Geophysical Research Abstracts
Vol. 17, EGU2015-7083, 2015
EGU General Assembly 2015

Increasing freshwater runoff and tidal action influences on spatial mixing patterns in Søndre Strømfjord, West Greenland.

Crystal Smiley (1), Nick Kamenos (1), Trevor Hoey (1), Finlo Cottier (2), and Rob Ellam (3)

(1) School of Geographical and Earth Sciences, University of Glasgow, Glasgow, G12 8QQ, UK, (2) Scottish Association for Marine Science, Scottish Marine Institute, Oban, Argyll, PA37 1QA, UK, (3) Scottish Universities Environmental Research Centre, East Kilbride, G75 0QF, UK

Greenland Ice Sheet melt has the potential to affect global sea levels and the strength of the thermohaline circulation (THC). Investigating spatial mixing patterns of seawater in Greenlandic fjords can help reveal characteristics of changes in runoff from the GrIS; for example higher runoff may be associated with lower salinity within GrIS fjords, which can be recorded by palaeoenvironmental proxies (Kamenos et al 2012). The Kangerlussuaq Drainage Basin mirrors melt patterns of the whole GrIS and drains into Søndre Strømfjord, a 170km long fjord on the west coast of Greenland. Temperature and salinity profiles to 40m depth were obtained at 11 stations along Søndre Strømfjord during the 2014 melt season. Each station was sampled twice once at high KDB runoff and once at low KDB runoff. With increasing freshwater runoff, salinity decreased by 1.65 – 2.91 and temperature increased by 0.47oC- 2.34oC at each station over a 7 hour time period. Higher salinities occurred at low run-off. In addition, with increasing run-off, the disparity between surface and deeper water (30m) salinity became greater with a 19.3 difference between the surface and 30m. This information was integrated with oxygen and deuterium isotopic signatures collected at 10 m depth from each station to pinpoint the exact source of the runoff causing salinity reductions. With increasing freshwater runoff, the chemistry of the fjord exhibits an enrichment of the heavier isotope. δ18Ovsmow values enrich by 7.40 permil while δDvsmow enrich 53.26 permil. Our data shows a relationship between KDB runoff, salinity, and oxygen, hydrogen isotopic chemistry of Søndre Strømfjord, data that will enable further calibration of marine proxies of GrIS melt.

References

Kamenos, N.A, Hoey, T.B, Nienow, P., Fallick, A.E., & Claverie, T., 2012: Reconstructing Greenland Ice Sheet runoff using coralline algae; Geological Society of America, Geology, doi: 10.1130/G33405.1