

**SWISS POLAR
INSTITUTE**

Annual Report 2021



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Foreword

In August 2021, the latest Intergovernmental Panel on Climate Change report forcefully demonstrated the urgency of climate research and action. Never has the importance of gathering knowledge in and about polar regions been so widely acknowledged.

Now more than ever, the Swiss Polar Institute (SPI) is committed to supporting the Swiss scientific community to make an impact and contribute to global knowledge on these crucial issues.

For the SPI, 2021 was a year of positive transformation and growth, following the announcement in December 2020 of its recognition as a “research facility of national importance” by the Swiss Federal authorities for the period 2021-2024.

With the backing of this status and increased resources, the SPI was able to deliver new opportunities to the Swiss polar community.

The most immediate and tangible manifestation was the launch of the first Swiss polar programme call. The two SPI Flagship Initiatives selected will enable Swiss scientists to establish ambitious multiannual collaborative projects in polar regions. These projects will have a strong transformative impact at the national level.

Another highlight was the Arctic Century Expedition in August and September to the Kara and Laptev Seas in the Russian Arctic, co-organised with GEOMAR (Germany) and the Arctic and Antarctic Research Institute (Russia). Swiss scientists from six institutions were on board to study the dynamics and interactions between the ocean, cryosphere, land and atmosphere in the face of global change.

With its new status, the SPI aims to have a long-term structuring effect and provide high added-value support to scientists whose work requires access to polar and high-altitude regions. Innovations and new opportunities are key, but so is predictability and stability. Throughout this new funding period, the SPI will therefore also maintain its existing support schemes and services.

Going forward, the SPI will continue to give a high level of priority to the development of new opportunities for access to international research infrastructure. Following an agreement signed with the Australian Antarctic Division in 2020, a new agreement providing facilitated access to French stations in the Arctic, Sub-Antarctic and Antarctic was finalised in 2021. The SPI also initiated collaborations with Parks Canada to facilitate the access of Swiss scientists to the Canadian Arctic.

Throughout the year, we were pleased to see polar science gain importance within Swiss science policy, notably through high-level representation at the Arctic Science Ministerial. We were also impressed by the engagement of the scientific community in our events and calls.

Again, we were able to count on the invaluable support of our founders and members in the Foundation Board, as well as of the members of the polar community who gave their time to serve on our Advisory Board and evaluation panels. We also express our sincere gratitude to the Swiss Polar Foundation and BNP Paribas Suisse Foundation for their continued trust and support.

Danièle Rod
Executive Director

Gabriela Schaepman-Strub
Scientific Director

1 Funding instruments

The SPI supports Swiss researchers with funding schemes targeted to their needs. In addition to annual calls for proposals, namely the Polar Access Fund, the SPI Exploratory Grants and the SPI Technogrants, funding is also offered through the PoARTS programme, and for field and summer schools related to polar topics.

The main novelty in the SPI portfolio for 2021 was the launch of the SPI Flagship Initiatives, ambitious multiannual polar programmes. Contrary to other SPI funding instruments, only one call for proposals will be published during the 2021-2024 period, making it one of the SPI's main deliverables over those four years. 2021 also saw the creation of the Konrad Steffen Grant, a new funding opportunity designed in collaboration with the Greenland Research Council.

Targeted funding schemes

- SPI Flagship Initiatives
- Polar Access Fund
- SPI Exploratory Grants
- SPI Technogrants
- PoARTS
- Field and Summer Schools

SPI Flagship Initiatives

The call for SPI Flagship Initiatives, which took place from February to October, invited proposals for multi-annual programmes focused around a polar or remote high-altitude region, combining science and technology projects from different disciplines and different institutions in Switzerland.

The funding provided is earmarked for field campaigns (logistics, safety, etc.), data management, outreach and programme coordination, thus providing temporary infrastructure for Swiss-led research.

Two SPI Flagship Initiatives were selected for funding:

PAMIR aims to unravel the mechanisms behind the anomalous glacier surges in the Pamir Mountains and to disentangle the consequences of this special cryospheric situation for stream ecology, hazards and water resources. Co-led by Francesca Pellicciotti (WSL) and Martin Hölzle (University of Fribourg), this programme consists of six diverse research clusters and two overarching modelling components.

GreenFjord led by Julia Schmale (EPFL) aims to create process understanding of how climate change affects a fjord ecosystem in Southern Greenland, and how perturbations propagate to biodiversity and livelihoods. Diverse datasets collected by six research clusters will be used to better simulate and predict the evolution of fjord systems, including glacier mass loss, trophic evolution and carbon cycling in the face of anthropogenic climate change.

First field seasons for Flagship Initiatives in 2022

The two SPI Flagship Initiatives GreenFjord (Greenlandic Fjord ecosystems in a changing climate: Socio-cultural and environmental interactions) and PAMIR (From ice to microorganisms and humans: Toward an interdisciplinary understanding of climate change impacts on the Third Pole) will be launched in early 2022.

They involve researchers from 13 Swiss institutions and numerous international collaborators. Both programmes will embark on their first field campaign in the summer of 2022, with subsequent field campaigns scheduled for the summers of 2023-2025.

Through dedicated support from the SPI, the SPI Flagship Initiatives will include a partnership with the Swiss Data Science Center and an extensive public outreach component.

*The SPI Flagship Initiatives will focus on two different environments, the Greenlandic Arctic and the Pamir Mountains, a high-altitude zone.
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Polar Access Fund

The Polar Access Fund enables early-career researchers to undertake a (first) field trip to a polar region or a remote high-altitude area. The research conducted during the field trip must become part of an existing overarching project and be related to the issue of climate change. Funding of up to CHF 20,000 per proposal is available.

2021 saw the fourth Polar Access Fund call launched. As usual, it was open from November of the previous year to mid-January. An evaluation panel comprised of members with different expertise evaluated the proposals received and recommended five projects for funding.

A total of CHF 74,244 was granted to researchers from five Swiss institutions. Four projects involve research in the Arctic and one targets field work in a high-altitude area.

Despite difficult international travel conditions, three Polar Access Fund grantees from 2020 who had had to postpone their field work, along with two grantees from 2021, were able to carry out their field trips in 2021. Their field work took them to Greenland, Iceland and the Canadian Arctic.

