EGU22-2255
https://doi.org/10.5194/egusphere-egu22-2255
EGU General Assembly 2022

Bromine, Iodine and Mercury on the East Antarctic plateau: preliminary results from sampling along a traverse.

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Sunlit snow is highly photochemically active and plays a key role in the exchange of gas phase species between the cryosphere and the atmosphere. Bromine (Br), Iodine (I) and Mercury (Hg) can be photoactivated by the UV radiation and, in certain circumstances, released from the snowpack into the atmosphere. Mercury is a heavy metal with a known toxicity present in the environment in several different chemical forms. Once present in the snowpack, Hg is very labile and, thanks to the UV light, it can be reduced back to elemental Hg (Hg(0)) and undergo dynamic exchange with the atmosphere. Similar to mercury, iodine can undergo photochemical activation in surface snow resulting in its presence in the surrounding atmosphere where it plays a crucial role in new particle formation. Bromine has a central role in the mercury cycle in polar regions (through the Atmospheric mercury depletion events) as well as contributing to the tropospheric ozone cycle in the polar region causing the so-called Ozone depletion events. However, compared to Iodine and Mercury, it seems to be more stable after deposition into the snow pack.

Here we present measurements of bromine, iodine and mercury performed by ICP-MS, on snow pit and shallow core samples taken over a 2100 km traverse in East Antarctica from the coast to the interior (Talos Dome – Dome C traverse 2016 and East Antarctic International Ice Sheet Traverse, EAIIST 2019). The shallow core and the snow pit samples at each site are estimated to cover about 10 to 20 years of snow accumulation, giving us a deposition record from approximately the late 90s, to around the early 21st century. The concentrations determined in different sampling sites show a rather clear decrease trend from the coast with the minima as we approach the inner part of the Antarctic plateau. In addition, the analysis of surface and bulk samples from EAIIST show a decrease of concentrations toward the inland except for the sites characterised by a strong snow metamorphosis caused mainly by the wind friction. In almost all

the sampling sites of the EAIIST traverse the concentrations of Br, I and Hg increase with sample depth, possibly due to snowpack photochemical activation in the upper part of the snowpack. Future studies are planned to investigate the possible link between the determined concentration profile and the variation of the solar radiation reaching the Antarctic Plateau during spring caused by the ozone hole formation.