

# INSTITUTE OF POLAR SCIENCES

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## UNDER THE SPOTLIGHT

### The Italian Institute of Polar Sciences at the geographic North Pole with the ELENO project

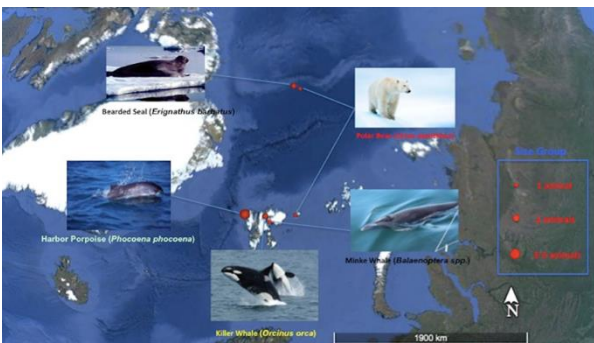
#### *The ELENO team*

The Italian Institute of Polar Sciences, 4 years after its foundation, reaches ever higher heights. In fact, an oceanographic campaign in the Arctic Ocean and up to the North Pole ended a few days ago, as part of the [ELENO](#) project (Habitat template, microbial signatures and iconic life in a changing Arctic Ocean), financed by the [PONANT-ARICE \(Arctic Research Icebreaker Consortium\) H2020](#). The objective of the ELENO project was to conduct sightings of iconic mammals as well as atmospheric and thalassographic studies in the Arctic Ocean. The icebreaker "Le Commandant Charcot", which left Longyearbyen on 26 August, arrived at the geographic North Pole (90°N) on 30 August, allowing the researchers on board to carry out scientific activities for 24 hours, including the sampling of an ice core for studies on the biogeochemistry of sea ice and its biodiversity.



Sampling of an ice core

The vessel then completed its journey with the arrival in Reykjavik on 11 September. During the expedition, mammal sightings, bioaerosol



Mammals spotted during the expedition

sampling and hydrological surveys were carried out daily. The latter involved physical, biogeochemical, ecological and pollution measurements (e.g. presence of micro- and nanoplastics) of the now fragile Arctic ecosystem. The ELEN0 project, as in Greek mythology, is the twin of the [CASSANDRA](#) project, which was financed by the Arctic Research Program and is inserted in the context of the international “Synoptic Arctic Survey” program which aims to determine the state of the Arctic Ocean in the

early years of the United Nations decade of Ocean Science for Sustainable Development.



Sampling of bioaerosol



Hydrological surveys



Pre-treatment of samples

The expedition was attended by: [Carlo Barbante](#), Director of CNR-ISP; [Maurizio Azzaro](#), project coordinator and manager of the CNR-ISP headquarters in Messina; [Francesco Filiciotto](#), CNR-ISP researcher; [Alessandro Ciro Rappazzo](#), CNR-ISP technician.



The ELENO team



Boarding

The emotion felt upon arrival at the geographic North Pole and being distracted during sampling by the curiosity of a polar bear approaching the ship while wandering on the sea ice is indescribable! The ELENO project is a unique example of Italian scientific activities at the geographical North Pole. In fact, the last Italian scientific activity at that latitude dates back to 95 years ago, with the unfortunate mission of the Airship Italia commanded by Gen. Umberto Nobile (1928). On the way back, the ship remained moored for a few hours in Ny-Ålesund, from where General Nobile departed, and most of the samples (95%) were taken by the logistics of the CNR Dirigibile Italia Station into the care of CNR-ISP, like passing of the baton between the past and present. The ELENO cruise was conducted 100 years after the historic oceanographic campaign in the Red Sea (1923-24), with the Royal Ship Admiral Magnaghi, of the illustrious scientist Luigi Sanzo, founder in 1916 of the headquarters that hosts the Messina secondary section of the CNR-ISP.

