Geophysical Research Abstracts
Vol. 13, EGU2011-10226, 2011
EGU General Assembly 2011

Glacial shortcut of Arctic sea-ice transport

Michael Stärz (1,2), Xun Gong (1), Rüdiger Stein (1), Dennis A. Darby (3), Frank Kauker (1), and Gerrit Lohmann (1)

(1) Alfred Wegener Institute, Bremerhaven, Germany, (2) Senckenberg Research Institute and Nature Museum, Frankfurt/M., Germany, (3) Old Dominion University, Norfolk, VA 23529, USA

Due to human impact the Arctic region warms up more rapidly than any other part of the world. The most prominent feature of the Arctic Ocean, the sea-ice cover reacts sensitively on temperature and is getting closer to a potential tipping-point. As a result of feedback mechanisms (ice-albedo feedback) we have reached a maximum retreat of Arctic sea-ice cover at 2007. Regional sea ice/ocean models are used to decipher causes and consequences of such events and to predict future climate change.
However, during glacial time this part of our climate system also changes drastically with expansion of sea-ice cover to lower latitudes. The dislocation of a glacial sea-ice edge to northern North Atlantic and the Nordic Seas has a direct potential impact on ocean dynamics and European climate. Yet there are problems in the science community to decipher the glacial conditions in the Nordic Seas and northern North Atlantic: Reconstructions of sea surface temperature and sea-ice cover at these regions show extreme differences depending on the type of proxy used. Furthermore global numerical models are not reliable in reconstructing glacial Arctic sea-ice extent revealing a lack in understanding sea-ice dynamics.
As a first attempt to overcome the drawbacks of global climate models we deploy a high-resolution regional Arctic ocean-sea ice model adapted to boundary conditions of the Last Glacial Maximum (LGM). Our results show a robust shortcut of ice motion in the Arctic Ocean which is supported by geological proxies. This means that earlier hypothesises of a static ice cover have to be rejected. The model results indicate that the pattern of Arctic sea-ice drift during the LGM is established by modified wind fields and seems to be a general feature of the glacial ocean. The validation of regional models against extreme paleoclimate conditions is crucial to understand and predict physical processes concerning key regions of our changing climate system.