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Monthly radiative forcing evolution over south-east Italy

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The aerosol impact on the Earth's climate is highly uncertain and a good knowledge of aerosol properties and corresponding radiative effects is required to reduce uncertainties in climate change predictions.

In this study, we present some results on the monthly aerosol radiative forcing evolution retrieved over South-East Italy by using a numerical code based on the two-stream radiative transfer method. Size-distributions and refractive indices at 0.44, 0.67, 0.87, and 1.02 μm, provided from March 2003 to October 2004 by the Cimel sun/sky photometer operating at Lecce's University (40.33^o N, 18.10^o E) within AERONET, are used to characterize aerosol properties. In particular, we use monthly averaged refractive indices and size-distributions to calculate by mean of the Mie theory averaged monthly values of aerosol extinction and scattering coefficients, optical thicknesses and single scattering albedos at solar (0.35, 0.45, 0.55, 0.65, 1.0, 1.6, 2.2, and 3.0 μm) and infrared (4.25, 5.35, 6.25, 7.35, 8.75, 10.3, 11.75, 13.9, 17.2, 24.3, 37, and 80 μm) wavelengths. Then, we use monthly averaged vertical profiles retrieved by 3-years (May 2000 – May 2003) of Raman lidar measurements, performed at Lecce's University in the framework of EARLINET project, to characterize the aerosol vertical distribution. Averaged monthly surface albedos over South-East Italy are retrieved by MODIS solar surface albedos computed for both "white-sky" and "black-sky" for 23 sixteen-day periods per year. Radiosounding measurements regularly performed at the meteorological station of Brindisi, that is 30 km away from Lecce, are used to get monthly averaged vertical profiles of atmospheric parameters (air density, temperature, and water-vapor columnar content).

Monthly aerosol radiative forcings have been calculated by the two-stream radiative

transfer method at the top of atmosphere and at the surface, both at solar and infrared wavelengths, and in clear-sky and cloudy conditions. The ISCCP cloud statistics is used. Results on the radiative forcing sensitivity to the aerosol vertical distribution and the surface albedo will also be reported.