## REPORT

### CNR-ISP at the IV Ross Sea conference

#### *The participants to the conference*

The Ross Sea holds a great importance on a global scale and heavily studied since the beginning of polar exploration. The [IV Ross Sea Conference](#) was held at the University of Naples "Parthenope" and, in part, at the Zoological Station "Anton Dohrn", from July 3rd to 7th, 2023. This international symposium aimed at bringing together the scientific community interested in studying the Ross Sea, highlighting recent advances from field observations, laboratory experimentation,



Conference participants at the Zoological Station "Anton Dohrn"

remote sensing, and modelling. Seven dedicated sessions (i.e., Physical oceanography, Marine biology and ecology, Biogeochemistry, Ocean-ice-atmosphere interactions, Marine geology and

geophysics, Emerging chemicals and pollutants, Climate variability and teleconnections) dealt with climate variability and change, as well as mechanisms and interactions that are involved in key regulatory processes at spatial-temporal scales in the Ross Sea. The participation of CNR-ISP was consistent and involved researchers, Ph.D. students and associates.



Conference participants at the University of Naples "Parthenope"

Their contributions were to the sessions Marine Biology and Ecology (four oral presentations), Biogeochemistry (four oral presentations), Emerging Pollutants (2 oral presentations and two posters), Ocean-ice-atmosphere Interactions (two oral presentations and one poster), and Marine Geology and Geophysics (two posters). There were also various moments of sharing, both scientific and convivial, during the coffee breaks and the social dinner, held at Villa Doria d'Angri in the splendid setting of the Gulf of Naples.

## NEWS FROM DIRIGIBILE ITALIA

### The Alpine Rescue Service of the “Guardia di Finanza” at D.I.

*Lieutenant Colonel Alessandro Alberioli and Marshall Nicola Zarbo*

A few days ago two members of [the Alpine Rescue Service of the “Guardia di Finanza”](#) reached the Arctic Station “Dirigibile Italia” of the National Research Council on the island of Spitsbergen, in the Svalbard archipelago, Norway. Our presence



From right to left: Lieutenant Colonel Alessandro Alberioli, Tessa Vignezio and Marshall Nicola Zarbo in front of the base Dirigibile Italia

within this scientific community, which is part of the broader collaborative relationship with the CNR, contributes to further implementing the safety framework in favor of scientists who work daily in extreme conditions. This first visit was exploratory: from 2024 we will be present in the field during the high research season, between March and August.

The Svalbard Islands, located in the Arctic Ocean, offer an extraordinary environment for research, but the severe weather conditions and the particular orography can represent a limit for scientists and technical personnel.



Sampling activities

Living in these places allows us not only to make a journey into a unique and magical land but also to make a journey within ourselves. Marcel Proust wrote "The true voyage of discovery does not consist in seeking new lands, but in having new eyes", here... our voyage of discovery of new lands has begun.

They are new lands not only because they are extreme, unique, timeless but above all because they are undergoing profound change, different from how they have been, from how they will be, to be rediscovered continuously with new eyes. Our new eyes are called technology, science, research, everything that researchers at the Institute of Polar Sciences are making us "see".



Sampling activities

In a land where the meridians are almost touching each other and where the concepts of east and west lose their meaning, because after all in this place everything is only to the south, you perceive the possibility of making a "journey" all together towards a more "eco-sustainable" world, because this is the only way to continue the journey in this fantastic world ... Here there is no flag, prevarication, exploitation, envy and competition, we all work in synergy to continue the journey. The [Fiamme Gialle d'Italia](#) are honored to be part of this group of men and women who work for the good of the planet and to preserve it for future generations.

## Back to NyA

[Tessa Viglezio](#)



My experience in the Arctic began five years ago, in 2018. After setting foot in Ny-Ålesund, in the midst of fog and bad weather, I immediately understood, paradoxically, that there I would find a place where I could feel well, welcome and be at home. During my short stay I met a researcher, a professor at the University of Groningen in the Netherlands, who told me about how global warming was affecting food chains in Svalbard. Fascinated by these words, as a biologist, I wanted to know more. The following year I found myself as one of his students, moved to Groningen and with the certainty of being able to set foot in Ny-Ålesund again during field work for my Master's thesis. In the summer of 2020, in the middle of the pandemic, I returned to a sunny and warm village, together with only 60 other people. I really felt at home, I felt I belonged in this magical and welcoming place. My vision of priorities, needs and wants changed radically compared to what I was experiencing "in Europe" and once I returned, I no longer felt myself among so many people with so many useless needs. From there I always missed Ny-Ålesund and I built my future in view of a possible return to my home in the Far North. Here I am, in 2023, in Ny-Ålesund this time as station manager of the Arctic Station Dirigibile Italia, doing research on different topics, assisting many groups of researchers who teach me new facts every day and managing the logistical and social relations for the station. I'm happy, I'm home!

