Geophysical Research Abstracts
Vol. 18, EGU2016-1006, 2016
EGU General Assembly 2016

First oceanographic observations on the Wandel Sea shelf in Northeast Greenland: Tracing the Arctic Ocean outflow through the western Fram Strait

Igor A. Dmitrenko (1), Sergei A. Kirillov (1), Bert Rudels (2), David G. Babb (1), Leif T. Pedersen (3), Soeren Rysgaard (1,4,5), Yngve Kristoffersen (6), and David G. Barber (1)

(1) Centre for Earth Observation Science, University of Manitoba, Winnipeg, Canada (igor.dmitrenko@umanitoba.ca), (2) Finnish Meteorological Institute, Helsinki, Finland (Bert.Rudels@fmi.fi), (3) Danish Meteorological Institute, Copenhagen, Denmark (ltp@dmi.dk), (4) Greenland Climate Research Centre, Greenland Institute of Natural Resources, Nuuk, Greenland (soeren.rysgaard@umanitoba.ca), (5) Arctic Research Centre, Aarhus University, Århus, Denmark (soeren.rysgaard@umanitoba.ca), (6) Nansen Environmental and Remote Sensing Centre, Bergen, Norway (yngve.kristoffersen@uib.no)

The first-ever conductivity-temperature-depth (CTD) observations on the Wandel Sea shelf in North Eastern Greenland were collected from the land-fast ice in April-May 2015 as a part of the Arctic Science Partnership collaboration during the first research campaign at the Villum Research Station. They were complemented by (i) the ice-tethered profiler (ITP) and Acoustic Dopler Current Profiler (ADCP) mooring observations in ∼300 m of the tidewater glacier outlet from the Flade Isblink Ice Cap and (ii) CTDs taken in June-July 2015 along the Wandel Sea continental slope during the Norwegian FRAM 2014-15 sea ice drift. The CTD profiles deeper than 100 m are used to reveal the origin of water masses and determine the extent to which these water masses have interacted with ambient water from the continental slope. The subsurface water layer from ∼20-70 m depth is comprised of freshened water (30-32 psu) that is likely associated with the Pacific Water outflow from the Arctic Ocean through the western Fram Strait. The underlying halocline layer centered at ∼80 m (∼33 psu) separates the Pacific Water layer from a deeper (<140 m) layer of modified Polar Water that has interacted with the warm Atlantic Water outflow through Fram Strait. The Atlantic Water layer with temperature above 0°C is recorded below 140 m. Over the outer shelf, the halocline layer shows numerous cold density-compensated intrusions indicating lateral interaction with an ambient Polar Water mass across the continental slope. Mooring data shows an enhanced shelf-slope interaction responding the storm event in 23-24 April 2015 with northerly winds exceeding 10 m/s. The on-shelf transport of a cold and turbid water from the upper continental slope results in enhanced interleaving within the depth range of the halocline layer (∼70-100 m). Our observations of Pacific Water in the Wandel Sea subsurface layer are set in the context of upstream observations in the Beaufort Sea for 2002-2011 and downstream observations from the Northeast Water Polynya (1992-1993), and clearly show the modification of Pacific Water during its advection across the Arctic Ocean from the Bering Strait to Fram Strait. Moreover, the Wandel Sea shelf and continental slope water shows a different water mass structure indicating the different origin and pathways of the on-shore and off-shore branches of the Arctic Ocean outflow through the Western Fram Strait.