

ID5- TOWARDS A BETTER USE OF ARCTIC MARINE INFRASTRUCTURE: EU-POLARNET, EUROFLEETS2 AND ARICE

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Abstract –The Polar Regions may seem remote, but the observed rapid changes now affecting both the Arctic and Antarctic regions have resulted in significant consequences for the weather and climate in lower latitudes, including Europe. Environmental changes being observed, particularly in the Arctic, are a clear indication of the impending shifts that will increasingly affect European environment, society and industry. Changes in the Polar Regions present societal challenges, but also economic opportunities for Europe and the world. Science is a vital tool in understanding what is driving the rapid changes being observed at high latitudes. Research is also necessary to make our climate models and forecasting more realistic by identifying and reducing important sources of uncertainty that may impair reliable prediction. However the scale of many of the questions being posed is now recognised as being beyond the capabilities of individual nations and strong international cooperation is needed to overcome these challenges. There is often a need to obtain data from geographically widely separated areas of the Polar Regions and these need complementary observational schemes to be implemented for valid inter-comparisons. Similarly the costs of operating infrastructure in Polar Regions are becoming increasingly challenging and there is a need therefore to cooperate on infrastructure access and shared costs to optimise the support of larger research programmes.

The presentation will introduce three European projects: EU-PolarNet, EUROFLEETS2 and ARICE which actively work on improving infrastructure development and access in the Polar Regions in cooperation with international partners. The examples given are from the Arctic Ocean but similar models of transnational access and infrastructure sharing will apply for the Antarctic.

Keywords – Polar Research Infrastructures, Arctic, Antarctic,

1. INTRODUCTION

The melting of Arctic sea ice to record lows in recent years has prompted many nations, principally those with an Arctic coastline, to reassess their commitments and strategic interests in the Arctic Ocean. Climate change in the Arctic and its influence on global climate is one of the future grand challenges for European societies and the importance of studying the Arctic Ocean has been stressed repeatedly in official policy documents by the European Commission, the European Parliament, international organizations and national funding agencies.

European polar research has contributed critical knowledge to identifying the processes behind these rapid changes, but datasets from the Arctic Ocean are still insufficient to fully understand and more effectively predict the effects of climate change. The largest gaps in our knowledge and understanding of the Arctic system processes are outside the summer season, when the Arctic Ocean is logistically and technologically extremely difficult to reach.

The changing Arctic Ocean opens up economic opportunities, including exploitation of marine living and non-living resources and increase in marine traffic. Maritime transport in the Arctic has increased in recent years with the retreat of the summer sea-ice, closely linked to the development of economic activities within the Arctic and the export of raw materials such as petroleum and minerals. Arctic cruise tourism is also growing fast, and a few merchant ships have made transit voyages between Europe and Asia so far.

The industries operating in the Arctic Ocean include shipping (including for mining products), oil and gas, fisheries, cruise tourism and the submarine cable industry. They face significant challenges, including a lack of critical infrastructure (e.g. ports, navigation charts), lack of means of communications, and the need for essential search and rescue capabilities. Safety of navigation is a serious concern for ships operating in harsh conditions and remote areas. There is some concern about potential environmental damage to areas that so far have been effectively protected from human influence by sea-ice. There is also a need to better forecast future scenarios of Arctic sea ice variation and

ocean conditions, to better guide the future sustainable development of the Arctic economy. Thus, industry partners also have a critical need for better Arctic information to support safe, responsible, and effective industry operations in support of Blue Growth.

To answer questions of particular scientific, environmental and societal concern and to develop policy recommendations for a sustainable usage of the Arctic and its resources, the international polar science community must have access to world-class marine research infrastructure in the Arctic, able to operate in the Arctic Ocean outside the summer season.

