



## Calibration of a hybrid sea-ice model based on particle and continuums mechanics

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Presently, climate models employ a continuum approach to describe sea ice. This approach assumes that statistical averages can be derived from a large number of ice floes. However, employing continuum rheological models at or below the scale of individual floes is only valid if the failure mode of a single floe aligns with that of an aggregate of floes. Initially, continuum models were designed for a grid resolution of 100 km. With recent advancements in computing power, sea-ice models are frequently operated at higher mesh resolutions, potentially leading to grid cells that no longer contains a representative sample of sea-ice floes.

We are addressing these shortcomings of current continuum sea-ice models by developing a hybrid model. The idea of the hybrid approach is to nest a particle model into a continuum sea-ice model in order to predict sea ice on fine spatial scales in a region of interest. An important component of particle models is a drag law to describe the influence of ocean and atmospheric currents on the floes. Measurements obtained onboard the Polarstern expedition PS 138 have shown that the correlation cannot be described fully locally, in regions with strongly heterogenous ice cover. Instead, larger surrounding flows have a substantial effect on the motion of small ones. Detailed numerical simulations of idealised test cases do confirm these findings.