

## **The role of volcanism as a source of trace-elements to the environment: The case of Deception Island, Antartica.**

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Deception Island (DI) located in the South Shetland Islands Archipelago near the Antarctic Peninsula is among the most active volcanoes of this region, having erupted at least 6 times since it was first visited around 160 years ago. DI consists of a composite volcano, whose central part is occupied by an 8.5 by 10 km elongated collapsed caldera. Port Foster Bay, the sea-flooded part of the caldera depression, is slightly smaller due to the numerous post-caldera eruptions that occurred around the caldera wall margins.

Some studies in DI showed that the active volcanism is an active source of trace element contaminants namely Arsenic (As), Copper (Cu), Cadmium (Cd), Lead (Pb) and mercury (Hg) however, the biogeochemical cycle of these elements in this remote system have only been recently studied.

Sources and speciation of the above trace elements were investigated, and a hydrological transport model were developed to trace those elements inside the caldera and their impact to the surrounding Southern Ocean. Organisms' accumulation was also studied.

Results showed that in saline waters, Cu and Pb had important punctual sources, and that concentrations of Cd and Hg were consistently high pointing to the existence of a natural and diffuse source related with the hydrothermal activity. Environmental conditions inside the caldera were found to be optimal for Hg methylation (formation of the toxic methylmercury) with measured rates higher than in other polar systems. These results coupled with a higher resident time of water inside the caldera suggest a potential impact in the living organisms due to the accumulation of the studied trace elements in caldera waters.

This work clear indicates the impact of active volcanism as a source of natural contamination and their potential role on the local, regional and global biogeochemical cycles, which is far for being taking into account in the current global biogeochemical models.