



The Sunphotometer Airborne Validation Experiment 2012: Preliminary Results

Victor Estellés (1,2), Franco Marenco (3), Claire L. Ryder (4), Monica Campanelli (5), Francisco Expósito (1), Yolanda Solá (6), Sara Segura (2), Carlos Marcos (2), Carlos Toledano (7), Alberto Berjón (8), Carmen Guirado (8), Bernard Claxton (3), and Martin Todd (9)

(1) University of La Laguna, San Cristóbal de La Laguna, Spain, (2) Universitat de Valencia, Burjassot, Spain, (3) Met Office, United Kingdom, (4) University of Reading, Reading, United Kingdom, (5) Instituto di Scienze dell'Atmosfera e del Clima, Rome - Tor Vergata, Italy, (6) Universitat de Barcelona, Spain, (7) Universidad de Valladolid, Spain, (8) Agencia Estatal de Meteorología (AEMET), Spain, (9) University of Oxford, United Kingdom

With the aim of validating columnar integrated aerosol properties retrieved by AERONET and SKYNET from ground sunphotometric measurements, with the integrated vertical profiles of airborne in-situ aerosol measurements, the “Sunphotometer Airborne Validation Experiment” field campaign was held in the Tenerife (Canary Islands) and western Sahara areas, during June 2012.

The Aerosol Robotic Network (AERONET) (<http://aeronet.gsfc.nasa.gov/>) and the Skyrad Network (SKYNET) (<http://atmos.cr.chiba-u.ac.jp/>) are two different international ground based networks that provide global aerosol properties. AERONET is an operative network run by NASA that makes use of an improved inversion methodology to derive the aerosol properties from measurements of the Cimel CE318 sunphotometer and its data is extensively used worldwide and archived in climate data records. In turn, SKYNET is a research network lead by the Universities of Chiba and Tokyo (Japan) and is present in Europe through the new European Skynet Radiometers network (ESR). SKYNET adopts the Prede POM sky radiometer as the standard instrument and an alternative inversion algorithm called SKYRAD.

Previous research has shown important discrepancies between the AERONET and SKYRAD inversion algorithms (Campanelli et al., 2010; Estellés et al., 2012) even in the case of applying these algorithms to the same instrument datasets and with the same calibration coefficients. Still no explanation is provided for these discrepancies, although it is crucial to state the responsible processes and address them so as to provide more accurate aerosol retrievals for climate recordings.

The SAVEX experiment took place alongside the FENNEC aircraft campaigns of June 2011 and 2012. The UK BAe146 was equipped with in-situ aerosol instrumentation to measure size distributions from 0.1 to 300 microns diameter, scattering and absorption properties, and aerosol composition. Vertical profiles and horizontal legs were performed over ground sites to provide detailed vertically resolved aerosol measurements, in order to compare these to sunphotometer retrievals.

Simultaneously, 4 different ground AERONET - Cimel sites were deployed in the Tenerife island, at different latitudes and altitudes for further investigation of spatial and vertical variability. Three of these sites also measured solar radiation components with CM21 pyranometers and CHP1 pирheliometers, for further research on radiative forcing of aerosols. One site was equipped with a Prede POM sun-sky radiometer for comparison with Cimel sunphotometer. On the other hand, for the FENNEC campaign another AERONET Cimel sunphotometer was deployed in Zouerate (Mauritania).

The ideal conditions for such a comparison consisted of cloudless skies and high mineral aerosol burdens, brought by the Saharan outflow. Although these conditions were not reached in the Tenerife area during the scheduled field campaign, appropriate conditions were met in western Mauritania, over the AERONET Zouerate site.

In this study, we perform a preliminary analysis of the columnar properties of aerosols in the Canary Islands and West Sahara areas during the FENNEC 2011 and FENNEC-SAVEX 2012 field campaigns, with an emphasis on the comparison between the size distributions retrieved from both AERONET and SKYRAD algorithms using the Zouerate Cimel site data. Validation of the vertical integrated aerosol size distributions will be also presented.

References

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