## RESEARCH HIGHLIGHTS

### Pristine Arctic? “SIGNALS” from the ice

*[Luisa Patrolecco](#) and [Andrea Spolaor](#)*

The Arctic has traditionally been considered free of local sources of contamination due to its distance from major anthropized areas.

However, increasingly more sensitive analytical technologies, and increased scientific research and the implementation of some screening programs, have demonstrated, and continue to detect the presence of "old" and "new" organic pollutants, which, essentially, should not be present in remote areas. In fact, these contaminants can be transported by atmospheric circulation from lower latitudes and deposited on the ground through dry deposition events, rainfall, and snowfall. Currently, local sources of pollution, such as shipping, natural gas combustion and local human settlements, cannot be overlooked either. Snowpack, and later glaciers, can act as "cold condensers" of contamination, accumulating organic and inorganic contaminants. In this context, glaciers can store several years of snow accumulation, and the collected ice cores are excellent archives of natural and anthropic emissions. From the ice core archive, we can extract valuable information on the past atmospheric characteristics of our planet, on climatic evolution and on the transport history of air pollutants.

With the aim of investigating the presence and spatial-temporal distribution of regulated and emerging organic micropollutants in the Arctic cryosphere, two campaigns were carried out within the SIGNALS project "Searching for anthropogenic organic micropollutants in Polar snow and ice" (April 2022 and 2023) for sampling the snowpack (snow-pit) and surface ice cores (about 1 m length) in the main glaciers surrounding the Kongsfjorden in the Spitsbergen peninsula, Svalbard Islands: the Brøggerbreen, the Kongsvegen and the Midtre Lovénbreen.

In these glaciers, the snow melts completely every year, exposing the underlying ice (which in turn can undergo partial melting and loss of mass) with the potential danger of reintroducing into the Arctic ecosystem contaminants, if any, trapped in the previous decades. This can alter the fate and distribution of contamination both seasonally and over the long-term, as well as re-introduce currently banned legacy contaminants back into the environment.



Snowpit sampling

Further campaigns are planned in the next three years, the results of which will integrate data obtained from other studies carried out in the Svalbard Islands, aimed at investigating the dynamics of diffusion of contaminants in polar areas (PHARMASvalbard, SedPOPs, ICEtoFLUX, PHARMACARE and PENDING). The integration of the data obtained will allow us to improve our understanding of the impact of human activities on the fragile Arctic ecosystem, in relation to the main sources of emissions and the possible processes of remobilisation of contaminants that is related to ongoing climate change. There is still a lot to understand, the “Signals” from the environment need to be listened to!

## The subglacial lakes: alien worlds on Earth

*[Clara Turetta](#) and [Elena Barbaro](#)*

Subglacial lakes are extreme environments that have so far remained untouched by humans. They are fascinating systems that seem little less than alien, so are veritable 'extraterrestrial laboratories' in which we can study the possibility of life outside our planet. The Antarctic subglacial lakes, are part of a complex network of basins and watercourses that have filling/emptying cycles that change the depth and volume of the lakes, causing periodic exchanges of large masses of water within this hydrogeological system to as far away as the Ross Sea. Furthermore, unlike other non-Antarctic subglacial systems, during interglacial periods these bodies of water may be periodically affected by intrusions of marine waters, which may influence the biogeochemistry of the lake itself. The interest in these extreme environments, in addition to their importance as 'extraterrestrial laboratories', is mainly due to three reasons. They represent an important component of the glacial hydrological system that can influence the dynamics of the overlying polar ice cap and have a significant impact on the productivity, geochemical composition and circulation of the oceans; they can host active ecosystems, populated by microorganisms that have adapted to live in one of the most inhospitable environments on our planet; the accumulated lake sediments are potentially valuable paleo-climatological archives that preserve the history of the oldest cryospheric system currently in existence.

