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Application of Luxembourg for Associate Membership of SCAR

Report Author(s)

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Summary

This paper is an application for Associate Membership of SCAR by Luxembourg through the Fonds National de la Recherche (FNR), which is a member of the International Science.

The letter of application is provided, along with an annex on scientific work undertaken, current collaborations and planned participation by Luxembourg.

Recommendations

The Delegates consider the application of Luxembourg for Associate Membership of SCAR.

Budget Implications

The Associate Membership fee of \$7,000 would be an additional annual positive contribution to SCAR's budget.

Esch-sur-Alzette, February 24th, 2022

Dr Yeadong Kim
President of the Executive Committee
Scientific Committee on Antarctic Research

Dear Professor Kim,

As Secretary General of the Fonds National de la Recherche (FNR), I am pleased to submit Luxembourg's candidature to become an associate member of the Scientific Committee on Antarctic Research (SCAR). The FNR is a member of the International Science Council (ISC).

The Luxembourg government and the relevant scientific institutions in the country have set up a National Committee tasked with coordinating the interaction with SCAR. The present application is made on behalf of this National Committee.

I would like to underline that the institutions represented in the National Committee adhere to the best of its abilities to the requirements of the Environmental Protocol and its Annexes, and to the ATCM Resolutions and Measures that apply to the environmental matters in the region. Luxembourg's scientific community supports the SCAR mission of promoting and developing research in the Antarctic region, in accordance with the Antarctic Treaty and the Madrid Protocol on Environmental Protection to the Antarctic Treaty. Luxembourg intends to adhere to the SCAR code of conduct. This is a step towards a potential membership to the Antarctic Treaty and the Madrid Protocol on Environmental Protection.

While the research community in Luxembourg is rather small, a number of researchers based in Luxembourg have participated in Antarctic research in the past and there are a couple of projects ongoing. In addition, there are active links with Luxembourg polar researchers based abroad and a Luxembourg researcher is already member of a SCAR working group. The interest in Luxembourg for Antarctica, including research, has increased also thanks to numerous projects, programs, and dissemination activities initiated by LIST, uni.lu, and polar.lu, an association gathering Luxembourg researchers interested in Polar Regions. Attached you will find a summary of activities relevant to this candidature. A SCAR associate membership would increase the possibilities for researchers to actively participate and contribute to Antarctic research, leading to a potential candidature for membership of the Antarctic Treaty.

Thank you for considering the Luxembourg candidature at the next General Meeting in view of a participation at the SCAR Open Science Conference to be held in August 2022.



Marc Schiltz
Secretary General of the FNR

Luxembourg candidature for associate membership of SCAR

Introduction:

In order to prepare this candidature and a potential participation as an associate member of SCAR, the Grand Duchy of Luxembourg has created in early 2021 a national committee, the “*Comité national chargé de la coordination avec le comité de la recherche scientifique de l’Antarctique (SCAR)*”, thereby showing its dedication to the important work of SCAR.

This committee, chaired by the *Fonds National de la Recherche* (FNR), is composed of the relevant administrations and the major scientific bodies; the Ministry of Higher Education and Research, the Ministry of the Environment, Climate and Sustainable Development, as well as the Luxembourg Institute for Science and Technology (LIST), the University of Luxembourg (uni.lu), and polar.lu .

Luxembourg Polar Research

Besides popular activities and research, the government’s environmental policy has specifically strengthened its international engagements. On a national level, the government supports research and the scientific community.

1. Luxembourg Institute of Science and Technology (LIST):

The Luxembourg Institute of Science and Technology (LIST) develops competitive and market-oriented product/service prototypes for public and private stakeholders, and works across the entire innovation chain: fundamental and applied research, incubation, transfer of technologies. By transforming scientific knowledge into technologies, smart data and tools, LIST empowers citizens in their choices, public authorities in their decisions and businesses in their strategies. Its Environmental Research and Innovation (ERIN) department, with more than 200 life, environmental and IT scientists and engineers, brings together the necessary interdisciplinary knowledge and skills to tackle the major environmental challenges our society is facing today, including climate change mitigation, biodiversity loss, ecosystem resilience, and environmental pollution prevention and control.

In this framework, the ERIN department has particular interest in Polar Regions along the following two lines:

Biodiversity and ecology of phototrophic microorganisms: Although glacial ice sheets cover most of the Antarctic continent, ice-free areas comprising approximately 0.4% of the continental land mass. These regions can be considered as a polar desert characterized by extremely low annual precipitation and phototrophic microorganisms are the base for the ecosystem functioning. ERIN is particularly interested in the biodiversity (discovery of new species, dynamics of species composition due to climate change) and ecology of cyanobacteria and diatoms. ERIN diatomists described a number of new Antarctic species and recently a review on the extinction of austral diatoms in response to large-scale climate dynamics in Antarctica was co-authored by an ERIN diatomist.

