



Extending the forecast of the Arctic summer sea ice minimum with winter sea ice and environmental conditions

Thorsten Markus and Alek Petty
(thorsten.markus@nasa.gov)

The decrease and thinning of the Arctic sea ice, especially during spring and summer, has generated a considerable interest in the seasonal prediction of sea ice in particular to aid the planning for Arctic shipping. While the focus for predictions has much been on using melt onset, melt pond formation, and ice-water-albedo feedbacks during spring, the conditions of the sea ice in the beginning of melt period are established during the preceding winter months. For example, the incorporation of March sea ice thickness from, currently, CryoSat-2 or Operation IceBridge has shown to improve prediction accuracy. This poses the question whether equivalently accurate predictions can be made even earlier during winter as the sea ice is growing and also whether the additional incorporation of winter data would improve sea ice minimum predictions. Is there observational evidence that the conditions during winter and thus the state of the sea ice already determine, to some extent, the sea ice minimum and if so to what extent and magnitude?

We have been exploring observables that determine the temporal and spatial sea ice thickness distribution during winter such as the air temperature, the timing of the onset of freeze-up and subsequently the length of the freezing season, as well as the snowfall on sea ice. The snow depth on sea ice also influences the sea ice melt rate during spring and summer.