

Description of the aerosol size distribution of the atmosphere during a Saharan dust intrusion over South Spain with airborne and ground based instrumentation: AMISOC

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The occurrence of Saharan dust intrusions over the Iberian Peninsula as primary source of atmospheric aerosols is well known but there is not much information on the vertical profiles of the particles size distribution by airborne instrumentation. This work aims to the improvement of knowledge about it, as well as, to compare ground based and airborne measurements. On the other hand, the representativeness of surface measurements will also be analyzed.

The AMISOC campaign (Puentedura et al., 2012) was carried out in May and June 2012. This campaign combined ground based and aero-transported instrumentation aiming to measure aerosols in the presence and absence of a Saharan dust outbreak. AMISOC (Atmospheric Minor Species relevant to the Ozone Chemistry at both sides of the jet) is a research project funded by a Spanish R&D program.

Measurements were taken in South Spain: “El Arenosillo” sounding Station (ARN) (37.1N, 6.7W in Huelva). Selected dates for the campaign were chosen based on an atmospheric dust alert system using information from different models (DREAM, MAAPS, and SKIRON). Dates 31 May and 1 June 2012 were representative of Saharan dust intrusion while 13 June 2012 was representative of no dust.

The characterization of the vertical profiles of several atmospheric parameters was done by the use of CAPS (Cloud, Aerosol and Precipitation Spectrometer) atmospheric probe (Droplet Measurements Technology, Boulder, CO). The CAPS probe measures temperature, pressure, relative humidity, liquid water content, aircraft velocity and altitude, aerosol particle and cloud hydrometeor size distributions and other miscellaneous data. In this work we have used the measurement of CAS instrument; an OPC ranges particles from 0.5-50 μm . This probe was installed on the Spanish National Aerospace Technique Institute (INTA) CASA C-212 atmospheric research aircraft. Additionally, from “El Arenosillo”, dry ambient sub-micron size distribution within (0.55-1) μm and super-micron size distribution within (1-10) μm were monitored by an Aerodynamic Particle Sizer (APS) (TSI Mod. 3321).

Atmospheric profiles, with or without Saharan dust, were characterized by the particle number concentrations in several particle sizes and thermodynamic profiles. Figure 1 shows the vertical profile during a desert dust day (31/05/2012) of the temperature and relative humidity (left side) and the particle number size distribution (right side)

The Saharan dust intrusion analyzed in this work took place under the presence of clouds at about 5 km and 6 km height (see Figure 1). This cloud condition has allowed exploring the interactions of cloud droplets with Saharan dust aerosols.

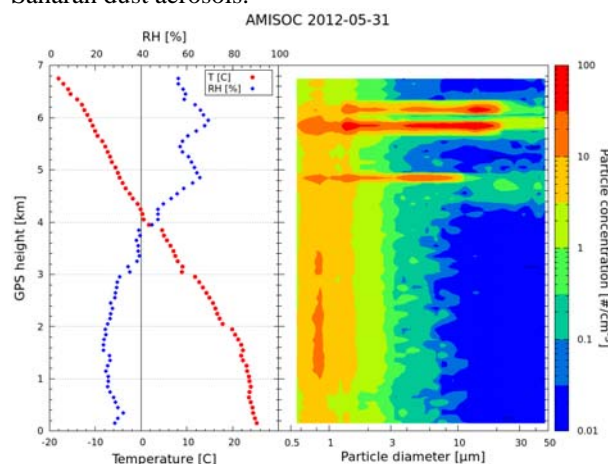


Figure 1: On the left side shows temperature and humidity profile from CAPS probe and in the right side vertical profile of the number particle size distribution of a dusty day.

References:

Puentedura, O et al., 2012. AMISOC 2012: Multi-instrument campaign for assessment of trace gas-aerosol interaction. European Aerosol Conference, Granada, Spain.

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