Christoph Oeschger ✕

More Than Meets the Eye: Capturing Invisible Flows and Processes

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**MORE THAN MEETS THE EYE:
CAPTURING INVISIBLE FLOWS AND PROCESSES**

This publication is the written component of the Doctoral Thesis in Fine Arts for the Doctoral Programme at the Academy of Fine Arts at the University of the Arts Helsinki in a joint collaboration with the Zurich University of the Arts.

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IN THE ICE, EVERYTHING LEAVES A TRACE

Abstract

For my doctorate, I created four films and one photo-text installation that engage with invisibility in various ways. My research for the film *2°*, which seeks the impact of human interaction with changing geographies, took me to an altitude of 3,500 meters above sea level. In my investigations, I traveled as far north as the 51st parallel to produce the film *In the Ice, Everything Leaves a Trace*, and the photo series *The Other Side of Ice*, examining the economic exploitation of the Arctic. My research also led me to a place where the wind is harnessed for filming, inspiring the creation of the film *Memories of a Past Future*, and to a location where filming is no longer possible, yielding images used in the production of *Unlearning Flow*.

The decisive events of our time are often not visible. My research revolves around making this invisibility negotiable. These occurrences possess a fascinating duality, simultaneously feeling both familiar and foreign. While we are intimately connected to them, they represent global processes that escape complete comprehension. They are complex chains of causality that have become inscrutable to individual perception.

Invisible events cannot be addressed through individual images or shots. Instead, it's the montage techniques of demontage, soft montage, and the productive gap that I employ. It is these working methods that allow me to approach the invisible, partially capture it, and make it negotiable.

These forms of montage are also mirrored in the written part of my dissertation. The written section of the doctorate brings together various text elements that influence each other and create cross-references within the individual works. The written part contains conversations with other artist researchers in order to contextualize my work within my field but also to build a forum to negotiate my work.

Tiivistelmä

Tein väitöskirjaani varten näkymättömyyttä monin eri tavoin käsittelevät neljä elokuvaa ja yhden installaation, jossa on käytetty sekä valokuvaa että tekstiä. Tutkimukseni elokuvaa *2°* varten, joka tarkastelee ihmisen ja muuttuvan maantieteen vuorovaikutusta, vei minut 3500 metrin korkeuteen merenpinnan yläpuolelle. Matkustin tutkimuksissani aina 51. leveyspiirille asti tuottaakseni elokuvan *In the Ice, Everything Leaves a Trace* (Kaikesta jää jälki jäähän) ja valokuvasarjan *The Other Side of Ice* (Jään toinen puoli), joissa tutkin arktisen alueen taloudellista hyväksikäyttöä. Tutkimukseni johti minut myös paikkaan, jossa tuuli valjastettiin kuvaamista varten, mikä innoitti elokuvan *Memories of a Past Future* (Menneen tulevaisuuden muistoja) luomiseen, ja paikkaan, jossa kuvaaminen ei ole enää mahdollista. Tämä kerrytti kuvamateriaalia, jota käytettiin elokuvan *Unlearning Flow* (Poisoppiva virta) tuotannossa.

Aikamme ratkaisevat tapahtumat eivät yleensä ole näkyviä. Tutkimukseni pyrkii tuomaan tämän näkymättömyyden keskusteltavaksi. Nämä tapahtumat ovat kiehtovan kaksijakoisia, samalla sekä tuttuja että vieraita. Vaikka olemme niiden kanssa tiiviisti tekemisissä, ne edustavat globaaleja prosesseja, joita ei voi kokonaan ymmärtää. Ne ovat monimutkaisia syy- ja seuraussuhteiden ketjuja, joista on tullut yksittäiselle ihmiselle vaikeaselkoisia.

Näkymättömiä tapahtumia ei voi käsitellä yksittäisten kuvien tai otosten avulla. Sen sijaan käytän montaasitekniikoita kuten demontaasi, pehmeä montaasi ja produktiivinen väli. Nämä menetelmät mahdollistavat näkymättömän tutkimisen ja sen osittaisen tallentamisen sekä sen käsittelyn.

Nämä montaasin muodot heijastuvat myös väitöskirjani kirjalliseen osaan. Se kokoaa yhteen erilaisia toisiinsa vaikuttavia tekstielementtejä ja luo ristiviittauksia yksittäisissä teoksissa. Olen sisällyttänyt kirjalliseen osaan keskusteluja muiden taiteilijatutkijoiden kanssa kontekstualisoidakseni työtäni oman alani sisällä, mutta myös luodakseni foorumin sen pohtimiselle.

Abstrakt

För min doktorsexamen skapade jag fyra filmer och en fototextinstallation som utforskar osynlighet på olika sätt. Min forskning om filmen *2°,* som undersöker inverkan av mänsklig interaktion med förändrade geografier, tog mig till en höjd av 3 500 meter över havet. I mina undersökningar reste jag så långt norrut som den 51:a breddgraden för att producera filmen *In the Ice, Everything Leaves a Trace*, och fotoserien *The Other Side of Ice*, där jag undersökte den ekonomiska exploateringen av Arktis. Min forskning ledde mig också till en plats där vinden utnyttjas som resurs för filmning och inspirerade skapandet av filmen *Memories of a Past Future*, samt till en plats där filmning inte längre är möjlig, vilket resulterade i bilder som användes i produktionen av *Unlearning Flow*.

De avgörande händelserna i vår tid är ofta osynliga. Min forskning kretsar kring att göra denna osynlighet hanterbar. Dessa händelser uppvisar en fascinerande dualitet, där de samtidigt känns både bekanta och främmande. Medan vi är intimt sammankopplade med dem representerar de globala processer som undgår fullständig förståelse. De är komplexa kausalitetskedjor som har blivit obegripliga för den enskilde individen.

Osynliga händelser kan inte adresseras genom enskilda bilder eller klipp. Istället använder jag montagetekniker såsom demontage, mjukt montage och produktiva glapp. Det är dessa arbetsmetoder som gör att jag kan närma mig det osynliga, delvis fånga det och göra det hanterbart.

Dessa former av montage återspeglas också i den skriftliga delen av min doktorsavhandling. I den skriftliga delen av doktorsexamen samlas olika textelement som påverkar varandra och skapar korshänvisningar inom de enskilda verken. Den skriftliga delen innehåller också samtal med andra konstnärliga forskare för att kontextualisera mitt arbete inom mitt område, men även för att skapa ett forum för att diskutera mitt arbete.

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This doctorate would not have been possible without the support of the Zurich University of the Arts (ZHdK) and the University of the Arts Helsinki (Uniarts Helsinki). The doctorate was financially supported by The Swiss National Science Foundation (SNSF) and the Research Focus in Transdisciplinarity (ZHdK). I would like to express my sincere thanks for their support.

For the conversations printed in the following text, I was lucky enough to meet artists who were willing to take the time and space to give me an insight into their work and enter into a dialogue with me. I would like to take this opportunity to thank Ursula Biemann, Florian Dombois, Armin Linke, Mischa Hedinger and Susan Schuppli.

In my artistic work, I have always been able to count on colleagues who have supported me both as friends and on an artistic level. I would particularly like to thank:
Michael Etzensperger, who stepped in when things started faltering.
Fabian Gutscher, who provided the music and sound for all the films and made the images breathe.
Michael Günzburger for the very black blacks.
Christof Nüssli for the discussions on content, the reminder to look closely and to have the courage to do things differently (and to do them differently again), the constant tangible support with graphics and formal implementation and, last but not least, for the friendship.

During my research, I met scientists who were willing to share their knowledge and enter into an exchange that was rich in ideas and often laid the foundation for the work. I would like to take this opportunity to thank Ian Delaney, Fien De Doncker, Ursula Röhl, Mario Schulze, Margit Schwikowski, Thomas Singer and Sarine Waltenspül.

I would like to thank my colleagues from Uniarts Helsinki and the Research Focus in Transdisciplinarity at ZHdK: Erick Flores Beltran,

List of the artistic parts

Memories of a Past Future, 2019
Three-channel HD video installation, 5'44"
https://www.researchcatalogue.net/view/2719418/2719405

Unlearning Flow, 2019
Essay film, 10'06", UHD (excerpt of 7'02")
https://www.researchcatalogue.net/view/2719418/2719389

2°, 2020
Essay film, 16'22", UHD
https://www.researchcatalogue.net/view/2719418/2719393

The Other Side of Ice, 2021
Photo-text installation, inkjet and chromira prints, 461 cm x 153 cm (framed)
https://www.researchcatalogue.net/view/2719418/2719411

In the Ice, Everything Leaves a Trace, 2023
Essay film, 13'09", UHD
https://www.researchcatalogue.net/view/2719418/2719397

Introduction

Making Phenomena Visible, and thus Making them Filmable

The decisive events of our time are often not visible. They might exceed human perception in terms of size and temporality. The defining phenomena of our time are strangely familiar and yet alien at the same time. We are a part of them, and yet they are global processes that are impossible to fully grasp. They are complex chains of causality that have become impossible for the individual to perceive.

I have a background in documentary work and have always relied on the existence of something in front of my lens. However, in order to make such invisible processes visible, I had to equip myself with new tools. Art, and especially essayistic work, provides me with a means to make these topics negotiable. A poetic approach allows me to illuminate the spaces in between and discuss topics that are invisible. My research resulted in five artworks and a written thesis in which I deal with such invisible phenomena in different ways.

My research for the film *2°*,[1] which attempts to articulate the impact of climate change, took me 3,500 meters above sea level. During my

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1   Christoph Oeschger (dir.), *2°* (cpress films, 2020).

investigations, I travelled as far north as the 51st parallel to create the film *In the Ice, Everything Leaves a Trace*[2] and the photo series *The Other Side of Ice*,[3] which explore the economic exploitation of the Arctic. My research also took me to a place where the wind is domesticized for filming purposes – inspiring the creation of the film *Memories of a Past Future*[4] – and to a location where filming is no longer possible, providing images that were utilized in the production of *Unlearning Flow*.[5]

This introductory text serves as a guide to help to navigate through the written part of my thesis and provides an overview of the work that has been produced, the subject areas I dealt with during the years 2018–2023 and the methods I have worked with.

The first film for my doctorate, *Memories of a Past Future*, is the closest to Florian Dombois's project in the wind tunnel, which provided the framework within which I embarked on my doctoral research. The film was composed of the footage we shot for the *Images of Air and Light* project in a wind tunnel using various historical and contemporary cameras.[6] The film explores the history of how air currents have been visualized for science, and highlights the studying of flows through the medium of film.

The working methods in the tunnel itself were very much oriented toward dialogical work between Dombois and myself. Both of us could bring something to the table and take away ideas that we could use in turn for our own works. For me, the film *Memories of a Past Future* is a way of entering into a dialogue with a co-researcher. It thus epitomizes the understanding of research that I want to follow, in which research in the arts creates a forum for different practitioners.

Through examining the research of flows, I also came across the theme of the second film, *Unlearning Flow:* the examination of scientific film. Flow research, as a historical endeavour, used film as a medium of research from early on, as Ludwig Prandtl's film *C1* shows.[7] *C1,* one of the scientific films around which *Unlearning Flow* revolves, is a very early example of how film could be used as a research tool, which is probably why this film became a founding document of the *Institut für den wissenschaftlichen Film* (IWF).[8] In addition to the flow film *C1*, their collection also includes films derived from the research of war material, sensitive ethnographic films and ideologically slanted material. The

2   Christoph Oeschger and Gianna Molinari (dirs.), *In the Ice, Everything Leaves a Trace* (cpress films, 2023).
3   Christoph Oeschger, *The Other Side of Ice* , Photo Installation, 2021.
4   Christoph Oeschger (dir.), *Memories of a Past Future* (2019).
5   Christoph Oeschger, Mario Schulze and Sarine Waltenspül (dirs.), *Unlearning Flow* (2019).
6   Florian Dombois, 'Images of Air and Light: The Moving Image and the Camera as a Scaling and Analytical Instrument'. <https://www.zhdk.ch/en/researchproject/549087>.
7   Ludwig Prandtl and Oskar Tietjens (dirs.), *C1* (n.d. [ca.1927/1936]).
8   'IWF Knowledge and Media', filmarchives online. <http://www.filmarchives-online.eu/partners/iwf-knowledge-and-media-1>.

ostensibly objective films of the IWF thus contain much that is unspoken and that I unveil through the montage and the text.

My third film project, *2°*, began with the failure to capture global warming in an image. However, through the initial failure and the subsequent search for images, the film talks precisely about the processes it cannot capture. In the film, the protagonist undertakes a journey through the Swiss Alps and links her images to a geography that has long since ceased to be wild.

Some events are not only invisible but also almost impossible to localize. For my fourth and fifth work, the photo series *The Other Side of Ice* and the film *In the Ice, Everything Leaves a Trace*, I undertook a journey to the Arctic, one of the regions most affected by global warming. The works can be understood as a patchy mosaic, revealing interconnections and structures linked to each other, meaning we are left only with the traces of events to form a picture.

Making phenomena visible, and thus making them filmable, was the starting point for my doctoral research. I participated in Florian Dombois's research project *Luftbilder/Lichtbilder, Bewegtbild und Kamera als Skalierungs- und Analyseinstrument* (Images of Air and Light: The Moving Image and the Camera as a Scaling and Analytical Instrument), funded by the Swiss National Science Foundation, and was at the same time enrolled as a doctoral student in the doctoral programme in Fine Arts at Uniarts Helsinki.[9] In this research project, the history of the role of film in wind tunnels was traced. The project explored the moving image as an epistemic medium from scientific, artistic, technical and media historical perspectives, with scientific moving images serving as recordings for analyzing motion sequences. Since wind is volatile and the phenomena in the wind tunnel are only visible briefly, and because every measuring device would disturb the flow, imaging with film has been an important part of fluid dynamics since the beginning of the history of wind tunnels. Wind tunnels are experimental facilities that have changed little since their invention. But what has changed is the camera technology and, therefore, how researchers look at the phenomena in the wind tunnel. The project involved the use of historical and modern cameras for flow visualization.

I was employed in the project to finance my doctoral studies and was responsible for the camerawork and the conceptualization of some parts of the project. One of the conditions for my doctoral studies was to use the wind tunnel as a starting point for my thesis. The wind tunnel at the Zurich University of the Arts is a research laboratory established by Florian Dombois. Despite its name, the laboratory is not primarily

9   This was a joint degree pilot formalized in a contract between Zurich University of the Arts (ZHdK) and the University of the Arts Helsinki (Uniarts) in 2018.

concerned with fluid dynamics research; it is a site of collaboration between artists and scientists.[10] This collaborative approach results in a layered environment that reflects the contributions of everyone involved and transcends the boundaries of traditional artistic discourse. This facility is a tangible place of exchange and discussion that serves as a reference system.

I worked in a documentary mode and with archival material before starting my doctoral studies in the wind tunnel. The work in the laboratory was new to me, and it took me a while before I could incorporate this form of image production into my artistic practice. Prior to the project, I had visited different scientific laboratories to document the work there but had never used a lab as a tool for my own work. This work was enriching, especially on an abstract and conceptual level. The lab was important to me primarily as a means to reflect on my documentary work. The strategies from the lab found their ways into various works as a way of commenting on documentary material. I was particularly interested in what happens when I restage various materials that I had collected during my research in the studio, and thus detach them from their environment and then montage them again with material recorded in the respective environments. The objects begin to speak for themselves and tell their stories.[11] Working in the lab has thus contributed to an expansion of my previous practice.

The experience in the lab also influenced me to include different materials that stem from different times and different scales, and therefore expand the scope of the subjects I choose. This enhancement of my skill set has allowed me to explore connections between subjects and to give substance to my work by including material from different sources, thereby expanding my previous practice so that it goes beyond classical documentary practice. This was the background against which I developed the focus of my doctorate.

From Collaborations to a Forum

There are innumerable different approaches to artistic research, many of which focus on knowledge production. My concept of research is strongly influenced by Dombois's idea that artistic research does not necessarily have to involve problem solving;[12] rather, it should be challenging and encompass forms of sharing and negotiating in order to be productive

10   See Florian Dombois, 'Ma', in Florian Dombois (ed.), *The Wind Tunnel Model – Transdisciplinary Encounters* (Zurich: Scheidegger & Spiess, 2017), pp. 153–7.
11   See Hito Steyerl, 'The language of things', *transversal texts*, June 2006. <https://transversal.at/transversal/0606/steyerl/en>.
12   Florian Dombois, 'Art with some T?: A 35-Minute Essay', in Hartmut von Sass (ed.), *Between / Beyond / Hybrid: New Essays on Transdisciplinarity* (Zurich: diaphanes, 2019), pp. 53–70.

for the artist's own community.[13] Therefore, my research is geared toward creating a forum for negotiation rather than answering a research question. I have borrowed the term 'forum' from Eyal Weizman at Forensic Architecture, who has stated that the forum encompasses the practice and expertise of presenting an argument in front of a 'professional, political, or legal gathering'. In this sense, the forum becomes a branch of rhetoric that extends beyond human speech to encompass the communication of objects as well.[14] I follow the approach of research as a dialogue among peers, as exemplified by the exchange of ideas, perspectives and experiences. In this framework, research becomes a collaborative process where artists engage in meaningful discussions, challenge each other's assumptions and collectively contribute to the advancement of artistic practices. In my doctorate, I do this at different levels.

My artistic practice is collaborative, involving various contributors, research partners and people with whom I connect through my research. The work process itself is a dialogue with different practitioners. It is not about dividing the work's authorship but rather about understanding the research as an engagement with different practitioners. Therefore, collaboration is the first step in sharing the fruits of my research. As I consider collaborations with other practitioners as a form of exchange, and therefore an intrinsic part of my research, it is important for me to establish a crediting system that includes all the different practitioners involved.

In addition, as my research takes the form of an artwork, it can be shown to the public through exhibitions and screenings. I see the films and photo installations that are part of this research as a form of audiovisual writing. The work is thus presented to the public and put up for discussion, creating a forum for negotiating the films and the artworks.[15] The act of publicly presenting my artworks serves as a second stage of sharing and engaging in a discourse surrounding the research outcomes.

This written part also creates a forum. Based on the conversations I had with other artists, I contextualize my research within my peer group. I engage in discussions about methodological and content-related questions and negotiate, share and interrogate my research with experts in my field.

13   Florian Dombois, 'Who, How, for Whom? Or: What are we doing here?', in Jeroen Boomgaard and John Butler (eds.), *The Creator Doctus Constellation: Exploring a new model for a doctorate in the arts* (Amsterdam: Gerrit Rietveld Academie and EQ-ARTS, 2021), pp. 173–8.

14   Eyal Weizman, *Forensic Architecture: Notes from Fields and Forums / Forensische Architektur: Notizen von Feldern und Foren (dOCUMENTA 13): 100 Notes – 100 Thoughts / 100 Notizen – 100 Gedanken* (Berlin: Hatje Cantz, 2012), pp. 8–9.

15   The works have so far been shown publicly in the following contexts/exhibitions:
Memories of a Past Future: Filme des Windes, Kunstraum of the Leuphana University of Luneburg (DE), 2019; *Zirkuliere! – Eine Konspiration*, Helmhaus, Zurich (CH), 2021; Espace DIAPHANES, Berlin (DE), 2023; Centre de la Photographie Genève, Geneva (CH), 2023.
Unlearning Flow: *Filme des Windes*, Kunstraum of the Leuphana University of Luneburg (DE), 2019; Rencontres Internationales, Paris/Berlin (FR/DE), 2021; Internationale Kurzfilmtage Winterthur, Winterthur (CH), 2020; Kasseler Dokfest, Kassel (DE), 2020.
2°: *Between the Mountains, Hills, and Lakes*, Shenzen, Shanghai, Beijing (CN), 2020–2021; Solothurner Filmtage, Solothurn (CH), 2022.
The Other Side of Ice: *Zirkuliere! – Eine Konspiration,* Helmhaus, Zurich (CH), 2021; Beijing Biennale, Beijing (CN), 2022.
In the Ice, Everything Leaves a Trace: *Quanga,* Palais de Rumine, Lausanne (CH), 2022; Mimesis Documentary Film Festival, Boulder (USA), 2023; Solothurner Filmtage, Solothurn (CH), 2024; Ann Arbor Film Festival, Ann Arbor (USA), 2024.

By creating a forum for sharing, negotiating and challenging research, I use my work as a form of community building.[16] For me, research is about dialogue with other researchers, practitioners and artists, which gives rise to a process of exchange.

The Written Part

This written component here affords an expanded perspective of my entire doctorate. One could compare it to an 'exploded view' of a machine. An exploded view visually presents the individual parts of an object or device to show their relationship and how they fit together. Similarly, I use this written segment to establish connections between my artworks, as well as cross references within and between the chapters.

In establishing the framework in which I operate as an artist, I am involved in artistic research and produce artworks. The written component functions as an exploded view that makes it possible to consider the five artworks as my research outcomes. By juxtaposing different elements, this written part of my thesis functions as an exploded view that exposes the research I have conducted over the past few years. To structure my written part of the thesis as an exploded view allows me to apply my methods accordingly to the artistic parts.

The written part of my work follows the structure of the five filmic or photographic works, and is divided accordingly into five chapters. Each chapter has the same structure:
1. A collage
2. An introduction
3. Text from the works (either the film narration voice-over, or in the case of *The Other Side of Ice*, the embedded texts)
4. A conversation with an artistic peer
5. A glossary

The individual components serve different purposes, but when combined, they function as an 'exploded view' for my whole research.

COLLAGE
Each chapter begins with a collage. I perceive these collages as artworks that provide an opportunity to contextualize my research within my formal (aesthetic) investigation and within artistic positions that have influenced the artworks presented here as my doctorate. This approach allows me to reference these artistic positions without having to negotiate them explicitly in the text.

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16   See Dombois, 'Who, How, for Whom?'.

The final collage is conceived as a coda that contextualizes my work in and of itself. Florian Dombois and I developed this method for the epilogue of the book *Movements of Air: The photographs from Étienne-Jules Marey's wind tunnels* by Laurent Mannoni and Georges Didi-Huberman.[17]

INTRODUCTION
Each body of work is prefaced by an introduction in which I highlight the context of its creation, displaying the initial idea behind the work and indicating the framework in which the work was created, shown and discussed. The introductions also specify the roles of all collaborators.

TEXT FROM THE ARTWORK / VOICE-OVER
In all parts of my doctorate, I work with language: in the films, with spoken language; and in the photo installation, with text panels. In the written part of the doctorate, I provide the transcripts of the films and the text panels as independent inserts in the written part. This affords a deeper reading of them.

CONVERSATION
The conversations contextualize my work within my field. The starting point for the discussions were always one or two of my five works and one or two by the other respective artist. These works provided the impetus and framework for the discussions. I consider these artists I have chosen for the conversations as part of the peer group for which I my artistic research is done.

Exchanging ideas with people with an aesthetic practice allows me to discuss content, aesthetic questions and methods without creating a split between theoretical and practical work. Since the conversations where not only about my work but an exchange about my work and the work of the participants, I found this method of importance to feed the discourse between practitioners in the artistic research community. The conversations are workshop reports that provide insights into the methodology and scope of the research, revealing the process of the work's creation. This exchange among peers aims to share knowledge and make it accessible to readers.

The following conversations were conducted with individual artists:

– Florian Dombois and I discussed his work *Deaf – Pride – Wish – Doubt – Greed – Sloth – Blind*[18] and my three-channel video essay *Memories of a Past Future*.[19] Our respective artistic practices come from

17   Florian Dombois and Christoph Oeschger, 'Epilogue', in Laurent Mannoni and Georges Didi-Huberman, *Movements of Air: The photographs from Étienne-Jules Marey's wind tunnels*, ed. Florian Dombois and Christoph Oeschger (Zurich: diaphanes, 2023), pp. 293–313.
18   Florian Dombois (dir.), *Deaf – Pride – Wish – Doubt – Greed – Sloth – Blind* (2019). <https://filmallmende.net/filme/deaf-pride-wish-doubt-greed-sloth-blind>.
19   Oeschger, *Memories.*

different discourses and traditions. The joint work in the wind tunnel allowed us to enter into a sustained dialogue, understand our works in conceptual terms and find parallels in their specific content. Through hands-on joint work in the wind tunnel, we established a dialogue that was verbal as well as non-verbal. Through my research, I make it possible to create an exchange within the different traditions in the arts. The exchange with Dombois was therefore a great enrichment and fuelled my understanding of research with art.

– In the conversation with Mischa Hedinger, we discussed his film *African Mirror*[20] and my joint-author video essay *Unlearning Flow*.[21] I decided to talk with Mischa Hedinger after seeing *African Mirror* in the cinema and being impressed by his editing style, which together with some unobtrusive interventions in the material exposed the source material, with the resulting montage displaying an outstanding sense of authorship.

– Ursula Biemann agreed to discuss with me her *Acoustic Ocean*[22] and *Subatlantic*[23] and my two works *2°*[24] and *The Other Side of Ice*.[25] I have respected Biemann as a researcher and filmmaker for some time. She belongs to a generation that paved the way for documentary-essay-istic working methods in museums. I had seen her film *Acoustic Ocean* in an exhibition and appreciated the way in which it shifted between the large and the small.

– Susan Schuppli was kind enough to engage in a dialogue with me focused on her long-term project *Learning from Ice*[26] and my work *The Other Side of Ice*. After returning from my expedition to Greenland, Schuppli was recommended to me due to her extensive research on the Arctic. I was already familiar with her influential work for Forensic Architecture, and felt fortunate to have, in the Arctic, a shared interest with her.

– Armin Linke and I discussed his work *Prospecting Ocean*[27] and *Blind Sensorium: Il paradosso dell'Antropocene*,[28] my *In the Ice, Everything Leaves a Trace*[29] and the essay film *The Other Side of Ice*.[30] I had studied in the master class of Armin Linke at the Karlsruhe University of Arts and

20   Mischa Hedinger (dir.), *African Mirror* (ton und bild, 2019).
21   Oeschger, Schulze and Waltenspül, *Unlearning Flow*.
22   Ursula Biemann (dir.), *Acoustic Ocean* (2018).
23   Ursula Biemann (dir.), *Subatlantic* (2015).
24   Oeschger, *2°*.
25   Oeschger, *Other Side of Ice*.
26   Susan Schuppli, *Learning from Ice*, ongoing research project. <https://learning-from-ice.org/>.
27   Armin Linke, *Prospecting Ocean*, installation, *tba21*, Institute of Marine Science (ISMAR), Venice, 23 May–30 September 2018. <https://tba21.org/ProspectingOcean-prints>. Parts of the work are reproduced in Stefanie Hessler, *Prospecting Oceans*, visual essay Armin Linke, foreword Bruno Latour (Cambridge, MA: MIT Press, 2019).
28   Armin Linke (in collaboration with Giulia Bruno and Giuseppe Ielasi)*, Blind Sensorium: Il paradosso dell'Antropocene*, exhibition, Fondazione Matera-Basilicata, 6 September 2019–6 January 2020. Parts are accessible via the website: <https://sourcebook.blindsensorium.net>.
29   Oeschger and Molinari, *In the Ice*.
30   Oeschger, *Other Side of Ice*.

Design, so he significantly influenced me during my time at the university. We discussed his methods of working, which include subjects on different scales.

The conversations were held in different settings and languages: with Susan Schuppli and Armin Linke we held the discussion in English; the others I translated from German. German terms that turned out to be difficult to translate are noted in parentheses. The in-person meetings with Ursula Biemann and Mischa Hedinger in Zurich resulted in longer conversations than those held via Zoom. I decided to shorten the former for publication in order to give each of the conversations a comparable weight. Florian Dombois and I engaged in an email exchange to allow for more thoughtful responses.

GLOSSARY
After the introduction, transcript and conversation, I then assembled a glossary for each film or photo work. The glossaries are a collection of materials that inform my work. Through the glossary, I connect pre-existing ideas with reflections on my artistic practice, exposing the ideas I refer to in the artistic parts. Some thoughts frame the films and photo series, opening fields not directly incorporated into the artwork's appearance, thereby expanding the work into a broader context. The glossary also identifies loose ends of my research that merit further investigation.

My research is embedded in my artistic practice, and it evolves in and through it. In addition to my research, which builds the artistic framework, diaristic entries in the glossaries provide insight into my artistic practice and demonstrate how this practice adapts to the particular subject area. These are subjective texts, set in italics.

The writing of the glossary has influenced my writing in the artistic context; it has found its way into my artwork *The Other Side of Ice* and thus became part of my artistic practice.

The Methods

For my research – the artworks but also the written part of the thesis – I employed various methods that I use to varying degrees in all my work. The experience I have gained while working on films has influenced my writing, and vice versa the way I write has also influenced my artistic practice.

SOFT MONTAGE
In his text 'Cross Influence / Soft Montage', Harun Farocki describes first seeing his *Eye / Machine* as a two-channel installation in an exhibition at

the Kunst-Werke in Berlin.[31] He wrote that he was 'struck by the horizontal connection of meaning', which he explains as a 'connection between productive force and destructive force'.[32]

In the two-channel installation, Farocki juxtaposed a Swiss film about the rationalization of work with images of a red rocket. He describes how the two kinds of footage build a connection with each other and create meaning beyond what the material was intended for.[33] This 'soft montage' consists of a 'relatedness of images rather than a strict opposition of equation produced by a linear montage of sharp cuts.'[34] In opposition to the linear montage, the soft montage operates with contrasting footage. 'In this regard, the cut in soft montage is synonymous with the conjunction and as multiple images are folded into one another within the same spatial field, creating new configurations.'[35]

Farocki traces this viewing experience back to the advent of video editing.[36] When analogue film material is edited, there is only one screen, but with video, suddenly two screens are present and two images can be viewed in parallel.[37] Thus the appearance of a new technology influenced the process of seeing itself.

Digital editing even goes a step forward. Attached to my computer there are more than two screens with different possibilities to control, adjust and perceive different layers of the digital film. Similarly to the way in which new analogue video editing influenced Farocki, digital editing influenced my seeing and the corresponding process of editing videos influenced my writing. So it is that I bring my experience of video editing back to the work with text and use 'soft montage' in the written part of my doctorate. The different parts of the text are mounted together as in film editing. I create a soft montage through the different text genres in this written part of the doctorate; a horizontal juxtaposition of texts, images and collages allows me to make references and connections within the individual parts. The soft montage method makes it possible to link together what seems at first sight unrelated without explicitly formulating these relationships.

PRODUCTIVE GAPS

In analogue film, there are gaps between individual frames. These gaps allow the viewer to perceive the film as a moving image. They are necessary for the creation of a film composed of individual frames. When

31   Harun Farocki, *Auge / Maschine*, two-channel video installation, 2000.
32   Harun Farocki, 'Cross Influence / Soft Montage', tr. Cynthia Beatt, in Antje Ehmann and Kodwo Eshun (eds.), *Harun Faocki: Against What? Against Whom?* (Montreal: Koenig Books / Raven Row, 2008), pp. 69–74, here p. 71.
33   Farocki, 'Cross Influence / Soft Montage', p. 70.
34   Nora M. Alter, 'Eine Einstellung zur Arbeit | Mit Farocki denken 1', HKW (Haus der Kulturen der Welt), 2015, 1:37:47, here: 28:08. <https://www.youtube.com/watch?v=-EWQ20Ct02o>.
35   Alter, 'Einstellung zur Arbeit', 28:34.
36   Farocki, 'Cross Influence / Soft Montage', p. 72.
37   Harun Farocki (dir.), *Schnittstelle*, originally as a two-channel installation, seen as one channel (Farocki Filmproduktionen and Musée Moderne d'art de Villeneuve d'Ascq, 1995), 23:00, here: 5:02.

two shots are combined, the gap creates a meaning constructed in the viewer's mind. Lev Kuleshov described this effect, which is now named after him. He created a short film in which he intercut a shot of an actor's expressionless face with other shots such as a bowl of soup, a girl in a coffin and a woman on a divan.[38] The audience viewing the film perceived changes in the actor's facial expression based on the objects and the woman he was supposedly looking at, alternatively showing hunger, grief or desire. However, the footage of the actor was in fact a repetition of the same shot.

Unlike in the Kuleshov effect, these 'productive gaps' are visible in the opening scene of Chris Marker's *Sunless*. He starts the film with a black leader, while the narrator states: 'The first image he told me about was of three children on a road in Iceland, in 1965.' After the narrator pauses his commentary, we see the image of the three children, followed again by the black leader. The narrator continuous: 'He said that for him it was the image of happiness and also that he had tried several times to link it to other images, but it never worked. He wrote me: "one day I'll have to put it all alone at the beginning of a film with a long piece of black leader; if they don't see happiness in the picture, at least they'll see the black."' [39] In between, very briefly, the image of a fighter aircraft on an aircraft carrier is montaged. So short that one can barely recognize what it is, and then Marker switches back to black. A fighter aircraft does not represent happiness. But maybe not all of us see happiness in the first picture either.

Our minds fill the gap between the war aircraft and the scene in Iceland. We fill the gap with our thoughts and feelings. In that sense, our imagination plays a part in the film. The in-between – the gap – becomes productive and rises above the two images that can be described. This is a 'productive gap'.

This productive gap method is based on the human ability to perceive similarities and analogies, but also contrasts, and thus the ability to fill these gaps with one's own thoughts and interpretations. The viewer/reader becomes an active collaborator who fills the gaps between the individual approaches with their own associations.

Something similar is at stake in juxtaposing my different research takes. Productive gaps allow for diverse interpretations of the work and encourage other practitioners to continue exploring the themes.

DEMONTAGE
'Demontage' involves working with images that have already been used in and shaped by specific contexts. Disassembling these images and

38   Lev Khuleshov (dir.), *Kuleshov Effect/Effetto Kuleshov* (n.d. [late 1910s/early 1920s]). <https://www.youtube.com/watch?v=_gGl3LJ7vHc>.
39   Chris Marker (dir.), *Sans Soleil/Sunless* (Argos Films, 1983/Arte Video, restored version, 2013), 1:40:00, here: 0:01:20 – 0:01:49.

exploring their ambivalences, similarities and contrasts creates a new arrangement, leading to a fresh interpretation of the circulating images. This approach aims to reorder and rewrite existing images and viewpoints through critical recycling. This is what I refer to in the following as 'demontage'.[40]

Demontage demonstrates how a film can question its meaning and source material, and how meaning can be created through paradoxes and contradictions between content and cinematic form. The method of demontage involves critically questioning and unravelling a film in a broader sense. It challenges the image, raises doubts about what is visible, identifies the limits of what can be filmed and suggests the existence of a reality beyond the image.[41] Demontage adds a layer of meaning to the image that may not be immediately apparent. This can happen both linguistically and pictorially.

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40   I borrow the term from Kaspar Surber's article about the film *African Mirror.* Kaspar Surber, 'Wenn die Montage zur Demontage wird', *WOZ – die Wochenzeitung*, 14 November 2019. https://www.woz.ch/1946/postkoloniale-schweiz/wenn-die-montage-zur-demontage-wird.

41   See Thomas Tode, 'Abenteuer Essayfilm: 60 Jahre Fieber und Träume', in Sven Kramer and Thomas Tode (eds.), *Der Essayfilm: Ästhetik und Aktualität* (Konstanz: UVK-Verlagsgesellschaft, 2011), pp. 29–44.

they were able to conceive or dream another ti
perhaps they would be able to live in it.
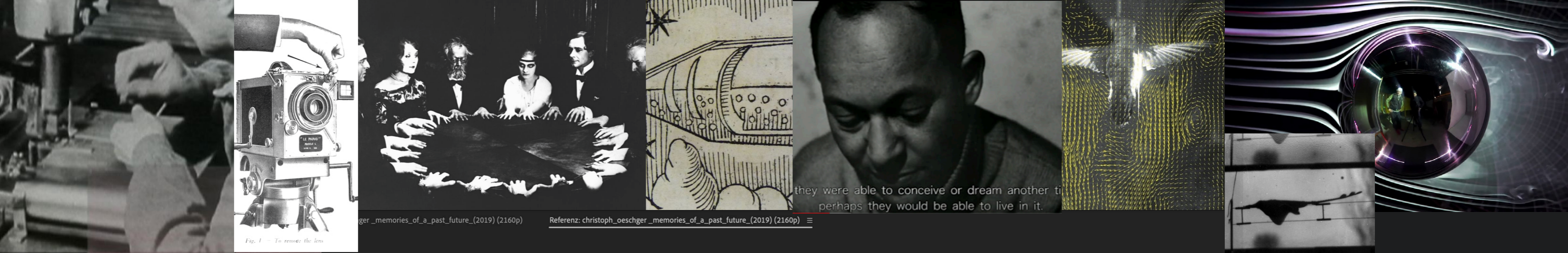
Referenz: christoph_oeschger _memories_of_a_past_future_(2019) (2160p)
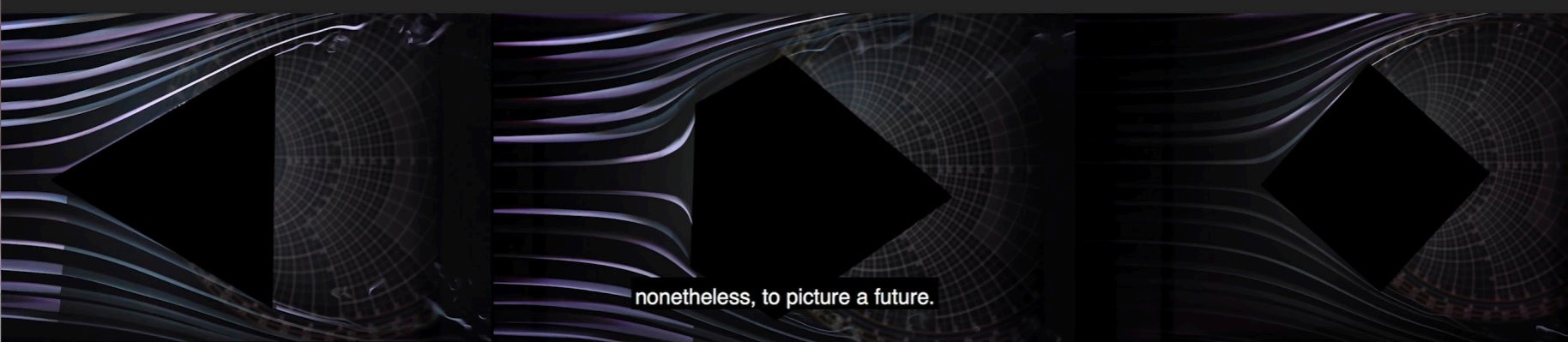
nonetheless, to picture a future.
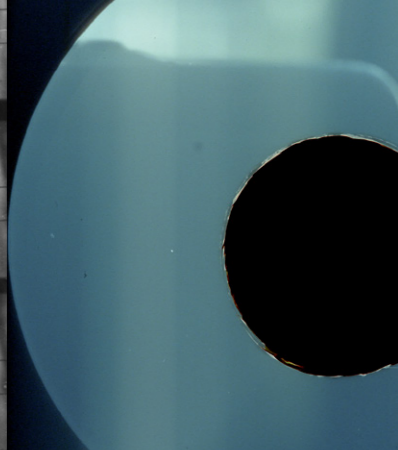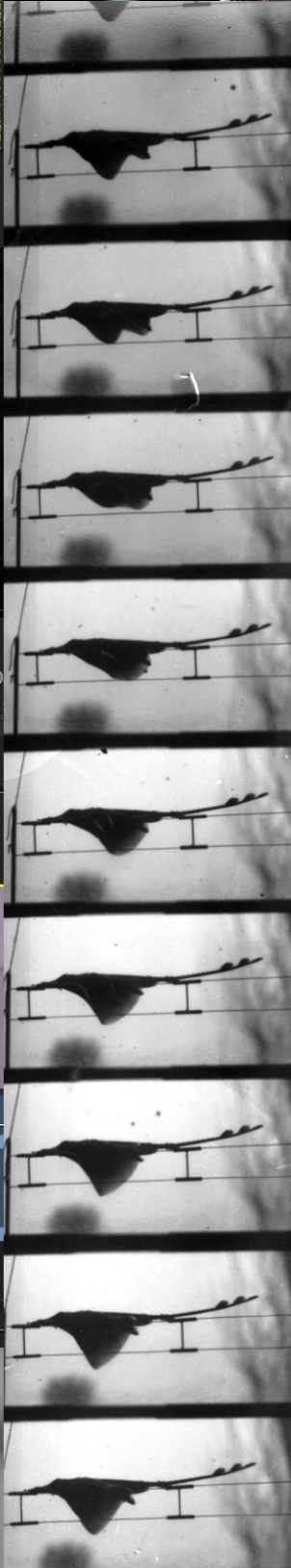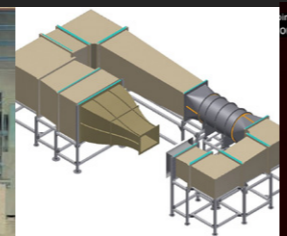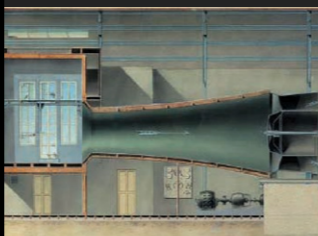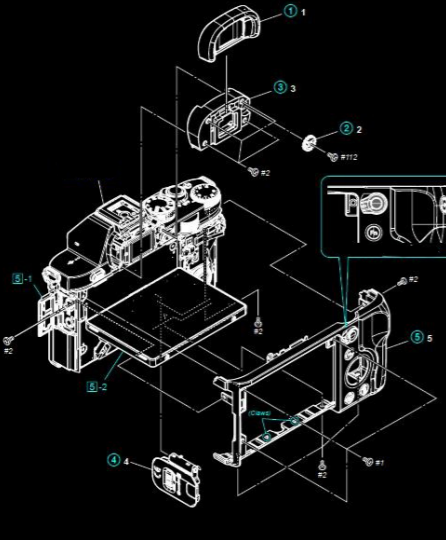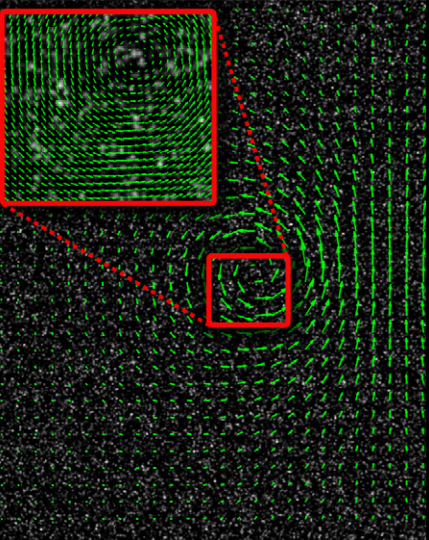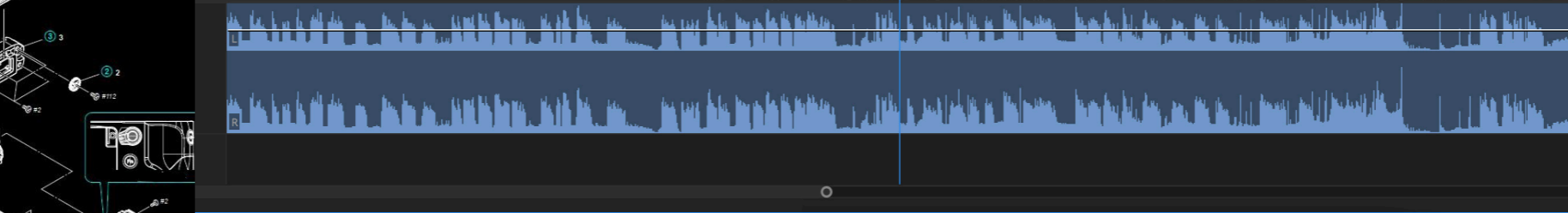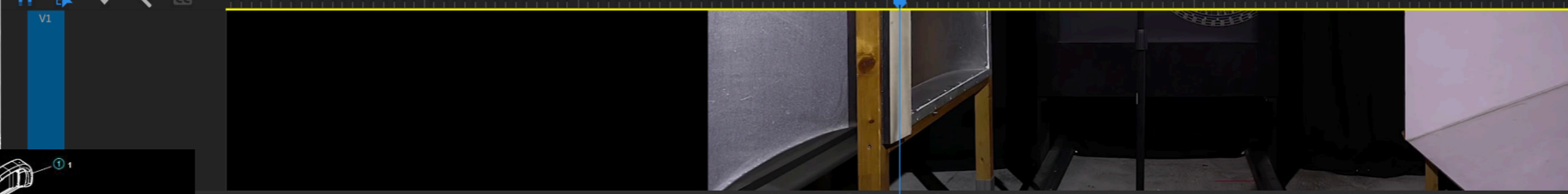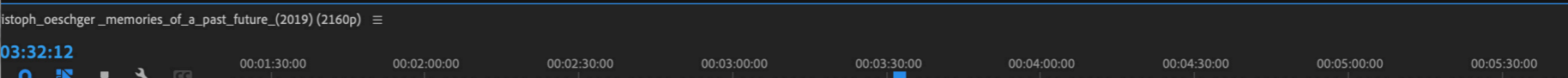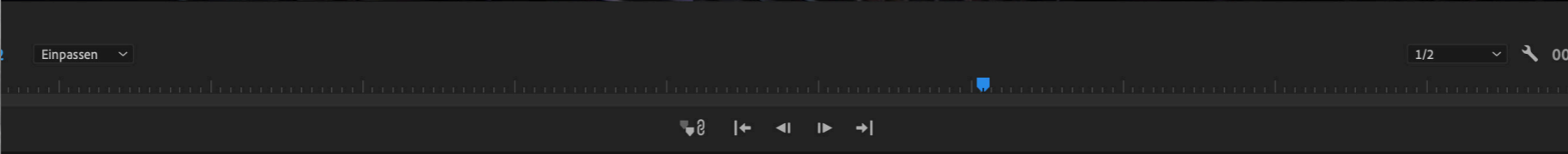
Sound wave „Memories of a Past Future"

