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On-line analysis of gas and particle composition during the AEROCLO-SA campaign in Henties Bay (Namibia)

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The AEROCLO-sA project (Aerosol, Radiation and CLOuds in southern Africa) investigates the role of aerosols on the regional climate of southern Africa. The region is characterized by high atmospheric aerosol loadings originated from biomass burning, mineral dust and marine sea salt. In addition it is influenced by strong marine biological emissions by the Benguela upwelling and a semi-permanent and extended stratocumulus cloud deck. This area therefore provides an exceptional natural laboratory for studying the full range of aerosol physico-chemical properties, aerosol-radiation and aerosol-cloud interactions and their perturbations of the Earth's radiation budget.

AEROCLO-sA is based on a field campaign conducted for a month in August-September 2017 at the coastal Henties Bay experimental site (22˚6' S, 14˚17' E). An instrumented mobile station was implemented at ground over coastal Namibia in order to document fog, clouds, aerosols, volatile organic compounds and other traces gases at the ocean-atmosphere interface. State of the state-of-the-art instrumentation for the measurement of volatile compounds as proton-transfer-reaction mass spectrometer and retrieval of chemical and physical properties of aerosol as time of flight aerosol mass spectrometer, scanning mobility particle sizer, particle counters, cloud condensation nuclei counter were deployed.

Here we present results from on-line AMS data analysis of the sub-micrometer aerosol which is dominated by sulphate, sea salt followed by organic compounds. Marine biogenic emissions strongly enhanced concentrations of short-chain aldehydes, alcohols, carboxylic acids and sulphur-containing compounds in the gas phase, and strongly influenced PM1 composition, while diurnal cycles of iodide and MSA species were observed along the whole campaign. Source apportionment analysis has been run for both the organic gas phase and aerosol fraction. Additional information from on-line analysis on water-soluble fraction on TSP (PILS-IC) and off-line analysis (filters and TEM grids) will complete our view of the aerosol chemical composition in this region. The full set of data will improve our understating of emissions and mechanisms occurring at the ocean-atmosphere interface in this region.