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The effects of assimilating a sub-grid scale sea ice thickness distribution in a new Arctic sea ice data assimilation system

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A modified, standalone version of the Los Alamos Sea Ice Model (CICE) has been coupled to the Parallelized Data Assimilation Framework (PDAF) to produce a new Arctic sea ice data assimilation system CICE-PDAF, with routines for assimilating many types of recently developed sea ice observations. In this study we explore the effects of assimilating a sub-grid scale sea ice thickness distribution derived from Cryosat-2 Arctic sea ice estimates into CICE-PDAF. The true state of the sub-grid scale ice thickness distribution is not well established, and yet it plays a key role in large scale sea ice models and is vital to the dynamical and thermodynamical processes necessary to produce a good representation of the Arctic sea ice state. We examine how assimilating sub-grid scale sea ice thickness distributions can affect the evolution of the sea ice state in CICE-PDAF and better our understanding of the Arctic sea ice system.