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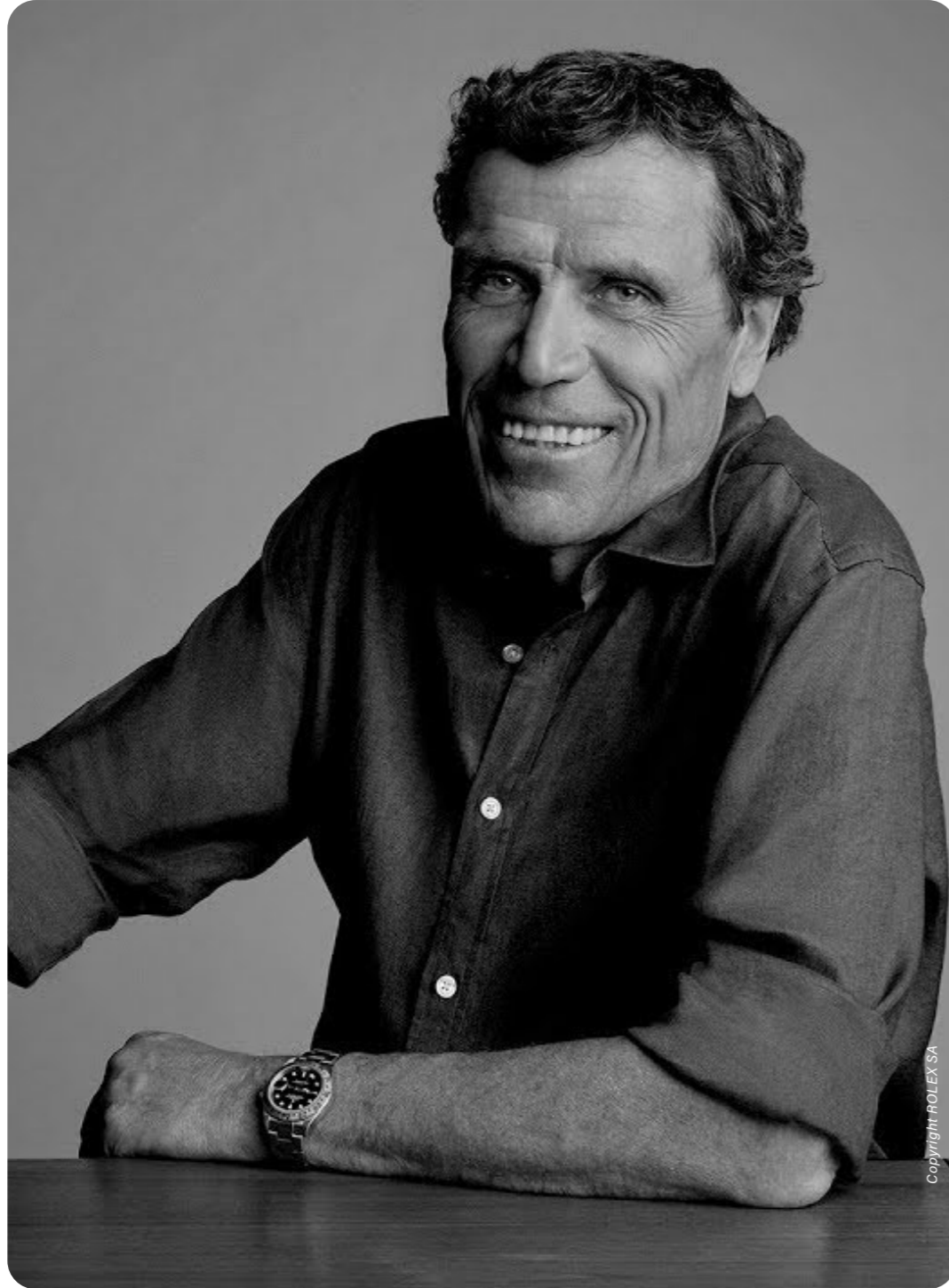


INTERNATIONAL  
POLAR FOUNDATION



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## LETTER FROM THE CHAIRMAN

In 2022, the International Polar Foundation celebrated the 20th anniversary of the creation of the IPF in January 2002. In the prevailing context of 2022, it was decided to delay celebrations to a later, more serene, time. The year 2022 also began with the tail end of the challenges presented by the worldwide outbreak of the COVID 19 pandemic which disrupted the years 2020, creating a new working environment based on isolation and remote working practices.

December 2021 was the peak of the disruptions experienced, with the arrival of the Omicron strain of the virus at the Princess Elisabeth Station. While the cases were all mild and no significant outcomes were experienced at PE, this event marked many spirits.

As remote working became the new normal during 2020 and 2021, and severe supply chain disruptions created growing challenges for operations, the general expectation was that 2022 would herald the return to normal operations. There was a general mood of optimism that IPF had seen the worst of the pandemic and would now be able to rebuild partnerships and forge ahead with reinforcing the core activities of the Foundation and the Antarctic Expeditions.

However, this optimism was soon to be dashed. Barely had the first shoots of post pandemic recovery begun to emerge, when a new crisis emerged on the horizon.

When Ukraine was invaded by the Russian army, the impact was immediately felt in all operating jurisdictions. The outbreak of a war on the European continent was not foreseen and this event has had far-reaching ramifications for the world economy, due to the issues linked to security of energy supply.

While the worst outcomes of the war have been concentrated on Ukrainian territory, the economic and political interlinkages have spread the impact across the entire globe. Sanctions were placed on Russian entities, and as the year progressed, supplies of gas and petroleum products were interrupted through evolving situations and re-alignments. The cost of energy and basic commodities rose significantly. This was to have important consequences for operations particularly as regards the Antarctic Expeditions.

The Antarctic Treaty Meeting held in Berlin in May 2022, was carried out under Antarctic Treaty provisions, which meant that, despite a sanctions regime being rolled out, Russia attended the Antarctic Treaty Consultative Meeting, albeit to some extent remotely. The COMNAP Annual Meeting was held through virtual meetings, and Russia participated due to the provision of the Treaty that requires all conflicts in the wider World to be disregarded within Antarctic considerations.

However, as the year progressed, it was no longer expected that hostilities would end rapidly



and normal relations could be re-established. The entrenchment of political positions also meant that the impacts began to be felt on the Antarctic continent itself.

The greatest impact on the activities of the Foundation was on the planning and preparation of the BELARE 2022-23 Expedition. The rapid rise in costs across the board, exacerbating supply chain issues combined with the spiralling cost of fuel meant that planning of the expedition had to take into account all these elements. In response, the duration and intensity of operations was reduced and ways were sought to overcome the challenges presented.

Instructions were provided by the Belgian authorities, and under a permit issued by the Ministry for the Environment, operations were able to proceed. Despite the easing of the COVID 19 restrictions and downgrading strategy to "Risk Mitigation", the logistics remained challenging.

These challenges allowed new opportunities to emerge and the IPF was able to roll out alternative logistic pathways which will lay the seeds for future developments allowing an independent access to the Antarctic continent. One of these developments has been the assumption of responsibility for the running of ground services at the Perseus Airfield, beginning with the organisation of two flights with small aircraft from Cape Town to Perseus. This flight organisation allowed for VIP visits from the South African Minister for the Environment and the French Polar Ambassador, amongst others, in January 2023.

Despite the few scientists supported by BELSPO during the season, due to a hiatus in the funding stream for Antarctic Science, there were several ongoing projects supported by IPF, both Belgian and international. Activities included aerial surveys conducted by the Alfred Wegener Institute from Bremerhaven. These surveys were interrupted by the pandemic during 2020-2021 but are now resuming.

The highlight of the Arctic activities was the Arctic Futures Symposium 2022, which was held in person and virtually, in November 2022 and saw the award ceremony for the Tran Foundation Arctic Prize being awarded during the Symposium.

Educational activities were also reinforced during 2022 with the demand for classroom activities and skype sessions from the PE Station being increasingly solicited.

While the current geopolitical situation continues to be of concern, with the support of the Belgian Polar Secretariat and the Arctic Futures Steering Committee and other partners, the IPF will confront any new challenges that might transpire in our bid to continue to provide World class support for research and clarity on the multiple challenges facing the world community from climate change, and the energy revolution to the rebuilding trust in international fora.

IPF is prepared for the challenges ahead,

Alain Hubert  
Chairman of the Board of Directors,  
International Polar Foundation

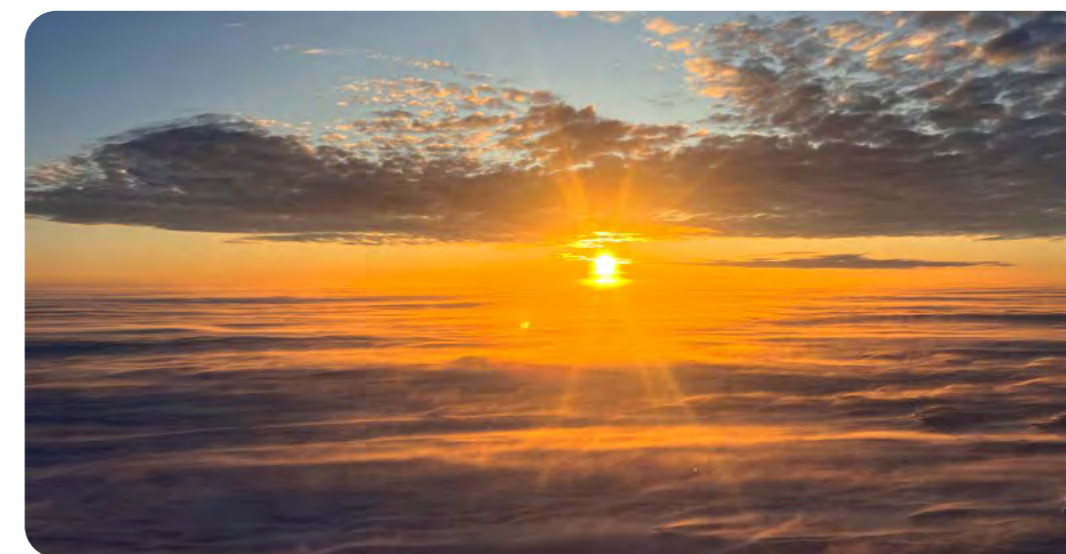
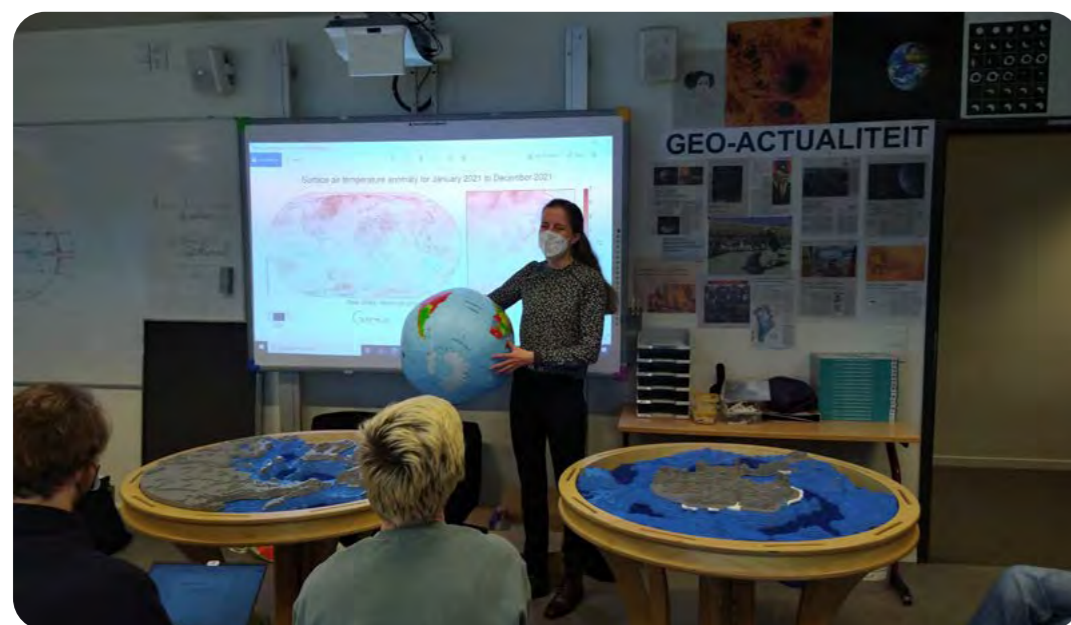
A handwritten signature in black ink, appearing to read "Alain Hubert". The signature is fluid and cursive, with a long horizontal line extending to the right.

## THE INTERNATIONAL POLAR FOUNDATION

### CONNECTING SCIENCE TO SOCIETY

The International Polar Foundation supports polar scientific research for the advancement of knowledge, evidence-based decision making on climate change, and the development of a sustainable society. Founded by Belgian polar explorer Alain Hubert, Prof. Hugo Declair, and Prof. André Berger in 2002, the Brussels-based International Polar Foundation provides a novel interface between science and society.

It was recognized by Executive Order as a private foundation with a public service mandate in 2002. HM King Philippe is the International Polar Foundation's Honorary President since 2002.



### MISSION AND VISION

The Foundation seeks to bring about a keener appreciation of the role of science in evidence-based decision making. In particular research in the Polar Regions, allows a thorough examination of the planet's interconnections, its fragility, the impact of human actions on the environment, and the evolution of millennial climate cycles.

To achieve its aims, the Foundation has initiated several high-profile projects, including supporting polar science through the creation and operation of the Zero Emissions Princess Elisabeth Antarctica station, which runs entirely on renewable energy. In this, the IPF partners with the Belgian State through the Belgian Polar Secretariat.

The IPF also supports scientists working in Antarctica, directly in field research and development of technical support actions, and indirectly through initiatives such as the fellowship awards for Antarctic researchers, an annual symposium on Arctic issues, organisation of seminars, exhibitions and installations, and development of science and education websites, offering classroom activities and multi-media resources for bolstering STEM learning.

# SUPPORT polar science & policy making

## Logistic support to Scientists\*

2002-2022: Alain Hubert: measurements in the field for scientists

2007: International Polar Year: construction of Princess Elisabeth Antarctica  
 2009: Inauguration of Princess Elisabeth Antarctica research station  
 2010: IPF official Antarctic Operator for Princess Elisabeth Antarctica

-  Data capturing (manual & automated)
-  Carpentry, Custom demands
-  Mobile Field Units
-  Logistic Field Support
-  Safety & Safety Training
-  Data storage & transfer:
  - near realtime
  - daily
  - yearly

\*This list is non-exhaustive

## Structural support to Scientists & Policy Makers

### ARCTIC FUTURES Conference

- Since 2010: Yearly conference in Brussels
- Since 2018: Arctic Shorts Film Evening @BOZAR

<https://www.arcticfutures.org>

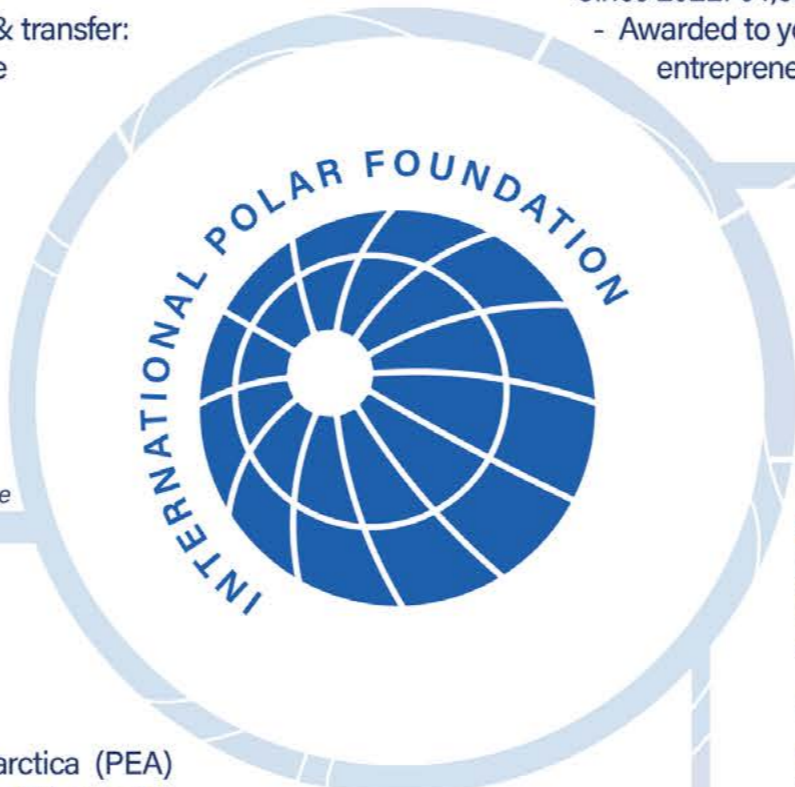
### LAURENCE TRAN Prize

- Since 2022: € 7,500 Award
- Awarded to young Arctic entrepreneurs or startups.

### INBEV-BAILLET LATOUR Antarctica Fellowship



- 2008-2018
- € 150,000 Fellowship Award
- Supports two field seasons at Princess Elisabeth Antarctica
- Open to PhD students & young post-docs



## EDUCATE and inspire the public at large

### Projects 2002-2021

**Educapoles**  
 website for educators (2005-2015)  
[www.educaholes.org](http://www.educaholes.org)

**Class Zero Emission**  
 permanent school visitor center in Brussels

**2 Polar Quest Teacher Contests**  
 class contest with winning teacher going to PEA.

**3 Live Exhibitions**  
 class contest with winning teacher going to PEA.

### Projects 2022-2023

**In-school workshops**  
 - primary, secondary & higher education  
 - topic: the polar regions & climate change

**Online workshop**  
 - overview of existing European education & outreach materials on the Arctic Ocean

**Live workshops with partners**  
 - 2 teachers' conferences  
 - APECS-Belgium museum nocturne & photo exhibition

**Live online class talks from PEA**  
 - Engineers @PEA presenting directly from Antarctica.

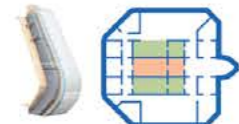
**Development of new materials, projects, website ongoing**

*The Arctic - Meteorites in Antarctica - STEM & Space Science*


## DEMONSTRATE through sustainable innovation

The IPF has built and operates the Princess Elisabeth Antarctica (PEA) research station. Out of the more than 80 stations in Antarctica, PEA was the first, and is still the only zero-emission research base on the continent.


Passive design




Renewable energy production

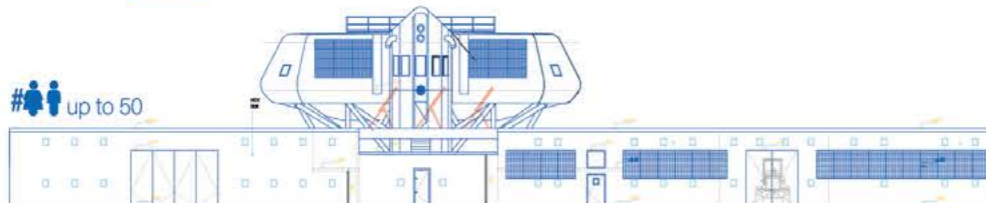


Smart Grid regulating production & demand



Water recycling





# up to 50

In 2022, PEA welcomed the world's first electrical tracked vehicle, the *Venturi Antarctica*, to operate in Antarctica. This is another milestone in the progress towards more sustainable scientific activities in Antarctica.