Snow sublimation, transport and accumulation in Antarctica

Armin Sigmund, early-career researcher and 2020 Polar Access Fund grantee, led field work as part of his project “Measuring snow sublimation, transport, and accumulation near Princess Elisabeth Station, Antarctica”. His objective was to further develop two automatic measurement stations near Princess Elisabeth Station for the determination of sublimation, drifting and blowing snow mass fluxes, and local surface elevation changes. He also wanted to complement the data sets from these stations with measurements of drifting snow mass fluxes very close to the surface, spatially resolved surface elevation changes, and snow density. His field trip took place during the Antarctic research season 2020-2021.

The data collected will be useful for improving simulations of the surface mass balance of the Antarctic ice sheet. Thus, he hopes to contribute to improved predictions of sea level rise.

*Armin Sigmund working on a measurement station at the Princess Elisabeth Station in Antarctica in the field season 2020-2021.
© 2020 Henri Robert, all rights reserved*



SPI Exploratory Grants

The SPI Exploratory Grants are a funding mechanism dedicated to established Swiss-based researchers active in polar regions, including the Third or Vertical Pole, such as the Andes or the Himalayas. The grants support the launch of new ideas or collaborations, and fund field work and logistics. They can be used to complement the funding of initiatives supported by larger funders (e.g., SNSF, EU) and cover project costs of up to CHF 40,000 per project.

In August 2021, the SPI issued the fourth call for proposals, which was open until 19 October 2021. Following evaluation of the submitted proposals by an external panel of experts, the SPI funded three projects with a total of CHF 90,334.

Two 2021 SPI Exploratory Grants projects will be carried out in the Arctic, and one will focus on the Mount Kilimanjaro glacier in Tanzania. Unlike in other years, no project in the Antarctic was funded.

In parallel, and while restrictions in international mobility resulting from the global COVID-19 pandemic were still constraining research in polar regions, seven groups who had obtained an SPI Exploratory Grant in the past two years managed to carry out field work in Greenland, Svalbard, the Central Asia mountains and Sweden.

SUMITER to explore arctic alpine vegetation

Christophe Randin received a 2020 SPI Exploratory Grant to support the logistical elements of his project "SUMITER: SURveying and MonItoring mounTain vEgetation in the aRctic. A resurvey of GLORIA sites in Zackenberg, Greenland".

The GLORIA network groups 500 summits and 130 sites from the equator to the poles to study climate-induced impacts on cold-determined ecosystems. The SUMITER expedition took place in 2021 and successfully resurveyed three summits of the GLORIA network in Greenland and set up measurements on a fourth summit, allowing for standardised comparisons of the sensitivity of alpine vegetation to climate change.

This project contributes to the understanding of how vegetation of arctic and alpine regions responds to climate change. This is a global ecological issue, since these regions represent 25% of the terrestrial biosphere, are determinants of the global carbon cycle and have high levels of biodiversity

*SUMITER members walking to a Greenland mountain peak to collect vegetation data.
© 2021 Christophe Randin, all rights reserved*



SPI Technogrants

The SPI Technogrants support the development of technologies relevant for research in polar regions and other extreme environments. They can also serve to improve and adapt technologies to extreme environments, including field testing. Unlike other SPI funding schemes, the SPI Technogrants are open to Swiss-based researchers at all levels, from Master's students to senior researchers, as well as to those working in private companies.

In 2021, the SPI issued the call for proposals for the third time. As in the past, the call was issued in August and was open for two months. Following feedback received in previous years, the SPI increased the cap per project from CHF 50,000 to CHF 100,000, resulting in more ambitious applications than in the past.

Following an evaluation of the submitted proposals by an external panel, funding was allocated to three projects, with a total of CHF 250,000. The panel was particularly pleased to see a large project headed by a PI affiliated to a University of Applied Sciences.

While SPI Technogrant projects are less reliant on international mobility than other SPI grants, some projects were nevertheless affected by the COVID-19 pandemic. Two teams had for instance to relocate field testing from high-latitude regions to local alpine environments, while another had to shorten the field-testing time window on local glaciers. Disrupted global supply chains delayed at least two more SPI Technogrant projects. No project however was disrupted in a way that jeopardised its successful implementation.

Improvements of unmanned aerial vehicles (UAVs) for polar-scale glaciers

A consortium led by ETHZ obtained a 2020 SPI Technogrant and started field testing on the Rhone glacier in 2021. The project "Autonomous Deployment of GNSS Stations on Polar Outlet Glaciers Using a Long-Range, Tilt-Wing UAV" aims at combining the advantages of hover-capable multi-copter UAVs with the range and efficiency of fixed-wing UAVs.

This would allow the development of a novel, hybrid, tilt-wing UAV, capable of autonomous placement and recovery of low-power global navigation satellite system stations at rough, inaccessible positions on polar-scale glaciers.

*Thomas Stastny's team testing a UAV on the Rhone glacier.
© 2021 Thomas Stastny, all rights reserved*



PolARTS

PolARTS is a joint initiative of the SPI and Pro Helvetia, the Swiss Arts Council, to stimulate exchange between polar sciences and the arts. The initiative supports tandems composed of an artist and a polar scientist who engage with topics and research linked to polar regions over a period of 12-18 months. The artist may additionally request support for a field trip to polar regions or remote high-altitude areas in the framework of the scientist's field work.

PolARTS was launched in 2019 through the publication of a first call for proposals, resulting in the support of four tandems. Their projects were carried out in 2020 and 2021. Two of these tandems managed to carry out joint field trips despite COVID-19-related travel restrictions. The plurality of approaches and perspectives seen in these projects perfectly fulfilled the purpose of the programme.

In 2021, on the basis of a joint evaluation of the initiative, Pro Helvetia and the SPI decided to renew their commitment to PolARTS for the period 2021-2024.

This will allow for the publication of two additional calls for proposals.

“In an increasingly complex and interconnected world, transdisciplinarity is becoming relevant for both artists and scientists. It is precisely at the crossroads of disciplinary boundaries that innovative strategies, new forms of dialogue, knowledge production and fundamentally forward-looking concepts of art can emerge.”

Seraina Rohrer, Head of the Innovation & Society Department at Pro Helvetia

Ice-cores meets theatre play

In the framework of the ice-coring programme ICE MEMORY, author Sabine Harbeke accompanied her tandem partner Margit Schwikowski, a senior ice-core scientist, to the Colle Gnifetti glacier in the Monte Rosa massif to gain a first-hand impression of the extreme conditions experienced on such scientific missions. A theatre play derived from this tandem work entitled "Flüchtiges Eis, Nachrichten von morgen" (fleeting ice, tomorrow's news) will be touring in 2022.

