Geophysical Research Abstracts
Vol. 20, EGU2018-8203, 2018
EGU General Assembly 2018

Variability of the Pacific-derived water over the Wandel Sea shelf (Northeast Greenland)

Igor Dmitrenko (1), Sergei Kirillov (1), Bert Rudels (2), David Babb (1), Søren Rysgaard (3), and David Barber (1)

(1) University of Manitoba, Centre for Earth Observation Science, Winnipeg, Canada (igor.dmitrenko@umanitoba.ca), (2) Finnish Meteorological Institute, Helsinki, Finland, (3) Greenland Climate Research Centre, Greenland Institute of Natural Resources, Nuuk, Greenland

The Pacific water outflow through Fram Strait transports a fraction of the low salinity Pacific-derived Arctic water southward along the east coast of Greenland. However, the pathways of the Pacific water along the Greenland coast are debatable. The Ice Tethered Profiler (ITP) was deployed over the Wandel Sea shelf in May 2015 at 178 m depth. The ITP collected a profile every 3 hours between 4 m and 150 m depth until May 2016 recording CTD and optical data on CDOM (Colored Dissolved Organic Matter) fluorescence. CDOM is a good tracer of the Arctic Ocean terrigenous organic matter. In the Canada Basin the CDOM maxima is also attributed to the winter Pacific water. Over the Canada Basin, Pacific water impacts the halocline structure, producing a double halocline with a "cold Halostad" formed by the volumetric injection of the winter Pacific water that overlies halocline water. The ITP data from the Wandel Sea shelf revealed that the sub-surface (15-70 m depth) low stratified "cold Halostad" layer with salinities of 30-31.5 and temperatures down to -1.7°C resembles a "cold Halostad" in the Canada Basin. The ITP data also show that the halostad is associated with the CDOM maxima. We suggest that the Wandel Sea halostad is maintained by the coastal branch of the Pacific water outflow from the Arctic Ocean, modified by interaction with river runoff water over the Canada Basin. Moreover, the halostad clearly demonstrates a seasonal-like behavior. From September to March, it is shallower and warmer, and the CDOM is reduced. This likely indicates higher fraction of the winter Pacific water during summer. The seasonal dynamics can be attributed to the seasonal origin of winter Pacific water in the Arctic Ocean. Seasonal variation of the local wind is also among the possible factors governing seasonal changes of the halostad. Over the northeast Greenland, winter winds have a northerly component from September to May, favouring Ekman transport of the Pacific-derived water to the Wandel Sea shelf. In contrast, the prevailing southerly summer winds are weaker resulting in retreat of the Pacific water coastal current off the Wandel Sea shelf.