One of these subglacial lakes, Lake Whillans (SLW), was reached by drilling 800 meters into the Antarctic ice sheet.

The drilling, carried out as part of the WISSARD project, allowed us to take samples of lake water,

sediment, and interstitial water. On these samples, as reported in [a recently published article](#), we determined the concentrations of trace elements (TE), rare earth elements (REE), amino acids (AA) and phenolic compounds (PC).

The properties and distribution of these elements and compounds showed that the concentrations of REE and some redox-sensitive TEs reflect changes in the redox conditions of the sediment and the effective occurrence of marine incursions at times when the shoreline was closer to the lake; that the concentrations of free amino acids are low compared to other freshwater and marine sediments, indicating a reduced cycle of nitrogen-rich compounds; that PCs are present in the sediments, suggesting the presence of ancient terrestrial plant matter, thus indicating a time when the climate was different enough to allow the development of terrestrial vegetation, while their concentration profiles may also be related to the redox conditions of the sediments.



Sediments at the bottom of Lake Whillans. Credits: Alberto Behar, JPL/ASU/NSF/NASA

Overall, our results lead us to conclude that SLW is a geochemically complex environment in which the interstitial water is influenced by both meltwater from the overlying ice sheet and inputs from past marine incursions, confirming the link between the lake, the subglacial hydrographic network and, ultimately, the Ross Sea.



## Polar Early Career Scientists

[Giuditta Celli](#), PhD student in Polar Sciences



My PhD project is focused on the Antarctic continent, with a particular interest in the East Antarctic Plateau. In the Australian summer of 2019 - 2020 a European Traverse took place in this specific area, as part of the East Antarctic International Ice Sheet Traverse (EAIIST) Project, which travelled for about 700 km from the French-Italian station Concordia, located at Dome C, to the so-called Megadune Site. The samples of snow and the ice cores that were taken during this traverse are the object of this PhD research project. Snow samples from the surface of the snowpack and in the first 1-meter of depth, as well as ice cores of 15 meters, have been analysed to measure the concentration of specific analytes like sodium, bromine and photosensitive elements as mercury and iodine. The aim is to understand if and how the geochemical cycle of these elements between the snowpack and the atmosphere, is influenced by the increased amount of solar radiation that reaches the snowpack surface due to the formation of the ozone hole. The traverse route is perfectly located in the area where the ozone layer thickness is reduced and considering the remoteness of the sampling site, this is a great location for this kind of study.

The project was by developed starting from the knowledge that sodium is used as a tracer element for air masses coming from the ocean, while bromine is linked with the sea ice extension and

the photochemical elements have a snowpack-atmosphere sunlight cycle dependency.

These analyses will be implemented with laboratory tests on sunlight penetration into the snowpack, at the University of Manitoba. In a cold room under a controlled environment, real snow from a clean area is spiked with a known amount of the photochemical element mercury, will be kept under observation to define how the amount of mercury in the snow changes over time. This will be followed by chemical speciation analysis to define which compound is present in the system. The results of this project can help the scientific community improve its knowledge on how climate change, and the ozone hole formation specifically, is able to modify the natural balance of some elements. Considering that mercury is a toxic element with natural sources, that is also anthropogenic produced, it is important to understand its fluxes the environment and the exposure of living beings to it.



