Does sea ice velocity and concentration data assimilation improve the model sea ice thickness estimation?

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One possible way of improving the performance of current sea-ice models is to assimilate data into models. This takes advantage of the great advances that have been made in polar observational capabilities during the last two decades. These advances have led to a rich collection of data on sea ice, including, among others, satellite passive-microwave observations of ice motion and concentration. Since it is only recently that the assimilation of satellite data into large-scale sea ice models has been initiated, we choose to investigate the impact of sea-ice motion and concentration data assimilation on the sea ice model behaviour and more especially on the ice thickness estimation. In order to reduce as much as possible the computational cost, we have started to evaluate some of the simplest and low cost data assimilation techniques in a simplified three-dimensional model of the Arctic sea ice using twin experiments (numerical experiments that assimilate model outputs instead of real observations). The results of this exercise will be presented.

In the future, and on the basis of this assessment, we will select the most suitable method and will implement it into the Louvain-la-Neuve thermodynamic-dynamic sea-ice model. The full system will be then used to make a hindcast simulation of the Arctic and Antarctic ice-thickness variability over the last few decades.