Geophysical Research Abstracts
Vol. 15, EGU2013-12666, 2013
EGU General Assembly 2013

Multi-year climatology of Mediterranean aerosol absorption optical depth and single scattering albedo products from ground-based and satellite remote sensing

Marc Mallet (1), Oleg Dubovik (2), Pierre Nabat (3), Ralph Kahn (4), Jean Sciare (5), Dimitris Paronis (6), Samuel Somot (3), Jean-François Léon (1), and François Dulac (5)

(1) Laboratoire d'Aérologie, Toulouse, France (marc.mallet@aero.obs-mip.fr), (2) Laboratoire d'Optique Atmosphérique, Lille, France, (3) CNRM-GAME, Météo-France, Toulouse, France, (4) NASA Goddard Space Flight Center, Maryland, (5) LSCE, Gif/Yvette, France, (6) National Observatory of Athens, Athens, Greece

This study presents a multi-year climatology of aerosol absorption properties obtained over the Mediterranean from ground-based AERONET and satellite remote sensing observations including Multi-angle Imaging SpectroRadiometer (MISR, 2000-2011), Ozone Monitoring Instrument (OMI, 2004-2010), and MODerate resolution Imaging Spectroradiometer (MODIS, 2005-2011) spaceborne sensors. Our analysis is focused on the aerosol absorption optical depth (AAOD) and single scattering albedo (SSA).

Sun-photometer observations obtained over more than 20 Mediterranean stations providing long time series (>2.5 yr) of level 2 products show that values of AAOD (at 440 nm) vary between 0.024 and 0.050 for urban sites and between 0.040 and 0.055 for sites under important influence of desert dust. Analysis shows that over the Mediterranean, urban-industrial aerosol appears "moderately" absorbing, with values of SSA close to $\sim$ 0.94-0.95 (at 440 nm) in most cases except over Rome and Athens, where aerosol appears more absorbing (SSA $\sim$ 0.89-0.90). The aerosol absorption Angström exponent (AAE) between 440 and 870 nm is found to be larger than 1 for most sites over the Mediterranean, as a result of mineral dust (iron) and/or brown carbon producing the observed absorption. AERONET Level 2 sunphotometer products (that correspond to AOD $>$ 0.4) indicate the existence of a longitudinal gradient, with higher average values over the eastern basin (AAE_{East} = 1.48, AAE_{West} = 1.27) due to the desert dust influence. A more detailed analysis of AERONET data including level 1.5 products (corresponding to AOD down to 0.2) also shows that organic absorbing aerosols significantly affect some Mediterranean sites.

Finally, an analysis of the regional variability in SSA is attempted using OMI, MISR and MODIS Deep Blue satellite products with a focus on spring and summer seasons which show the maximum aerosol load. The OMI and MODIS data show an absorbing region (SSA $\sim$0.90 at 470-500 nm) over Northeast Africa that does not appear in the MISR retrievals. In contrast, MISR seems to observe the East-West SSA gradient during summer, as also detected by AERONET. Also, the analysis of satellite-derived SSA products indicates that the aerosol over the Mediterranean Sea appears less absorbing during spring than summer. However, the uncertainty associated with satellite SSA does not allow quantitative conclusions.