Distribution of ^{129}I in the Fram Strait

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The Fram Strait is a region of particular importance regarding water mass circulation, as it is the only deep gateway allowing for intermediate and deep water exchange between the North Atlantic and the Arctic Ocean. The long-lived artificial radionuclide ^{129}I is known to be a suitable tracer to study circulation patterns in the Nordic Seas and the Arctic Ocean due to its locally and timely constrained release by two European nuclear reprocessing plants.

Here we present a first comprehensive dataset of ^{129}I from the Fram Strait region. About 140 water samples (19 deep profiles) were taken during the R/V Polarstern cruise PS100 "GRIFF" in 2016 and measured with AMS at ETH Zürich. Resulting ^{129}I concentrations ranged between (2.6±0.1) $x10^7$ and (628±9) $x10^7$ atoms kg^{-1}, with lowest values occurring in deep Atlantic waters inflowing into the Arctic Ocean. Highest concentrations were observed in the surface waters of the East Greenland Current (outflow from the Arctic Ocean), which are nearly twice as high as concentrations measured in the West Spitzbergen Current (inflow to the Arctic Ocean). The high ^{129}I concentrations represent Atlantic waters carrying the signal of the reprocessing plants, either arising from a local recirculation of inflowing Atlantic waters or indicating the return flow of Atlantic waters that have circulated through the Arctic Ocean. The ^{236}U data from the same samples is currently under preparation and will be shown if available. The $^{129}I/^{236}U$ ratio can be used to constrain sources of waters in the Fram Strait region.