International Science & Infrastruc-ture for Synchronous Observation (Antarctica InSync)

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**Information Paper submitted by Germany, Australia, France, Italy,**

**Norway, UK, USA.**

***Summary***

This information paper brings to the attention of the Antarctic Treaty Consultative Meeting (ATCM-45) and the Committee for Environmental Protection (CEP-25) a proposal for a synchronous scientific observation mission, to allow for a circumpolar assessment of the connections between ice, ocean, climate, environment and life, including human pressures, and their solutions such as marine protection. The SCAR Southern Ocean Action Plan ([*https://www.scar.org/general-scar-news/so-decade-action-plan*](https://www.scar.org/general-scar-news/so-decade-action-plan)) has outlined the need for pan-Antarctic studies across a number of scientific disciplines. It builds on a Horizon Scan across the scientific communities including those of SOOS, GOOS, ACCE and others. This proposal for a coordinated synchronous mission will be realized in close collaboration with SCAR, which will initiate a UN Decade Collaborative Centre (DCC) for the Southern Ocean. We intend to seek the logistic contribution of all National Antarctic Programs via COMNAP, for a planning phase in 2024-2026, and realization in 2027-2030. This mission is thus planned as a contribution to SCAR and to the regional and thematic programs of the UN Decade for Ocean Science for Sustainable Development, which calls for innovative science solutions and a shared, global effort that builds on decades of achievement. ATCM and CEP are the key hubs to consult both policy- and research-driven needs for such an international mission. In the future, side-events offering dialogue about the planned mission shall be offered at ATCM, with a first lunch-seminar at the ATCM-45 Meeting in Helsinki on Friday, 2 June 2023.

***Background***

Antarctica and the Southern Ocean are among the least studied places on Earth, despite their importance for global climate, biodiversity and humanity. Global challenges associated with climate change, declines in biodiversity and increasing pollution require synchronous, concerted science efforts to assess the intricate links between atmosphere, ocean, ice and life, and to protect and sustainably manage this region.

Remoteness and extreme climate conditions remain a challenge to international research and especially coordinated synergistic observation in Antarctica and the surrounding Southern Ocean. Solving these challenges is beyond the skills and infrastructure of any single science programme or nation. It will require a targeted, collaborative and globally coordinated approach, consistent with the goals of SCAR. It is important to do this now, at the onset of Antarctica’s predicted sea-ice decline, to achieve a much-needed pan-Antarctic ecological baseline knowledge. The joint ambition is thus to deliver a coordinated mission in the Southern Ocean and Antarctica meeting the key challenges denominated by the UN Ocean Decade. ATCM and CEP could play central roles in supporting this mission, as it brings together the Consultative Parties to exchange information on scientific and policy knowledge and all matters of common interest pertaining to Antarctica.

***What we want to achieve***

The proposed Antarctica InSync research programme aims to unite national Antarctic programs to achieve collaborative and synergetic actions, dedicated to synchronous observation in the years 2027-2030, which are likely to conclude the first decade of consecutive sea-ice minima since the onset of satellite observation. Simultaneous research carried out by all disciplines around Antarctica with similar approaches, common methods and shared goals has not been carried out in this region at the level proposed here. Key knowledge gaps will be addressed, including circumpolar assessments of fluxes and dynamics, heat transport, ice behaviour, primary production, CO2 budgets, and the distribution of key species in Antarctica and the surrounding waters. Data will be shared by FAIR[[2]](#footnote-2) principles, and next-generation scientific capacity will be developed by involving Early Career scientists and policy makers of all ATCM / CEP Parties and Observers.

With this ambition, the programme will contribute to a number of policy processes and frameworks with the Antarctic Treaty system (e.g., ATCM, CEP, CCAMLR, SCAR). It builds directly on a vast community effort in defining challenges and objectives for future science. The proposed Antarctica InSync research programme aims to enhance collaboration, knowledge, data sharing (between science and other societal agents) and outreach to raise awareness of the role of Antarctica and the Southern Ocean for our lives and humanity’s future. Its goal is to provide a framework for international collaboration to implement a number of actions addressing different UN Decade challenges for sustainable ocean science.

***A pan-Antarctic mission bringing together national programs and other partners***

Many leaders of Antarctic scientific research institutions and agencies, including AAD (Australia), AWI (Germany), BAS (UK), IPEV (France), ISP (Italy), NPI (Norway) and NSF (USA), already support the idea of such a pan-Antarctic mission and are ready to engage. Many more have expressed their interest.

Similar positive and encouraging feedback was received from the Antarctic and Southern Ocean science community and their working groups, represented by SCAR, SCOR and other international science frameworks, including their respective programmes and bodies, such as SOOS. For the larger UN Decade framework to which this proposed mission program will contribute, SCAR will act as a Decade Collaborative Centre (DCC) for the Southern Ocean and Antarctica.

