

# **POLARICE: An International Collaborative Effort** in study of Cryosphere-Atmosphere interactions and their relationship to Climate Change

Idea469

**Background:** An international group of polar researchers has combined their efforts to create an integrated IPY effort aimed at improving our understanding of air-surface interactions in polar environments, and the connections to climate change. This effort combines the IGAC-AICI and OASIS IPY proposals (ID Nos. 48 and 50). It is motivated by recent observations of important air-surface chemical interactions, including polar surface ozone and mercury depletion, transport and input of toxic pollutants to polar regions, emission of photochemically reactive chemical species from snowpacks and sea ice, and changes in firn and ice core composition with time. These observations are supported by exciting new satellite remote sensing data, but are as yet poorly understood. It is essential that we improve our understanding of these processes and their feedbacks with climate change, as air-surface interactions change along with a rapidly changing polar climate.

**Scientific Objective:** Study of the impact of Air-Surface Interactions and chemical exchange between reservoirs in polar regions, and how these processes affect atmospheric chemical composition, climate and climate change, input of toxic chemicals to polar environments and associated human and ecosystem impacts, and interpretation of ice cores and past and future climate.

**Organisation and Connections:** The parent project AICI is an International Global Atmospheric Chemistry (IGAC) project, and OASIS is endorsed by the IGAC project SOLAS. To date, this coordinated Bi-Polar research effort involves multi-disciplinary researchers from Canada, USA, Italy, France, Sweden, Norway, Germany, Czech Republic, Austria, China, Japan, New Zealand, and UK. There are direct connections to submitted IPY proposal Nos. 3, 22, 48, 50, 64, 79, 82, 87, 92, 97, 148, 202, 211, 217, 240, 263, 308, 318, 335h, 342d, and likely many others. We are eager to identify further collaborative connections and opportunities. This research effort is expressly multidisciplinary: the science involved necessarily spans all aspects of Polar Studies, e.g. biology, oceanography, atmospheric science, ice physics, human dimensions, hydrology, biogeochemistry and others.

**Proposal:** This work will proceed along three main lines: Intense research campaigns during the IPY, establishment of long-term polar observatories, and fundamental studies and modeling aimed at developing a predictive understanding of the Polar Air-Surface System and Climate interactions. Specifically, we propose:

1. investment in an array of polar infrastructure, including ice breakers, floating and moored platforms, autonomous buoys, remote sensing and other analytical instrumentation, remote research laboratories, and aircraft/airships, for pursuit of the Scientific Objectives.
2. A coordinated Bi-Polar effort during the IPY period, aimed specifically at studies of ozone and mercury depletion in polar regions, and their cause and impacts, and related air-surface chemical interactions in polar regions.

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