



The Multidisciplinary drifting Observatory for the Study of Arctic Climate (MOSAiC)

Markus Rex (1), Matthew Shupe (2), Klaus Dethloff (1), and Anja Sommerfeld (1)

(1) Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research, Research Unit Potsdam, Potsdam, Germany (anja.sommerfeld@awi.de), (2) Cooperative Institute for Research in Environmental Science, University of Colorado and NOAA-ERSL, USA

MOSAiC is an international initiative under the umbrella of the International Arctic Science Committee (IASC) designed by an international consortium of leading polar research institutes.

Rapid changes in the Arctic lead to an urgent need for reliable information about the state and evolution of the Arctic climate system. This requires more observations and improved modelling over various spatial and temporal scales, and across a wide variety of disciplines. Observations of many critical parameters were never made in the central Arctic for a full annual cycle.

MOSAiC will be the first year-around expedition into the central Arctic exploring the coupled climate system. The research vessel Polarstern will drift with the sea ice across the central Arctic during the years 2019 to 2020. The drift starts in the Siberian sector of the Arctic in late summer. A distributed regional network of observational sites will be established on the sea ice in an area of up to 50 km distance from Polarstern, representing a grid cell of climate models. The ship and the surrounding network will drift with the natural sea ice drift across the polar cap towards the Atlantic.

The focus of MOSAiC lies on in-situ observations of the climate processes that couple atmosphere, ocean, sea ice, biogeochemistry and ecosystem. These measurements will be supported by weather and sea ice predictions and remote sensing operations to make the expedition successful. The expedition includes aircraft operations and cruises by icebreakers from MOSAiC partners. All these observations will be used for the main scientific goals of MOSAiC, enhancing the understanding of the regional and global consequences of Arctic climate change and sea ice loss and improve weather and climate prediction. More precisely, the results are needed to advance the data assimilation for numerical weather prediction models, sea ice forecasts and climate models and ground truth for satellite remote sensing. Additionally, the understanding of energy budget and fluxes through interfaces, sources, sinks and cycles of chemical species, boundary layer processes, and primary productivity will be investigated during the expedition. MOSAiC will provide scientific knowledge to support safer Arctic maritime and offshore operations, including fisheries and transportation along northern sea routes.