Geophysical Research Abstracts
Vol. 13, EGU2011-9894, 2011
EGU General Assembly 2011
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Dynamical Impact of Changes in Arctic Sea Ice

Andreas Born (1,2), Kerim H. Nisancioglu (3,4), Christoph C. Raible (1,2), Thomas F. Stocker (1,2)

(1) Climate and Environmental Physics, Physics Institute, University of Bern, Bern, Switzerland (andreas.born@climate.unibe.ch), (2) Oeschger Centre for Climate Change Research, Bern, Switzerland, (3) Bjerknes Centre for Climate Research, Bergen, Norway, (4) UNI Research, Bergen, Norway

Recent years showed a dramatic reduction in Arctic sea ice cover, and a further retreat is expected to occur within this century, possibly leading to an ice-free Arctic during summertime. Since sea ice strongly controls air-sea fluxes of heat and momentum, and because its high reflectance changes the radiation balance, large climate changes have been predicted for the Arctic and analyzed in a relatively large number of scientific studies.
However, beyond these thermodynamical changes, sea ice also has an impact on ocean dynamics that has not yet been investigated in detail. Sea ice is exported continuously from the Arctic, flowing southward along the coast of East Greenland. Although it forms from salty ocean water, the ice rejects most of the salt in the freezing process and therefore is an effective means of transporting freshwater in the ocean. This freshwater transport is highly seasonal and concentrated at the sea surface, in contrast to liquid freshwater advected in the East Greenland Current which is more prone to dilution vertically as well as along the current's flow path and thus in time.
This study investigates the difference between liquid and solid Arctic freshwater export on ocean dynamics using a state-of-the-art coupled climate model.