Sound wave John Coltranes „Naima"
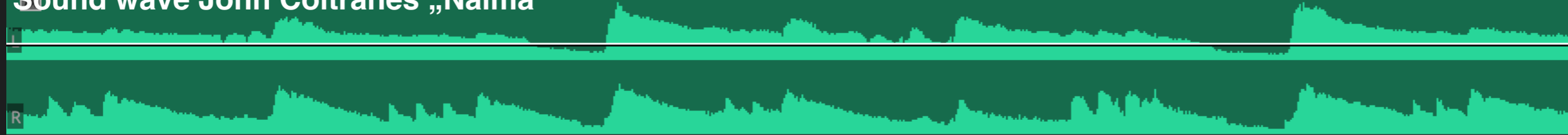
Memories of a Past Future – A Collage, by Christoph Oeschger with the use of the following materials:

– Film still from Harun Farocki, *Auge / Maschine II* (Farocki Filmproduktionen, 2002)
– From the instruction manual of the camera Parvo Debrie, Model L
– Film still from Fritz Lang, *Dr. Mabuse, der Spieler* (Uco-Film, 1922)
– Woodcut of a spaceship, Conrad Lycosthenes of Basel, 1557
– Film still from Chris Marker, *La Jetée* (Argos Films, 1962)
– Bret Tobalske, 'The wake of a hovering rufous hummingbird'
– Film still from wind tunnel film (mirrored sphere) by Florian Dombois and Christoph Oeschger, 2019
– Screenshot of the editing programme of *Memories of a Past Future* by Christoph Oeschger, 2019
– Étienne-Jules Marey, 'Studies of the skate's fin movements', 1891
– Film still from Georges Méliès, *Le voyage dans la lune* (Star Film, 1902)
– Model mounted in the test section or the 6-by-6-foot supersonic wind tunnel at NASA, 1948
– Film still from Harun Farocki, *Erkennen und Verfolgen* (Harun Farocki Filmproduktion, 2003)
– PIV Multipass, particle image velocimetry (PIV) analysis of a Hamel-Oseen vortex pair, 2011
– Exploded view of a Sony A7, the camera we used often in the wind tunnel
– Watercolour drawing of the Eiffel wind tunnel located in the rue Boileau, Paris (Aérodynamique Eiffel)
– Göttingen design wind tunnel, Helmut-Schmidt-Universität / Universtiät der Bundesewehr Hamburg
– Image from Trevor Paglen, *Image Operations. Op.10*, 2018
– Film still from Dziga Vertov, *Man with a Movie Camera* (1929)
– Film still from footage shot by Florian Dombois, Christoph Oeschger with an Askania Z, 2019
– Screenshot from the editing of *Memories of a Past Future*: sound wave of John Coltrane's *Naima* overlaid with the final sound wave of the film
– Film still from Jean-Luc Godard, *Histoire(s) du cinéma* (Véga Films, 1988–1997)

Memories of a Past Future

Title:	*Memories of a Past Future,* 2019
Director:	Christoph Oeschger
Camera:	Florian Dombois, Christoph Oeschger
Editing:	Christoph Oeschger
Voice:	Irina Schönen
Sound Design / Music:	Fabian Gutscher
Translation:	Simon Cowper
Lenght:	5' 44"
Audio:	stereo
Format:	three-channel HD video on three monitors (online version 4096 × 768 pixels)

Introduction: *Memories of a Past Future*

My doctorate starts in a wind tunnel. More precisely, it starts in the Zurich University of the Arts' wind tunnel, which is not, as one might think, a research facility for fluid dynamics. Instead, it is a laboratory for artistic research, where artists and scientists meet for their productions. This creates a form of layering. Everyone leaves their traces and inscribes themselves in the wind tunnel on the roof of the university facilities at the Toni Areal, and thus works to ensure that it remains a concrete place while also becoming a kind of reference system that goes beyond purely scientific or artistic discourse.

With Florian Dombois, I participated in the National Fund project: *Luftbilder/Lichtbilder, Bewegtbild und Kamera als Skalierungs- und Analyseinstrument* (Images of Air and Light: The Moving Image and the Camera as a Scaling and Analytical Instrument), funded by the Swiss National Science Foundation from 2017 to 2022.[42] It was a project where we filmed a standard fluid dynamic research experiment in the wind tunnel with different historical cameras. Florian Dombois expanded this standard experiment with a mirrored sphere. This has no effect on the stream, but the mirrored sphere reflects the process of the filming itself. Through the reflection in the sphere, the process of the filmmaking

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42   Dombois, 'Images of Air and Light'.

inscribes itself into the image. From the footage we shot, I made the three-channel essay film *Memory of a Past Future,* and we created the project 'Filmallmende'.[43]

We started filming in the wind tunnel in 2018. We had spectacular shots in mind, of the kind shown in the *Album of Fluid Motion* by Milton van Dyke[44] and the film and photo shoots of Étienne-Jules Marey[45] and Ludwig Prandtl.[46] We spent a good amount of time on the film technique and modifying the wind tunnel. The first attempts were rather poor, but the hands-on working process trained our vision. Based on this seeing experience, we were able to move the things in the lab around a little to get a usable shot. This knowledge enabled us to look at other people's flow images in a more differentiated way.

Some flow research techniques have hardly changed since the invention of wind tunnels. But the camera technique has developed. In 1920s, researchers were already looking for ways to make air and water flow measurable using moving images. Therefore, it is not surprising that the shots resonate with the history of film techniques, and it is interesting to study how the pioneers of flow visualization worked. The question of the attempt to measure with images, the historical references within the practical work itself – all these stratifications echo in our pictures. We certainly did not figure out how the wind could be measurable in and through film, yet our experiments allowed us to see how the images created their own logic through the footage itself, and these layers fed my inspiration for *Memories of a Past Future.*

This project was not only a starting point for my doctorate but it also expanded my way of working. Prior to the project in the wind tunnel, my work consisted of documentaries or archival materials. I searched for items in archives or in the world that manifested different phenomena that I wanted to talk about; I was looking for crystallization points where fractures in our society are revealed. I assembled this material in the studio so that a photo series or a film emerged from the interplay of found footage, archival materials, and self-photographed and filmed material that went beyond the purely documentary.

However, there was the wind tunnel, a laboratory in which the focus was not on searching but on creating phenomena. It was a stage on which

43   'Filmallmende' is a project that I initiated with Florian Dombois. The platform allows us to make our films from the wind tunnel available to other artists as raw material with which they can create their own works, which are then published on the project website. 'Filmallmende', <https://filmallmende.net/>.

44   Milton van Dyke, *An Album of Fluid Motion* (Stanford: Parabolic Press, 1982).

45   Étienne-Jules Marey, 'Photographs from wind tunnels, 1899–1901', in Mannoni and Didi-Huberman, *Movements of Air*, pp. 1–80.

46   Ludwig Prandtl and Oskar Tietjens (dirs.), *C1*, (n.d. [1927/1936]). At least parts of *C1* were shown in 1927. See Christian Willert, Mario Schulze, Sarine Waltenspül, Daniel Schanz and Jürgen Kompenhans, 'Prandtl's flow visualization film C1 revisited', conference paper, 13th International Symposium on Particle Image Velocimetry – ISPIV 2019, Munich, 22–24 July 2019. <https://www.researchgate. net/publication/336197763_Prandtl%27s_flow_visualization_film_C1_revisited>. There are many versions of the film. The IWF one is dated 1936, but it is most likely that this is the version of the Reichsstelle für den Unterrichtsfilm (RfdU), as the IWF was first founded in 1953. <https://av.tib.eu/media/12263>.

one could bring forth various things, but for me it was also a confined space in which it was initially difficult to create something that went beyond the beauty of the phenomena produced. It took some time for me to understand the laboratory's potential and to create images in this experimental space that took on the form of a commentary on reality. This experience is reflected in all my subsequent films.

Voice-Over:
Memories of a Past Future

That which you hear but do not see is wind.

People versed in fluid dynamics said that describing flows mathematically was too complicated …
… that it was much easier to photograph the wind.

Or instead, its trails.

So, the wind was made straight; it was furnished with smoke particles,
which can catch the light and be laid down in the photo emulsion.
In the hope that we might thus quantify the wind, take its measure.
The image – a way to picture how the wind behaves.
The image as a basis for his boundary layer theory published in 1904.
An image of what scientists could not picture.

An image that made him a *discoverer.*
An image of his discovery.
A scientific discovery in a lab can be repeated,
so the repetition of a scientific discovery can be predicted.
A brief moment of clairvoyance.

It is almost impossible to study movement with static images.
The object of your research is gone even before you've clicked the shutter.
To remedy this, the *inventor* built cameras.
First, his photographic gun
to study birds in flight,
the barrel a long lens,
the photographic plate turning, as in a revolver,
and a rifle stock to hold the camera in position.
The photos were literally shots back then.
Later he built a camera to study the movement of the wind,
a camera that had precisely the dimensions of his wind tunnel.
This invention paved the way for the cinema.

The subjects, the test objects, the things being studied were to be themselves,
so they would show their true selves in the image,
and their true self would inscribe itself on the film,
so that the findings would be safeguarded for the future.

The camera, to record what was seen,
to see in places where the eye does not suffice
to see what the naked eye has no access to.

The camera knows the magic words to open up this universe.

In the wind tunnel, we can see speed even though everything is standing still.
The wind tunnel, the laboratory, the experiment, the measuring section: a set-up that is like a film studio, everything geared to the camera position.

The wind tunnel as a means to facilitate repetition.
The wind circulates in an infinite loop.
The iterated production of images that are always the same.
Always the same, always different.
The stasis in endless iteration.
The stasis to achieve acceleration.
Images – so that we can picture speed.

Images – not in the scientific sense but a way, nonetheless, to picture a future.
Images of our universe.
He was called a *magician* or a *conjurer*, a *charlatan* too.
In 1902, he shot his first science-fiction film,
the first images of rockets in flight,
the first moon landing on film.
Two years before the boundary layer theory was published.
So there were already images of rockets even before the fundamental theory for developing real rockets had been published.

A year after the first moon landing, a crater on the far side of the moon was named after the *discoverer* of the boundary layer theory.

The *inventor's* new photographs dissolved time and space.
Time was nested in his images.
Non-simultaneous events could be seen simultaneously.
Short journeys through time with the help of images.

Artists were also captivated by the dissolution of time and the poetics of movement.
The nesting of time was taken over by the cubists.

The ambivalent fascination with acceleration,
with progress, with speed,
fascinated the futurists.
The acceleration that led to excess.

But what was then their future
is now my past;
knowing what I know of what was then the future
and is now the past,
I wonder
what future was already inscribed in those pictures.

Conversation between Florian Dombois and Christoph Oeschger

Conducted in March 2021 via email in German, translated by Christoph Oeschger.

Dear Florian,
The wind tunnel is a laboratory, a meeting place, and a performance venue. We have been working together in "your" wind tunnel for the last three years. Together, we have made films and created art, or rather created the "raw material" for it. The tunnel is an artwork of yours, but it also creates a series of reference points that other artists and scientists can take up to make art. In my case, this is specifically the film *Memory of a Past Future*. Much of what we do in the tunnel and what we refer to can only be experienced on-site. So, the question for me is how to share the "research results" created by the wind tunnel, and to what extent is this problem inherent in artistic research?
I look forward to your answer.
Best regards, Christoph

Dear Christoph,
Yes, when I came to ZHdK in 2011 and started my professorship in transdisciplinarity, it quickly became clear to me that I had to set up a concrete place for work, a laboratory in which my research group from the arts and sciences could work, and where our encounter between artistic and scientific disciplines could manifest and occur. I decided to go for a wind tunnel for many reasons, one of them being that the tunnel is "empty" inside, the wind remains invisible, and it only exists when something moves. Those of us who meet there can cast our imaginations into the "empty space" enclosed by the tunnel. The wind tunnel shapes a wind sculpture, for it is only a shell. And if one associates the wind with thinking, we shape thinking. However, I wanted "thinking" to be understood in the plural, for it is explicitly not about streamlined optimization! That is why our wind is probably so slow.
Your *Memory of a Past Future* looks at the history of the wind tunnel and the film and their promises of happiness. I like the melancholic note that I hear in your three-channel installation. The hope for an image of the invisible wind, the hope for measurability and prediction, the hope for a standstill in acceleration, etc. – your speaker's voice never reports a failure. Still, the subjunctive of the sentences skilfully disavows the stories and their hopes. And then the whole installation as a loop: like in the circular wind tunnel of Göttingen design,[47] you send the story

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47   There are essentially two main types of wind tunnel designs: The Göttinger design developed by Ludwig Prandtl and the Eiffel design created by Gustave Eiffel. The Göttingen design wind tunnel is constructed as a circular tunnel with a closed circuit. On the other hand, the Eiffel design wind tunnel features an open configuration without air recirculation. See, for instance, Bruno Chanetz, 'A Century of wind tunnels since Eiffel', in *Comptes Rendus Méchanique*, vol. 345, no. 8 (2017), pp. 581–94, esp. p. 584.

through eternal repetition. What role does this unspoken failure play? Which things that are said between the lines in your film do you think are particularly important, especially for other artists/peers? And do you see your work as a description of melancholy, as a dead end, or where do new doors open?
Best regards, Florian

Dear Florian,
Most wind tunnels were designed as places of development, progress and acceleration. It is about understanding wind, optimizing technical developments and bringing moving things into a streamlined form to accelerate them. This story could be told linearly, and one could document such technical progress. However, I have limited faith in this form of progress.
The wind tunnel on the roof of ZHdK is an exception because it is not built to bring technical progress. The sense of its existence eludes any rationalized determination. It is, in fact, a machine whose purpose has been deconstructed and can, therefore, be many things. That creates various possibilities for everyone who works with it.
For me, the wind tunnel works as an image machine not only in a very concrete sense – in that we produce pictures, films and videos at this place – but also in a linguistic sense. That work also produces mental images that are fruitful for further thinking and working. For me, the resulting abstract images are a key to thinking about narratives of progress and about its failure, its utopian and, at the same time, catastrophic potential. Since my attitude is so ambivalent, there are these gaps that allow the viewer to engage, to communicate and to think further. The gap is also the part that the viewer has to fill in themselves – for me, that's also a *productive gap* with its fiction and its attitude. It's perhaps like the moment between cuts, the transition from one image to the next, that's where meaning emerges.
When you mention melancholy, it's perhaps something that connects all the works. It resembles the search for "good progress". A progress that wants to create a flourishing future but always fails because it also follows a very engineering-driven understanding of science and progress. I always had this mistaken rendering of a sentence from Goethe's Faust in my head. Mephisto – the devil – introduces himself as follows: "I am the power that always wills the good and always creates evil."[48] I have now found out that the quote is wrong,[49] but in this version it describes what I mean.
For me, this belief in progress is not a utopia. The impossible, the unimaginable, and thus the truly utopian come into play when I write about Georges Méliès.[50] The utopian potential arises for me through fictionalization and poetry, through opening up and not fixing. Maybe also

48   Johann Wolfgang von Goethe, 'Faust I', in *Werke, Hamburger Ausgabe,* 14 vols., *Dramatische Dichtungen*, vol. 1 (Munich: dtv, 1982).
49   The correct quote is: 'I am part of that force that always wills the evil and always produces the good.'
50   Georges Méliès, one of the pioneers of fictional and science-fiction films.

what only briefly appears and then disappears again. In the installation, therefore, I often jump back and forth between times and mix them up to create a puzzle. This handling of the temporal and of time itself plays a significant role in my work. This can also be observed in your work[51] – as well as in Mika Elo[52] and Irene Vögeli's[53] contributions to "Filmallmende".[54]

Do you believe that this handling of time is already inherent in the raw material? What was the decisive factor for you in dealing with time?

Best regards, Florian

Dear Christoph,

As mentioned, I associate wind with thinking. Wind is movement – without movement, it ceases to exist. In the wind, we experience time; it is, for me, the flow in which you cannot step twice. Therefore, if you work with the wind in front of the lens and moving images behind the lens, you cannot really avoid the question of time. In computer science, one would say it's hard-wired. So, I answer your first question with a resounding "yes"; yes, time is already written into the raw material.

For me, engaging with time is currently the central and most important task, not so much in an ontological sense as in a methodological one. For many years, I have been trying to move away from territorial thinking, which is so dominant in our Central European culture, and towards a temporally organized way of thinking (and typically, even this formulation, "away-towards," is again an example – everything is always explained with spatial metaphors …). I could give countless examples of this: for example, thinking of "nature" (perfect tense of the Latin "*nasci*", meaning "to be born") as "*physis*" (derived from the Greek verb meaning "to become"); using quantum mechanics instead of Newtonian physics to describe everyday experience; changing the question "What is art?" to "When is art?"; placing Wittgenstein's *Philosophical Investigations* above the *Tractatus*; or studying the flow phenomena of wind and water in order to shift from a metric notion of time to a multidimensional one. That's why my art always ends up being processual: with sound and happenings. And that's why I also have a certain scepticism about simple loops in exhibitions, where a sound or a film is repeated identically. I am currently working on an audio installation at TEA in Tenerife[55], where I run five tracks in parallel, adjusting their loop length so that they all repeat together only after 30 years of play time. This has to do with a certain numerology and would be too complicated to properly explain here.

But speaking of numbers, you mentioned the meaning that arises between the images in film editing. What about the space between the stills, Godard's "truth 24 times a second"? We shot in a wind tunnel with

51   Dombois, *Deaf …*.
52   Mika Elo (dir.), *Allmende* (2020). <https://filmallmende.net/filme/allmende>.
53   Irene Vögeli (dir.), *Schnittübung* (2020). <https://filmallmende.net/filme/schnitt%C3%BCbung.>.
54   'Filmallmende'.
55   See Michy Marxuach (curator), *Porque para que haya fiesta también tiene que danzar el bosque*, exhibition, TEA Tenerife Espacio de las Artes, 2 July–26 September 2021. < https://teatenerife.es/exposicion/para-que-haya-fiesta-tiene-que-danzar-el-bosque/220>.

35 mm, 16 mm and video, using a Debrie Parvo L, which Dziga Vertov used in *Man with a Movie Camera*,[56] as well as the latest Sony Alpha 7SII and iPhone7 and 10. What significance does the single image have for you, and what is contained in the intervals or omissions?
Best regards, Florian

Dear Florian,
This space in between is interesting to me as a metaphor. While it would be useful for my work if it had a practical application, I am too anchored in the digital world where this physical space no longer exists. I started working with moving images in video, wWhich only knows omissions as line jumps, which, to continue with this metaphor, is like a permanent image.
Nevertheless, all digital editing programs are calibrated to 24/25 frames per second, so digital technology still runs in time with the history of cinema. The space in between only plays a role during editing.
When talking to older cameramen, this space in between was not only metaphorically important but also practically so. An oft-cited example is when the cameraman saw the muzzle flash of a pistol through the viewfinder, but it did not appear on the film due to the alternation of the shutter and aperture. I like this story as an image because it illustrates the very narrow perspective one gets when filming. In this sense, it would be a counterargument to Godard that film can only be a half-truth or one possibility of truth.
But what is interesting is the deliberate omission in film. It is not the physical space between frames but what one consciously does not articulate. Something is created there, and the viewer must fill that gap themselves. That is where the gap becomes productive.
Best regards, Christoph

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56   Dziga Vertov (dir.), *Man with a Movie Camera* (All-Ukrainian Photo Cinema Administration (VUFKU) / Filmstudio Alexander Dowschenko, 1929).

Glossary: *Memories of a Past Future*

Clairvoyance

The *déjà vu* when framing the crop; setting up the camera in front of the test section of the wind tunnel.

The environment remains the same. I know the wind will come from the left and pull off to the right, blowing around the sphere and swirling before being sucked out of the test section of the tunnel.

But as for whirling, it's a different picture every time. Mathematically precise descriptions and predictions of turbulent flow remain an unsolved problem in physics and engineering. There is the Navier–Stokes equation with which turbulence can be described mathematically, but the formula cannot be solved analytically.[57] The prediction of how wind behaves is not possible despite all the efforts that have been made. Because of this mathematical problem, in early fluid dynamics it was already important to have images from which assumptions about flow behaviour could be derived in order to come close to a prediction.

To have wind under control and to be able to study it at all, two scientists in France and Germany built parallel research laboratories to find out about wind in an artificial environment. In France, the engineer Gustave Eiffel did this. In Germany, Ludwig Prandtl was also working with a wind tunnel and influenced a lot of flow researchers with his work.[58] It was Prandtl's former doctorate student Theodore von Kármán who saw the need to calibrate wind tunnels in order to make the research repeatable and comparable.[59] Kármán suggested several standard experiments, including the sphere in the wind tunnel.[60] Calibration at that time was not based on measurement but on visual reference.

Today's state-of-the-art imaging in flow visualization is particle image velocimetry (PIV). As with Prandtl, particles are added to the airflow or the waterflow. These particles are no longer merely imaged, but a series of images are produced with the aid of high-frequency laser beams. From the particle positions on the pictures, the direction and speed of movement can be averaged.[61] PIV is not clairvoyance; it's prediction – It's mathematics, isn't it?

One of the predictions that was actually scientifically backed is the weather prediction. Not far removed from flow research but on a larger scale than in a laboratory where nature is simulated, the work of James Bridle identifies this form of thinking with the numerical weather prediction of mathematician Lewis Fry Richardson.[62] In 1916, Richardson was in an army medical unit in France and Belgium. In civilian life, however, he worked as a meteorologist in a remote Scottish observatory. In his free time during his military service, he examined all the weather records for a single day from different European weather stations. He was convinced that with the help of various mathematical operations obtained from years of weather data it would be possible to numerically improve the observations and predict how weather conditions would develop over a period of several hours. He succeeded in creating a helpful method from his calculations, although the results were still too inaccurate.[63] A breakthrough came with the development of fast calculation speeds in computers.[64] This is not clairvoyance; it's prediction – It's mathematics, isn't it?

Emergence
Part 1

The Shroud of Turin had long been considered a fake. Historically, the Vatican refused to recognize it as a genuine relic. But when it was to be presented to the public once again in 1898, Secondo Pia, the mayor of Asti, who was also an amateur photographer, was commissioned to take a picture of the shroud. The owner of the cloth, King Umberto I of Savoy, was critical about the photographic reproduction.[65] He feared that the sacred aura of the object would be lost through the reproducibility of photography.[66]

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57   See 'Navier–Stokes Equations', National Aeronautics and Space Administration (NASA). <https://www.grc.nasa.gov/www/k-12/airplane/nseqs.html>.
58   See Chanetz, 'Century of wind tunnels'.
59   Michael Eckert, *The Dawn of Fluid Dynamics: A Discipline between Science and Technology* (Berlin, Weinheim: WILEY-VCH Verlag, 2006), pp. 93–4: 'he [Kármán] emphasized like Prandtl, how important it is for the achievement of comparable test results in wind tunnels that the current of air is as free as possible from turbulent eddies. He suggested developing instruments for the measurement of turbulence. Furthermore, he agreed with the proposal that in order to compare results from different wind tunnels, all laboratories should first measure simple test bodies, such as spheres and disks of equal size; in fact, "it would be best to have the same model make a round trip to every laboratory adapted for such work."'
60   Eckert, *Dawn of Fluid Dynamics*, pp. 93–4.
61   Institut für Aerodynamik und Stömungstechnik (DLR), 'Particle Image Velocimetry (PIV) Eine optische Methode zur Messung von Geschwindigkeitsfeldern'. <https://www.dlr.de/as/desktopdefault.aspx/tabid-183/251_read-12796>.
62   James Bridle, *New Dark Age: Technology and the End of the Future* (London, New York: Verso, 2018), p. 20.
63   Bridle, *New Dark Age*, pp. 20–1.
64   Bridle, *New Dark Age*, p. 23.
65   Peter Geimer, *Bilder aus Versehen: Eine Geschichte fotografischer Erscheinungen* (Hamburg: Philo Verlag, 2010), p. 180.
66   Geimer, *Bilder aus Versehen*, p. 180.

In the end, the argument that a technically well-made photograph would be a document that could be used in the event of the destruction of the cloth was decisive. So, two photos were made, each on a glass plate of 50 × 60 centimeters.[67]

The photographer described the moment of the development of the negatives as a shock when he saw the 'holy face' appearing on the plate.[68] What was depicted on the shroud was visible to viewers only as a negative until then. By reversing it using the photographic process, the supposed face of Jesus was seen as a 'positive' for the first time.[69]

On my visit to Turin, I see nothing of the shroud. Only a very elaborately forged box containing the cloth. Or, as I was to learn later, a replica of the fabric. Coming out of the cathedral, I turn three corners and accidentally end up in the museum, which has set itself the task of proving the authenticity of the image.[70]

In the museum, it almost seems as if the Catholic Church were trying to repeat the aesthetic shock that Secondo Pia's photograph caused. The argument is made with images. Early representations of Jesus are shown, and similarities are pointed out, but contemporary imaging techniques are also used, such as 3D scans, to make visible that the imprint is a relief. The electron microscope shows an image of particles of typical plants from the Mediterranean. Maybe because of my knowledge of the radioactive carbon analysis that dates the shroud to the Middle Ages, my aesthetic shock is minimal. In the end, there is always the question: Do you believe in the picture or not?

Part 2

I am standing in the lab, with the wind tunnel behind the camera. The mirror ball is firmly mounted on a bar. The smoke filaments hit the circumference of the sphere and the laser is aligned with the circumference. The laser lights up the smoking threads. The laser makes the wind appear.

We simulate travel and acceleration. A controller regulates the speed in the wind tunnel. The wind is low in our case. Can we talk about speed here, or rather slowness?

For movement to be perceived, the camera is essential; it becomes an extension of the human eye to sense the speed. The speed only exists in the pictures of the camera. However, the camera remains rigidly in one place in the wind tunnel. A perpetual movement replaces the moment of motionlessness. The air turns in a circle, in an infinite loop. The camera remains rigid in order not to disturb the delicate air currents. The camera that captures speed and transfers it to screens or film while everything stands still. A movement that our bodies do not participate in but only observe from the outside.

The love affair between speed and photography does not only begin with wind tunnels. For Eadweard Muybridge's legendary photographs of the horse, it had to be one of the fastest racehorses at the time.[71] The pace of the racehorse also meant that the photographic technology had to be able to keep up with the speed. In the case of Muybridge, this required more light-sensitive negative plates.[72] Regarding speed and images, it is worth taking a closer look at how these images are used and their purpose in acceleration. But taking Muybridge's horse as an example, the animal's movement was visible to the human eye but not the trajectory of its hoofs. The camera made the movements of the hoofs perceptible to the human eye.[73] The same was probably the case when it came to high-speed wind tunnels, which were also used to develop war materiel, as was the case, for example, in the wind tunnel in Peenemünde.[74]

Images became an observation instrument, as the movements were too fast for the human eye. The frame rate was in the high-speed range, and the slow-motion effect allowed time to be stretched.

He

My film deals with certain men in the research of fluid dynamics – the nineteenth-century male became part of the canon. As a result, I use the male form in the film text of *Memories of a Past Future*.

In my three-channel installation, *He* is four people; *He* is the discoverer, the inventors and the magician. *He* is Étienne-Jules Marey, Ludwig Prandtl and Friedrich Ahlborn, as well as Georges Méliès.

Celebrated names, each with a story of their own, so I refrained from mentioning the names in the film as that would have been too much historical weight for a six-minute film. Not mentioning names was a decision to not specify things in writing. Leaving the names unspecified allows me to partially fictionalize the narrative and therefore *He* can also be much more than the three people. The viewers are invited to use their imagination. Here I point out a productive gap.

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67   Geimer, *Bilder aus Versehen*, p. 181.
68   Geimer, *Bilder aus Versehen*, p. 181.
69   Geimer, *Bilder aus Versehen*, p. 183.
70   The Museo della Sindone. See 'Centro Internazionale di Studi Sulla Sidone'. <https://sindone.it/museo/it/home/>.
71   Rebecca Solnit, *River of Shadows: Eadweard Muybridge and the Technological Wild West* (New York: Random House N.Y./Penguin Books, 2003), p. 181.
72   Solnit, *River of Shadows*, pp. 184-5.
73   Solnit, *River of Shadows*, p. 6.
74   Peter P. Wegener, *The Peenemünde Wind Tunnels: A Memoir* (New Haven: Yale University Press, 1996), p. 22.

The first *He* we encounter is Marey. We begin with his late work – unsurprisingly, with his studies on the behaviour of fluids in his wind tunnel. Marey wanted to know how a liquid responds to the passage of objects after observing fish locomotion with chronophotography in the 1890s. He submerged tiny silver-coloured wax and resin balls in water.[75] Light was mirrored in these suspended small bright bodies, and the effects of an obstacle in the current's path were visible. Later, he built his own laboratory wind tunnels.

My interest, however, was initially a technical one. How did Marey manage to direct the light so that the smoke lines were so well defined on the glass plate? How did he manage, in the nineteenth century, to get so much light onto his smoke lines to make his shots turn out so well? I still haven't quite figured out how he did it.

Apparently, Marey was not interested in the pictures themselves. In 'The Dance of all Things', Didi-Huberman remarks that Marey 'always used photography in order to observe, and he always used observation in order to measure.'[76]

In countless essays and books, Marey extolled the virtues of the '*méthode graphique*',[77] which made it possible that the phenomena speak their own language,[78] or, inscribe themselves into an image.[79] With his *méthode graphique* and his idea that imaging methods do not interfere with the experiments or the observed, he also created an illusion that these methods are objective because the human hand is not involved – the thing to be researched is unaffected by it, and, in this sense, it is objective.[80]

In the case of the pictures Marey produced in his wind tunnels, it was a possibility to observe what could not yet be mathematically described.[81]

According to Didi-Huberman, Marey seemed to be aware of Claude Bernard's experimental method and Bernard's famous sentiment that 'experiment is fundamentally only induced observation'.[82] To *induce an observation* that is sophisticated enough, Didi-Huberman concludes:

> The experimental method involves, at the very least, a triple task: one must first *amplify* tactility, sensitivity: the capacity to objectively inscribe what is perceived. At the same time, one must *simplify* the phenomenon, separating it from its "noise". [¼] This allows one to *measure*, to reduce intensities, which are by definition beyond our control, to extensive—that is, manipulable—magnitudes.[83]

We faced similar problems in the wind tunnel at the Zurich University of the Arts while we created the set-up for our filming. We spent a lot of time achieving the laminar flow of the wind in the tunnel, which is in fact to free the wind from turbulences and creating a straight wind that cannot be found in nature but is necessary to see how the wind behaves in a repeatable setting. However, the effort to make this laminar flow filmable was approximately equally significant. As Marey did, we also used lighting to guide the viewer's gaze so that what is being examined appears in the best possible light. Getting sufficient light focused on the smoke threads was a major challenge. We wanted to illuminate only the smoke threads while visually excluding everything else to direct attention solely to the phenomenon. As Marey did, we too used black backdrops to eliminate all unwanted information from the image while also preventing the light from reflecting and distracting the gaze. Since we were creating the phenomena for the camera, our laboratory almost looked like a film studio.[84]

Many of Marey's composition and design decisions come from a photographic practice. As Florian Dombois and I exposed in our epilogue:

> It is interesting to note that Marey, who was one of the pioneers of the (chrono)photographic camera, quite literally constructed his wind tunnel in front of the camera, as can be seen in the dimensioning of his experimental installations, whose design is based on the ratios of 2 : 3, 3 : 4, and 1 : 2, thus corresponding to the proportions of his negatives. Unlike Marey, specialists in aerodynamics, such as Ludwig Prandtl, built their wind tunnels first and only then went looking for cameras.[85]

Even if Marey apparently had no aesthetic interest in the pictures themselves,[86] his working method is committed to

75   Inge Hinterwaldner, 'Parallel Lines as Tools for Making Turbulence Visible', *Representations*, vol. 124, no.1. (Fall 2013), pp. 1–42, here p. 19. <https://doi.org/10.1525/rep.2013.124.1.1>.

76   Georges Didi-Huberman, 'The Dance of All Things', in Mannoni and Didi-Huberman, *Movements of Air*, pp. 157–291, here p. 162.

77   Étienne-Jules Marey, *La méthode graphique dans les sciences expérimentales, et principalement en physiologie et en médecine* (Paris: Masson, 1878).

78   Lorraine Daston and Peter Galison, 'The Image of Objectivity', in *Representations*, no. 40 (1992): *Seeing Science*, pp. 81–128, here p. 81. <https://www.jstor.org/stable/2928741>.

79   Hinterwaldner, 'Parallel Lines' p. 33.

80   Bruno Latour, 'What is Iconoclash? Or Is there a world beyond the image wars?', in Bruno Latour and Peter Weibel (eds.), *Iconoclash: Beyond the Image Wars in Science, Religion, and Art*, ed. Bruno Latour and Peter Weibel (Cambridge, MA: MIT Press, 2002), pp. 14–37, here p. 18.

81   Oeschger, *Memories*, 00:18.

82   Cited in Didi-Huberman, 'Dance of All Things'*,* p. 168.

83   Didi-Huberman, 'Dance of All Things', p. 169.

84   Oeschger, *Memories*, 02:56.

85   Dombois and Oeschger, 'Epilogue', p. 294.

86   Hinterwaldner, 'Parallel Lines', p. 5.

a photographic and thus a creative approach. The use of light, the deliberate production of prints and the presentation of the images in a designed layout testify to a creative will. It is precisely this focus on the actual phenomenon without the visual 'noise'[87] that makes the images evaluable. Marey continued this practice in the printing process. He used high contrasts to eliminate all the unwanted information from the pictures. What remained were the traces of movements in black and white with almost no greyscale.[88] What appears as theatrical, staged and tidy leads us back to a focus on of phenomena. By documenting the observation in his experimental set-up with the help of photographic techniques, he made the results of his experiments comparable and sharable.

It was also this apparent objectivity in capturing and measuring the ephemeral nature of air and water currents that allowed the next two *Hes* to reach for the film camera. In the film, two individuals merge into one *He*. They are Ludwig Prandtl and Friedrich Ahlborn. It was Prandtl whose experiments were filmed and who developed his theory from them. The credits for the films must be attributed to Friedrich Ahlborn, from whom Prandtl took the visualization methods for his films. His inventions for flow visualization are no less influential than those of Étienne-Jules Marey.[89]

It is interesting to compare the early methods of flow visualization of Marey and of Prandtl and Ahlborn because they use similar techniques,[90] and therefore it is very likely that they knew each other's work. So, it is these two latter figures who formed a language of flow visualization and therefore shaped our ways of looking at currents.

There are only a few biographical notes on Ahlborn. It is known that he was a zoologist before he became interested in currents. As in Marey's case, his interest in air currents came from his involvement with biology and bird flight, and then later through his studies of the dispersal of flying seeds.[91] Looking at his shooting techniques from the water tunnel, it is also very likely that Ahlborn was influenced by Marey. Do both branches of research go back to the same desire to fly?

Ahlborn's earlier engagement with nature is perhaps reflected in his use of things from the real environment in his water tunnel, such as bear lobe seeds or flying seeds.

In simulated nature, found things from nature become an echo.

For me, his idea that pure measurement means nothing without understanding the whole picture describes very well his working method and ultimately the success of *C1*.[92] Ahlborn thus focused his attention on seeing and understanding through seeing. The possibility of measurement was only a secondary consideration for him at that time. According to Mario Schulze and Sarine Walenspül, Prandtl proved 'his boundary layer theory ¼ with photos of the phenomena based on Ahlborn's method in a water tunnel'.[93] Prandtl is still considered one of the most influential fluid dynamics researchers in history. He is the discoverer of boundary layer theory, a discovery which still forms the basis for airfoil construction, the aerodynamics of cars and the efficiency of wind turbines.[94]

My interest in Prandtl begins – as with Marey – with his pictures of currents. Prandtl failed in his attempt to measure the wind using images. Nevertheless, the pictures played an extremely important role in the analysis of his experiments and the boundary layer theory developed from them. In Prandtl's case, photos and films always occupied a position between imaging and measurement.[95] Although wind could not be measured with the help of images, Prandtl's film was a success. In it, seeing becomes a form of understanding, and the fact that the images are so beautiful certainly helps people to want to see and therefore to look. I am almost tempted to accuse aesthetics of aiding cognition.

Despite the beauty of the images that were produced, the research was far from innocent. In *Memories of a Past Future*, there are some hints of the acceleration that led to the development of war technologies through the research in the wind tunnel, and which thus contributed to the technological armament of World War II. Prandtl's research very clearly laid the foundation for the development of rocket technology as it was developed in the Peenemünde army research laboratories during World War II – the V2, Hitler's *Wunderwaffe*.[96]

Long before research began in Peenemünde, rockets were part of the science-fiction fantasy. There are also overlaps between fantasy and reality. For example, when the fluid physicist Hermann Oberth, who later also worked in Peen-

87   Didi-Huberman, 'Dance of All Things', p. 169.
88   Marey, 'Photographs from wind tunnels'.
89   Hinterwaldner, 'Parallel Lines', p. 6.
90   Hinterwaldner, 'Parallel Lines', p. 4.
91   Hinterwaldner, 'Parallel Lines', p. 7.
92   Oeschger, Schulze and Waltenspül, *Unlearning Flow*, 02:11.
93   Mario Schulze and Sarine Waltenspül, 'From Images of Lines to Images of Particles: The Role of the Film Camera in Flow Visualization', in Lars C. Grabbe, Patrick Rupert-Kruse and Norbert M. Schmitz (eds.), *Image Evolution: Technological Transformations of Visual Media Culture.* (Marburg: Büchner-Verlag, 2019), pp. 161–86, here p. 166.
94   See 'Boundary Layer', National Aeronautics and Space Administration (NASA). <https://www.grc.nasa.gov/www/k-12/BGP/boundlay.html>.
95   Schulze and Waltenspül, 'From Images of Lines', p. 166.
96   Wegener, *Peenemünde Wind Tunnels*, p. 23.

emünde, acted as a consultant for Fritz Lang on his film *Woman in the Moon*.[97] Whether there was a similar interaction between Prandtl's research and Georges Méliès's films, I do not know, but Méliès is definitely the third *He* in my film.

Méliès came to film through the wind. In an interview, he tells the story of being at the first commercial screening of the Lumière Brothers' film *Repas de bébé*.[98] What stood out most for him was not the child's obvious hunger nor the touching display of the Lumière family's gestures and expressions, which could still be attributed to mere theatrical performance. Instead it was the movement of the leaves in the background, something that no previous art or invention had been able to capture, and which even the most authentic form of theatre could not replicate. This was what truly fascinated him, and indeed the audience of that era.[99] Similarly, after seeing the harbour scenes in *Barque sortant du port*,[100] the spectators were once again struck not by the ships or their passengers, which could easily have been part of a staged performance, but by the subtle movements of the waves – the insignificant ripples that embody the essence of life itself. These phenomena exceeded the contemporary boundaries of realism and conventional representation.[101]

If Marey provoked events in his laboratory, it can equally be said that Méliès created possibilities out of the impossible. The magician, who switched to film, can perhaps be said to have performed the magic that is inherent in art. A possibility that is just as attainable in film as currents. With his work, he expanded the possibility of images, and, with the knowledge of Marey, scientific images can be read differently. Images are never created without the intervention of an author. I admire Méliès for bringing this magic into the film. And, I guess, I am not alone in that.

I wander through the small palaces that various people have erected as tombs in the Père Lachaise cemetery in Paris and look for Méliès's grave. After about an hour, I find it and immediately recognize it by the film snippets lying on the grave slab and the circles left by the rusty film cans next to it; reverential ones that fans and subsequent filmmakers have left for him. The grave is simple, located on the outer edge, and seems inconspicuous – a monument like the other burial towers it does not want to be. It is almost hidden

amongst all the pomp around it. It almost seems as if he had spirited himself away – as in his films.

