ARCUS
Arctic Research Consortium of the United States

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Parallel Session Summary

Robust Autonomous Arctic Observations – Successes and Challenges

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Overview. The technological focus of this topic led the breakout group to an alternative to the original three-question structure.

Successes

- Many of the autonomous technologies that revolutionized observing at lower latitude have been adapted for Arctic observing. Development of the underlying technologies typically required years to more that a decade of support, often from multiple agencies. Adaptation for Arctic use required shared risk-taking by researchers and agencies, and additional years of development and testing. Examples of successful transitions include Ice Tethered Profilers (ITPs), a variety of ice-tethered instruments; novel moored instruments for sampling near the ice-ocean interface and acoustically navigated Seagliders. These developments have been employed to augment many components of the Arctic observing network.
- The Arctic science community has worked to share knowledge and technological developments. ITPs have been deployed for a wide range of programs, mooring technologies are widely shared and sea ice researchers share expertise in the development of a ice mass balance buoys.
- Coordinated deployment of clusters of ice-tethered platforms has become common. Multiple instruments with complementary capabilities are deployed together to provide a more comprehensive picture of atmosphere, ice and ocean.
- The dramatic increase in autonomous platform deployments has yielded large gains in both temporal and spatial data density, as well as improved coverage across the Arctic. These data have been exploited to seek new understanding, such as investigations of seasonality and freshwater storage and release.
- Rapid data release with open access has enabled the use of Arctic observations and data products by a wide range of stakeholders, including climate researchers, policy makers and Arctic residents. Provision of real time data also allows ingest into models to generate nowcasts and forecasts.
- International collaboration is an essential component of an Arctic observing system. Programs such as the Nansen and Amundsen Basin and Canadian Basin Observational Systems demonstrate the benefits of such collaboration.

Challenges

- Develop more efficient approaches for deploying clusters of ice-based instruments.
- Accelerate adaptation and adoption of unmanned aerial vehicles for ship-based sampling and for long-term measurements of surface fluxes.
- Autonomous sensors, especially those for biological and biogeochemical properties, can provide only a fraction of the desired variables. In situ sampling using ships and aircraft thus remain a critical component of the observing system. These capabilities must be maintained.
- Sensors for atmospheric variables that are capable of long-term, untended operation in the Arctic.
- Measurement of trace gas fluxes.
- Upscaling (temporal and spatial) of sparse observations.
- Access to vessels capable of working in sea ice.
- Scientific cooperation to provide access within national EEZ boundaries.