



Characteristics of the aerosol climatology over Finland based on the optical columnar properties

Veijo Aaltonen (1), Edith Rodriguez (1), Kazadzis Stylianos (2), Sogacheva Larisa (1), Arola Antti (1), and Gerrit de Leeuw (1)

(1) Finnish Meteorological Institute, Research and Development, Helsinki, Finland (veijo.aaltonen@fmi.fi, +358 9 19293146),

(2) Institute for Environmental Research and Sustainable Development, National Observatory of Athens, Greece

We have studied the long-range aerosol transport over Finland using ground-based sunphotometric and satellite based aerosol optical properties' measurements. More specifically, we have used data from two satellite sensors: the Advanced Along Track Scanning Radiometer (AATSR) flying on ENVISAT and the MODIS instrument onboard Terra. In addition data from three Cimel sunphotometers were used at: an urban (Helsinki), a rural (Hyytiälä), and a semiurban (Kuopio) sites all being part of AERONET network, supported by PFR measurements at two rural sites, Jokioinen and Sodankylä. AATSR and MODIS provided information on the regional distribution of aerosol properties whereas sunphotometers provided information on local columnar aerosol properties (e.g. Aerosol Optical Depth). Sunphotometric AOD data were used to validate the satellite retrievals, as well as to provide information on other microphysical parameters such as the aerosol single scattering albedo, size distribution, and refractive index. The wind speed and direction, jointly with the air mass back trajectories for specific cases of aerosol transportation over Finland were used to determine aerosol gradients in along-wind situations.

Depending on the prevailing air masses, Finland (boreal forest, subarctic zone) is characterized by maritime - causing warm, clean weather - and continental climate, accounting for moderately cold in winter, and hot in summer. Our initial expectation is that pollution events are connected with polluted air masses originating from east or southeast as well as industrial areas in Central Europe. Pollution events observed in spring in Helsinki are often related to the removal of the sanding material or inversion situations. We distinguished the events with long transported air pollution from cases with accumulation of the pollution due to the local meteorological factors. We chose a set of representative event days covering the overall time period between June 2006 and August 2009.