



Biogenic VOCs in the Arabian Sea during the AQABA ship cruise

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Over the past decades, multiple field and laboratory studies concerning dimethyl sulfide (DMS) oxidation were conducted. Nevertheless, several relevant atmospheric chemistry questions remain open. Large regional differences in oxidation pathways have been reported, most probably due to the large range of environmental conditions. For a better understanding of DMS oxidation pathways in the atmosphere, more measurements of DMS and related compounds in different marine environments are important.

The AQABA (Air Quality and Climate Change in the Arabian Basin) cruise took place during July and August 2017. The ship Kommandor Iona was equipped with a wide range of instrumentation for trace gas and particle measurements. The expedition started near Toulon (France), proceeded via the Mediterranean, the Suez Canal, the Red Sea, the Arabian Sea and the Arabian Gulf to Kuwait, thereafter returning by the same route. Most regions were characterized by strong anthropogenic influence except for parts of the Arabian Sea/Northern Indian Ocean. There, significant biogenic VOC concentrations were detected, including DMS (nominal protonated mass 63 m/z), which is known to be emitted by phytoplankton. Higher DMS mixing ratios were observed when passing through regions of enhanced biological activity (confirmed with satellite-aided detection of chlorophyll). In addition to DMS we observed the DMS oxidation product dimethyl sulfone (DMSO₂: nominal protonated mass 95 m/z) and a previously unknown compound at a nominal mass of 96 m/z, closely correlated to the DMSO₂ signal. The exact mass of the unknown species corresponds to CH₃S(O₂)NH₂ and a spike test of this pure compound was found to correspond to the mass detected on the ship. This marine emission unusually links both the marine nitrogen and sulfur cycles.