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

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The presence of melt ponds over the sea ice cover in the Arctic has a profound impact on the surface albedo inducing a positive feedback leading to sea ice thinning.
At the end of summer the melt ponds, covering a large sea ice, start freezing and get trapped between the sea ice beneath and a thin surface layer of ice.
The pond water also 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 they are present for a few months after the formation of the initial ice lid.
In this work we study the ice/water temperature profile in the trapped pond system and its evolution until the pond freezes and show the impact of the presence of a trapped pond on sea ice growth. We show a number of sensitivity studies assessing the impact of varying the model's meteorological inputs, sea ice parameters and ocean salinity.