His last trick during his lifetime was a tragic one. He burned all his original negatives and film prints in 1923, his total oeuvre comprising some 520 films,[102] some of them shot on the highly explosive nitrate film[103] – one last firework for a great body of work. A desire to disappear. A desire that his works disappear before the future has begun.

Laboratory

I go there to get a picture.
I am coming back with images – from there or thereabouts. Thinking about it in the studio – putting them together – juxtaposing them with something – assembling them. Only to go out again. To make images, collect them, collect other images, and then think about them again in the studio – to bring them together – to juxtapose them with something and assemble them.
My practice, until the work in the wind tunnel, lived from the documentary moment. It has lived from the detection of something in reality to which my worldview is attached.
So much for a summary of my artistic practice. So far.
What is new now is a laboratory?
Is the experiment in the laboratory just an observation that is provoked.[104]
Next to the camera, another actor enters my practice.
It is pleasant not to have to ask for access. It is convenient to be able to produce and to leave the external circumstances outside.
So far, my thoughts. But then to realize that I also bring external circumstances into the laboratory. That I produce a phenomenon with the wind tunnel and that the cameras do so – especially if they are old, bulky, and somehow have a flaw.
Questionable, my subjective projection into the experiments in the lab. My worldviews this time manifesting not as fences in Calais, mines in South Africa, ice in the Arctic, but as a geometric figure, as a triangle, diamond, or square.
I now ask myself to what extent what is found differs from the built reality in the laboratory. And thus, to what extent my worldview is my projection.
Because what remains is this:
Think about the studio's pictures, put them together, juxtapose them – assemble them. Then back to the lab. To start making pictures again, collecting, thinking, then back to the

97   Wegener, *Peenemünde Wind Tunnels*, p. 22.
98   Lumiere Brothers (dirs.), *Repas de bébé* (1895). <https://en.wikipedia.org/wiki/File:Repas_de_b%C3%A9b%C3%A9.webm>.
99   Dai Vaughan, *For Documentary: Twelve Essays* (Berkley, CA: University of California Press, 1999), pp. 4–5. (I would like to thank Florian Dombois for the hint regarding this point.)
100   Brothers Lumiere (dirs.), *Barque sortant du port* (1895). <https://www.youtube.com/watch?v=bQKJOxMu3iE&ab_channel=Iconauta>.
101   See François Albera, 'Le Cinématographe dans le mouvement: une métaphysique des feuilles', *1895: Revue de l'association française de recherche sur l'histoire du cinéma*, vol. 87 (2019): Émulsion – Mouvement – Accéléré – Couleur, pp. 34–63. <https://doi.org/10.4000/1895.6754>.
102   There are various estimates of how many films Mélies made. I follow the number given by Erich Lange in his film *The Mystery of Georges Méliès* (arte, 2020). <https://mubi.com/de/ch/films/the-mystery-of-georges-melies>.
103   Tania Capron, 'Restaurations des films de Georges Méliès, la fantaisie mise en musique', *La Cinémathèque française*, 5 September 2022. <https://www.cinematheque.fr/article/1884.html>.
104   See Peter Weibel, 'A Literary Montage', *MaHKUscript: Journal of Fine Art Research*, vol. 1, no. 1 (6) (2016), pp. 1–4. <https://doi.org/10.5334/mjfar.6>.

studio – to bring them together, to juxtapose and montage them.

From Working with Images to Surveying with Images and Operational Images

In our society, images have assumed a role where they are not only used for representation but actively intervene in our environment. Images have become both control elements[105] and measurement instruments.[106] I believe that a closer examination of their functions is worthwhile. Due to the rapid development of image-guided machines, their functionality changes continuously, and some observations become quickly outdated.

'Technical images' are images created and used for a specific purpose or function, such as a technical diagram, a blueprint or a computer programme. Technical images, according to Vilém Flusser are (meant) to 'take over the task formerly served by linear texts, that is, the task of transmitting information crucial to society and to individuals'.[107] The term 'technical image' is very broad, which is why it's worth further examining the different purposes of its creation and functions to differentiate them further. In particular, I would like to take a closer look at images that can generate factual information, referred to in the following as 'surveying images'.[108] This term is a direct translation of the German word '*Messbild*' used by Harun Farocki in his film *Bilder der Welt und Inschrift des Krieges* (Images of the World and the Inscription of War). In the English version of the film, the term is translated as 'scale measurement',[109] which is too narrowly defined for my purposes as it specifically refers to photogrammetry.[110] With the term 'surveying images', I aim to encompass all the methods that obtain measurement data or derive measurement data from various impulses.

A multispectral image can be considered a surveying image[111] – just as bathymetric recordings can be[112] – and a photograph used for bird counting can be seen as a surveying image, similar to photogrammetric images.[113]

What Roland Meyer describes in his book *Operative Porträts* for 'operative images' applies also to surveying images. They are often not standalone entities but are embedded within a constellation of other images that refer to each other[114] – unless the measurement scale or a fixed size is already inscribed within the image, allowing the image to be evaluated.[115]

In the analogue era, in order to create a surveying image it was necessary to produce an image through human intervention. The signal (light) would reach a light-sensitive surface (film) and be developed and printed by humans. This was crucial because the images were also evaluated by humans, catering to human perception.

Visual information, in the form of different rays, sound waves, etc., is now formulated into images that directly address the machine's evaluation or is not even presented as an image but as a digital code that directly interacts with the machine (computer).[116] When something remains perceptible to us humans, it appears often as grey noise. Perception now primarily occurs at the machine level, with the spectrum of human vision covering only a small portion.[117]

Through Farocki's work, the concept of the operative image has become a widely used term to describe certain functionalities of digital images. These images are not created to represent; rather they are integrated into a decision or action in a certain form. The image itself becomes an instrument.[118] The

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105   Armin Linke, *The Appearance of That Which Cannot Be Seen* (Leipzig: Spector Books, 2017), p. 207.

106   Jussi Parikka, *Operational Images: From the Visual to the Invisual* (Minneapolis and London: University of Minnesota Press, 2023), p. 95.

107   Vilém Flusser, *Into the Universe of Technical Images* (Minneapolis: University of Minnesota Press, 2011), p. 5. <http://www.jstor.org/stable/10.5749/j.ctttttcq8.>.

108   Jussi Parikka seemed to have similar thoughts on the translation of the term '*Messbild*', which he translated as 'measurement image'. I will stick to my translation 'surveying image', matching the term 'surveying cameras' often used by camera producers for their product when a numerical value is given. See Parikka, *Operational Images*, p. 102.

109   See Harun Farocki, 'Commentary from "Bilder der Welt und Inschrift des Krieges"', *Discourse*, vol. 15, no.3. (1993), pp. 78–92. <http://www.jstor.org/stable/41389287>.

110   Farocki's engagement with 'smart' bombs is also not surprising in this context, as photogrammetry provides the basis for this technology.

111   A multispectral image consists of multiple image layers of a single scene, with each layer captured at a specific wavelength band. The widely recognised high-resolution visible sensor uses a three-band multispectral approach to detect radiation in specific wavelength bands.

112   Bathymetry is the measurement and mapping of the depth and shape of underwater terrain or the topography of the ocean floor. It uses different technical imaging such as echo sounding (in German: *Echolot*) and satellite images.

113   A very simple example of surveying images can be found under <http://www.eldey.is/index-en.html> [accessed 23 May 2023]. These images become surveying images based on the mutual referencing of the images.

114   Roland Meyer, *Operative Porträts: Eine Bildgeschichte der Identifizierbarkeit von Lavater bis Facebook* (Konstanz: Konstanz University Press, 2019), p. 25.

115   Two examples of surveying images where the scale is written into the image can be found under <http://www.zeno.org/Fotografien/B/Marey,+%C3%89tienne-Jules%3A+Stabhochsprung> and <https://www.youtube.com/watch?v=xdnhEZ-tkOg&ab_channel=PabloL.%C3%81lvarez> [accessed 3 April 2024].

116   Trevor Paglen, 'Operational Images', *e-flux Journal* no. 59 (November 2014), pp. 72–3. <https://www.e-flux.com/journal/59/61130/operational-images/>.

117   Steyerl, 'A Sea of Data'.

118   Volker Pantenburg, 'Working images: Harun Farocki and the operational image', in Jens Eder and Charlotte Klonk (eds.), *Image Operations: Visual Media and Political Conflict* (Manchester: Manchester University Press, 2016), pp. 49–62, here p. 49.

discourse surrounding operative images revolves around the idea that images have the power to influence and shape our reality. This means that images are no longer passive reflections of reality but active agents that shape and produce it.[119]

In contrast to surveying images, operative images are embedded in decision-making or control processes. While surveying images can be operative images, it is not always the case. Surveying images become operative images when they are integrated into decision-making or control processes.[120]

Farocki borrows the concept of the operative from Roland Barthes. In his book *Mythologies*, Barthes describes the language of lumberjacks, which serves a purely functional role.[121] The operative nature of the lumberjack's language takes on 'utopian qualities'. The language becomes a functional extension of the worker's body and tools. It escapes mythical connotations and becomes an integral part of the work process.[122]

In his essay *Operational Images*, Trevor Paglen seems to situate the operative image within the digital realm.[123] I believe that this perspective is limited, and that it is highly enlightening to include analogue images as well, as these make it particularly clear how embedded ideological biases can be in the processes of producing and interpreting both types of images. Therefore, I believe it is crucial to examine the functioning of operative images more fundamentally, and not solely focus on contemporary contexts.

In *Operative Porträts,* Meyer describes operative images as a special class of technical images that do not merely depict the world but intervene in its happenings and decisions. These images are not primarily intended for human perception but rather are integrated into technical processes and regulated procedures.[124] The physical form of the images does not initially matter: whether they exist as analogue prints or digital data, the term is applicable to both types of images.

Attempts to make images operative emerged back in the analogue era – for instance in witness identification photographs and their analysis – as seen in the works of Alphonse Bertillon[125] or Cesare Lombroso.[126] Meyer identifies operative images as emerging in contexts where large quantities of images are managed and evaluated by institutions organized for specific tasks, with the aim of initiating subsequent actions based on the analysis.[127]

This does not contradict the fact that these images also intervene in the events and decisions of the world. Operative images are not exclusively images that access objective data or measurements, but rather a computerized (systematized) form of production and analysis, leading to subsequent actions. Again, this applies to both analogue and digital images. The main difference between the two is primarily the immediacy of analysis in the digital realm. While analogue pictures required interpretation and analysis by humans, digital images can be analyzed by an algorithm automatically.

At this point, it is important for me to emphasize that operative images belong to a convolute of images: a database or an archive of images against which the single image is computed. In the single image, but also in the intention, an ideological ascription is latent in how the whole archive or database is created and how the analysis is done.[128]

While Farocki places a strong focus on the military use of operative images, this form of image control has become a reality in many other parts of our society, ranging from industrial production to automated advertising, surveillance and manipulation.[129] In recent years, a shift has occurred in this regard. In previous uses of surveying images and operative images, they had to be created according to specific criteria in order to be useful for measurement or action. However, with the advent of AI, particularly in processing datasets derived from representational images, the operative mechanism changed fundamentally.[130] Also, in representative digital images a measurement scale, such as the focal length, are inscribed in the metadata of the image itself. Together with pattern recognition, this makes it possible to evaluate images that were not created through strict processes and may have been made solely for representational purposes into surveying images.[131]

119 Parikka, *Operational Images*, p. vii.
120 Meyer, *Operative Porträts*, p. 22.
121 Roland Barthes, *Mythologies*, tr. Annette Lavers, 25th ed. (New York: The Noonday Press, 1991), p. 146.
122 Pantenburg, 'Working images', p. 51.
123 Paglen, 'Operational Images'.
124 Meyer, *Operative Porträts*, p. 22.
125 Alphonse Bertillon, 'Selections from *Theoretical Study of Signalment* (1896)', in Walead Beshty (ed.), *Picture Industry: A Provisional History of the Technical Image 1844–2018* (Arles and Zurich: Fondation LUMA JRP/Ringier, 2018), pp. 179–93.
126 Meyer, *Operative Porträts*, p. 150.
127 Meyer, *Operative Porträts*, pp. 22–3.
128 See Steve Lohr, 'Facial Recognition Is Accurate, if You're a White Guy', *The New York Times*, 9 February 2018. <https://www.nytimes.com/2018/02/09/technology/facial-recognition-race-artificial-intelligence.html>.
129 Parikka, *Operational Images*, p. vii.
130 See Naomi Rea, 'How ImageNet Roulette, a Viral Art Project That Exposed Facial Recognition's Biases, Is Changing Minds About AI', *Artnet News*, 23 September 2019. <https://news.artnet.com/art-world-archives/imagenet-roulette-trevor-paglen-kate-crawford-1658305>.
131 An example for this is the image search engine PimEyes, which offers a reverse image search: <https://pimeyes.com/en/blog/image-search-with-pimeyes-how-to-reverse-image-search>.
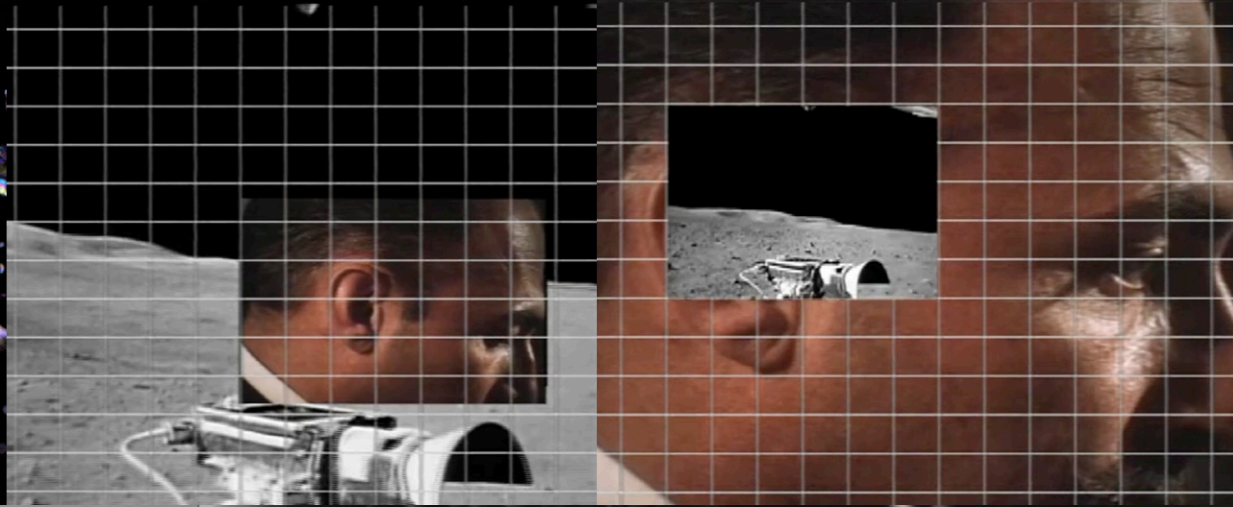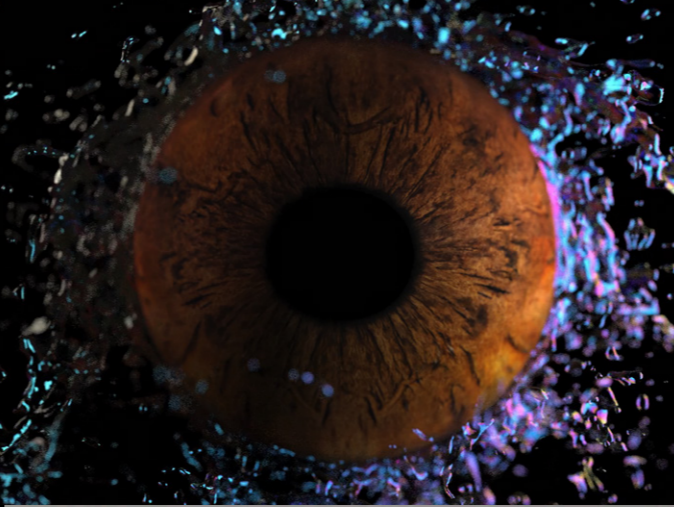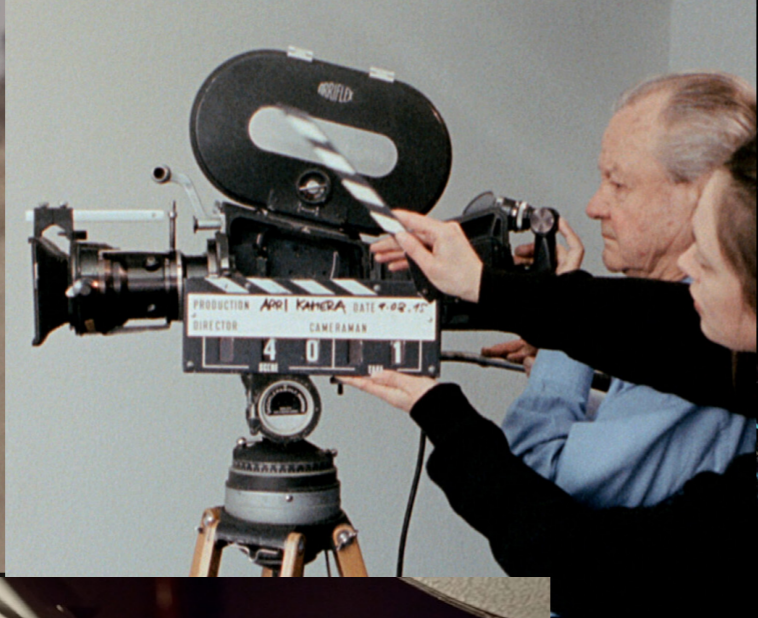
The IWF set out to record all the movements
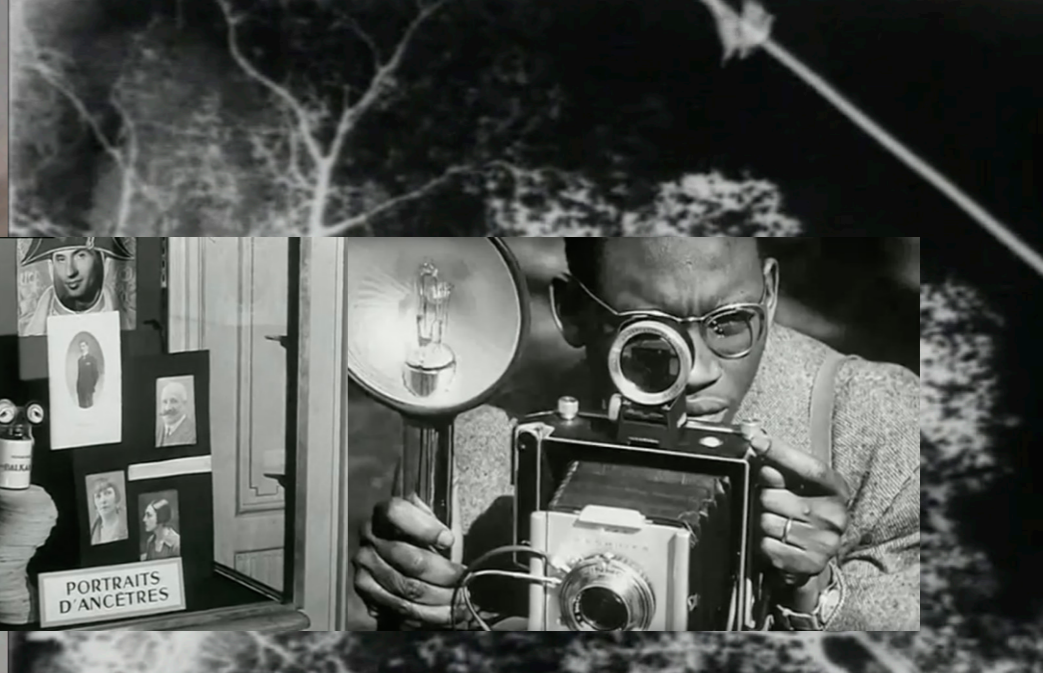
you organise the crime.

PORTRAITS D'ANCÊTRES

Formation of Vortices in Water Currents
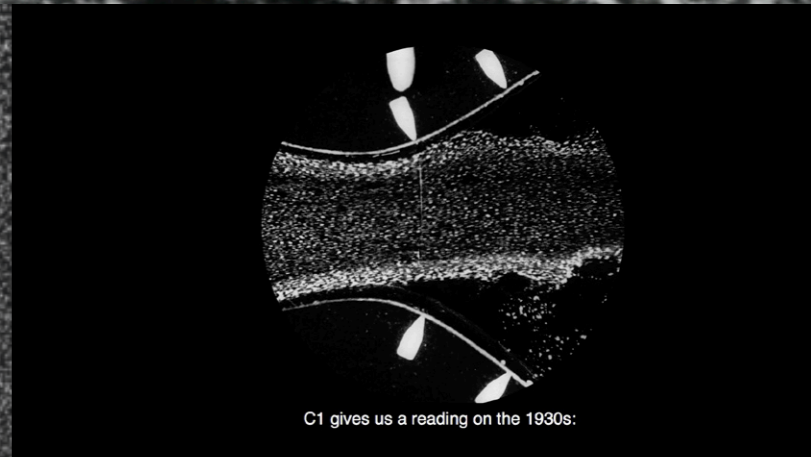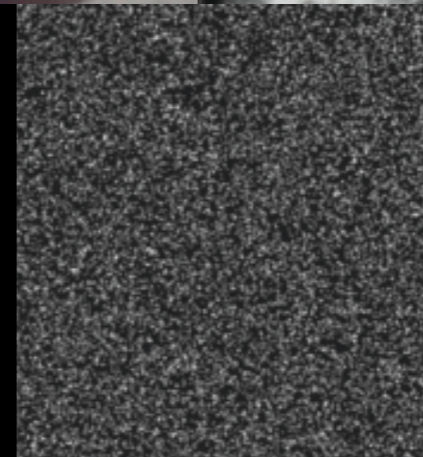
C1 gives us a reading on the 1930s:
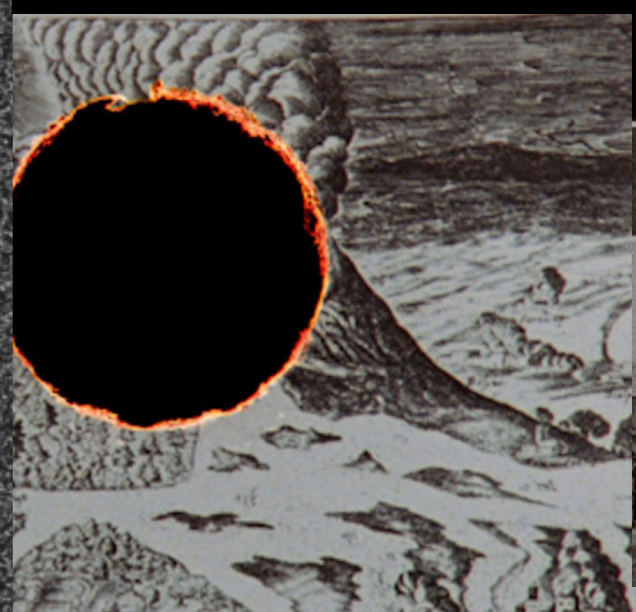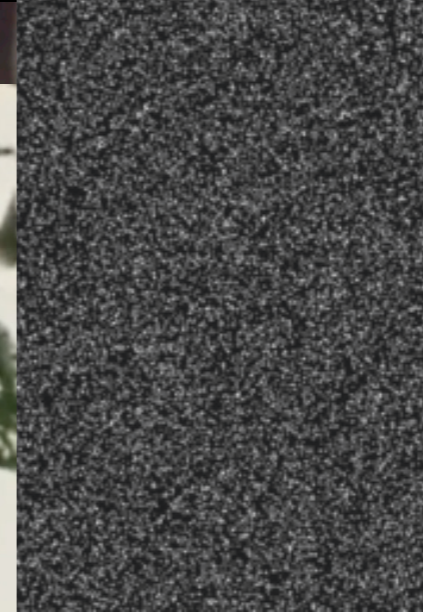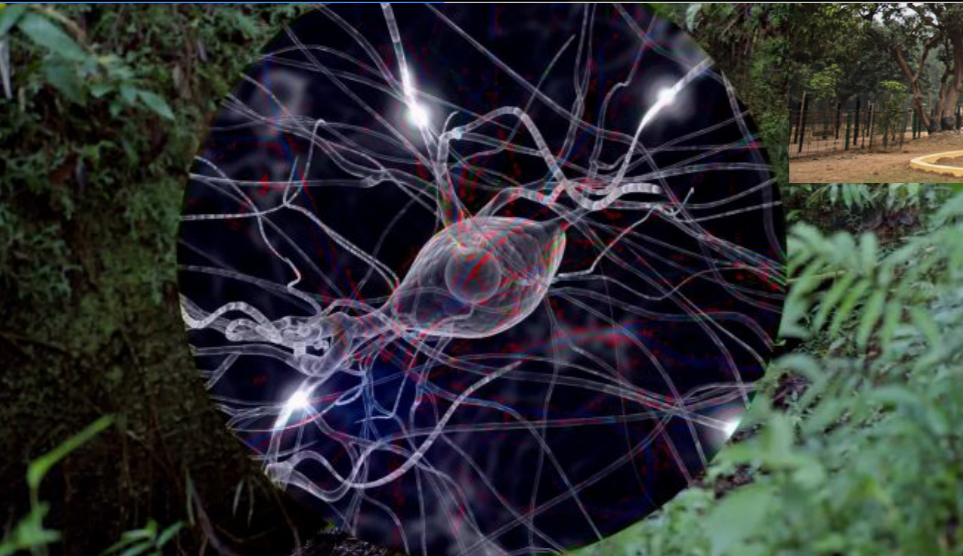
Unlearning Flow – A Collage, by Christoph Oeschger with the use of the following materials:

– Film still from Mischa Hedinger, *African Mirror*, (ton und bild, 2019
– Film still from Lisa Rave, *Burning in Patterns*, (Whole Wall Films 2015)
– Film still Raqs Media Collective, *Unruly Iris of Dissent (U.I.D 2)*, *Swamp & Marsh,* 2023
– Film still from Leslie Thronton, Strange Space, 1993
– Film still from Oeschger, Schulze, Waltenspül, *Unlearning Flow*, 2019
– Film still from Mischa Hedinger, *African Mirror*, (ton und bild 2019)
– Film still from Chris Marker, Alain Resnais, *Les Statue Meurent Aussi*, (Présence Africaine Tadié Cinéma 1953)
– Film still from Leslie Thornton, *The last Time I saw Ron*, 1999
– Film still from Jean - Luc Godard *Nummero Deux*, (Sonimage, Bella Productions 1975)
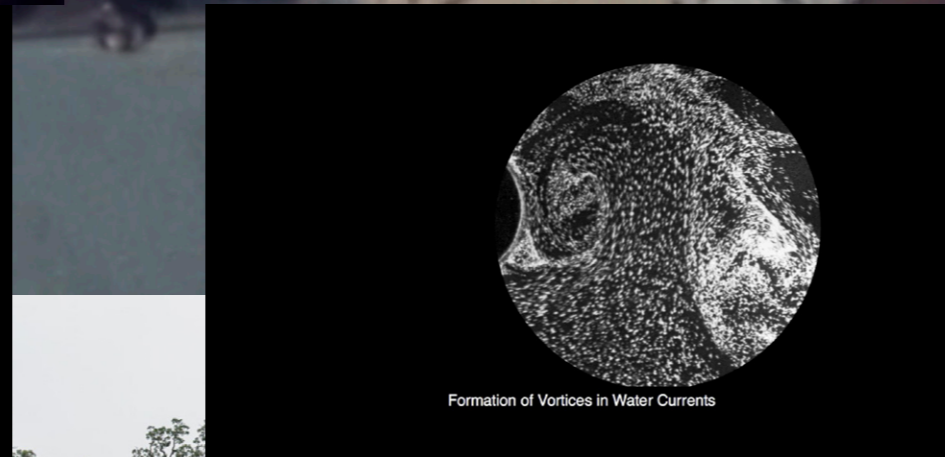– Film still from Oeschger, Schulze, Waltenspül, *Unlearning Flow*, 2019
– Film still from Oeschger, Schulze, Waltenspül, *Unlearning Flow*, 2019
– Film still from Ursula Biemann, *Forrest Mind*, 202
– Film still from The Otolith Group, *O Horizon*, 2018
– Film still from Gustav Deutsch, *Film ist*, (loop media 1998)
– Grey noise of a PIV image.
– Film still from Pauline Julier, *Naturalis Histoirea*, 2018
– Film still from Simon Starling, *Black Drop*, 2012
– Film still from Andreas Bunte, *Low Pressure*, 2013

Unlearning Flow

Title:	*Unlearning Flow*, 2019
Directors:	Christoph Oeschger, Mario Schulze, Sarine Waltenspül
Camera:	Christoph Oeschger
Editing:	Christoph Oeschger
Voice:	Ute Sengebusch
Sound Design / Music:	Fabian Gutscher
Translation:	Simon Cowper
Length:	10' 07" (due to copyright regulations, only a 6' 52" excerpt of the film can be shown online)
Audio:	stereo
Format:	HD video

Introduction: *Unlearning Flow*

For the film *Unlearning Flow* I teamed up with media historian Sarine Waltenspül and science historian Mario Schulze who where also part of the research project *Luftbilder/Lichtbilder*. The starting point for our film essay was the scientific film *Entstehung von Wirbeln bei Wasserströmungen / Formation of Vortices in Water Currents* (C1) by Ludwig Prandtl, filmed in the 1920s. The film demonstrates phenomena and experiments in a water tunnel. Filmmaking for research was an unusual endeavour then, but it was particularly suitable for fluid dynamics because the phenomena were fleeting and short lived and filming does not disturb the flow.

Film was a relatively young medium then, and it came with great hopes of objectivity and reproducibility. However, the work that went into producing and distributing films was much greater then than it is today. In Germany, *the Reichsstelle für den Unterrichtsfilm* (Reich Office for Teaching Films) was founded in 1936. This institution was the predecessor to the *Institut* für den *wissenschaftlichen Film* (IWF, Institute for Scientific Film), which is the subject of *Unlearning Flow*. *Entstehung von Wirbeln bei Wasserströmungen* was the founding document of the *Reichsstelle für den Unterrichtsfilm*. The film was given an institute catalogue number, and is known now under the title *C1*.

The institute aimed to unify science education and collect research films from scientists using film as a research tool. This practice did not change even in 1953 with the founding of the IWF. The range of uses for the films is diverse. On the one hand they were used for the representation and communication of scientific knowledge; on the other the IWF served as an archive for all types of scientific films.

We put a lot of energy into producing the film *Unlearning Flow*, which we shot in a short period of time. It took only four months to move from the initial idea to the finished cut. We shared our research on the IWF together, shot together in Göttingen, and cooperated on the film script.

During our research for the film, we repeatedly came across sensitive films, and finding a way to deal with them was central to the creation of our own film. In my opinion, we found a way to deal productively with the ambivalence present in the films and to accept contradictions as enrichment. Working with these contradictions, making them visible without reproducing the problematic aspects, was the basis for the editing and the visual concept.

Voice-Over: *Unlearning Flow*

Some pictures seek to be more real than others.
These include the films from the IWF, Institute for Scientific Film.
- *Tibetans, Central Asia – Animal Dances*
- *Central Europe, Bavarian Forest – Plaiting an Oval Basket*
- *Imprinting Ducklings*
- *Machining Steel*
- *Dumdum Bullet Impact*
- *Formation of Vortices in Water Currents*
- *Central Europe, Basel region – String Figures*
- *Life among the Taulipang of Guiana – Film Documents from the year 1911*

Films capture movements.
Operating from a hill on the outskirts of Göttingen, the IWF produced, sold, lent and archived several thousand films from the 1950s on. Millions saw them in lecture halls, classrooms and conference rooms.
Most of the films were silent, and almost none of them had commentary. They were simply accompanied by a note and an index number: *C1, C229, E1609*. The IWF set out to record all the movements of the organic and inorganic world on celluloid. They were tagged according to category and type of movement and became part of an encyclopaedic project. The films were to be "documents of reality."

The camera doesn't just direct its gaze from nowhere. Yet you get the feeling there's no one standing behind it.

Tibetans, Central Asia – Animal Dances

The dancer's gaze lets on that there was indeed someone behind the camera, someone who was filming a theatre group in Rikon in Switzerland.[132] Why doesn't it say: *Theatre Group (Central Europe) – Animal Dances?*

Some movements are harder to grasp than others.
C1, for instance, is number 1 at the IWF, both lexically and chronologically. A flow film, a film about the invisible, about something we feel and hear but mostly don't see: flow. The film was meant to make flow measurable.

In the 1920s, a German aerodynamicist made recordings to prove his boundary layer theory. In 1936, the IWF's predecessor made the film its founding document. From that point on, it was labelled *C1*– and it became a standard for Nazi university films.

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132   It is said in the film that the theater group performed in Ebnat-Kappel when in fact it was in Rikon (Switzerland). We based this on the information from the archive, but the established location changed during the making of the film. According to our own research, Rikon is correct.

C1 gives us a reading on the 1930s: education was standardized, flow could be taught, movement could be learned.

Some films are more sensitive than others.

After World War II, *C1* and almost all the other university films avoided being de-nazified by the US authorities. They were seen as objective, devoid of any political sympathy. Films with Hitler salutes and emblems were banned, as was a film about bullets that were designed to cause maximum laceration to the body: "Dumdum—effect".

The IWF took over the films but replaced all the opening titles. Nazis and Nazi materials no longer figured in the institute's history. During the war, the IWF's founding director had also put together snippets of images showing bullets. They became his perceptual model, his view of the world: brief movements captured on celluloid, divided up into very small units that could be reanalyzed at any time. After the war, he had the idea of creating an encyclopaedia for the institute – the *Encyclopaedia Cinematographica*, or EC for short. An encyclopaedia promised authority, objectivity and freedom from any ideology. In the EC, the tagging based on things that had been shelled or shot at and the frequency of the image recorded gave way to tagging based on species, "tribe", type of material and the kind of movement recorded.

For example, games with string figures were played not only by Central Europeans but also by the Taulipang, the Inui, and the Krahô. Or dancing, imprinting, mating, machining, living.
Slow-motion –
Time-lapse – X-ray cinematography.
Beating heart.
Dumdum.
Sticks on drums.
Dumdum.
Flying bullets.
Even the films on projectiles that were initially banned ultimately found their way back into the media catalogue.

Some movements are more sensitive than others.

Film reels aren't in circulation anymore. Copying film is a dying art, like plaiting a winnowing basket.

The IWF was finally wound up in 2010. Anything that remained of material value was liquidated to finance the former employees' redundancy programme. The building became an object of financial speculation. Millions flowed between estate agents in Göttingen, Munich and Bielefeld. The empty building could be put to new use and provide a return on investment. In 2015, it was leased to the city of Göttingen, and refugees were housed in it over a three-year period.

The IWF looked at the world. What do we see when we look at the IWF? What movements do we see?
Central Europe, Göttingen – the movements of people in flight …
Some pictures seek to be more real than others.

Films capture movements.
Some movements are harder to grasp than others.
Some films are more sensitive than others.
Some movements are more sensitive than others.
Some movements are real.

Conversation between Mischa Hedinger and Christoph Oeschger

Conducted in October 2021 in Zurich. The conversation was held in German, translated by Christoph Oeschger

Christoph Oeschger: For my doctorate, I conduct conversations with other artists in order to establish relationships between my work and theirs. The goal is to connect two pieces and generate new observations about each other's work. I have invited you to speak with me about your film *African Mirror*[133] and our film *Unlearning Flow.*[134] I see similarities between the two films in their use of archival material, which takes on a new meaning through editing and montage. Could you briefly describe your film and share your thoughts on the similarities and differences between the two works?

Mischa Hedinger: I see the similarities. Both films work with an archive that can be geographically located. Both films draw on a closed pool of material, images, texts, etc. Both try to make a film out of it, a short one in your case, a long one in mine. In both films, the question arises of how to use the film material. How do you choose, how do you create a flow, and above all, are there other levels? What else is added to the material from the archive? In your case, you have also filmed the archive itself, creating a new layer. In my film, I don't have this extra layer: all of the material for my film comes from the archive. I rely on René Gardi's material as the source.

Then there are different forms of intervention; some of the footage I slowed down, and the sound is also entirely composed. With your film, the interventions with the circular mask are more obvious. There are almost no full-screen images in your film. You actively intervene in the material. With my film, people often don't even notice what interventions I've made. It plays with the immediacy of the material and my use of it. This question came to the fore when I had to decide how to digitize the material.

CO: Our work started a little later in the process. We took over the digitized material from the archive. All the films we used were already digitized in different formats, partly because the archive operated without a clear concept and because the films were digitized at different times. All the films had different resolutions. We never blew up the digitized material but presented it as cropped clips within the circular mask. This made it possible to work with clips of very low resolution. It's quite a

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133   Hedinger, *African Mirror.*
134   Oeschger, Schulze and Waltenspül, *Unlearning Flow.*

conceptual approach, but it makes the different formats of digitization visible. Can you tell me something about the archive you were using? How did you come to it? In both cases, it's very different. In our case, everything was already digitized and online.

MH: The biggest difference is that it was René Gardi's private archive. Gardi could be described as a media entrepreneur. He financed his travels and all his films himself; investors were only involved in the longer films. It was a business. When he worked for radio and television, he usually kept the rights. When Gardi died, his son took over the archive. The two had a complex relationship. By the way, the son became an ethnologist, a professional, academically trained ethnologist, unlike his father. He also conducted research in Africa.

The son maintained the archive well but wanted to sell it. He was critical of his father, although perhaps not as critical as he should have been. This personal contact allowed me to financially participate in purchasing the archive as part of the project so that the archive became public and is now housed in the State Archives of the Canton of Bern.[135] To start with, it was still a private archive, which is certainly a huge difference from your situation. Especially the legal starting point. Nevertheless, the question is the same for both films: How do you build a narrative from this archival material? My film is more narrative in this sense than yours, and tries to do justice to a chronology of the life of René Gardi from the archive itself.

It is also interesting to note an overlap in content. Did you know that films by Gardi were listed in the catalogue of the IWF, Institute for Scientific Film?

CO: I didn't know that. That's interesting.

MH: From the material that he filmed for his lectures, he edited the film *Eisengewinnung der Matakam* (Iron production of the Matakam) for the IWF.[136] I suspect that the institute had clear guidelines on how films should look. At the IWF, there was this apparent scientific approach to the processes. One thing had to be shown after the other. I don't know exactly what the collaboration looked like. There is a clear connection between Gardi and the IWF.

CO: I find that extremely interesting. Especially because I think Gardi's films have a very similar gesture to the IWF films. In both archives, a claim to truth is ascribed to the films.

MH: True

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135 Staatsarchiv Kanton Bern, 'Nachlass 5, Nachlass René Gardi, 1939 (ca.)-1990 (ca.) (Bestand)'. <https://www.query.sta.be.ch/>.
136 René Gardi (dir.), *Eisengewinnung der Matakam* (IWF Göttingen, 1955) <https://doi.org/10.3203/IWF/C-665>.

CO: I see the similarities of the films in this form of truth construction. You make it clear at the beginning with the following quote from Achille Mbembe: "What they call 'Africa' is a collection of wishes, desires, and naïve fantasies. These are promoted, propagated, and farmed."[137] In our two films we work against this construction of truth through images, what I call "demontage". I think the term fits as a description for both films, as in both films an attempt is made to reverse the statements made by preloaded material through montage and to juxtapose our own attitude with the material. In both films, the authorial achievement arises to a certain extent through this demontage. In both films, narratives are constructed that run counter to the material. How do you demontage the original narrative?

MH: That is perhaps the core question when dealing with such material. You've already developed an attitude toward the archive and want to convey this attitude through film. In both cases, we are working with archives that are permeated by colonial thinking, racism and imperial ideas, and we want to criticize that. We use different strategies that work more or less well. In both films, there are strategies that need to be questioned.

It is relatively difficult to describe how this process of demontage works because it functions very affectively and plays with the perceptions of the audience. In your film, there is a voice-over that you have newly generated. The voice has a somewhat authoritarian character, guiding the film in a very objective tone that is perhaps slightly didactic. However, things are not over-explained. You still have the courage to leave gaps and a space that allows the audience's thoughts to come into play.

In my case, I don't have this didactic commentary. I refrain from conducting interviews. There is only the source material. The demontage is achieved through the montage, by combining film images. The order – that is, the dramaturgy – is central, and the selection of the material is closely related to it. What is selected from the archive is therefore crucial, as well as what is left there.

CO: In your selection, you have included images that are out of focus. These are images that were probably outtakes and are not used by Gardi. We did not have this possibility since we had to rely on finished films from the archive and could not access this kind of "raw material". You are using this material to characterize the process of filmmaking itself. We also address the production of a film by documenting the copying process of *C1*. The aim is to create a media reflection of time and become aware of the difference between digital and analogue

137   Mischa Hedinger, *African Mirror – René Gardis Afrika* (self- published, 2019), p. 9 (author's translation). The original quote reads: 'Das, was wir "Afrika" nennen, ist eine Ansammlung von Wünschen, Sehnsüchten und naiven Fantasien. Diese werden gefördert, weiterverbreitet und bewirtschaftet.' The reader is accessible under <https://www.africanmirror.ch/>.

filmmaking. This also gives us an idea of how complex the filmmaking is and how sophisticated the distribution and archiving in the IWF must have been. By using outtakes and images that are not in focus, you address the process of filmmaking itself. Or maybe this is something I see just because I'm a filmmaker?

MH: In my film, less than half of the footage has been published. Sometimes it's difficult to say for sure. Gardi used his footage for different purposes, and he used different media. He recorded the same events using different media. For example, in my film I used footage that has never been shown before but I know that a photo of the same scene was published. Ultimately, I don't know whether all the footage has been included or not.

My work is not about the revelation of unpublished material. The material is essentially recontextualized through this demontage. It's more that things are put into a new context in which my critical attitude towards Gardi becomes visible.

An important aspect here is trying to focus on the production conditions of the material itself, which is what I do. The production conditions have already been addressed by Gardi himself, but only in passing, of course, and in a different way. For him, it was more important to bolster his image as an adventurer. In my film, we see Gardi sitting at a table drinking beer with colonial officials. It was important for me to show the context in which his films were produced – something completely different from a film about some ethnic group making pottery. It was important to show that he used the colonial infrastructure to make his films. He was embedded in a colonial system.

One of the main elements in the film is the production of media itself, which is meant to criticize a specific way of working in documentary filmmaking that still exists today. This way of working can easily be read from his archive.

CO: In Gardi's archives – and the holdings at the IWF – you can see this desire for apparent objectivity attributed to the film medium. The filmmakers themselves became authorities, in a way, because they were witnesses of a sort. There was almost a kind of "reverence" toward those who travelled to Africa and brought the "truth" back to Europe.

