

MO190 Enrichment of perfluoroalkyl substances (PFASs) in Arctic sea-ice O.R. Bertrand, Lancaster Environment Centre; C.J. Halsall, Lancaster University; D. Herzke, Norwegian Institute for Air Research; S. Huber, Norwegian Institute for Air Research / Department of Chemistry; P. Carlsson, The University Centre in Svalbard / Arctic Technology Department; R. Kallenborn, Norwegian University of Life Sciences / Arctic Technology; T. Nordstad, Norwegian Polar Institute / Fram Centre; S. Del Vento, The Reach Centre Ltd. / Lancaster Environment Centre; M.H. Hermanson, The University Centre in Svalbard / Arctic Technology Department. Poly- and perfluoroalkyl substances (PFASs) are subject to long range transport and have been reported in the Arctic and to a lesser extent in coastal areas of Antarctica. Here we report concentrations of C₈-C₁₀ perfluoroalkyl acids (PFAAs) and other PFASs such as PFOS^A (perfluorooctane sulfonamide) measured as part of ship-based campaigns in the Barents Sea and the coastal areas of Svalbard in the Norwegian Arctic. Samples of snow, sea-ice and beneath-ice seawater were collected in April 2011 and again in May 2012. Care was taken to avoid contamination during fieldwork operations and as such method detection limits generated from field blanks were low (~ND-40 pg L⁻¹ of meltwater or seawater). PFOA and PFNA dominated the PFAAs profile in the late-season snowpack averaging 237 and 333 pg L⁻¹ (snowmelt), respectively. However, in the sea-ice (multi-year ice) a wider number of PFASs were detected and the concentrations were higher than in snow. In the case of PFOA, concentrations in bulk ice exceeded 3500 pg L⁻¹, >>10-fold higher than levels observed in snow or seawater and differences were also apparent between the upper and lower sea-ice. Enrichment factors of ~30-150 were apparent between 'old' snow and lower sea-ice for density-corrected concentrations, with enrichment most pronounced for the even carbon chain-length PFAAs [e.g. C₈-PFHpA (0.77 here between upper and lower sea-ice) and C₁₀-PFNA⁷ (1.50) compared to C₈-PFOA (16.2) and C₁₀-PFDcA (50.3)]. Similarly particle-bound PFAAs were close to or below method detection limits in the snowpack, but were present in the sea-ice with possible differences between upper and lower (0.15 m to 0.50 m depth from the base of the snowpack) sea-ice samples suggesting inter-annual chemical processing during ice formation and ageing. Levels of PFAAs in seawater were low and comparable to those measured in the snowpack with perfluorooctane sulfonate (PFOS) only detected in upper sea-ice at a relatively high concentration (397 pg L⁻¹). Significant accumulation of PFASs occurs in sea-ice. The timing of ice melt and associated release mechanisms will play an important role in controlling the exposure of these chemicals to the lower marine food web.