*Scientist Margit Schwikowski and author Sabine Harbeke working together with an ice core that had just been removed.
© 2021 Sabine Harbeke, all rights reserved*



Field and Summer Schools

The SPI contributes to the costs related to participation in field schools and training programmes in order to enable Master’s and doctoral students to acquire specialised experience and knowledge.

The programmes must relate to topics and disciplines relevant for or associated with polar areas or remote high-altitude areas, or teach skills to be applied to research in such disciplines. The SPI is very open regarding the selection of training it supports, allowing the students to choose the summer school according to their needs. Participants profit from high-quality teaching, enhance their field experience and benefit from new opportunities arising from an enlarged network of international contacts.

In 2021, the SPI saw an increase in the demand for participation in such courses after a difficult year in 2020. Unfortunately, most courses had to be cancelled by their organisers as the months went by. Hopefully, students will again be able to participate in training programmes in 2022.

Professionalising experience in Svalbard

In August 2021, Master’s student Janine Wetter attended the “Safety Management in the Arctic” course at the University Centre in Svalbard (UNIS). The SPI programme for field and summer schools financially supported her travel, accommodation and certification.

She describes her experience as a very relevant and professionalising one for her future career: “During the trip, we were accompanied by the logistics employee from UNIS who had a lot of field experience. I personally benefited very much from this trip because we could learn first-hand about the environment here in Svalbard, about its hazards, and about safety and accident prevention.”

Students participating in a practical exercise in safety management.
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2021 SPI GRANTEES

GRANTEE	INSTITUTION	PROJECT	REGION	FINANCIAL SUPPORT (CHF)
SPI FLAGSHIP INITIATIVES				
Francesca Pellicciotti and Martin Hölzle	WSL	From ice to microorganisms and humans: Toward an interdisciplinary understanding of climate change impacts on the Third Pole (PAMIR)	High-altitude Pamir, Central Asia	1,500,000
Julia Schmale	EPFL	Greenlandic Fjord ecosystems in a changing climate: Socio-cultural and environmental interactions (GreenFjord)	Arctic Narsarsuaq, Greenland	1,500,000
POLAR ACCESS FUND				
César Ordóñez	University of Geneva	Arctic Change: Resolving methane and CO2 concentrations and their fluxes in Baffin Bay	Arctic Baffin Bay, Canada and Greenland	18,220
Ian Delaney	University of Lausanne	Creating and continuing a record of sediment discharge from land-terminating glaciers in southwestern Greenland	Arctic Kangerlussuaq, Greenland	18,260
Imogen Gabriel	University of Bern	Sampling campaign for volcanoclastic material for subsequent tephrochronological and geochemical analyses for selected (pre-)historic volcanic eruptions in Iceland	Arctic Iceland	9,600
Marin Kneib	WSL and ETHZ	Historical Archives to monitor long-Term evolution of Himalayan debris-covered glaciers (HATHI)	High-altitude Garhwal range, Indian Himalaya	12,326
Gerald Raab	University of Zurich	Origin and timing of erratic boulders on Disko Island, Greenland	Arctic Queqertarsuaq, Disko Island, Greenland	15,838
SPI EXPLORATORY GRANTS				
Theo Jenk	Paul Scherrer Institute	ICE MEMORY Tanzania	High-altitude Kilimanjaro, Tanzania	39,800
Laine Chanteloup	University of Lausanne	Indigenous dwelling with arctic environment	Arctic Nunawik, Canada and Inari, Finland	18,454
David Janssen	Eawag	Assessing the impact of mining and natural enrichments on heavy metal contamination in Greenland’s rivers	Arctic Greenland	32,080
SPI TECHNOGRANTS				
Christian Hauck	University of Fribourg	Development of low-cost and robust electrical resistivity tomography monitoring system for remote permafrost environments (ERT-PERM)	Antarctic, Arctic, High-altitude	95,000
Daniel Farinotti	ETHZ and WSL	The Airborne Ice Radar of ETH Zurich (AIR-ETH)	High-altitude	69,000
Peter Gallinelli	University of Applied Sciences and Arts Western Switzerland	A smart autonomous CTD probe for water body mapping	Antarctic, Arctic, High-altitude	86,000
POLARTS (2020-2021)				
Sabine Harbeke, Author Margit Schwikowski, Ice core science	Paul Scherrer Institute	Ice coring meets play writing at 4500 meters above sea level	High-altitude Colle Gnifetti Glacier, Monte Rosa massif	6,300
Gianna Molinari, Writer, novelist In collaboration with Christoph Oeschger, Photographer, artist Fien De Doncker, Glacier dynamics, geomorphology	University of Lausanne	Sediment cores, photography and literature	Arctic Egi Bay, South Greenland	6,300
Mario von Rickenbach, Interactive media art, design Carolín Willibald, Snow physics	WSL	New perspectives on snow as a material	Switzerland	6,300
Barbara Schibli, Author Gabriela Schaepman-Strub, Tundra ecology, biodiversity	University of Zurich	The silence and sounds of the tundra	Switzerland	6,200



SPI support for high-altitude projects

Over the last two years, the SPI has witnessed an increase in the participation and engagement of the high-altitude community in its activities. This positive evolution can be observed across all SPI funding schemes, from early-career researcher funding to the newly launched Flagship Initiatives.

From a scientific point of view, many parallels can be drawn between polar and remote high-altitude regions. Additionally, from the SPI's viewpoint, many of the challenges faced by scientists performing field work in remote high-altitude regions are comparable to those in polar regions: complex access and logistics, difficulty of obtaining permits as well as the importance of a professional approach towards health and safety issues. SPI funding and services are therefore also applicable to the needs of the high-altitude community.

*Polar Access Fund grantee Evan Miles drilling a Himalayan glacier at sunset
© 2021 Evan Miles, all rights reserved*

2 Expeditions

Resource and planning-intensive expeditions allow for exceptional international collaboration and interdisciplinary exchange. Expeditions are also an excellent training ground for early-career scientists. SPI (co-)lead expeditions enable specific sampling opportunities in polar regions.

