Geophysical Research Abstracts, Vol. 7, 07223, 2005
SRef-ID: 1607-7962/gra/EGU05-A-07223

Interaction of Arctic sea-ice with Northern Hemisphere climate variability on inter-annual timescales in coupled ocean-sea ice-atmosphere simulations

J. Singarayer, P. Valdes and J. Bamber

Bristol Glaciology Centre, School of Geographical Sciences, Bristol University, University Road, Bristol, U.K. (joy.singarayer@bristol.ac.uk / Fax: +44 117 928 7878 / Phone: +44 117 928 8186)

There is currently considerable interest in the role of sea-ice on changes in climate and climate variability. Variations in sea-ice modify the atmosphere and oceans through its influence on albedo, ocean-atmosphere heat exchange and ocean buoyancy. Studies show clearly that interactions between sea-ice, oceans and atmosphere are likely to be important at seasonal to decadal timescales of variability.

The interaction of Arctic sea-ice with Northern Hemisphere climate variability at these timescales has been investigated. The Hadley Centre ocean-atmosphere model, HadCM3, has been coupled to an elastic-viscous-plastic (EVP) sea-ice dynamics and Semnter zero-layer sea-ice thermodynamics schemes. Multi-decadal length simulations have been performed primarily using pre-industrial atmospheric forcing to determine natural variability and feedback processes inherent to the climate system. The simulations are examined in terms of patterns such as the North Atlantic Oscillation and oceanic thermohaline circulation, and how their characteristics and magnitude are influenced by key sea-ice processes, for example albedo feedbacks, brine rejection, and wind-driven sea-ice motion. Results suggest that ocean overturning strength is directly affected by brine rejection and wind-stress forcing of sea-ice. The frequency of sea-ice variability is influenced by such sea-ice processes, through changes in ocean and atmosphere coupling mechanisms. Differences induced in sea-ice extent impact on high latitude mean climate.