Geophysical Research Abstracts
Vol. 14, EGU2012-10795, 2012
EGU General Assembly 2012

Impact of decreasing sea ice cover and warming Arctic surface temperature on the Northern mid-latitude climate – comparison of coupled with uncoupled EC-Earth simulations

T Semmler (1), E Gleeson (2), R McGrath (2), and T Jung (1)

(1) Alfred-Wegener-Institute for Polar and Marine Research, Climate Sciences, Bremerhaven, Germany (tido.semmler@awi.de), (2) Met Eireann, Research and Applications, Dublin, Ireland (emily.gleeson@met.ie)

Idealized atmosphere-only simulations with reduced and removed Arctic sea-ice cover and increased Arctic surface temperatures are compared with fully coupled atmosphere-ocean-sea-ice simulations for 1850-2100 including increases in greenhouse gas and aerosol concentrations. While the uncoupled simulations only contain surface forcing in the areas of Arctic sea-ice of the reference simulation, the coupled simulations show warming over the whole globe although in the Arctic the strongest signal occurs in all seasons but summer. A warming of more than 21 °C over the northern Barents Sea in winter 2001-2100 compared to winter 1851-1950 is simulated according to the strong RCP 8.5 scenario. The weakest warming within the area north of 40 ºN can be seen south of Greenland and Iceland with even a slight cooling simulated in spring according to the moderate RCP 4.5 scenario, due to a weakened Atlantic Meridional Overturning Circulation. Over the Central Arctic a baroclinic response, i.e. sea level pressure decrease and 500 hPa geopotential increase, can be seen in both the uncoupled and the coupled simulations. Barotropic responses with sea level pressure and 500 hPa geopotential increases occur in the uncoupled simulations over Eastern Europe and in the coupled simulations south of Iceland and over the west coast of the US.