Arctic Century Expedition

🕒 2021

Organised jointly by the SPI, the Arctic and Antarctic Research Institute (AARI) in Russia and the Helmholtz Centre for Ocean Research Kiel (GEOMAR) in Germany, the Arctic Century Expedition was a multidisciplinary venture that studied remote and rarely accessible areas in the Kara and Laptev Seas, as well as on Franz Josef Land and Severnaya Zemlya in the Western Arctic.

The scientific programme focused on diverse important aspects of the atmosphere, cryosphere, marine and terrestrial environment in a rapidly changing Arctic climate. Exciting projects were carried out by an international team of researchers aiming to understand the sensitive Arctic environmental system.

Postponed in 2020 because of COVID-19 restrictions, the expedition left Murmansk on 5 August 2021 on board the research icebreaker Akademik Tryoshnikov and after a transit of three days, the station work started along multiple transects in the Kara Sea. Thereafter, a comprehensive terrestrial and glaciological work programme took place in Franz Josef Land and Severnaya Zemlya.

The marine work focused on key areas in the Saint Anna Trough, the Kara Sea continental margin and in the central Kara Sea. The expedition returned to Murmansk on 6 September 2021.

“The Arctic Century Expedition has succeeded in providing deep insights into the rapidly changing atmosphere-land-ocean system of the Eurasian Arctic. The international team of scientists shed new light on this internationally rarely visited hot-spot for climate studies in the Arctic.”

Heidi Kassens, Chief Scientist Arctic Century Expedition

The months following the expedition were dedicated to the shipment of the samples collected to the different scientific teams involved. Sea water and atmospheric samples, for instance, arrived in Switzerland and were distributed amongst the different scientific groups involved in their collection. Further samples and datasets will be transferred to Swiss research groups within the first months of 2022.

The first results of the expedition and future interdisciplinary collaborations will be discussed during an international Arctic Century workshop, which will be held in Sion in May 2022.

Arctic Century Expedition in Numbers

4,455

nautical miles travelled

13

nationalities on board

14

microplastic stations deployed

7

islands visited

15

institutions involved, incl. 6 from Switzerland

20,468

litres of water collected

82 05.26 N

furthest north

125

marine and terrestrial stations

~7,000

instrument hours of atmospheric measurements

106 70.78 E

furthest east

10,298

samples collected

34

metres of sediment cores collected

59

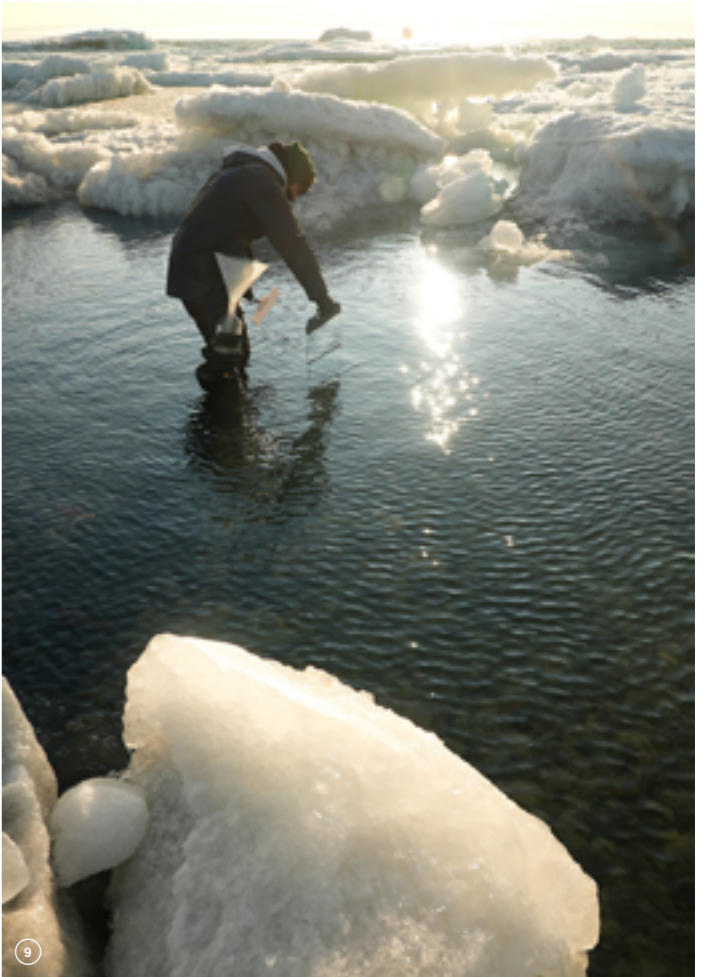
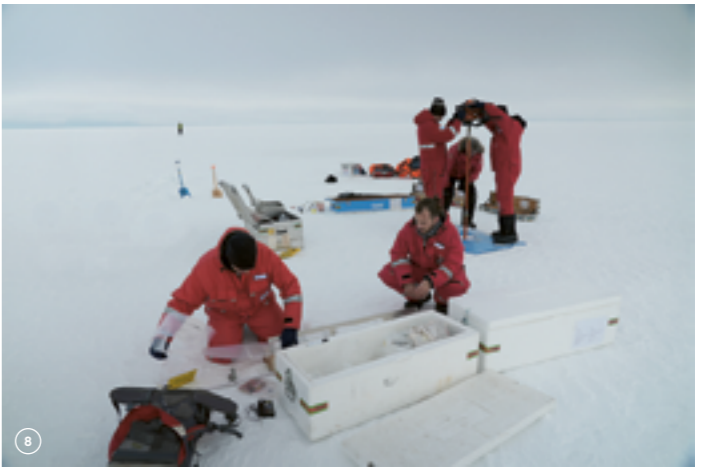
scientists incl. 30 early-career

170

oceanographic instrument deployments

27

metres of ice cores collected



ARCTIC CENTURY EXPEDITION

- ① Sedimentologist performing field work on October Revolution Island.
© Swiss Polar Institute. Photographer: Jön Björgvinsson
- ② The Akademik Tryoshnikov moored near Cape Baranov, Bolshevik Island.
© Swiss Polar Institute. Photographer: Jön Björgvinsson

- ③ Collection of data often involves electronic material and software.
© 2021 Fabian Fopp, all rights reserved
- ④ Field work in Inostrantsev Bay.
© Swiss Polar Institute. Photographer: Jon Bjorgvinsson
- ⑤ Scientists deploying a CTD probe to collect data about the water column.
© 2021 Fabian Fopp, all rights reserved

- ⑥ Scientists collecting a sediment core with a gravity corer.
© Swiss Polar Institute. Photographer: Jön Björgvinsson
- ⑦ Helicopter bringing scientists back after field work on Uyendinia Island.
© Swiss Polar Institute. Photographer: Jön Björgvinsson

- ⑧ Researchers carefully placing an ice core in a thermal box to keep it in its original state and prevent it from melting.
© Swiss Polar Institute. Photographer: Jön Björgvinsson
- ⑨ Collecting samples in shallow water from the sea surface microlayer to study the effects of sea spray aerosols on clouds over the Arctic Ocean.
© Swiss Polar Institute. Photographer: Jön Björgvinsson

Antarctic Circumnavigation Expedition (ACE)

🕒 2016-2017

ACE was the first expedition carried out by the SPI. Although the expedition finished its journey in March 2017, participating scientific teams are still actively working on data and samples collected on board.

