An Acad Bras Cienc (2023) 95(Suppl. 3): e20230451 DOI 10.1590/0001-3765202320230451
Anais da Academia Brasileira de Ciências | *Annals of the Brazilian Academy of Sciences*
Printed ISSN 0001-3765 I Online ISSN 1678-2690
www.scielo.br/aabc | www.fb.com/aabcjournal

GEOSCIENCES

Biogeochemical and oceanographic conditions provide insights about current status of an Antarctic fjord affected by relatively slow glacial retreat

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Abstract: Understand the origin, transport, and character of organic matter entering Antarctic fjords is essential as they are major components of the global carbon cycle and budget. Macromolecular pools of particulate organic matter, bulk organic geochemistry, major and trace elements in surface sediments from Collins Bay were analysed as source indicators. Oceanographic conditions, bathymetry (multibeam) and grain size were considered as environmental controlling factors. Sediment samples were taken with a van Veen grab, during the ANTAR XXV Peruvian expedition (February 2018), onboard the R/V "*BAP Carrasco*" from the Peruvian Navy. Biopolymeric composition revealed the predominance of fresh marine protein-rich organic matter in the seafloor of Collins Bay, denoting high quality food resource for marine benthic heterotrophs. Based on Igeo values (between 0 and 1) Collins Bay can be considered unpolluted with natural levels of As, Cd, Cr, Cu, Fe, Mn, Ni, Pb and Zn. Distribution of most of these elements with a gradient of decrease from the shallow inner fjord towards the outer deepest fjord, suggest their association with the deposition of detrital material and lithogenic particles supplied by Collins Glacier frontal ablation and runoff. This first comprehensive baseline information would assist in interpreting downcore sedimentary reconstructions and future climate-induce changes.

Key words: organic and inorganic elements, biopolymeric carbon, glacio-marine sedimentation, terrestrial inputs, unpolluted sediments.

INTRODUCTION

The rapid atmospheric and surface ocean warming undergone by the West Antarctic Peninsula (WAP) during the second half of the last century, have been associated with documented reductions in the thickness and extent ice cover (Meredith & King 2005, Turner et al. 2016). Maritime Antarctica, including the South Shetland Islands is particularly affected by these climatic changes, leading to increase precipitation, the shortening of the sea ice season, and also, the acceleration of ice melting and retreat rates of marine-terminating glaciers (Rückamp et al. 2011, Boy et al. 2016, Meredith et al. 2018). Glacier retreat impacts the adjacent marine environment in many ways, contributing to sea level rise by increased freshwater budgets, exposing newly available ice-free areas to colonization and weathering processes, and increasing the transport of organic and inorganic material from land and glaciers to the ocean (Kim et al. 2015, Boy et al. 2016). In addition, enhanced