

AEROMAP

Global mapping of aerosol properties using neural network inversions of ground and satellite based data

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AEROMAP began on the 1st of March 2012 and is a two year project (FP7-PEOPLE-2011-IEF) designed to produce accurate, daily-updated, global maps of atmospheric aerosols. Aerosols affect human health and the environment [Samet et al., 2000] as they impact strongly on the Earth's energy balance, hydrological cycle and air quality [Remer et al., 2005]. The uncertainty associated with estimating the impact of aerosols is of the order of 2 Watts per m^2 – a value approximately equal in size to the estimated impact of all greenhouse gases combined [Houghton et al., 2001]. In order to improve the estimate of the impact of aerosols, they must be correctly characterised globally. Aerosols are characterised by their microphysical properties - the aerosol size distribution (ASD), their single scattering albedo (SSA) and their complex refractive index (Z). While accurate measurements of these parameters are currently provided by the 257 international ground-based stations forming the aerosol robotic network (AERONET), the uncertainty is mainly caused by this limited number of stations across the whole Earth's surface, particularly over the oceans. AEROMAP will use the daily, full-Earth coverage of aerosol optical depth (AOD) provided by the moderate resolution imaging spectrometer (MODIS) satellite instrument in 3 wavelength bands to globally extrapolate local ground-based estimates of aerosol microphysical properties (ASD, SSA and Z) from AERONET stations to the global domain. This will be achieved by constructing and training artificial neural networks (NN) to learn the relationship between AOD inputs and aerosol microphysical properties. In this way, AEROMAP will be able to produce the first global maps of aerosol characteristics on a daily basis.

