

## Halogen Chemistry in Southern Ocean Marine Boundary Layer

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### **Abstract**

Oceanic emissions of volatile gases play an important role in various atmospheric processes and global biogeochemical cycling. Reactive halogen species (like iodine oxide, IO and bromine oxide, BrO) have a large oceanic source and affect the atmosphere through the destruction of tropospheric ozone, altering the oxidizing capacity and the formation of marine aerosols. Some observations of these gases have been made in the global marine boundary layer, but there are regions which are undersampled, like the Indian Ocean and the Southern Ocean. Here we report observations of halogen oxides, ozone, and meteorological parameters in the marine boundary layer of the Indian Ocean and the Southern Ocean during the 9th Southern Ocean expedition (SOE-09). The expedition was carried out from Port Louis, Mauritius to the Antarctic coastline close to the Indian Antarctic base, Bharati, aboard the oceanographic research vessel S. A. Agulhas during 6<sup>th</sup> Jan 2017 to 26<sup>th</sup> Feb 2017. During this expedition, elevated IO observed near the Mauritian Island and also close to the sea ice region in Antarctica. BrO was observed above the detection limit only close to the Mauritius, adding to previous unexplained detection of enhanced BrO in semi-polluted marine environments. We try to understand the sources controlling the distribution of halogens by studying the sea-air fluxes and also study the correlation of IO with biogenic parameters along the cruise transect. Finally, we compare the observations with a global chemistry climate model to highlight the differences and the need to improve the model emission parameterizations.

**Keywords:** Southern Ocean atmosphere chemistry, Marine boundary layer, halogen chemistry, lower troposphere chemistry, trace gases.

### ***References***

Carpenter, L. J. et.al, 2013. Atmospheric iodine levels influenced by sea surface emissions of inorganic iodine. Nature Geoscience, volume(6), 108-111.