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Freshwater sources in the North Atlantic subpolar gyre from isotopes of sea water

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The surface freshwater budget of the North Atlantic subpolar gyre may contribute to control the meridional overturning variability. The isotopic composition of sea water is sensitive to the origin of the freshwater. It can be used together with salinity measurements and other tracers to investigate the relative contributions of water from Greenland icesheet and sea ice melt or Arctic freshwater to the surface layer budget. The transect Iceland-Newfoundland was sampled for isotopic measurements during two periods (1994-1996 and the 2010s) in order to assess the recent changes. These two periods are very contrasted in terms of ocean circulation and Labrador Sea water formation. The recent one corresponds to a period of accelerated melting of Greenland icesheet and of reduced subpolar and Arctic ice cover. In both periods, the Labrador Current carries a large part of the freshwater from the higher latitudes.
These sections illustrate the seasonal variability of the freshwater input to the Labrador Current. On the Newfoundland shelf and slope, the salinity variability is dominated by the successive formation and melting of sea ice. We also observe decadal changes in the relation between salinity and isotopic composition in the interior subpolar gyre.