National Antarctic programs represented by COMNAP intend to engage from the beginning in the development of the Antarctica InSync research programme to ensure that the necessary infrastructure and logistical support can be made available in time and in a synergetic manner by national programs. Such collaborative approaches have been successfully tested in the International Polar Years and in specific programs such as the MOSAiC[[3]](#footnote-3) drift mission to Arctica. This proposed mission would also contribute to the ongoing planning of the next International Polar Year (2032-2033).

Input and contributions would also be welcome from other Antarctic and Southern Ocean stakeholders, including CCAMLR, the World Climate Research Programme (WCRP) and European Polar Board (EPB), but also from various NGOs, foundations and partners from industry.

***Notional timelines***

**2023 - Outreach and engagement phase**

Talks with decision makers and leaders of Antarctic research institutes and programmes in other ATCM member states will be held in the course of 2023, with a kick-off side event at the ATCM-45 in Helsinki on Friday, 2 June 2023. SCAR, SOOS and COMNAP and other important partners will be informed about the Antarctica InSync research program at their respective meetings in 2023, and working groups will be initiated to develop the scientific agendas. Other stakeholders, including NGOs and industry associations, will be informed and asked whether they would like to join.

**2024-2026 - Preparatory Phase**

The main tasks in the preparatory phase are aligning the scientific and infrastructure processes for synchronous multidisciplinary observation. Effort will go to establishing alliances, working groups with stakeholders, logistic teams and a framework of collaboration. An Antarctica InSync science plan will be established and approved by SCAR, SOOS and other key scientific communities to ensure that key challenges, questions and needs for research are appropriately addressed and able to decipher the drivers, impacts and feedback mechanisms of this key region, together with their global interactions on the oceans, climate, biodiversity, and humanity. Joint data collection and coordinated, synchronous experiments and composite observations will be developed. National programs and institutions operating polar infrastructure, including remote sensing, meteorology, etc. will be asked for input and to coordinate the logistical means to implement the science plan. In addition to central coordination of outreach and data sharing, these could support additional activities such as stipends for scientists from countries without national polar infrastructure, opportunities for artists and writers.

**2027-2029 - Implementation Phase**

Beginning of 2027 will see an intense planning phase of the joint field campaigns for land, sea and air. Field observations will include all components of the Antarctic/Southern Ocean region, and combine different strategies and technologies for observation, including process studies and remote-sensing initiatives, to be carried out from mid-2027 to mid-2029. Most activities will be carried out in the Antarctic summer season, but there should also be opportunities organized to collect winter data. It has to be seen whether certain questions and projects in the Antarctica InSync Science Plan will require additional field work in the subsequent Antarctic season.

**2029-2030 - Completion and Reporting Phase**

Analyses of the results of the joint field campaigns and synchronous data assemblies should start directly after their completion. In 2029/2030, workshops will be held to discuss and compile the knowledge gained from the Antarctica InSync programme with a view to prepare synthesis reports ready for submission as contributions to SCAR’s Decade Collaborative Centre (DCC). Technical reports and Policy briefs will be developed to inform COMNAP and ATCM / CEP. Further, the experience gained under the Antarctica InSync research programme will then also provide input to the planning of the 5th International Polar Year (IPY) 2032-33.

***The funding***

The Antarctica InSync research programme, especially the planned joint field campaigns and the use of polar infrastructure and synchronous data assemblies, will be supported primarily by voluntary contributions from National Antarctic Programs, in their sole discretion. Where appropriate, they may be enhanced by other stakeholders / foundations and further pro Antarctica InSync partners. Foundations can substantially enhance international coordinated programmes, as previously shown e.g. in the framework of the Census of Marine Life. The objective is to make best use of available resources.

Nevertheless, Antarctic Treaty Parties will be asked in the context of the Antarctica InSync research programme to enhance their Antarctic and Southern Ocean research programmes with the special aim to improve sustainable and year-round autonomous observation. Extra funding would also be invited to support and connect young scientists globally to build the next generation of inclusive Antarctic and Southern Ocean expertise. The aim is also to facilitate access to research infrastructure by scientists from resource-limited countries through coordinated calls, to achieve a new level of synergy and FAIR data and knowledge sharing.

***Side-event (Lunch seminar) at ATCM-45***

To inform about progress with this initiative and further partnerships to enable this mission, a lunch seminar will take place on Friday, 2 June 2023.

1. Working title of the Mission [↑](#footnote-ref-1)
2. Findable, Accessible, Interoperable, and Re-usable [↑](#footnote-ref-2)
3. MOSAiC - Multidisciplinary drifting Observatory for the Study of Arctic Climate, see *https://mosaic-expedition.org* [↑](#footnote-ref-3)