# ARCTIC 2022 – IMPLEMENTED PROJECTS

## NANOPLARCTIC

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## ABSTRACT

The recent communication of the AMAP initiative declares that "*Litter and microplastics must be monitored in the Arctic environment to understand their sources, transportation patterns, spatial and temporal trends, and possible impacts on the Arctic...*" In the Arctic, microplastics have already been detected in marine waters[1,2], sediment[3], the ice pack[4], and snow[5]. And yet, in the plastic debris lifecycle, it is very likely that nanoplastics will pose a greater risk than the microplastics (>1 µm) due to their smaller size, the higher surface to volume ratio, and their associated increased chemical reactivity. Unlike microplastics, nanoplastics may reach and penetrate all organs, including the placenta and brain, as it was observed for nanosized particles[6–8]. Even if there are no publications relating the nanoplastics presence in the Arctic, our new observation in marine systems during the last CCGS Amundsen scientific campaign (2021) (not published yet), we detected nanoplastics presence in sea ice and sea surface.

**The main expedition's objective proposed here is to document the presence, fate, and impact of nanoplastics and anthropogenic nanoparticles in the Arctic Ocean.** In this context, several questions are raised: what is the distribution of nanoplastics from land-source to the North Pole and open oceans? Does the Arctic play as a sink or a catalyzer of their transportation?

All these questions must be urgently addressed in the context of the global change of our environment. Indeed, the investigation of the nanoplastics presence, fate, and impact is immediate, considering the flow of plastic debris added to the oceans every year, currently estimated at several million tons[9]. Based on our preliminary work[10] in the Beaufort Sea, we hypothesize that nanoparticles remain stabilized and dispersed at the sea surface and sea-ice interface. At this interface, nanoparticles could hetero-aggregate with the natural organic matter, increase in size, and be assimilated by the biota and partially sediments or trapped with particles in ice and sediments. In the last expedition of the CCGS Amundsen in the Beaufort Sea, we identified the presence of nanoplastics in the seawater surface and sea-ice.

**References**

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