



## State of the Arctic Sea Ice

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Some global climate models predict up to 50% reduction of summer sea ice cover in the Arctic Ocean by 2100, as a result of an amplified response to global warming. According to other model results we can expect near ice-free September conditions by 2040. However, the majority of climate models are limited in their ability to reproduce past and present variability in the Arctic sea ice, which diminishes their accuracy of future climate prediction. A more realistic representation of the Arctic Ocean and its sea ice, using regional high resolution simulations forced with atmospheric data over the past decades, implies that during the last decade sea ice might be declining faster than predicted by climate models or as determined from satellites.

We analyze results from the Naval Postgraduate School (NPS) coupled ice-ocean model of the pan-Arctic region and validate them against several data sets to better understand the past, present and potential future states of the Arctic Sea Ice. While many previous studies have analyzed changes in ice extent and concentration, this research focuses on ice thickness and volume as it gives a better indication of the total sea ice cover variability and rates of change. The skill of the model is evaluated by comparing its ice thickness output to actual sea ice thickness data gathered by submarines and satellite during the last three decades. The NPS model indicates an accelerated thinning trend in Arctic ice during the last decade. This trend is robust and independent of timescales for surface temperature and salinity relaxation in the ocean model. Validation of model output with data supports this result. This implies that the Arctic not only might, but is likely to be ice-free during the summer in the near future.