The SPI has continued to provide data management support, leading to 108 datasets compiled in the SPI/ACE Zenodo community, of which 105 are openly available. Another 15 datasets published elsewhere are also referenced on the ACE website. Mirroring the analytical work and publication of datasets, 14 new publications from ACE appeared in 2021, bringing the total to over 60. Some recent highlights include research on the evolution of beetles along the Antarctic Polar Front, results from studies of ice cores from remote Antarctic islands visited by the expedition, and an insight into the sources of airborne biological particles.

Data management support and a pro-active open-science policy in the post-expedition phase has kept the collaborative momentum going and has strongly increased the impact of this international and interdisciplinary expedition.

ACE-related publications can be found at:
swisspolar.ch
 expeditions → ACE → ACE related publications

ACE-DATA – a project to increase the value of the data gathered

To foster ACE's interdisciplinary nature, the SPI applied for funding from the Swiss Data Science Center (SDSC) in 2016 to help add value to the numerous datasets collected during the expedition through novel data science approaches.

The Southern Ocean plays a very critical role in global climate, but we know very little about it. The ACE-DATA project combined multidisciplinary expedition data with data science in order to gain new knowledge in this area.

ACE-DATA enabled participating teams to combine the numerous variables observed and to understand how they influence each other. A specific focus was for example on how air and ocean temperature effect the formation of clouds.

ACE-DATA helped explore important climate processes in depth, such as the formation of algal blooms. Scientists around the world can use these results to improve global climate models and help prepare for climate change. "This was an amazing journey, where we as environmental scientists learned a whole lot about data science and the insights it can bring to our work", explains Julia Schmale (EPFL), co-PI of the ACE-DATA project.

The project was closed at the end of 2021.



Aerial view of icebergs during the Antarctic Circumnavigation Expedition
 © Peter Ryan, all rights reserved

3 Services

Throughout the year, the Swiss Polar Institute works in close collaboration with the community to facilitate their work in the field and make them benefit from SPI's networks. In addition, a series of services are developed to help scientists carry out their campaigns safely and efficiently.

Health and safety in the field

The SPI helps Swiss scientific groups improve the health and safety elements of their field work.

The SPI organises dedicated courses for first aid in the field, with a focus on the special conditions encountered in cold, high-altitude and remote regions.

These courses are led by medical doctors and mountain guides in collaboration with the Groupe d'Intervention Médicale en Montagne (GRIMM).

In 2021, two courses were organised and carried out in an alpine environment. The first took place from 23-24 April. Due to the prevailing COVID-19 restrictions at the time, two separate groups had to be formed and participated in the course on two different days. The second course took place from 3-4 December. In total, 28 scientists participated.

The SPI also puts customised field pharmacies at the disposal of expedition parties and offers access to expedition telehealth services.

These field pharmacies were used during four field campaigns by three research groups. All the field campaign participants also registered for the "SOS MAM" expedition telemedical service.

Data management

Investment in sound data management in the initial stages of a project can save time, aid collaboration within and between projects, and most importantly, ensure the security of data and samples.

To encourage and facilitate good data management practices, the SPI offers workshops on managing data in the field, tailored to polar and high-altitude field work. Workshops cover aspects of data management from storing and backing-up data, to recording metadata and preparing for field work. The SPI has also produced a field guide to support the workshops. The last workshop was dedicated to early-career researchers and took place in September. 15 Polar Access Fund grantees and APECS Switzerland members participated.

In order to provide the Swiss polar community with information and access to good data management practices, the SPI represents Switzerland in international bodies such as the Standing Committee on Antarctic Data Management (SCADM).

Furthermore, the SPI engages in the wider polar and global data communities through the Polar Data Discovery Enhancement Research

(POLDER) working group as well as at international conferences.

The SPI also provides data curation and support for data publication, encouraging open access data from SPI-led expeditions. Thanks to an ongoing collaboration with EMODnet Physics, these data are easily findable by a wide audience.

SPI containers

The SPI co-owns two research containers that are used for atmospheric sciences experiments.

The "red container" was moved to Sion in December 2020, where it is based on the ALPOLE campus. It generally functions as a laboratory, including for student work for a campaign in January and February 2021 on air pollution.

In July 2021, the "white container" was made mission-ready at ETHZ to be deployed during the Arctic Century Expedition. Instruments from Swiss (ETHZ, EPFL, Eawag) and Spanish (CSIC) institutions were installed, tested and secured for transport. Via Basel, the container lab was then shipped to Kiel where it was loaded onto the ice breaker Akademik Tryoshnikov. In early August, the scientific crew boarded the ship in Murmansk and conducted atmospheric measurements to investigate cloud formation, the water cycle, and nutrient transport in the Arctic Ocean.

“The white container lab served its purpose well and allowed the collection of high-quality datasets”

Zamin Kanji, ETHZ

After the Arctic Century Expedition ended in Murmansk, the container was closed and remained on board the ship. It was offloaded in Kiel at the end of October and shipped back to Zurich to unload the instruments.

2021 travels of the SPI pharmacies

The SPI owns two customised field pharmacies, set up and packaged for field work in polar and high-altitude regions. These pharmacies were lent twice to a group from the University of Fribourg who travelled to Greenland in April and July.

Following the first field campaign of the year, a pharmacy was lent to a group from the WSL performing field work in High-Mountain Asia and a group from the University of Zurich, leading research in Greenland from July-September.

Specific conditions apply to the use of these field pharmacies, which are managed in close collaboration with the medical team from GRIMM.

