

Underwater Imaging of Marine Snow in Admiralty Bay

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1. INTRODUCTION

Marine snow morphology and distribution has been already investigated in Arctic region using underwater imaging, but this research is the first one focusing on Antarctic region. The main source of marine particles and their aggregates are the glacier meltwaters, decaying phytoplankton and the by-products of their consumers. Therefore, the knowledge about marine snow composition and morphology may constitute an important new indicator of the processes occurring in the coastal waters. Research objective was to characterize marine snow composition and concentrations, as well as to estimate driven by it carbon export flux in order to broaden our understanding how they change across various glacial bays at a time of climate change. Moreover, we aimed to compare Arctic and Antarctic marine snow to check if their origin deduced by morphology is similar.

2. METHODS

Field campaigns took place in the summers of 2023 and 2024 in Admiralty Bay, the largest bay of King George Island, South Shetland Islands. Imaging using underwater camera UVP6, supplemented by CTD profiles, was conducted at stations representing various horizontal gradients across various branches of the bay.

3. RESULTS AND DISCUSSION

Our results show that these two years varied environmentally, year 2023 was warmer, with higher chlorophyll-a fluorescence and fresher than 2024, which might have influenced the observed differences in marine snow composition and concentration between years. Furthermore, 2023 was a year of higher concentrations of marine snow and greater differentiation in relative roles in morphotypes. Even small differences in distance from the glacier as well as differences in timing of imaging showed changes in composition and concentration of particles, but with no consistent pattern. Vertically, higher concentrations of marine snow were near surface and

decreased with depth. Comparison of data from Antarctic with data collected in the Arctic glacial bays showed that in general, there were similarities in marine snow morphology in these two distant regions, meaning they mostly shared the range of various morphological traits. However, particles from Antarctic have larger scale of variability in most traits.

This research gives highly valuable information about marine snow morphology and concentration in Antarctic region, next step is to connect this data with information about phyto- and zooplankton variability in Admiralty Bay to provide a broader picture of pelagic functioning in this vulnerable region.

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