Surface snow sampling

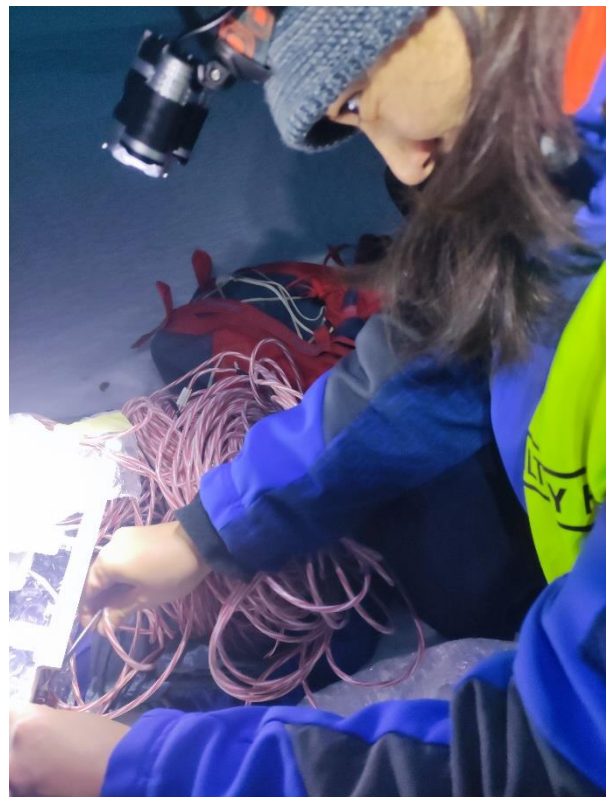
[Claudia Franqipani](#). PhD student in Science and Technology for Sustainable Development



Ny-Ålesund, Svalbard Islands, at the research station Dirigibile Italia CNR-ISP. Credit: Simonetta Montaguti

My name is Claudia, and I am a PhD candidate from the University of Chieti - Pescara, working at the Italian Institute of Polar Sciences offices in Bologna. My project focuses on using broadband solar (SW) and terrestrial (LW) radiation measurements, through algorithms, to infer information on cloud cover and compute cloud radiative forcings for different Antarctic sites. Currently, the data I am studying are from four different stations: Marambio and Professor Julio Escudero located in the Antarctic Peninsula, Jang Bogo on the Ross Sea and Concordia in the Eastern Antarctic Plateau. The algorithms we are studying are two: one based on SW radiation ([Long et al. 2006](#)) and one on LW radiation ([Dürr and Philipona 2004](#)). This choice not only guarantees a better adaptability to the measured components of a station but was made considering that SW based methods yield results for daylight, but LW based methods give night-time data, crucial in polar regions where “visual observations” (synoptic ones or images from sky camera) are limited by night-time visibility. The chosen algorithms were developed based on data from mid-latitude stations and so far, they have rarely been used and tested at polar ones. Indeed, the results suggest that the methods need adjustment for Antarctic sites, especially those characterised by persistent

cloudy conditions like Marambio and Escudero. Moreover, one should keep in mind that the choice and implementation of an algorithm becomes more complicated if it needs ancillary measurements, especially in a continent where observations are challenging, and data are scarce. Hence, part of my activity is dedicated to the promotion of an Antarctic Radiation Regional Network (ARRN). Its realisation would allow us to (i) collect all information on radiation measurements, to get a clear picture of the historical data sets available, (ii) have a list of ongoing activities and promote improved harmonisation and integration, (iii) define radiative regimes of different regions, and (iv) promote radiation measurements best practices in polar regions, especially those of the Baseline Surface Radiation Network (BSRN) and measurement of key parameters to address unanswered scientific questions.



Thermometer installation near the Climate Change Tower. project “WMO intercomparison of thermometers and solar shields”. Credits: Ombretta Dell’Acqua

[Giulia Genuzio](#), PhD student in Polar Sciences

## Pollutants and personal care products: the Great Acceleration in Antarctica

*Giulia Genuzio, Elena Argiriadis, Marco Vecchiato*

In the last decades the human impact on planet Earth has accelerated at an unprecedented pace marking the so-called “Great acceleration”. Industrial expansion has led to the release of large quantities of pollutants into the environment. As a result, several international bans and regulations have been established to reduce their production. However, these restrictions have resulted in a succession of alternative substances for the same industrial applications. Since some of these compounds are highly persistent and semi-volatile, they can be carried over the atmosphere and deposited in remote areas such as the polar regions.

The aim of this study is to reconstruct the anthropogenic fingerprint over the last 150 years through the analysis, for the first time at high resolution, of trace organic compounds in an Antarctic ice core.



