Tracing the circulation in the Subpolar N. Atlantic using long-lived radionuclides

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The transformation of water masses occurring in the subpolar North Atlantic (SPNA) has a large impact on the Meridional Overturning Circulation. Among the most important processes is the ventilation of the ocean interior via the inflow of dense waters through the Greenland-Scotland passages and the in-situ dense water formation in the Irminger and Labrador Seas. Such waters can be traced using long-lived radionuclides that were introduced as global fallout in the 1960s and as liquid releases from European nuclear fuel reprocessing plants since the 1950s to present. In this work, we aim at better understanding the main ventilation pathways and their time-scales, by comparing the distribution of ^{129}I along the GE/OVIDE transects from Portugal to Greenland (2014 and 2018) and to Greenland-Newfoundland (2014). These ^{129}I data are combined with earlier observations to estimate transit times and dilution factors of ISOW alongside the Reykjanes Ridge and southwest of the Rockall Plateau. We also extend the existing ^{129}I time series for DSOW at the Labrador Sea. Our results provide more insight about the loops of Atlantic Waters in the Arctic Ocean. Additionally, we measured other artificial and natural radionuclides such as ^{236}U and ^{14}C, which will be explored to shed more light on water mixing and transient changes in the water circulation of the SPNA.