## THE BELGIAN POLAR SECRETARIAT

The Belgian Polar Secretariat is a Public Private Partnership, which is comprised of six representatives of Belgian Ministries (cabinet level) and six representatives of the private sector nominated by the IPF.

Every year, the IPF and the Polar Secretariat sign an agreement setting out the terms and conditions of the partnership, in line with the original Protocol signed in 2010. This includes operations (logistics, station maintenance and science support) and representation of the Belgian State at certain international coordination meetings, such as the DROMLAN (the Dronning Maud Land Air Network), and the COMNAP (Committee of Managers of National Antarctic Programs).

The IPF also works closely with the different Ministries involved in Antarctic matters, in particular the SPF Environment, which is responsible for permitting the activity in Antarctica in line with the Madrid Protocol and its enabling legislation. The IPF submits a permit request to the Belgian competent authorities in collaboration with the Belgian Polar Secretariat every year, and provides an end of Mission Environmental Impact and Mitigation Report in line with the conditions of the Environmental Permit.



BELGIAN POLAR SECRETARIAT

## ACTIVITIES OF THE IPF

### ANTARCTIC OPERATIONS

The International Polar Foundation is the privileged partner of the Belgian State under the agreements signed between the parties in 2007 and 2009. The Foundation is mandated to manage the Princess Elisabeth Antarctic Research Station by the Belgian Polar Secretariat. Antarctic operations are managed through the Belgian Antarctic Research Expeditions - (BELARE asbl.), a subsidiary of the IPF.







# Princess Elisabeth Antarctica



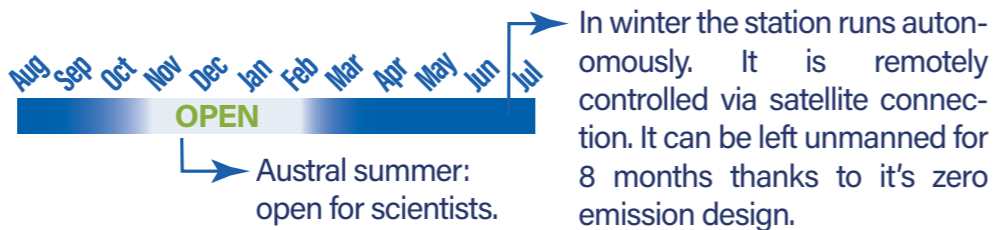
## What?

**1st** and **ONLY** zero emission research station in Antarctica demonstrating how today's energy challenges can be tackled in order to secure a sustainable future.

A base where scientists can conduct world-class research in fields like Climate & Weather, Glaciology, Geology, Geodesy, Biology, Space & High Atmospheric Sciences, etc., while minimizing their carbon footprint.

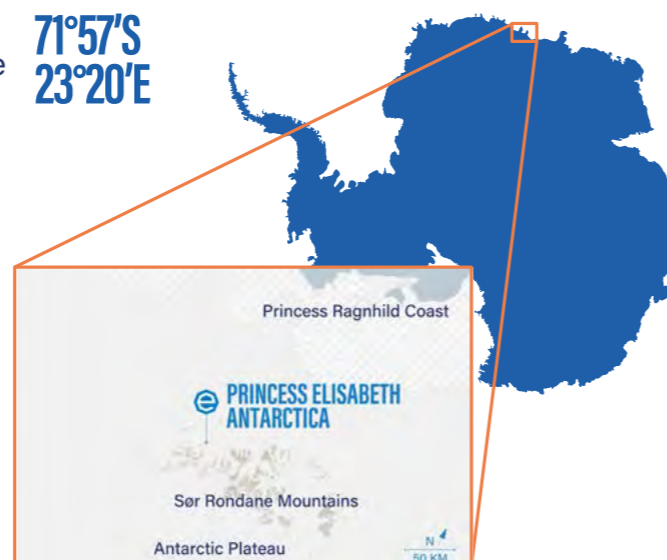


2007-2008 → 2008-2009 →  15 Feb 2009



Utsteinen Ridge - North of Sor Rondane Mountains, Dronning Maud Land, Antarctica.

71°57'S  
23°20'E



## Equipment & Facilities



Satellite dish allowing efficient communication & high-speed data-transfer from the field.



Observatories and Science Shelters in the vicinity of Princess Elisabeth Antarctica, hosting permanent & temporary scientific instruments.



Operational machines, snow tractors and vehicle park (Prinoth, skidoo, container side loaders, etc.)



Technical Workshops (building, electronic & vehicle maintenance)



Mobile solar-powered energy field units producing up to 25 kWh per day that scientists can use while on extended research missions in the field

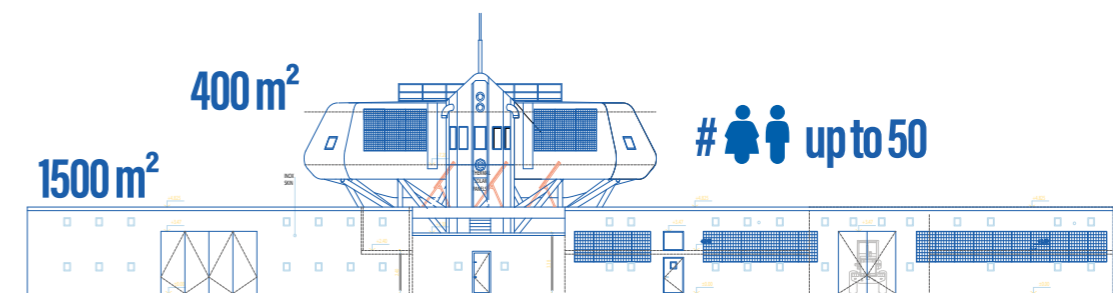


Automated Weather Stations measuring meteorological parameters at different locations.



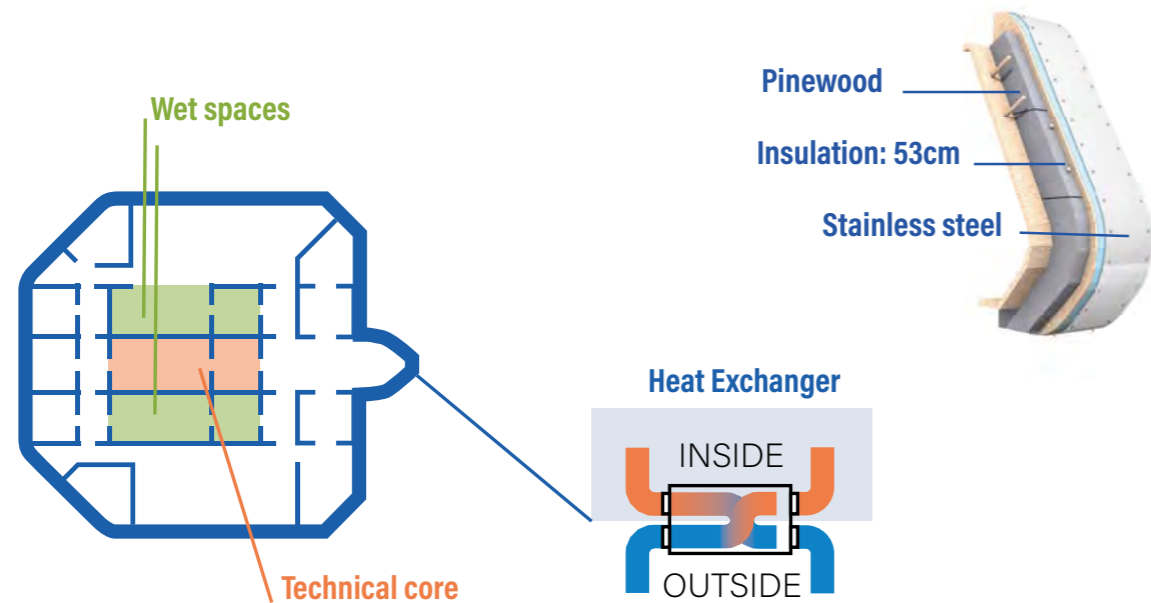
**2022 NEW!**

The world's first electrical vehicle capable of running & supporting scientists in the harsh environment of Antarctica.



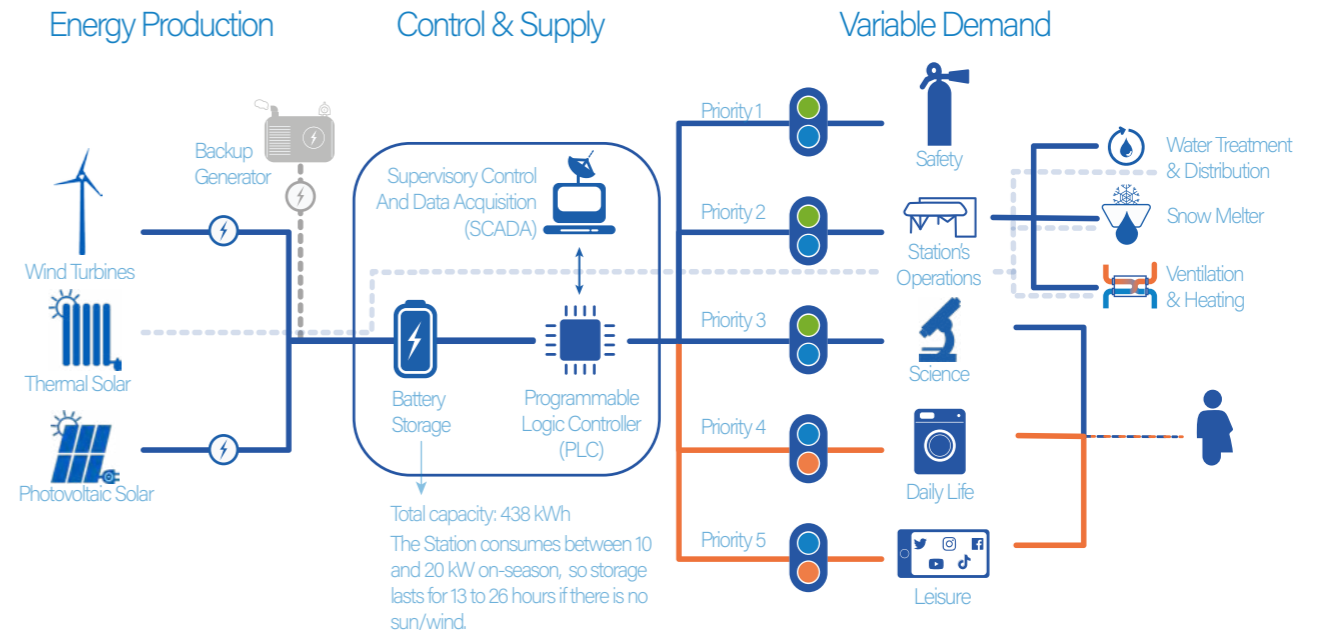
## Unique Design

The station's shape, orientation, skin, insulation, and window disposition allow a comfortable ambient temperature to be maintained inside the building with little energy input. The station's operation systems are located at the core of the building, with the outer rooms serving as an extra layer of insulation to avoid freezing during winter.

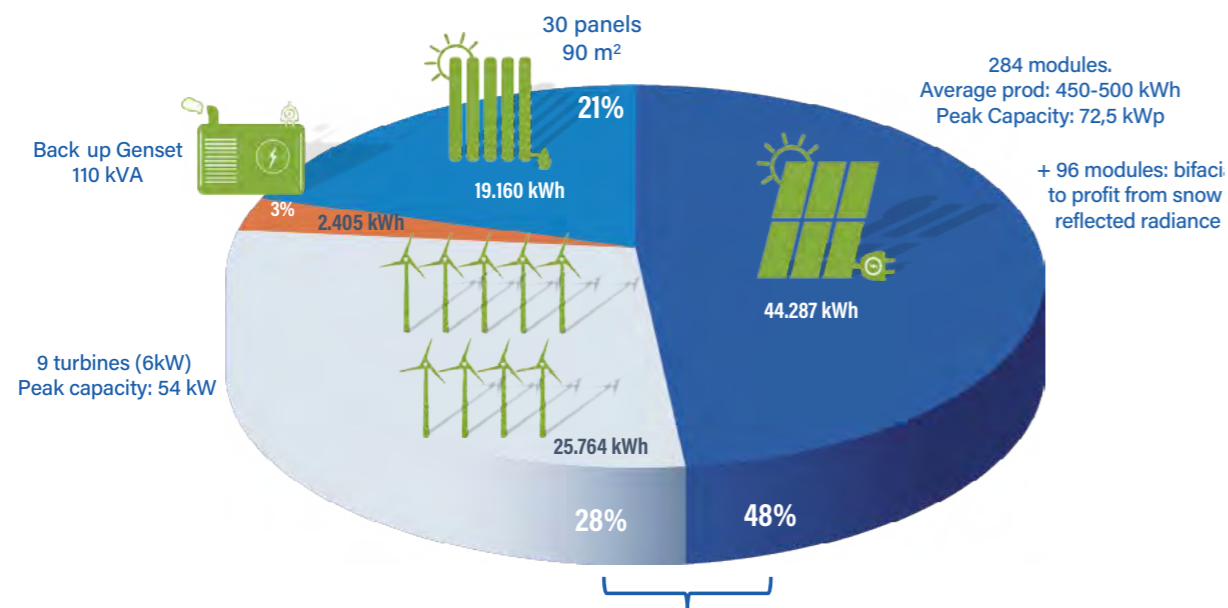


## Intelligent Systems

The renewable energy production is variable, hence, an intelligent system balances available energy and energy demand through a system of dynamic prioritisation.



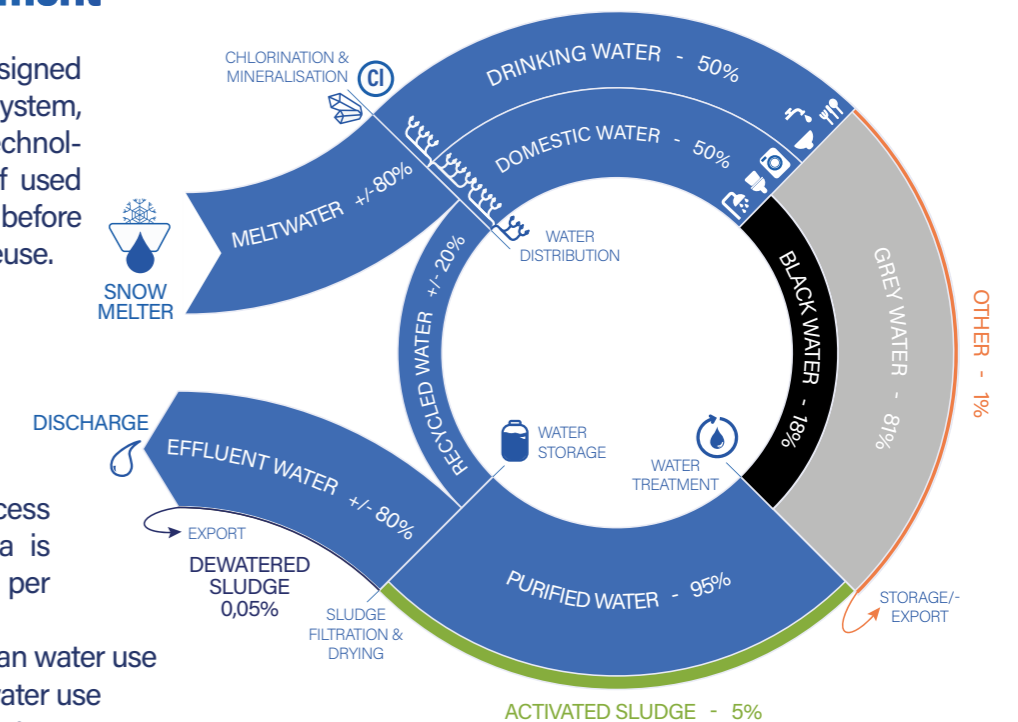
## Renewable Energy Production



## Water Treatment

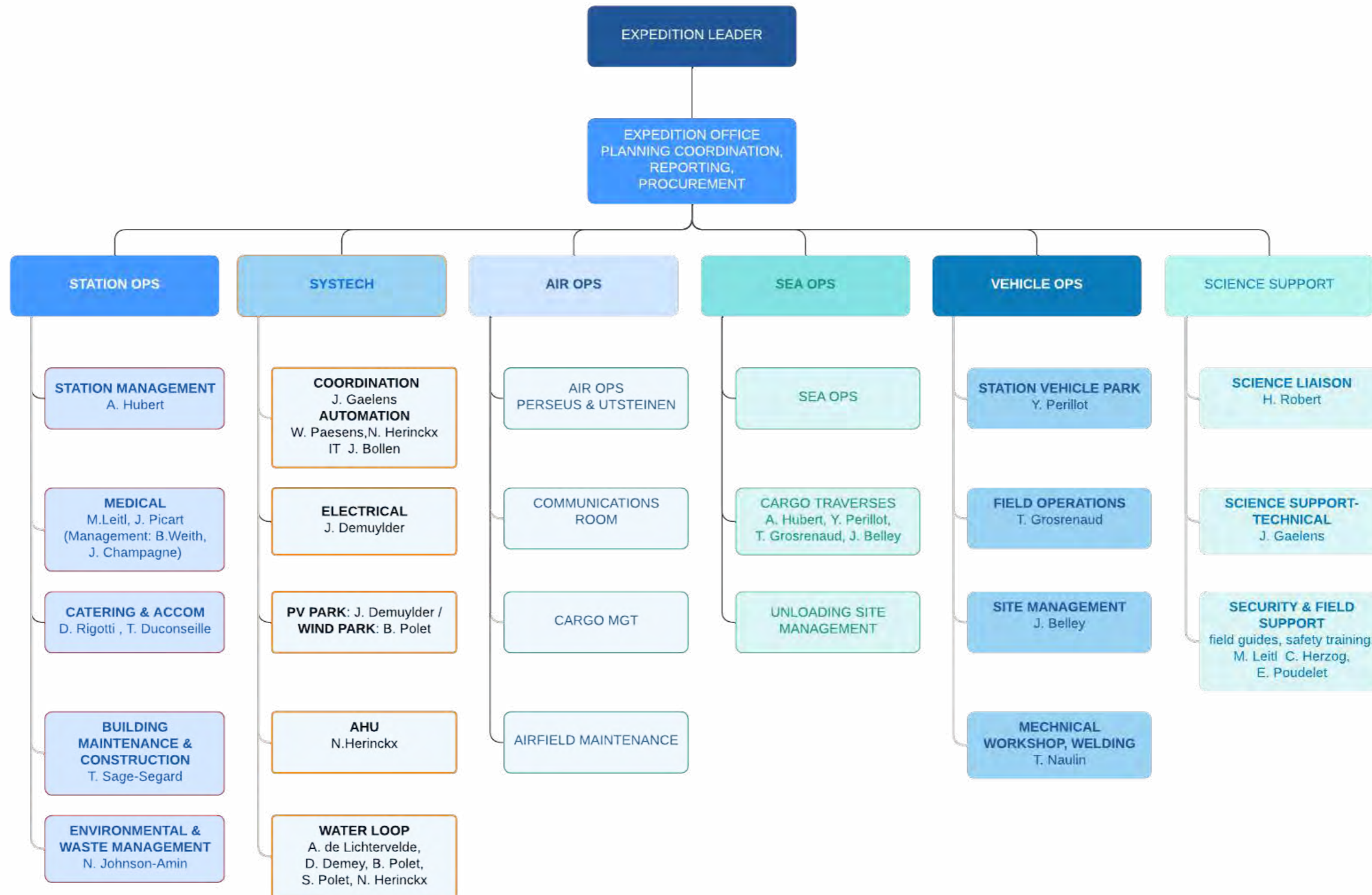
A uniquely designed water treatment system, inspired by space technology, allows 95% of used water to be treated before discharge and/or reuse.