A section of the ice core. Credits: Giulia Genuzio

The anthropogenic tracers considered in this study include several classes of well-established and emerging persistent organic pollutants (polychloronaphthalenes, polychlorinated biphenyls, flame retardants) and personal care products (UV filters, musks and fragrances). Some of these compounds have already been internationally banned for decades, while others are still widely used. Hence, different categories of substances present at different temporal

evolutions related to their production and consumption. This is reflected in a variation of the concentration levels found in remote environments.

The ice core, 50 meters deep, was retrieved at the site named GV7 (70°41'S, 158°51' E, 1950 m a.s.l.) during the 2013/14 Antarctic campaign. The site is highly significant because it has a high snow accumulation rate that ensures a high temporal resolution. This feature is rare in archives covering such recent periods and enables us to perform high resolution analyses of trace organic compounds, which otherwise would require large amounts of matrix. The low concentrations of the analyzed molecules require a stainless-steel clean room to minimize contamination, increase the analytical signal, and achieve high resolution data. So, the study focuses on tracing the transport and evolution of individual molecules over time in response to international bans and resulting changes in trade and consumption. Furthermore, the use of atmospheric models will provide a deeper understanding of the processes involved in long-range transport and the potential sources of the analyzed organic compounds.



Cut and processing of the ice core. Credits: Giulia Genuzio

Giulia Vitale. PhD student in Polar Sciences



Sampling of superficial seawater with the Niskin bottle in Kongsfjorden (Svalbard Archipelago). Credits: Sara Giansiracusa

Plastics and microplastics, given their spread, represent the human footprint at every latitude, including polar areas. In this context, my PhD project aims to study the distribution of small microplastics (<math><100\ \mu\text{m}</math>), plastic additives and other microlitter components in the Arctic. Specifically, we are quantifying and identifying these contaminants in marine waters, marine sediments and biota, such as small marine invertebrates (i.e. amphipods). Still few studies deal with small microplastics that are more easily transported and easily enter trophic networks; the same goes for plastic additives, which may be an indicator of the presence of microplastics and whose toxicity data are still very limited.

Thanks to the PLACEBO (Arctic Field Grant) and MICROTRACER (PRA) projects, in the summer of 2022 we sampled water, sediment, and small

marine invertebrates in the fjords of the Svalbard Islands around Ny-Ålesund. Laboratory activities took place partly at the Dirigibile Italia Base, and partly at CNR-ISP in Venice. In addition, sampling is ongoing onboard the cruise ship *Le Commandant Charcoat* (Project ELEN0, call ARICEPONANT), which will expand the study area to include routes from the Svalbard Islands to the geographic North Pole, the coasts of Iceland and Greenland. On board, seawater samples are being collected at different depths to obtain information not only on the surface distribution of smaller microplastics and microlitter but also on their vertical distribution. Thus, the pathways and transport of these emerging pollutants can be studied. Most of the laboratory activities are carried out in Venice, at CNR-ISP. In addition, for validation of a potential screening method, some samples will be analyzed at the Scripps Oceanography Institute in San Diego (CA, USA). By the end of these projects, the data obtained will help not only to assess the distribution of microplastics and microlitter in the Arctic Ocean but also potential accumulation points. It will be possible to identify bioindicators of microplastic and microlitter pollution at these latitudes.



Sampling of amphipods and coastal sediments in the Kongsfjorden (Svalbard Archipelago Fjords); in the picture Giulia Vitale (left) and Massimiliano Vardè (right). Credits: Lara Vimercati (University of Boulder, Colorado)

[Azzurra Spagnesi](#). Post-doc researcher, CNR-ISP, Venezia Mestre



In May 2023 I obtained my Doctoral degree in Science and Management of Climate Change at the University of Venice, with a thesis on a new Continuous Flow Analysis (CFA) system for ice cores analysis, applied to two reported case studies: the Grand Combin and Weißseespitze glaciers. Currently, I deal with the management of hardware-software systems for the implementation of the CFA technology at our Institute. In particular, the main objective of my project, funded by the FISR – ICE MEMORY international programme and coordinated by Dr. Jacopo Gabrieli, is to guarantee an efficient system of continuous analysis for insoluble dust particles, conductivity, water stable isotopes ( $\delta^{18}\text{O}$ ,  $\delta\text{D}$ ), along with the sampling of aliquots (discrete samples) for off-line analysis of trace elements and major ions in alpine and polar ice cores. The scalability of the system, in fact, guarantees a wide applicability and can be adapted to the needs of the laboratory, as well as to the instrumentation and available spaces. Notably, in 2021-2022 a novel set-up was developed for the semi-continuous analysis of specific markers of biomass burning (vanillic and syringic acid), achieving high resolution, and this system was subsequently implemented for the analysis of levoglucosan. At

