



The impact of refreezing of melt ponds on Arctic sea ice thinning

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While the impact of melt ponds on the albedo-feedback mechanism of Arctic sea ice is well known, their impact in suppressing winter freeze up has been less studied.

At the end of summer the melt ponds, covering a large fraction of the sea ice, start freezing and get trapped between the sea ice beneath and a thin surface layer of ice.

The pond water stores latent heat that is released as they freeze. Ponds trapped under a layer of refrozen ice have been observed in the Arctic and our model results, confirmed by observations, show that the latent heat stored in the ice due to their presence slows the basal sea ice growth for over a month after a sea ice lid appears on their surface.

We have developed a three layer, one-dimensional model of temperature and salinity evolution to study the refreezing process and conducted sensitivity studies to examine the factors affecting melt pond refreezing, including the presence of snow on a refreezing pond.

We also show some preliminary results obtained by including this new process in the CICE model and in particular, the impact that the increased pond salinity and the refrozen pond persistence have on the sea ice basal growth.