## The Importance of Ocean Heat Transport to Arctic Sea Ice Variability

The Arctic region is warming at a rate much faster than the lower latitudes, a phenomenon closely linked to the rapid decline of Arctic sea ice. However, the dominant driver of Arctic sea ice variability remains under debate, with some studies emphasizing the role of ocean heat transport (OHT) and others highlighting atmospheric variability.

In this study, which is part of the $AC^3$ project, we aim to assess the role of OHT in Arctic sea ice variability using the Alfred Wegener Institute Climate Model version 3 (AWI-CM3), which couples the Finite-volumE Sea Ice–Ocean Model (FESOM2) and OpenIFS (Integrated Forecasting System) via the OASIS coupler. FESOM2's unstructured triangular mesh enables regionally refined resolution within a coarser global framework.

We will apply the Modini technique, a partially coupling approach in which the wind stress from the atmosphere model is exchanged with a wind stress taken from an atmospheric reanalysis. This yields a realistic variability of the OHT into the Arctic Ocean. Three experiments are planned: (1) a fully coupled control simulation, (2) a globally applied Modini experiment, and (3) a regionally applied Modini experiment that retains full coupling within the Arctic. This framework will allow us to isolate and quantify the influence of OHT on Arctic sea ice variability in an energetically and dynamically consistent manner.