Geophysical Research Abstracts,
Vol. 10, EGU2008-A-08875, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-08875
EGU General Assembly 2008

Arctic shelf seas: Are we getting the full picture?

G. R. Tattersall, C. F. Postlethwaite, M. A. Morales Maqueda, J. T. Holt and A. J. Willmott

Proudman Oceanographic Laboratory, 6 Brownlow St, Liverpool, L3 5DA, UK.
(grta@pol.ac.uk / Fax: +44 151 795 4801 / Phone: +44 151 795 4810)

The Arctic shelf seas are important sites of dense water formation, driven by surface cooling and brine rejection, which contribute to the maintenance of the thermohaline circulation and are critical for regulating global climate. Significant quantities of sea ice are formed in recurrent leads and polynyas, where ice cover is patchy and ice free areas are opened and closed by mechanisms such as strong winds and tidal currents. In global climate models, leads and polynyas are often sub grid scale features, typically 10-100km wide, that are not adequately resolved; consequently, the quantity of sea ice and dense water produced may be underestimated. We have coupled a dynamic/thermodynamic sea ice model to a baroclinic coastal ocean model to investigate the effect of grid resolution (2km, 10km and 25km) on polynya size and dense water production, using three identical domains with uniform topography. The results show that changing the resolution from 25km to 10km enlarged the polynya by 50% and increased ice production by 10% after 5 days, rising to 20% after 10 days. In addition, a 25km resolution domain with realistic topography was used to examine the role that tidal stresses play in exposing areas of open water in the Barents and Kara Seas. Including tidal forcing (not usually a component of global climate models) increased the areas of open water by 2.5% over a 12 month simulation.