Geophysical Research Abstracts
Vol. 19, EGU2017-3155, 2017
EGU General Assembly 2017

Thermodynamic and dynamic linkage between the inter-model spread of Arctic sea ice concentrations and Northern Hemisphere atmospheric and oceanic circulations in CMIP5 models

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While all CMIP5 models simulate the decline of Arctic sea ice concentrations (SIC) in a warming climate, the magnitude of such changes has a large inter-model spread that contributes to the uncertainty of projected climate change. It is thus important to understand the underlying thermodynamic and dynamic causes of the inter-model spread. In this presentation, we will use the budget analysis to quantify how much the large-scale thermodynamic and dynamic factors contributes to the inter-model spread of SIC over the Arctic in the historical run of CMIP5 models. Our preliminary results show that the primary factor is the thermodynamic processes related to the Atlantic meridional overturning circulation, and the secondary factor is the wind-driven circulations related to the NAO and the Aleutian low. The dominant spatial patterns linking the inter-model spread of SIC and these factors could be obtained from the SVD analysis. We will also discuss the linkage between the inter-model spread of SIC and the large-scale circulation features over the Northern Hemisphere.