MOSAiC

Multidisciplinary Drifting Observatory for the Study of Arctic Climate

Background

The central Arctic climate system is changing dramatically as the ice pack shrinks, opening the Arctic to numerous human activities, affecting ecosystems, and potentially impacting weather and climate at lower latitudes. MOSAiC is a field program that aims to study this Arctic system, and specifically how coupled atmosphere, sea ice, and ocean processes contribute to observed changes, so they can be more accurately represented in regional- and global-scale models. Comprehensive year-round measurements, extending from the atmosphere through the sea ice and into the ocean of the central Arctic Basin, are needed to advance understanding of critical Arctic processes, to enhance model predictive capabilities and to improve sea-ice forecasting tools.

The Plan

To obtain the needed measurements and knowledge a manned, ship-based ice camp will drift with the central Arctic ice pack for a full year (2019-2020) to collect coordinated observations of atmospheric, oceanic, sea ice, biogeochemical, and ecosystem processes. This central, intensive observatory will be embedded within a constellation of distributed measurements made by buoys, remote stations, underwater drifters, unmanned aerial systems, aircraft, additional ships, and satellites. MOSAiC observations will underpin multi-scale modeling and synthesis activities that will contribute towards the development of earth system models that are better able to represent the Arctic system and its change. A broad consortium of nations and funding agencies will jointly facilitate, coordinate, and support this international and interdisciplinary initiative.

Science Themes

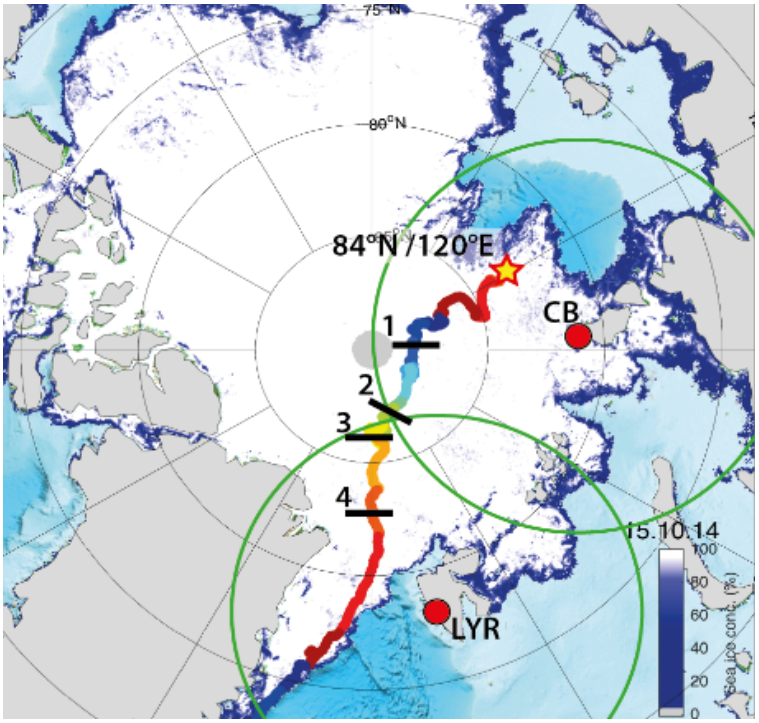
- Coupled-system energy budgets.
- Momentum transfer and ice dynamics.
- Changing Arctic characteristics, including first-year sea ice.
- Clouds, precipitation, and aerosols.
- Sources, sinks, and cycles of chemical species.
- Role of biology in mediating biogeochemical cycles.
- Interdisciplinary process linkages.

Anticipated NOAA Contributions

- Support for observations of the atmosphere-surface interface, including meteorological tower and autonomous surface energy budget stations.
- Operational satellite product evaluation and technique development.
- Experimental sea-ice and surface flux forecasting and assessment.
- Coupled system model evaluation and assimilation studies.

Outcomes

- A comprehensive, coupled-system, Central Arctic observational data set.
- Enhanced Arctic observing system through evaluation and development of autonomous sensors and techniques.
- Enhanced utility of operational satellite observations and ice services through process-based ground validation and evaluation.
- Improved coupled atmosphere-ice-ocean process understanding to guide model development and forecasting capabilities.
- Operational model assimilation studies for a data sparse region.
- Assessment of operational weather and sea-ice forecasting systems.



Potential movement of the observatory along the Transpolar Drift beginning at the star and taking one year to reach #4.

Project Partners

AWI
U.S. DEPARTMENT OF ENERGY
TROPOS
Leibniz Institute for Tropospheric Research
NOAA
Polar Research Institute of China
NORWEGIAN POLAR INSTITUTE
NSF
NERC
SCIENCE OF THE ENVIRONMENT
European Commission
DFG
Deutsche Forschungsgemeinschaft

Project Coordinators

Markus Rex
Alfred Wegener Institute
Markus.Rex@awi.de

Matthew Shupe
CIRES/NOAA
Matthew.Shupe@noaa.gov
303-497-6471

www.mosaic-expedition.org