Testbed for extreme environmental conditions: Due to its extreme environmental conditions, polar regions are interesting terrestrial habitats to be used as testbeds for testing new technologies for space resources valorisation and space life support systems. In this framework ERIN is particularly interested in using polar regions for exploring under extreme environmental conditions the water cycle (eg isotopic fractionation of water), the recycling of resources, and the functioning of closed ecosystems.

2. Geophysics Laboratory of the University of Luxembourg (GL-UL; uni.lu)

Two members of the Geophysics Laboratory of the University of Luxembourg (GL-UL) Prof. Olivier Francis and Dr. Sajad Tabibi are involved in collaborative research projects on key questions about earth crust deformation and climate change at Belgian Princess Elisabeth Station (PES). PES is located on a nunatak in East Antarctica 150 km from the ocean facing the African continent. A permanent GNSS station was installed at PES about 10 years ago by GL-UL. In addition, episodic absolute gravity observations were carried out in 2011, 2013 and 2015. The combination of the vertical displacements obtained from GNSS with absolute gravity measurements allows us to separate the viscoelastic deformation due to the Global Isostatic Adjustment from the present day elastic deformation due to the melting or accumulation of the ice mass. Our results show a clear accumulation on the Antarctic ice sheet within a radius of approximately 500 km of PES station. This season, the GNSS station at PES will be replaced by a new state-of-the art multi-GNSS receiver and the GNSS station at the former Japanese station Asuka (~ 60 km from PES) will be upgraded to provide continuous measurements all year around.

In the future, it is planned to install more GNSS stations to monitor the glacial flux (the motion of the glaciers toward the ocean) in this region of Antarctica. These observations will provide information on the long-term ice mass balance of the Antarctic Ice Sheet. Using GNSS-R, the ice sheet topography around the GNSS stations will be mapped and would be used for validation/calibration of satellite remote sensing techniques.

In the northern hemisphere, the GL-UL is a partner of the G-NET from the very beginning. G-NET is a network of 46 continuous GNSS stations in Greenland and is part of the POLENET (Polar Earth Observing Network). The GL-UL also acquired episodic absolute gravity observations at four locations in Greenland over the last two decades. The results on the effects of present-day and Pleistocene ice-mass changes in South East Greenland were published in Earth and Planetary Science Letters in 2017. Recently, GL-UL demonstrated that different GNSS signals of opportunity in Antarctica and Greenland can be used for tides and sea level studies.

3. Polar.lu

In the recent past interest in and research about the Polar Regions has increased in Luxembourg especially since the International Polar Year when numerous scientific and popular activities took place. Luxembourg's IPY Committee, the *Comité luxembourgeois pour l'année polaire* (COLUPO), and APECS Luxembourg were organized in 2007 and 2012 respectively. Science fairs, polar days and others have since then attracted young Luxembourgers to a field of study and research which before was limited to a few researchers.

Polar.lu started from a synergy between COLUPO and APECS Luxembourg, and assembles researchers and academics dedicated to study the Poles. This organization has been bringing together scientists and addressing the public in numerous awareness campaigns. Their education and outreach events and thematic conferences are very successful and have motivated young people to study the Polar Regions. Since 2017, the focus has been to develop Luxembourg polar research and enable researchers to participate in international networks, through a full membership in the European Polar Board (EPB), and cooperation with APECS, aiming at developing the capacity building for our current and future polar scientists.

One polar.lu researcher, Tania Gibéryen, has been a member of the SCAR AG on plastics in polar environments since 2018.

Contributions and gains of a Luxembourg membership to SCAR

A Luxembourg associate membership in SCAR will certainly lead to a strengthening of the involvement of Luxembourg's scientific community for the Antarctic protection. Not only will young researchers find an easier way to participate in international research, but they will also contribute with their work to the activities of SCAR.

Today Luxembourg has competent polar researchers, who need international research opportunities. Without an own research station in the Antarctic international cooperation is a prerequisite. International cooperation, in the past mainly with the Belgian, Bulgarian, Canadian and Polish researchers, supports polar research currently. In addition, partnerships with Luxembourg's space and satellite programs could be explored.

An associate membership in SCAR would help create new opportunities for Luxembourgish and Luxembourg-based polar scientists and facilitate synergies at the national and at the international level, create an important stimulus to Luxembourgish polar research and attract new young scientists into polar science and stimulate the grow of the national polar scientific community through participation in SCAR programs.