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Information on chemical pollution at Port Foster, Deception Island

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An Information Paper submitted by Portugal and Spain

Summary

This paper reports of emerging contaminants in phytoplankton samples collected from Port Foster, Deception Island (South Shetland Islands, Antarctic Peninsula). A total of 70 persistent pollutants (including, Biocides, PAHs, POPs, PCPs, and Pharmaceuticals) from human origin were found, with pharmaceutical compounds the largest group of emerging contaminants identified. We encourage Parties to set up monitoring programs to mitigate and remediate chemical pollutants from across the Antarctic Treaty area, to help inform future monitoring research and policy development, and consider the implementation of appropriate contamination control and remediation methods.

Introduction

The Protocol on Environmental Protection to the Antarctic Treaty states that activities in the Antarctic Treaty area shall be planned and conducted to limit adverse impacts on the Antarctic environment. Considerable initial work has been made by many National Antarctic Programmes, via SCAR and COMNAP, on the Antarctic Environmental Monitoring Handbook (May 2000) that National Antarctic Programs have implemented and improved as technology advanced.

Within the Antarctic Peninsula region, the South Shetland Islands have been subject to long-term human activity, which increased with the establishment of research stations as scientific activity in the region expanded. In accordance with the provisions of Annex I to the Protocol, the region has been the subject of scientific investigations for monitoring of environmental impact (ATCM XXII/IP44; ATCM XXXI/IP30) with more recent research suggesting that some areas have been subjected to negative environmental impact caused by historic and potentially on-going local human activity around the scientific stations (ATCM XXXIX/IP8, ATCM XL/IP22) and the increasing pressure of tourism (ATCM XLIII/IP110). As there is scarce information on the presence of these emerging contaminants, such as Biocides, Persistent Organic Pollutants (POPs) as well as Pharmaceutical and Personal Care Products (PPCPs) in the Antarctic Treaty Areas, this paper reports on the most recent scientific evidence of these emerging contaminants in Deception Island, South Shetlands Island (Antarctic Peninsula region).

Information of emerging contaminants

An untargeted screening of the metabolome of the phytoplankton community, collected at two sites in Port Foster Bay at Deception Island, was performed. Seventy different contaminant compounds were found to be present. These emerging contaminants included 1 polycyclic aromatic hydrocarbon (PAH), 10 biocides (acaricides, fungicides, herbicides, insecticides and nematicides), 11 POPs (flame retardants, paints and dyes, polychlorinated biphenyl (PCB), phthalates and plastic components), 5 PCPs (cosmetic, detergents and dietary compounds), 40

pharmaceutical compounds and 3 illicit drugs. Pharmaceutical compounds were, by far, the largest group of emerging contaminants found in phytoplankton cells (anticonvulsants, antihypertensives and beta-blockers, antibiotics, analgesic and anti-inflammatory drugs)(Duarte et al. 2021) (Figure 1).