Water use at Princess Elisabeth Antarctica is about 35-45 liter per person, per day.  
 = 1/2 average Belgian water use  
 = 1/3 average EU water use  
 = 1/5 average US water use



# PRINCESS ELISABETH OPERATIONS 2022

2022-23





# BELGIAN ANTARCTIC RESEARCH EXPEDITIONS

## BELARE 2022-2023

Following two seasons that were strongly impacted by the COVID pandemic, the 2022-23 season of the Belgian Antarctic Research Expeditions (BELARE) saw a return to near normal operations and scientific activities.

The IPF team undertook significant work on the logistical infrastructure supporting the BELARE teams and scientific projects, including making significant upgrades to the hangar at Perseus Intercontinental Runway, beginning the installation of a new water treatment system for the Princess Elisabeth Antarctica, and improving a system of automatic weather stations collecting data contributing to regional weather and climate models.

This year, the Princess Elisabeth Antarctica welcomed a number of VIPs, including South African Minister for Environment, Barbara Creecy and her civil engineer colleague in charge of energy strategy, Mphikeleli Amos Ndlela.

Members of the Belgian Polar Secretariat, the public-private partnership that manages activities at the Belgian station, also visited the base, as well as Eric Rignot, Professor of Earth Systems Science at the University of California Irvine (UCI) and the NASA Jet Propulsion Laboratory in Pasadena, and French Ambassador to the Polar Regions, Olivier Poivre d'Arvor.

During their three-day visit, the VIPs received a guided tour of the world's first (and so far only) zero-emission polar research station. They learned about its passive design, how the station's energy is produced and managed, and how the water used at PEA is treated and recycled.

"For many years I've served on the Belgian Polar Secretariat, witnessing the spectacular development of the world's first zero-emission polar research station," remarked Piet Steel, Vice-President of the Belgian Polar Secretariat. "But it's an entirely different experience once you visit it for yourself."

It's a powerful, efficiently-run base. It has a professional crew that works day and night to support scientists with their work at the station or in the field. The International Polar Foundation and Belgium as a country can be very proud of everything that has been accomplished at the Princess Elisabeth Antarctica as an example of sustainable management of a scientific base in a very ecologically demanding environment."

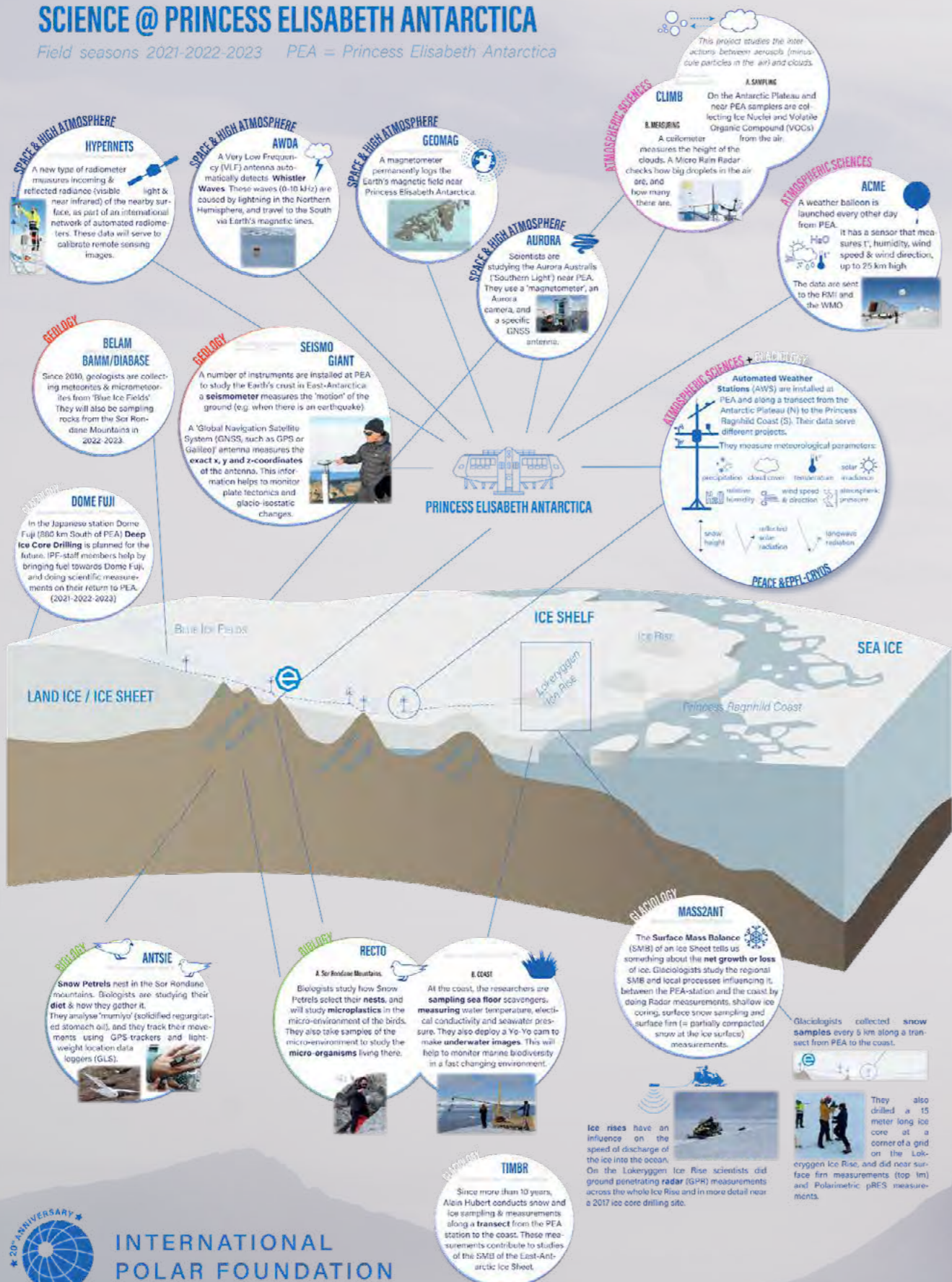
With a short plane ride from PEA, Minister Creecy and Mr. Ndlela also used the occasion to visit the South African research station, SANAE IV, and their scientific vessel, the Agulhas II, which was resupplying their station.



*Piet Steel, Vice President of the Polar Secretariat, welcomes Minister Barbara Creecy and Mr Mphikelele Ndlela from South Africa to Princess Elisabeth.*

# SCIENCE @ PRINCESS ELISABETH ANTARCTICA

Field seasons 2021-2022-2023 PEA = Princess Elisabeth Antarctica



## SCIENCE AT PEA

Since its inauguration in 2007-2009, the Princess Elisabeth station has helped scientists from all over the world to perform their research in Antarctica. The Station regularly hosts an international research effort on a yearly basis.

Fields of investigation are as diverse as glaciology (the study of the ancient composition of our atmosphere, mass balance, glacier movements and their implications for ocean fertilisation), atmospheric sciences with a large spectra of research topics (atmospheric properties and composition, formation of clouds, precipitation, long-range transit of particles, etc.), geology, seismology, gravimetry, astronomy, biology, ecology, biogeography, microbiology, human health in extreme environments to name a few.

The arts and social sciences have not been left out, and photographers, film makers, playwrights, and educators have also visited PEA for various projects.



### AWDA

“BIRA/IASB and ELTE – Science Support PEA/IPF – funding BELSPO”

Led by the Space Physics Division of the Royal Belgian Institute of Space Aeronomy (BIRA-IASB) and Eötvös Loránd University (ELTE) in Hungary, the BELPSO-funded AWDA project has been monitoring whistler waves for several seasons. Whistler waves are a particular type of electromagnetic wave that propagates from one hemisphere to another in Earth’s protective magnetosphere. Studying these waves helps researchers to better understand the state of the part of Earth’s magnetosphere referred to as the plasmasphere (containing low-energy plasma) and to model its behaviour.

A VLF (Very Low Frequency) magnetic antenna connected to data processing equipment was built at the Princess Elisabeth Antarctica in 2016 as part of a global network of similar antennas designed to monitor these waves. During the 2022-23 season the IPF team performed annual maintenance on the antenna and downloaded data on a hard disk, which was then brought to scientists in Europe.

### PEACE - ACME

Science support PEA/IPF  
co-funded by the IRM/KMI and the IPF

The ACME project (or Air Column Moisture Evaluation) is part of the Princess Elisabeth Antarctica Climate Experiments (PEACE) Projects, started in collaboration with the late Director of the Swiss Federal Institute for Forest, Snow and Landscape Research (WSL), Konrad Steffen, in 2012.

Currently, in partnership with the Royal Meteorological Institute of Belgium (IRM/KMI), every two days each season IPF launches a weather balloon equipped with radio sounding instruments to take an atmospheric profile. As the balloon rises into the atmosphere, it collects data profiles of temperature, wind speed, humidity, precipitation, and air pressure. The purpose of this exercise is to obtain a long time series of weather data for climate models.

Professor Koni Steffen provided the first ground station. Today the IPF has acquired a modern GRAW ground station to support this activity. The WMO-harmonised data that is collected is then sent to the international weather and climate modelling community so it can contribute to regional weather and climate forecasts, within the framework of the WMO’s Year of Polar Prediction (YOPP).



## BAMM

ULB, Field Museum Chicago, University of Berne

- Science support PEA/IPF -

funding BELSPO, and partners

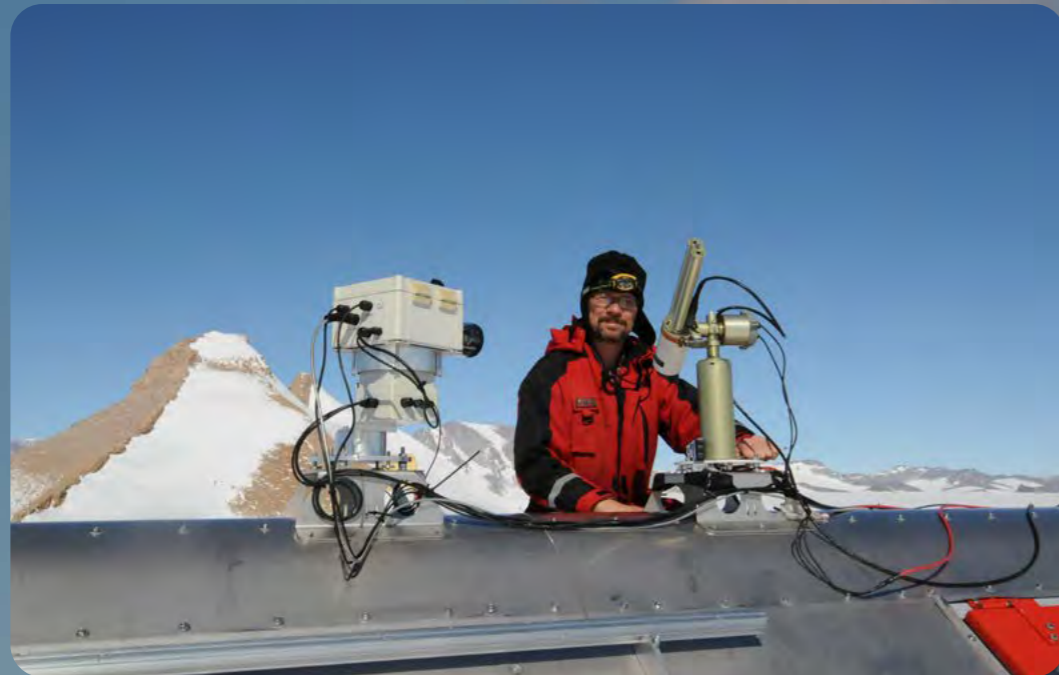
Studying meteorites and micrometeorites provide information about the formation of our Solar System. Meteorites that originate from the Asteroid Belt between Mars and Jupiter are the most commonly found, with meteorites from Mars and the Moon (ejected during an impact event) are much less common to find on Earth. Most tend to be 4.5 billion years old and date from the time of the formation of the Solar System.

Antarctica is a great place to look for meteorites, since the ice preserves meteorites against rapid erosion and makes them easy to find against the pale bluish-white ice covering the continent. Blue ice fields in particular are the best places to look for them, as the contrast between ice and any object on its surface is maximal.

A collaboration between the Université Libre de Bruxelles (ULB), the Vrij Universiteit Brussel (VUB) and the Royal Belgian Institute of Natural Sciences (RBINS), the BELSPO-funded Belgian Antarctic Meteorites and Micrometeorites (BAMM) project is the latest meteorite expedition to Antarctica beginning with the joint Japanese Belgian Expedition in 2009-10 to look for meteorites and micrometeorites on the continent. Belgian researchers collaborate closely with the Japanese National Institute of Polar Research (NIPR), which curates the collections.

During the 2022-23 season, a team led by Vinciane Debaille from the ULB found five meteorites in the vicinity of the Niels Larsen Blue Ice Field, including one massive 18 kg meteorite. Some of the meteorites collected during this season are being studied at the RBINS in Brussels.





**CLIMB**

IRM/KMI/ IASB/KUL/ - Science support PEA/IPF - funding BELSPO

The water droplets that make up clouds form around tiny particles in the atmosphere, and the precipitation that forms and falls to the surface of the Antarctic Ice Sheet influences its mass balance (how much ice mass is gained or lost over time).

The BELSPO-funded CLIMB project, led by the Royal Meteorological Institute of Belgium, KULeuven, the Royal Belgian Institute for Space Aeronomy (BIRA-IASB) and the University of Ghent is investigating the role of ice nuclei particles and organic compounds in the atmosphere and their influence on cloud formation and precipitation in Antarctica.

A total of 13 instruments collect meteorological data, as well as aerosol, cloud, and precipitation data at cloud level in two locations: at PEA, and at the edge of the Antarctic Plateau 60 km south of the station, at the edge of the plateau, at an altitude of 2800 metres.

IPF engineers performed necessary maintenance on the 13 instruments collecting data for the project during the 2022-23 season.

**ANTSIE**

University of Durham UK - Science support PEA/IPF - funding Natural Environment Research Council, UK

A collaboration between the University of Durham and British Antarctic Survey (BAS), the ANTSIE project has been studying the biogeography of snow petrels (*Pagodroma nivea*) nesting on Utsteinen Nunatak close to the Princess Elisabeth Antarctica. By tagging eleven birds with GPS and GLS devices during the 2021-22 season and collecting mumiyo (solidified stomach oil) accumulated in front of each breeding cavity, the research team sought to learn more about the feeding habits (behaviour and foraging locations) of the snow petrels breeding on the Sør Rondane Mountains.

During the 2022-23 season, IPF Science Liaison Officer Henri Robert retrieved the GLS loggers from eight of the eleven snow petrels on behalf of the researchers from Durham University and the RSPB present during the 2021-22 season. The GPS loggers, which were never meant to be recovered, had fallen off the birds during seasonal moulting. Along with the data collected from the loggers, Mr Robert also collected three to five feathers from the bellies of the birds to be sent to Durham University where isotope analysis was done.



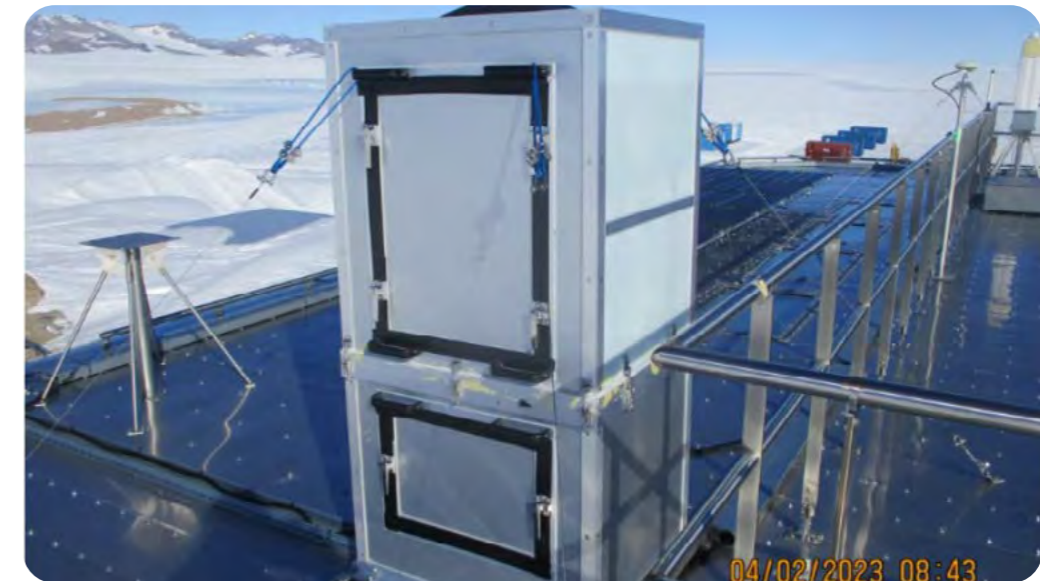
**SEISMO**

Royal Observatory of Belgium - Science support PEA/IPF – funding BELSPO

One of the longest-running research projects at PEA, this project of the Royal Observatory in Brussels not only studies micro quakes created by the movement of glaciers in the vicinity of PEA, but also measures seismic activity further afield. IPF engineers assist researchers from the Royal Observatory with the maintenance of seismometers at the Princess Elisabeth Antarctica every season.

The SEISMO (originally called LISSA) project gathers unique information about Earth’s lithosphere and microseismic activity in East Antarctica as a proxy measure of glacier movement. A surface seismometer sits on Utsteinen Ridge in the Northern Science Platform (GEOS) near the PEA station.

During the 2022-23 season, routine maintenance was conducted on the surface seismometer and GPS receiver in the shelter.

