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Characterization of the southern hemisphere marine boundary layer aerosol composition

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During a ship campaign onboard the French research vessel Marion Dufresne in the late southern hemisphere summer 2007 an Aerodyne High-Resolution Time-of-Flight AMS was used to measure the sub-micron (70 nm-700 nm) non-refractory composition of the southern hemisphere marine boundary layer aerosol. The AMS was used to measure mass concentrations and species-resolved size distributions as well as single particle spectra. The itenary was going from Cape Town (RSA) to Punta Arena (Chile) and back to Reunion Island spanning the Southern Atlantic Ocean from 35°S to 60°S latitude and from 70°W to 55°E longitude. For the campaign the AMS data analysis covering the standard species (ammonium, chloride, nitrate, organics, sulfate) was extended to cover also methanesulfonic acid (MSA), a species that is produced by oxidation of dimethylsulfide and can be ubiquitously found in marine environments. To extract information on MSA from the data collected during the ship campaign additional laboratory measurements were performed in order to develop a new data analysis method. According to the AMS measurements nearly all the time sulfate is the dominating species, with average mass concentrations ranging from 0.18 µg m^{-3} for clean Southern Atlantic Ocean air masses to 1.4 µg m^{-3} for continental outflow from Africa. Organics mass concentrations as seen by the AMS are very low with average mass concentrations around 20 ng m^{-3} for most of the time intervals with remote marine influence. They are increasing for air masses influenced by continental outflow. Highest organic mass concentrations are observed while crossing a phytoplankton bloom with an average mass concentration of 0.32 µg m^{-3}, where organics

are accounting for 50% of the total mass concentration measured by the AMS.