



Changes in Arctic freshwater export: a new proxy from 30 years of hydrographic surveys in the Labrador Sea

Cristian Florindo-Lopez (1), N. Penny Holliday (2), Sheldon Bacon (2), and Yevgeny Aksenov (2)

(1) University of Southampton, National Oceanography Centre, Southampton, UK, (2) National Oceanography Centre, Southampton, UK

The Arctic Ocean is the most rapidly changing environment in the globe. One of the observed changes is a significant increase in the freshwater storage at the region. It is believed that a large and rapid export of this freshwater into the North Atlantic could potentially affect high-latitude dense water formation, the overturning circulation and climate. However, Arctic freshwater fluxes to the Labrador Sea are poorly known and observational time series are not available beyond the last decade. We present a new insight in Labrador shelf dynamics, which allows us to connect locally-observed property variability to net Arctic freshwater exports west of Greenland. By combining the high-resolution (1/12 degree) NEMO model and hydrographic observations at the Labrador Shelf, we describe two major components of the shelf circulation. On the one hand the Labrador Current fills the shelf with Arctic originated waters. On the other hand, the Hudson Strait Outflow generates a very distinctive inshore buoyancy-driven flow. This newly described current is geographically and dynamically independent of the Labrador Current, and we are able to separate it from the waters of Arctic origin which flow further offshore. We apply this methodology to a Labrador hydrographic time series of over 30 years in length, allowing us to generate a proxy that we can use to assess the variability of Arctic freshwater export west of Greenland for over 30 years. We show that on decadal timescales, periods of decreased freshwater export on the Labrador Shelf coincide with periods of increased Arctic freshwater content.