Geophysical Research Abstracts
Vol. 16, EGU2014-6506, 2014
EGU General Assembly 2014

Impact of Barents Sea air-sea exchanges on Fram Strait dense water transport

Ben Moat, Simon Josey, and Bablu Sinha
National Oceanography Centre, Southampton, SO14 3ZH, UK.

Impacts of extreme Barents Sea air-sea exchanges are examined using the HadCM3 coupled ocean-atmosphere model. Variability in the Barents Sea winter air-sea density flux is found to be a potentially significant factor in determining changes in the southward transport of dense water through Fram Strait. The density flux variability is primarily driven by the thermal term, FT, due to heat loss to the atmosphere. The other two terms (haline flux and ice formation) play a relatively minor role. The difference in ocean circulation between winters with extreme strong and weak Barents Sea surface density flux anomalies is analysed. This reveals an increase in strong winters of both the north-westwards intermediate depth flow out of the basin and the east-west deep flows north of Spitsbergen and south through the Fram Strait. A linear fit yields a Fram Strait southward transport increase of 1.22 Sv for an increase in FT of 1x10-6 kg m-2 s-1. For the ten strongest Barents Sea surface density flux winters, the Fram Strait winter southward transport increases by 2.4 Sv. This compares with a reduction of 1.0 Sv for the corresponding weakest winters. Furthermore, the properties of the southwards flowing water are modified in strong density flux winters. In such winters, the Fram Strait water below 250 m is colder by up to 0.5 °C and fresher by 0.05 than the climatological winter mean.