*Course participants preparing a bivouac in the Swiss Alps during health and safety training co-organised by GRIMM and the SPI.
© Evan Miles, all rights reserved*



4 Outreach

In addition to strengthening collaboration in the Swiss polar community, the SPI also works to raise awareness in the general public about polar science and issues.

No exhibitions with SPI involvement took place in 2021, but SPI started collaborating with the Palais de Rumine and the Espace des Inventions in Lausanne, providing background support for future exhibitions they have planned. The SPI also focused on the development of knowledge in the youth of Switzerland. The Swiss Polar Class especially gained in importance and scope in 2021.

Swiss Polar Class (SPC)

SPC is a free educational programme developed by the SPI to raise awareness among Swiss primary school students of the polar regions and their fragility. It was launched in the French-speaking part of Switzerland in spring 2020 and was expanded to the German-speaking part in summer 2020. The programme is available to teachers, students or anyone interested in learning more about polar regions, and was developed for students from 8 to 12 years old, and beyond. SPC develops learning content in French and German, including among others theory sheets, worksheets, classroom experiments and videos, based on the SPI's scientific activities. It also conducts class visits and organises various events and activities.

In 2021, focus was placed on reaching out to classes – events and class presentations took place in both French- and German-speaking Switzerland. The total number of registrations for SPC in 2021 was 96 classes for the

French-speaking part of Switzerland and 23 for the German-speaking part. In 2021, SPC participated in the Arctic Century Expedition and produced exciting videos and content about the expedition for students, which was put online



Polar scientists on the Arctic Century Expedition meet with pupils online to answer questions.

© 2021 Swiss Polar Institute, mockup: © GruppoPiù, Unsplash.com



Flyer for Swiss Polar Class event.

in January 2022. Furthermore, in 2021 a lot of work was dedicated to the development of the new module “Humans in the polar regions” and preparatory work was done for the “Swiss Polar Class Expedition Game” – both of which are scheduled to be completed before summer 2022.

A total of 668 children participated in SPC events and activities in 2021. Every month, a presentation took place in a classroom in multiple locations throughout Switzerland.

Furthermore, the yearly SPC drawing competition was held in spring, a total of three “Ask a polar scientist” online events were held with 2-13 participating classes each, and a workshop was held at EPFL in November in collaboration with the Science Outreach Department (SPS) of EPFL.

SPC works with various cantonal education departments. In 2021, we collaborated with the Science Lab of the University of Zurich and the educational programme of the World Wild Fund for Nature on the exchange of learning content. In addition, we maintained a close exchange with the SPS.

In February and December 2021, meetings of the Advisory Committee were held to discuss the development of SPC and its future priorities.

Swiss Polar Class visits

Every month, SPC selects one class to receive a 60- to 90-minute on-site visit and polar workshop. In 2021, visits took place in six cantons. Visits postponed because of health regulations will take place in 2022.

The presentation in the classroom begins by surveying the students' knowledge of the topic. After watching a video introducing the polar regions, all the students are involved in defining keywords about these regions. The class then continues on a subject pre-arranged with the teacher, e.g., polar animals. Pictures and videos are presented and group activities are organised to explore different aspects of the topic. Since the pupils are always very inquisitive, a Q&A session is organised at the end of the visit.

SPC visits classes and organises many activities for pupils, such as drawing contests. The winners of the 2021 drawing contest were Vince and Tristan, 12 years old.

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SPI scientific events

In 2021, the SPI held numerous events to bring together the Swiss polar community and inform them of the new developments. Other events were targeted at a more international audience, with the aim to increase the visibility of Swiss polar science, such as “Century of Antarctic Science celebrated by Australia, UK and Switzerland”, the launch of the SPI Foundation, and the Swiss Polar Day with international speakers. We observed an upward curve in participation in SPI events and a real enthusiasm for on-site activities.

Communication channels

At the end of 2021, the SPI had 1,063 followers on its Twitter feed, an increase of 25%, and the number of followers is increasing constantly. The ACE Twitter account remains stable at 1,066, which is appreciable considering that the expedition took place almost five years ago.

The SPI Secretariat also sent five general mailings with SPI news and opportunities to the Swiss polar community. The contact database is being constantly updated and remains stable with about 1,500 addresses.

The SPI's website had more than 14,000 visitors and 70,660 page views, which is more than double the number in 2020.

Polar Social Sciences & Humanities: Spotlight on Swiss Research #3

For the third year, the SPI organised an event dedicated to the Swiss polar social sciences and humanities (SSH). The main objectives were to facilitate networking, bring together the SHS community and support an exchange about current work and possible synergies.

Organised were a keynote about the Siberian indigenous sciences, an open forum with short presentations from Swiss researchers, and a general discussion on issues of common interest.

Online event dedicated to Swiss polar SSH researchers held in March 2021.

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Researcher Andrew Tedstone and his colleagues endured six days of storms with blowing snow, which continually threatened to bury their tents, making the shovels probably the most important tools of the field season!
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SWISS POLAR CLASS EVENTS

DATE	EVENT	PLACE	NUMBER OF PARTICIPANTS
22 January	SPC Lesson - January	📍 Lausanne, VD	19
22 February	SPC Lesson - February	📍 Geneva, GE	21
26 March	SPC Lesson - March	📍 Broc, FR	19
April 2021	Drawing contest	📍 Online	157 drawings received
30 April	SPC Lesson - April	📍 Delémont, JU	19
25 May	SPC Lesson - May	📍 Neuhausen am Rheinfall, SH	30
27 May	Ask a scientist - "Frag den Polarforscher!"	📍 Online	37
1 June	Ask a scientist - "Rencontre avec un scientifique polaire"	📍 Online	198
22 June	SPC Lesson - June	📍 Porrentruy, JU	21
5 August – 6 September	Arctic Century Expedition	📍 North of Russia, Online	
8 September	SPC Lesson	📍 Murmansk, Russia	150
9 November	SPC High School Lesson	📍 Renens, VD	12
15 November	Journée Osez tous les métiers	📍 Lausanne, VD	14
25 November	Ask a scientist - "Frag den Polarforscher 2.0"	📍 Online	134

