IRS2012-432
International Radiation Symposium 2012
Dahlem Cube, Berlin, Germany, 06 – 10 August 2012

Analysis of aerosol over the Mediterranean basin from 2005-2011 POLDER-3/PARASOL and AERONET/PHOTONS measurements

I. Chiapello (1), D. Tanré (1), P. Goloub (1), F. Ducos (1), F. Dulac (2), P. Nabat (3), and M. Mallet (4)

(1) LOA, Université Lille 1/CNRS, Villeneuve d'Ascq France (isabelle.chiapello@univ-lille1.fr), (2) LSCE, CEA/CNRS/UVSQ, Gif-sur-Yvette France, (3) CNRM, Meteo-France, Toulouse France, (4) LA, CNRS/Université Paul Sabatier, Toulouse France

POLDER-3 (Polarization and Directionnality of the Earth's Reflectances) has been launched on board the PARASOL microsatellite in December 2004. Although the PARASOL orbit has been lowered twice (in September 2009 and recently in November 2011) compared to the other platforms of the A-Train constellation, POLDER observations continue, providing now about seven years of innovative retrievals of aerosol properties from space.
In this analysis we focus on analyzing POLDER-3 capabilities to derive both aerosol loads (Total Aerosol Optical Thickness) and size properties (fine and coarse spherical/non-spherical Aerosol Optical Thickness, Angström coefficients) over oceanic surfaces.
This analysis, as part of the ChArMEx (the Chemistry-Aerosol Mediterranean Experiment) program, focus on the Mediterranean basin, a region under the influence of a complex mixture of aerosols from different continental sources. Especially we aim to investigate the respective contributions of (i) pollution aerosols (emitted by industry and urban environments of some European regions or megacities surrounding the basin), (ii) carbonaceous particles (from biomass burning events), (iii) mineral dust exported from arid and semi-arid regions of North Africa.

In a first step, our study consists in an analysis of AERONET/PHOTONS photometer records from selected sites located in Western part of the Mediterranean basin (i.e. Soust-East of France, Spain, Corsica/Sardinia), central part (i.e. Italia and Lampedusa), and Eastern part (i.e. Greece and Turkey). These measurements provide a unique characterization of both aerosol load (aerosol optical depth) and properties (size distribution and absorption though single scattering albedo) and their temporal variabilities over each part of the Mediterranean basin. The second step focus on a regional validation of the PARASOL level 2 (daily data) and level 3 (monthly and seasonal averages) aerosol products by comparison with these equivalent and selected ground-based AERONET/PHOTONS photometer measurements.

Overall such a regional analysis is expected to provide an overview of aerosol variability, combining ground-based photometer aerosol records with the seven years of PARASOL data, and focusing on western, central and eastern part of the Mediterranean basin. Special interest will be given to (i) assessment of reliability and quality of POLDER-3 aerosol retrievals (ii) better understanding of the influence of the different continental sources of aerosols in space and time (iii) interpretation of the seven years of POLDER-3 aerosol record, in view of spatial and temporal variability of each aerosol component in the different parts of Mediterranean basin. Specific analysis on year-to-year evolution of the aerosol loads including impact of past extreme events (fires in Greece in summer 2007, intense desert dust outbreaks from North Africa. . .) on the Mediterranean aerosol content will be performed. Finally, the PARASOL aerosol data set will be compared to model data (especially GEMS and MACC) in terms of aerosol optical depth monthly climatologies. This comparison will be helpful to distinguish the contributions of the different aerosol types (dust, sea salt, sulfates and carbonaceous aerosols) to the satellite retrieval.