the same time, continuous analyses of dust and conductivity were carried out, while sample aliquots were collected during the melting process and were analysed off-line to determine the content of trace metals and major ions, for paleoclimatic and paleoenvironmental reconstructions of the selected high-altitude sites. Preliminary tests are currently underway for coupling the melter system with the vaporizer and Cavity Ring-Down Spectrometry (CRDS, Picarro L2130-I) for the continuous analysis of  $\delta^{18}\text{O}$  and  $\delta\text{D}$ , together with tests for the trapping of the gases contained in the air bubbles embedded in ice cores, employing a special cryogenic trap created by the ArTTA working group of Heidelberg (Institute of Environmental Physics), in order to extract  $^{39}\text{Ar}$  for dating our alpine samples or binding their shallow layers (investigated range: 50-1000 years).




A) longitudinal view of an alpine ice core (Ph. Riccardo Selvatico); B) ice sticks (bags) cutting for CFA; C) general view of the melting system (CFA); D) coupling test phases

POSTCARDS FROM THE FIELD .....

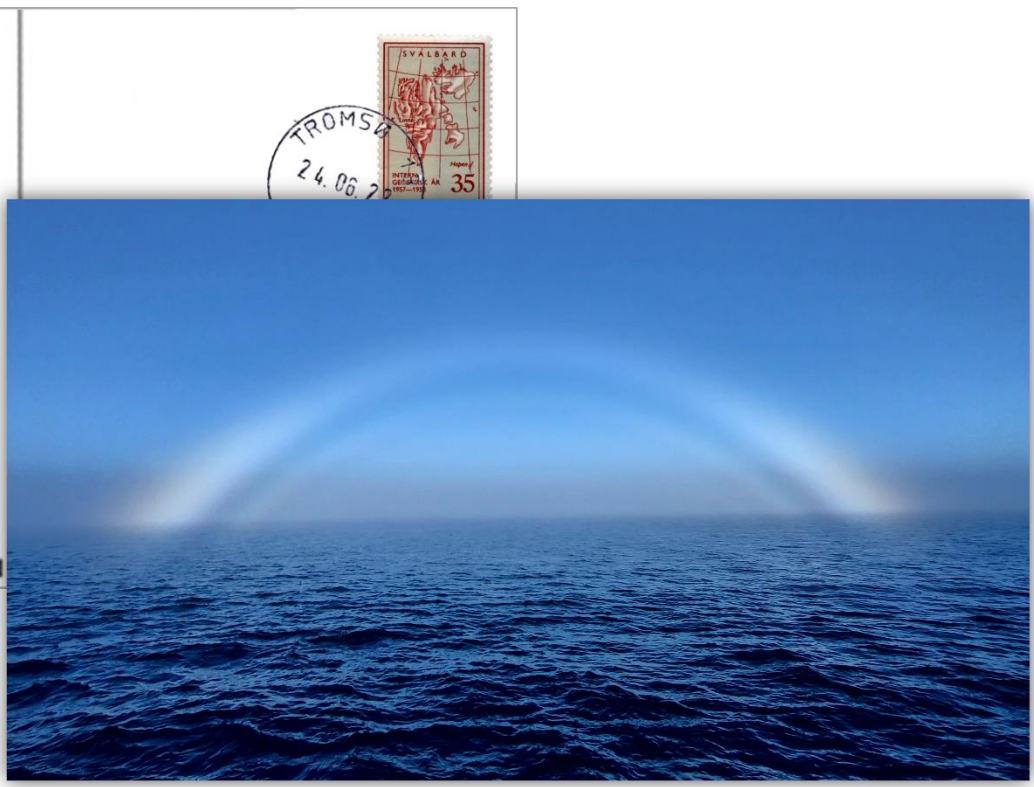
Nell'ambito del progetto SIGNALS "Searching for anthropogenic organic micropollutants in Polar snow and ice" (RIS 12166) si è conclusa ad aprile 2023 la seconda campagna di campionamento (la prima ad aprile dello scorso anno) di neve e carote di ghiaccio nei principali ghiacciai che circondano il Kongsfjorden nella penisola Spitsbergen, Isole Svalbard: il Brøggerbreen, il Kongsvegen e il Midtre Lovénbreen. Il progetto mira a migliorare le conoscenze sulla presenza e distribuzione spaziale/temporale nel sistema neve-ghiaccio di inquinanti organici persistenti normati ed emergenti, per meglio valutare l'evoluzione dell'impatto antropico e del cambiamento climatico, in relazione a fonti principali (ad es. deposizione atmosferica) e ai possibili processi di rimobilizzazione dei contaminanti a seguito dello scioglimento.

