
Microplastics in the Arctic

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Abstract

Globally, the abundance of microplastics in our oceans is increasing. Previous studies have shown the Arctic to exhibit significant abundances of microplastics, with the highest levels observed in the Barents Sea. Due to the convergence of currents in the Barents Sea, it is an area of high productivity, and shows potential for a sixth ocean gyre. Consumption of microplastics by zooplankton may occur due to the size overlap with their food source, phytoplankton. This can result in detrimental effects on growth and fecundity as well as disruption to in key processes within the water column. This study aims to explore data collected from samples of sub-surface water collected from transects through the Barents Sea to; 1) quantify and characterise microplastics, 2) investigate the potential presence of a sixth ocean gyre, and 3) explore the co-occurrence of microplastics and phytoplankton. Overall, the mean microplastic abundance was 0.0106 m⁻³ and predominantly consisted of fibres (92.08%). Microplastics were found in higher abundances nearer land mass at the southern end of the transect and also northwards towards the ice edge, however this study showed no additional evidence toward the presence of a potential sixth ocean gyre. The colour of microplastics were dominated by blue (79%) and red (17%) and polymers identified consisted of Polyester, Copolymer, Elastomer, Polyamide, Acrylic group, Polytetrafluoroethylene. No correlation was seen between abundance of microplastics and phytoplankton, however, they were both present throughout each sampling site and due to the comparable size of zooplankton prey to microplastics, the likelihood of accidental consumption is high.

Keywords: Microplastics, Barents Sea, Arctic, Zooplankton, Sixth ocean gyre.

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