2021 SPI CONFERENCES AND EVENTS

DATE	EVENT & NUMBER OF ATTENDEES	PLACE	DETAILS
19 February	SPI Flagship Initiatives information event #1 👤 40	📍 Online	First informative event about the launch of the SPI multiannual programme "SPI Flagship Initiatives"
26 February	SPI Flagship Initiatives information event #2 👤 40	📍 Online	Second informative event about the launch of the SPI multiannual programme "SPI Flagship Initiatives"
3 March	Planning your field trip in spite of COVID 👤 20	📍 Online	First workshop, co-organised with Blaise Genton, CHUV/ Unisanté, to anticipate potential consequences of the pandemic on field campaigns
12 March	Polar Social Sciences & Humanities: Spotlight on Swiss Research #3 👤 35	📍 Online	Workshop, co-organised by Yvon Csonka, dedicated to the polar SSH community in Switzerland
25 May	Century of Antarctic Science celebrated by Australia, UK and Switzerland 👤 100	📍 Hobart, Australia/ Online	Public lecture to discuss the progress of Antarctic science over the last century
26 May	New momentum for Swiss polar science 👤 80	📍 Online	International launch of the SPI as a research facility of national importance
27 May	Planning your field activities in spite of COVID – Follow-up 👤 15	📍 Online	Workshop, co-organised with Blaise Genton CHUV/Unisanté, to anticipate potential consequences of the pandemic on field campaigns
29 September	Workshop: data management in the field 👤 15	📍 Online	Workshop for Polar Access Fund grantees and other ECRs to exchange best practices regarding data management in the field
1 October	Swiss Polar Day 2021 👤 113 in person and 64 online	📍 Lausanne / Online	Annual conference dedicated to the Swiss polar community
24 November	PolARTS matchmaking event 👤 45	📍 Zurich	Co-organised by Pro Helvetia, the Swiss Arts Council
16 December	Information & brainstorming event – Konrad Steffen Grant 👤 30	📍 Online	Co-organised by the Greenland Research Council

SPI PARTICIPATION IN EXTERNAL EVENTS AND CONFERENCES

DATE	EVENT	PLACE	SPI CONTRIBUTION
5 February	Presentation of SPI and Swiss polar science to the UK Ambassador to Switzerland	📍 Saint-Prex	Presentation and discussion of Swiss-UK collaboration opportunities
15 March	Lunchtime events, Swiss National Science Foundation (SNF)	📍 Online	Presentation to SNF staff of SPI activities and aims
19 March	General Assembly Forum of Arctic Research Operators (FARO)	📍 Online	Presentation of 2021 SPI activities in the Arctic
19 March	APECS Switzerland Event	📍 Online	Presentation of SPI activities for early-career researchers
19 March	Conservation of Arctic Flora and Fauna (CAFF) Board meeting	📍 Online	Observer statement presenting new SPI role and function as Swiss national research infrastructure
23 March	Arctic Science Summit Week (ASSW)	📍 Online	Participation in numerous sessions, notably about international access to research infrastructure in the Arctic
24 March	ACE-DATA Knowledge transfer workshop	📍 Online	Presentation of ACE-DATA results and process Co-organised with Julia Schmale (EPFL)
14 April	COMNAP townhall meetings	📍 Online	Exchange on COVID regulations and protocols
21 April	International Arctic Science Committee Action Group on Carbon Footprint (AGCF) Community Consultation	📍 Online	Discussion of SPI CO2 emissions reduction strategy
29 April	Foundation Board of the Swiss Polar Foundation	📍 Lausanne	Presentation and report on SPI achievements and projects
8-9 May	Arctic Science Ministerial (ASM3)	📍 Tokyo, Japan, Online	SPI contribution as part of Swiss delegation
3 June	COMNAP Safety WG	📍 Online	SPI contribution as Swiss delegate
10 June	COMNAP Environmental WG	📍 Online	SPI contribution as Swiss delegate
21-24 June	Antarctic Treaty Committee Meeting (ATCM)	📍 Online	Participation in different sessions as part of the Swiss delegation
24 August	"Conférence des Ambassadeurs"	📍 Bern	Panel on science diplomacy from a Swiss point of view
27 September	26th International Symposium on Polar Sciences (ISPS2021)	📍 Online	Organised by the Korea Polar Research Institute
4-5 October	Science and Technology for Society (STS) forum	📍 Online	Representation of SPI, including written statement Organised by the International Institute for Applied Systems Analysis
20 October	The Arctic in a Changing Climate: First results of the Russian-Swiss-German expedition "Arctic Century"	📍 Swiss and German Embassies in Moscow, Russia, Online	Presentation of Arctic Century Expedition and first results, participation in a panel discussion
25-26 October	General Assembly EU-PolarNet	📍 Online	Contribution to work in WP 3 and WP4 towards mapping of European polar funding and capabilities
11 November	Contributing to climate science through research in polar and high-altitude regions: the early-career researchers' point of view	📍 Online	Organised by the Geneva Cryosphere Hub, on the occasion of the 26th UN Climate Change Conference of the Parties (COP26)
13-17 November	Arctic Circle conference	📍 Reykjavik, Iceland	Follow-up of Arctic Century Expedition and bilateral meetings
18 November	Meeting of the SKPH	📍 Bern	Report on SPI activities and news
18 November	Prix de Quervain 2021	📍 Bern	Awarded jointly by the Swiss Committee for Polar and High Altitude Research of the Swiss Academies of Arts and Sciences, the Swiss Commission for the Jungfrauojoch High-Alpine Research Station of the Swiss Academy of Sciences, and the Swiss Foundation for Alpine Research
28 November	Global Science Film Festival	📍 Zurich	Statement about Koni Steffen's role in Swiss polar science during the Koni Steffen Award Ceremony
7 December	Swissnex China Art x Science Dialogues – Polar Science and Art	📍 Online	Presentation of PolARTS programme with Pro Helvetia
17 December	EU-PolarNet 2 Catalyst platform demonstration	📍 Online	Preparation of joint platform to share polar resources

5 Collaboration

Collaboration with partner institutions and colleagues around the world is a central success factor for an institution such as the SPI. Only in this way can the SPI deliver enhanced access, opportunities and support services to the polar research community.

The SPI's status as a Swiss research facility of national importance has further emphasised the importance of nurturing established partnerships and seeking new collaboration opportunities.

International collaborations

International collaboration and networks are a crucial element for successful field work in polar regions. Establishing relationships with polar institutions in order to facilitate access to international infrastructure and support field work is therefore a central goal for the SPI.

In 2020, the SPI concluded an agreement with the Australian Antarctic Division (AAD) in order to promote collaboration.