MH: I always found this claim to truth extremely bizarre, even for those times. It reached a long way into the progressive left. Gardi's main work – *Mandara*[138] – received a special mention at the Berlinale. To put it in context, this was in the same year Jean-Luc Godard's *À bout de*

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138   René Gardi and Charles Zbinden (dirs.), *Mandara: Zauber der schwarzen Wildnis* (Expedition Cinématographique au Cameroun / Rene Gardi & Charles Zbinden, 1960).

souffle was released.[139] *Mandara* was shown at a smaller ethnographic festival that is still quite well known today: the Festival del Popoli Firenze. *Mandara* won the top prize there. One of the jury members was Roland Barthes. There is this brief justification by the jury for why the film won the award. In the award ceremony, the film was heaped with praise and lauded as an "extremely authentic document." People who are still highly respected today, such as Roland Barthes, had also adopted this concept of truth uncritically. This needs to be seen in the context of World War II and the accompanying propaganda machinery, which had a decisive impact on filmmaking on all sides.

One can see this matter-of-fact quality celebrated by the IWF, this exaggerated objectivity, as a countermovement to propaganda. This was mistakenly understood as objectivity, especially in Germany. More likely, it was a desire to grasp the truth and not accept the distortion that had actually taken place. This is now speculation, of course. From our perspective, it is difficult to empathize with this today.

Neither the people from the IWF nor Gardi himself saw themselves as artists and filmmakers. They aspired to impart knowledge. The cinematic was a tool for them and was therefore questioned very little. For Gardi, it represented a means for reaching a popular audience. In the case of the IWF, it was perhaps more of a specialist audience from the world of science, which is why the films were even stricter formally speaking. This formal corset was supposed to guarantee scientificity and thus truth.

CO: Despite their similarities, *Unlearning Flow* and *African Mirror* use different strategies. We had long discussions about how to use ethnographic films without reproducing power relations, which is why we decided to use a circular mask, so we cropped the image. Did you also have such considerations? That you would not reproduce the power relations of Gardi by reusing the films, especially in relation to people who are recognizable?

MH: Yes, of course, there were many such considerations. I had thought for a long time about whether a second level was needed, a counter-voice to Gardi. I was specifically looking for an African perspective on the material. Somehow, nothing convinced me.

Eventually, I realized that if you want to take archival material seriously you need to invest a lot of time into understanding and engaging with the material. Therefore, the archival material should have a significant weight in the film. I never wanted to make a film that used archival material illustratively, as in traditional television documentaries, with interview situations interspersed between the vivid moments from the archives. I

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139   Jean-Luc Godard (dir.), *À bout de souffle / Breathless* (Les Films Impéria, 1960).

never found that interesting. I wanted to use the material as an autonomous player that creates its own meaning.

It was important for me to create an experience that is not straightforward or easy to escape. I didn't want the treatment to be glib: it wasn't just a matter of simply labelling Gardi an old white racist and condemning him from a safe distance, feeling like you've done your part. People should realize that they are entangled with this kind of thinking and are somehow a part of it. This works with a "white" audience.

The film is perceived very differently by "non-white" audiences. In the beginning, I was not fully aware of this, and I would almost describe myself as ignorant. I am aware that watching the film is a completely different experience for non-white people. Then the whole discussion about whether I am reproducing stereotypes or Gardi's racism arises. This question keeps coming up in my film and will continue to be discussed. The question is whether there were strategies I could have used to address this. This extends to the issue of whether this material should be brought up again.

I would have had to give up my authorship to allow an African perspective on the topic, at least partially. Eventually, I would no longer have been the right person to make this film. I always understood the material as primarily showing how we look at Africa. It is a view of our own "white" history, the history of Switzerland and its entanglements with colonialism. That was ultimately my motivation. The political conditions changed during the making of the film. The Black Lives Matter movement emerged, and these questions became more legitimate.

There were other ideas. I met Tevodai Mambai, a Cameroonian researcher, and we filmed in Gardi's archive. But in the end, I couldn't find a good solution for integrating this material into the film. I also created a reader to provide more context.[140] In this book, the interview with Tevodai Mambai is included. I created other contexts through this reader, through Q & As, and by actively contacting the activists from Bla*Sh.[141] Amidst all these discussions, the film is most radical to me when it stands for itself and exposes itself.

CO: I felt the same way. That the non-explicit, the non-expressed, the implied, triggered more in me than when it was explicitly expressed. And there are a few of these alienating moments in your film as well as in ours.

MH: You have come up with a different solution. What is surprising for me is that the film clips you choose as examples refer mainly to Europe.

140   Hedinger, *African Mirror – René Gardis Afrika*.
141   Bla*Sh is a Black Feminist network from German-speaking Switzerland with local groups in Basel, Bern and Zurich. See <https://histnoire.ch/> [accessed 17 May 2023].

I didn't feel that I saw much of this colonial/racist gesture, but you talk about it. You have adjusted/defused it through your use of the circular mask, but especially through the selection of films.

CO: We deliberately chose European examples: on the one hand to question this form of European ethnology outside of Europe, while on the other it is always about whether you want to open the poison cabinet or not. For the framework in which we shot the film, we could not have resolved this at all. We would not have done justice to this material within that framework. But one of the films included in it comes from a former colony. It shows the Krahô playing with threads.[142]

MH: I find the question quite complex. I understand your strategy with the circular mask, but it remains unresolved for me. You take something away from people. Maybe these people enjoyed being filmed. For example, pride in performing thread games is a document of a disappearing tradition. These materials have extreme ambiguities, and not showing them is certainly not a solution. These thread games are not delicate material. You show it well. With this subject, you will always find someone who thinks it's shit how you dealt with the material.

At this point you are thrown back on yourself. The question at the end is, can I stand by what I have done? That's good because you have to reflect on what you did consciously and realize where you did things unconsciously.

CO: I know this very well, especially when it comes to editing. You can give yourself guidelines: for example, the dramaturgy, an editing concept or a provisional text. In putting everything together effectively, you can only do it by trying things out and testing whether something works. Sometimes you experiment for hours and every now and then you get something as a gift and something works. It's so unpredictable. That's one reason it takes so long to edit a film like that.

MH: Yes, I agree with that. In some cases, you can only follow your intuition.

CO: From today's perspective, Gardi is probably located more in the realm of popular culture. However, he received an honorary university doctorate and claimed at least an affinity with science. He made at least one film for the IWF.

Can you say something about his attitude toward science? Do you see him dealing with film material in a similar way to the IWF? Is there any indication in your source material of what his attitude to science was? In the film, he aligns himself closely with science at least once.

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142   Harald Schultz (dir.), *Krahó (Brazil, Tocantins Region): String Figures* (IWF Göttingen, 1966). <https://doi.org/10.3203/IWF/E-865>.

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MH: I don't know any material where he takes a very clear position on this. Gardi likes to present himself as an unpretentious Swiss.[143] There is little self-reflection; he almost never reflects on his own role. When asked what he sees himself as, he always answers anecdotally, along the lines: "The writers always think I'm a photographer. The photographers think I'm a filmmaker, and the filmmakers think I'm a writer."

He probably liked this in-between position. He could do different things but was still not taken seriously everywhere. He saw himself as a kind of knowledge broker, a popular ethnologist. He certainly strove for recognition. He wanted to be part of the bourgeoisie, a "part of a better society," and "wanting to be a scientist" fits in well with that. Some of the scientists he travelled with respected him, and that was very important to him. He probably wanted to be more scientific than he was.

In my film, there is a scene in which you notice that his work does not belong to one or the other side. Some say this, others say that. The film festival in Wiesbaden attests to his sensationalism, but on the other hand there are films from the time that were even more sensational and that became audience successes for that very reason. His films were almost considered too matter of fact, too scientifically ethnological. That's not something that is going to attract the masses to the cinema. He also wanted to do that. He oscillated back and forth between these poles. I don't know how much he was able to reflect that himself. I think it was very puzzling for him. In one way, he was a simple travel writer with a penchant and fascination for traditional crafts and customs.

CO: One strategy I used directly in the editing was dealing with the ambiguity of image and text. In the text, one film is mentioned and another that could have been meant is played. So, the viewers always have to check whether there is a correspondence between the text and the image or whether there are only similarities with the image being talked about. A similar demontage figures in the *African Mirror* with the mountain farmers making hay. With the voice-over describing the "primitives"[144]. Was that also a conscious strategy for you?

MH: Yes, exactly. This is with material from articles about him. The word "backwoodsman" is used there – it's really referring to people from North Cameroon, but I actually show some Swiss "hillbillies".[145] These are things that come up during the work, and you see that they work and you stick with it. It is interesting to note that Gardi himself worked with this comparison. In the prologue, Gardi compares the Mafa with mountain farmers. This was, of course, his strategy for arousing sympathy

143   The word used in the original is '*hemdsärmelig*', a German term that describes a person who is down-to-earth, approachable and unpretentious. It literally translates as 'shirt-sleeved' and implies that the person is someone who is comfortable rolling up their sleeves and getting down to work.
144   *African Mirror,* 15:18–16:35.
145   '*Hinterwäldler*' in the original.

among the Swiss rural population. For them, Gardi's films were very far away from the reality of their lives and were very abstract. At this point, Gardi was concerned with creating a sense of identification.

CO: What is interesting, is that he does it the other way round as well.

MH: Everything reflects a discomfort with industrialization and modernity. The film paints an embellished picture of a simple life, and this is still done in certain kinds of filmmaking. We are all tourists and susceptible to such things. My film was never about showing that as morally reprehensible, but trying to expose these mechanisms and asking what is being left out when you do this exoticization. In Gardi's work as a whole, there are so many contradictions and idealizations, but on the other hand he shows that people have to pay taxes or else their hut will be burnt down. How can you link all this together?

CO: You almost get the feeling that Gardi puts this extreme form of "civic duty" above everything else. He's actually super conformist.

MH: These are examples that we don't think about when we go on holiday somewhere and think the people there have everything much easier and nicer. But at the same time they're being exploited, because our prosperity is based on such exploitation.

CO: You do not include an introductory text or a voice-over. You assemble the film exclusively from Gardi's archive, so you don't provide any additional context. You rely on Gardi exposing himself. I was extremely impressed with how well this works. Later, I wondered how we would read/understand this film in the future.

I watch your film with my contemporary awareness of colonial injustice. With this perspective from today, I look at how the zeitgeist of the past is exposed in the film. Do you think the montage and self-exposing will still work in 20 years time? One problem with the IWF films was that they were never contextualized. Often there was no commentary – the images were left to speak for themselves. The claim was made that films are objective and, therefore, true. How did you deal with these questions? On the one hand, our oldest material is from the 1950s, the most recent from the late 1980s, and today we look at it again 60 or 70 years later and evaluate it differently. What will it be like in 20 years?

MH: This film could not have been made 20 years ago. It only works on the basis of a historical distance: if the material had been too close, this deconstruction would not have worked. Of course, the question of how the film will look in 20 years is interesting. I didn't ask myself such questions when I was making it. It's an interesting thought, especially because discourses are changing in the broader public sphere. These discourses have been around for 30 years, but like everything

in Switzerland they always arrive much later. But actually, this question is particularly exciting with regard to the reproduction of racism. In 20 years, it will be clear that you can no longer show something like that, or that showing my film at a greater distance will be less problematic.

CO: Or maybe the film will expose us?

MH: Of course, the films say a lot about our time, our generation.

CO: I think that's a strength, that you can make a current film out of 60-year-old material.

MH: Of course, you have to bear in mind that my film relates to a Swiss context. That is very difficult to communicate abroad. In Switzerland, there were critical voices too: for example from Bla*Sh. The film was difficult for them, and they would have preferred a trigger warning in the opening credits. In Switzerland, it was always clear that the film was about coming to terms with its own history. So, the film has a different legitimacy in Switzerland than in other parts of the world. The film was not shown once in the USA – I understand that. But the film was shown in Brazil, where it raises other questions, especially concerning the country's colonial history.

MH: The context is less clear outside Switzerland and raises more questions. Of course, it's a question of which context gives the film a different meaning and legitimacy. Depending on the context, the film has a different effect on the audience, which shouldn't be ignored in how the film ages.

CO: There is criticism of our film that it is too "didactic", although I am very ambivalent about this: To what extent do you let the film material speak for itself, and how much do you put it into context through the commentary? This contrasts with your approach, which relies purely on the source material.

One of the problems with the IWF films is precisely that they have never been contextualized. That's where I find the problem unresolved with both our films. That was also a big question for me in the editing of our film, but for me it's not resolved at all.

MH: You can never resolve this problem definitively. Perhaps it's a question of a filmmaker's attitude and artistic interest. Do you have an interest in the (visual) material itself? Can you or do you want to write? How can one write? Writing a commentary is an art in itself, and something I wouldn't trust myself to do. I would fail because of my own demands. With you, it actually works out quite well. I don't know all the films of the IWF. As you say, they rarely had a commentary, only intertitles or something. I read your commentary almost as a parody of the "authorial

commentary" form, which has a kind of deconstructive effect. The more popular films – like those by Gardi – had this kind of commentary. In yours, the commentary has a completely different content.

CO: We once thought of giving the title a subtitle. If we had, it would have been called *Unlearning Flow: An Educational Film*. To push this reading that you describe and to emphasize it even more. We (all) have a different media competence today. You can see that in our films when you compare them with the archive material. With the archive material, the filmmakers at that time presupposed a different media competence on the part of the viewer.

MH: Television looked different ten years ago. There was much more narrator explanation in films. Films were more didactic back then. Even the more progressive films were different 20 years ago.

CO: It's very similar with our films. Both films demand something from the viewer, or we rely on the viewers to do something themselves. In both cases, the viewers have to fill in the blanks. Or they have to have their own attitude so that a dialogue between film and viewer emerges.

MH: This is a question, on the one hand, of media competence and, on the other, of artistic attitude and strategy. There are examples of directors who worked like this twenty years ago. How much do you want to take the viewer by the hand, and to what extent do you leave the viewer alone? With questions like these, it matters where the film is shown. Films are read differently when they are shown in an art space, at festivals or on television. There is always the question of how much media competence can be assumed in which places.

Glossary: *Unlearning Flow*

Findings

I found a picture there and many more.
I go there to shoot other images,
to have more pictures, to be able to connect the shot material with what I found,
to be able to bring it together.
With Sarine and Mario in the studio,
we write texts; I start editing.
Every time I assemble a concrete sentence with a concrete image,
something escapes.
Every time the image contradicts the sentence,
or only briefly crosses, escapes from the phrase, contradicts the language, something emerges.
Contradiction as an artistic practice.
So much for a summary of my artistic practice. So far.
My practice is sustained by collecting – even before Unlearning Flow. *It thrives on the detection of something found to which my worldview is attached, which is contradictory to my worldview.*
What is new now is a collaboration with the scientists.
Before Unlearning Flow, *I was looking for the contradiction in the material.*
Now I have a contradiction between the disciplines – the scientific language that must be exact, the art that exists only in ambiguity.
Communication arises between the disciplines, where one works directly on the material.
I dispute through the pictures, which I confirm through the images but leave open whether it might not have been something else.

Sensitive Film

There is a film sensitivity that ASA/ISO describes as the standardized light sensitivity of the film stock. This indicates the amount of light that must strike the light-sensitive layer for an image to be created in the development process. So much light that the outside can inscribe itself into the emulsion or the chip, but such a tiny amount that it does not erase the image itself again, so much light that the frame is exposed. The shutter of the camera only opens for a brief moment and just records the light that enters through the lens in that very moment. The image itself does not document the circumstances of its creation.[146]

There is a discourse about human remains and the cultural artefacts that were unlawfully taken and archived in the repositories of ethnological museums. However, there is less discussion on how to deal with human lives that have inscribed themselves in photographs, film material and sound.

There is a significant proportion of sound recordings, films and photographs from ethnographic contexts since colonial times that were made under problematic circumstances.

These documents were taken in situations where equality between the recorder and the recorded, the filmer and the filmed, the photographer and the photographed was not given, nor was there any idea of free choice.[147] Individuals were not portrayed and seen as such. The documents often reproduced stereotypes and supported a system of supremacist ideology.[148]

In this context, there are media products that can be clearly assigned to an ideology. However, there are also those whose problems are not so easily recognizable because they lie in the creation processes, which in many cases are not apparent from the material itself. Ciraj Rassool illustrates this in his essay 'Rethinking the Ethnographic Museum' using the example of the ethnographer Rudolph Pöch. Pöch's Kalahari recordings are regarded as the oldest documents of the polyphonic songs and Khoisan languages, and as such have been included in the UNESCO Memory of the World International Register and thus recognized as an important historical document.[149] As a result, Pöch was celebrated as a pioneer of field recording.

With Pöch's recordings, the problem lay primarily in the circumstances and contexts of their production, or as Rassool states:

> Moreover, Pöch's phonographic legacy of Kalahari recordings needed to be understood as part of the wider multidisciplinary collecting project, key components of which had been carried out unlawfully and through concealment from the authorities. Pöch's expedition conducted on behalf of the Imperial Academy of Sciences in Vienna between 1907 and 1909 occurred in the violent and disruptive transfrontier colonial landscape of the Kalahari – the borderland between Namibia, Botswana and South Africa – still in turmoil from the genocide in Namibia.[150]

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146 Ariella Azoulay, *Potential History: Unlearning Imperialism* (London: Verso, 2019), p. 2.

147 See, for instance, the vivid description of such inhumane practices in Francesca Melandri's book *Alle ausser mir*, tr. Esther Hansen (Berlin: Wagenbach, 2017).

148 See Raoul Peck (dir.), *Exterminate All the Brutes*, Parts 1–4 (HBO and arte, 2022).

149 Ciraj Rassool, 'Rethinking the Ethnographic Museum', *African Futures*, vol. 27 (2022), pp. 56–66, here p. 57. <https://doi.org/10.1163/9789004471641_007>.

150 Rassool, 'Rethinking', p. 58.

On one hand the recordings serve as a historical document of the Kalahari people and exist still today because they were archived, but its creation was strongly bound with the oppression of the people that where documented. The archives and museums themselves played an important role in the suppression, as they were the source of this violent media production through collection and classification.[151] Beyond the image itself, the institutional and media framings determine what these images are, what they serve and what treatment of them was cultivated.

We also encountered 'sensitive films' during our research work for the film *Unlearning Flow* in connection with the IWF. To equate the IWF's ideas with those of the race theorists would be short-sighted. Nevertheless, images that had violent historical origins found their way into the catalogue of the IWF, which is why many of the IWF's films are sensitive films. The context in which the individual films were made was not always transparent for us. We were looking for a formal way to deal with these circumstances, but not to re-reproduce stereotypes. We decided to use a circular mask, which blacks out a large part of the image and makes the protagonists unrecognizable. With the exclusion of a part of the image, we also show that there is something missing. This can be a productive gap – the part that had to be filled in by the viewers themselves.

Founding Document (*C1*)

The film *C1* was shown in various contexts and had different lives. For example, Ludwig Prandtl used the film during his lecture tours to illustrate his scientific work. Since then, the film has also appeared in various scientific contexts and is still shown in different versions today.[152] In the pre-digital age, it was always difficult to distribute and disseminate films. Owing to technological developments, films had to be copied into new formats to be shown in different performance formats. The film *C1* was recorded on 35-mm film. It was reused, and for the respective purpose it was first copied onto 16-mm film and later transferred to video formats.[153] 16 mm and 35 mm have different aspect ratios, and therefore the image is cropped differently. *C1* reflects part of the history of film and video formats.

A more recent manifestation of *C1* is particularly interesting for my work with scientific film and for the question of when an image becomes a surveying image. In 2007, the film was again digitized and evaluated by the two fluid dynamicists, Christian Willert and Juergen Kompenhans, using a PIV (particle image velocity) procedure.[154] The PIV procedure makes it possible to track particles in the film. Prandtl's film could thus be made measurable. The images of *C1* thus became surveying images.

The evaluation was possible owing to the fine quality of the source material. The experimental set-up of Prandtl and Tietjens was also crucial. They used particles in the water to visualize the currents, which were reflected by the light and thus inscribed on the film.[155] Even if the technique differed in its subtleties from today's attempts, it was similar in its broad outlines. Therefore the particles could be detected by PIV – an optical measurement technique – for the non-contact remote measurement of the velocities of liquids.[156]

From the footage of the film *C1,* Willert and Kompenhans gained numerical information about the velocity and the behaviour of the single particles in the experiment from the 1920s. Basically the image remains the same, but through the PIV measurement method the images become a surveying image*.*

151 Rassool, 'Rethinking', p. 59.
152 Mario Schulze, 'Mobilizing Moving Images: Reusing a German Flow Film of the 1920s for U.S. Science Education in the Cold War', *Isis*, vol. 112, no.2 (June 2021), 361–9, here p. 361. <https://www.journals.uchicago.edu/doi/full/10.1086/714728>.
153 Schulze, 'Mobilizing Moving Images', pp. 362–3.
154 Schulze and Waltenspül, 'From Images of Lines', p. 179.
155 Schulze and Waltenspül, 'From Images of Lines', p. 169.
156 Schulze and Waltenspül, 'From Images of Lines', p. 179.
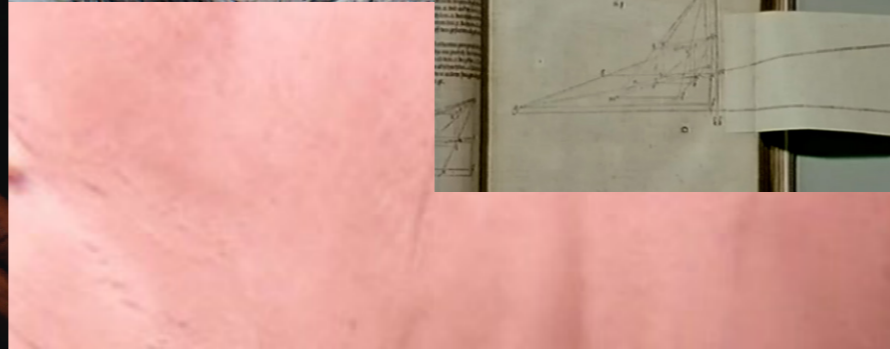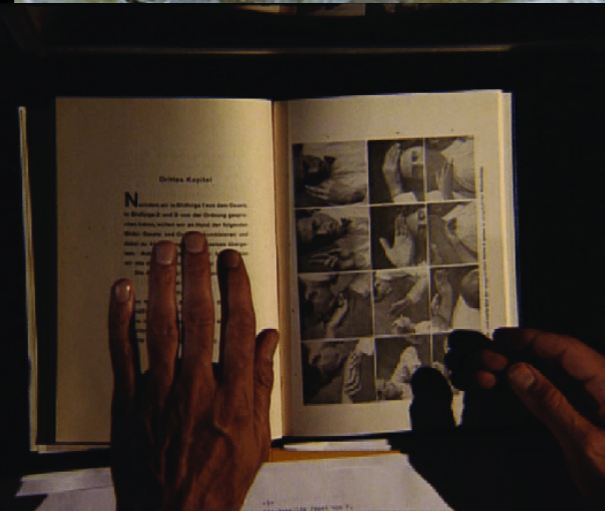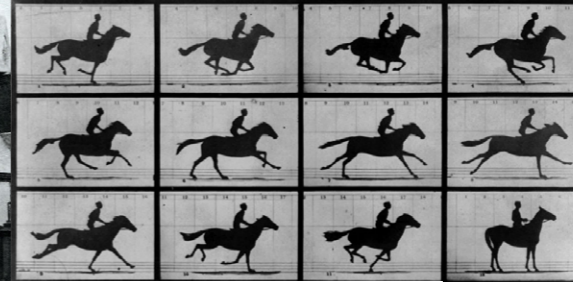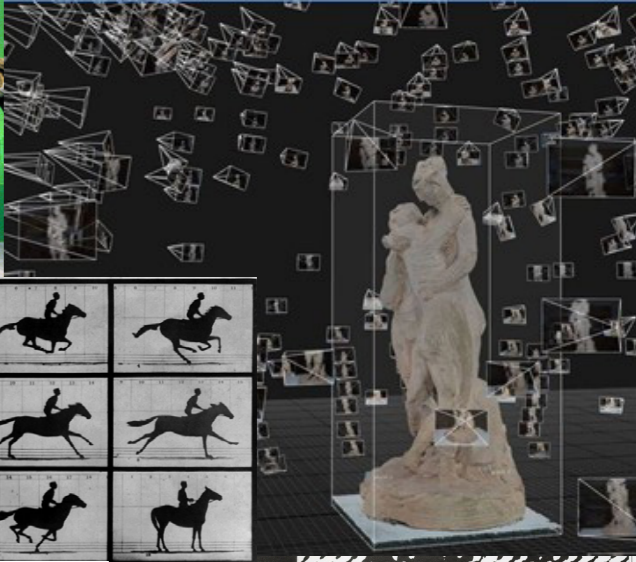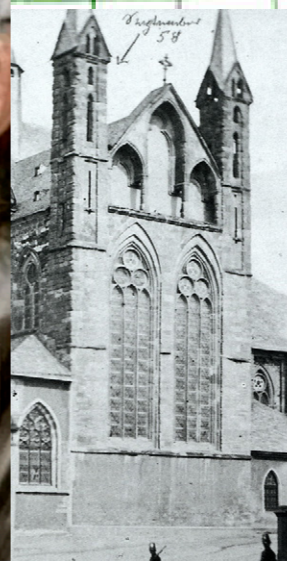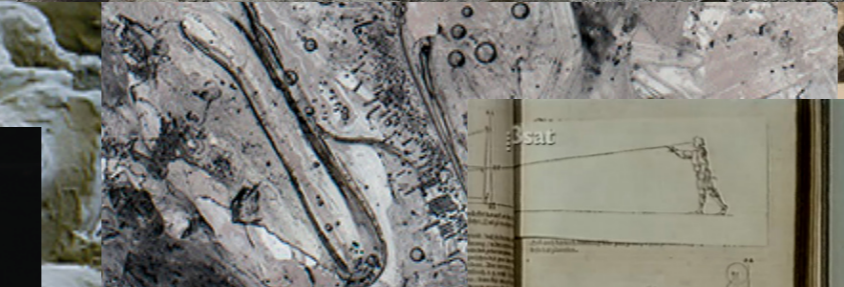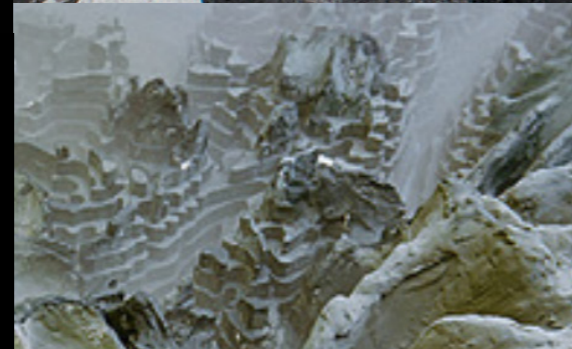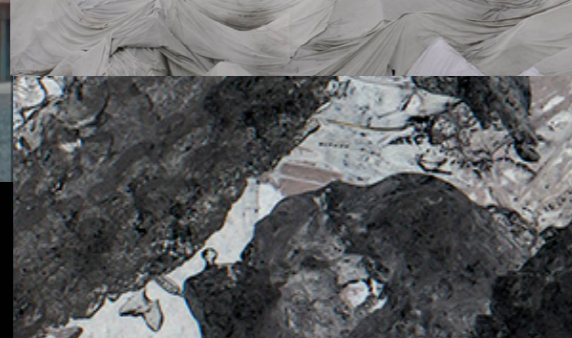
2° – A Collage, by Christoph Oeschger with the use of the following materials:

– Film still from Chris Marker, *Sans Soleil* (Argos Films, 1983)
– Film still from Ursula Biemann, *Subatlantic* (2015)
– Film still from Jean-Luc Godard, *Histoire(s) du Cinema* (Vega Film, 1988–1998)
– Albrecht Meydenbauer, *Dom of Wertzlar*, ca.1900
– Making of the Matrix
– Photogrammetry tutorial
– Film still from Laurence Bovin, *Aletsch Negative* (2019)
– Eadward Muybridge, 'Animal Locomotion (Plate 626)', *Sequence with Jockey on Horseback* (1878)
– Film still from Christoph Oeschger, *2°* (cpress films, 2020), showing the Rhône Glacier
– Hans Rudolf Lutz, *1979 – Eine Art Geschichte*, 1980
– Film still from Armin Linke, *Alpi* (2011)
– Christoph Oeschger, the Rhône glacier four years after the shooting of *2°*, 2023
– N.a., *Vom Rohonegletscher zur Furka*, n.d. (late 19th century)
– Charlotte Rudoph, *Mains de Mary Wigmann*, 1928
– Film still from Harun Farocki, *Ausdruck der Haende* (Harun Farocki Filmproduktion, 1997)
– Film still from Ursula Biemann, *Subatlantic* (2015)
– Film still from Harun Farocki, *Bilder der Welt und Inschrift des Krieges* (Harun Farocki Filmproduktion, 1988)
– Film still from Simon Starling, *Black Drop* (2012)

2°

Introduction: *2°*

With some works, it is not so clear when and where they started. That is how it is for me with *2°*. I had the assignment as a photographer to take pictures of a historic hotel on the Furka Pass, which lies not far from the Rhône Glacier. There, Janis Osolin, who looks after the building, had shown me for the first time his collection of objects that the ice had released. Was it there that the work began, well before I had thought about a doctorate? Or was it my preoccupation with the question of when an image becomes a surveying image and the resulting experiments in creating photogrammetric 3D scans from photographic images?

Maybe it was also my residency in Paris, some years after the UN's Paris Agreement of 2015, and the feeling that not much had changed since then. Maybe it was one of my first assignments after my bachelor's degree when I took pictures for a nature conservation organization. They sent me all over Switzerland and wanted pictures of wilderness. But when I was photographing, I always had the feeling that I was standing in a 'built landscape'.

I can't say exactly when the work on the film began, but it was certainly before the filming started. In the film, all these preoccupations flow into it. My research on this film was a process of gathering and linking all the stories and images that I had been collecting over time, and which have shaped my perception of geography, and Swiss geography in particular.

Voice-Over: *2°*

I don't have an image of 2°.

To get an idea of what 2° might look like, I asked my lab to raise the temperature of the developing fluid by 2° while some film material was being developed.

In 1895, the chemist Arrhenius described the greenhouse effect caused by the emission of carbon dioxide into the atmosphere. He worked on the assumption that if the amount of CO_2 in the atmosphere doubled, the average temperature of the Earth would go up by 5° Celsius. At the time, the scientist was delighted with his theory and looked forward to a future that was warm and bright. He wrote, "The rise in CO_2 will permit future generations to live under warmer skies."

My lab assistant reckons that the light sensitivity of my film material increases by 3 stops when the temperature of the developing fluid goes up by 2°. This is equivalent to doubling the amount of light exposure three times over.

The readings recorded on Jungfraujoch have shown for some time now that greenhouse gases are making our world warmer. The observatory is packed with sensors whose elevation affords them a kind of sovereign view, making it possible to obtain an overall impression. But even though you might think that the work of an observatory revolves around seeing, I don't get an image of global warming there either – and that's not simply because the clouds are almost impenetrable.

Up until ten years ago, scientists on Jungfraujoch used a 76-centimeter telescope to map the night sky. The lens of this telescope also received light from various stars that had already ceased to exist. This light, which had travelled such a long distance, provided the scientists with an image of these stars. No one ever questioned their existence.

Instruments like the Kepler space telescope, which was shot into the sun's orbit, promised to yield better results than the observatories. Scientists used the telescope to look for new planets that might be habitable for humans. Nine years after its launch, it ran out of fuel and had to be brought back to earth in 2018.

In the late 1970s, the economist William Nordhaus defined the benchmark of "a 2° warming of the earth relative to the pre-industrial era." His main motivation was to have at least one constant in a chain of so many variables in his cost–benefit calculation of climate change.

Thankfully, this figure was accepted by politicians at the UN climate summit, though it took 33 years for this to happen. They probably opted for 2° Celsius because it is a constant in an equation with so many variables.

When, in 2010, politicians in Cancún resolved to limit global warming to a maximum of 2° in comparison with the pre-industrial age, they gave themselves a pat on the back.

John Quincy Adams was one of the first politicians to appear in a photographic image. It was so cold in photographer Philip Haas's studio that he kept his gloves on while the first shot was being taken. He was still cold, so he rubbed his hands together. After his death, a glacier was named after him: the Adams Glacier in Antarctica. For a long time it was thought that these glaciers were stable, but in 2018 a reduction in the ice mass was noted around the South Pole.

In my mind's eye, I picture the expedition that had set out to survey the Adams Glacier. The scientists did not once set foot on land. The glacier was photographed from an airplane, and the photos were used for measurement purposes. This process, which used to be both costly and laborious, can now be carried out with any mobile phone.

There is a second picture from the same photo shoot with John Quincy Adams in which his hands are in focus. The room had probably got warmer.

Ten years after Adams had his portrait taken, work came to an end on the road over the Furka Pass in Switzerland. The planners built in an extra bend in the road so that tourists could go right past the glacier and see it in comfort. A resourceful businessman built a hotel on this bend and dug out the main attraction: the glacier grotto. The cave is still there to this day, as is the hotel. It offers people a view of the glacier from the inside, which can be gained without any major effort or the need for mountaineering equipment. To stop their livelihood from melting away, the hoteliers now cover the glacier with white sheeting. Nevertheless, the cave needs to be carved out of the ice again every year to a depth of 40 meters, while a man-made (artificial) landscape has been created above ground to protect nature from the anthropogenic climate.

One of the first tourists to be drawn to Switzerland by the sublime landscape was Queen Victoria. Shortly after the road to the Rhône Glacier had been built, she spent several nights on the Furka Pass, drawn primarily by its salutary mountain air and breathtaking landscape. The queen's motto at the time was "simplicity enjoyed in comfort." I don't know if the hotel was able at the time to offer the appropriate level of luxury, but it certainly would have from 1866 onwards when mules

were used to carry a set of dinnerware up to the Furka Pass hotel that included 35 types of crystal glass.

There is no record of whether the queen visited the ice grotto.

Without the tourists, there would be no research station on Jungfraujoch either. It only exists because it is so easy to get to by train, and the railway exists because of the tourists who travel there from all over the world. The scientists conducting research there are not entirely happy about this. So many tourists visit the mountain that their breathing causes a significant increase in the amount of CO_2 emitted there. These exhalations are also picked up by the sensors, thereby distorting the readings.

Tourists come to Jungfraujoch to gaze in wonder at the alpine scenery, the Aletsch Glacier in particular. With around four thousand visitors a day, it is perhaps the most photographed glacier in the world. But the wall of fog that greets me when I visit makes it only vaguely perceptible – if you want to take photos, all you can see is a shroud of bright white.

I consider using the tourists' pictures for scientific purposes. I assembled all the images of the glacier I could find on the Internet and tried to create a 3D model of it. The model turns out flat and two-dimensional, mainly because all the tourists take photos from the same angle.

What we regard today as natural beauty represented a grave threat to the people living in the mountains at the other end of the Aletsch Glacier. In the seventeenth century, the dam for the meltwater burst four times in one year, flooding fields and destroying the livelihood of the local inhabitants.

So the village's pious Catholics went to the Pope and asked if they might hold processions to pray for the Aletsch Glacier to disappear and so remove this existential threat. These biannual processions continued until as recently as ten years ago. Up until this point, people realized that the glacier really was disappearing. The glacier was again pivotal to sustaining life in the mountains because it might stop tourists from coming. A request was made for another audience with the Pope to reverse the edict and pray for the glacier to start growing again.

Sadly, I'm not allowed to film the pilgrimage. But in a pilgrimage chapel, I find ex-voto pictures, offerings given in thanks for deliverance from great adversity. I wonder what images we will offer up in the future.

As the ice melts, the glaciers perspire, revealing things that have been frozen in the ice for tens or hundreds of years. To preserve what came

out of the ice, I tried to create digital copies with a photogrammetry app – perhaps based on the same technology that had been used to survey the John Quincy Adams Glacier. But however many images I fed into the app, the objects remained mere ghosts of themselves.

The 3D models that emerge are so abstract
that the Victorian lady's shoe is scarcely recognizable,
that the leather upper of a shoe becomes a glacier,
and a bottle turns into a sea of tarpaulins.
Those snow goggles could be a cave
and a propeller a grotto.

Conversation between Ursula Biemann and Christoph Oeschger

Conducted in October 2021 in Zurich. The conversation was held in German, translated by Christoph Oeschger.

Christoph Oeschger: For our conversation, I originally suggested discussing *Acoustic Ocean*[157] together with *2°*. Then you proposed adding *Subatlantic* as well.[158] I have added *In the Ice everything Leaves a Trace* so that both have two works to discuss. Why did you think *Subatlantic* would fit better? Where do you see the parallels between my *2°* and your two films?

Ursula Biemann: I wasn't specifically looking for parallels. All of the works involve ice, and in some cases, they were even shot in the same locations. *Acoustic Ocean* primarily focuses on interspecies communication rather than solely on climate change, which makes it a different proposition altogether. That's why I thought *Subatlantic* would be a fitting addition.

CO: In *Subatlantic*, as well as in *2°*, the focus is on the accumulation of knowledge and its interconnectedness. Would you describe your approach to *Subatlantic* in a similar way?

UB: I was drawn to this project by an external impulse. I was invited to participate in an expedition to the Shetland Islands. The research group had previously focused on the Arctic, so I was initially a bit disappointed that this time it was "only" the Shetland Islands. However, these islands provide a clear illustration of the various climate phases of the past 100,000 years. This makes the impact of climate change there visibly evident. I found it interesting to explore how the current coastal villages will disappear owing to a rise in sea levels, and there were most likely settlements in the past that vanished during the last thaw. This inspired me to create a narrative from a subatlantic perspective. I always need a starting point to clarify what artistic statement I want to make, and from there I develop my writing position.

CO: I had a similar experience with the concept for *2°*, which became a metaphor for climate change. For me, the starting point was a thought experiment involving developer fluid. Climate change is not something that can be directly captured on film, and there is no iconic image associated with it. I needed to merge this linguistic image with a visual anchor to guide my writing. Were there similar anchors for *Acoustic Ocean* as well?

157   Biemann, *Acoustic Ocean*.
158   Biemann, *Subatlantic*.

UB: In *2°* you explore the narrative of warming through this thought experiment. You highlight how the concept of global warming has been known for some time and has been interpreted differently. The 2° itself is not visible, but you make it visible through overexposure.

In *Acoustic Ocean* I wanted to focus on the underwater universe and explicitly avoid depicting the surface of the Atlantic. The directive was to "create something about the Atlantic." I was specifically not interested in exploring the trading and global relationships that have emerged thanks to the Atlantic. Instead, I was intrigued by the shift in perspective. I had this idea of being able to wander through the underwater world in the film and hear various sonic effects emitted by the underwater inhabitants. Sometimes, you are also inspired by watching a film and thinking, "Wow, I want to work with such sounds too." This led me to conduct research on the underwater sonic communication world and its connection to the research instruments used today. In the past, certain scientific knowledge was lacking, leading to flawed interpretations of results. It's like your film, where people once thought a 5° increase in temperature was a wonderful thing because they didn't fully understand the bigger picture.

CO: In *Subatlantic* you alternate between above-water and underwater scenes. That's why I wanted to discuss *The Other Side of Ice* with you as well. I noticed similarities not only in content but also in our approaches to finding images. I assume you also used a GoPro camera and submerged it in water. In my case, I have four images in the photo installation, and I plan to incorporate the video footage into an essay film about the work. Could you talk a bit about how you arrive at your visual compositions and why the shift from above-water to underwater appeals to you?

UB: In the film, I describe events that take place underwater, focusing on large-scale underwater currents on a planetary level. These movements, on a planetary scale, are also things that cannot be visually captured on film. The idea was, that as a species we need to physically attune to the upcoming changes, which is, of course, the science-fiction aspect of it. The upcoming changes are expected to occur much faster than we can physically adapt. Scientists estimate that this adaptation occurs one million times slower than the changes themselves.

The concept of attunement resonated with me. In my work, I aim to find a language for the state that lies ahead of us. This state is not only physical but also emotional and psychic. It is imaginary, but, above all, it is real.

Returning to the topic of visual compositions, I was determined to capture underwater images on the ice. I managed to persuade an Inuit fisherman to take me out on his boat. We attached the camera to his fishing pole, so I couldn't see what I was filming at the time. We repeated this

process several times, and I only saw the footage in the hotel, not knowing whether I had captured any images or not. If I hadn't captured any, I would have had to go out again the next day.

CO: I'm familiar with that kind of working approach from the Arctic as well. I had three GoPros that I used in alternation mounted on a wooden stake. We would go out almost every day with the researchers on a small cargo boat that we had modified for scientific measurements. The researchers would take sediment samples near the Eqi Glacier in Disko Bay. I quickly realized that my camera equipment had its limitations. With one camera, I could record for about five minutes per day, and with the other two, approximately ten minutes each because the cold of the water quickly drained the batteries. I would come home with only 25 minutes of footage each day, and considering the blind shooting approach, oftentimes most of it would have nothing usable.

UB: In the cold, everything becomes a challenge for the equipment. What is interesting about the underwater shots we took is that there is no human behind the camera, so it is detached from a human perspective. There is a lens, there is an objective, but no one controls what is being recorded.

CO: I also found that interesting, but from a different perspective. For a while, I delved into photographs from the classical modernist era of the 1920s. It was during that time that the Leica and other 35-mm cameras were introduced. There was a switch in perspective. The cameras became much more portable, allowing for different angles of view, extreme low or high angles. The composition of the images became diagonal, breaking away from the static shots taken on tripods. A similar movement happened with the introduction of GoPros. Using GoPros can be seen as a repetition of this style of photography, and today this applies to moving images as well. If you look at films like Verena Paravel and Lucien Castaing-Taylor's *Leviathan*, [159] you can see a similar movement to the 1920s in photography history. Back then cameras got smaller, and it was possible to detach it from the eye. Now something similar happens with the moving images.

UB: I find that very interesting. Because that relates very strongly to the history of film and photography. You don't bring that into the works themselves. In *2°* you tell the story of climate science, the story of the glacier, and other stories that come into play. But not so much the history of film. That would have interested me as well.

CO: In *2°*, it can be found in the story of John Quincy Adams and studio photography. In *The Other Side of Ice*, it's not explicitly formulated because it affects my image findings but is not so relevant to the narrative.

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159   Lucien Castaing-Taylor and Véréna Paravel (dirs.), *Leviathan* (Sensory Ethnography Lab, 2012).

In *The Other Side of Ice*, there are parallels between my work and that of the scientists I was with. They would lower their tubes into the water to retrieve sediments while I was trying to bring up images.