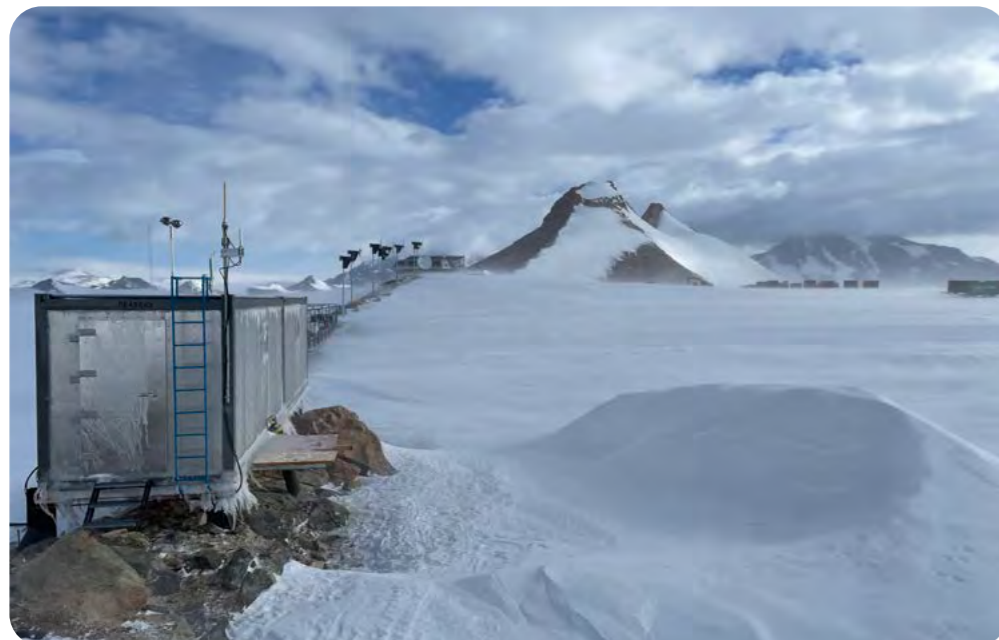


**AURORA**

NIPR Tokyo - Science support PEA/IPF

This project, led by the Japanese National Institute of Polar Research (NIPR), aims to observe the spatial and temporal evolution of aurora by building an aurora observation network along the coast of the Queen Maud Land in East Antarctica. This includes studying the onset mechanisms of auroral substorms (which produce mild aurora), the temporal and spatial variation of auroral phenomena, the wave-particle interaction process during an auroral substorm, and a full on auroral storm (which produce vivid auroras).

PEA has been part of this aurora observation network since January 2020, when NIPR researchers installed at PEA an Auroral Observation system (UAO-2), which is composed of a Fluxgate Magnetometer, an aurora camera and a Global Navigation Satellite System (GNSS) antenna. The magnetometer is installed on Utsteinen Ridge next to the station, while the camera and GNSS antenna are installed on the roof of the station. During the 2022-23 season, IPF engineers performed maintenance to ensure data on aurora continued to be sent to scientists.



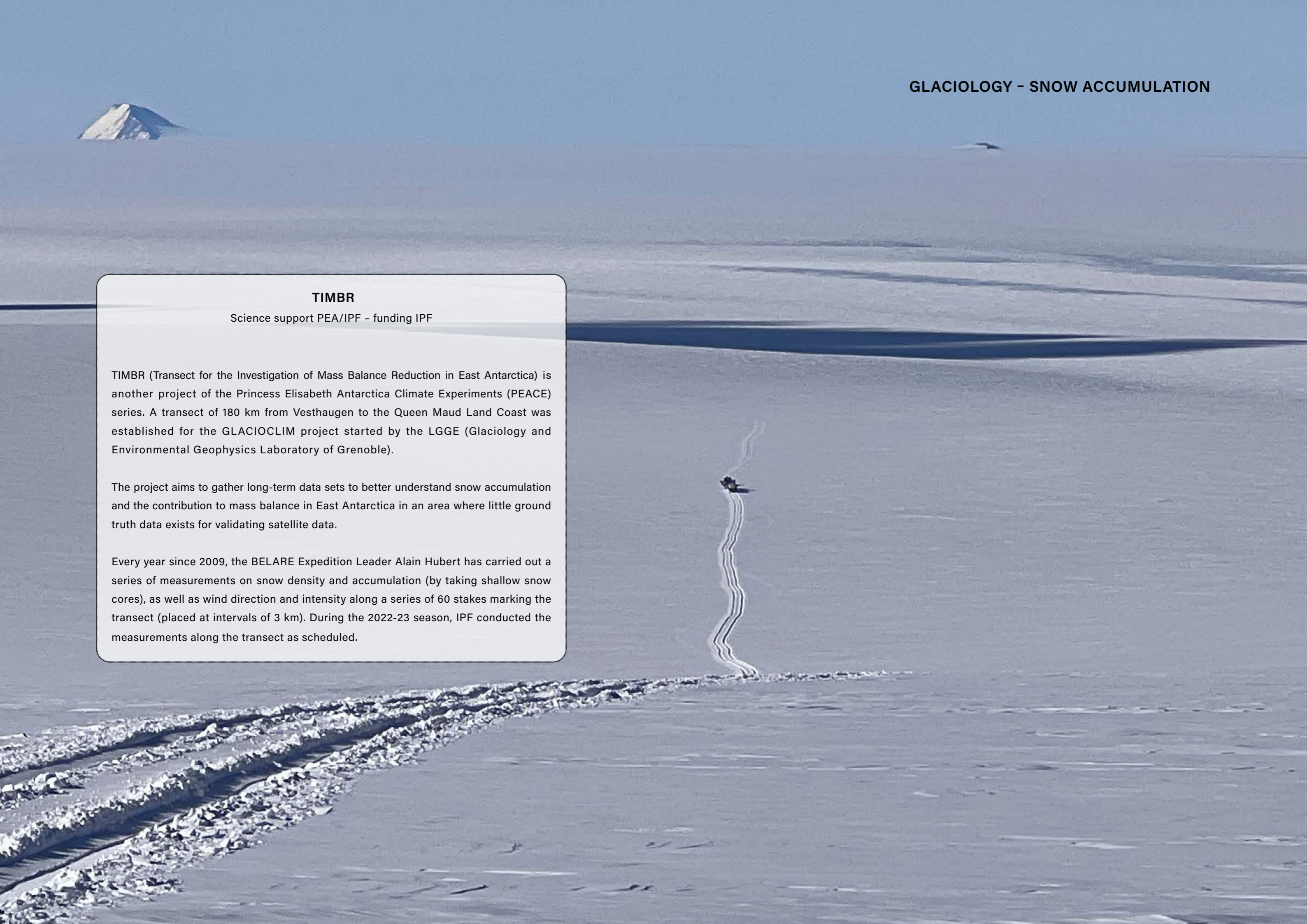
### TIMBR

Science support PEA/IPF - funding IPF

TIMBR (Transect for the Investigation of Mass Balance Reduction in East Antarctica) is another project of the Princess Elisabeth Antarctica Climate Experiments (PEACE) series. A transect of 180 km from Vesthaugen to the Queen Maud Land Coast was established for the GLACIOCLIM project started by the LGGE (Glaciology and Environmental Geophysics Laboratory of Grenoble).

The project aims to gather long-term data sets to better understand snow accumulation and the contribution to mass balance in East Antarctica in an area where little ground truth data exists for validating satellite data.

Every year since 2009, the BELARE Expedition Leader Alain Hubert has carried out a series of measurements on snow density and accumulation (by taking shallow snow cores), as well as wind direction and intensity along a series of 60 stakes marking the transect (placed at intervals of 3 km). During the 2022-23 season, IPF conducted the measurements along the transect as scheduled.



## WEATHER DATA FOR CLIMATE MODELS

### PEACE AWS TRANSECT

The Princess Elisabeth Antarctica Climate Experiment (PEACE) Automatic weather station (AWS) transect project of the International Polar Foundation and its partners. Set up with Professor Konrad Steffen (the late director of the Swiss Federal Institute for Forest, Snow and Landscape Research (WSL) and former director of CIRES in Boulder Colorado).

Following recovery from Greenland, two more stations have joined the network to arrive at five AWS which collect weather data across a 280 Km transect from the Antarctic Plateau to the Princess Ragnhild Coast via the Princess Elisabeth Antarctica. The data are freely available to any scientist or researcher who wants them, and are used in regional weather forecasts and climate models.

<http://www.polarfoundation.org/aws/awsindex.html>

The project started in 2012 When Professor Steffen installed two AWS in the vicinity of PEA. In 2013, the network was augmented with a third weather station installed at the Perseus Blue Ice Field (the current position of Perseus Intercontinental Runway). In 2021, IPF took over the maintenance of the weather stations and makes the weather data available to the international research community. The University of Colorado Boulder donated all the weather stations in the network to the International Polar Foundation.

The two AWS added to the network in December 2021, after receiving parts from Swiss Camp in Greenland, were placed at L-Zero Ice Rise, and on the blue ice band at the top of the Gunnestadtbreen, creating a transect of AWS from the Princess Ragnhild Coast to the Antarctic Plateau.

During the 2022-23 season, each AWS was maintained to update the software, to replace damaged parts and to extend the life of the batteries, and to install an antenna one each AWS so they can communicate with the relay station at Van Autenboer Peak.

Data from all five AWS are sent to the relay station and then on towards PEA. From the station, the data is sent to data servers in France and Switzerland from where it is made freely available to the public.

<http://www.polarfoundation.org/aws/awsindex.html>



The terrestrial hub model, is a more cost-effective way to collect and repatriate weather data, as it does not require paying for expensive satellite links to collect data from each individual AWS.

Data from all five AWS are sent to the relay station and then on towards PEA. From the station, the data is sent to data servers in France and Switzerland where it can be uploaded.

<http://www.polarfoundation.org/aws/awsindex.html>

The terrestrial hub model, is a more cost-effective way to collect and repatriate weather data, as it does not require satellite links to collect data from each individual AWS.

IPF aims to expand the network of AWSs by adding intersecting transects to increase the data resolution.



### CRYOS

EPFL and the swiss polar institute

The Antarctic Ice Sheet gains surface ice mass through snowfall and loses it through ablation and wind erosion. The overall balance of ice gained versus ice lost on its surface is the ice sheet's surface mass balance. Determining how snow-atmosphere interactions affect the ice sheet's surface mass balance is the goal of the CRYOS project led by the Swiss Federal Institute of Technology in Lausanne (EPFL).

Since 2016 the project has been operating two automatic weather stations (AWS) near PEA. Measurements the AWS take improve the representation of snow transport and sublimation in surface mass balance models of the Antarctic Ice Sheet. The EPFL runs numerical model simulations for the entire Antarctic Ice Sheet to identify all processes that add to or remove ice from its surface.

During the 2022-23 season, EPFL PhD student Oceane Hames visited the AWS located on the Antarctic Plateau with IPF engineers. Due to heavy snow accumulation parts of the instruments were not working, it was decided to take the station down to conduct full maintenance at PEA and repatriate the data it had been collecting. The AWS has now been redeployed to another location.

**GIANT**

University of Luxembourg - Science support PEA/IPF – Funding University of Luxembourg

The Geodesy for Ice in Antarctica (GIANT) project led by the University of Luxembourg has been operating in the vicinity of the Princess Elisabeth Antarctica for more than a decade collecting GPS, gravimetry and seismology data. These data are analysed to track the horizontal and vertical deformation of Earth’s surface. The isostatic rebound measured is also a proxy for mass changes in the Antarctic Ice Sheet.

IPF staff maintain the equipment (GNSS station with receiver and antenna) installed at the GEOS north scientific shelter at PEA and near the former Japanese Asuka station located 30 km northeast from PEA. During the 2022-23 season, PE crew undertook two expeditions to the GNSS station at Aksuka station to repatriate data loggers, replace the GNSS antenna and install a Superwind wind turbine to power the antenna during the winter.



**GEOMAG**

IRM/KMI - Science support PEA/IPF

Every year since 2014 this project, led by the Royal Meteorological Institute of Belgium (IRM/KMI), has collected data on Earth’s magnetic field.

The project uses a theodolite as well as a proton overhauser magnetometer and a triaxial variometer. The instruments developed by Prof. Jean Rasson are housed in a adome made of materials which are not sensitive to magnetic forces at the foot of Utsteinen Nunatak, 300 metres away from the Princess Elisabeth Station. A non-magnetic theodolite known as an “Autodif” can take automated absolute measurements of Earth’s geomagnetic field and create a time series of the geomagnetic field’s position in three dimensions.

Every season the IPF BELARE team carries out maintenance on the instruments to keep them functioning properly throughout the austral winter. The team sets up a large controlled access perimeter around the radome to prevent any magnetic disturbance



## EARTH OBSERVATION VALIDATION



### **HYPERNETS**

Royal Institute for Natural Sciences Brussels-Science support PEA/IPF – Funding EU

Our everyday lives rely on satellites not only for communications, but also for Earth Observation data..

Optical satellites launched by space agencies (Landsat, Sentinel-2, and Sentinel-3) as well as commercial satellites require in-situ validation of the images they take on the ground.

However there had been very few in-situ measurements being made to validate the quality of optical satellite measurements. This is where the HYPERNETS project comes in. Funded by the EU under Horizon 2020, the project's primary goal was to develop a new, lower cost hyperspectral radiometer known as the HYPSTAR® (HYperspectral Pointable System for Terrestrial and Aquatic Radiometry). The HYPSTAR® measures incoming light and light being reflected from a surface to determine surface reflectance, which is one parameter optical satellites measure.

The project established a network of satellite validation sites to deploy the HYPSTAR® in different parts of the world. One of the validation sites chosen for the project was the Princess Elisabeth Antarctica.

Early December 2022, Quinten Vanhellemont from the Royal Belgian Institute for Natural Sciences (RBINS) travelled to the Princess Elisabeth Antarctica to service the project's signature device, which had been set up 1.8 km from the Princess Elisabeth Antarctica during the previous season in an area covered only by snow to accurately measure the surface reflectance of the snow.

At the end of the 2022-23 season, IPF engineers dismantled the HYPSTAR®, carefully packed it away, and shipped it back to Belgium, where it has been re-deployed in locations around Belgium to measure surface reflectance.

Now that the HYPSTAR® has been properly tested in the field, it will enter commercial production.



## AIRBORNE SURVEY

### QUEEN MAUD LAND RADAR SURVEY

Alfred Wegener Institute - Science support PEA/IPF - Funding Helmholtz Foundation

During the 2022-23 season, IPF staff provided logistical support to a crew from the Alfred Wegener Institute (AWI) flying the AWI Polar 5 Basler to conduct an aerial radar survey of sea ice along the Queen Maud Land Coast.

Assistance was provided for communication between stations, weather forecasts, providing power supply, and refuelling the flights.

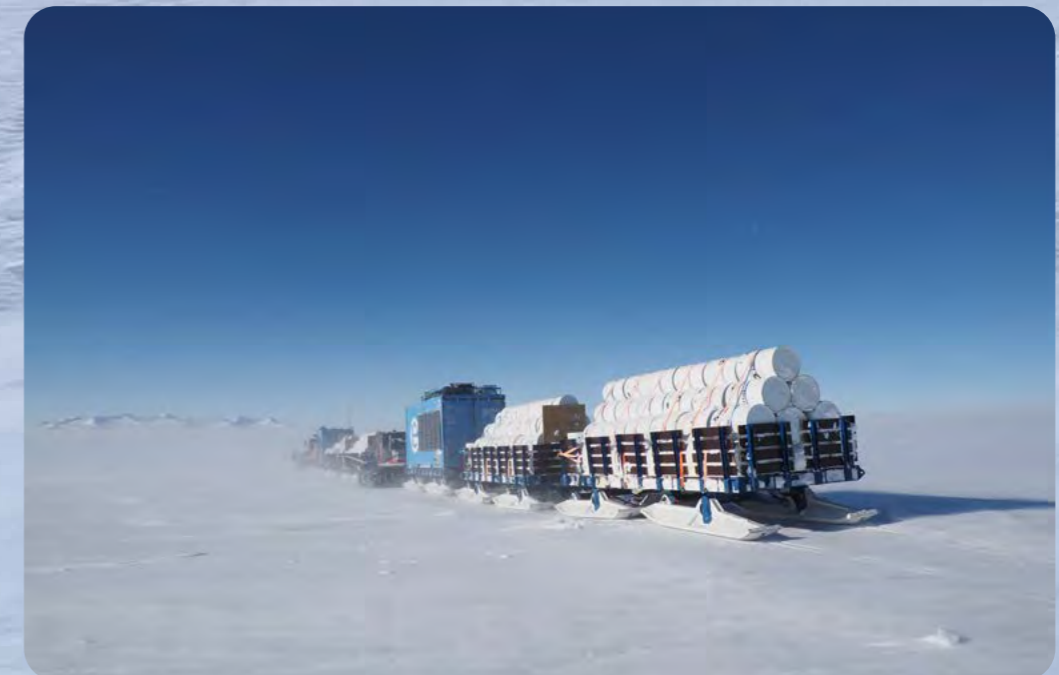
With the warming of the oceans around the globe and in the Southern Ocean, scientists have noticed a change in the formation dynamic and extent of sea ice platelets patches that form around the ice shelves of the continent. These layers of platelet ice create a unique habitat that provides a protective environment for algae and bacteria and offers a sheltered nursery for species of fish to hatch. The platelet ice ecosystem could be hugely important for underpinning marine food webs. The objective of the project is to map where these platelets ice form around the Antarctic and monitor their resilience to warming sea water.



### DOME FUJI

Institution : NIPR-IPF

Traverse with tractors from PEA towards Dome FUJI (altitude 3800m) at 880 km from PEA on the Antarctic plateau to provide logistical support to the NIPR deep ice drilling project on Dome "F". Work performed during the expedition: Four loaded sledges were carried up @ 130km from PEA in 2019-20. The objective was to transport 200 drums of fuel for the drilling operations. Scientific were to be carried out on the plateau on return to PEA. Due to technical issues and environmental challenges, the expedition to Dome "F" had to be cancelled.



Installation of a relay station on the Van Autenboer Peak to connect the weather station to PEA



## SCIENTIFIC PUBLICATIONS FROM RESEARCH AT PEA

Over several years of the BELARE expeditions around the Princess Elisabeth Station, data were collected by scientists from all over the world leading to the publication of nearly 120 peer reviewed publications, reports, notes in journals or conference communications.

During the year 2022, several papers were published in fields as diverse as remote sensing, energy production, meteorite research, microbiology, geology, biology and biogeography.

