First results of inverted aerosol properties through GRASP algorithm, using polarized data from the multi-wavelength sun/sky/lunar photometer in Barcelona, Spain.

D.C.F.S. Oliveira[(1)], A. Rodríguez-Gómez[(1)], A. Comerón[(1)], C. Muñoz-Porcar[(1)], M. E. Herrera[(3)], M. Sicard[(1,2)]

[(1)] *CommSensLab, Dept. of Signal Theory and Communications, Universitat Politècnica de Catalunya (UPC), 08034-Barcelona, Spain, E-mails: daniel.camilo.fortunato@upc.edu, alejandro.rodriguez.gomez@upc.edu, constantino.munoz@upc.edu, michael.sicard@upc.edu*

[(2)] *Ciències i Tecnologies de l'Espai-Centre de Recerca de l'Aeronàutica i de l'Espai/Institut d'Estudis Espacials de Catalunya (CTE-CRAE/IEEC), Universitat Politècnica de Catalunya (UPC), 08034-Barcelona, Spain*

[(3)] *Laboratoire d'Optique Atmosphérique, CNRS/Université de Lille, Villeneuve d'Ascq, France, E-mail: milagros.herrera@univ-lille.fr*

In recent decades, studies involving optical and microphysical properties of aerosols retrieved from polarized data have increased due to the polarization sensitivity of the shape of particles. Therefore, this study aims to assess the retrieved aerosol properties from GRASP (Generalized Retrieval of Atmosphere and Surface Properties) using the polarized data as input of the algorithm.

The polarimetric data was measured by the new multi-wavelength sun/sky/lunar photometer installed recently at the Universitat Politècnica de Catalunya (UPC), which makes part of AERONET network. Aerosol Optical Depth (AOD), radiances (I), and Degree of Linear Polarization (DOLP), available at 1.5 level, were input into the inversion mode of the GRASP code in order to retrieve Volume Size Distribution (VSD), Imaginary part of the Refractive Index (IRI) and Real part of Refractive Index (RRI) at both wavelengths sets (standard and standard + 380, 500, and 1640 nm). The D0 (AOD + I at 4λ), D0P (AOD + I + DOLP at 4λ), D1 (AOD + I at 7λ) and D1P (AOD + I + DOLP at 7λ) were the configuration used as input data of GRASP. The results obtained for each configuration (D0, D0P, D1, and D1P) are compared with the retrievals from AERONET for a case of mineral dust with high AOD (0.9).

The results present unique behaviors for VSD showing some underestimations in the coarse mode with respect to the AERONET experimental data with a relative error equal to 6.9%, 18.0%, 15.4% and 16.0%, respectively. For the fine mode, some overestimations have been observed, mainly for the D0P (176.1%) configuration. Regarding the refractive index, D1 and D1P do not present major differences, whose relative errors are similar for both. These fits show some overestimations in IRI and underestimations in RRI with respect to the AERONET data for the shorter wavelengths, whereas D0 has the lowest reported relative error values, 0.3% (870 nm) for RRI and 7.7% (440 nm) for IRI. TheD0P configuration shows some overestimations of the IRI and underestimate RRI.

Thus, GRASP has demonstrated its ability to perform different inversions based on the measurements from new multi-wavelength sun/sky/lunar photometer with polarization.