



Project acronym: ArcticMP

Project title: Arctic microplastic invasion through atmospheric deposition

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Discipline: Earth Sciences & Environment: Other - Environment

Station(s): Ny-Ålesund Research Station - Sverdrup (Svalbard/Norway)

Atmospheric microplastic appear ubiquitous in air. In cities atmospheric microplastic (MP) has been reported to levels of $>24000\text{MP}/\text{m}^2/\text{day}$ while remote areas show $>365\text{MP}/\text{m}^2/\text{day}$ (Allen et al., 2019; Zhang et al., 2020) and $>23.6\text{ng}/\text{mL}$ of nanoplastic (Materić et al., 2020). The recent Arctic studies identified microplastic on or in snow in the Fram Strait and northern Europe (Bergmann et al., 2019). Nanoplastic has not yet been quantified in the arctic environment. Whether these microplastic particles were transport by air and deposited onto the arctic terrain or whether they are locally sources, marine sourced or transported by animals or other mechanisms is not known. It is important to know how much and by what processes this plastic is reaching this remote area as the Arctic functions as a sentinel to environmental pollution occurring globally. It is theorised that the majority of this micro-nanoplastic is being transported and deposited on the arctic terrain by air. This project proposes to quantify the atmospheric microplastics in the relatively remote Arctic environment by undertaking a 4-week sampling campaign of daily atmospheric samples in Svalbard (Sverdrup research station), a location that have basic atmospheric monitoring records (wind direction, temperature, precipitation) and can provide a representation of extreme northern/Arctic and relatively remote location. Samples will be collected by NILU deposition collectors and air samplers and analysed to identify polymer types, characteristics (shape, size, particle count) and mass. Back trajectory modelling (HYSPLIT/FLEXPART) will then be done to illustrate where this deposited plastic pollution may come from. This study will be the baseline atmospheric deposition dataset for global atmospherically transport terrestrial pollution and the first air transported analysis of Arctic plastic pollution.