1.073 Ship-based NOx and O3 Measurements in the Marine Boundary Layer Around the Arabian Peninsula.

Early Career Scientist

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Abstract:

The Arabian Peninsula is a hot and dry desert region between Africa and Asia that is exposed to intense solar radiation, pollution emissions from many anthropogenic sources, including on- and off-shore petrochemical industry. Although the environmental conditions are globally unique, recent studies show that the extreme weather conditions are intensifying. However, in-situ atmospheric gas phase measurements on and around the Arabian Peninsula remain sparse. We present ship-based NO_x and O_3 measurements obtained during the AQABA campaign (**A**ir **Q**uality and Climate in the **A**rabian **Ba**sin) onboard the 'Kommandor Iona' Research and Survey Vessel that sailed from Toulon to Kuwait and back in summer 2017 to investigate chemical processes in the Marine Boundary Layer (MBL) in the region.

We will present and interpret the conditions and differences observed in the various regions investigated during AQABA. Whilst background mean NO_x and O_3 abundances of 0.21 ppb_v and 24.2 ppb_v were observed over the Indian Ocean, a significant northeastward increase in pollution towards the Gulf of Oman was observed, with mean mixing ratios of NO_x and O_3 of 3.85 ppb_v and 38.4 ppb_v respectively. A further increase in O_3 could be detected entering the Arabian Gulf coinciding with a mean NO_x mixing ratio dropping below 1 ppb_v. In late summer, a strongly elevated mean O_3 mixing ratio of 65.4 ppb_v was detected over the Mediterranean Sea with $NO_x < 0.3$ ppb_v.

Daytime NO maximum mixing ratios of ~ 30 ppt_v were observed over the Indian Ocean. Concurrent NO_2, O_3 and $J(NO_2)$ measurements enabled deviations from the Leighton Ratio to be estimated which indicated daytime maximum RO_2 mixing ratios of 40-70 ppt_v. Similarly low NO mixing ratios were observed in the Southern part of the Red Sea, with increases in both NO_x and O_3 observed in the northerly parts.