II. EU-POLARNET “CONNECTING SCIENCE WITH SOCIETY”

The objectives of EU-PolarNet are to establish an on-going dialogue between policy-makers, business and industry leaders, local communities and scientists to increase mutual understanding and identify new ways of working that will deliver economic and societal benefits. The results of this dialogue will be brought together in an Integrated European Research Programme that will be co-designed with all relevant stakeholders and coordinated with the activities of polar research nations beyond Europe. This programme will be accompanied by a feasible implementation plan to provide Europe with the capability to define the nature of environmental risks so that governments can design policy measures to mitigate them and businesses and other stakeholders benefit from the opportunities that are opening up in the Polar Regions.

Polar research infrastructures represent significant investments made by individual nations, yet lack an overall co-ordinated framework for shared access and interoperability. EU-PolarNet therefore aims at initiating a European Network of Polar Operations that will develop a management system for transnational access to these infrastructures. These will thereby be made available to the whole European research community, their international partners and other users engaged in the Polar Regions to deliver the highest quality and relevant research. EU-PolarNet will also identify and incorporate information from industry, to determine how commercial polar infrastructures and facilities might contribute to the European Polar Research Programme (e.g. tourist ships in Antarctica ferrying scientists to research stations, ships of opportunity deploying observational floats or carrying Ferry-Box style instrumentation packages on transits).

Since satellite technologies are very efficient and practical tools to provide consistent, year-round observation in the Polar regions, as well as communication and navigation support in the harsh polar environment, EU-PolarNet collaborates and interact with relevant space organizations (e.g. European Space Agency (ESA), NASA, Canadian Space Agency) and operational services (e.g. Copernicus) to coordinate pertinent space activities in Polar Regions on European and wider international level.

III. EUROFLEETS 2 “New operational steps towards an alliance of European research fleets”

The EU funded project EUROFLEETS2 aims at consolidating the construction of a pan-European distributed research fleet infrastructure with common strategic vision and coordinated access to European marine research vessels and equipment. In this context, EUROFLEETS2 provides access to RVs for all European scientists and their industrial and international partners on the sole condition of scientific excellence covering all fields of marine science from environmental and biodiversity protection, to coastal zone management, geodynamics and climate change research. EUROFLEETS2 has provided for the first time access to six European Polar Research Vessels (PRV) and funded 49 days of research in both the Arctic and Antarctic regions.

The EUROFLEETS 2 work package “Flagship initiative for polar access” works on integrating the European PRV fleet and establishing models for implementing

a joint coordination of these vessels. It aims at optimizing the usage of the European Polar Research Fleet by determining the available capacities of Polar Research Vessels; comparing them with the scientific demand, and establishing models for optimization of this fleet by better coordination of the vessels' scheduling and by harmonizing the deployment of ice-strengthened research vessels with the heavy icebreakers.

IV. ARICE "Arctic Research Icebreaker Consortium: A strategy for meeting the needs for marine based research in the Arctic"

The project ARICE aims at providing Europe with better capacities for marine-based research in the ice-covered Arctic Ocean with the existing polar fleet by developing strategies to ensure the optimal use of the existing polar research vessels at a European and international level and by working towards an International Arctic Research Icebreaker Consortium which shares and jointly funds operational ship time on the available icebreakers.

It will provide trans-national access to a unique set of four key European and international icebreakers for European scientists based on scientific excellence:

- > PRV Polarstern, Germany
- > IB Oden, Sweden
- > PRV Kronprins Haakon, Norway (under construction, to be operative in 2017)
- > CCGS Amundsen, Canada

It also aims at improving the research icebreakers services by partnering with maritime industry on a "ship of opportunity" programme and by exploring into new key technologies that could lead to an improvement of ship-based and autonomous measurements in the Arctic Ocean, e.g. to install in existing RVs and ROVs or gliders. These could be advanced modulation techniques for the communication with autonomous devices and/or improved battery packs for usage in cold waters. ARICE will also work with Copernicus on data requirements for new Sentinel missions and better communication and data transfer in the Arctic Ocean. This collaboration on technology and innovation will lead to more efficient use of the research icebreakers and the growing number of commercial vessels in the Arctic, while reducing human impact on Arctic observation.

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