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MODULATION OF THE ARCTIC LINKAGES ON ATMOSPHERIC ENERGY TRANSPORT IN NORTHERN HIGH LATITUDES

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We evaluated the impacts of the recent Arctic sea-ice reduction on NH tropospheric and stratospheric circulation based on a series of AGCM experiments. Perpetual model runs were conducted with the Arctic sea-ice boundary conditions of the past period (1979-1983) and the more recent period (2005-2009). The comparison of those two sets of runs reveals that changes in the Arctic sea-ice conditions lead to the modulation of tropospheric and stratospheric circulation in the NH mid- to high-latitudes such as a negative phase shift of the AO/NAO and enhanced residual mean circulation in winter. We also investigated long term changes in the observed meridional atmospheric energy transport (AET) of the northern high latitudes for the period of 1979-2010 based on the ERA-Interim reanalysis data. The analysis reveals that on the annual average the stationary dry static energy component dominates the long term AET change in the northern high latitudes with significant seasonal variability.

In this presentation we combine the results of those studies to evaluate the impacts of the recent Arctic sea-ice reduction on the meridional atmospheric energy transport in NH high latitudes. In early winter the changes in the AET are dominated by the stationary component, which appears to be related to the modulation of planetary waves. On a contrary, the late winter changes are balanced by the stationary and transient components. We discuss about how this intra-seasonal change in the AET characteristics is related to the Arctic linkages, which also has intra-seasonal characteristics.