In our pre-discussion, you asked me if the story in *2°* about human CO2 emissions affecting the measurement results on the Jungfraujoch is true, and yes, it is. Conversely, in the first few minutes of *Acoustic Ocean* I had the feeling that we were looking at a real character precisely because I know that you work with a lot of documentary elements. Can we say that? How important is this form of fictionalization to you?

UB: The term "documentary" is completely forbidden [*laughs*].

CO: The question still stands though [*laughs*].

UB: When did it become clear to you that it was fictional?

CO: It became clear to me after taking a second look at the clothing. I don't think anyone dives wearing an outfit with a reindeer-fur collar.

UB: Yes, there is indeed a contradiction.

CO: How important is the documentary aspect and how important is fictionalization? And especially the interplay between the two?

UB: I am very interested in science, and I don't want to criticize or parody it. However, I find that pure rational thinking excludes many forms of communication. In my works, I am specifically interested in these forms of communication. It shouldn't feel completely like science fiction. I wanted it to be more subtle. The viewer should stay engaged with the scientific content, and in between these poetic moments should emerge, which don't necessarily belong there. The poetic aspect is perhaps a "breach" of scientific belief. Through a fictional character, I can incorporate a good deal of this content. Having a character in itself is a good thing because it allows a lot of content to be conveyed.

CO: I also considered the narrator in *2°* to be a literary character …

UB: What kind of character is she? She's a narrative character, but she doesn't reveal herself as a distinct character, right?

CO: Exactly, she's a narrative character who serves as the narrator and conveys the content, but she is not at the centre as an independent character with an individual story. She rather represents a voice that guides the audience through the narrative. It was a deliberate choice not to establish explicit autonomy for this character in order to focus on the scientific content. Character development was not a central concern for me. Instead, my focus was on having a different relationship with the "I" in the narrative. This allowed me to create a distance from myself as a

person. It enabled the narrator to say things that I wouldn't necessarily say, thus serving the dramatic structure. It also allowed the narrator to engage in thought experiments that may not be strictly logical or scientific. Understanding the narrative voice in this way was very helpful for me in the writing process. While this may not be crucial for the film itself, it served as a methodology for developing the narrative voice.

UB: That is very important, especially when gathering many pieces of information. The narrative voice is what connects these elements the most and actually shapes the storytelling. When I was filming for *Subatlantic* on the Shetland Islands, I visited the little village museum, which had a small library with a few hundred books. I decided to read one of them, just one. It was the account of a captain, as there were many whalers on the Shetland Islands who sailed from there to Disko Bay in Greenland for hunting. They would be away for six months before returning. In the book from the library, these were heroic tales of men.

This captain was one of the few who survived when they got trapped in the ice in the course of one winter and had to overwinter on their ship. What interested me about this account was the words he found to describe the various forms of ice, the climate. The entire language surrounding these harsh conditions fascinated me. Such sources, with their unique narratives, provide me with a vocabulary as well.

As for establishing my own writing style, it's a process that evolves over time. It's influenced by various factors, including the subject matter, the intended audience and my own creative instincts. I strive to find a balance between informative and engaging language, and I often draw inspiration from diverse sources, both within and outside the field of filmmaking. Ultimately, it's about finding a voice that effectively conveys the intended message and resonates with the audience.

CO: Especially when it comes to writing, I find it very difficult to define a specific methodology. For me, writing film scripts often takes the form of a search. Visual metaphors, in particular, provide me with a structure that I can navigate to tell a story. In *2°* it was the opening sequence with the jump cut that served as a starting point, from which I could then continue with the rest of the research. My writing process is not linear; it's more like a network. Bringing that network into the linearity required for the film is always a major challenge for me. However, it was much easier for me with *The Other Side of Ice*. There, I had these different puzzle pieces that were sometimes directly connected – texts that specifically referred to images, while others loosely commented on or addressed topics that were not visible. This working method was much easier for me.
I also struggle a lot with the linear texts for the films. Similar questions arise repeatedly: What information do I need to provide to be understood? How specific or open can my storytelling be? How much does

the image or sound take on? Where can I contradict the image or have the text contradict it? Where is the image important, and where is the text important? And what meaning do they have? Something I also wrestle with is the singular voice. The omniscient voice-over that is present. For an upcoming film, I'm currently experimenting with writing the voice-over as a dialogue. While it solves some problems, it also introduces many more challenges. It's more difficult in terms of writing, but it makes sense in terms of content because it's easier to expose contradictions.

After my research work on *The Other Side of Ice*, I felt that research in the Arctic plays a very ambiguous role. On the one hand its results give us an idea of what is to come, as this data can be incorporated into climate calculations. On the other it also helps preserve a part of the Arctic.

Then there is the other aspect of research in the Arctic. I think Kvanefjeld illustrates this very well. Kvanefjeld is the site of a rare-earths deposit, and there is currently a huge debate about whether to start open-pit mining there or not. This would entail significant environmental destruction. These rare-earth deposits were discovered by the Geological Surveys of Denmark (GEUS), which was a scientific expedition. It was this discovery that triggered the thirst for rare-earth materials. I saw your Sami researcher almost as the "ideal image" of a researcher. A researcher who connects with nature through her research, instead of enabling its destruction. Does fictionalization here also take on a form of utopia?

UB: Yes, definitely. That has to do with the fact that in various works I started out with the image of the indigenous researcher. In my current works in the Amazon, this figure is very present. It represents a type of knowledge that has never undergone scientific validation and therefore has not found a place within our scientific paradigms. It's something that I would like to bring back. I want to acknowledge these different forms of knowledge as valuable. The Sami people have a highly nuanced understanding of their environment and ways of communicating with it.

CO: Is this somewhat of a poetic counterproposal to science, or more of an opening in a different direction?

UB: Science used to assume that the oceans were a silent world. That has now been disproven. The Sami people have always communicated with what they couldn't see. It's a different truth, where there is a vast knowledge of nature. In *Subatlantic*, data comes in triggered by the melting ice, such as the microbes that have been preserved for 400,000 years and are still alive, actually altering the genetic composition of our planet. I find that a very suggestive idea. It all has a scientific basis. The

fact that our planet is changing on so many different levels, from the smallest to the largest dimensions, stimulates my imagination.

CO: I find it difficult to have a clear stance on science itself. Last week we had a conversation with the people from MARUM[160], and they said, "Of course, when we go on an expedition, companies that are interested in deep-sea mining are also interested in our scientific data. This is open-source data that is accessible to them. On the other hand, researchers also make use of data from resource companies."

That's when my activist side emerges, and I think it might be good if certain places remain unexplored. However, I don't want to burden science with my activism. Sciences have a different role. The goal of sciences is to generate knowledge. I can't shake off this ambivalent relationship because I often feel that science doesn't take a clear stance on such matters. Especially in the context of the Arctic, this is strongly felt with all the global players now pushing into the region. For example, China has built the icebreaker *Snow Dragon* for research purposes and declared itself an "near-Arctic state". There, research is clearly intertwined with geopolitical interests.

UB: Research alone never has the funding for such endeavours. It has to align itself with other interests. This has been a fact since the beginning of research. It's something I've been looking at more closely in relation to indigenous scientists. There was a debate that took place between the National Geographic Society and the Church in relation to Darwin's teachings. In the end, it was decided that Darwin was permitted to teach his controversial theory of evolution but keep out of politics. The human relation to the natural world was delegated to science but at the same time banned from the public sphere. This was very limiting for scientists. They were expected to be objective and neutral while being excluded from crucial political debates. This has had a profound impact that continues to this day. I believe that with COVID and climate change there is a new imperative to address this. Science can no longer maintain this standoffish position.

CO: I don't think my film is primarily about climate change. Rather it's an exploration of how we in Switzerland interact with landscapes, how we understand them and how we interpret them. Something similar happens with your (fictional) Sami researcher. She offers a different approach to reading landscapes. She develops her own scientific way of measuring that lies somewhere between animism and interspecies communication. Is this also a proposal for understanding nature differently or for changing our understanding of landscapes?

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160   Marum – Zentrum für Marine Umweltwissenschaften, Universität Bremen, website. <https://www.marum.de/index.html>.

UB: "Landscape" is a word I never use, either in my films or in my texts. It doesn't even occur in my imagination …

CO: What term do you suggest instead?

UB: My thinking is heavily influenced by a geographical understanding. Geography, as a produced space, is where we, as filmmakers, operate and create the meaning of this space. You shape this space of significance, and it is always characterized by relationships. It is not defined by the frame that is seen in the film – rather meaning emerges through the relationships that take place between people, their social and historical connections. Interspecies relationships with postcolonial references are formed, and all of this is part of geography. The concept itself is hybrid. It is both scientific and technical, biological and cultural, etc. In my opinion, this concept aligns more closely with the understanding of an indigenous worldview. Indigenous people immerse themselves in a network of relationships, and if someone understands these relationships well they become part of this territory. It is in no way something measurable.

I agree with this perspective. It moves beyond the dualistic opposition of nature and technology, of sentient beings and those that are non-sentient. It transcends these boundaries.

CO: I really like the term "geography". I also struggle with words like "landscape" and "nature", yet these terms are used to describe the Alpine region. There is this fixed idea of a Swiss landscape, even though it is a technical landscape full of infrastructure.

In the film, my intention was to break this image. One must understand that you always look at this landscape from within or through the infrastructure. But you never really want to see the infrastructure itself. In this sense, I find the term geography fitting because it encompasses this perspective. Of course, this is far from a consensual society. Perhaps that's where it comes from. I did my alternative military service in a nature conservation organization, where I took photographs. I always felt that they had an extremely idealized image of nature. For example, I would go out and photograph a forest. When I returned with a picture, they would ask me the altitude at which it was taken, and if it was around 500 meters above sea level, they would say they couldn't print the image because, from their perspective, the coniferous trees in the picture only occur naturally in an ideal setting at altitudes higher than 800 meters above sea level.

I realized that this way of idealizing nature, as practiced by this nature conservation organization, is the consensus in our society. It was completely contradictory to what I saw during my travels to the protected areas. In Switzerland, the nature reserves are often very small-scale. To

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reach these protected areas, one has to pass through industrially used forests or landscapes. In my work, I noticed that landscape/geography is encoded differently and read differently.

It's the same with the tourist view of Switzerland. Everyone wants this idealized image – a comfortable view that requires infrastructure, but no one wants to see the infrastructure itself. Everyone looks at the glacier from the viewing platform, but no one wants to see the viewing platform itself. That's what interested me in the film, rather than the concept of nature itself.

UB: Exactly, the question of what form of nature one wants to preserve, and how, has also changed significantly in recent years. What you're describing is almost an American concept of nature conservation. It is not really advocated elsewhere. Today, there is a much stronger emphasis on the idea that humans should also have their place in such reserves. This is how the opposition between nature and culture is breaking down in nature conservation as well.

CO: In the exhibition *Circular Flow* in Basel,[161] your film *Remote Sensing*[162] was shown. I found the film alarmingly current. In the film, you get a picture of the period in which it was created, but video technology has advanced since then, and the methods of securing borders with satellite images are certainly no longer as new. However, I would claim that human trafficking has continued in the same way. So the film is simultaneously current and rooted in the time of its making. Do essayistic documentary works have different temporalities in their performances? How do you move from the current to the universally valid?

UB: In *Subatlantic* I was preoccupied with the fact that we are entering a completely new era with the Anthropocene. Previously, the focus was mainly on the period between World War II and globalization – that was the historical frame of reference. Then, suddenly, this dimension of time exploded, encompassing the entire history of humankind. I wanted a character who could undertake such a vast journey through time, and this can only be fictional.

As for the relevance in the film, it deals with things that span a long period of time. That's something I had never done before. I would never have come up with this idea. In *Acoustic Ocean* it is more of a mythical situation, and time is unimportant there. There are references to *Silent Spring*, where they talk about the canary in the coal mine that should indicate when the CO_2 levels are too high.[163] In this case, the bird has died. These kinds of "canaries" also exist underwater – such indicators

161 Søren Grammel (curator), *Circular Flow: Zur Ökonomie der Ungleichheit*, exhibition, Kunstmuseum Basel, 7 December 2019–19 July 2020. <https://kunstmuseumbasel.ch/de/ausstellungen/2019/circularflow>.
162 Ursula Biemann (dir.), *Remote Sensing* (2001).
163 Rachel Carson, *Silent Spring*, 40th anniversary ed. / 1st Mariner Books ed. (Boston: Houghton Mifflin, 2002).

exist. It highlights a relationship: it's a literary moment that was important for our understanding of the environment.

CO: I started working in a more essayistic manner in order to have a different temporal horizon, to connect narratives from different time periods. This approach expands the frame of reference and allows for broader storytelling in relation to the topics concerned. With this background, I find it interesting that you mention how entering the Anthropocene has expanded the notion of time and the frame of reference. The essayistic approach allows me to tell stories that connect the present with the historical, providing me with a different kind of access to current events.

UB: Why did you choose the visit of Queen Victoria for your film? Why is it an important moment, and what does it say? Especially with all the glasses?

CO: The visit of Queen Victoria was actually like a promotional moment for Swiss tourism. Not only did adventurers, mountaineers and pioneers come then but also the upper class. It was the moment when they started to make themselves feel comfortable in the Alps, even if it meant hauling goods up the mountain to an altitude of 2,500 meters at the expense of considerable physical and logistical effort. This is related to the creation of infrastructure. And again, we are looking out at this "wilderness" in comfort. However, this wilderness is an internal image and not something that really exists in Switzerland.

UB: That's the only reality we have in Switzerland. But I also find it interesting that we constantly engage with what we have here.

CO: For me, it's a historical reality that repeats itself in variations. The reality of the hundreds of glasses in the Furka Hotel is repeated again at the Jungfraujoch. The hundred different glasses at the Furka Pass are echoed in a different form at the Jungfraujoch, where Swiss luxury watches are sold. While it may be seen as an absurd narrative with Queen Victoria, it is still the reality in the Alpine region under different circumstances. And although it's no less absurd, it's much less questioned.

UB: Of course, we tend to overlook the things we do ourselves.

CO: Is essayistic work also a way for you to engage in time travel? A way to condense a narrative spanning thousands of years in your case, and two hundred years in my case, into approximately 15 to 20 minutes of essayistic film?

UB: In my case, it spans 12,000 years – since the ice last melted. I place us in relation to that time, as we are also facing a turning point. Just like back then, sea levels are rising, and there are many other parallels to that time. The essayistic narration serves multiple purposes for me,

the most important of which is that it allows me to combine things we know, such as political and social realities, with sometimes very theoretical material. That's something you don't often do in a documentary film. It's a privilege to be able to engage in such reflections in an essay film. Additionally, I can take on a planetary perspective and establish connections between different elements. The essay film has a different dimension in all respects. For me it is also something that can constitute an imaginary space.

CO: Something I also experience in my essayistic work is the question of scaling. I originally came from a documentary background but now consider myself to be working in an essayistic manner. Scaling allows me to move from the small to the large, from the visible to the invisible within my works. From this process, a space of meaning emerges that can connect these different levels and create a sense of resonance. This aspect is of key importance to me in this form of work.

UB: You're talking about the physical experiences one has on location. In the film, you mention things like the temperatures and the challenges of getting there, as well as the ease that digital technology has brought to the process. There's a significant difference between what technology and mediation can accomplish compared to the physical experience on-site, and that's something I see strongly in your film.

CO: Fieldwork remains a central part of my work. It's important for me to be truly on location – not just to abstractly address things but to have that physical experience. Whether it's always visible in my works, I'm not sure, but it's always palpable. I find it interesting to go to places where something crystallizes, where there's a fault line that reveals something. How do you choose the places you visit? What do these places need to fulfil? And how do you approach fieldwork?

UB: In the case of *Acoustic Ocean* in the Lofoten Islands, there was no fieldwork in the traditional sense. I wasn't there to investigate the situation, to explore which whale makes which sound. In fact, I can do a better job of that from my computer here than being there on-site. In other works, however, fieldwork is much more pronounced. It was a feature of *Subatlantic* and even more so of my current work in the Amazon, and especially works that deal with resources. In those cases, I have to go to where the clashes between indigenous communities and other actors are taking place. It's important for me not only to depict the politically activist positions but also to examine the influence these clashes have on climate laws and the larger problems we, as humans, must confront.

Usually, I start with philosophical ideas. If something interests me, like Timothy Morton's concept of hyperobjects or any other philosophical proposition, I consider where I can find it on our planet so that I can

make visible what interests me about it.[164] *Subatlantic* embodies the concept of the hyperobject for me.

CO: Do philosophical ideas influence your language or the language you create for your films?

UB: No, not really. I understand *Subatlantic* to be a poetic work, in both its imagery and its language. In the process of creating the work, I read scientific texts as well as a lot of poetry. For *Subatlantic*, in particular, I was inspired by Etel Adnan, the French Lebanese poet. She wrote a book called *Sea and Fog*.[165] I really liked her texts because they bring together surprising combinations of ideas that are irrational. I wanted to incorporate some of that quality into the film.

CO: So you have many literary references?

UB: Yes. On the Shetland Islands, I had this book about whalers that originally inspired me for *Subatlantic*. Then, because of the book, I travelled to Greenland. I wanted to have ice landscapes for this work. I actually said "landscape" [*laughs*]. The organizer of the trip to Shetland had contacts in Ilulissat, and she said it's the northernmost place you can still fly to, where there are still hotels and, more importantly, ships that can take you to the icebergs for filming. That made perfect sense to me.

How about you? You have to select more precisely where you go. For example, you are doing something *about* the ice or *about* the glacier. Then you must have clear ideas about where you want to go, right?

CO: I choose the places I go to very consciously; they have to be places where something crystallizes. My method is definitely to collect stories on-site and to establish connections within these stories. My challenge is to notice when it doesn't work within the different materials. Then I have to go out again to add another story or even to get rid of one.

In *2°* there is the ending with the votive tablets, which was added relatively late. But it was important precisely because it illustrates how the relationship between the inhabitants and their geography changes. From nature being a threat, to nature as a foundation of life.

UB: That's actually a very intriguing story. I found it a bit disappointing that you didn't integrate it more into those ice landscapes. After the votive tablets, there are more abstract images and themes. That would have been a moment that could have resonated with people. Not just the tourists walking around, but suddenly it's about something. My

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164   Timothy Morton, *Hyperobjects: Philosophy and Ecology after the End of the World* (Minneapolis: University of Minnesota Press, 2013).
165   Etel Adnan, *Sea and Fog* (New York: Nightboat Books, 2012).

question was whether this is the right place for this type of information and in what visual world this part is embedded.

It immediately made sense to me why this story is in the film. I thought it was great that the idea of the mental power of this small community up there can have such significant effects. I don't find it ridiculous at all. The Internet is full of those management trainings that essentially do the same thing. Today we know that such targeted attention can trigger materialization. It's not as foreign to people today as one might think. Back then, it was actually practiced, and today it's portrayed as if there's no such counterpart anymore and that the idea is outdated. These ways of creating connections interest me, and I'm trying to incorporate them more and more into my new works.

What about sound? How do you work with it? What kind of sound do you create? What function does sound have for you?

CO: In my recent films, I have always collaborated with Fabian Gutscher. Fabian is a musician, artist and sound designer. I have worked with him on three films so far.[166] His work has always allowed me to see my own work in a new light.

I should also briefly mention how I work in the field. I always shoot alone. When shooting alone, you have to make compromises, and for me that usually means sacrificing the original sound. It's a challenge to capture high-quality original sound, create good visuals and deal with the people on location all at the same time. At some point I decided to focus on the visuals and the people on location. That's why Fabian always does the sound design for the films. Fabian has a subtle approach that aligns very well with my filmmaking style. In his soundtracks, there are illustrative moments – the postproduction sound – that create a kind of hyper-clarity. He then develops and dissolves that clarity. His soundtracks always have something very distinctive that comments on the actions in the film and provides strong support. I greatly appreciate this approach in his work.

There's always a sense of relief and ease when I layer Fabian's sounds under the film. It's in that moment that I can see whether the film is "breathing" and whether the images come to life. A raw cut without sound is always quite dry. That might sound a bit esoteric …

UB: I understand what you mean.

CO: Specifically, this is how I work. I try to write in such a way that the text already has a certain rhythm and melody. When writing, I read the text aloud in the studio to get a feel for the rhythm. Listening to hip-hop

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166   By the end of the doctorate, it had become four films.

beats while writing helps. That forms the basic structure for the film's rhythm. To get the film to a rough cut, I overlay it with music pieces. For *2°* it was mainly a techno track by Marcel Dettmann titled *Phantom Studies*.[167] For *Memories of a Past Future*, it was various snippets from John Coltrane's album *Giant Steps* that I sped up.[168] Before passing it on to Fabian, I delete all the music. Because I don't consider this provisional music as the actual soundtrack, but rather as a metronome. I only give Fabian the recorded and edited voice-over. And Fabian starts working on the sound design for the film. You often work with the same sound designer. How does the process work for you?

UB: I actually only work with Patrick Codenys from Brussels. He's a musician and works a lot for video artists.

CO: How clear are you as the client, or how much freedom do you give to the sound designer/musician?

UB: I know that composers appreciate it when you bring a lot of original sound from the field. I always try to capture sounds like wind or water moving up the shore, etc. In *Acoustic Ocean* there is also a small story that we had to record twice. Once while filming, and then about 15 times in a cave where there were fewer background noises. It was quite challenging for me to synchronize the lip movements.

I create a very rough cut, perhaps more of a first sketch, so that the sound designer can get an idea of the sounds involved. I don't like working for too long without knowing what kind of sound will come. There is a risk that the sound suddenly becomes alienating if you have already edited so much and then, six months later, a strong element comes back that you had already said goodbye to earlier. So we work hand in hand. I send him something, and he sends back something he thinks could fit. I then react and say that I want more or fewer effects at a certain point, or I don't need anything there. He is very careful and always leaves a lot of space.

CO: For me, that happens in a second step. Fabian then builds up a lot of sound. There are moments where I have to say, "Oh, here it's too illustrative or too much, too dense. It needs more space." I like this hyperrealism that you achieve through sound design, which you can never achieve with original sound. For example, in *2°* the scrolling on the mobile phone screens or the footsteps from afar. I like it when it emphasizes certain scenes. The danger is that it can veer into slapstick humour. Usually, Fabian builds up the sound and we go through it together, figuring out where it's too much, and then we level it down together.

167   Marcel Dettmann and Ben Klock, *Phantom Studies*, record (Ostgut Ton Berlin, 2017).
168   John Coltrane, *Giant Steps*, record (Atlantic Records New York, 1959).

UB: That really helps to define exactly what you want with the film. This dialogue with the sound designer is a crucial part of that definition for me.

CO: Is it an additional external perspective for you? In the dialogue, you check whether the film is ultimately coherent. It's comparable to editing, but on an artistic and poetic level. I sometimes had that feeling that together with the sound you realize what works and what doesn't.

UB: The sound designer comes into play a bit earlier for me than for you. Sometimes it can be too early. In a current project, I sent it to him in advance. He quickly replied that he didn't understand the film's intention yet. That's when I realized that I didn't know it either. He then sent a few sounds, and they were really helpful in moving forward. They also made it clear which passages didn't work at all, so I removed them immediately. For me it becomes a reflection of the editing process.

CO: You also use footage from other people, like the underwater footage from the Shetland Islands. Is that a similar collaboration?

UB: Just like how I sometimes purchase sounds or get material from scientists when quoting them, it's the same with visual footage. For example, in *Acoustic Ocean* I used the wonderful microscopic images of water microorganisms from a photographer in Paris who mainly collaborates with scientists. He gave them to me. I can't create such images myself, and I don't necessarily have the ambition to learn how. I think if someone is willing to give me those images, then I'll use them. Do you have a problem with that? Or how do you handle such material?

CO: I often use external material. I collect a lot of it when I'm doing research, for example the map from Greenland in *The Other Side of Ice* or the 3D model of the Lomonosov Ridge. It's also clear to me that I can't create such material myself.

It's very important, both in terms of content and form, to integrate this material into my work. This material forms an echo chamber for me, and I need it for the type of narrator in my work. There are also materials from collaborations that I incorporate into my work. As mentioned earlier, foreign material allows me to expand the temporal and spatial horizons. So my work is not limited to just the Rhône and Aletsch glaciers; I can extend it further. The question of how to handle the material arises for me. Especially in the case of the film *2°* there are these hands, this clapping. These hands come from the official press image of the UN Climate Conference in Cancun 2010, the meeting where the foundation for the agreement was laid. I really like to use this material, but I have to give it a different appearance. I want to break down the expectations associated with this material once again.

UB: In essay films, the analysis of other images is indeed a very important element. It's important to incorporate such sources. I used to do that a lot more in the beginning than I do now.

CO: Do you mainly work alone? Are there also collaborations? How do you attribute them? I'm wondering about this because in a scientific context there are very clear forms of attribution. In art, that's often not done.

UB: Of course, I have done several collaborations. Until recently I used to go into the field alone, but more and more I have a camerawoman and an assistant handling the sound, and I have people designing props. Artistic input also comes from others, which is a normal situation for filmmaking.

For other films, like *Forest Law*[169], invited Paolo Tavares to be a fixer (stringer) for me in Colombia. It turned out that his content was influential for the interviews he conducted on my behalf. Since he speaks Spanish and is writing his PhD on similar topics, he had a significant thematic influence and it became increasingly clear that it was a proper collaboration.

From experience, I know that such collaborations can become complicated when you're working with people who were not involved in the conceptualization of the work from the beginning. There are cases where individuals start claiming ownership because they see the work as their own, even though they were never involved in creating the work or even installing it in an exhibition. I have become cautious about how to attribute collaborations. Even though the whole world knows that I make this kind of film and I'm always invited, the other person claims the work for themselves. That's why I make a clear agreement from the beginning. For example, the film part is my copyright, and I can show it wherever and whenever I want. I am the author of the film, as I filmed and edited it. The collaborators are listed in the credits. In the case of the book, Paolo was the author.[170] The roles were clear in that context too. I know it can be difficult sometimes, but I still enjoy collaborations. I am currently writing a proposal for a larger project that will also be collaborative. I try to establish agreements in advance so that no one feels disadvantaged in the end. Clarity is extremely important in the way we work.

It's also important to note that appearing in a film is not as crucial for scientists as it is for artists. For most scientists, it's an escapade, an excursion, and they go back to business as usual afterwards.

169   Ursula Biemann, *Forest Law*, two-channel video installation, 2014.
170   Ursula Biemann and Paulo Tavares, *Forest Law – Selva Jurídica* (Michigan: Eli and Edythe Broad Art Museum / Michigan State University, 2014).

CO: I can relate to that very strongly, especially in terms of role distribution. Who is responsible for what, and who takes what value from the film? I share your assessment that it's clear who did what because both sides bring different forms of expertise.

I'm quite generous in giving credit. I often find it appropriate to acknowledge shared authorship. I understand the caution that you mentioned, as I'm familiar with these disputes as well. I don't think the way it's handled in science is bad at all. There, it's also clear how citations are done, and you can include something in the footnotes. There are entirely different possibilities for giving credit.

Glossary: *2°*

Different Lives, Different Times, Different Meanings

The objects from the glacier had a life as utility items before the time they were lost. A shoe was worn as a shoe, water was drunk from the field bottle, the propeller propelled an airplane, and goggles were used to protect against the blinding sun on a glacier. Once lost, the objects became traces of human existence on the glacier. Evidence that a human dared to walk through the harsh ice landscape. A trace that the wild place is not free from human touch, and that this has been the case for a long time.

The objects contain various times and meanings within themselves and therefore speak for themselves. In my film *2°* I attempted to think of these objects as being part of the alpine geography and treated them just like the landscape shots in the film.

The idea of creating 3D scans of the glacier findings was inspired, among other things, by Timothy Morton's book *Hyperobjects*.[171] The scans do not follow Morton's definition of a hyperobject so much as the text was an impulse to understand these glacier findings as objects that have different meanings in different temporalities.

Our collective consciousness before climate change assumed that the glaciers were eternal ice. As this is no longer the case due to climate change, the glaciers in Switzerland have become a visual metaphor for climate change. Even though the melting is slow, it is still a tangible and symptomatic aspect of the current situation. For each of us, it is understandable that 1° Celsius can decide whether water is frozen or liquid.

The fact that these objects – which were frozen in the ice for between 50 and 200 years – are now coming to the surface gives them a different meaning than what was originally intended. They become witnesses of the conquest of the Alps by mountaineers, and at the same time they bear witness to the Anthropocene. In this sense, the objects tell us a story that goes beyond themselves, beyond what was intended at their creation. Scanning the objects is not an attempt at realism. Scanning is a process that claims to be precise, but in my case it creates an abstraction. My goal is to bring the objects into the present, to create relationships with other materials in the film, to make them what they are and what they became. So that the objects speak for themselves.[172]

Memories (*2°*)

I had this picture in my head.
I go back there to look at that faded shoe again, the shoe that Janis had picked up from the ice, the shoe that had been frozen in the ice for so long.
Strange that this piece of cracked leather seems to communicate more to me than all the technical images that contain the measurable data.
Strange that this piece of holey leather seems to communicate more to me than the alpine landscape surrounding us – more than the old hotel where the finds are stored.
I have more memories of this Victorian lady's shoe than of all the art that is also housed in the hotel.
I go back there to transfer my memory into a technical image. I go back to preserve my memory with the accuracy of a measured image. To reproduce using the technique we use for measuring the landscape today, for looking at the landscape.
On the way, I encounter landscapes that are no less technical and no less artificial, but rather landscapes that are real – man-made landscapes to protect against man-made events. By transferring them into another pictorial form, the image of the found objects resembles the man-made landscape that still pretends to be nature.
And then images that tell of the relationship with nature, of the threat posed by nature. Images that make us wish the glaciers would disappear (back then) – pictures which should protect the glacier (now).
I find images that tell of what is the same but always different yet always strangely similar. Images that I can assemble together, that become more through the interplay.
My practice, also before 2°, was based on observation. It's the observations that shape my worldview, observations of small things that speak of the bigger picture.
So much for a summary of my artistic practice. So far.
What is new?
A shift of perception, with the change of images. Changing the images of memory. Changing the images of memory to imagine a different future. Images as clay to form a possible future?

Photogrammetry Measurements Surveying Image

The protagonist in the film *Le petit soldat* by Jean-Luc Godard boldly proclaimed: 'Photography is truth. And cinema is truth twenty-four times a second.'[173] It became one of Godard's most famous quotes, taken out of context and presented in direct speech. But does an image become more truthful if it can have infinite appearances as the 3d model

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171   Morton, *Hyperobjects*.
172   Steyerl, 'Language of things'.
173   Jean-Luc Godard (dir.), *Le petit soldat* (Productions Georges de Beauregard, 1960), 24:34.

has on my screen? Is a 3D model that can be rotated on a screen an array of images? Is a model that relies on image measurements and is exact in that sense – but still just a shell – real? My 3D images of glacier findings could not be further from Godard's idea of truth.

Photogrammetry is the first reliable method to achieve a surveying image, and it still forms the foundation for various applications that involve measuring with cameras or other visual recording devices. Even with today's digital images, photogrammetry is often the technical basis for making images usable for surveying. With the invention of photogrammetry, the visible becomes measurable.

Photogrammetry is a measurement image process that was developed in 1858 by the engineer Alfred Meydenbauer.[174] Legend has it that Meydenbauer came up with the idea after he fell while trying to survey the cathedral in Wetzlar and narrowly escaped death. He decided that it would be safer to create an image rather than be on-site. Even in the early days of photogrammetry, the image was used to avoid the need to be on-site. The image allows for remote access.[175]

I don't want to go into too much technical detail about the process, but it is helpful to understand some of the basics of creating photogrammetric image measurements. For photogrammetric recording, at least two images with corresponding image points are required. The measurement cameras built for this purpose were equipped with two lenses, like a stereo camera, which could capture images in parallel. This means that at least two shots of the same object with the same focal length are needed. If the recording position is known – i.e., the distance between the object and the cameras – these shots can be overlaid prospectively and then evaluated. Meydenbauer used a measurement table to transfer data from photographic images to a plan and then measure them.[176] Today this evaluation step happens digitally.

A simplified, visual understanding of photogrammetry can be gained by looking at film trick shot that was developed by filmmaker and artist Tim MacMillan, the 'time slice shot'.[177] For the time slice shot, several images are taken simultaneously from different perspectives. The cameras are mostly arranged in a curve or a circle around the object. This effect simulates a camera movement in a temporal standstill. We perceive a camera movement around the object/subject and feel like we are circling the three-dimensional object/subject at a standstill.

The structure of this technique is comparable to Eadweard Muybridge's sequential photographs of a horse. Muybridge's temporal dimension arises from the horse's running, which activates the wires to trigger the cameras. The result is the horse appearing to move in the sequence of images. The significant differences from the time slice shot are that Muybridge's cameras are arranged in a straight line and released one after another, whereas cameras for time slice shots are arranged in a curve and released simultaneously.[178]

Hollywood's repertoire extends even further, combining the time slice shot with movements, called the 'bullet time shot'. This trick shot became famous primarily through the action film *The Matrix*.[179] In the bullet time shot, a simulation of apparent spatial movement is created by circling around a subject/object. This involves not only capturing a static subject/object from different angles but also capturing an object/subject in motion. This altered spatial perception also allows for a modified sense of time since it simulates the viewer's movement, which is not possible with Muybridge's frontal shots and goes beyond them.

However, photogrammetry takes measurements based on fixed points and the distance between the cameras or the captured images. It is the same technique that I used to scan the glacier finds with the 3D scan app.[180]

174   Albrecht Meydenbauer, 'Die Photometrographie', *Wochenblatt herausgegeben von Mitgliedern des Architekten-Vereins zu Berlin*, no. 14 (6 April 1867), pp. 125–35.
175   Harun Farocki (dir.), *Bilder der Welt und Inschrift des Krieges*, 03:06.
176   Meydenbauer, 'Photometrographie'.
177   'Tim MacMillan', Science Museum Group, Collection. <https://collection.sciencemuseumgroup.org.uk/people/cp133039/tim-macmillan>.
178   This is based on an idea of Mika Elo's, who made this comparison. I thank him very much for the thought.
179   Lana Wachwowski and Lilly Wachwowski (dirs.), *The Matrix* (Warner Brothers, 1999).
180   For the 3D scans in *2°* I used the application matlab.
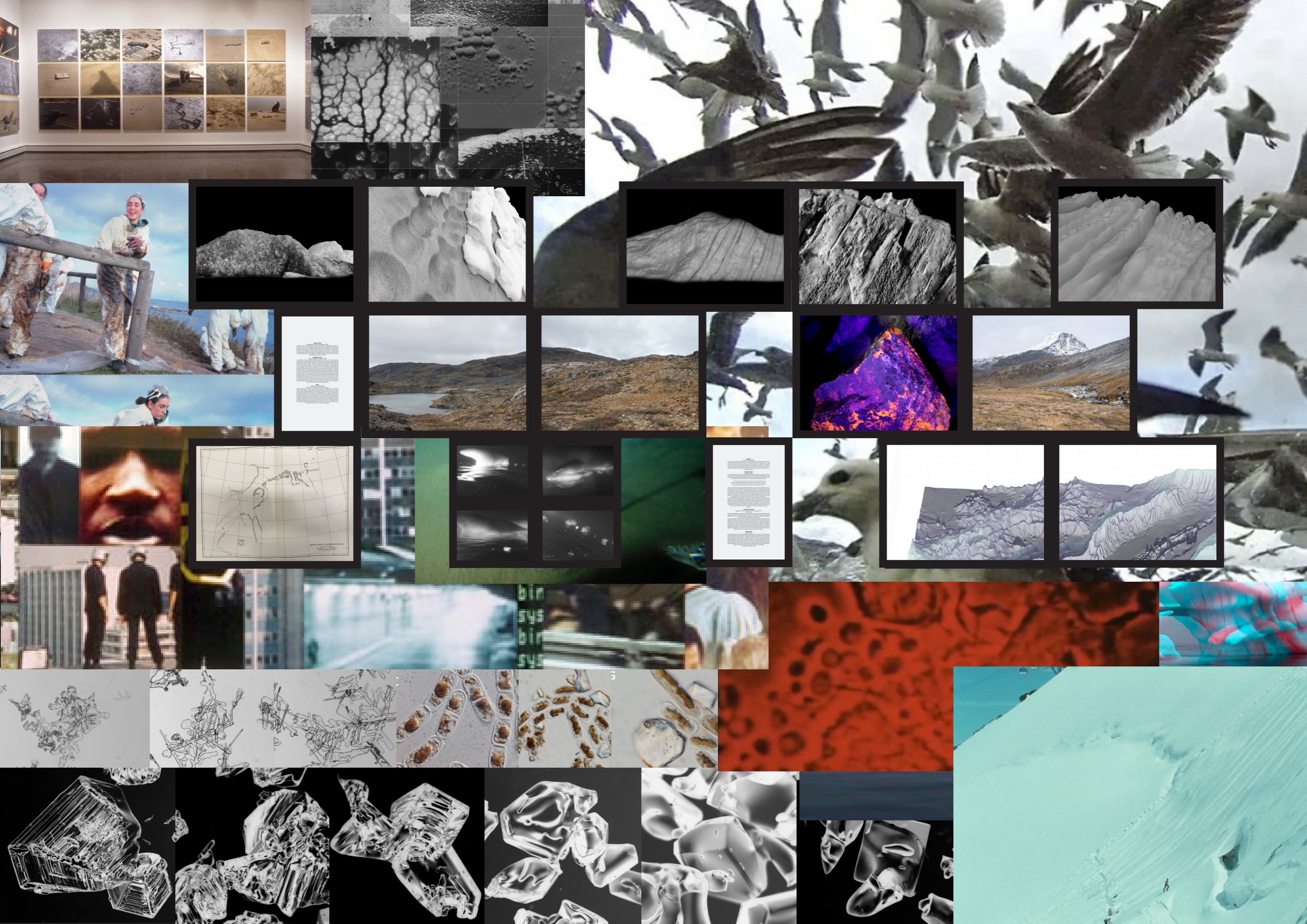
The Other Side of Ice – A Collage, by Christoph Oeschger with the use of the following materials:

– Sophie Ristelhueber, *Fait*, 1992. Installation view of New Room of Contemporary Art: Sophie Ristelhueber / photograph by Tom Loonan
– Alexandra Navratil, *Under Saturn – Act 1*, 2018
– Film still from Lucien Castaing-Taylor and Vérnéna Paravel, *Leviathan* (Sensory Ethnography Lab, 2012)
– Allan Sekula, *Volunteer watching, volunteer smiling*, 2002
– Christoph Oeschger, *The Other Side of Ice* (2022)
– Lewis Baltz, *Politics of Bacteria*, 1995
– Eidg. Forschungsanstalt für Wald, Schnee und Landschaft (WSL), ice crystals
– Marek Stibal, Microorganisms living in the ice (2017)
– Film still from Leslie Thornton, *The last Time I saw Ron* (1994)
– Film still from Armin Linke, *Alpi* (2011)
– Eidg. Forschungsanstalt für Wald, Schnee und Landschaft (WSL), Electron microscopic images of ice
– Film still from Susan Schuppli, *Arctic Achipelago* (2021)

The Other Side of Ice

18 photographs and texts, inkjet and chromira prints, framed,
total size 461 cm × 153 cm, texts originally in German, translated by Simon Cowper.

Introduction: *The Other Side of Ice*

The images in *The Other Side of Ice* explore the tension between the iconic image and the increased technologization and economization of the Arctic.

My interest in the Arctic lies primarily in the areas north of the Arctic Circle that are undergoing significant change. Owing to man-made warming, the ice is melting. In the past, this area has been difficult to access. The melting of the ice is now enabling the extraction of raw materials and opening up new trade routes. Attempts are being made to open up once inaccessible places for exploration and make them productive within a capitalist logic.

This is one of the reasons why there has been a new race to acquire territory in the Arctic. Since a Russian expedition planted its flag on the seabed at the North Pole in 2007, a symbolic battle has broken out over who owns the North Pole. Several countries are claiming areas in the Arctic that have belonged to humanity as a whole. Of crucial importance is the measurement of the Lomonosov Ridge, which stretches across the North Pole.

My work began with a project with the scientist Fien De Doncker and the writer Gianna Molinari. We joined forces within the framework of

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the PolARTS grant from Pro Helvetia to share our research material. Scientific material, ideas and artistic and scientific semi-finished products were to be shared to be then incorporated into each other's work. We met several times to exchange ideas about our respective works and thus created a forum to talk about research outside of our group of peers and repeatedly come up with new approaches to content. This project, which included a trip to Greenland, gave rise to all our individual works.

Interest in raw material extraction exists on the seabed as well as on land. With this in mind, Gianna Molinari and I travelled to South Greenland to visit Kvanefjeld, located in a high plateau above two fjords. Kvanefjeld has become interesting for mining, as it is thought to be one of the world's largest multi-element deposits of its kind. There is rare earth stored there, which can be used for wind turbines, batteries for electric cars and solar panels. Unfortunately, a mine would also mean that radioactive rock would be exposed. The indigenous community fears the released radioactive material will contaminate their hunting, fishing and gathering grounds.

For the sciences, the cryosphere is an invaluable area for studying global climate, which makes the Arctic so important to them. The ice is an archive in which the climate and the composition of gases in the atmosphere are inscribed.

Many researchers undertake expeditions to the Arctic to collect data for climate models. In this way, they contribute to the protection of the Arctic. On the other hand, through seabed research and geological analyses, science also provides the basis for states (and capital) to re-contest national sea territories, thereby leveraging scope for state-sanctioned exploitation of newly found raw material deposits.

The work *The Other Side of Ice* shows how strongly the written part of my doctorate has influenced my artistic practice. Writing the glossary entries has become a part of my artistic practice in this work. The words in the work are already the glossary.

The influence of the doctorate is also reflected in the form of presentation, in that I take up the idea of cross montage. The photographs of *The Other Side of Ice* are presented in frames that are coordinated in size so that the work can be expanded modularly, and I can insert images of future research into the grid. This allows me to set different focal points within the montage.