### List of publication from or mentioning research at PEA for 2022:

#### A1 Scientific papers:

Franziska Bockelmann, Ann-Kathrin Dreier, Joris Zimmermann, Markus Peter. 2022. Renewable energy in Antarctica - Photovoltaic for Neumayer Station III. Solar Energy Advances, 2 : 100026  
<https://www.sciencedirect.com/science/article/pii/S2667113122000146>

Juan José Lucci, María Alegre, Leandro Vigna. 2022. Renewables in Antarctica: an assessment of progress to decarbonize the energy matrix of research facilities. Antarctic Science, 34(5) : 374-388.  
<https://www.cambridge.org/core/journals/antarctic-science/article/renewables-in-antarctica-an-assessment-of-progress-to-decarbonize-the-energy-matrix-of-research-facilities/11AF4776EBF9A902F437394B655B2E14>

Nander Wever, Eric Keenan, Charles Amory, Michael Lehning, Armin Sigmund, Hendrik Huwald, Jan T. M. Lenaerts. 2022. Observations and simulations of new snow density in the drifting snow-dominated environment of Antarctica. Journal of Glaciology, pp. 1 – 18  
<https://www.cambridge.org/core/journals/journal-of-glaciology/article/observations-and-simulations-of-new-snow-density-in-the-drifting-snow-dominated-environment-of-antarctica/88E29C9A4B1E8D9F8528F84E5F3C242E>

#### Conference papers:

Stefania Danesi, Simone Salimbeni, Alessandra Borghi, Stefano Urbini, Massimo Frezzotti. 2022. Cryoseismicity triggered by ice mass discharge through the Antarctic subglacial

hydrographic network. The Cryosphere Discussions (preprint). DOI:  
<https://doi.org/10.5194/egusphere-2022-29>

#### Book chapters:

Hocine Sekhane. 2022. An Overview Study of Micro-Grids for Self-Production in Renewable Energies. In: IntechOpen. Electric Power Conversion and Micro-Grids. Majid Nay-eripour & Mahdi Mansouri, 125-129.  
<https://www.intechopen.com/chapters/79375> and [https://books.google.be/books?hl=fr&lr=&id=E6RcEAAAQBAJ&oi=fnd&pg=PA125&dq=princess+elisabeth+antarctica&ots=t0wukuMzCb&sig=ChtqZ2-iL-1UD8xIWF-0q9NL-HY4&redir\\_esc=y#v=onepage&q=princess%20elisabeth%20antarctica&f=false](https://books.google.be/books?hl=fr&lr=&id=E6RcEAAAQBAJ&oi=fnd&pg=PA125&dq=princess+elisabeth+antarctica&ots=t0wukuMzCb&sig=ChtqZ2-iL-1UD8xIWF-0q9NL-HY4&redir_esc=y#v=onepage&q=princess%20elisabeth%20antarctica&f=false)

#### Theses:

Alfonso Ferrone. 2022. Radar processing techniques to study summer snowfall in the Sor Rondane Mountains, Antarctica. Thesis submitted to the EPFL, Lausanne. 176 pp. DOI:  
<https://doi.org/10.5075/epfl-thesis-9593> Infoscience – EPFL scientific publications: <https://infoscience.epfl.ch/record/293519>

#### Project reports:

Alexander Mangold, Andy Delcloo, Herman Van Langenhove, Kristof Demeestere, Christophe Walgraeve, Nadine Mattielli, Philippe Claeys, Karen De Causmaecker, Preben Van Overmeiren, Stefania Gili, Sibylle Boxho. 2022. CHASE - Unravelling Particle Chemistry in Dronning Maud Land: from Atmosphere to Surface. Final Report . BELSPO  
[https://www.belspo.be/belspo/brain-be/projects/FinalReports/CHASE\\_FinRep.pdf](https://www.belspo.be/belspo/brain-be/projects/FinalReports/CHASE_FinRep.pdf)

#### Conference abstracts/presentations/posters:

Fabien Darrouzet. 2022. Photographs taken during scientific expeditions in the Arctic and Ant-

arctica. 44th COSPAR Scientific Assembly, online, 16-24 July 2022. Abstract D3.7-0012-22.

<https://ui.adsabs.harvard.edu/abs/2022cosp...44.1747D/abstract>

Alfonso Ferrone, Alexis Berne. 2022. Summer snowfall in the Sor Rondane Mountains, Antarctica: characterization using a transect of K-band Doppler profilers. EGU General Assembly 2022. DOI:

<https://doi.org/10.5194/egusphere-egu22-5553>

Akira Kadokura, Yasunobu Ogawa, Yoshimasa Tanaka, Hisao Yamagishi, Masaki Okada, Ryuho Kataoka, Yuichi Otsuka, Henri Robert, Ashwini K. Sinha, Gopi K. Seemala. 2022. Antarctic large area network observation of auroral phenomena using unmanned systems: Event studies of multi-point simultaneous observations. The 13th Symposium on Polar Science, Indian Institute of Geomagnetism, Nov, 16th, 2022.

<http://library.iigm.res.in:8080/jspui/handle/123456789/1696>

Alexander Mangold, Karen De Causmaecker, Quinten Laffineur, Preben Van Overmeiren, Christophe Walgraeve, Kristof Demeestere, Herman Van Langenhove, Sibylle Boxho, Nadine Mattielli, Andy Delcloo. 2022. Measurement of Atmospheric Particles and Volatile Organic Compounds at Princess Elisabeth Antarctica Station: Properties and Air Mass Origin. 10th SCAR Open Science Conference, online.

<https://biblio.ugent.be/publication/01H3C4F5605VMYDM3AB44EBQ3S>

Florian Sauerland, Nicole Van Lipzig, Niels Souverijns, Alexander Mangold, Preben Van Overmeiren, Heike Wex. 2022. Modelling the impact of cloud condensation and ice nuclei on the near-surface climate of Dronning Maud Land (East Antarctic) using the regional climate model COSMO-CLM2. EGU General Assembly 2022, EGU22-12863, Vienna. DOI:

<https://doi.org/10.5194/egusphere-egu22-12863>

Valentina Savaglia, Bjorn Tytgat, Benoit Durieu, Sam Lambrechts, Anne Willems, Anton Van De Putte, Quinten Vanhellemont, Bart Van De Vyver, Elie Verleyen, Wim Vyverman, Annick Wilmotte. 2022. Which factors are shaping the microbial diversity in the inland high-altitude biotopes of the Western Sor Rondane Mountains (Eastern Antarctica, ACBR6)? 10th SCAR Open Science Conference "Antarctica in a changing world", online. The National Centre for Polar and Ocean Research (NCPOR). <https://orbi.uliege.be/bitstream/2268/294254/1/ASPAPresentationSCAR22BEpdf.pdf>

Preben Van Overmeiren, Andy Delcloo, Karen De Causmaecker, Alexander Mangold, Kristof Demeestere, Herman Van Langenhove, Christophe Walgraeve. 2022. Sequential sampling of Volatile Organic Compounds (VOCs) and atmospheric oxidation products in the Sor Rondane Mountains, East-Antarctica. EGU General Assembly 2022. DOI:

<https://doi.org/10.5194/egusphere-egu22-12072>

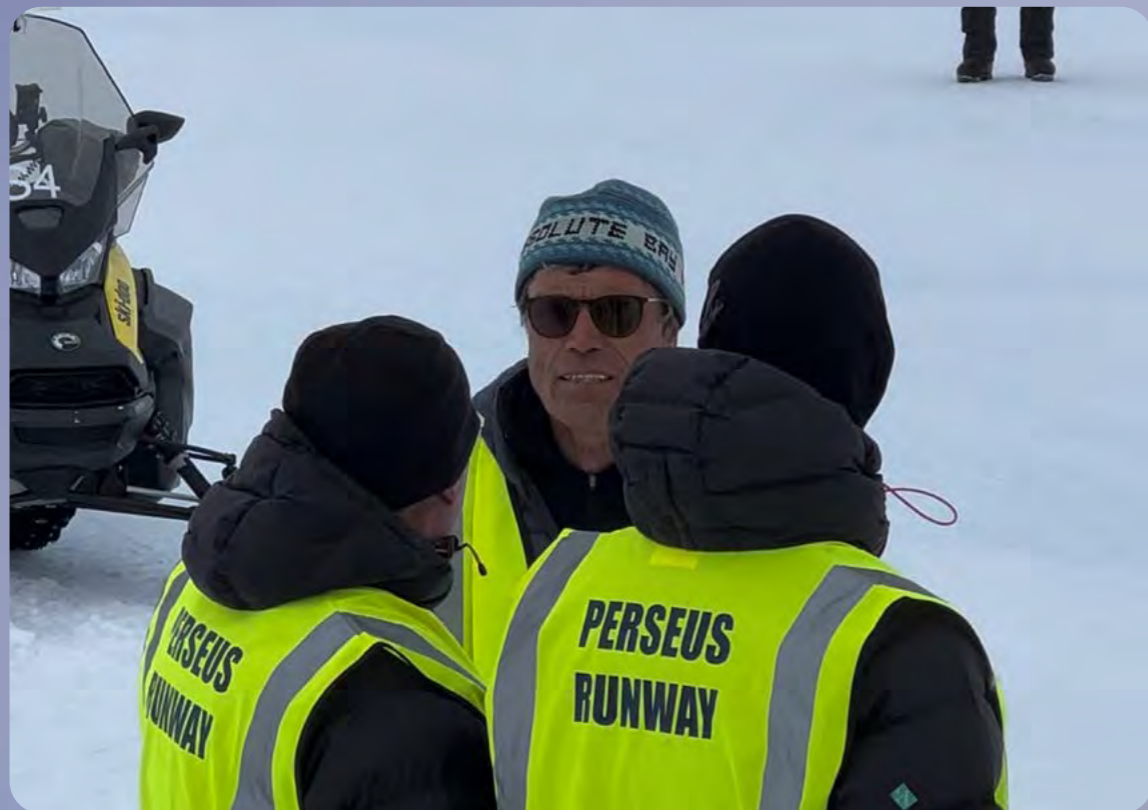
Heike Wex, Silvia Henning, Alexander Mangold, Preben Van Overmeiren, Sebastian Zeppenfeld, Manuela van Pinxteren, Hartmut Herrmann, Manuel Dallosto, Frank Stratmann. 2022. Ice Nucleating Particles in the Antarctic region. EGU General Assembly 2022. DOI:

<https://doi.org/10.5194/egusphere-egu22-3796>

Annick Wilmotte, Valentina Savaglia, Benoit Durieu, Bjorn Tytgat, Sam Lambrechts, Anne Willems, Anton Van De Putte, Quinten Van Hellemont, Bart Van De Vijver, Elie Verleyen, Wim Vyverman. 2022. The science-policy link in practice: how to propose an Antarctic Specially Protected Area (ASPA)? 10th SCAR Open Science Conference "Antarctica in a changing world", online.

<https://core.ac.uk/display/541100134?source=4>





## PERSEUS AIRFIELD OPERATIONS

Perseus Intercontinental Runway has been serving as one of two entry points to the White Continent from Cape Town for teams heading to the Princess Elisabeth Antarctica (PEA).

Located just 60 km from the station, teams arriving at Perseus Intercontinental Runway reach PEA within a few hours using Toyota Hiluxes or Prinoth tractors (which can haul heavy cargo).

The runway's close proximity to PEA reduces the carbon footprint of teams travelling from Cape Town to PEA, cutting out the need for a 435 km connecting flight from the next closest major inter-continental runway in Antarctica.

With the aim of having the runway fully operational during the austral summer research season, during the 2023-24 season, IPF carpenters, engineers, and technicians upgraded the hangar next to the runway into a fully-functioning liveable building with an office, a kitchen, a mess area, bedrooms, bathrooms, and electricity (provided by solar panels).

Having been used once or twice a season as an alternative route for teams travelling to PEA from Cape Town, Perseus is very convenient for the BELARE operations.. Starting from the 2023-24 research season, the Perseus Intercontinental Runway will be the main point of entry in Antarctica for BELARE teams heading to PEA.

Perseus is also available for use by other Antarctic research programs operating in the Queen Maud Land, East Antarctica.



## NEW DEVELOPMENTS AT PEA

### PEA installs high capacity water treatment system

The Princess Elisabeth Antarctica was designed to meet the intentions of the Madrid Protocol to the Antarctic Treaty. With this vision in mind, the station was built with a water treatment unit inspired by the International Space Station but one which allows the treatment of black and grey waters onsite and recycles a part of the purified water for uses other than for drinking water uses (showers, washing machines, toilets, etc.).

As the station's occupancy has increased in recent years, additional water treatment capacity has become necessary. Furthermore, after years of operation, experience was gained and it became clear that the initial design could be improved in several ways to increase performance, reliability and energy efficiency, and meet the specific constraints of Antarctica more closely.

After a few seasons of optimisation and improvement on the current system, during which IPF engineer Aymar de Lichtervelde closely collaborated with the original designer of the system, Dries Demey (Redwire Space), IPF decided to build a new system that will solve several capacity issues at one go, while sustaining PEA's leadership in environmental technology.

During 2021-2022, Aymar worked with IPF engineer Nicolas Henrickx to develop a new water treatment installation for the Princess Elisabeth Antarctica. More than just a resizing, the new system integrates a blend of the latest innovations on the market, and was fully redesigned based on the know-how gained from 10+ years of off-grid water treatment operations in the Antarctic. Over the last two seasons, IPF's team of engineers and water distribution professionals has performed the necessary preparation work to install the new system in the station's south annex.



*Return of the Dome Fuji traverse to the station*

*Tanngarden and Pingvinane taken from the East*







### NEW SOLAR FIELD ADDED TO PEA

In 2022, Slovenian solar panel company BISOL donated 60 solar photovoltaic panels to the Princess Elisabeth Antarctica. During the 2022-23 season, IPF engineer Johan Demuylder installed 48 of the 60 solar panels on the granite ridge next to the station. Facing east, these panels will provide energy early in the day to reduce the battery discharge during night time. The remaining 12 solar panels will be installed during the 2023-23 season.

Once installed, the new solar photovoltaic panels will add an additional 22kWp of renewable energy at PEA.

## EVENTS & EXHIBITIONS

**After two years of primarily online and hybrid events, IPF resumed its participation in numerous live events.**

### Opening of Space: The Human Conquest

Organised by VITO (an independent Flemish research organisation in the area of clean tech and sustainable development), the event opening the Space: The Human Conquest exhibition in Antwerp (an exhibition on space exploration, which ran from April 23rd until November 13th in Antwerp, Belgium) highlighted the importance of data science with regard to space, sustainability and innovation.

IPF President and Founder Alain Hubert addressed the event with a speech that focused on his experiences with remote sensing in Antarctica.



### Nocturnes Polar Photo Exhibition

As part of Brussels' Nocturnes open museum nights, on May 19th, the Royal Belgian Institute for Natural Sciences (RBINS) hosted a public polar photo exhibition in partnership with the International Polar Foundation and APECS Belgium.

Scientists and engineers who have travelled to the Princess Elisabeth Antarctica during recent BELARE missions exhibited breathtaking photos they had taken during their missions and were on-site at the RBINS to tell stories about their adventures in Antarctica to the general public. IPF also gave workshops to visitors with our 3D Arctic & Antarctic puzzles!



### PEA and Venturi Antarctica Featured during EU Green Week

On May 30th, IPF, Schneider Electric, and Venturi held a partner event to the EU Green Week in Brussels' EU Quarter.

This event was designed to showcase the technological achievements that allow the Princess Elisabeth Antarctica - the world's first zero emission polar research station - and the Venturi Antarctica - the world's first electric polar exploration vehicle - to reduce the environmental footprint of conducting polar research.

The event began with a press conference featuring IPF Founder and President Alain Hubert and Schneider Electric President for the Benelux Region David Orgaz D'Hollander discussed the design and implementation of renewable technologies at PEA, including the station's passive design, its renewable energy production and storage, its expanded water treatment system, its smart microgrid, and its programmable logic controller, which manages energy use at PEA. Venturi Chief Technical Officer Franck Baldet then told the story of how the Venturi Antarctica was born from an idea that Prince Albert II of Monaco had following his visit to polar research stations across Antarctica in 2009 (including the Princess Elisabeth Antarctica) and that this idea had now become a reality.

The press conference also featured three scientists who have used PEA as a base for conducting their research. Glaciologist Sarah Wauthy (ULB), atmospheric chemistry scientist Preben Van Overmeiren (Ghent University), and Kate Winter (Northumbria University) all explained what it was like not only to live and work at the zero-emission station, but also to get support using renewable energy solutions such as solar panels and small wind turbines to power their scientific instruments in the field.

Following the press conference, in-person attendees were able to learn more information about the Princess Elisabeth Antarctica and the Venturi Antarctica at workshops hosted by each of the partners, after which a networking lunch was served.



## Into the Blue Festival

Alain Hubert and the Princess Elisabeth Antarctica were featured at the 7th annual “Into the Blue” film festival at Wolubilis cultural centre in Brussels.

The first night of the three-day festival, November 24th, focused on polar exploration. After the evening opened with a video welcome from Alain Hubert, the packed auditorium was treated to three films: *Odyssées blanche*, which focuses on the French Polar research institute, *Continent de glace*, which looked at a season at the Princess Elisabeth Antarctica, and *L’Antarctique en héritage* a film made by Henri de Gerlache about his great-grandfather’s overwintering expedition on the Belgica research vessel 1897-99. Following the presentation of the films, the audience was treated to a question and answer session that featured IPF Managing Director Nicolas Van Hoecke and some of the filmmakers. The annual Into the Blue festival held in Brussels targets marine environment and scientific exploration enthusiasts. It features numerous movies, documentaries, and short films.



## 2022 Belgian Polar Symposium

Organised by the Egmont Institute, BELSPO, BNCAR, and APECS Belgium, the 2022 Belgian Polar Symposium highlighted Belgian polar research and the scientific and policy fora associated with it. Presentations looked at climate, ice, geology, space, terrestrial biology, anthropology as well as health, ocean, marine biology and Belgian research facilities. The presentations were complemented by contributions from leading polar organisations and prominent political speakers.

IPF Science Liaison Officer Henri Robert delivered a presentation on the zero emission concept of Princess Elisabeth Antarctica (PEA) research station. As the world’s first and so far only zero emission polar research station, PEA Belgium can be proud of this incredible accomplishment.

## Live Magazine for kids 2022

On October 2nd, IPF President and Founder Alain Hubert took part in the “Live Magazine for kids 2022” event, organised by Live Magazine and hosted by the BOZAR Centre for Fine Arts in Brussels.

This event, specifically designed for children 12 and younger, offered an opportunity to meet and hear the stories of celebrities in Belgium, including journalists, children’s novelists, cartoonists and young reporters. Through their speeches and presentations, guests contributed to creating a “living newspaper”, sparking children’s curiosity and imagination.

During his contribution to the event, Alain Hubert shared his experience as a polar explorer, focusing on one of his most challenging expeditions: crossing over the North Pole on skis in 2007 with his friend and fellow polar explorer, Dixie Dansercoer.

### IPF at Space Week 2022

On October 19th, more than 500 students and space professionals gathered in Brussels for the third edition of Switch To Space, Belgium's largest biannual space technology gathering.

IPF Education and Outreach Coordinator Mieke Sterken took part in a panel moderated by ESA's Education Administrator Natacha Callens, which discussed how Moon and Mars explorations can benefit society on Earth. The panel also included astronaut Frank De Winne (Head of the European Astronaut Center) Koen Vriesacker (Techtransfer Broker for the Belgian Space Solutions Center), Jan Van Baelen, (Founder and CEO at The Lunar Grid). The panel discussed the current challenges for interplanetary manned space explorations as well as the problems long-term space travel exacts on the human body.

The Princess Elisabeth Antarctica has many similarities with closed-loop space habitats, making it an ideal place to conduct research related to living on the Moon or Mars. Developed to be self-sufficient and sustainable, getting its energy from renewable sun and wind, and featuring a water treatment system that treats all black and grey water and recycles nearly all of it. Additionally, the isolation the teams experience during long stays at Antarctic research stations makes them excellent places to study the stresses on humans who may one day travel to Mars. The panel also discussed the added value of Moon and Mars explorations for humanity and the importance of shifting our mindsets towards scarcity-based thinking and solution-focused reasoning, two skills highly needed for humanity to more sustainably deal with the Earth's finite resources.