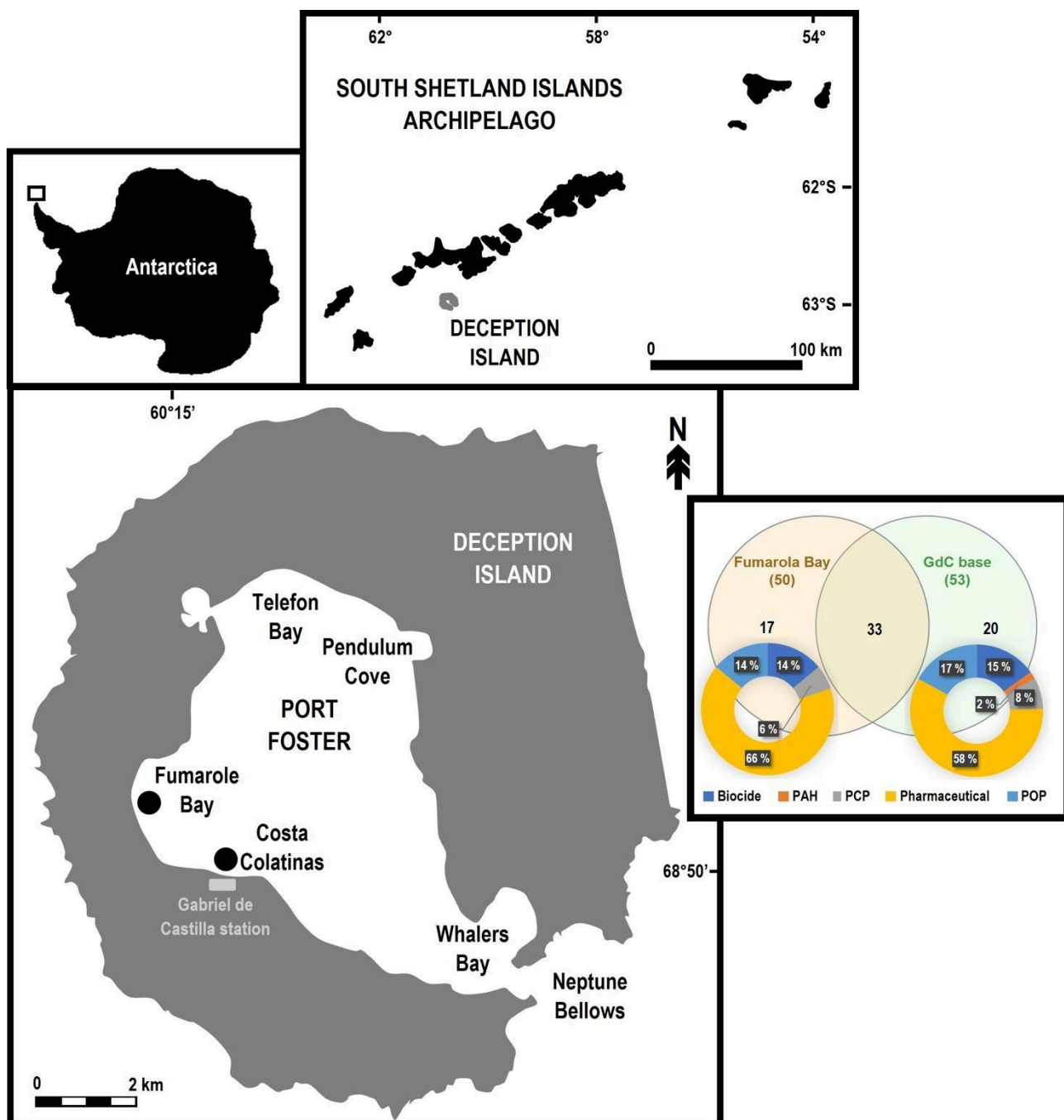


Figure 1. Location of sampling sites, in the vicinity of the Spanish Gabriel de Castilla station (GdC station) and at Fumarole Bay, situated in Foster Bay, Deception Island (South Shetland Islands archipelago, Antarctica), and relative abundance of the total contaminants classes per site and Venn diagram made for the detected contaminants for both sites.

As Port Foster is a semi-closed natural port with a long residence time, the bioaccumulation rates of these potential compounds is unknown at the site and there is a large number of vessels visiting Port Foster, it is extremely difficult to identify the sources of these contaminants, evidencing that a more extensive sampling program in time and space may be needed to find

suitable and effective mitigation and protection guidelines. The present findings provide evidence that a diverse range of persistent pollutants of human origin are found in the Antarctic food chain. Further consideration should be given by the CEP to the development of policy aimed at reducing the release of persistent pollutants into the Antarctica environment.

Reference

Duarte, B., C. Gameiro, A. R. Matos, A. Figueiredo, M. S. Silva, C. Cordeiro, I. Caçador, P. Reis-Santos, V. Fonseca, and M. T. Cabrita. 2021. First screening of biocides, persistent organic pollutants, pharmaceutical and personal care products in Antarctic phytoplankton from Deception Island by FT-ICR-MS. *Chemosphere* **274**:129860