Words of the Work / Glossary:
The Other Side of Ice

Seabed

North Pole, August 2007

Two diving capsules, *MIR I* and *MIR II*, set out from the Russian research vessel *Akademik Fyodorov* to explore the seabed beneath the North Pole. Expedition leader, Artur Chilingarov, is on board one of the capsules. Soon after the dive begins, he reports back to the crew on the *Akademik Fyodorov*: 'We had a soft landing. We are surrounded by the yellowish ocean floor – there are no marine creatures to be seen.'[181] *MIR I* and *MIR II* have reached a depth of 4,261 meters, where, in the yellowish seabed, they plant a Russian flag, 1 meter in height. The flag is made of titanium, an incorruptible metal.[182]

Mare Liberum

Netherlands, 1609

In his pamphlet *Mare Liberum*, jurist Hugo Grotius distinguished two classes of goods: those which, by virtue of the physical properties that constrain them, can and need to be owned by one or more people and thus controlled; and those that are unlimited. These other goods cannot be controlled and taken possession of by a private person or a particular group of people.[183] He writes:

> The air belongs to this class of things for two reasons. First, it is not susceptible of occupation; and second its common use is destined for all men. For the same reasons the sea is common to all, because it is so limitless that it cannot become a possession of anyone, and because it is adapted for the use of all, whether we consider it from the point of view of navigation or of fisheries.[184]

Thus, by the same token, the sea at the North Pole belongs to us all.[185]

In the seventeenth century, a country's sovereign waters extended 3 nautical miles from the coast. Three nautical miles was the firing range of a cannon at that time. Three nautical miles was thus an area that could be defended and constituted a distinct territorial zone before international waters were instituted.[186] At some point, defence was no longer predicated on cannons. And at some point, countries became more interested in extending their national borders than in defending existing boundaries. The seabed became a focus of greed. But who owns the territory beneath the water, and how are these areas measured? From the coastline, from an island, from a rock in the breaking waves?

In 1994 the United Nations Convention on the Law of the Sea (UNCLOS) came into force.[187] According to this treaty, Arctic coastal states that are signatories to UNCLOS are authorized to claim a national territorial sea of up to 12 nautical miles from the baseline and an adjoining exclusive economic zone (EEZ) of a maximum of 200 nautical miles (from the baseline). Furthermore, if a state can show that the geological structure of the continental shelf represents a prolongation of its land mass, the 200 nautical miles can be extended. This is a further reason for exploring the bottom of the Arctic Ocean: to prove ownership of this or that portion of the deep ocean, thus establishing the right to exploit it.[188]

Lomonosov Ridge

between 87° 24′ 27″ N, 142° 34′ 11.2″ E and 80° 30′ 0″ N, 175° 55′ 12″ W

The Lomonosov Ridge is a 1,800-kilometer-long mountain range lying at the bottom of the sea. Like a gigantic whale that has bedded down there. The ridge is up to 3,400 meters high[189]. It lies there serene, sealed off from the air and in absolute darkness. Its furrows, troughs rifts, and grooves are inhabited by creatures that can withstand the cold. Copepods, for example, paddle and crawl around it. Above the ridge, closer to the surface, cod swim in schools and the clicks of seals can be heard. Icebergs drift by.

In September 2007 the Russian Ministry wrote, 'Results of an analysis of the Earth's crust show that the structure of

181   Cited in Wolfgang Löhr, 'Landeroberer am Nordpol', in *taz archiv*, 3 August 2007. <https://taz.de/!251734/>.

182   Wolfgang Löhr, 'Landeroberer'.

183   Hugo Grotius, *The Freedom of the Seas, or The Right which Belongs to the Dutch to Take Part in the East Indian Trade*, tr. Ralph van Deman Magoffin, ed. James Brown Scott (New York: Oxford University Press, 1916), pp. 27–9. <https://iilss.net/wp-content/uploads/2021/08/Mare-Liberum.pdf>.

184   Grotius, *Freedom of the Seas*, p. 28.

185   United Nations, 'United Nations Convention on the Law of the Sea: Convention Agreements', 1982, Art. 136. <https://www.un.org/depts/los/convention_agreements/texts/unclos/unclos_e.pdf>.

186   'cannon-shot rule', *Oxford References*. <https://www.oxfordreference.com/display/10.1093/oi/authority.20110803095546425>.

187   'International Tribunal for the Law of the Sea'. <https://www.itlos.org/en/main/the-tribunal/unclos>.

188   Dominique Kopp, 'Kalter Krieg unter dem Packeis', tr. Barbara Kleiner, *Le Monde diplomatique*, 14 September 2007. <https://monde-diplomatique.de/artikel/!236982>.

189   Martha Henriques, 'The rush to claim an undersea mountain range', BBC, 23 July 2020. <https://www.bbc.com/future/article/20200722-the-rush-to-claim-an-undersea-mountain-range>.

the underwater Lomonosov mountain chain is similar to the world's other continental shelves, and the ridge is therefore part of Russia's land mass.'[190] Denmark does not concur with this, asserting that the ridge is an extension of Greenland and the mountain range thus belongs to Denmark. Canada also dissents, claiming that the ridge is an extension of its continental shelf and is Canadian land.[191]

Ownership of the Lomonosov Ridge will be decided by a new survey of the massif. The re-measurement of the furrows, troughs, rifts and grooves in the mountain massif will be of crucial importance.

Hans Island
Hans Island, 1984
The Danish Minister for Greenland visited the small island in the Arctic Ocean. He hoisted a Danish flag and left behind a bottle of schnapps (typically Gammel Dansk). On the flagpole he had affixed the message 'Velkommen til den danske ø' – Welcome to the Danish Island.[192]

The 1.2-square-kilometer island is located 377 kilometers north of Qaanaaq/Thule. From a Canadian perspective it is part of the Qikiqtaaluk/Baffin region, while for the Danes it belongs to the province of Qaanaaq. The border between Greenland and Canada was agreed in 1973.[193] When the borderline was drawn, Hans Island was omitted and a decision on where the line should run there was put off until a later date. When a Canadian delegation visits the island now, they raise a Canadian flag, leave behind a bottle of whisky (usually Canadian Club), and write 'Welcome to Canada' on the flagpole.

The dispute was ended in 2022.[194]

Rare Earths
Kvanefjeld, South Greenland, September 2020
I am standing on the high plateau and looking out across the fjords. One of the biggest rare-earths mines is due to be established here. People are saying that this hill is one of the reasons that Greenland is being coveted now. As I take photos at Kvanefjeld, I wonder which rare earths have been used to make my camera and in what quantity. My enquiry to the manufacturer received no response. Based on a quick research, I suspect my gear contains europium, cobalt, terbium, samarium, and maybe lanthanum if I include my lens. Five of the 17 rare-earth elements are in the equipment I took with me to take pictures on the mountain, where the material is still buried in the ground.

Reindeer Blood
Narsaq, South Greenland, September 2020
I am standing in the local museum, amongst the collection of rocks. It's not worth opening the shutters for the museum's handful of visitors. The light comes from LED lamps. A placard thanks the museum's sponsors: the Greenland Minerals mining company and the Geological Survey of Denmark and Greenland research institution. Both sponsors have a particular interest in the Kvanefjeld site. The rock there contains a range of rare earths, radioactive material and red inclusions that the Inuit call '*tugtupite*' – reindeer blood – on account of its colour.

The possibility of extracting the rare earths encourages people to dream big. Mining them is a lucrative business because sustainable technologies rely on these raw materials, which are used for wind turbines and electric car batteries. This is a mine, then, that causes natural destruction in the north so that the technology for sustainable energy can be built further south.

There are significant fears about what the rare earths will bring to the surface with them: uranium and thorium. Many of the people living in the village of Narsaq, at the foot of the mountain, are worried that emissions from the mine will pollute arable land and the hunting and fishing grounds.

No one can own land in Greenland. Everyone has free access to land and water, and fishing, hunting and gathering are open to all. This is not the case in the area around the mine, which will block the way to the hunting grounds. And the owners of the mine don't look kindly on it when Greenlanders climb the mountain and look for *tugtupite*, which they use to make pendants, lucky charms and pieces of jewellery. The land and the rocks on the site of the mine belong to everyone, though a little less so to the Greenlanders.

Hotel
Narsarsuaq, September 2020
The hotel has a drawing with various plants typical of Greenland hanging in the corridor. I notice the word '*Alpinum*' that appears in some of the Latin names: *Cerastium alpinum*, *Lychnis alpina*, *Hieracium sect. Alpina*. In the lobby, there is a brass plate commemorating a Japanese explorer who was the first to cross Greenland from north to south, along with a display of traditional Inuit clothing. The top is labelled 'Anorak' – an item of clothing that has been a global success story. The word has now entered the Ger-

190   Cited in Mike Eckel, 'Russia says tests back claim to Arctic ridge', *The Guardian*, 21 September 2007. <https://www.theguardian.com/world/2007/sep/21/russia.arctic>.
191   Jochen Bittner, 'To Whom Does The North Pole Belong?' *Zeit online*, 9 April 2016. <https://www.zeit.de/politik/ausland/2016-04/arctic-russia-america-conflict-zone/seite-2>.
192   Cited in Marcel Burger, 'Denmark And Canada End Whisky On The Rock War', *The Nordic Reporter*, 14 June 2022. <https://nordicreporter.com/2022/06/denmark-and-canada-end-whisky-on-the-rock-war>.
193   United Nations, 'Agreement between the Government of the Kingdom of Denmark and the Government of Canada relating to the Delimitation of the Continental Shelf between Greenland and Canada', 17 December 1973. <https://www.un.org/Depts/los/LEGISLATIONANDTREATIES/PDFFILES/TREATIES/DNK-CAN1973CS.PDF>.
194   Burger, 'Whisky On The Rock War'.

man language. Anorak is French, it's English, but first and foremost it's Greenlandic.

Like the other guests in this hotel, I am waiting to fly back to Copenhagen. The hotel was built because of the airport. The airport was built because the US military was once stationed there. The US military was there because of World War II. Greenland belonged to Denmark at the time but was then occupied by Germany.

In the hotel lobby, two guests are looking at the departures board installed there and seem a bit nervous. I start talking to them. It turns out that their flight has been delayed by a week. That's the Arctic for you! They say you have to factor things like that in here – the Arctic is unpredictable.

Conversation between Susan Schuppli and Christoph Oeschger

Conducted in March 2022 via Zoom. The conversation was held in English.

Christoph Oeschger: I'd like to talk about your work and contextualize it in relation to my work and research. So, to give you the framework, I approached you for this conversation because I'm doing a practice-based doctorate at the University of the Arts Helsinki in conjunction with the University of the Arts Zurich, which will produce a body of work on different subjects. For each film or each body of work, I'm conducting a conversation with a different artist or researcher that works on a similar subject or has similar methods to mine. I asked you to have this conversation with me to discuss the work *The Arctic Archipelago*[195] and *Not Planet Earth*,[196] both from the long-term project *Learning from Ice*.[197] So maybe you could explain why you chose the Arctic, and why the cryosphere became so crucial for your work or research.

Susan Schuppli: It's always good to talk to another practitioner and reflect on one's practice in the context of someone else's work. I am both Swiss and Canadian. I come from countries that are considered "Nordic". There are a few reasons why the Arctic became important. I have been engaged in working with climate scientists for some time. When people talk about global warming and climate change in the United Kingdom, they tend to think and focus their attention on the Global South, even though the impact and consequences of warming are much more extreme in the Circumpolar North than they are in the Global South.

We know that in Europe we constitute 2 % of the world's population. We understand that the impacts and effects are always radically unequal in terms of their distribution. So it's not to say that, overall, there aren't very extreme climate events happening in the Global South.

I think the discourse – certainly from my vantage point here in the United Kingdom – largely forgets about the impact of climate change in the north. It comes to people's attention through a Greenpeace campaign or the image of a polar bear floating on an iceberg or maybe through the work of Olafur Eliasson.[198]

In Canada, the cold is part of the national mythology. It is valorized as part of the cultural imaginary. Part of the work has also been trying

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195 Susan Schuppli (dir.), *Arctic Archipelago* (2020). <https://susanschuppli.com/ARCTIC-ARCHIPELAGO>.
196 Susan Schuppli (dir.), *Not Planet Earth* (2021). <https://susanschuppli.com/NOT-PLANET-EARTH-1.>.
197 *Learning from Ice* is the title of the overall project that contains different films and works by Schuppli, including *Arctic Achipelago* and *Not Planet Earth*.
198 See Studio Olafur Eliasson, website. <https://olafureliasson.net>.

to delve into these mythologies, and we recognize them too from the colonial imaginary of expeditionary journeys.

But even in the UK there is a colonial connection to the cryosphere. There was a trade in ice between the UK and India. There were a lot of British geographic expeditions to the Himalayas and things like that. These comprehensive nineteenth-century image archives were produced for the various colonial treks into northern India, in and around Kashmir, Ladakh, etc.

The final point I'd make is this: I've always been interested in ordinary materials in my work. Ice is an amazing material to narrate all these stories. Many people have ice in their domestic environment. It is very familiar yet highly extraordinary.

I think that as an artist – if you're interested in working with and through materials – it's about finding materials that enable you to tell a story that straddles many different domains, areas of expertise and communities of interest. So ice is one of those materials. I also like the fact that it's a monocrystal. It's geological when it's frozen, but in its liquid state it's no longer part of the world of geology, it's part of the world of hydrology. And I guess it would also be in another area when it becomes a gas. It's a material that, depending on its state, moves into different fields of study. We're encountering something that has particulate matter from the earth, gases, etc. It's not pure water. It's a very complex material from the point of view of what it holds.

CO: Fieldwork is an integral part of the work for both of us. Going somewhere is very interesting when several parts of my research intersect. I'm looking for places where something from my research manifests and materializes. I'm looking for a kind of nucleus, a place where one sees something. Can you say something about how you choose the places you go to?

SuSc: I don't have a master plan. In some way, the *Learning from Ice* project emerged from an article about this freezer meltdown I was reading. The ice-core archive in Canada, the new ice-core facility, had experienced a triple malfunction in its refrigeration system, and thousands of years of climate history had literally melted away over the course of a weekend. I thought, wow, what a fascinating story. I didn't even know Canada had an ice-core archive! I looked into that story and reached out to the scientists to see whether I could visit this place because I thought this would be … [*pauses*]. In the *Material Witness* project, I was interested in the ways in which materials hold evidence of events.[199] An ice core is probably the most important material from the natural world for studying ancient climactic histories. Other bodies are doing this as

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199   Susan Schuppli, *Material Witness: Media, Forensics, Evidence* (Cambridge, MA, and London: MIT Press, 2020).

well, but ice is very high resolution. I reached out to these scientists. But they never got back to me. Eventually, I was invited to do a three-year project with the Toronto Biennial of Art, and I said I would like to begin this project in the Canadian Ice Core Archive, and with their help we gained access to the people.

That propelled the whole project on a journey, and then I went to the United States – I had a friend who was working there – and I went to the major lab that did the analysis of ice cores in Antarctica and did some shooting there.

When I was back in Canada, the ice-core melting became so much bigger than I'd ever imagined. The story of freezer failure was just a minor story, and the scientists were really annoyed that this was the thing that captured everybody's attention. But when I was there, they also brought in examples of interesting ice that they thought would be useful for me to look at and film.

As an artist, I think they were really struck by what it meant to see their world through someone else's eyes. The things that you notice as an artist, even certain aesthetic qualities of the spaces in which one shoots. These silver tubes are highly reflective, and as you're moving, whatever you're wearing, you see these colours. It was kind of like being inside the International Space Station or something. An ice-core archive is a very unusual kind of space. Very few people will ever be in one of those.

But the short answer to your question is this: it becomes this journey where I need to find out more. You meet someone, then you start. You reach out to somebody else, and things just move. I had an opportunity to work with the Office for Contemporary Art in Norway. They said we have a relationship with Svalbard, which is where I'm going next week. I started talking to glaciologists who are working in this Arctic Archipelago.

This project has many back stories and interviews with scientists from all over the world, from the United States to Nepal, Kathmandu, etc. I've talked to a lot of people. And built up this puzzle, and then certain opportunities come along. And now I'm finally going to Svalbard to do the work that I had originally planned to do through the residency. I guess it is a more organic process than just saying, "I'm going to go here, here and here because I want to tell this global story." In my case, it's just been much more pragmatic about what's possible at any given moment.

There's one final work I want to do. My father worked in development. He was a soil scientist for the Department of Agriculture in Canada. We lived in Tanzania, literally on the slopes of Kilimanjaro, and I thought, okay, I want to go back to this. The last story will be a very personal one.

My father died last year. I thought I'd like to go back to Lyamungu to tell that final story. Go there by myself, very low-key, filming in some way the afterlife of this incredible glacier that is vanishing so rapidly. It won't be around in 20 years time. My father immigrated from Switzerland to Canada and worked on an icebreaker. In a strange way, my own family history has looped back through this project, but that wasn't where it began. Ironically, it's where the journey took me. It took me back to these moments where you connect to a personal story that wasn't significant at first.

CO: I have a bit of the same with the subject of mining. In several of my works, it comes up again and again, and it's getting stronger. My mother is from Germany, and she comes from a mining area on the Rhine – the Ruhr area (*Ruhrgebiet*), where coal and steel production had such a defining influence on the whole economy and the identity of the region. I looked at this from the point of view that many people got incredibly rich, while others, who are still living there, are left to deal with the fallout. Sometimes it's very interesting that even if you start out with an intellectual way of thinking about something, the stuff that you encounter gets to you in a very personal way.

SuSc: I see myself mediating between different communities of practice and knowledge; those are the stories I'm trying to tell. I'm not really telling a story about myself and my family. It's not autobiographical.

Those moments in which you reconnect in ways you don't intend are interesting. Like mining, all these primary resource industries established modernity; they set up the social welfare state. We are now returning to these contact–skin conditions from a very different perspective.

Probably most people in Europe and North America have this kind of history. If you're living in Canada, the healthcare system – basically everything – is a consequence of forestry, fishing and mining, all highly extractivist economies that really set the country up. I think Switzerland is different in that regard, but Germany has much more of that industrial basis as the source of its wealth, I would say. It's not surprising that we can loop back through our family histories to these moments, albeit in very different ways.

CO: In Switzerland, there is the idea of this complete wilderness you have in the Arctic, that there is this natural beauty, while in the UK, as you were saying before, there is not so much awareness about the melting of the ice in the Arctic…

SuSc: It's more like the impacts of climate change on indigenous communities, not things like polar bears and ice caps. It's much more a whole set of transformations. If you live in Norway, you'll also know about the sea ice breaking up. And in Russia, of course, there are huge conflicts

emerging around northern sovereignty now. Access to resources is suddenly becoming possible because of the retreat of the sea ice edge. It also means that the limit of 200 nautical miles is receding. Countries are getting smaller.

CO: That's one of the storylines about the measuring of the seafloor. The discussion about surveying the Lomonosov Ridge is becoming crucial in the division of land or sea.

SuSc: I think people in Britain know that icebergs are melting, but that's about the limit. It's reduced to this one image of a polar bear or an ice shelf collapsing or something like that. I want to tell you much more. As you said, it's not about these iconic moments.

CO: In your book, the *Material Witness*, you link the evidence to the event.[200] When I was in the Arctic, it was very hard to see an event – even though I know that changes were taking place. For me, this was a perfect example. What is happening now with climate change – and on a political level too – has no place anymore. Or these events can't be perceived by the human eye. How does this idea of evidence affect your artistic methods, especially in *Learning from Ice*?

SuSc: It's an interesting question because I would say it's really in the ice-core documentary that I'm still working on the material evidence. In the film, the scientist Martin Sharp at one point agrees that an ice core is a material witness to what we as a species have done to the planet. Everything that goes into the atmosphere ends up in the glacial ice sheets, and so he uses the term 'material witness'.

In the book *Material Witness* and in the research attached to that, I looked at the appearance of evidence related to nuclear events. I was telling a story of Chernobyl from Sweden. I was looking for evidence of where Chernobyl really appeared. It was in Scandinavia, at Forsmark in Sweden, where the radiation detectors at a power plant had these massive spikes. Workers were coming in and setting off the detectors in the morning, and they just didn't know what was going on. They thought there must be a massive radiation leak at the plant in Sweden. They started investigating and realized that the signature of the radioactive isotopes was not something that one of their reactors in Scandinavia would produce. It could only have come from the Soviet Union. I tell the story of ecological or environmental events by following this trail.

Similarly, I told the story of Fukushima from the west coast of Canada five years after the accident. It takes five years for the contaminants that have been dumped into the Pacific Ocean to move through the current. It

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200   Schuppli, *Material Witness*.

takes five years for things to move through the major current to arrive on the west coast of Canada. Once again, Fisheries Canada was starting to get these spikes of radioactivity off the west coast, at Vancouver Island, in the Pacific Ocean. That evidence allowed me then to narrate the story of Fukushima. This is a case where I could connect the evidence. It was highly delocalized from the site of the accident. I was telling this story from a distance because the evidence for the events had migrated, had travelled.

Radioactive isotopes are so particular in terms of their molecular arrangement. They basically have fingerprints you can trace back to their origin point because of their half-life. In the case of the contaminants that arrived in British Columbia, around Vancouver Island, there was lots of testing done in the Pacific Ocean, in the Marshall Islands. The radioactive contaminants of all the nuclear weapons tests that were happening had decayed by the time 2011 came around. There was only one possible place such a concentration of radioactive contaminants in the Pacific could have come from. It was Fukushima, because the half-life of caesium 137 and 134 was 30 years. The stuff that was dumped into the Pacific Ocean during the testing would have basically decayed beyond its half-life.

There are these very interesting examples. Nuclear is a unique point in that sense because it's so particular. You can trace these things directly back to their source, even if they're highly dispersed and move through very dynamic, non-linear kinds of systems. We can't say that for most environmental pollutants and contaminants. It's hard to connect something from, let's say, a mine that's thrown its tailings into a river to people getting ill. It's much harder to make that connection.

So in general, when it comes to environmental evidence, I think tracing it back or connecting it to an event is quite difficult. The thesis relating to the *Material Witness* project doesn't hold up in the same way when it comes to the cryosphere, I would say. Well, it does and it doesn't. It is not a single event; rather it is the interplay of different conditions. For example, lead has reappeared in the ice-core record recently, but microplastics have as well. So it's not a singular event but rather a set of activities. There's evidence of these anthropogenic activities that are recorded by the ice sheet. So, in environmental monitoring, they have a sense of what kind of emissions and pollutants are being released. There's a case of a sudden spike in the levels of lead, even though lead has virtually disappeared since the phasing out of leaded gasoline. Why is lead suddenly appearing in the ice sheets again? It's connected to this manufacturing region in China. But there, we don't have evidence of one specific event but rather a series of events or activities.

CO: Scientists I talked to for my work are using the testing of nuclear weapons as a point where they can synchronize all the ice cores. The

radiation of the nuclear testing in the South Sea is visible to scientists, so they can use this event to date and then synchronize the ice cores.

We talked about the *Material Witness*—material that becomes a witness because the information is inscribed into it. In the film *Not Planet Earth*, your narrator comments on the unwanted effects that arctic weather conditions have on the process of image making.[201] In the film, you use a poetic approach to the material. It's like a dematerialization of the images. Has this more poetic approach to do with the visible and the invisible you're confronted with in the Arctic? When you want to say something about the political reality in the Arctic, you don't see much on the visual plane. In that film, you're speaking about the military submarines in Svalbard and so on.

SuSc: When we're dealing with environmental contaminants, obviously, there's often latency. The consequences accumulate over time. They don't necessarily produce visible changes in every instance. The threshold of visibility has been important for my work, but it's also important for the work of Forensic Architecture.[202] They're always trying to investigate these events of harm and violence that operate in threshold conditions. We all have experience of that. Financial trading does not happen in the visual field. We don't *see* high-frequency trading. We don't *see* the algorithms that are deciding whether we can move across the border or not, go through the electronic border, all of this. We're constantly confronted with the realm of the invisible in our day-to-day lives.

Then there's the way things are changing, and the embodied knowledge that people have of the places in which they live and the tales they tell. My experience in the Himalayas was very different, working with communities there, because they have long-standing knowledge of the incremental changes to the water supply – when the glacier melts or when they can plant this crop. Changes are being registered by communities, and these stories are being told all the time. But when I was in the Arctic Archipelago, in that part of the world there were no people living there.

SvalSat, Europe's largest telecommunications infrastructure, is located there, which is highly controversial.[203] There are Russian and British nuclear fleets moving under the sea ice, etc. There are lots of things happening, but we can't see any of that. It's not perceptible, and so you're right to use the description. The piece became more poetic. I was also very influenced by a novel I had read years ago as a teenager – *Smilla's Sense of Snow* – which takes place in Greenland.[204] It's basically about extremophiles that are released. I don't know if you know this novel.

201 Schuppli, *Not Planet Earth*.
202 For the work of Forensic Architecture, see their website: <https://forensic-architecture.org>.
203 See The European Space Agency, 'Managing signals at the top of the world'. <https://www.esa.int/Enabling_Support/Preparing_for_the_Future/Space_for_Earth/Arctic/Managing_signals_at_the_top_of_the_world>.
204 Peter Høeg, *Smilla's Sense of Snow*, tr. Tiina Nunnally (New York: Farrar Straus and Giroux, 1993).

CO: It's a long time since I read it, but…

SuSc: It was something about these extremophiles that are being released through the melting of maybe a glacier or something. It's a kind of science-fiction story, but it's based on actual events. There was the release of anthrax spores in Russia caused by the melting of the permafrost. The idea that the melting of ice is unleashing these kinds of microorganisms is at the heart of *Smilla's Sense of Snow*. At key moments, the visual image breaks apart in the film. I wanted to say that these are transformative geographies, and we have psychological anxiety about the stability of that world being pulled apart. To do that through visual language and then, of course, with sound. That's what I was driving at there and to suggest the image as a means of transmission. I have such a commitment to thinking of images medically and in terms of transmission regimes and economies.

CO: I had a similar feeling. It's just overwhelming when you see the icebergs. I had to connect the photographs I shot there to a different context, not to reproduce the cliché of wilderness or this mythological nature. I have juxtaposed it with a different narrative about the geography. I decided to link it with other subjects to have a broader view of the Arctic without being too didactic.

Your work contains different films. How do you think these different films contextualize each other? There is not so much text in the film *Arctic Archipelago*. How important are the other films shown in parallel in the way that they contextualize each other?

SuSc: That's the only way I work, so that everything is a part of the project. If I'm doing a workshop as part of the project; there is no single artwork. And I would say that for every talk I've ever done about the series. The two pieces we're talking about are a bit of an anomaly for me. I didn't have a specific story I wanted to tell. As I said before, it was a sudden invitation. It was not that I needed to go there and visit this glacier. It was more of an opportunity to spend time in that environment.

The film sits a bit outside of the overall *Learning from Ice* project. I guess the rest of the work, the work in India, the ice cores out in *Cold Cases*, all these things are much more embedded in the conceptual frameworks that I've been developing, and they have a much more explicitly political dimension, for sure. They're more informational. I wanted some of this reflection. I said I'll work with the material – all of the things that also challenged the ways in which the camera wasn't working and all that kind of stuff.

I would like to move over to the *Not Planet Earth* project, a smaller piece.[205] I'd love to talk to people about how they think these two things

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205   Schuppli, *Not Planet Earth*.

work together. I see the video as a footnote that you can give thought by putting on the headphones, and you hear a lot of information. And if you take them off, you're more in this imagistic sensory world where the sound has to produce this sense of anxiety.

I did have a science-fiction world where things are like they are in John Carpenter's film *The Thing* or a world where there's something lurking that isn't fully present.[206] Science fiction and horror are very good at doing that. There's something happening here that we're trying to attune to. Because of the pandemic, I've never seen it installed myself, so I don't know if it's doing what I was hoping it would do.

The short answer is yes. For me, the projects only make sense when they're part of a whole. Some of them are artwork; some are just workshops; some of them are talks; some of them are little bits of writing. To me, that's the project, that constellation of activities. Nothing is self-sufficient. I think it needs to be understood as part of the whole project. You know this as an artist, the burden of a single work to say everything you want to say doesn't seem … I wouldn't want to put that burden on an artwork – that it must somehow do everything.

CO: Harun Farocki uses the term "soft montage" to describe something similar. He used it to describe what's happening in a two-channel installation. The images influence each other horizontally, not in a linear way. The two screens influence each other in a way that is more abstract or theoretical, rather than on a narrative or informational level. For me, this idea of soft montage as an artistic practitioner and researcher is quite convincing. As regards the extended understanding of this term, you don't have to put everything into one art piece. Especially if you have a more spatial installation of the work, you can connect a more informational section with an immersive experience. This creates different ways of reading the two parts.

In the exhibition *The Other Side of Ice*, I used different distances for the work. You need to go closer to read the texts, but you need to step back to see it. There's a movement the viewer must do. Would you describe your way of working as a form of soft montage?

SuSc: Yes, that makes a lot of sense to me because that seems like a really nice way to describe it. There's a handful of filmmakers and thinkers who are inspiring when it comes to developing research practices. I think Farocki is one of these people. Farocki's film *Images of the World and the Inscription of War* has amazing scenes shot in a research facility where they're studying tides and wave pools.[207] I think there's something about finding a situation. I think I aspire to do that by finding

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206   John Carpenter (dir.) *The Thing* (Universal Pictures, 1982).
207   Farocki, *Bilder der Welt*, 0:00:06–0:01:45.

a situation that can act as a stand-in for something that is at stake in the work.

It captures something of the force, the intensity, the movement. You introduce something into a film project that comes from another world, but it can have a destabilizing effect, one that you can connect to. Adam Curtis does that a lot, but he's more, let's say, hallucinogenic.[208] He brings in diverse materials to do the same thing and tries to create something via an indirect mode. I think we could think of soft montage as a way of introducing elements that are completely external to the world in which the research sits but somehow manage to help you narrate the story that you want to tell.

In some way, it's much more of a montage in a classical sense. Gilles Deleuze has written about the cuts as the transverse connections that are created. So, maybe soft montage is more about the assemblage rather than the sort of thing that intervenes directly in the field of the image.

CO: In the book *Material Witness*, you describe your method as a mode of aesthetic assembly and narrative construction. I can really relate to this description in my own practice in connection with the idea of soft montage. For me, soft montage can also work according to a different "logic" – by this, I don't mean scientific logic but more "logic" in an artistic sense. I'm looking for a better word here, a better word than artistic logic, a "logic" that is required by the aesthetics of the material and the narration. Let's call it the artistic coherency of the work. How would you describe this part of the working process? Is this something you can connect with what I'm describing?

SuSc: Yes, that's interesting. Typically, I will have done the research in advance, so I know something of the context and have a sense of the content. I don't have a script or anything, but I have a story in my head. What I really like to do is when I'm working on a project… For example, when I was in Sri Lanka I wanted to find a place where there had been this massacre of Tamil Tigers. There was a video that was leaked in the UK of this massacre, but it was an anonymous video. I went to try and find the location of that site. It's a bit of a strange piece. I'm just telling you this to give you a little bit of a sense of how to work. I was comparing it to a video that emerged out of Kosovo, which went through the ICTY,[209] and I wrote about that case, the massacre.

I was really trying to compare two very different ethnic conflicts, looking at the media evidence of atrocities and the video in the Kosovo case. We see the way that that eventually makes its way to The Hague. So, I

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208   See for example Adam Curtis (dir.) *HyperNormalisation* (BBC, 2016).
209   See United Nations, 'International Criminal Tribunal for the former Yugoslavia'. <https://www.icty.org/>.

was able to track the video and see how it enters the Sri Lankan forum. However, there's been no regime change in Sri Lanka, and there have been no accountability mechanisms for any of the war crimes committed there. So I was trying to tell the story of these two massacres, both of which had been captured on video but where there were very different responses regarding accountability, etc. That was the story I wanted to tell.

When I went to Sri Lanka, the war had just ended and the state was intent on completely obliterating and changing the public discourse to a war of independence and a struggle for self-determination. The narrative created is that the Tamil Tigers are all terrorists and that this is a war against terrorism. In fact, it was multiple decades of people fighting for self-determination, but the public rhetoric had been completely reframed. The major economic initiative is to turn the north of Sri Lanka into a new tourist economy. To accelerate this, it was moved to cover the traces of history. That was the context I found myself in there. I'd say that this "artistic logic" was more, I think, an artistic sensibility.

During my time there, I was waiting for things to come to my attention, looking out for something that would enable me to tell the story. If we want to use the word synchronization, I was waiting for the story to sync up with what I was seeing and experiencing, and I started noticing that all the billboards were blank. I started shooting these billboards because I thought they were almost like a frame where you would project an image of a future that is yet to come. The billboards were blank because, basically, there was no money. Things hadn't been transformed economically. I can work with that because there's this blank slate. The future will be written from here on. This blank slate is where you start history again, which was really what the state was trying to do.

It leads back to your earlier question. For me, being in the field allows me to have experiences and to get a grasp of things that sync up with the story in my head. I can use that moment because it captures something of what I'm trying to grasp. It's a very different method of assembly. If you're a filmmaker funded through these various production companies, you've got to submit a script, get your producer, and somebody organizes the location shoots. All these things are mapped out, so I could never work that way. I need to be in a context in which the story is slowly … It's lurking on-site. When I'm there, using different recording technologies and microphones, somehow I'm starting to almost tune into that story or pulling it out of the little things I notice.

It starts to be assembled through these experiences. It's not logical. I'd say it's much more of an attunement to certain kinds of conditions – conditions of light, of image. You start to see the images and hear certain sounds in the world around you. I don't know if we would want to call that logic.

I think that's why it is hard to ask someone else to step into my shoes. "Can you go off and shoot this for me?" Because the story has to come out of these perceptual kinds of encounters. In part because it's largely in my head, and I'm assembling it on the site itself. I kind of like editing the film as I'm going along and spending time in places. That's been my mode. It's mostly more solitary and slower – just spending time walking, filming, stopping and noticing things.

I really like Walter Benjamin, and I almost think of my projects in terms of his descriptions in *The Arcades Project*,[210] a sort of assembly composed of minute fragments in ruins and how you begin telling the story out of these minor materials that you start to pay attention to in these moments. I really learned that when I was in Sri Lanka. Precisely because I was trying to tell a story, and it was a story of obfuscation, a story about anonymity. A video was leaked that wasn't identified, and the perpetrators aren't known, and the victims aren't known. In the whole video, the story was a story about unknowns.

CO: I listened to an interview you gave to the MIT podcast.[211] You referred to Walter Benjamin and his looking for small particles and small fragments, which one develops a story around. Knowing that it's going to be important. Finding these particles is essential in the way we work. It's very important to be on the ground to feel this connectivity.

It's the same for me in that the work already starts in my head. After that, I collect material on-site and then process it in the studio. I go somewhere where my idea can materialize itself. From there, it will lead me to the next phase or the next chapter of work.

SuSc: The piece that I just produced, *Cold Cases*, comes out of archival research.[212] This includes places that I haven't been to, for example the ice-box detention at the US/Mexico border. I haven't been inside those facilities. I've been to the places but not at the moment of the crime.

In my work on Chernobyl, which seemed to be quite popular, the piece I did with the newspapers is called *Delayed Decay*, which was an installation.[213] Maybe my more installational work tends to come out of the archival. I really enjoy archival work as well, and it's different. I'd say those kinds of projects are about the assembly of material. They're much more about opening up the research archives. It's not a matter of aesthetic sensibility.

210 Walter Benjamin, *The Arcades Project*, tr. Howard Eiland and Kevin McLaughlin (Cambridge, MA, and London: Belknap Press, 1999).
211 'Material Witness: Media, Forensics, Evidence', interview with Susan Schuppli, 4 May 2023, MIT Press Podcast.
212 Susan Schuppli (dir.), *Cold Cases* (2021). <https://susanschuppli.com/COLD-CASES-1>
213 Susan Schuppli, *Delay Decay*, installation, 2016. <https://susanschuppli.com/DELAY-DECAY-2>.

CO: Like your practice, my work is often research based. I often get labelled a journalist. Through the discussion with Ursula Biemann, I realized that compared with journalism, these ways of working have a very different approach to time.[214] With the method of assembling material or the method of soft montage, you'd be able to confront different periods of time than journalists.

Relative to the timeline of world history, processes are running fast in the Arctic, but it's still so slow that it can't be captured by the camera or perceived by the human eye. What do time and temporality mean for you and your work?

SuSc: Many things, of course. Projects take time. The projects that I work on take the time that they need. In terms of my productivity, if you want to call it that, I am not putting out work all the time because it's just like … it takes whatever time is required. I have a full-time job, and I've got to do everything around my work with the students. I can't just take time off to work on things. Time is the most precious thing we have.

As I said, I couldn't work the classic way. I rely too much on my own perception of the places, acclimatizing to the conditions I'm in and the environment, talking to people, and having conversations. Going somewhere, shooting for three days, moving on, that kind of filmmaking. I don't want to be someone rushing in. Part of the kind of extractivist economy offered in the art world.

There are all these practical issues around time, but then I would say what I think is amazing about working with the moving image is the capacity to slow time down, to play back time, to move forward. You can modulate time, the time of the event, but then go back in time and explore a single moment that expands and becomes a whole project. The temporality in many of the works is often a conceptual breach that I enter and explore.

I use the 19 days between the accident at Chornobyl and its discovery. That time delay of 19 days becomes the whole conceptual framework of the project. One reads the politics of events out of that temporal gap. The work on the Watergate tape: 18 ½ minutes, which becomes 18 ½ minutes of silence after the act of erasure.[215] The 5 ½ minutes of the signal relay from Saigon to New York to transmit the image of Kim Phuc.[216] Often it's these temporal conditions that I enter into. I realize I'm often coming into an event through a time frame, which has been my entry point into much of the research.

214   See Conversation with Ursula Biemann in this thesis.
215   Susan Schuppli, *The Missing 18-1/2 Minutes*, installation. <https://susanschuppli.com/THE-MISSING-18-1-2-MINUTES>
216   Susan Schuppli, *Sound Proofs*, sound piece, 2014. <https://susanschuppli.com/SOUND-PROOFS>.

Forensic Architecture has done a lot of work around the long delay of the split second. So, you enter an event that happened in an instant. Someone got killed, a shot was fired, but one understands everything that happened in that moment of intensity. To look at this moment, you have to expand time.

For Forensic Architecture, developing timelines has been a critical methodological strategy. You start to expand time and to read the long histories. Who's where? What's happened? How did we get to this moment? To understand this moment of a split second, we have to understand much longer temporalities. I don't think journalism generally is interested in these multiple, coexisting temporalities. In the coverage of the war in Syria, we're not hearing the story of long-term drought, and how drought was an actual exacerbating condition causing internal migration in Syria, etc.

When it comes to environmental changes, I think about the homogenization of time. With time-based media, it's a unique attribute – being able to stop time, to play back, slow down time, rewind, fast forward. And there you start to construct the story, and you start to understand the politics. That ability to modulate time is an essential dimension of how one can begin to tell stories.

The film I just finished – *Cold Cases*,[217]which was a collaboration with Forensic Architecture – does precisely this. All ten cases of freezing deaths we are investigating are structured around doing exactly that: looking at the historical circumstances of the death of indigenous people in police custody and then scrubbing back and forth across the timeline to understand the event. This movement across the timeline can tell the story of violence in a settler colonial state and the use of cold as a weapon. That's the method for each case that I developed. We have to go back to 1976 and move forward to 2015.

