Geophysical Research Abstracts,
Vol. 11, EGU2009-4522, 2009
EGU General Assembly 2009

Size-resolved chemical composition showing the vertical heterogenity of Saharan aerosol in the Cape Verde region

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The Saharan Mineral Dust Experiment (SAMUM) is dedicated to the understanding of the radiative effects of mineral dust. A field campaign was performed during the winter season in the long range transport region (Cape Verde), when dust from the African continent, especially from the Sahel region reaches the Cape Verde islands. Flights were conducted over the atlantic ocean heading towards south, east and north and above the Cape Verde islands, in order to gain information about the spacial distribution of Saharan mineral dust, biomass burning aerosols and marine boundary layer aerosol.
A column closure study was performed over the cape verde islands, including groundbased maeasurements.
Samples were collected with a micro intertial impaction system in each flightlevel. The size-resolved chemical composition was determined by single particles analysis with electron microsocopy and energydispersive x-ray detection.
The results show a high vertical heterogeneity, especially among the fine and ultrafine particles. Layer structures of air masses in terms of chemical composition clearly show different sources for the corresponding air masses. The marine boundary layer aerosol is overlayed by a layer of mineral dust and/or by biomass burning aerosol layer, which is sometimes overlayed by another layer of mineral dust in 2000 to 3000m height.
Soot and sootagglomerates are the dominating particle group in the biomass burning aerosol layers. Alumosilicates are always present with 50 to 70% in dust layers, but are found in other types of air masses as well in high relative number abundance. In case of a dust event, they dominate over the sea salt in the marine boundary layer. In about 60% of the alumosilicate particles, iron is found. Other particle groups are quartz, calcite and gypsum, as well as other sulfates or sulfate silicate mixtures. In the fine and ultrafine particle range, samples collected groundbased are dominated by ammonium sulfate, which is not present at higher altitudes (above 500m).