



Arctic climate variations in 20th century simulations: contributions from atmospheric and oceanic heat transport variations

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Arctic climate variations depend largely on changes in the lateral heat fluxes towards the North Polar Region. On decadal to century time scales, atmospheric and oceanic heat transport exhibit anomalies with similar magnitude. Recent publications demonstrate that atmosphere and ocean may interact in a way that heat transport anomalies in the ocean may be compensated by those from the atmosphere. In this study we analyze various terms contributing to the Arctic heat budget and discuss their relation in space and time. Ensemble simulations for the 20th century carried out with the MPI-M IPCC AR4 coupled atmosphere ocean model ECHAM5/MPIOM are compared to the observed Arctic climate trends. We find that ocean and atmosphere heat transport variations have to act in concert to produce relatively large temperature fluctuations, such as the 1940s warming and the 1970s cooling.