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Project and Community Management in Polar Sciences: Challenges and Opportunities to Support Frontier Research

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Polar regions have undergone dramatic environmental changes in the past decades due to ongoing global climate change. Retreating sea-ice cover have made the polar seas more accessible (particularly, the Arctic Ocean), therefore providing new logistical and planning challenges. As key areas for understanding the current state and future changes in Earth's climate system, both Arctic and Antarctica have brought the attention of the international research community and public.

Because geoscientific research often occurs via community-instigated bursts of activity variously labelled as e.g., years (The International Polar Year IPY), experiments (World Ocean Circulation Experiment WOCE), programs (International Ocean Discovery Program), missions (CRYOSAT spacecraft), or decades (The International Decade of Ocean Exploration IDOE), successful attainment of research goals generally requires skilful scientific project management. In addition to usual challenges of matching scientific ambitions to limited resources, on-going coordination and specific project management, polar science confronts additional unusual challenges: Planning and implementation of polar science projects often involve many uncertainties caused by, for example, unpredictable weather, ocean and sea ice conditions, or large-scale logistical juggling. Large amounts of funding are needed to procure the considerable infrastructure and technical equipment required for polar expeditions; permissions to enter certain regions must be requested; and potential risks for expedition members as well as technical issues in extreme environments need to be considered. All these aspects are challenging for polar science projects, which therefore need a well thought-through program including a realistic alternative 'plan B'. Assessment of risk is key to successful polar science project management as failure can be extremely costly. Furthermore, important aspects in polar research are the very high degree of interdisciplinarity and internationality.

While these issues need to be considered by operating scientists, there is an increasing demand to employ professional project managers and community managers able to support their colleagues' operations. Project managers in polar science need to have comprehensive expertise in polar sciences themselves in order to understand requirements, structures and funding schemes that drive interdisciplinary polar research. Polar science community managers must understand the science and the institutional landscapes that polar researchers work within. At the same time, the managers' task is to oversee that the project objectives are fulfilled; and they have to use their skills in communication, outreach, and networking to communicate with the various stakeholders and increase awareness of the project's relevance to the general public.

In this paper, we provide an overview of specific challenges of project and community management in polar sciences. We address the unique challenges and report the (mostly) successful processes of polar science project management; we focus on background planning and coordination infrastructure that, building on past experience, will enable and support future polar research.