

Seminar “Ocean, Ice and Atmosphere”,
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Development of machine learning-based parametrizations for sea ice in climate models

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Earth system models (ESMs) show large discrepancies in historical and projected Arctic and Antarctic sea ice towards the end of the 21st century. One of the main reasons of this spread is the way ESMs represent processes that occur at spatial or temporal scales smaller than the models can resolve. The effects of these unresolved processes are represented through so-called subgrid-scale parameterizations, which describe their influence on the resolved model variables. Sea ice parameterizations are based on statistics or empirical relationships that are often derived from localized field measurements dating back to the 1970s to early 2000, when sea ice conditions differed from those observed today. In the era of big data, machine learning (ML) can help leverage observational and high-fidelity model data to develop more sophisticated parameterizations. In this talk, I will present how to develop an ML-based parameterization for sea ice, specifically for sea ice albedo and floe perimeter, which impact surface, lateral and basal melt. The integration of ML into physics-based models paves the way for building hybrid ESMs, with the overarching goal of reducing systematic biases and uncertainties in ESMs.