Geophysical Research Abstracts
Vol. 20, EGU2018-18755, 2018
EGU General Assembly 2018

Fram Strait sea ice volume export: comparison of a high resolution sea ice-ocean model with remote sensing data

Behnam Zamani (1), Thomas Krumpen (1), Lars H. Smedsrud (2), and Rüdiger Gerdes (1)

(1) Alfred Wegener Institute for polar and marine research AWI, Bremerhaven, Germany, (2) Geophysical Institute & Bjerknes Centre for Climate Research, University of Bergen, Norway

The Arctic sea ice area and volume export and their trends at Fram Strait are studied. A high-resolution 0.1˚ version of the Max Planck Institute for Meteorology Ocean Model (MPIOM) known as STORM, with NCEP atmospheric is used for this study. The captured fluxes by the model were compared with the values derived from NSIDC and ICESat satellite data combined with in-situ sea ice thickness observations. The comparison showed a good consistency between the area and volume fluxes (rarea=0.67 and rvolume=0.58). The mean annual sea ice area export by the STORM model is 860,000 km2 (1990-2010) with no significant difference from the satellite data with a positive bias throughout the period. The corresponding mean annual volume export is 3.3 milion km3 (1990-2010) with no significant difference from ICESat values, though the agreement is less than that of area fluxes (r=0.58). The annual and seasonal trends are consistent with the trends of the available observations the monthly area export has a significant positive trend of +10% per decade in 1990-2010 (up from+6% per decade in 1980-2010) of which, the robust trend in the summer fluxes (Jun-Sep) is the major contribution. We see no trend in volume exports at the significance level of 95%, though the model shows a 6% per decade decline in volume export. This means that the positive trend of the area export is compensated by the simultaneous and robust negative trend of the ice thickness. Consequently, the STORM model simulations indicate that the ongoing changes in Arctic sea ice, changes the ice deformation and export characteristics in Fram Strait change from a thicker old ice to a thinner and younger ice regime that is more responsive to the southward winds leading to even more ice area export but less volume export.