Geophysical Research Abstracts,
Vol. 11, EGU2009-5806, 2009
EGU General Assembly 2009

Climatic Variability Simulation of Coupled North Atlantic and Arctic Ocean Circulation

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The INM RAS ocean circulation sigma-model is realized for coupled North Atlantic Ocean - Arctic Ocean - Bering Sea region. The global version of the model is used as the oceanic component of the climate system model which is presented in the IPCC Fourth Assessment Report. The present model has the spatial resolution 0.25 degree and 27 sigma-levels in the vertical with increased vertical resolution near surface. To avoid converging of meridians near the North Geographical Pole the model area on sphere is located with poles outside the integration domain on the geographical Equator (60E and 120W). We carried out the experiments using the realistic CORE atmosphere data provided by GFDL for years from 1958 to 2004 (6hr for turbulent and 24hr for radiative fluxes). The model ocean circulation response on the North Atlantic Oscillation (NAO) as the strong climatic variability signal in the North Atlantic was analyzed. It was shown that the intensity of coupled North Atlantic (NA) and Arctic Ocean (AO) large-scale circulation is closely associated with NAO index. The circulation is more intensive when the NAO index is high (1988-1994), and vice versa, the circulation slows down during low NAO index (1995-1997). The water mass exchange between NA and AO was also investigated. It was demonstrated that SST formation in the transient zone between NA and AO is strongly influenced by the Norwegian Current variability.