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Interactions between Arctic sea ice drift, concentration and thickness modeled by NEMO-LIM3 at different resolutions

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Sea ice concentration and thickness have substantially decreased in the Arctic since the beginning of the satellite era. As a result, mechanical strength has decreased allowing more fracturing and leading to increased sea ice drift. However, recent studies have highlighted that the interplay between sea ice thermodynamics and dynamics is poorly represented in contemporary global climate model (GCM) simulations. Thus, the considerable inter-model spread in terms of future sea ice extent projections could be reduced by better understanding the interactions between drift, concentration and thickness.

This study focuses on the results coming from the global coupled ocean-sea ice model NEMO-LIM3 between 1979 and 2012. Three different simulations are forced by the Drakkar Forcing Set (DFS) 5.2 and run on the global tripolar ORCA grid at spatial resolutions of 0.25, 1° and 2°. The relation between modeled sea ice drift, concentration and thickness is further analyzed, compared to observations and discussed in the framework of the above-mentioned poor representation. It is proposed as a process-based metric for evaluating model performance. This study forms part of the EU Horizon 2020 PRIMAVERA project aiming at developing a new generation of advanced and well-evaluated high-resolution GCMs.