From 2022, the bilateral agreement concluded with the French Polar Institute Paul-Émile Victor will deliver new opportunities to collaborate with the French polar community and to access French research stations in the Arctic, Sub-Antarctic and Antarctic.

Collaboration with Canada was also high on the agenda in 2021 (see red box on following page).

Close collaboration with GEOMAR (Germany) and the Arctic and Antarctic Research Institute (Russia) led to rare field access opportunities in 2021. The jointly organised Arctic Century Expedition enabled 17 scientists established at six Swiss research institutions to participate in a truly international expedition, with 13 nationalities on board.

The SPI also continues to engage actively in multilateral networks such as the Forum of Arctic Research Operators (FARO) and the Committee of Managers of National Antarctic Programs (COMNAP). The SPI is also a partner in the EU-funded "EU-PolarNet2" project, which aims to co-ordinate and co-design the European Polar Research Area.

National collaborations

The SPI seeks to work closely and coordinate with all stakeholders and initiatives related to polar and high-altitude sciences in Switzerland. The SPI enjoys a very close working relationship with the Swiss Committee on Polar and High-Altitude Research (SKPH) at the Swiss Academies, who help relay the expectations and needs of their scientific community.

The SPI also seeks to engage and exchange informally with other research and funding institutions in Switzerland. For example, the SPI actively contributed to the events organised by the University of Geneva ("Geneva Cryosphere Hub") during the UN Climate Change Conference, COP26.

Finally, the SPI is in close contact with the federal administration, in particular when it comes to polar policy. Both the Federal Department of Foreign Affairs and the State Secretariat for Education, Research and Innovation are represented in the SPI Foundation Board as observers.

Collaboration with Canada

In October 2021, the SPI hosted Martin Raillard, Chief Scientist at Parks Canada, for a study visit. During his stay in Switzerland, Mr. Raillard gave a presentation at the Swiss Polar Day and visited numerous research groups interested in or currently working in the Canadian Arctic, with the aim to give hands-on advice and to facilitate further collaborations.

As a result, there is now increased awareness of opportunities for research in the vast and diverse Canadian Arctic. Furthermore, new links were established between researchers in both countries on topics of mutual interest.

"I frequently heard from Swiss researchers that more information was needed on the mechanics of starting a research project in the Canadian Arctic," says Mr. Raillard.

To meet this need, he compiled a report entitled "Preparing for Arctic Research in Canada – A Guide for Swiss Researchers" containing very useful information about logistics, permits, resources and contacts.

*Participants surrounding a CTD sensor, on board the Permafrost Carbon on the Beaufort Shelf (PeCaBeau) expedition in the Canadian Arctic.
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6 Internal developments

While the new status as a research facility of national importance meant new funding opportunities and the possibility to launch long-awaited Swiss polar programmes, it also required important transformations within the SPI.

Although the majority of our human resources were dedicated to this transformation, all of the planned activities for the year could still be carried out – hopefully resulting in a seamless transformation in the eyes of those concentrating on SPI opportunities.

Carried out in the spirit of continuity, the aim of the transformation was the SPI’s long-term development and sustainability.

Foundation and governance

In 2021, the SPI transformed into a private foundation under Swiss law. Originally hosted by the EPFL, the SPI established its own legal entity in line with the requirements of its new status. All of the SPI’s assets were therefore transferred to the new Swiss Polar Institute Foundation over the course of 2021.

This transformation required numerous changes in the back-office processes. However, continuity was maintained by carrying over the same decision-making and advisory bodies. Similarly, the Foundation Board committed to continuing the SPI’s strategic aims and its portfolio of activities.

As a foundation, the SPI is subject to annual audits and to reviews by the Federal Foundation Surveillance Authority. This guarantees a high level of compliance and quality in processes and reporting.

Funding

The SPI is funded by the Swiss Confederation as well as by Swiss research institutions (EPFL, ETHZ, UNIBE, UNIL, UZH, WSL). In 2021, the funding received from the Swiss Confederation was also matched thanks to the financial support of philanthropic partners, in particular Frederik Paulsen and the Swiss Polar Foundation. All contributors stepped up their support with a commitment throughout the 2021-2024 funding period, making the launch of new mid-term initiatives for the benefit of the Swiss polar community possible. Additionally, the SPI is thankful for the continued support of early-career researchers by BNP Paribas Swiss Foundation through the Polar Access Fund.

FOUNDATION BOARD

as at 31 December 2021

In 2021, the SPI Foundation Board met on 20 April, 15 November and 13 December.

Martin Vetterli	Chair	EPFL
Christian Leumann	Vice-Chair	University of Bern
François Bussy		University of Lausanne
Detlef Günther		ETHZ
Christoph Hegg		WSL
Elisabeth Stark		University of Zurich

SCIENCE AND TECHNOLOGY ADVISORY BOARD (STAB)

as at 31 December 2021

In 2021, the STAB met on 19 January, 3 June and 30 September.

Björn Dahlbäck	Vice-Chair and ad interim Chair	Formerly Swedish Polar Secretariat, Sweden
Jane Francis		British Antarctic Survey, UK
Philippe Gillet		EPFL
Christian de Marliave		Editions Paulsen, France
Heini Wernli		ETHZ
Hubertus Fischer	(SKPH delegate; Chair from 1 January 2022)	University of Bern
Patricia Holm	(SKPH delegate)	University of Basel

Members who left the STAB in 2021

Gabriela Schaepman-Strub	Chair until April 2021	University of Zurich
Frédéric Herman	Until June 2021	University of Lausanne

SPI STAFF

as at 31 December 2021

Paul Ducommun	Swiss Polar Class – Project Manager Romandie
Basil Fahrlander	Scientific Collaborator
Anita Feierabend	Swiss Polar Class – Project Manager Deutschschweiz
John Maxwell	Web and Communication
Laurence Mottaz	Administrative Assistant
Charmilie Nault	Scientific Collaborator
Carles Pina Estany	Systems Architecture
Danièle Rod	Executive Director
Gabriela Schaepman-Strub	Scientific Director
Nina Schuback	Scientific Collaborator
Jenny Thomas	Data Manager
Janine Frost	Head of Finance

until October 2021

Joaquin Bastias	Scientific Collaborator (Arctic Century Expedition)
Christel Hassler	Scientific Collaborator (Forel project)

IMPRESSUM

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COVER PHOTO

Gabriela Schaepman-Strub taking field work notes on October Island during the Arctic Century Expedition.
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