Mechanisms and Predictability for Arctic Sea-Ice Variability with the MIROC Climate Model

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The Arctic environment has markedly changed due to the rapid decline of sea ice in summer Arctic Ocean. The retreat of sea-ice cover could be associated with the Arctic amplification and an increase in the frequency of severe cold winters in the Northern Hemisphere mid-latitudes. Accurate predictions of sea-ice variability on seasonal to decadal time-scales and its mechanisms would be useful for further progress in science as well as socio-economic activity. To examine the mechanisms and predictability for Arctic sea-ice variability, we analyze the control simulations from the Arctic Predictability and Prediction On Seasonal to Inter-annual Timescales (APPOSITE) project. The model used for the APPOSITE is the climate model MIROC 5.2 in which external forcing is fixed in 2005. The time evolution in sea-ice extent and volume shows that an extreme reduction event occurs one or two for a century even without the global warming trend. The spatial feature in sea-ice distribution and its reduction mechanisms resemble those in 2007. This suggests that an anomalous sea-ice loss could be caused by only natural variability. We have currently investigated the key factors closely related to the sea-ice variability.

Keywords: Arctic, Sea ice, Climate model