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217   Susan Schuppli (dir.), *Cold Cases* (2021).

a thumb's length of ice
contains two millennia.
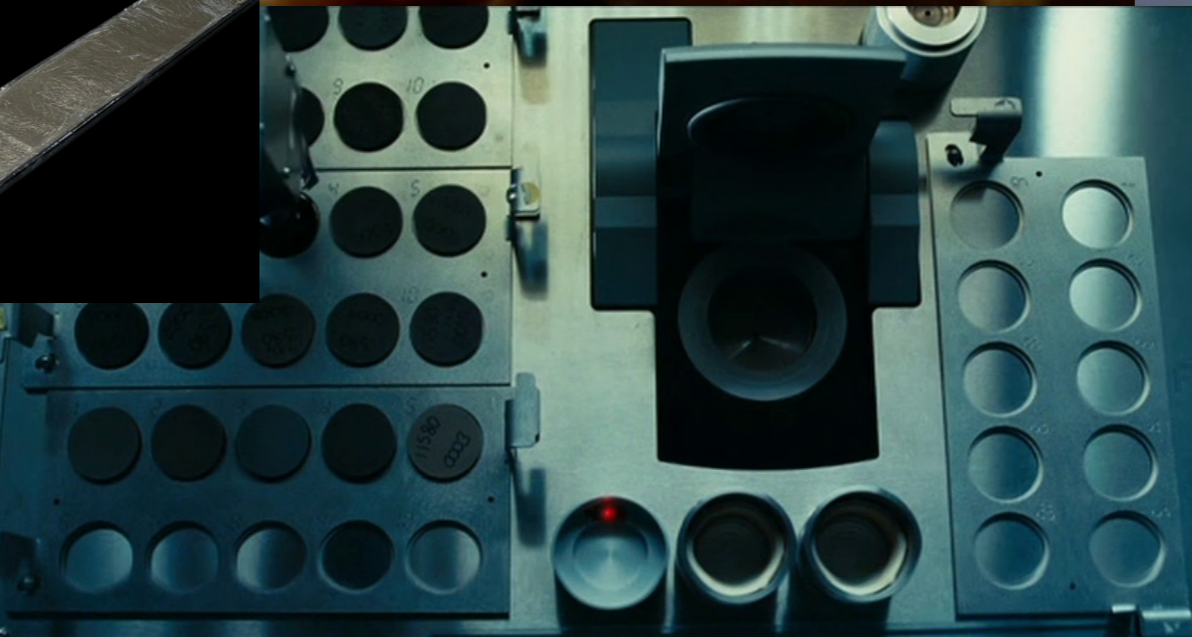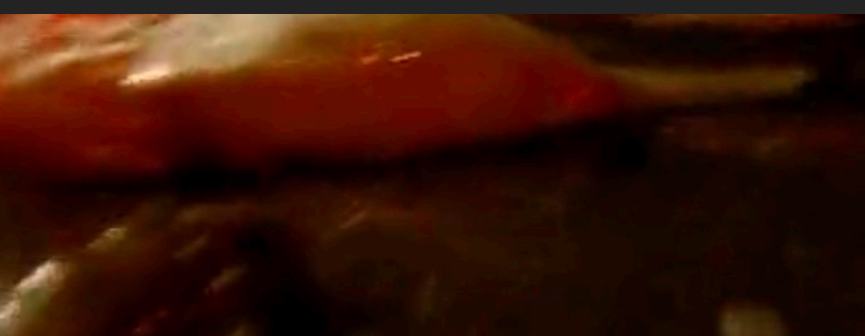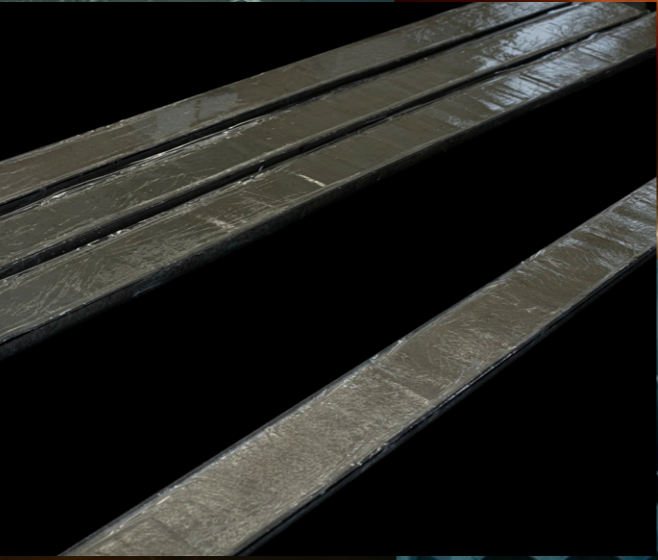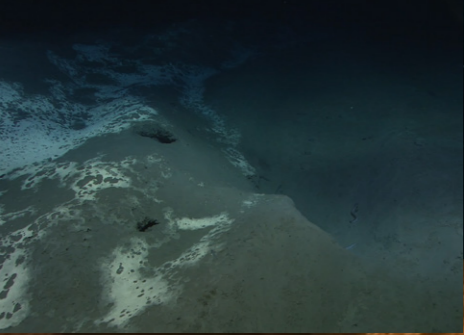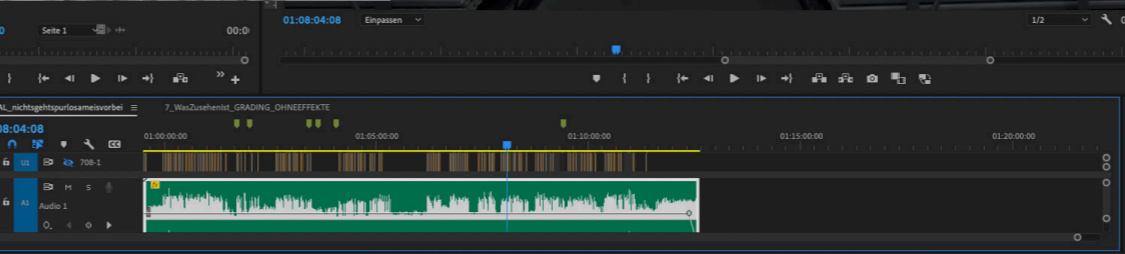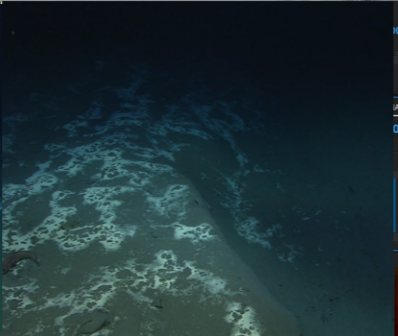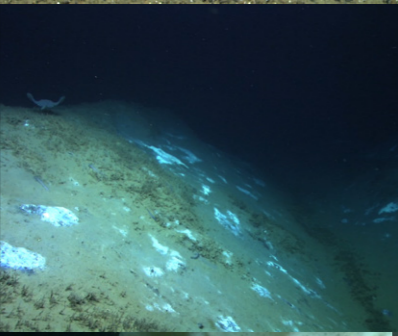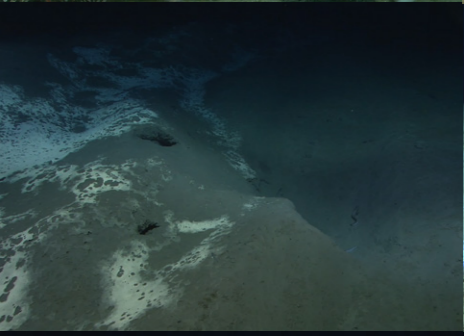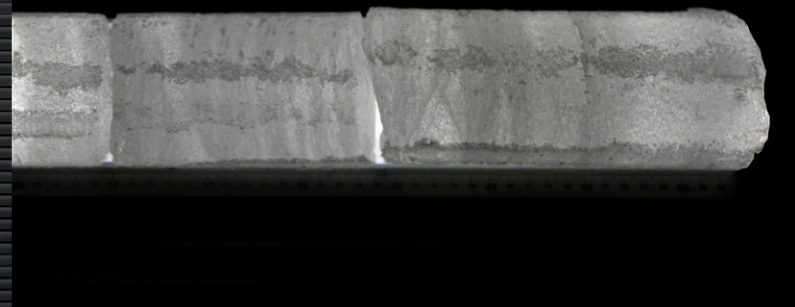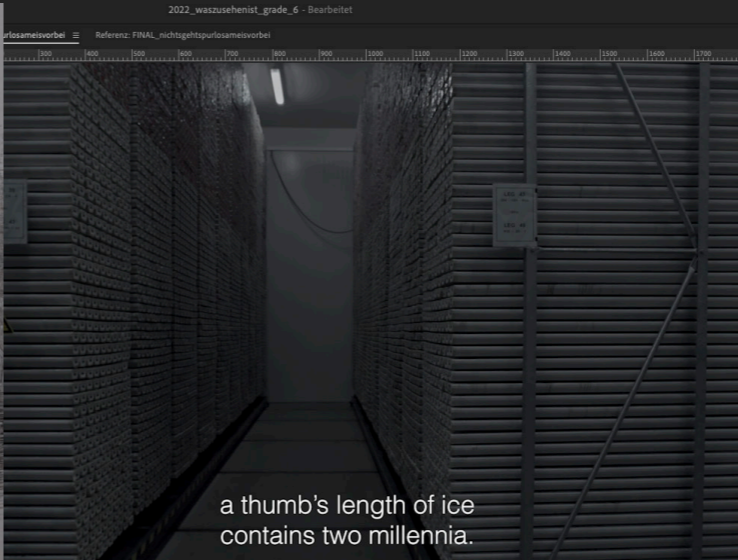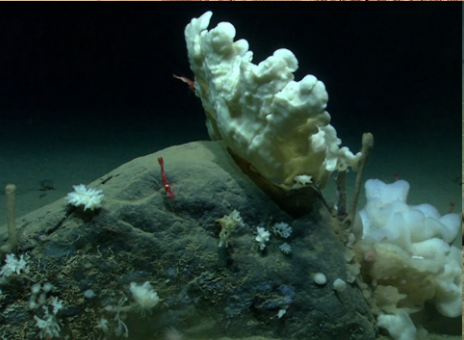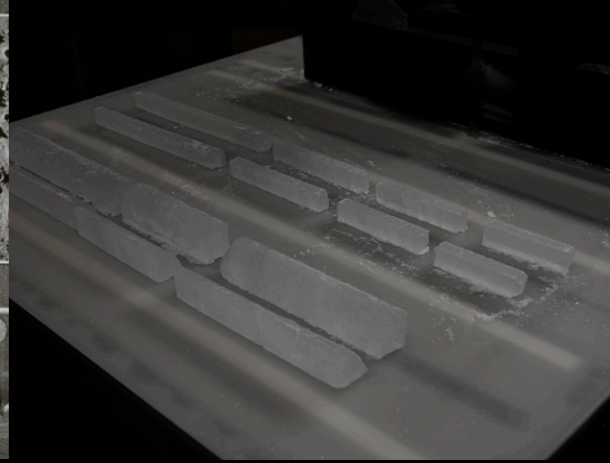
In the Ice, Everything Leaves a Trace – A Collage, by Christoph Oeschger with the use of the following materials:

– Film still from Trevor Wilkerson, *Machinegun or Typewriter* (Creative Agitation, 2015)
– Film still from Simon Starling, *Black Drop* (2012)
– Christoph Oeschger, cutting ice in the Paul Scherrer Institute Baden, 2021
– Film stills, 'Ark_XXII_organisms', MARUM – Zentrum für Marine Umweltwissenschaften, Universität Bremen
– N.a., whaling in Spitsbergen
– Screenshot of the editing project
– Christoph Oeschger, ice core in the Paul Scherrer Institute Baden
– Film stills, 'Ark-XXII_seafloor', MARUM – Zentrum für Marine Umweltwissenschaften, Universität Bremen
– Lucien Castaing-Taylor and Véréna Paravel, *Leviathan* (Sensory Ethnography Lab, 2012)
– Film still from Susan Schuppli, *Arctic Achipelago* (2021)
– Film stills, 'Ark-XXII_seafloor', MARUM – Zentrum für Marine Umweltwissenschaften, Universität Bremen
– Film stills, 'Ark_XXII_organisms', MARUM – Zentrum für Marine Umweltwissenschaften, Universität Bremen
– Film still from Steve McQueen, *Gravesend* (2007)

In the Ice, Everything Leaves a Trace

Title:	*In the Ice, Everything Leaves a Trace*, 2023
Directors:	Christoph Oeschger / Gianna Molinari
Camera:	Christoph Oeschger
Editing:	Christoph Oeschger
Voice:	Natascha Kuch, Achim Barrenstein
Sound Design / Music:	Fabian Gutscher
Translation:	Simon Cowper
Length:	13' 07"
Audio:	stereo
Format:	UHD video

Introduction:
In the Ice, Everything Leaves a Trace

Gianna Molinari and I decided to continue working on the topic after the end of the PolARTS project.[218] This collaboration resulted in the film *In the Ice, Everything Leaves a Trace*.

If you stand in the Arctic and look at the icebergs, you don't realize that the area is becoming a plaything of global interests. No event could be used as a basis for this. The event occurs *elsewhere* or moves in a temporality that is not perceptible to humans.

For the film, Gianna Molinari and I visited the Paul Scherrer Institute in Baden (CH) and the MARUM Center for Marine Environmental Sciences at the University of Bremen to retrace this temporality and create a narrative that works for a much larger period.

During our trip to Greenland, we encountered field names on an old map that seemed familiar to us. Alfred de Quervain, a Swiss explorer, had given the fields equivalent names he knew from home. The study of Greenland also revealed a colonial link with Switzerland, and we wondered how much science had to do with the country's colonial history.

218　See PolARTS Project, Swiss Polar Institute, website. <https://swisspolar.ch/polarts-projects>.

Voice-Over:
In the Ice, Everything Leaves a Trace

Still *terra incognita*, they said.

Perhaps, they said, up in the north, in the interior of the largest island in the world, there are areas that are free of ice, land where roots penetrate the soil, where bushes grow, where life would be possible – and cultivation and prospecting and dominion.

Another attempt then, after the failure of the first expedition, when they had to turn around midway through.

In 1912/13, travelling from west to east. Covering 700 kilometers in 37 days, Swiss explorer Alfred de Quervain and his team trekked across Greenland, conducting research for Denmark: they wrote field notes, put up pilot balloons filled with hydrogen, made observations of the degree of cloud cover, measured the direction and speed of the wind and the air pressure and temperature, and searched for ice-free land. But there was ice everywhere.

After the trek, de Quervain remarked that in future expeditions scientists should observe the clouds, noting, in particular, the direction they moved in.

"Ce qui serait d'une très grande importance."

For whom?

Important for whom?

I'm trying to visualize the Arctic, piecing together a picture bit by bit. Creating an image. An approximation of an image.

What can be seen …

What not …

Well-researched areas.

Un-researched areas.

The ice still provides protection. The cold keeps out the inquisitive eyes of tourists and the robotic arms of mining machines and stops flags being hoisted.

Still.

And yet,

the ice is melting and with the melting of the ice comes the possibility of new trade routes, awakening greed and territorial claims.

What are now international waters may tomorrow belong to Russia, the USA, Canada, Denmark or China.

Where are the bounds of this expanse of white whose boundlessness is no more?

What can be seen …
What not …
Above the water …
And beneath …?

The Arctic seabed is reportedly far less explored than the surface of
the moon.
And far more interesting. It's said to be rich in natural resources.
Arms reach out, elbows extended, fingers placed on points on the map,
leaving behind faint greasy marks.
Oil is still the key.
What was once whale blubber is now oil deposits, gas bubbles, fossil
fuel prospects.
So today oil is still at the heart of things. Oil in a different form. And
metals and rare earths.
The melting of the ice exposes the soil, and the seabed is made accessible.

The Arctic composes itself before me, reconstituting itself over and
over. Layer by layer.

Scientists bring home ice cores and samples of sediment and rock. They
remove a piece of the Arctic and take it to their laboratories further
south. The Arctic migrates, ending up in cold storage units, freezers,
bags, test tubes, mortars, under microscopes; it is mixed with fluids,
ground up, scanned, dissolved. It is broken down. The Arctic is no lon-
ger just in the Arctic. Parts of it have gone elsewhere.

Bits of the Arctic can be found in sediment cores retrieved from the
seabed and stacked in plastic pipes that have been cut in half.
They have been prepped for current research and for future use.
The Arctic lies congealed in the material, ready for examination.
Collected, in the dry, stored in the archive of the ocean floor.

Time is compressed.
If you put your hands beside a drill core, a thumb's length of ice con-
tains two millennia.

Millions of years collected in a linear meter of core.

What can be read from it?
the impact of a meteorite and the extinction of the dinosaurs, a volca-
nic eruption, the tunnelling of a worm. Global warming is recorded as
a dark stain.

What can be seen …
What not …?

The ice is also a store of time.

It is remembering shortly before memory is lost.
What can be read from the ice cores?
all the summers that have been too hot, the eruption of a volcano, storms in the Sahara, every fall of snow, dead animals, nuclear weapons tests.
Traces can be found in the ice cores: bone, pelt, ash, pollen, dust, tritium.

In the ice, everything leaves a trace. Nothing eludes it.
Not the plague in the fourteenth century, not the nuclear tests of the 1960s.

The ice records these tests as radioactive tritium emitted into the atmosphere by the explosions, which then sank down on the glaciers, shrouding everything, a toxic mantle covering the Earth.
The time of the plague is recorded too in the glacial ice. During this period, fields went untilled, and no crops were harvested – there is no pollen to be found in the glaciers.

So what is missing tells a story too.

What can be seen…
What not…?

On his expedition, de Quervain saw mountains covered with glaciers in front of him. He called one of them Mont Forel after his Swiss patron and named an entire region in East Greenland Schweizerland. A bay in Greenland was given the name De Quervain's Havn.

De Quervain inscribed himself in the ice too – in the ice and on maps. Which begs the question: Who gives the names? Who has ownership, who makes a record of themselves, who is left out, who is forgotten, what of all this disappears?

Conversation between Armin Linke and Christoph Oeschger

Conducted in May 2023 via Zoom. The conversation was held in English.

Christoph Oeschger: My work on the Arctic began with a scholarship from Pro Helvetia. This was an exchange between scientists and artists working in the Arctic. Together with Gianna Molinari, we went on this trip with two researchers to Greenland, where I did the photo work. The film footage also stems partly from this trip. In Greenland, we realized that lots of the decisions that are making the Arctic so political and important now are made elsewhere. We developed the film from this idea of "*andernorts*" (the "elsewhere").

The photographic work has three rows of images. In the upper row, ice is focused on at an aesthetic level – it's a study of shapes and forms. The images were made during the time we spent on a boat with the researchers. Driving on the slope of the Eqi Glacier. Gianna and I continued our trip to Southern Greenland, where there are plans for a large mining project of rare-earth metals at Kvanefjeld. That is the middle row of images; and the bottom row in the work is about everything that happens below sea level, something that will be crucial for mining and for territorial claims in the Arctic.

Could you give some insight into why you chose this subject of the seafloor, and how you developed your project *Prospecting Oceans*?[219]

Armin Linke: The *Prospecting Oceans* project developed over a longer period of working on commission by the Haus der Kulturen der Welt in Berlin, and setting up the Anthropocene Observatory collective with John Palmesino and Ann-Sofi Rönnskog of the architectural studio Territorial Agency, and Anselm Franke. About every six months, after visiting scientific and political institutions, we would present fieldwork on climate crisis and, more generally, the topic of the Anthropocene.[220]

These exhibitions addressed atmospheric and geological issues around the topic of climate crisis. Somehow the ocean was often not included. Later, I was invited by the TBA21 Academy foundation to present some work in Kingston, Jamaica. By chance, I spoke with Davor Vidas, an international lawyer specializing in the law of the sea, based in Oslo. He made me aware of the International Seabed Authority (ISA) in Kingston.[221]

219 Linke, *Prospecting Ocean*. See also Hessler, *Prospecting Oceans*.
220 'Concluding the Anthropocene Project with three exhibitions', e-flux Announcements, 11 October 2014. <https://www.e-flux.com/announcements/30524/concluding-the-anthropocene-project-with-three-exhibitions/>.
221 'The International Seabed Authority (ISA) is an autonomous international organization established under the 1982 United Nations Convention on the Law of the Sea (UNCLOS).' International Seabed Authority (ISA) website. <https://www.isa.org.jm>.

As I arrived in Kingston, I set about contacting them and asked if it would be possible to film an ISA session.

We conducted interviews with an ecological assessment specialist at the ISA. During filming, I met many scientists looking into ecological impacts on behalf of various nations. Through them, I got to contact different German institutions.

I developed two projects in parallel that later came together. One was for the *Year of the Oceans* in Germany, organized by the Ministry of Education and Science. I was invited to the Oldenburg Media Museum and worked with video material from the ROV [remotely operated vehicle] footage taken as part of research and development by the MARUM[222] and GEOMAR centres.[223] I spent a week at GEOMAR, where I had a direct line to the servers and access to the footage. A lot of this ROV footage is purely operational, used mainly by the pilot in order to guide the activities. We made an installation out of this material. At the same time, we produced a larger piece for TBA21 that brought us to South Africa, where we focused on discussions among the international lawyers on sea-level rise.

What will happen if the islands in the Pacific lose their lands? They will also lose their exclusive economic zones (EEZ) enabling them to fish within 200 or 300 miles from the shore. But if you lose the shore, you also lose the fishing grounds.

CO: Not only the fishing grounds but also the possibility of other economic exploitation.

AL: As well as offshore electricity production or mining grounds, of course, if you want to allow deep-sea mining. They're already discussing how to change this, and how this should be implemented in the law. This brought us to Papua New Guinea to look at their national waters. At the time, a Canadian company – based in Australia, financed by Russian and Omani money, and using Chinese infrastructure – was trying to operate deep-sea mining in the Bismarck Sea, which is also a former German colony.

We were put in touch with local activists. For two weeks, we went around in the boat to document their work. In the end, we found ourselves not only documenting their activities but also helping their cause. The deep-sea mining company decided to operate in an area where the local population had no cell phones and could not organize. It's for this reason that the communities in the area we worked in were cut off from each other. In the process of filming, our boat would visit these communities – for gasoline, to charge our batteries and cell phones, and spreading the

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222   See Marum – Zentrum für Marine Umweltwissenschaften, Universität Bremen, website. <https://www.marum.de/index.html>.
223   See GEOMAR – Helmholtz Zentrum für Ozeanforschung Kiel, website. <https://www.geomar.de/>.

news – helping them communicate. We became unwitting participants in their activism, and the project itself a form of activism. We also did projections at community meetings.

We presented the exhibition in the old laboratories of the CNR-ISMAR Marine Science Institute in Venice. Then it travelled around, to Brussels, Istanbul, Chennai. That's the history of it.

CO: What I find interesting is that you are referring to the Anthropocene Observatory project at the HKW. You describe how there was an atmospheric part, a geological part, but the sea was missing. And so you started *Prospecting Ocean*.

There's a similar concept in my work with these three rows of images. In my case, it's the ice, then it's the ground, and then it's everything that is in the sea beneath the surface. You get these three levels, which spin together. But you make the connection on a larger scale through different perspectives. At the moment, I'm conducting research prior to going to Svalbard to continue with the photo work *The Other Side of Ice*. Around Svalbard, Norway declared an area about the size of Germany as a possible site for deep-sea mining. They have found ores, especially rare earths, zinc, copper, lithium and a bit of gold.

When it comes to mining, in Svalbard there's a long tradition of coal mining. But now they're trying to stop the coal because it is not a sustainable source of energy. Instead they're supporting deep-sea mining for metals used for "sustainable" energy technologies. So sustainable energy is dependent on non-sustainable mining.

Today, our western economy is mainly built on immaterial work. With digitization, we may have lost our sense of materiality. Mining and production happen far away from us. What is interesting is that digital technologies depend so much on the "material". For the Internet, there are actual cables on the seafloor. Making this materiality visible is one of my interests. What is your particular interest in mining?

AL: I've been photographing various mining sites around the world, looking at these immense interventions in the landscape. For example, the copper-mining site in Chile, where, we could say, the Chilean dictatorship started over who controls these resources. But I was interested in how mining changes the landscape. A friend pointed out that I don't need to travel across the world, that larger globalisation projects are happening at home, in the Alps. I started working on the film *Alpi*[224] – there are two or three sequences in which you see people going into the mountains and shaping the landscape in what are almost sculptural interventions, to put it in positive terms.

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224   Armin Linke (dir.), *Alpi* (2011).

And speaking about oceans, we looked at how the development of sonar technology and ocean floor mapping by Marie Tharp inevitably also contributed to seabed oil extraction and deep-sea mining. I was interested in how visualization technologies, or mapping technology, also makes mining possible. How our visual practice is connected to it. Even more interesting to me is the absurd scale of this practice, but also more so in how this is depicted than in the material aspects of it.

CO: What interested you was the scale of the mining; that it's so huge. Mining is reshaping the world, but it's just one part of the Anthropocene. On the human scale of perception, the Anthropocene barely registers. What I'm interested in is making it visible. Is this something that drives you too, making this kind of scale visible, or retracing something, reconnecting something to a whole?

AL: Yes, it's clearly interesting, but impossible. I don't know if you have the same feeling in classical photography, but one can only fail at this. Photographing these large projects … I always think it's a Sisyphean task. Each is too large to work on because it has too many side effects. So this is always short-lived as an idea. I'm interested rather in showing what infrastructure is needed to plan something like that – cartography again, as well as other technologies, like satellite imaging. I really like how you included the photograph of this 3D rendering, as a moment of abstraction moving away from the "classical journalistic documentation".

So, our medium makes us co-responsible – we use a medium that was developed for exploitation of resources. Along the way, it also produces "aesthetic by-products". That's on the one hand. On the other I'm influenced by my collaboration with Bruno Latour, who asked the question: What are the legal instruments? Not just what are the visual and scientific instruments but also what are the legal instruments that lay the ground for this? In two weeks I'm presenting work at the Luxembourg Pavilion, Venice Architecture Biennale, about geological resources on the Moon.[225] It's very interesting to look at how, parallel to the United Nations Convention on the Law of the Sea (UNCLOS), the laws of space and the Moon were also developed.

These laws were created during the era of colonization when non-industrialized countries in the south aimed to prevent industrialized nations from advancing too quickly – for instance in areas such as satellite positioning in space. However, as developing countries continue to seek a place in the satellite area, now largely occupied by industrialized countries, the question remains as to how they can do so in the years ahead.

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225   Francelle Cane and Marija Marić (curators), *Down to Earth*, exhibition, La Biennale di Venezia, Architecture, Pavillion of the Grand Duchy of Luxembourg, 20 May–26 November 2023. <https://www.labiennale.org/en/architecture/2023/grand-duchy-luxembourg>.

CO: Speaking of the legal aspect, the 3D rendering is of the Lomonosov Ridge, which goes through the North Pole. It's the key geographical fact that will decide the territorial claims on the North Pole. Whichever country can prove that it is connected to the ridge will own the North Pole. This ridge is a crucial geological structure that is being measured now. Russia is doing lots of cartography to map this ridge, but Norway is also doing quite a bit of research on it. To prove that it belongs to them or that they can expand their EEZs, their exclusive economic zones.

And in my work, this is a form of scaling. You get a very narrow view of Kvanefjeld, where you don't see much of anything except stones. On a different scale, the 3D rendering of the Lomonosov Ridge is visible, but on a very abstract level. It's like in filming: you get a close-up, then a wider view. This sets us apart from traditional documentary making as we operate on a distinct scale that we navigate throughout our work.

Another form of scaling is what is readable from the seafloor, especially when you're looking at the Arctic seafloor. Basically, it's an archive of the atmospheric composition of gases. From the seafloor, researchers can retrace the climate of the past millions of years. Our film discusses this form of time scaling beyond the possibility of human perception. The film allows us to connect different time periods.

What role does time play in your work? You're working with film, which is more of a time-based medium, and then you're working with photography, which is a still medium. What role does time play in the different media?

AL: It's quite fascinating to see the scanning of these large ice cores done in order to try and identify the beginning of the Anthropocene, among other reasons. Each core gives us these points in time, punctuating large intervals of time. So, it's quite interesting – it's almost a musical score of the climate.

In an exhibition space, there is no linearity, rather things refer one to another. Often, photography is more of a storyboard to explain things. The photographs are like footnotes to a film. Sometimes the photography highlights a specific pivot point, and the film somehow reconnects these points. It's a bit complicated working like this because you can't show the film without the other material – it's shot for an art exhibition. If you want to bring the film into a film festival, for example, a lot of the context is missing.

CO: One of the methods I described for my doctorate was the "productive gap". This is like the concept you described, where we cannot fully capture the entirety of a subject. There are always gaps in our understanding. By identifying these gaps, we can engage the audience's imagination in filling them. Is this something you work consciously with?

Or is it more a problem that appears through the realities of producing the exhibitions?

AL: I don't know if I would call it a gap. I try to be documentary and anti-documentary at the same time. In other words, I try not to explain the whole frame but instead show some aspects very openly so that more questions come up than answers. This began with my film *Alpi*, where we show representations of the landscape, never the landscape itself. It starts from a film set, and then you don't know if the film set is fiction. You're brought to the next place, but without explaining why you are brought there. And then to the next place, and the audience needs to ask: okay, is this the next place or is it the same, and where are we, and is this fiction or is it a document? It's basically not explaining but posing questions. Maybe this is what you mean by the gap: opening questions.

CO: There is another method I have defined for myself, the idea of soft montage, a term I borrow from Harun Farocki. Something he described when he was looking at his two-channel installation. One channel showed the production of a rocket, while on the other you could see the flying rocket itself. He said that it's like these two images connect on a horizontal level, not on a linear level.[226] So it's about the viewer producing the connection between the two images. This happens through this way of montaging the two images.

I often work in a similar way. In *The Other Side of Ice*, you get the different rows with different subjects – the ice study, the possible mining site and the seafloor – so there are also three distinct topics, but they influence one another. Is this something you can refer to as a working method?

AL: Yes. Of course Harun's work was very influential for me. I knew him personally, and looking at how he worked influenced me a lot. I think the method is somehow a Marxist idea – in the sense that by showing the rocket you're showing the spectacular, the rocket flying, but parallel to this you're showing the whole industrial and military infrastructure. It is the knowledge and the workers that made it possible for the rocket to fly.

In a certain way, you dare to both spectacularize it and break it down into its materialist building and knowledge processes. And you show this parallel, and say: look, it's a critical moment of constructing the final product. And you take an analytical and dialectical approach to investigating the production conditions of these events. And then, in showing this, you also bring up the issue of responsibility – somebody wanted it, somebody created a political structure or an economic structure or

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226   Farocki, 'Cross Influence / Soft Montage', p. 70.

a technological and scientific structure to build it. Somehow, you make the responsibility visible.

CO: When you talk about being documentary and anti-documentary, you're talking about a similar way of working. These are the two poles. You're talking a lot about infrastructure, and in your work I also see the spectacular and the unspectacular.

AL: In a manner akin to news reporting, the work is often focused on the sensational aspects of an event, but it's important to also analyse the underlying conditions that contribute to the creation of such a visually striking occurrence.

CO: When discussing events, it's fascinating to consider not only the event itself but also the context surrounding it. It's important to acknowledge that defining moments often occur in seemingly mundane office spaces, which may not initially capture our attention. Yet it's the event that gets documented and highlighted, creating a juxtaposition between these two distinct poles.

AL: Yes, having different places, or different times that seem disconnected, and through the editing for the exhibition or the film, you can reconnect and show the whole process. It's like layering things that seem disconnected. But this is what you did in your work *Miklós Klaus Rózsa*.[227] Rózsa's photographs are not classical reportage – they're already a form of anti-reportage, which didn't work for the magazines. It is the attitude of creating another narrative. You did a soft montage there, and then you bring in the bureaucratic document, something that is not considered spectacular. It's like the screen: at that time, it was the typewriter, and you put them together. I really liked this work. So, I think you are a great master of this soft montage.

CO: Somehow it's also the way I worked for my subsequent book, *They've Made Us Ghosts*, which I did about the refugee crisis in Calais.[228] I got these technical X-ray images from the police and the photographs of fences in this very industrial landscape outside of Calais, and I show the people from the camp in a series of quasi close-ups and details. In these two works, I was already using the technique of soft montage, even if I am only now formulating it as a term.

For me, soft montage can happen in different ways. As you described before, one possibility is that you're juxtaposing the event and the non-event. I found this quote of yours that corresponds quite well with this idea: "They [the images] become forensic later, when a person takes the time to put them in a larger context and not just view each one in

227 Christof Nüssli und Christoph Oeschger, *Miklós Klaus Rózsa* (Zurich: cpress, 2014).
228 Christoph Oeschger, *They've Made Us Ghosts* (Zurich: cpress, 2017).

isolation. That would mean my images function as indices that do not make a specific statement until they are in the right configuration."[229] In a sense, this means that the event appears at a later point in time when the images are being analysed.

The idea that your work is becoming forensic refers quite a lot to Forensic Architecture. What about this idea that it can be a trace, something that is usable at a later point in time. What would you say about this? How influential was Forensic Architecture for you? And what is the event for you in those terms? What does it mean for you to become forensic in that sense?

AL: Yes, there is a conceptual influence. History of technology and how the same technology can have different uses is very interesting to me. Those can be aesthetic, cartographic or forensic.

And yes, coming from photography – a typical two-dimensional realm – this is what forensic architecture does. It gets you to rethink things, investigate the dimension of space and the dimension of time. And when we are rethinking our media practice, this is also a completely new cultural practice. Looking into cell phone images or looking into security cameras. To some extent, it involves a complete re-evaluation of authorship, strengthening the notion that those who are not traditionally considered authors can indeed have authorial power. This shift recognizes that their contributions can significantly influence criminal proceedings or make arguments that directly impact individual lives.

And what is the role of art in the process of rethinking? Definitely very important. In the sense that I always must rethink my own practice as an artist and a photographer. Knowing that there are now groups like Forensic Architecture using the medium and creating their own artistic practice on a whole new level that is very interesting has been a major influence in the last ten, 15 years.

CO: I think the history of photography is very much connected to this idea of capturing an event. Does the idea of the event play a role for you? What is the event for you? We talked about Harun Farocki, and you said the event is actually the flying rocket, but then you get the non-event. When we are talking about the Anthropocene, the event is global warming but it's very hard to trace. And the event is much more expanded on a temporal level. Do you reflect on that? Is it something that you're thinking about?

AL: When I was very young, at the age of 18, I started working as a stage photographer in a theatre in Milan. That was my first interest. I often

229   Armin Linke and Max Dax, 'The Appearance of That Which Cannot Be Seen', interview, *VTph magazine*, January 2017. <https://www.vt-ph.com/armin_linke>.

see these events as scripts. You have humans on a stage, and they move into this space, and as a photographer or filmmaker you move with them, and then you're never just an observer. You must decide and negotiate continuously where you're allowed to position yourself in relation to who commands a space at a particular moment. Essentially, you're documenting it, as well as influencing the reality through your presence, of course.

When we were speaking of Forensic Architecture earlier, I was thinking more of the work they presented at the HKW, for example, the restaging of the NSU murders.[230] They recreate a stage, recreate the whole, let's say, script, and look at all these other perceptual elements that we normally don't have in photography: sound, space and time. The potential fictionality is destroyed by this hyper-attention to detail and the synchronization of all the elements.

CO: In our photographic work there is also an event, but the time span of these events is much larger then in classical documentary. Do you see what you're covering as an event? Just much more of an event, happening on a larger scale? Or is there another term you would apply to describe these instances in your own work?

AL: I'm not sure. There's a range of other events that are synchronized. I propose that there is a connection without explaining it. In a laboratory, you bring things together that might seem disconnected, and you try to mix them to see if some kind of reaction is caused by the combination. But it can also fail.

CO: This is something I can relate to. I'm also trying to put different source materials together and see what appears. I like the idea that this is a laboratory in a way. I should maybe go deeper into that idea.

Then there are the different mediums we're bringing together. I think that photography and film in an exhibition have very different roles. Could you talk a bit about how you put these two things together, or how they work together? Or how you choreograph these two mediums together in an exhibition?

AL: That's a long discussion. First, there's always this dilemma. I have a place to visit: Do I have a commission, and so do I work with one medium or the other? Sometimes the answer is very banal, very trivial, involving time and money really. When you don't have that much time – you'll have access to a specific place for a certain amount of time – you say, okay, the only way to work is with photography because it's just

230 The NSU, the Nationalsozialistischer Untergrund (National Socialist Underground), was a neo-Nazi terrorist group that operated in Germany from 1999 to 2007, committing nine murders, three bomb attacks and 15 robberies. Forensic Architecture investigated the highly suspicious background to one of the killings. See Forensic Architecture, 'The Murder of Halit Yozgat'. <https://forensic-architecture.org/investigation/the-murder-of-halit-yozgat>.

faster. With cinema, and video, as you know, you need a lot of engagement. You need to stay in the place; you need to be part of the place. With photography sometimes you can also scan or have this moment of punctuation.

This doesn't mean that you need to be superficial: on the contrary, you can go deeper because you're free, and you can move immediately to the next thing while somebody tries to block your escape, almost as in a judo movement. So you're more flexible. You can go deeper and react flexibly.

When you work with film, you need to work with audio, you need to engage in discussions, you need to find the best viewpoint. Then it becomes an economic issue, because working with video and films is often more expensive, and you have a lot of postproduction to factor in. These are production issues.

What is interesting in an exhibition like *Prospecting Ocean* is that you can have these two mediums reacting to each other. It's also very interesting to work with archival material in the video and have it all react together somehow with the photographs. It gives a narrative to the contemporary photograph. It makes it possible to explain which tradition or theoretical angle in media history and which political or geopolitical context a specific event is coming from.

CO: Your photographs have different recurring formats in the exhibitions. For *The Other Side of Ice*, I created this almost mathematical way of using half- and full-size images so that it evolves, or there is an evolution or a growing archive. This comes from the fact that I want to show the work in parts and not just the whole work. I think you operate in a similar way. Your works look different in the exhibition space. You've got different formats, and you don't have a definite size for the print. Do you have a concept behind that, or is it something that you change from time to time?

AL: Well, there are two layers. So, once an artwork in an exhibition has a definitive form – once a picture is framed – there is an edition of it, and then it's definite. Like the final cut of a film. But these images can be recombined with found material. This recombination is another manifestation of the images.

For example, in a project like *The Appearance of That Which Cannot Be Seen*, I showed different images of mine to different practitioners and then recorded their reactions.[231] I then recomposed them in different sets in an exhibition, bringing everything together. Many of these prints

231   The project contained several exhibitions and a catalogue. Armin Linke, *The Appearance of That Which Cannot Be Seen* (Leipzig: Spector Books, 2017).

came from other exhibitions but were reselected and recreated by these practitioners. This is something I often do, not only for the final objects but also with the raw materials. Maybe I film something for a specific project but then it's reused in another project. A lot of the material that I filmed for the Anthropocene Observatory then made it into the *Blind Sensorium*.[232] This is a way of reactivating different projects. For example, what I also do with photographs is select specific sizes and specific frames with which to work. I can also take prints from different exhibitions and recombine them in new exhibitions, almost like they were notes from a musical score, and then I can re-choreograph them. Doing this is maybe what you call soft montage – reusing the images. The images come up with new permutations, like in music, rearranging the montage. So it's a kind of multiple soft montage – or open soft montage.

CO: Thank you very much for taking the time for this conversation. I'm very grateful.

AL: Thank you, because it's also very interesting having to rethink my own practice. A good kind of therapy [*laughs*]. Thank you.

CO: I hope it didn't feel too much like therapy! It was very interesting to talk to you.

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232   Linke (with Bruno and Ielasi)*, Blind Sensorium*.

Glossary: *In the Ice, Everything Leaves a Trace*

Ice Cores

In an interview with Margit Schwikowski at the Paul Scherrer Institute, she compared the glaciers to a storage medium that is disappearing due to global warming, making this storage analyzeable through the ice core samples. The ice cores allow researchers to show the changing chemical composition of the atmosphere; they are witnesses to past events. The traces of copper on a glacier in the Andes suggest that there has been metal-melting in South America since 2,700 years. In Europe the ice had recorded what was grown and when it was not grown. The cultivation gap coincides with the plague wave: the ice records that nothing was cultivated. The ice records Sahara storms, which are visible as fine lines. Most importantly, the glacial ice has recorded the slow accumulation of carbon dioxide, allowing scientists to trace the history of climate change. The cryosphere is thus a vast network of sensors that record anthropogenic and non-anthropogenic environmental events.[233]

Ice cores are what Susan Schuppli calls 'material witnesses'.[234] In her book of the same name, Schuppli defines the term as follows:

> *Material witnesses* are nonhuman entities and machinic ecologies that archive their complex interactions with the world, producing ontological transformations and informatic dispositions that can be forensically decoded and reassembled back into a history. *Material witnesses* operate as double agents: harboring direct evidence of events as well as providing circumstantial evidence of the interlocutory methods and epistemic frameworks whereby such matter comes to be consequential. *Material witness* is, in effect, a Möbius-like concept that continually twists between divulging "evidence of the event" and exposing the "event of evidence."[235]

If one thinks of the ice cores as a timeline, they can be dated by a human-made event. The nuclear bomb tests in the Northern Hemisphere in the 1960s inscribed themselves in the ice worldwide.[236] These events recorded elevated radioisotope levels in the ice on all continents at all altitudes. So the ice cores document the human impact on the environment. The fall-out from atomic bomb tests were used to establish the peak readings, making it possible to date ice cores from all over the world.[237] To remain with the language of the film, this is akin to the moment when the sticks of the clapperboard are clapped together to provide a point of synchronization for sound and picture. Importantly, these atomic bomb tests are often also seen as a possible beginning of the Anthropocene.[238]

In the ice, so much information is inscribed and can be measured with the help of physical analysis. The physicist Hans Oeschger was the first to use this method.[239] This made it possible to record 'high- and low-frequency climate events and shifting environmental conditions throughout the present Holocene warm period, through the preceding Wisconsin ice age, and into the earlier interglacial warm period.'[240] This proved that fast warming in climate development was always followed by slow cooling. By analyzing the ice cores, it was proved that there had been about 24 such events, known today as 'Dansgaard-Oeschger events'.[241]

As such, Dansgard and Oeschger could thus also prove, based on the increased CO_2 concentration, that today's climate development is human-made and proceeding far faster than earlier fluctuations.[242] Oeschger publicly pointed this development out to very early on.[243]

The subsequent Greenland Ice Core Project (GRIP program) – in which Danish, Swiss and American universities joined forces to analyze ice cores – began a systematic collection of cores and, thus, a systematic analysis of climate events.[244] The project provided valuable scientific knowledge and gave scientists some of the first ice cores.

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233 Author's interview with Margit Schwikowski, held at the Paul Scherrer Institute, Baden, 29 November 2021.
234 Schuppli, *Material Witness*, p. 286.
235 Schuppli, *Material Witness*, p. 3.
236 Interview with Margit Schwikowski, Paul Scherrer Institute, Baden, 29 November 2021.
237 It became a common method to date ice cores according to the carbon dioxide concentrations linked to datable atomic bomb tests, as mentioned in conversation with several scientists, for instance with Margit Schwikowski at the Paul Scherrer Institute, Baden, 29 November 2021.
238 See, for example, Damian Carrington, 'When Did the Anthropocene Actually Begin?', *WIRED*, 14 January 2023 <https://www.wired.com/story/when-did-the-anthropocene-actually-begin/>.
239 Chester C. Langway, *The History of Early Polar Ice Cores*, US Army Corps of Engineers, Engineer and Research Development Center / Cold Regions Research and Engineering Laboratory (ERDC/CRREL), January 2008, p. 34. <https://erdc-library.erdc.dren.mil/jspui/handle/11681/5296>.
240 Langway, *History of Early Polar Ice Cores*, p. 34.
241 Thomas Stocker, 'Hans Oeschger (1927-98)', *Nature*, vol. 397 (1999), p. 396. <https://doi.org/10.1038/17034>.
242 Stocker, 'Hans Oeschger', p. 396.
243 See Elia Blülle, 'Das verlorene Jahrzehnt: Wie die Schweizer Klimapolitik durchstartete – und abstürzte', *Republik*, 28 May 2021. <https://www.republik.ch/2021/05/28/das-verlorene-jahrzehnt-wie-die-schweizer-klimapolitik-durchstartete-und-abstuerzte>.
244 See Stocker, 'Hans Oeschger', p. 396.

he ice cores contributed by the Americans were drilled primarily at their Camp Century military base in northern Greenland. During the Cold War, the US Army envisioned building an extensive network of mobile nuclear missile launch pads under the Greenland ice sheet under the project name 'Ice Worm'.[245] The construction for this sub-ice station began in 1959. Twenty-one tunnels, each 3 kilometers long, were built, including a hospital, a store and a church.[246] The world's first mobile nuclear reactor provided electricity for the maximum of the about two hundred inhabitants.[247] It soon became apparent that the ice was moving much more than predicted and would destroy tunnels and launch stations.[248] As a result, the facilities were closed in the mid 1960s.

As determined by the Danish Geological Survey, Camp Century today lies 232 meters southwest of its original position and is still moving. On average, the migrating ice pushes the sub-glacial station toward the sea 3.9 meters per year.[249] A large part of the infrastructure, and probably nuclear material too, was left behind.[250] So far, these polluting, radiating and partly toxic relics of Camp Century are still buried deep in the ice.[251] This will not remain so, as was determined with the help of climate simulations. In Greenland, climate change has gradually been altering the rate of ice loss in recent years and decades, even in the north. One research team estimates that in around 2090 the protective cover layer over Camp Century could well disappear.[252]

The Danish government established a monitoring program in 2017, led by the Geological Survey of Denmark and Greenland (GEUS), to monitor the development of the site of the Camp Century, including the installation of automated sensors that allow 'near-real-time' observations. Through their website it is possible to gain access to the latest data and information about the Camp Century.[253]

Boat

I go there to get a picture. I go there to see and collect and I am coming back with images – from there or thereabouts. Thinking about it in the studio – putting them together, juxtaposing them with something, assembling them.
I show it to her. We discuss juxtaposing them with something and adding her texts.
Only that I want to go out again, to make images again, collect them, collect other images, and then think about them again in the studio – bring them together, juxtapose them with something and assemble them. Because being there is not everything; because we know that there is an elsewhere where decisions are made. Looking for the elsewhere.

Energy

When we think of the Arctic, we imagine a place that is cold, and we rarely think of energy in relation to one of the coldest places in the world. We often overlook the fact that this region has been linked to energy production for Europe and America for a very long time. But also that the quest for raw materials is linked strongly with territorial claims. A look at the history of Svalbard illustrates this.

