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Spatial variation of aerosol properties over Europe derived from satellite observations and comparison with model calculations

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Abstract. Aerosol optical depths (AOD) and Angström coefficients over Europe were retrieved using data from the ATSR-2 radiometer on board the ESA satellite ERS-2, for August 1997. Taking advantage of the nadir and forward view of the ATSR-2, the dual view algorithm was used over land to eliminate the influence of the surface reflection. Over sea the AOD was retrieved using only the forward observations. Retrieved aerosol optical properties are in good agreement with those from ground-based sunphotometers. The AOD and Angström coefficients together yield information on the column integrated effective aerosol distribution. Observed regional variations of the AOD and Angström coefficient are related to anthropogenic emissions of aerosol precursors such as SO₂ and NO_x in the major European industrial and urban areas, and their subsequent transformation into the aerosol phase. The influence of anthropogenic aerosols such as ammonium sulphate and ammonium nitrate on the total AOD is estimated using a regional chemistry transport model. Sulphate is estimated to contribute from 15% in very clean areas to 70% in polluted areas, the contribution of nitrate is between 5% and 25% over most of Europe. This paper shows the great importance of nitrate in summer over The Netherlands.

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