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Observations for climate: An integrated international approach to Arctic ocean observations for society

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This poster takes a broad pan-Arctic approach to describe key components of a sustained ocean observations program in the Arctic region, directed to providing societal benefits and contributing to the ocean component of the Global Climate Observing System, while serving other needs as well. The poster touches on the most important in situ platforms and addresses associated modeling and analysis activities, including requirements for ocean physics, ocean biology and biogeochemistry, sea ice, and the atmosphere over the Arctic Ocean. Also discussed are remote sensing techniques for the Arctic, and issues regarding data management, organization and Exclusive Economic Zones. There is much interest in sustaining the enhanced level of Arctic Ocean observations that existed during the International Polar Year (IPY), 2007-2009. The results from the IPY will provide new insight into cost-effective observing strategies and reliable emerging technologies. A key task in the post-IPY period is to refine the most important science questions and most urgent user needs, and provide an updated observing strategy to meet each. The key priorities for sustained observations at this time are: 1. Estimating change in heat and fresh water content of the Arctic Ocean, examining the flux of heat between ocean and atmosphere, and monitoring the influx of heat and salt from the Atlantic and Pacific; 2. Estimating change in sea ice extent and thickness and observing the factors that control sea ice growth and melt; 3. Observing the seasonal evolution of landfast ice, coastal surface currents and coastal storm surges; 4. Estimating ecosystem response to change in physical and chemical conditions in the ocean, including productivity, ecosystem structure, and populations of key species and groups; and 5. Provide data for the coastal and shelf seas, their ice cover and ecosystems to inform marine spatial planning and resource management. These priorities require that existing in situ and satellite observations be continued. However, recent assessments of polar observing networks indicate that new observations must also be initiated. This means filling spatial gaps in current networks, but it also means improving the accuracy with which we measure ocean, ice, and atmosphere properties by adding new sensors and integrating existing systems. Regarding the latter, the value of combining measurements from multiple instruments and using in situ and satellite data with models is becoming increasingly apparent. Scientific understanding, user needs, logistic complexities, and national policies must all be considered in developing an Arctic-wide ocean observing program. An international framework, most likely a government-based structure, is needed.