

Snapshots of soft sediment benthos influenced by glacier retreat in an Antarctic fjord: assemblage structure, functioning and biogeochemical cycling

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The West Antarctic Peninsula (WAP) is one of the fastest warming regions on Earth. Recent observations on the WAP have documented the rapid retreat of many tidewater glaciers and the warming of mean air temperatures. This resulted in increased iceberg scouring, local snow and permafrost melting and related freshening events, and higher sediment loads to coastal waters. All these disturbances are known to affect the marine assemblages. At the same time, new ice-free areas are appearing from beneath the ice and represent new habitats for the establishment of benthic assemblages via colonization and succession processes. Potter Cove (King George Island) is a fjord at the northern tip of the WAP, and it is among one of the hot spots of biodiversity of the Antarctic shelf. Benthic biomasses in the cove are extremely high and comparable to those of temperate regions. The structure, functioning and carbon and nitrogen cycling potential of these communities was the focus of a three-fold study which started in 2010 and finished end of 2016. We investigated three size classes (microbenthos, meiofauna and macrofauna) of the soft sediment assemblage of Potter Cove at three sites which differed in the glacier retreat-related disturbance regimes and had different ice-free age status. We focused on (i) standing stocks, (ii) trophic relationships and (iii) in situ biogeochemical cycling, the latter by means of in situ deployment of benthic chambers during summer, winter under ice measurements, and spring. Soft sediment communities have been only poorly studied in the Antarctic. This widely comprehensive and interdisciplinary investigation is unique in its kind and the data and observations gathered during this research represent a baseline in the understanding of the role of Antarctic soft sediment communities in the local, regional and global marine system.