### Prix Terre d'Avenir

On October 5th, the Reine Paola Foundation, in collaboration with the Dirk Frimout Foundation, awarded its Terre d'Avenir Prize at the Belgian Royal Palace.

This wonderful initiative, aimed at high school students, emphasises the importance of instilling technical and scientific knowledge for our future generations. Young students were given a platform to present their projects, expressing their creativity from a scientific, technical and ecological point of view.

The award beneficiaries were selected by three juries (one per linguistic community in Belgium - Dutch, French and German-speaking) composed of eminent personalities from the scientific, business, and academic fields.

The jury for the French-speaking community was presided over by the International Polar Foundation President and Founder Alain Hubert.

### IPF at Arctic Circle

In October 2022, IPF took part in a Belgian delegation at the annual Arctic Circle Assembly in Reykjavík, Iceland.

At a side panel organised by the Egmont Institute on October 14th, IPF Board member, Egmont Institute Senior Fellow and former EU Arctic Ambassador Marie-Anne Coninx moderated a panel including IPF Managing Director Nicolas Van Hoecke, Belgium's Ambassador to Norway and Iceland Frank Arnauts, EU Special Envoy for the Arctic Clara Ganslandt, Director of the Egmont Institute Pol de Witte, Professor Philippe Huybrechts from the VUB, and Romain Chuffart from The Arctic Institute took part in a panel discussion on past, current, and future developments of Belgium's Arctic Journey.

Presenting IPF's contribution in advancing Belgian interests in the Polar regions, Nicolas Van Hoecke introduced the potential of "zero emission" polar research during the panel discussion.



## AFS 2022 / SIDE EVENTS

The 2022 Arctic Futures Symposium featured two official side events, creating and fostering connections between Arctic stakeholders and the general public.

### Arctic Photo Exhibition:

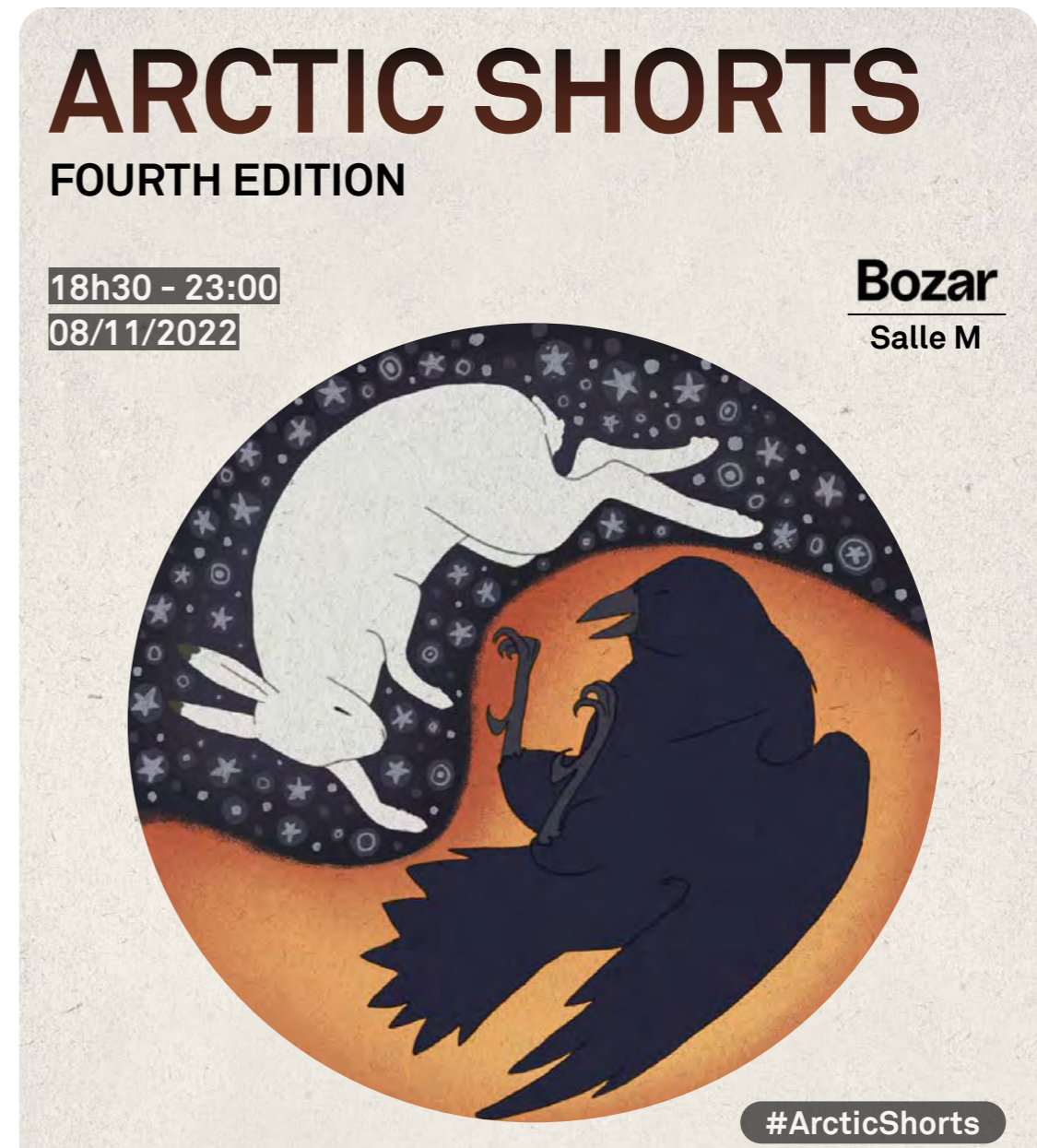
Belgian polar photographer Christian Clauwers exhibited several of his photos taken during his travels to the Norwegian Arctic during the two days of the symposium in the atrium of the Residence Palace.

### Arctic Shorts:

The 4th edition of Arctic Shorts took place in Salle M at BOZAR Centre for Fine Arts on Tuesday, November 8th, 2022.

*More than 250 people enjoyed the screening of different short films made by Arctic filmmakers:*

- Selshamurinn (Sealskin), Ugly Hauksdóttir (Iceland)
- Tuullik, Berda Larsen (Greenland)
- Taiga, Leena Lehti (Finland)
- Neka, Nemnemiss McKenzie (Quebec)
- Arctic Song, Germaine Arnattaquq, Neil Christopher, Louise Flaherty (Canada)
- Tokskinnarin, Terji Mohr (Faroe Islands)
- Frydelund Hair Parlour, Hanne Berkaak (Norway)
- Meet your local yuru-chara, Magnus Fredriksson (Sweden)



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## CONFERENCES

### Arctic Futures

After two years of online and hybrid versions of the symposium, the 2022 Symposium took place at the Residence Palace in the EU Quarter on Tuesday, November 29th and Wednesday, November 30th. About 180 people attended the event in-person and about 300 have watched the proceedings online.

Organised by IPF and its many Arctic stakeholder partners, the 2022 symposium focused on a wide variety of topics, including:

- Evolving Arctic Governance
  - Arctic Cooperation in Turbulent Geo-political Times
  - The Evolving Role of Arctic Stakeholders
- Arctic Research Cooperation in the Current Geopolitical Situation... and Beyond
  - Arctic Energy and Resource Security
  - The Arctic as an Attractive Place to Live and Work
  - Arctic Innovation

Over the two days of the symposium, these topics were addressed in seven different panels, each featuring a diverse selection of Arctic stakeholders and experts.

Following a welcome from Nicolas Van Hoecke (IPF Managing Director), participants were also briefly greeted by Alain Hubert (IPF President and Founder), who joined the event via satellite from the Princess Elisabeth Antarctica research station.

Angelina Eichhorst (Managing Director, European External Action Service), Charlina Vitcheva (Director-General, DG MARE), Eivind Vad Petersson (State Secretary of Norway), Sara Olsvig (Chair, Inuit Circumpolar Council), Neil Gray (Minister for Culture, Europe and International Development, Scotland), and Jasper Pillen (Federal Deputy, Belgian House of Representatives) opened the Symposium with insightful keynote addresses. Setting the tone for the day, they introduced the main challenges in the Arctic that have arisen due to the current geopolitical situation.

**ARCTIC FUTURES SYMPOSIUM** 2022

**A Dynamic Arctic**

**29 & 30 November**  
**Residence Palace, Brussels**

**#ArcticFutures**

Photo: Christian Clauwers

#### FOUNDER & ORGANISER



#### PARTNERS





Panels during the first day, moderated by Mike Sfraga (Chair, U.S. Arctic Research Commission and US Arctic Ambassador nominee), Andreas Østhagen (Senior Research Fellow, Fridtjof Nansen Institute; Senior Fellow, Lars Haltbrekken (Chair, Arctic Delegation, Norwegian Parliament) and Gizem Eras (Head of Section and Counsellor for Agriculture, Fisheries and Environment, Mission of Canada to the EU) opened the second day of the symposium. They introduced the challenges faced by local people, focusing on climate change and the importance of research and cooperation.

The following panels for the day - moderated by Johanna Ikävalko (Director, Arctic Centre, University of Lapland), Greg Poelzer (Professor, School of Environment and Sustainability, University of Saskatchewan), Patti Bruns (Secretary-General, Arctic Mayors Forum), and Mads Qvist Frederiksen (Director, Arctic Economic Council) - focused on key topics affecting Arctic stakeholders. The first panel focused on how the current geopolitical situation has affected international research collaboration, while the second panel looked at energy and resource security in the changing geopolitical climate. The third panel addressed practices and policies, developed in the Arctic regions, to attract and retain a skilled workforce. The final panel did a SWOT (strengths, weaknesses, opportunities, threats) analysis of various sectors of Arctic innovation.

All sessions of the 2022 Symposium can be viewed on IPF's YouTube channel:  
<https://www.youtube.com/watch?v=wfBzAdQHS08&list=PLUd2Ya71uzhpFoEA5BD-Kfvs0om9Y3GmnK>.

A summary of the event is available on the Arctic Futures Symposium website:





## SYMPOSIUM PARTNERS AND SPONSORS

The 2022 Symposium was made possible thanks to the contributions of our sponsor and Arctic stakeholder partners:

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The Brussels-Capital Region



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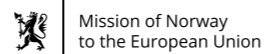
The Wilson Center Polar Institute



The Mission of Canada to the European Union



The Mission of Norway to the European Union



The North Norway European Office



The Permanent Representation of Finland to the European Union



The Mission of Iceland to the European Union



The East and North Finland European Office



The North Sweden European Office



The Representation of Greenland to the European Union



The Mission of the Faroes to the European Union



## Laurence Tr n Arctic Futures Award

During the second day of the symposium, the International Polar Foundation presented the winner of the first ever Laurence Tr n Arctic Futures Award to Containing Greens AB, a startup created by young entrepreneurs based in Lule  in northern Sweden.

The Laurence Tr n Arctic Futures Award is an initiative of the International Polar Foundation, financed by the Tr n family. The award provides 7,500 Euros of financial assistance to a fledgling startup or young entrepreneur based in the Arctic to help them further establish their business.

Containing Greens was selected among 10 candidates proposed by the Arctic Futures Symposium partners as well as other Arctic stakeholders.

The innovative startup uses the waste heat from data centres to grow fresh produce locally for restaurants and supermarkets in their region, thus reducing the need to ship produce from further south to the Arctic and cutting the carbon footprint of local food supply.

The award was presented by Nicolas Van Hoecke (IPF Managing Director) and Mads Qvist Frederiksen (Director, Arctic Economic Council).



Aerial view of Relay Station on Van Autenboer Peak



## COMMUNICATIONS & OUTREACH

### EDUCATIONAL ACTIVITIES

Since its founding, the International Polar Foundation has been very active in education and outreach activities as they reinforce its mission of supporting polar science and bridging the science-society divide, advancing knowledge and promoting informed action on climate change. After a few years of dormancy, IPF resurrected its educational activities at the end of 2021. In 2022, IPF gradually restarted educational activities targeted at a wide variety of audiences, both in terms of age as well as professional orientation.

31/01/2022 Go! Athenium, Lokeren, Belgium  
17/02/2022 BISB primary school, Brussels, Belgium  
13/05/2022 Drôme Primary school, France

Online classes for students, from PEA (during the field seasons 2021-22 and 2022-23) Continuing a tradition, during the austral summer research season, IPF staff continued to give online classes to students in Belgium and around the world directly from the Princess Elisabeth Antarctica. Instructors at primary and secondary schools, high schools, and even universities enthusiastically welcomed IPF's educational STEM (science, technology, engineering, mathematics) activities as part of their curricula.

#### Online classrooms

15/02/2022 Université Libre de Bruxelles (ULB), Brussels, Belgium  
18/02/2022 Klimop Basisschool, Lembeek  
13/12/2022 Royal Hospital School, Suffolk, United Kingdom  
16/12/2022 Private High School of Art, Zagreb, Croatia



## Workshops for Educators

### Artesis Plantyn Hogeschool

Mieke Sterken and Alain-Thierry Barrera gave a workshop on February 22nd with IPF's Arctic and Antarctic 3D puzzles for geography students at Artesis Plantyn Hogeschool in Antwerp, Belgium. The second year students learned about how they could structure their lessons and implement a variety of learning styles in one lesson.

### European Ocean Basin Event for Educators

On April 5th, at the invitation of the European Marine Educators Association (EMSEA), Mieke Sterken gave an interactive online workshop about the Arctic Ocean during one of a series of s organised by EMSEA and its partners. Mieke introduced a group of educators from all over Europe to the Arctic Ocean and explained why it is so important to learn about changes in the Arctic Ocean. She also presented a list of existing educational materials related to the Arctic.

## Collaborations with partners

### VLA-Think Tank

Mieke Sterken joined and has actively participated in the VLA (Flemish Teachers Association) Think Tank on renewing and reinforcing geography education in Flanders. Geography is by far the most diverse and integrative science, representing 21st century skills of creative and integrative thinking. The VLA wants to strengthen these skills in schools by giving guidance and support to teachers in the region. Mieke joined several online think tank meetings and provided the VLA-teachers valuable feedback from the viewpoint of an outsider. She continues to collaborate with VLA and its think tank, joining their efforts to create a hands-on teachers guide for geography.

### MOMSTER project

The MOMSTER (MOBILE Meteor Station for Education and outReach) project is an educational citizen science initiative that aims to detect meteors by analysing radio signals emitted by a central emitter located in Dourbes, Belgium and received by a network of radio-receivers spread all over Belgium, after reflecting off of meteors in the upper atmosphere. Actively involved in this project, IPF has started developing educational materials on meteorites in Antarctica (to be published in 2023) to complement other educational materials that focus on cosmology, physics and data visualisation. Project partners include BIRA-IASB, the Planetarium of Brussels, and KULeuven. After having presented at a teacher training in the Brussels Planetarium in October 2021, Mieke Sterken also joined her MOMSTER-colleagues in a workshop during the 2022 VeLeWe (Flemish Science Teachers Association) Congress (see table "workshops for educators" above).

### APECS-Belgium

APECS Belgium is the Belgian branch of the Association of Polar Early Career Scientists (APECS). It is an association run by, and for, young researchers from Masters to the post-doc level. Mieke Sterken along with IPF's interns Monica Gamba (2019-2020), Estelle Loraing (2020-21), Eva Horovčáková (2021-22) and Francesca Fiore (2022-23) have been members of APECS Belgium. As a former chair of APECS-Belgium (2007-2009) Mieke now volunteers as a mentor for the association, providing advice, administrative support and graphical assistance.





*View of Utsteinen Peak taken from the South - crew members maintaining the radio antenna.  
Princess Elisabeth Antarctica is visible in the background*

## IPF ON THE WEB

The IPF is working to re-launch websites and provide new content following a hiatus during the years 2015-2020. The pressure to improve material available on line is great especially as the COVID-19 pandemic underlined to what extent many activities and much information has now moved on-line. In order to do justice to the activities of the IPF, the Communications team has been actively looking to modernise its on-line presence, including the updating of the backbone software.

### Websites

[POLARFOUNDATION.ORG](http://www.polarfoundation.org) is the IPF's principal website. Content pertaining to the Foundation's initiatives, projects, and events, as part of the Foundation's mission to connect science and society, are communicated on this website by way of news items, photos and press releases.

[ARCTICFUTURES.ORG](http://www.arcticfutures.org) provides information about the annual Arctic Futures Symposium - a multinational and multidisciplinary event at which Arctic stakeholders from Brussels and around the globe gather to discuss topics of great interest within an EU context. The website also features the Arctic Shorts Film Evening.

[ANTARCTICSTATION.ORG](http://www.antarcticstation.org) provides information about the IPF's flagship project, the Princess Elisabeth Antarctica - the world's first zero emission polar research base. The website is an archive of operations at the station, science projects, and the renewable energy systems and smart grid used at the station.

[HTTP://WWW.POLARFOUNDATION.ORG](http://www.polarfoundation.org)

[HTTPS://WWW.ARCTICFUTURES.ORG](https://www.arcticfutures.org)

[HTTP://WWW.ANTARCTICSTATION.ORG](http://www.antarcticstation.org)

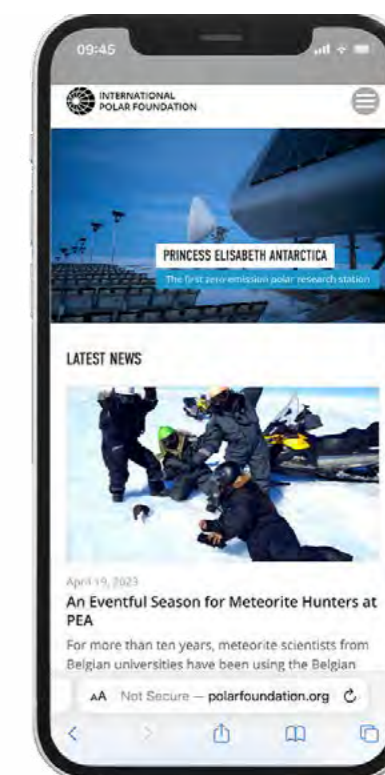
[HTTP://WWW.EDUCAPOLES.ORG](http://www.educapoles.org)

[HTTP://WWW.SCIENCEPOLES.ORG](http://www.sciencepoles.org)

[EDUCAPOLES.ORG](http://www.educapoles.org) hosts the International Polar Foundation's multimedia educational materials. The site provides these materials to the teaching community in three languages: English, Dutch, and French. The site also raises awareness of the Polar Regions as an early warning system for climate change and a unique place to conduct research, and also mobilizes citizens to take informed actions against climate change.

Aimed at teachers, teachers in training, and all other educators, EducaPoles.org offers pedagogical dossiers, animations, videos, picture galleries, tailored stories, and ready-made content such as quizzes, scientific experiments, and classroom activities.

[SCIENCEPOLES.ORG](http://www.sciencepoles.org) is a collection of polar science articles and interviews with top polar scientists. By clearly explaining and demystifying complex scientific issues, the website contributes significantly to the Foundation's mission to connect science and society, catering to both policymakers and the general public.



