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Aerosol sources and properties in the Mediterranean and the Middle East: First results of the AQABA campaign

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Although the Eastern Mediterranean and the Middle East (EMME) region is a global change hot spot with very high loads of air pollutants and atmospheric dust from the two largest deserts worldwide, it has received only little attention (e.g. in reports of the Intergovernmental Panel on Climate Change; IPCC, 2013). One reason is that observational data (especially in the Middle East) are insufficient, unavailable or of limited quality.

In the framework of the AQABA (Air Quality and climate change in the Arabian BAsin) project led by the Max Planck Institute of Chemistry, a two-month long (1st July - 1st September 2017) intensive campaign was performed onboard the a research vessel, to document with a high time resolution the physical, optical and chemical properties of the ambient aerosol around the Arabian Peninsula. The campaign consisted of a round trip from south of France (Toulon) to Kuwait crossing the Mediterranean Sea, Red Sea, Indian Ocean and Arabo-Persian Gulf, thus exploring for the first time the composition and properties of the atmosphere in the region.

The aim of the campaign, was to sample contrasted air masses such as the European outflow (Mediterranean Sea), contrasted properties of desert dust from Sahara and the Arabian deserts (Red Sea and Gulf), pristine marine air masses (Indian Ocean) and heavily polluted outflow of the Middle East (Gulf). PM1 and PM10 aerosol size fractions were sampled in order to better apportion natural (sea salt, desert dust) against anthropogenic sources and characterize their atmospheric fate. Aerosol absorption (measured with an aethalometer) and light scattering coefficient (measured with a nephelometer) in these two size ranges were monitored along with a comprehensive characterization of size segregated aerosol number concentration (measured with an Aerodynamic Particle Sizer and a Scanning Mobility Particle Sizer) and water-soluble ions in PM1/PM10 with hourly resolution.

Preliminary results of this comprehensive characterization of the sub/supermicron aerosol particles, including their optical, physical, and chemical properties that were collected during AQABA are presented here.