Geophysical Research Abstracts
Vol. 16, EGU2014-15297, 2014
EGU General Assembly 2014

In situ spectral aerosol absorption properties obtained in Valencia (Spain)

Sara Segura, Víctor Estellés, Anna R. Esteve, María Pilar Utrillas, and José Antonio Martínez-Lozano
Solar Radiation Group, University of Valencia, Burjassot, Valencia, Spain

Aerosols play an important role in the radiative forcing in the Earth's atmosphere by scattering and absorbing solar radiation. Reducing uncertainties in the determination of aerosol light absorption is important in order to obtain better results for climate models. To do this, different methods and instruments are used to measure the absorption aerosol properties. The most common method for in-situ measurements is the filter-based technique, which determines the light absorption by measuring changes in the attenuation due by aerosols collected on a filter matrix.
One of the instruments currently used for determining the absorption coefficient based on this technique is the Aethalometer (Magee Sci.). In this study, measurements have been obtained with a 7-wavelength Aethalometer AE-31 (Hansen et al., 1984). This instrument covers from the UV (370 nm) to the IR (950 nm) bands. As other filter-based instruments, the Aethalometer measurements also suffer artifacts which need to be compensated in order to determine the absorption coefficient (Weingartner et al., 2003). Specific site calibrated correction factors have been obtained for this site and applied to the data.
Therefore, in – situ aerosol absorption properties at 7 different wavelengths have been obtained in Burjassot, Valencia, since 2011 in this study. Valencia is a medium size city in Spain ($\sim$1,800,000 inhabitants in the metropolitan area) located in the Western coast of the Mediterranean Sea. In total, a 3-year study of the absorption coefficient is presented attending to annual, seasonal and monthly variations.
Spectral dependence of the aerosol absorption properties has been also analyzed using absorption coefficients obtained from the 7 Aethalometer channels. Determining the spectral dependence of aerosol absorption coefficient is important to distinguish different absorbing components. The major light-absorbing compounds among aerosols are carbonaceous substances and mineral dust. As the measurement station is located near a highway, measurements are highly influenced by traffic and, therefore car emissions, so most of the absorption is expected to be caused by carbonaceous substances.

References:
Weingartner, E., Saathoff, H., Schnaiter, M., Streit, N., Bitnar, B., and Baltensperger, U.: Absorption of light by soot particles: Determination of the absorption coefficient by means of aethalometers, J. Aerosol Sci., 34, 1445–1463, 2003.

Hansen, A. D. A., Rosen, H., and Novakov, T.: The aethalometer; an instrument for the real-time measurements of optical absorption by aerosol particles, Sci. Total Environ., 36, 191 – 196, 1984.