## SOCIAL MEDIA

IPF is present on multiple social media platforms which keep its online followers informed about the activities and events of the Foundation while also providing information about important developments in polar and climate science, renewable energy, environmental and sustainability issues, and newsworthy events in the Polar Regions.

The International Polar Foundation was mainly active on three social media platforms: Facebook (@intpolarfoundation) Twitter (@PolarFoundation), and Instagram (@international\_polar\_foundation).

In the autumn IPF began to use the TikTok video-sharing app (@int.polarfoundation) featuring primarily content from the Princess Elisabeth Antarctica research station.

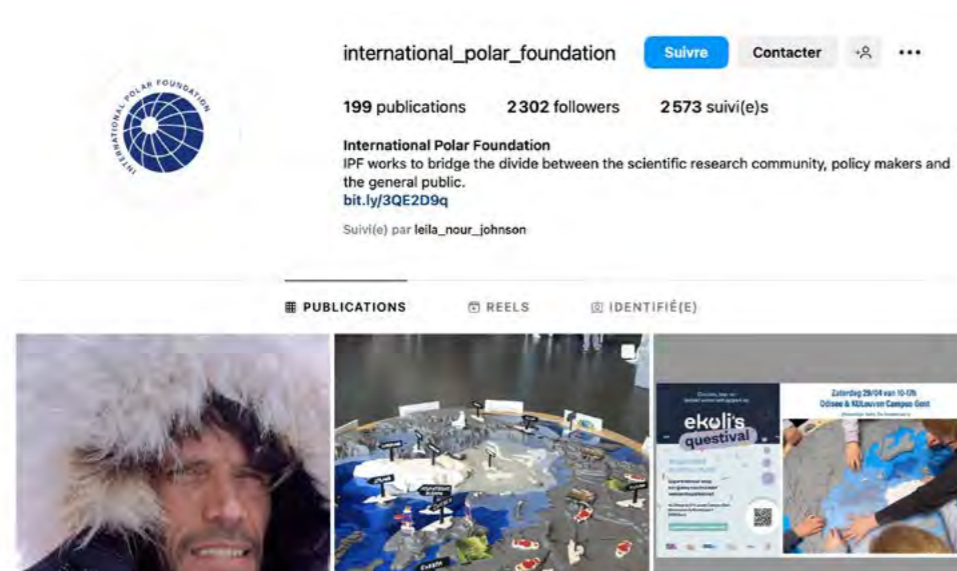
As the number of people using social media as their primary source of information continues to rise, and as different platforms are aimed at different audiences, communication on a variety of platforms is essential for IPF to reach a broad cross section of the general public.

The IPF INSTAGRAM account, which was activated in the summer of 2020. Efforts will continue to increase reach, in 2023. Most of the photos shared on Instagram are related to activities of scientists and the IPF team at PEA station, or events organised by IPF such as Arctic Futures Symposium. The “Stories” feature of Instagram was used to draw attention to new posts, post short videos from the IPF team at PEA, or share photos and videos from live events in real time.

IPF’s TWITTER account has been in use since 2012. The account had 6859 followers at the start of 2021 and its following had reached 7048 by the end of 2022. In addition to sharing photos related to PEA and other IPF activities, “live tweets” were conducted from conferences and events IPF members took part in.

IPF’s Facebook page was used similarly to Instagram and Twitter to share news related to PEA and IPF activities, events included, but also news from relevant sources related to polar research, climate change, renewable energy, sustainable development, and Arctic events and politics. The account had received 2802 likes by the end of 2022 and had reached thousands more through its posts.

The IPF TIKTOK account debuted in November 2021 as the 2021-22 austral summer research season at the Princess Elisabeth Antarctica got underway. By the end of December eight videos had been posted, reaching a total of 61K views and 1181 likes. TikTok as a video-sharing platform was used to share videos with content taken from the staff at the PEA station.



[INSTAGRAM](#)

[TWITTER](#)

[TIKTOK](#)

[FACEBOOK](#)

[LINKEDIN](#)

*IPF friends celebrating the 20th anniversary of IPF at the emperor bay penguin colony, discovered in 2013*





15th anniversary year of Princess Elisabeth Antarctica - seen here in January 2008



## IN MEMORIAM

### In Memoriam: Dr. Claude Lorius

The International Polar Foundation mourns the death of a legend in climate change research.

World renowned French glaciologist Dr. Claude Lorius (1932-2023) passed away in January at age 91. Over his long and productive career, he led 22 expeditions to Antarctica and Greenland to study ice and his insights were fundamental in creating the link between polar research and the study of Earth's climate.

Claude Lorius accorded the International Polar Foundation the singular privilege of accepting to be amongst the first Honorary Members of the Foundation, in 2002.

In 2001, Alain Hubert consulted the world-renowned Climatologist André Berger, professor at the Institute of Geophysics Georges Lemaître (UCL) about creating a new foundation. This new Foundation aimed to establish a platform between Science & Society to enforce the role of science as a driver to action on Climate change.

André Berger became a co-founder of the 'International Polar Foundation' (IPF). He advised Alain Hubert to first consult with the heads of three leading European Polar Research Institutes to find out if the initiative could provide useful support to improving the public outreach on climate change.

"That is how I came to meet Claude Lorius, who was at one time head of the Laboratoire de glaciologie et géophysique de l'environnement, in Grenoble, an Institute with whom I had longstanding relations linked to the study of weather in Antarctica, and with whom I later came to do a long series of data collection on snow accumulation in Antarctica," Alain Hubert explained. "He was a very compelling figure, with a very active imagination and keen intellect which allowed him to see a connection that might have escaped the notice of others."

(Note: The LGGE does not exist anymore, having been absorbed by other Institutes).

Prof. Lorius' most important contribution to polar science came in the 1960s from his help in pioneering ice coring as a means to study the Earth's climate history, at Vostok, where the first cores were being extracted.

From a happy accident involving millennial ice cubes crackling in a glass, he postulated that studying the air bubbles trapped in such ice that had been buried over millennia in polar ice sheets could reveal information about Earth's climate in the distant past (up to 800KYears currently by this method).

From there it could be extrapolated how temperature evolved, in line with concentrations of the greenhouse gas carbon dioxide. The atmospheric concentrations of various gas-

ses stored in tiny bubbles trapped in the ice, allowed for measuring the concentrations of the carbon-dioxide in these trapped air bubbles. The deeper the core extracted, the older the ice, and the air in the bubbles. It became possible to link the concentrations of carbon dioxide to ambient temperature, creating what became known as the hockey stick curve. It became evident early on that the research being carried out in the Antarctic had key lessons for the study of Climate Change.

The changing concentration of carbon dioxide extracted from the ice cores, could be linked to the average global temperatures rise after the start of the Industrial Revolution in the late 18th century, when human activity was responsible for emitting large quantities of carbon dioxide into the atmosphere from burning of fossil fuels, like coal.

It is thanks to the research carried out by Prof Lorius and others that we now can say with some degree of certainty that the Industrial Revolution marked the beginning of anthropogenic climate change, when human activity started having a major effect on Earth's climate.

Prof Lorius agreed with the notion that it was of fundamental importance that the link between climate change and atmospheric carbon-dioxide should be explained



to the wider public. He had been one of the first in the 1960s to postulate that the atmospheric gasses trapped in ancient ice on Antarctica held important information about climate change, and understood that this message was not easy to convey to a non-scientific public.

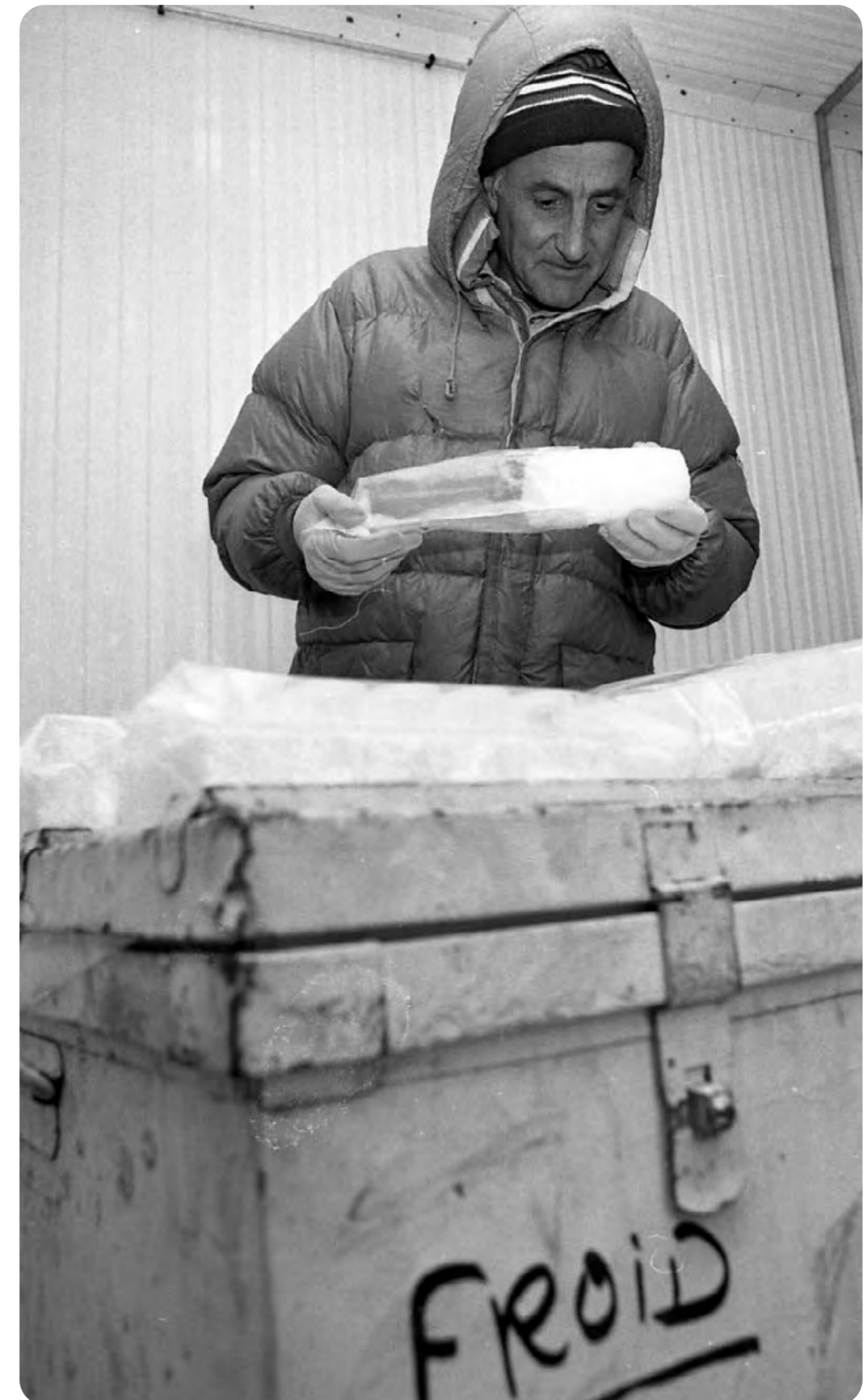
In order to help this complex message to pass, it would be necessary to create several levels of support to encourage research in the polar regions, (from funding, to dissemination and education). It was of fundamental importance that the complexity of the message did not become an obstacle to its transmission. It would be equally important to have wide-scale public support for action to combat the increase in emissions. In parallel the political establishment would need to come to understand that the societal impacts of Climate Change would be immense, and that the funding for research in the area was vital for understanding the pace and direction of change.

Claude Lorius was unfailingly supportive of the IPF, for which we are grateful, and immensely honored.

Dr. Lorius' scientific contributions saw him awarded with numerous prizes, including:

- the Humboldt Prize (1988),
- the Belgica Medal (1989),
- the Italgas Prize (1994),
- the Tyler Prize for Environmental Achievement (1996),
- the Balzan Prize for climatology (2001),
- the CNRS gold medal (2002),
- the Vernadsky medal of the EGU (2006),
- the Blue Planet Prize (2008), and
- the Bower Medal and Prize of the Franklin Institute (2017).

In 1988, he was also the inaugural expert of the United Nations Intergovernmental Panel on Climate Change (IPCC), which recently released its Sixth Assessment Report.



## In Memoriam: Prof. Dr. Tony Van Autenboer

Prof. Dr. Tony Van Autenboer was geologist and later expedition leader of several of the Belgian Antarctic expeditions in the period 1957-1970. He also participated in Norwegian, Danish and American research in the Arctic.

Tony was a compelling personality. With his understated manner and his dry humour, he would tell us the most hilarious stories concerning the surviving Belgian Antarctic community. A kind, generous man, with a self-deprecatory smile, you would never have guessed on meeting him for the first time that he pioneered Belgium's history in Antarctica with Commander Gaston de Gerlache. He will be much missed by those who he favoured with his friendship.

Excerpts below from WHERE WISE MEN DARE NOT TREAD - Belgium in Antarctica (1957 - 1970) by Tony Van Autenboer.

*On January 11 1958 the 60-year-old weather-beaten flag of the "Belgica" flew again in Antarctica: a simple ceremony marked the construction of a geophysical observatory in 70°25'S and 24°18'E to operate as Belgium's contribution to the International Geophysical Year (IGY). The "Belgica" flag that flew in early January 1958 was also a symbol of a new beginning.*

*Can it be taken as a sign that Belgian interests, which for more than half a century had focused narrowly on parts of tropical Africa, finally widened and discovered the rest of the world?*

*This evolution was not spontaneous, and tradition and inertia in both the academic world and in governmental administration had to be overcome.*

*Meteorologist Edmond Hoge was the first to advocate Belgian participation in the Antarctic within the framework of IGY, but he failed to convince the authorities. The proposals by Air-Force meteorologist Frank Bastin 1 also failed to catalyse a new initiative. The scientific community (the local IGY Committee) planned its contribution to be carried out between the national borders and in what was still Belgian Congo.*


*When Gaston de Gerlache decided to try to continue what was to become a family tradition, he had much better assets. His wartime experience as a Spitfire pilot in the RAF and his subsequent career as a lawyer led to this unique combination of a man of action who understood, or at least accepted, the stream of paperwork, the beloved tool of the government. The memory of his father, the now famous leader of the "Belgica", opened many doors including those of reluctant cabinet ministers.*

*They had much better plans for government subsidies, rather than financing research in an uninhabited part of the world. The impressive series of the scientific results from the*

*Belgica Expedition probably helped him to convince the scientific community. The local Belgian IGY Committee surprisingly reversed its negative advice given a few months earlier, and endorsed de Gerlache's initiative. When King Baudouin marked his interest, the last sceptics turned into enthusiastic supporters and in October 1956 the Council of Ministers voted a subsidy of 40 million (1956) Belgian francs.*

*The 1958 Belgian Antarctic Expedition was born and preparations began. The most urgent and critical task for de Gerlache was to ensure supplementary funding. Thanks to many private contributions and the help of the Ministry of Defence (personnel and equipment) an additional 20 million BF became available. The link with the Meteorological Wing of the Belgian Air Force deserves a special mention. From 1957 until the Belgian observatory was definitively abandoned (1967) the Meteor Wing provided meteorologists and technicians. An important part of the preparation of the expedition was also taken care of by this unit, especially in 1957 and 1958. Frank Bastin 1 was responsible for the scientific program and Xavier de Maere 2 planned and designed the station to be built and its technical infrastructure.*





The lack of polar experience, it appears, was no deterrent, and the Expedition rapidly got underway and was set to sail in the autumn of 1957.

*Equally urgent was the recruitment of the 17 scientists and technicians. This was critical most of the members needed some extra training, e.g. the pilots practised take offs and landings on glaciers and the dog driver had to learn to handle a team of dogs from the Inuit on the West Coast of Greenland. Several members took a course on snow and ice techniques in Chamonix. The expedition leader also took part in a traverse in Adelie Land. This short trip was the only Antarctic experience available in the team.*

*The average age of the participants in 1957 was 35.3 with the youngest 23 and the oldest 50 years of age.*

Thanks to his intimate knowledge of the area he was able to counsel the Foundation on where to build the new research station which was to become the Princess Elisabeth Antarctica.

He writes of the area in which the BELARE (Belgian Antarctic Research Expeditions) operate today:

*De Gerlache's choice fell finally on Breidvika (now called Breid Bay) in Dronning Maud Land. Information on the area was scarce. In 1937 a Norwegian expedition with seaplanes, operating from a whaling factory ship, had taken aerial photographs. A rough map of the coast, with an indication of mountains further inland, was produced. Access to the ice shelf – still called the Barrier – was considered to be possible.*

*During "Operation High Jump" (1946 – 1947), a US Navy plane had taken a series of oblique and vertical photo-graphs of the mountain range 200 km to the South. The Norsk Polarinstittutt produced a map from these photo-graphs in 1957 and christened the range Sør Rondane. The nearest geological information came from an area 1000 km further west, studied by a joint Norwegian-British-Swedish expedition some 10 years before.*

Much of what he describes in his account of his experiences in Antarctica resonates with the experience of the scientists and the PEA Station Crew to this day. The scientific activity they initiated is replicated in today's programs.

*The meteorological program responded to one of the important IGY recommendations and included both surface and upper air measurements. The surface observations provided a three hourly record of temperature, pressure, wind, visibility and cloud cover. The upper air program depended on the twice-daily launching of hydrogen-filled balloons with continuous radar-tracked sondes. These radioed pressure and temperature and allowed*

*height, wind speed and direction to be calculated as the balloons climbed to their maximum altitude. Solar radiation and albedo were other important measurements as was the precipitation. The snow accumulation was also measured by the glaciologist on a series of markers some distance from the station. Normal accumulation was around 1 m/year (40 cm of water-equivalent).*

*The meteo team was usually the largest at the station. It came well-prepared as most observers and technicians were on detachment from the meteorological wing of the Belgian Air Force.*

*They had to brave the elements to launch their balloons. It soon became a sport to get the radiosondes airborne under the worst possible conditions. Only exceptionally strong gales and blizzards stopped this daily exercise. Part of their work was not so pleasant and even dangerous: the preparation of the hydrogen for the balloons. Based on a chemical reaction involving caustic soda, an iron-silicium compound and water, it left sticky residues in the high-pressure gas bottles. Modifications to the standard radiosondes were made to measure the atmospheric electricity and its gradient.*

Today we use inert Helium in the balloons launched at PE, but the return to hydrogen may not be far off as Helium becomes more scarce. Tony also lamented the lack of research publications, which would have served to preserve long term data sets giving much needed insight into the evolution of the atmospheric conditions accompanying climate change today. There must be treasures somewhere in the archives. He also mentions the possibility of studying "meteor dust", an idea which a few years ago resulted in a celebrated publication in the journal "Nature", on the micro-meteorites found in the moraines of the Sør Rondane Mountains, carried out by a team from the VUB under Prof. Steven Goderis.

