An Integrated International Approach to Arctic Ocean Observations for Society

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Scientific and societal bases for ocean observations in the Arctic

In the Arctic, a key challenge in designing an ocean observing system is to consider the effect of the presence of an ice cover - that depends on the state of the ice - can serve to enhance or reduce the coupling between ocean and atmosphere and can serve as a unique habitat for both flora and fauna. Since much of the societal benefits are derived close to the coast, more challenging and innovative approaches, including the use of local stakeholder expertise, will be required.

Physical ocean observations

As ice sheets grow and thin, and perennial sea ice wanes, it is crucial to understand the oceanic impacts and to minimize and manage the risk of long-term, high-impact events to benefit society.

Biological and biogeochemical ocean observations

The state of the Arctic Ocean is in disequilibrium, driven by warming ocean and atmosphere. Monitoring key observations in this region is a foremost priority in climate change research.

Observing platforms: satellite and aircraft, surface and sub-surface moorings, in situ instrumentation, and real-time data products. Interoperability with in situ observations is essential to sustain observational capacity.

Satellite observations

Large observational arrays of satellite and in situ data can observe the sea ice extent and changes. The International Arctic Buoy Program (IABP) is an integrated part of the Sustained Arctic Observing Network (SAON). Multiple types of satellites are essential for recurring and novel types of products.

Methane observations using satellite data would provide a new perspective on methane emissions from the Arctic.

Other issues

Data analysis, data assimilation and modeling

Remote sensed data, observations, and models need to be validated and standardized for real-time applications, in particular, to support marine operations, tourism, and marine transportation.

Organization of required activities

A key task in the post-IPY period is to define the most important science questions and priorities for sustained observations in the Arctic.

International coordination, legal frameworks and EEZ issues

The Arctic and Antarctic are the only regions in the world that are the subject of international agreements focused on the protection of the environment and sustainable use of the living and non-living resources of the areas.

Next steps and future directions

Interest is high for sustaining the enhanced level of Arctic Ocean observations that existed during the IPY period of 2007–2009. Improved access to high-resolution products will result in new insights and opportunities for socio-economic benefits.