*Federico Scotto* *Luisa Patrolecco*  
*David Cappelletti* *Andrea Spolaor*




Once again this year in June, we set off for the Arctic with our friends from the OGS in Trieste on the CMRE's Alliance ship from LaSpezia for the maintenance of the S1 mooring to the SW of Svalbard. The instrument chain was recovered quickly, taking advantage of the perfect weather and sea conditions. Unfortunately, 2 current indicators flooded, and this brought an end to their long and glorious career. In spite of everything, they collected data until a few weeks before recovery. The data downloaded from the instruments and the samples recovered from the sediment traps are perfect. This postcard comes to you from Molloy Hole, which at 5,669m is the deepest point in the Fram Strait. This year there is still a lot of sea ice and a lot of fog. But every now and then a ray of sunshine allows these strange rainbows to form, rising from the fog above the ice.

*Leonardo Langone* *Patrizia Giordano*





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## UPCOMING EVENTS

- First Level University Master's Course in [Sustainable Development, Geopolitics of Resources and Arctic](#), 17 April - 15 December 2023. The Italian Society for International Organization – SIOI and Unitelma Sapienza, in agreement with the Italian Ministry of Foreign Affairs and International Cooperation, CNR, UiT – The Arctic University of Norway and Nord University of Bodø, organize the University Master's Degree in Sustainable Development, Geopolitics of resources and Arctic Studies.
- [3<sup>rd</sup> SIOS Marine Infrastructure Workshop](#) - 4 October 2023. The third workshop will present marine infrastructures and time series from the north to the south of Svalbard, and finish with an introduction to the Atlantic-Arctic Distributed Biological Observatory (A-DBO). Place: Online via Zoom ([register here](#)).
- [SSC2023 - Svalbard Science Conference](#), Oslo 31 October - 1 November 2023. The organizing committee for SSC2023 will be The Research Council of Norway, The Norwegian Polar Institute, Norwegian Institute for Air Research, The Norwegian Meteorological Institute and Svalbard Science Forum.
- [Polar Data Forum V](#) (PDF V) will be hosted by the British Antarctic Survey (BAS), October 30 - November 3, 2023 - Cambridge, UK and online. Registration deadline: October 1. The Polar Data Forum is a place where polar data holders get together and make more use of data. The Forum has two main components: the Conference, where the border between funding, policy and data is explored through presentations and posters; and Workshop Sessions & Hackathons, where the Polar Data Community opens the dialogue to make progress on their shared objectives.
- The [5<sup>o</sup> APECS Italy national conference](#) will take place on 8-9 November 2023 – Venice, Italy. This year, thanks to our collaboration with the Venice Institute of Sciences, Literature and Arts and the Institute of Polar Sciences (CNR ISP), the conference will be held at Palazzo Loredan in Venice as well as online. More information [here](#).
- [#ArcticPlastics2023](#), the 2nd international symposium on plastic pollution in the Arctic & Sub-Arctic regions, 22-23 November 2023 - Reykjavík, Iceland. The symposium will evaluate the present extent and nature of plastic pollution in the Arctic and Sub-Arctic regions and discuss its impact on ecosystems and communities.

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