*A related proposal was made to filter the melting water of the station in order to collect and study the meteoritic dust. The pure Antarctic environment was supposed to be ideal for this study, as was proved by the discovery much later of a rich harvest of meteorites on the blue ice fields. The study of extraterrestrial matter started at the Belgian station, was continued with success with the US Antarctic Program, as well was the use of the radioactive fallout as a reference horizon to measure the precipitation on the polar plateau.*

Prof. Jean Rasson carried out measurements of the geomagnetic field at the site of the King Baudouin Station in 2013, when he came to PE to survey the area for the building of the geomagnetic radome to house the revolutionary instruments that he had developed to take measurements of magnetic fields, but in complete autonomy.

*The magnetic field is part of an interacting group of physical phenomena in and around the earth (i.e. atmospheric electricity, ionosphere, aurora and propagation of radio-waves).*

*The geomagnetic observations were carried out in two special huts. One of them housed several photographic recorders operating at different speeds to differentiate between long and short-term variations of the components of the magnetic field vector. In the other hut, absolute measurements were regularly made.*

*The huts, in which no magnetic material such as steel nails or ordinary light bulbs could be used, were constructed at some distance from the magnetic disturbances of the station. In bad weather, the scientist was guided to his daily tasks by a rope stretched between bamboos. Occasionally when the trap door of his hut was heavily drifted up, a rescue party from the main station had to go to dig him out. The magnetic sanctuary was roped off and strictly "off limits" to anyone not having a clear bill of magnetic health. However, this did not impress the free-roaming dogs.*



## In Memoriam: Chevalier Jacques Brassine de La Buisnière

The Chevalier Jacques Brassine de La Buisnière served as a professor, politician, political scientist, and civil servant in both The Kingdom of Belgium and the Congo.

From 2003 until his retirement in 2019, Jacques was a Member of the Conseil d'Administration of the International Polar Foundation, where he was amongst the most ardent supporters of the projects of the Foundation.

An Alumni of the Université libre de Bruxelles (ULB) and the Harvard Business School, Jacques had a distinguished career in development and in the Foreign service, and was of good counsel in navigating the corridors of public administration.

After serving as an attaché in the cabinet of Vice-Premier Albert Lilar from 1958 to 1960, Jacques spent numerous years in the Congo where he advised a number of ministers, including Moïse Tshombe, the former Prime Minister of the independent Democratic Republic of the Congo.

Upon his return to Belgium, Jacques became the Vice-President of the Centre de recherche et d'information socio-politiques (CRISP). He was an accomplished writer on political history and policy and took a keen interest in the development of policy. During his long career, spanning six decades he worked with some of the best known names in Belgian politics. In the 1980s he was Deputy Chief of Staff to André Bertouille and Chief of Staff to Jean Gol, and François-Xavier de Donnea. From 1988 to 1994 Jacques Brassinne held the job of Director General at the Ministry of the Walloon Region. From 1999 until 2003 he was Head of Mission at the Office of Interior Minister Antoine Duquesne and from 2003 to 2004, he was Head of Mission at the Office of Cooperation and Development Minister Marc Verwilghen.

In 1988, Jacques received the title of Knight (Chevalier / Ridder) from King Baudouin, for his significant contribution to the Foreign service.

Jacques also took an interest in the Arts. As well as being President of the Board of Directors of the National Orchestra of Belgium, he was also on the Board of the Theatre de Poche in Brussels.

During the latter part of his career, he became President of the Jules Destree Institute, a think tank that focuses on Public Policy for the Walloon Region.

When Jacques joined the IPF Board of Directors in 2003 as an advisor on protocol, he was full of enthusiasm, and saw the potential of this new organisation. He counselled the Foundation in gaining the support of the then Minister of Foreign Affairs, Louis Michel in bringing Belgium back to Antarctica through the construction of the world's first zero emissions polar research station, the Princess Elisabeth Antarctica.

Not to be intimidated by new challenges, during the 2008-2009 austral summer research season, Jacques travelled to Antarctica to work as base camp site support, and fully demonstrated his capacity for hard physical work. He participated in the Inauguration of the Princess Elisabeth Antarctica, attended by Ministers Sabine Laruelle and Pieter De Crem, and the project donors on February 15th, 2009.

Jacques also sat on the Conseil Stratégique of the Polar Secretariat, which came into function from 2010, as a Public Private Partnership between the IPF and the Belgian State. He remained a staunch defender of the International Polar Foundation throughout the difficulties encountered between 2015 and 2017.

In 2019, he became Président faisant fonction of the Foundation's Board of Directors, while Alain Hubert was in Antarctica. Later the same year, at the age of 90, he retired from his duties at the Foundation.

The International Polar Foundation has a debt of gratitude towards Jacques Brassinne de la Buisnière for his keen intellect, his wide experience, and his boundless energy, all of which he gave freely in support of the Foundation from its earliest years.







# STRUCTURE & GOVERNANCE 2022

## INTERNATIONAL POLAR FOUNDATION

### HONORARY PRESIDENT:

- HM King Philippe of Belgium

### FOUNDERS:

- Alain Hubert, Civil Engineer, Polar Explorer, Mountain Guide
- André Berger, Climatologist, Emeritus Professor at UCL (Belgium), Honorary President of the European Geosciences Union
- Hugo Declerck, Glaciologist, Emeritus Professor at VUB (Belgium) +

### HONORARY MEMBERS:

- Roger Barry, National Snow and Ice Data Centre (NSIDC), USA +
- Paul Crutzen, Max Planck Institute, Mainz, Germany +
- Ivan Frolov, Arctic and Antarctic Research Institute (AARI), Russia +
- Claude Lorius, Laboratoire de Glaciologie et Géophysique de l'Environnement (LGGE), France +
- Lawrence Mysak, McGill University, Canada
- Olav Orheim, Norwegian Research Council, Norway
- Dahe Qin, China Meteorological Administration (CMA), China
- Chris G. Rapley, University College London (UCL), UK
- Kazuyuki Shiraishi, NIPR
- Susan Solomon, Massachusetts Institute of Technology (MIT), USA
- Konrad Steffen, WSL, Switzerland +
- Svein Tveitdal, GRID Arendal, UNEP, Norway
- Okitsugu Watanabe, National Institute of Polar Research (NIPR), Japan

### EXECUTIVE COMMITTEE:

- Alain Hubert, President, International Polar Foundation
- Nighat Amin, Head of Environmental and International Affairs at the IPF
- Nicolas Van Hoecke, Managing Director

### FINANCIAL:

- Arnaud de Viron, IPF Finance and Accounting
- Alain Thierry Barrera, IPF Finance and Accounting

### BOARD OF DIRECTORS:

- Alain Hubert, Founder President, Chairman of the Board (mandate: 20/12/2018 - 20/12/ 2023)  
Member of the Belgian Polar Secretariat
- André Berger, Founder (mandate: 20/12/2018 - 31/12/2022)
- Nighat Amin, Director (mandate: 27/09/2019 - 27/09/2024)
- Piet Steel, Non Executive Director (mandate: 20/12/2018 - 20/12/2023)  
Member the Belgian Polar Secretariat
- Marc Speeckaert, Non Executive Director, Member of the Belgian Polar Secretariat  
(mandate : 20/12/2018 - 20/12/2023)
- Alain Dewaele, Non Executive Director (mandate: 20/12/2018 - 20/12/2023)
- Olivier Périer, Non Executive Director (mandate: 27/09/2019 - 27/09/2024)
- Eric Goens, Non Executive Director, Chairman of the Board of BELARE  
(mandate: 27/09/2019 - 27/09/2024)
- Jacques de Mevius, Non Executive Director (mandate: September 2019 - September 2024)
- Marie-Anne Coninx, Non-Executive Director, Former EU Arctic Ambassador, Senior Fellow  
of the Egmont Institute ( 27/04/2019-27/04/2027 )

## BELARE

### EXECUTIVE COMMITTEE:

- Alain Hubert, President, International Polar Foundation
- Nighat Amin, Head of Environmental and International Affairs, International Polar  
Foundation
- Nicolas Van Hoecke, Managing Director

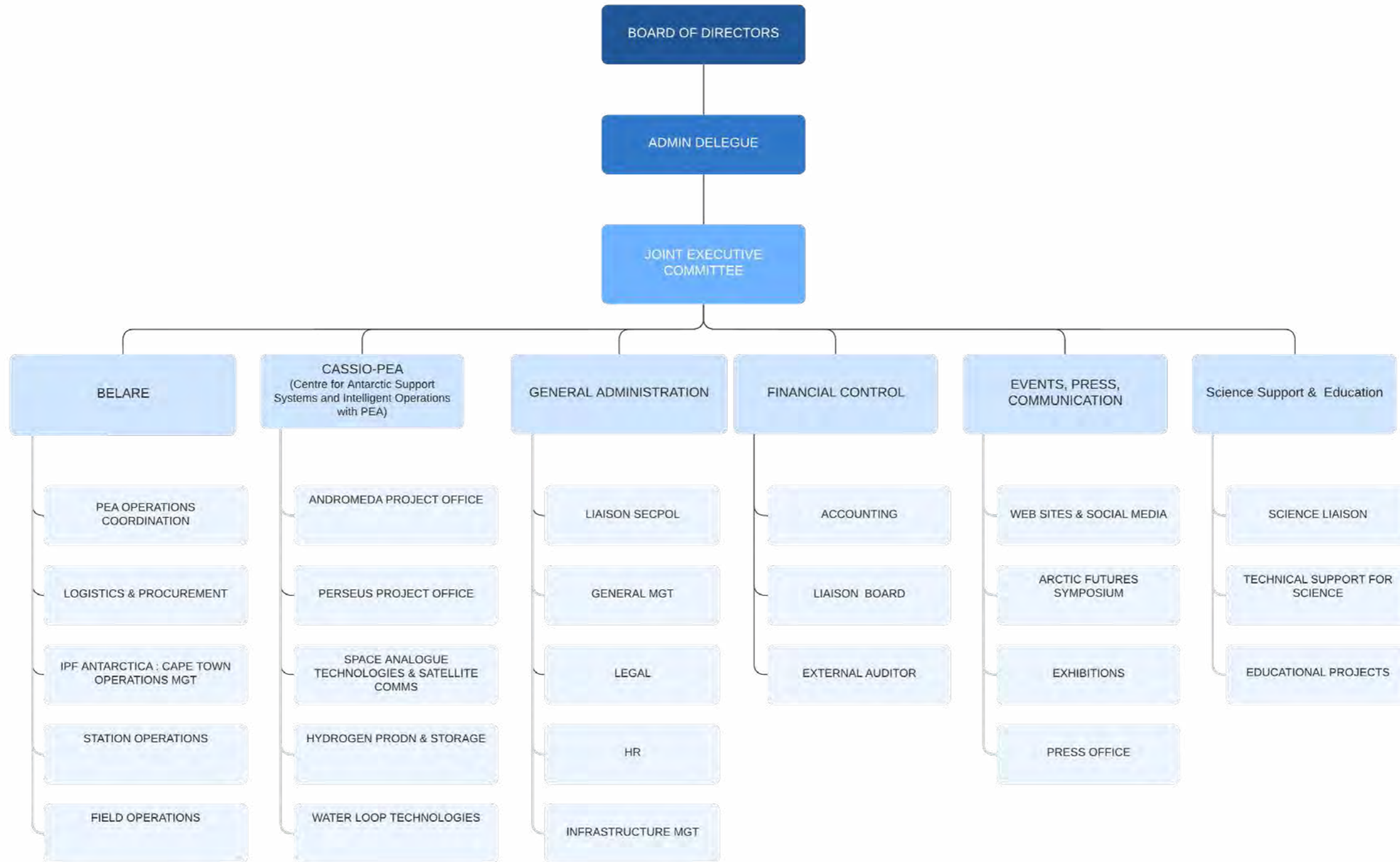
### FINANCIAL:

- Arnaud de Viron: IPF Finance and Accounting
- Alain Thierry Barrera, Liaison with the Financial Control of the Polar Secretariat

### BOARD OF DIRECTORS:

- Eric Goens, Chairman of the Board of BELARE (mandate: 27/09/2019 - 27/09/2024)
- Nighat Amin, Director (mandate: 20/12/2018 - 20/12/ 2023)
- Alain De Waele, Non Executive Director (mandate: 20/12/2018 - 20/12/2023)

IPF ORGANIGRAMME 2022



## FINANCIAL REPORTING

## FINANCIAL STATEMENT

### ACCOUNTS

OPERATING YEAR	2019	2020	2021	2022
REVENUE & EXPENDITURE	EUROS	EUROS	EUROS	EUROS
Revenue	3.736.000	3.718.000	4.022.000	3.619.000
Belgian Polar Secretariat funding			3.068.000	3.247.000
Science Support			211.000	39.000
Technical Project support			325.000	0
Donation & bequests			231.000	115.000
Other			187.000	218.000
Expenditure	4.226.000	3.444.000	3.744.000	3.650.000
Expenditure related to Antarctic Operations			3.323.000	2.934.000
Expenditure related to other Projects			421.000	716.000
Profit/(Loss) for the Period	-490.000	274.000	278.000	-31.000
<b>BALANCE SHEET</b>				
Non-Current Assets	0	4.000	16.000	285.000
Current Assets	1.909.000	1.210.000	2.091.000	1.144.000
<b>Total Assets *</b>	<b>1.909.000</b>	<b>1.214.000</b>	<b>2.107.000</b>	<b>1.429.000</b>
Reserves	692.000	966.000	1.242.000	1.208.000
Accruals	0	0	0	
Accounts Payable and deferred income	1.217.000	248.000	865.000	221.000
<b>Total Liabilities</b>	<b>1.909.000</b>	<b>1.214.000</b>	<b>2.107.000</b>	<b>1.429.000</b>

\* In line of the rules for valuation, all the tangible fixed assets (equipment and infrastructure) belonging to the Foundation and linked to the Princess Elisabeth Antarctica activities are transferred from BELARE to IPF at fully depreciated values. The real use value of all tangible fixed assets is EUR4.500.000.

The total assets for 2022 amount to €1,430,000 compared to €2,107,000 during the previous financial year. This difference can be attributed to a difference in current assets, related to BELARE operational costs. It has to be noted that the International Polar Foundation has pre-financed one Prinoth tractor (€257,000) destined for the BELARE 2023-24 season. As a consequence, non-current assets jumped from €16,000 last financial year, to €285,000 in 2022.

Due to this year's financial deficit of €33,000, reserves amount to a total of €1,208,000 in comparison to €1,242,000 in 2021. The financial figures are in compliance with the long-term financial strategy of the foundation.

### IPF MANAGEMENT REPORT SUMMARY ON ACTIVITIES IN 2021

In January 2022, the International Polar Foundation celebrated its 20th anniversary. In the last twenty years, the Foundation has managed to survive challenging circumstances to deliver projects which serve to inspire the next generation with a positive message of intelligent action in the face of uncertainty.

The Princess Elisabeth Antarctica Station, has succeeded in demonstrating the way forward towards zero emissions in building technologies, and reduction of environmental impacts with regard to water use.

In the coming decades, the Station will remain as a platform for research and testing of new concepts for energy and water management as well as improved safety in Antarctic operations through new technologies, such as terrestrial radio links.

The scientific research being carried out at Princess Elisabeth has become a showcase for Antarctic monitoring and research into environmental factors intricately linked to climate drivers. That PEA continues to attract a range of scientific disciplines is testament to the fact that the Station site was well chosen, (covering both ocean and plateau) but also that the Zero Emissions label has been an important factor in attracting the young generation of researchers who wish to work in an environment where the impact of burning fossil fuels is much reduced.

The International Polar Foundation, operator of the Princess Elisabeth Antarctica station, has successfully completed its 19th season of operations.

After two challenging seasons due to the COVID-19 pandemic, it is global geopolitical developments that have influenced the preparation and execution of the

2022-2023 season. Efficient preparation, the know-how of the IPF and BELARE teams and a close collaboration with the Polar Secretariat allowed for the season to proceed with minimum disruption.

To ensure the safety of all, COVID-19 precautions were maintained, including PCR testing before flights from Cape Town and at the station before return flights, and adherence to DROMLAN's hygiene protocol recommendations.

The season was shortened by 23 days due to supply chain issues and increased costs resulting from the war in Ukraine. Over the 84-day operation period, PEA hosted 55 visitors and participants, with some staying for brief periods. The IPF's support to scientific teams in Antarctica received a 91.6% approval rate.

Various projects were undertaken to enhance the station, its facilities, and operations. These included installing additional PV panels, receiving a new Water Treatment System for integration next season, fully operating and developing the Perseus airfield, and expanding the network of automatic weather stations (AWS).

Visiting dignitaries from South Africa and France amongst others expressed admiration for the true zero-emission approach implemented at PEA.

Prior to the 2022-2023 season, IPF capitalized on the opportunity to operate and develop the Perseus airfield, ensuring independent access to Antarctica and PEA for its teams and partner organizations and countries, including Japan and India. The Perseus airfield will also operate based on PEA's zero-emission philosophy.

In the Brussels and Cape Town offices, the Foundation has focused on further improving operations through enhanced back-office planning and in-house management of activities such as flight planning and support in Cape Town.

A strategy meeting in South Africa and follow-up discussions have progressed the Andromeda Antarctic University study project, with plans to hire engineers in a separate entity in 2023.

From a governance perspective, initiatives to diversify and expand the Board of Directors have commenced, along with initial discussions to revise the Foundation's statutes. Efforts to increase visibility and reputation continued through regular meetings with high-level stakeholders, conference participation, and industrial collaborations.

Educational projects have expanded both in Belgium and abroad, generating interest from schools and academic institutions, resulting in increased requests for lectures and conferences. IPF remains committed to promoting the importance of scientific research in

understanding climate change dynamics and potential solutions.

In November 2022, IPF organized the 13th edition of the "Arctic Futures Symposium" in Brussels, which saw higher attendance than in previous years and welcomed Ministers and EU Commission representatives. IPF awarded the inaugural annual Laurence Tran Arctic Futures Award to Containing Green (Sweden).

## IMPORTANT EVENTS SINCE THE END OF THE FINANCIAL YEAR

IPF continues to evaluate potential risk to mitigate as far as possible the danger of the current and future geopolitical instabilities.

After the closure of account for the 2022/2023 Antarctic season, the Polar Secretariat has approved the budget for the 2023/2024 season in accordance with the Executive order of 2009 defining the privileged partnership between the Belgian State and the IPF.

## INFORMATION ON RESEARCH AND DEVELOPMENT COSTS

Expenses were incurred for the development of a new water treatment system, which was delivered to the Station late due to sea ice conditions.

The installation will be completed during the season 2023/2024. The planned budget was approximately €380K (excluding transport).

Costs for the study of the green hydrogen production project have not yet been engaged, but are offset by the donation of two hydrogen generators, in 2021.

Research and development of the Point-to-Point Relay Station for the repatriation of data from the PEACE AWS transect amounted to EUR25,000. This proof-of-concept study will allow the PEACE AWS Project to reduce costs through the reduction of costs from satellite repatriation via other satellites than the SES-5. Training was provided for the management of data repatriation.

Research also began into the energy fit out of the Perseus Hangar which will be running entirely on renewables energies. The costs will be engaged in the 2023-24 season.

*PEA team members carrying up equipment for the relay station on Van  
Autenboer Peak*



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