In the seventeenth century a commercial whaling industry was established in Svalbard by Dutch and English merchants who hired Basque whalers for the hunt.[254]
At that time, whales were hunted mainly for oil that was sold to Europe. The oil had to be cooked and filled in barrels. The small outposts developed into small camps and then in steady settlements.[255] It did not take long for the effects of a new, booming industry to be realized; the whale population was irreparably damaged.[256]

During the nineteenth century, European scientists turned their attention to Svalbard and numerous expeditions were dispatched to study its flora, fauna, geology and geography. The archipelago held great promise for scientific research, but it also fuelled the pursuit of new nation-state territories and natural resources. By the late nineteenth century, mineral prospectors and mining companies joined the scientists, in turn now particularly interested in the coal reserves and leading to the development of a mining industry on Svalbard. [257] Coal mining on Svalbard continued to expand, and by the early twentieth century several com-

245 Klaus Dodds and Mark Nuttall, 'Materialising Greenland within a critical Arctic geopolitics', in Kristian Søby Kristensen and John Rahbek-Clemmensen (eds.), *Greenland and the International Politics of a Changing Arctic: Postcolonial Paradiplomacy between High and Low Politics* (London: Routledge, 2017), pp. 139–54, here p. 146.
246 Peter Bardehle (dir.), *Die Stadt unter dem Eis – Kalter Krieg auf Grönland* (Arte, 2020), 52:30, here 32:29.
247 Bardehle, *Stadt unter dem Eis,* 02:12.
248 Dodds and Mark Nuttall, 'Materialising Greenland', p. 146.
249 Nanna B. Karlsson, et al., 'Ice-penetrating radar survey of the subsurface debris field at Camp Century, Greenland', *Elsevier*, vol. 165 (September 2019), pp. 1–13, here p. 5. <https://doi.org/10.1016/j.coldregions.2019.102788>.
250 Bardehle, *Stadt Unter Dem Eis*, 45:53.
251 William Colgan, et al., 'The abandoned ice sheet base at Camp Century, Greenland, in a warming climate', *Geophysical Research Letters*, vol. 43, no. 15 (2016), 8091–96, here p. 8091. <https://doi.org/10.1002/2016GL069688>.
252 Colgan, et al., 'Abandoned ice sheet base', p. 8094.
253 'The Camp Century Climate Monitoring Programme', 2024. <https://www.campcenturyclimate.dk/>.
254 Louwrens Hacquebord and Dag Avango, 'Settlements in an Arctic Resource Frontier Region', *Arctic Anthropology*, vol. 46, no. 1/2 (2009): *The Topos of the World*, pp. 25–39, here p. 26.
255 Hacquebord and Avango, 'Settlements', p. 26
256 Louwrens Hacquebord, 'Three Centuries of Whaling and Walrus Hunting in Svalbard and its Impact on the Arctic Ecosystem', *Environment and History*, vol. 7, no. 2 (May 2001): *Beyond Local, Natural Ecosystems*, pp. 169–85, here pp. 171, 178. <http://www.jstor.org/stable/20723175>.
257 Hacquebord and Avango, 'Settlements', p. 31.

panies had established mines on the islands. The coal was primarily shipped to Europe, respectively to Russia.[258]

At the time, Svalbard did not yet belong to one country and was stateless.

The settlements on Svalbard that came out of whale hunting and coal mining had a double function, starting out as stations: 'on one hand as tools for the production of raw materials and on the other as geopolitical outposts and tools of diplomacy.'[259] In 1920, the Svalbard Treaty came into force, which made Svalbard Norwegian territory, but with the condition that all citizens of the signatory states were allowed to engage in economic activity on the archipelago. The treaty states:

> The nationals of all the High Contracting Parties shall have equal liberty of access and entry for any reason or object whatever to the waters, fjords and ports of the territories … subject to the observance of local laws and regulations, they may carry on there without impediment all maritime, industrial, mining and commercial operations on a footing of absolute equality.[260]

One mine is still operating to fuel the heat and electricity for Longyearbyen, the main town on Svalbard. Longyearbyen is home to various research institutions and tourism services. While coal mining is no longer a significant industry on Svalbard, the legacy of its coal mining history remains visible in the landscape and architecture of the islands.[261]

Today it is again about new raw materials, this time often about rare earths, as I have also thematized in my work *The Other Side of Ice*. Rare earths are used in the production of renewable energies and for the manufacture of batteries. They have also been discovered in the Arctic – besides the Kvanefjeld in Greenland[262] also between Svalbard and the island of Jan Mayen.[263]

However, it seems that history is repeating itself here as well. Just as with whaling, extracting these minerals will cause an immense disruption to the ecosystem. It is a paradox that the development of sustainable energy goes hand-in-hand with the destruction of valuable ecosystems.

258   Hacquebord and Avango, 'Settlements', p. 35.
259   Hacquebord and Avango, 'Settlements', p. 36.
260   'The Svalbard Treaty', 9 February 1920, Arctic Portal Library. <http://library.arcticportal.org/1909/1/The_Svalbard_Treaty_9ssFy.pdf>
261   During my research trip to Svaldbard in September 2023 I spoke with former miners and town officials.
262   Ksenija Hanaček, 'Deep-sea mining of rare earth minerals in the Svalbard Archipelago, Norway', *Global Atlas of Environmental Justice*. <https://ejatlas.org/conflict/deep-sea-mining-svalbard-archipelago-arctic-norway>.
263   Louisa Mathies, 'Greenland Mineral Ltd.'s Kuannersuit/Kvanefjeld Rare Earth-Uranium Project, Greenland', *Atlas of Environmental Justice*. <https://ejatlas.org/conflict/greenland-mineral-ltds-kuannersuit-kvanefjeld-rare-earth-uranium-project-greenland>.
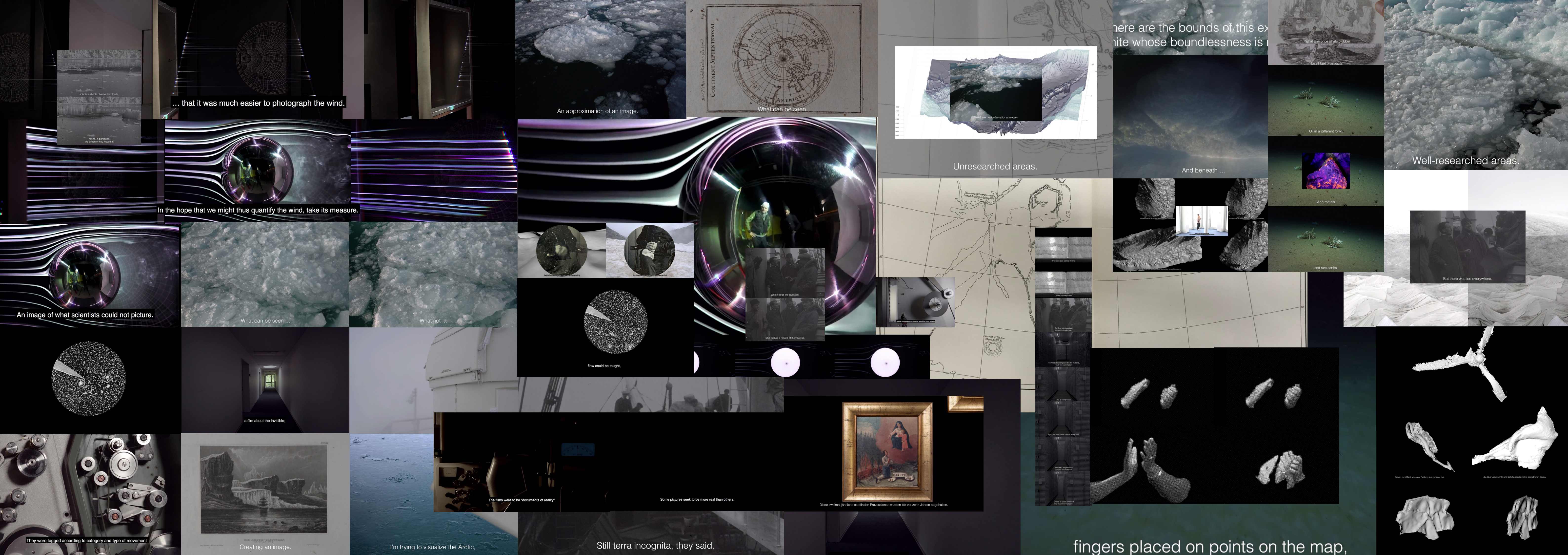
... that it was much easier to photograph the wind.

In the hope that we might thus quantify the wind, take its measure.

An image of what scientists could not picture.

What can be seen ...

What not ...

An approximation of an image.

What can be seen ...

here are the bounds of this ex

ite whose boundlessness is

Unresearched areas.

Well-researched areas.

And beneath ...

And metals

and rare earths

But there was ice everywhere.

flow could be taught,

who makes a record of themselves.

a film about the invisible;

They were tagged according to category and type of movement

Creating an image.

I'm trying to visualize the Arctic,

The films were to be "documents of reality".

Still terra incognita, they said.

Some pictures seek to be more real than others.

Diess zweimal jährliche stattfinden Prozessionen wurden bis vor zehn Jahren abgehalten.

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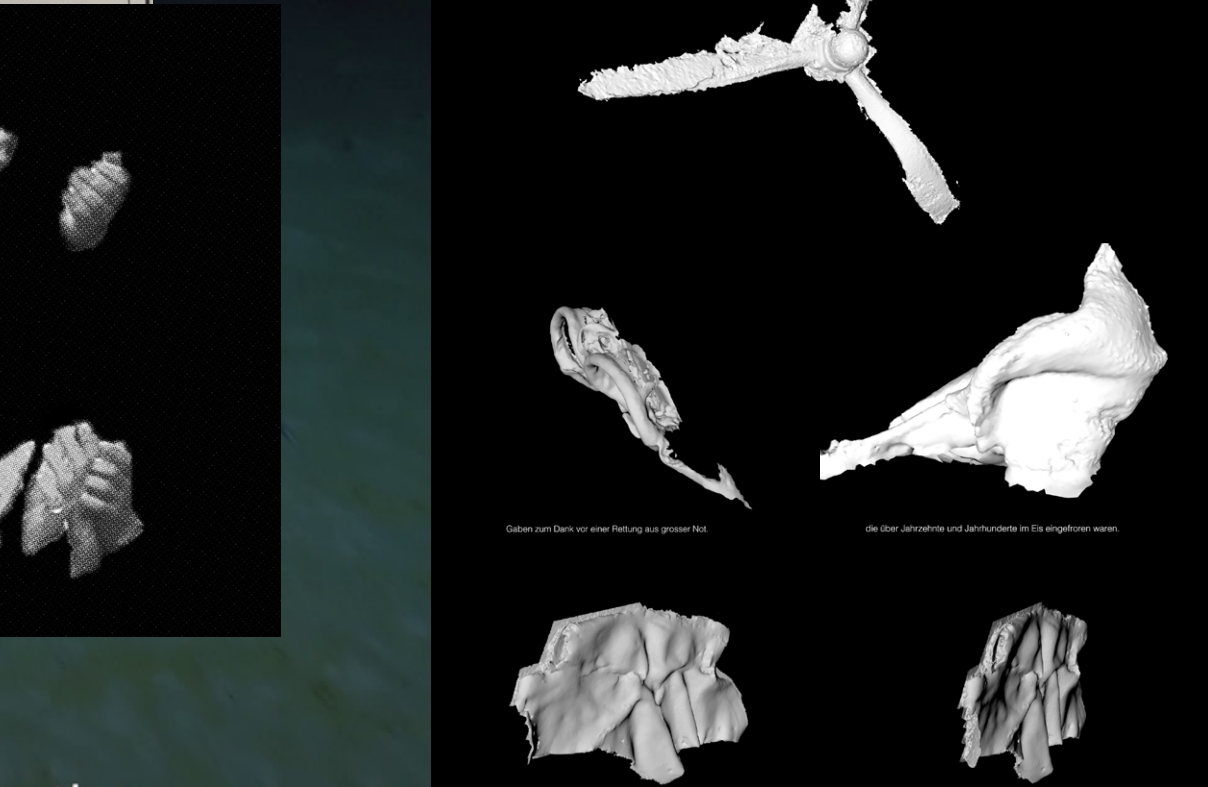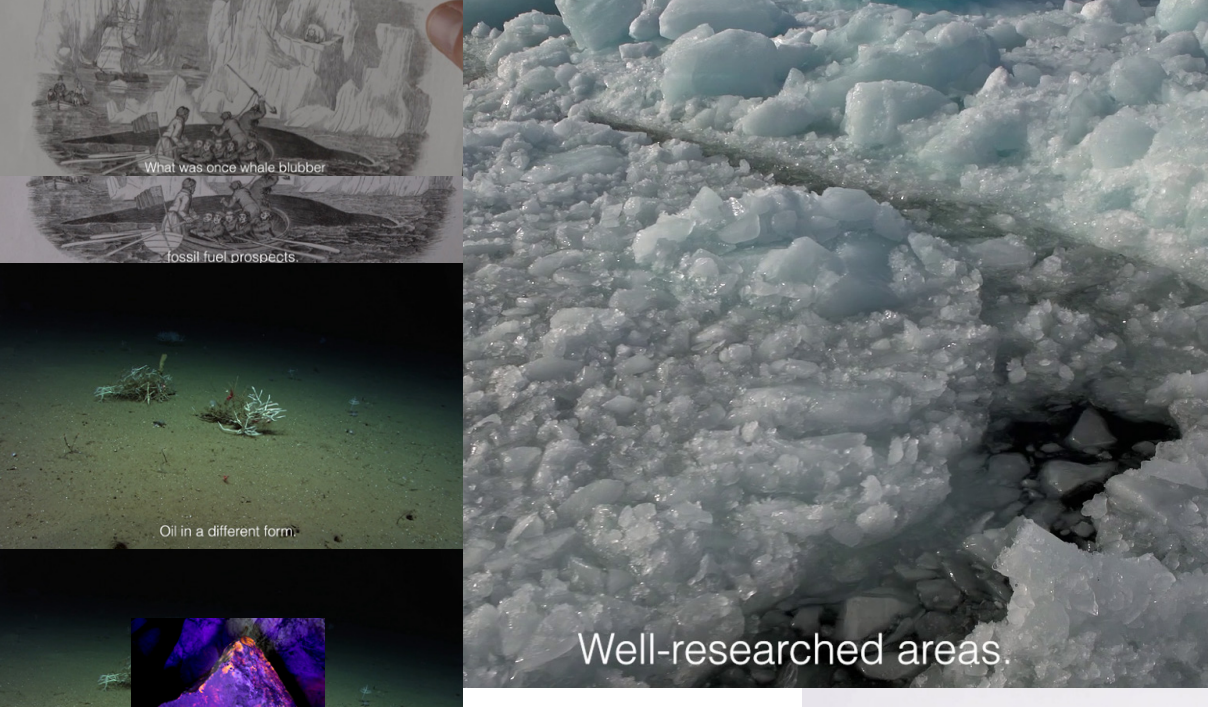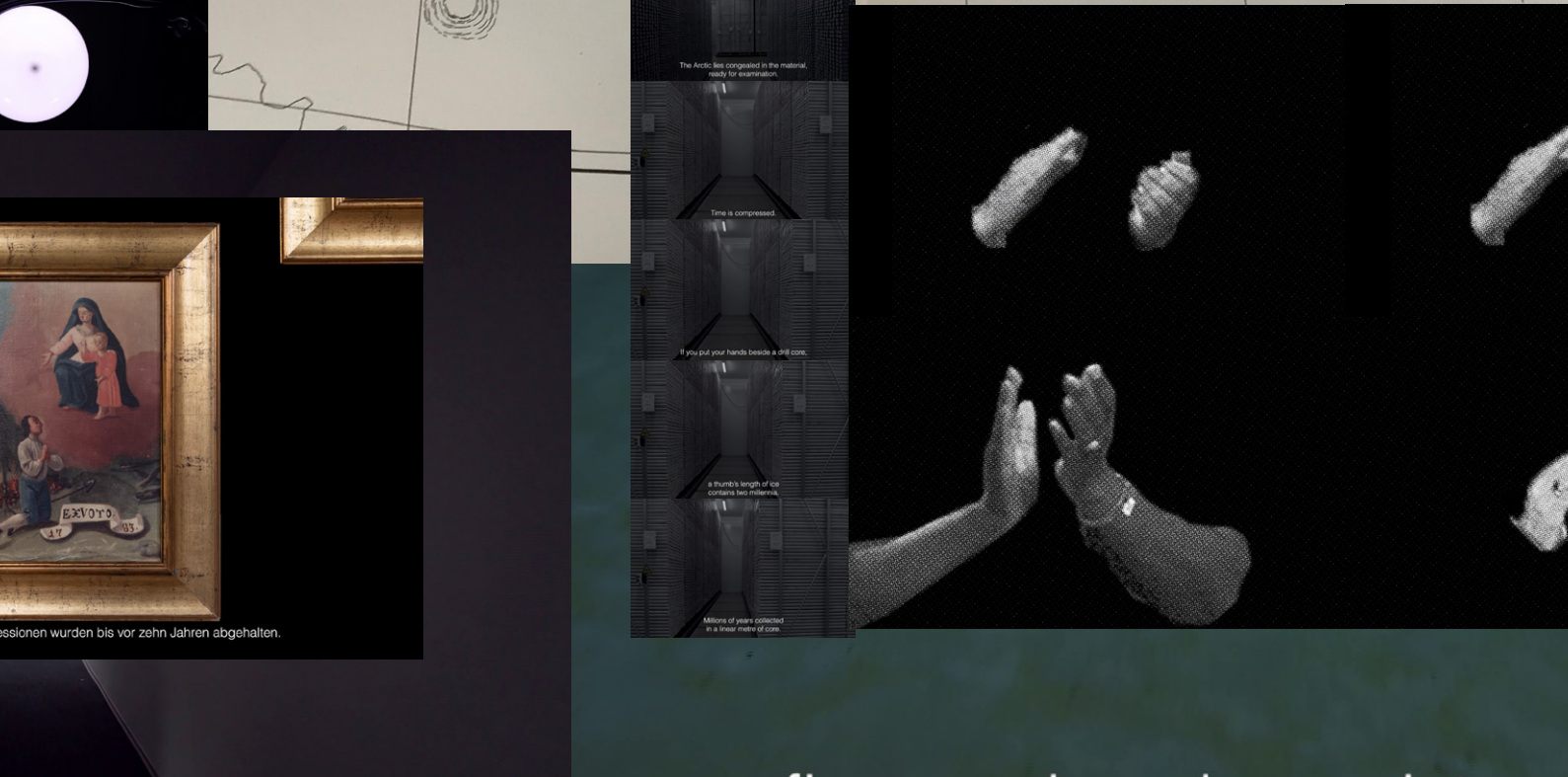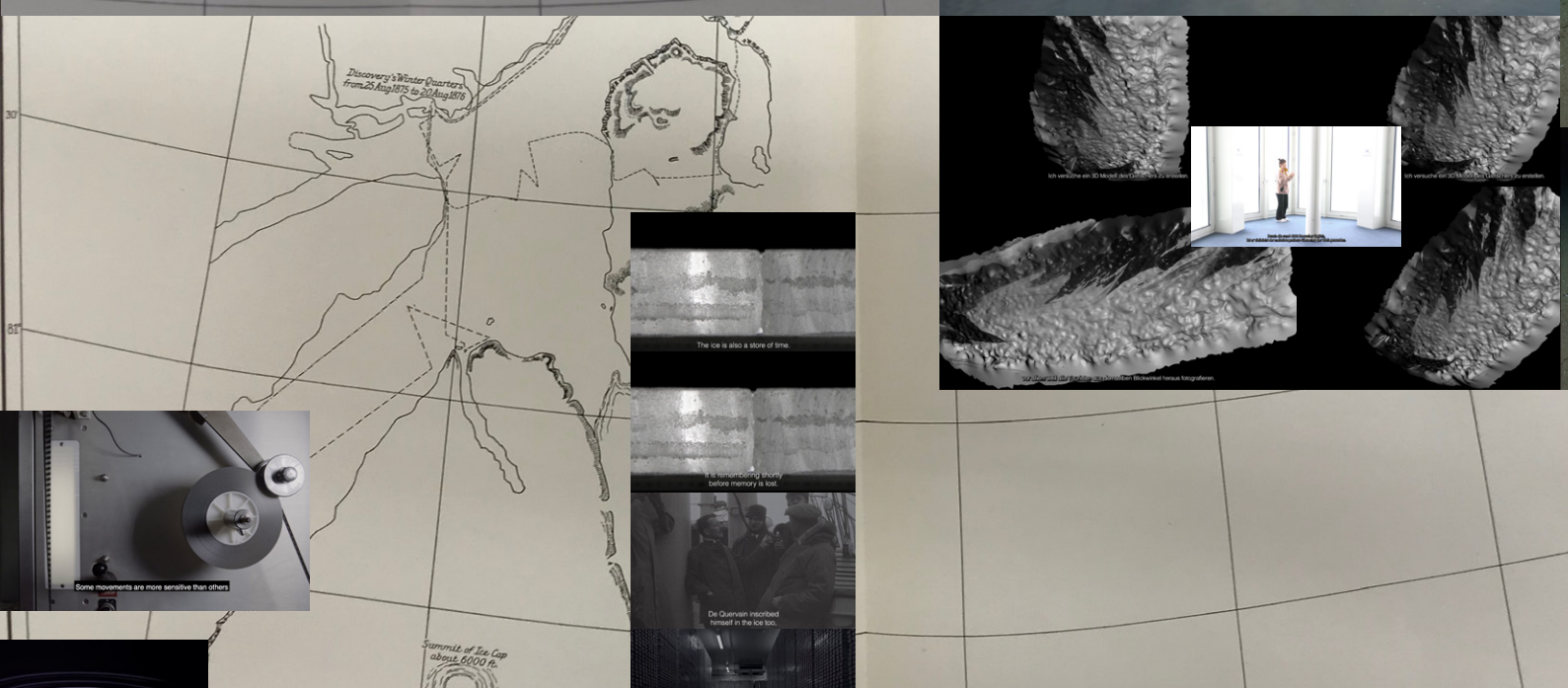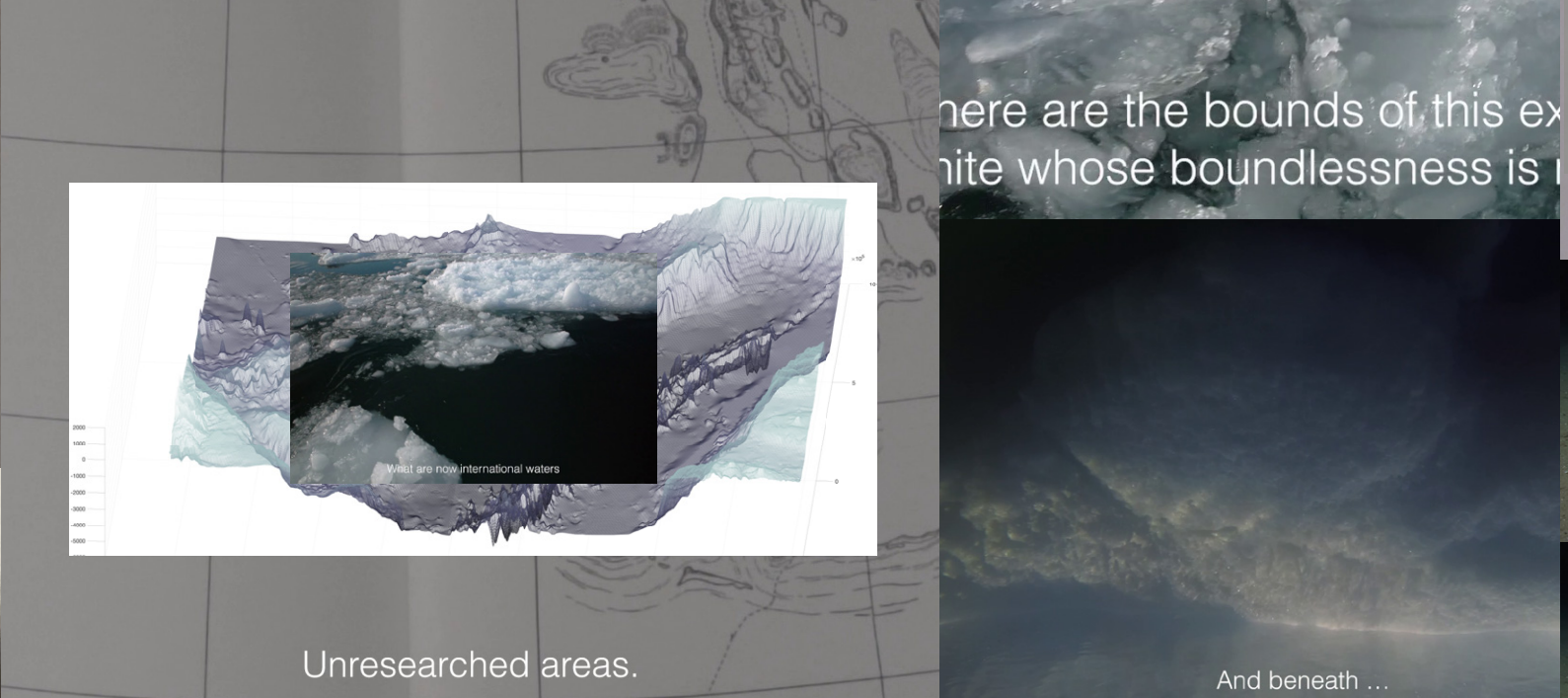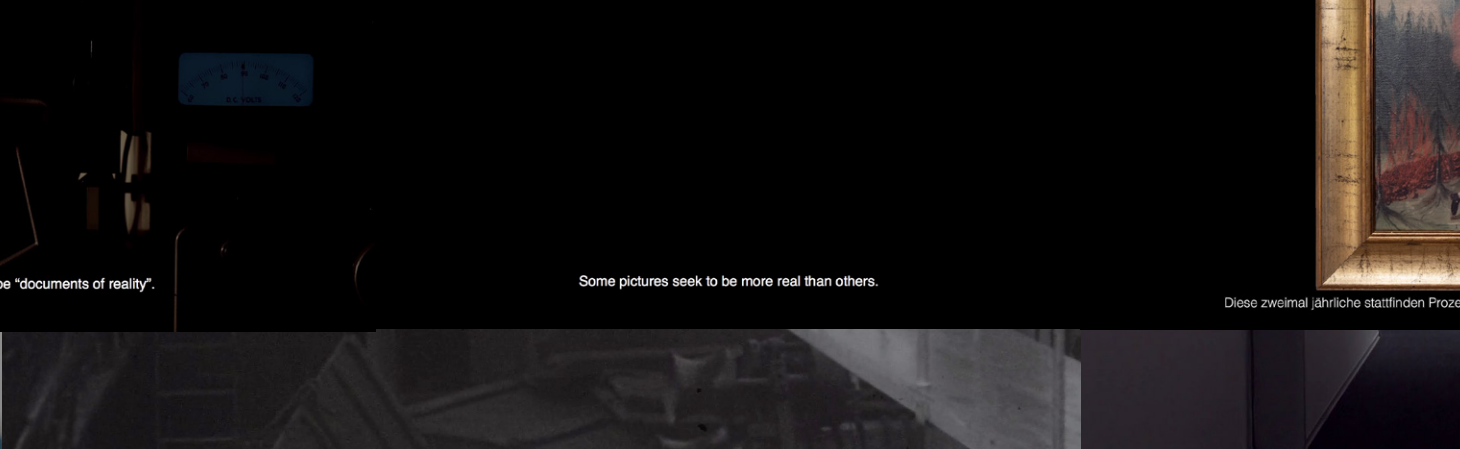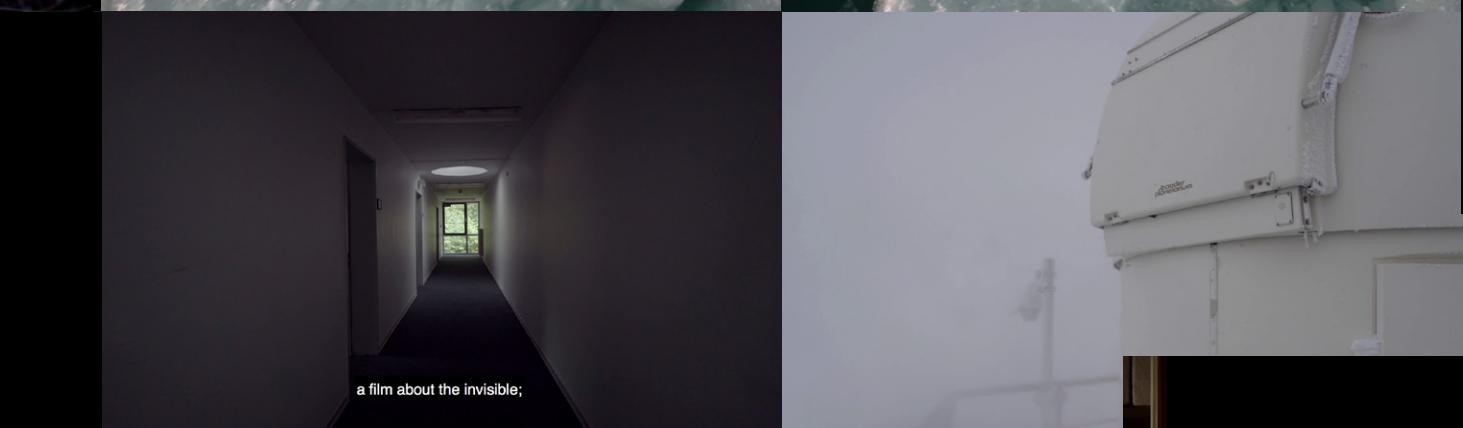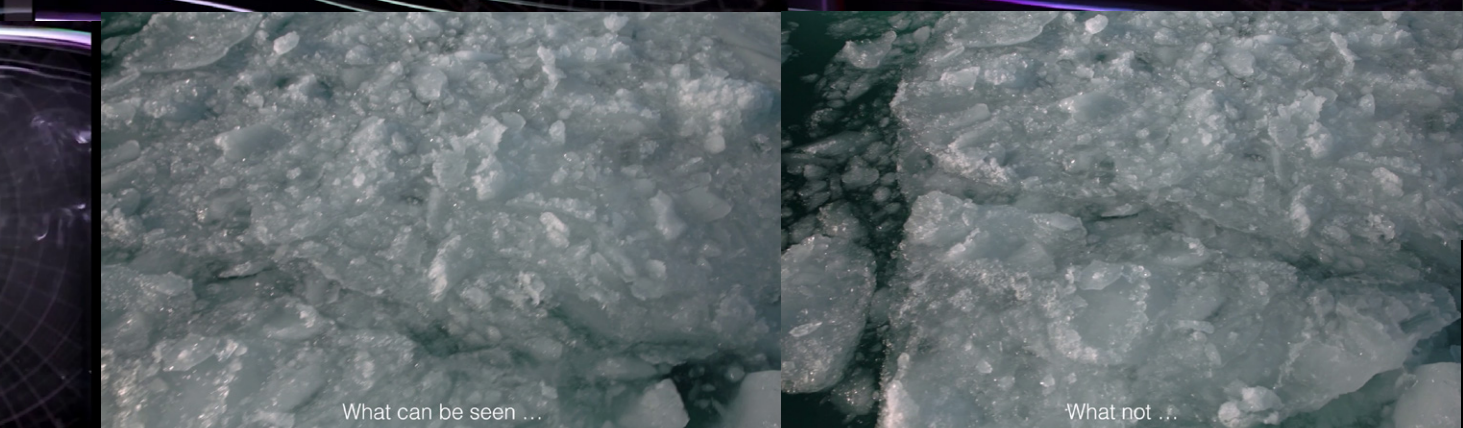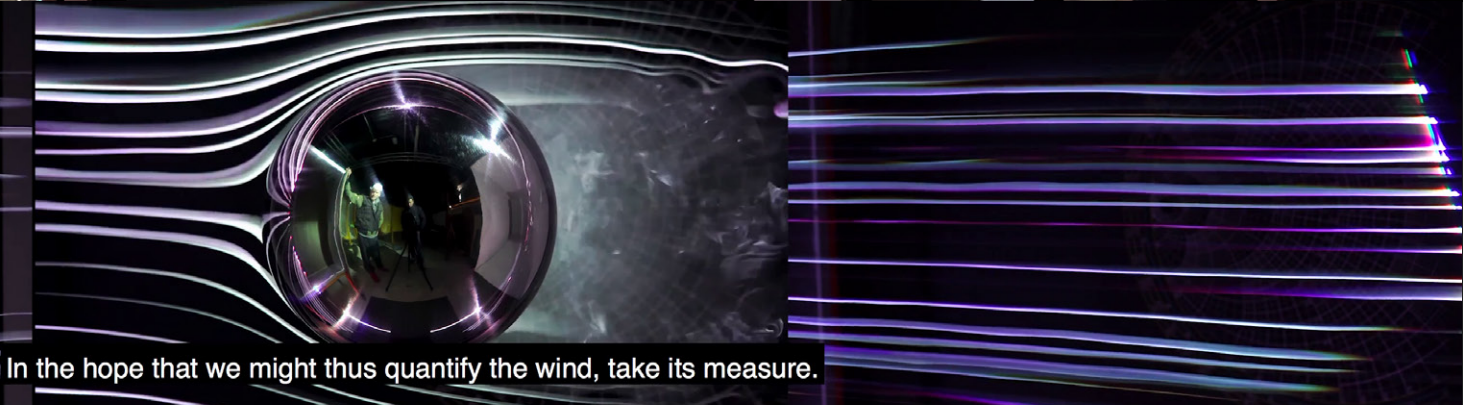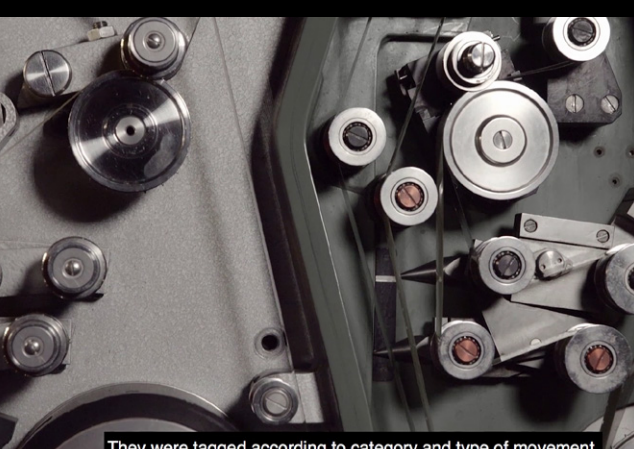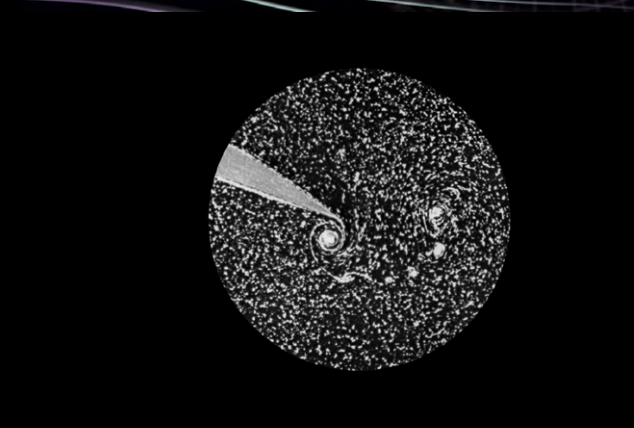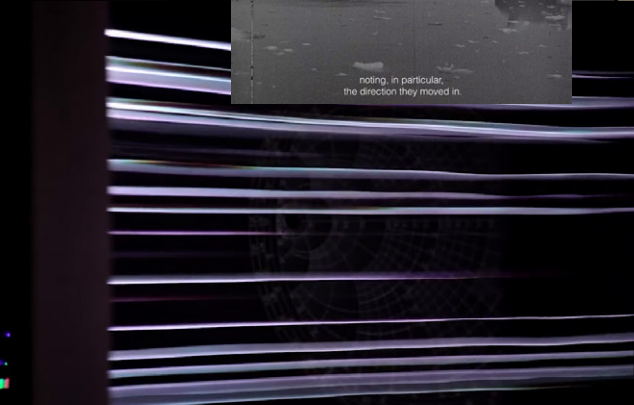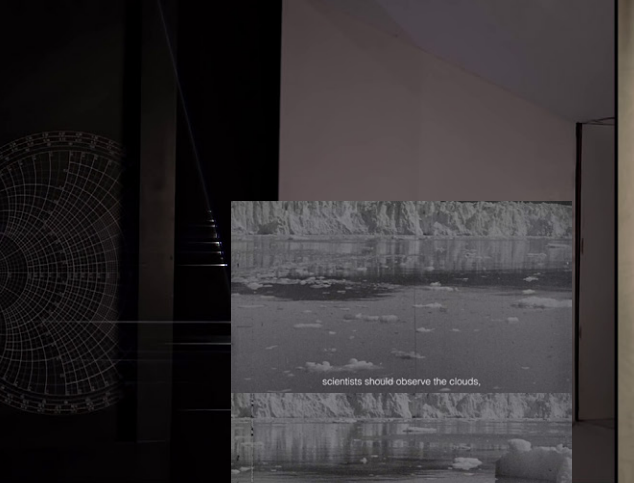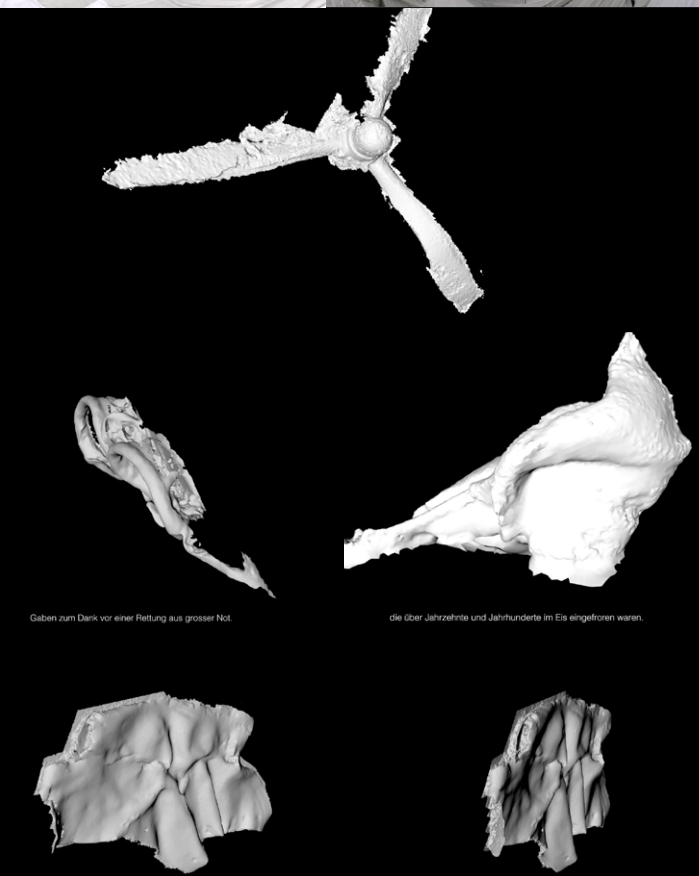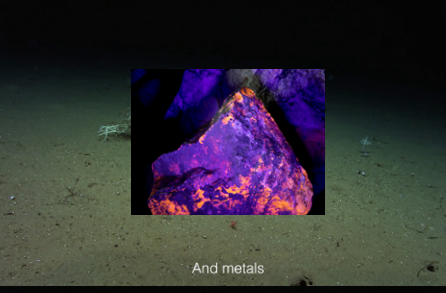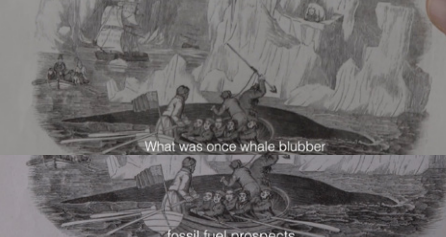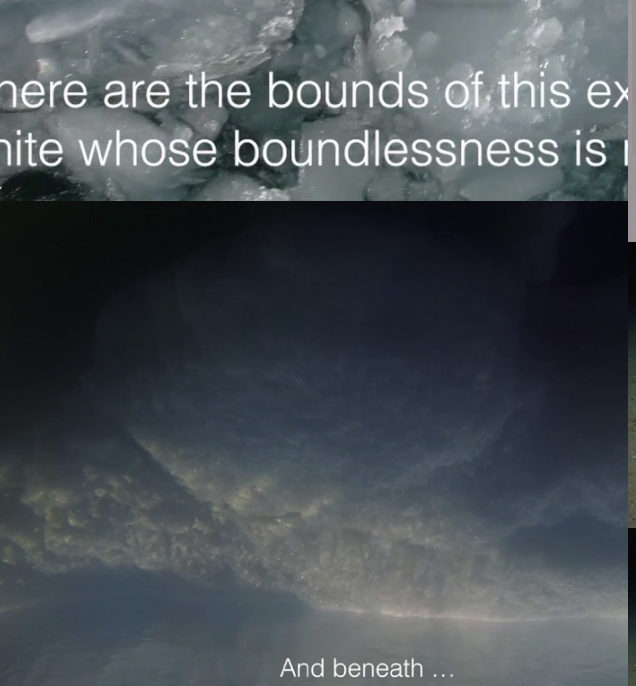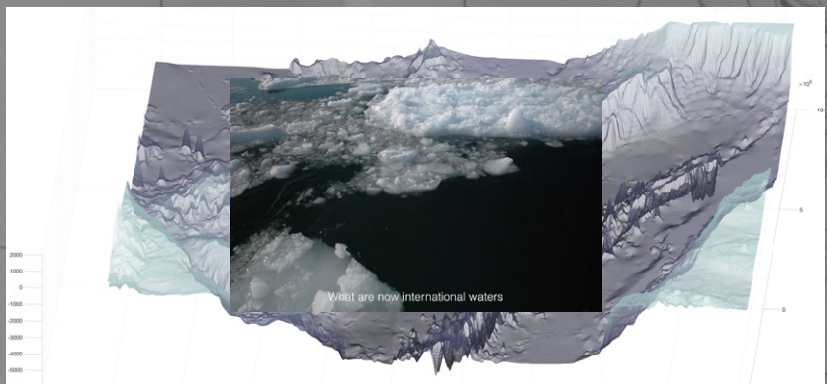
More than Meet s the Eye – A Collage, by Christoph Oeschger with the use of film stills and photographs from all the artistic parts:

– *Memories of a Past Future*, 2019
   https://www.researchcatalogue.net/view/2719418/2719405
– *Unlearning Flow*, 2019
   https://www.researchcatalogue.net/view/2719418/2719389
– *2°*, 2020
   https://www.researchcatalogue.net/view/2719418/2719393
– *The Other Side of Ice,* 2021
   https://www.researchcatalogue.net/view/2719418/2719411
– *In the Ice, Everything Leaves a Trace*, 2023
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