



How reliable are simulations of past and future sea-ice evolution?

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We examine the quality of Earth System Models in simulating the observed sea-ice cover. Based on such analysis, we then estimate the reliability of the models' projections of the future sea-ice evolution.

In recent years, there has been much progress in the representation of the physical processes that govern sea-ice evolution both within the models' sea-ice components and in the models' representation of atmospheric and oceanic forcing. Nevertheless, the reliability of the resulting sea-ice simulations is often not clear *per se*. Particular focus related to the models' quality has recently been on the models' representation of the observed rapid decrease of Arctic sea-ice extent, of the observed increase in Antarctic sea ice, of the estimated loss of Arctic sea-ice volume, and of the seasonality of sea-ice speed in the Arctic. Focusing both on CMIP5 model simulations and the data sets that are used for the respective comparison of simulations and "reality", we discuss the validity of the critical assessment of model performance according to these observables. Such discussion then allows us to estimate which sea-ice state variables can most reliably be estimated from scenario simulations of the Earth's future sea-ice cover.