

Atmosphere-Ocean-Island-Biogeochemical Interactions in the Macaronesian region (AIMAC)

(Expedition POS533 from 28.02-22.03.2019 Mindelo-Las Palmas-Funchal-Las Palmas)

A three weeks expedition with RV Poseidon on atmosphere-ocean-island-biogeochemical cycles in the Macaronesian region in conducted in March 2019. It intends to capture natural and anthropogenic interactions in this highly dynamic region. The Macaronesian region with many different islands is an ideal natural laboratory to study anthropogenic and natural sources of trace gases, their emissions and transport into the ocean and their interaction with marine biogeochemical cycles. It offers the opportunity to also investigate the highly coupled and dynamic atmospheric and oceanic processes on the air-sea exchange of climate-active gases. In close cooperation between the onboard scientists from GEOMAR, Madeira, the Canary Islands and Cape Verde, we hope to be able to explore the full potential of the huge interdisciplinary atmospheric, oceanic biogeochemical and planktonic dataset that will be obtained from the cruise.

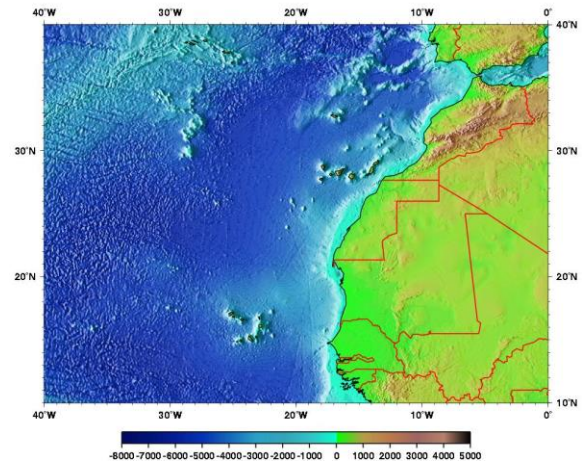


The main goals of the expedition are:

1. Understand the sources, distribution, emissions, gradients and transport of bromoform and other trace gases from urbanized coastlines into the open ocean. We will use bromoform (CHBr_3), a halogenated, volatile compound, formed in large quantities during water disinfection as a proxy to trace coastal water and air transport, to quantify its abundances and sources and try to assess its local, regional and possibly global impact.
2. Testing bromoform and other halocarbons to differentiate between the anthropogenic and natural imprint of the island-induced biogeochemical enhancement of nutrients and productivity in the oligotrophic region around the Macaronesian islands.
3. Identification of the air-sea fluxes and atmospheric transport of terrestrial natural and anthropogenic trace gases to assess a possible deposition and impact on marine biogeochemical cycles
4. Identify biogeochemical signatures and microbial community differences between on- and off shore regions of the Macaronesian islands and their relation to trace gas abundances.



The cruise will transit through the open ocean and at the closest possible safe distance to the coast, in general in lee of the islands along the 100 to 50m depth line, to detect terrestrial influences on water and on the atmosphere. It alternates between on-shore and off-shore conditions. The cruise track of 2600 nm is planned to catch chemical, biogeochemical and biological imprint of the islands, fading away offshore and in deeper waters. We start the cruise in Mindelo in order to steam against the prevailing trade winds. We intend to measure trace gas concentrations (O_2 , CO_2 , N_2O , halocarbons and other reactive trace gases of natural and anthropogenic origin) in deep and surface water and the overlying atmosphere, as well as physical (atmospheric boundary layer conditions, SSS, SST), chemical (nutrients, CDOM/FDOM) and biological (phytoplankton pigments and size distribution, microbial community) parameters.



Important dates of cruise in 2019:

25 th of February:	Arrival of participants in Mindelo
26 th to 27 th of February:	Setup of equipment in Mindelo harbour
28 th of February:	Departure of expedition POS533 from Mindelo
14 th of March:	Personnel exchange in Las Palmas
19 th of March:	Personnel and sample drop-off in Funchal
22 nd of March:	End of expedition POS 533 in Las Palmas

Relevant previous cruises

POSEIDON cruise P320 (2005) in the Mauritanian upwelling
SONNE cruise TransBrom (2009) in the western Pacific
POSEIDON cruise P399 (2010) in the Mauritanian upwelling
Sonne cruise SO218 SHIVA (2011) in the South China Sea
Sonne cruise SO234/235 (2014) in the Indian Ocean
POSEIDON cruise POS519 (2018) in the Mauritanian upwelling
NRP Gago Coutinho cruise Ardití/ OOM (2018) around Madeira

Previously published research data relating to the proposed cruise.

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