

B02-O01

ENHANCING PROCESS UNDERSTANDING IN THE COUPLED ARCTIC ATMOSPHERE-OCEAN-ICE SYSTEM THROUGH MOSAIC

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There exist many uncertainties in our understanding of the coupled Arctic climate system that inhibit our abilities to comprehend the recent decline in sea ice, to draw large-scale linkages, and to represent these processes in numerical models. Leading uncertainties involve mesoscale processes related to clouds and aerosols, stable boundary layers, vertical mixing, energy fluxes through sea ice, the buildup and release of upper ocean heat, and the influences of these on biogeochemical processes. Substantial advancement in predictive skill and sea ice forecasting requires unraveling the coupled interactions among these processes including numerous feedbacks and responses that vary as a function of season, ice coverage, and meteorological state.

To gain the process-level knowledge needed to address these critical gaps requires year-round, coordinated, and comprehensive measurements extending from the atmosphere through the sea ice into the central Arctic Ocean. The Multi-disciplinary drifting Observatory for the Study of Arctic Climate (MOSAIC) is an international, inter-disciplinary initiative designed to provide such detailed process observations from an icebreaker drifting with the Arctic ice pack, combined with a constellation of distributed observations and a hierarchy of coordinated modeling and synthesis efforts. Observational assets will be installed in autumn 2018 in a region of newly freezing sea ice and will passively drift with the ice along the Transpolar Drift for a full year. Measurements made along the drift will be designed to characterize key physical and biological processes and their coupling. Science and implementation planning for this initiative is currently underway, with a particular focus on identifying major infrastructure and scientific contributions to the effort. This presentation will lay out the scientific motivation, foci, and design of MOSAiC and offer insights on future coordination and planning for the initiative.