Geophysical Research Abstracts
Vol. 16, EGU2014-2259, 2014
EGU General Assembly 2014

Wind influence on sea ice transport through the Svalbard – Franz-Josef Land gate

Natasha Ridenour, Tor Eldevik, and Lars Henrik Smedsrud
Geophysical Institute, University of Bergen, Bergen, Norway (post@gfi.uib.no)

Arctic sea ice has declined substantially in all months over the last few decades, but mostly during summer. In contrast, sea ice in the Barents Sea has experienced the largest *winter* retreat in the Arctic region. Barents Sea ice experiences high inter-annual variability and is influenced by factors such as Atlantic inflow, regional atmospheric circulation, and ice import from the Arctic Ocean. The wind's influence on sea ice motion through the Svalbard – Franz-Josef Land gate, connecting the Barents Sea and Arctic Ocean, was investigated using drifting buoys, passive microwave derived ice drift, weather station observations, reanalysis, and model simulations. Wind forcing of sea ice near Svalbard was analyzed using sea ice buoy drift and observed winds from Hopen island from March to May 2006. A linear relationship of the form $V_{ice} = 0.0244V_{wind} + 0.3681$ [ms^{-1}] was found between wind speed and ice drift using the free drift assumption. Meridional wind driven ice drift through the Svalbard – Franz-Josef Land gate was investigated using passive microwave satellite data and reanalysis pressure data (1979 to 2011), from which geostrophic wind was calculated. This resulted in a linear relationship of $V_{ice} = 0.0021V_g - 0.002$ [ms^{-1}]. The relationship between wind speed and ice drift was found to be stronger on shorter time scales (hourly/daily) than longer time scales (monthly). Furthermore, the wind had greater influence on sea ice drift when ice cover was thinner, as was the case near Svalbard. Analysis demonstrated that, on average, present ice import from the Arctic Ocean to the Barents Sea through the Svalbard – Franz-Josef Land gate is small. Sea ice drifts faster on the eastern side of the gate compared to the west. However, large ice transport events do occur in winter, given specific atmospheric circulation conditions. Quantification of how effective wind forcing is for ice drift in this region is important for understanding the year-to-year variability, and will likely become more important in the future because of the thinning of the Arctic sea ice.