

Aerosol-cloud-turbulence interactions in well-coupled Arctic boundary layers over open water

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Recent field campaigns in the Arctic have successfully collected state-of-the-art datasets on low level mixed-phase clouds, however key aspects still prove hard to measure. We present complementary high-resolution simulations to serve as a virtual laboratory, being properly constrained by relevant measurements. The focus lies on gaining insight into interactions between aerosol, hydrometeors and turbulence.

A composite LES case is constructed based on dropsonde profiles collected by collocated airborne measurements in a cloudy boundary layer over open water in the Fram Strait as observed during the ACLOUD campaign on 18 June 2017.

The results highlight the impact of ice hydrometeors on the thermodynamic state and turbulence of the Arctic boundary layer. Furthermore, we find that the variation in aerosol concentrations also modifies the structure of the turbulence. Opportunities created for the evaluation of parameterizations for Earth System Models will be highlighted.