



Aerosol optical properties and distribution during the extreme Arctic haze event in spring 2006

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During spring 2006 a special meteorological situation occurred in the European Arctic resulting in record levels of air pollution. The temperatures were very high and the monthly mean temperatures for January, April and May were the highest ever recorded. The synoptic situation resulted in extensive transport of pollution from agricultural fires in Eastern Europe into the Arctic region (Stohl et al., 2006). Record high air-pollution levels were measured at the Zeppelin observatory at Ny-Ålesund (78° 54'N, 11° 53'E) in the period from 25 April to 12 May.

In the present study we investigate the optical properties of the aerosols from this extreme haze event and estimate the radiative forcing of the pollution episode.

We examine the aerosol optical properties from the source region and into the Arctic and explore the evolution of the plume and the changes in the optical properties. A number of sites in Eastern Europe, Northern Scandinavia and at Svalbard are included allowing a regional characterization of the aerosol optical properties by means of remote sensing instruments. In addition to AOD measurements we have also used lidar measurements from Minsk and ALOMAR (69° 16'N, 16° 00'E). For the AERONET sites included (Minsk, Toravere, Hornsund) we have studied the change in aerosol size as well. At Svalbard it is consistency between AERONET measurements and calculations based on aerosol chemical composition with regard to the single scattering albedo. Additionally we have used daily MODIS AOD products when available. We find very good agreement between the satellite AOD data and the ground-based obser-

vations from the period. The use of satellite data allows a more complete picture of the episode and its evolution in time and space. The agreement between the satellite AOD and the ground-based observations is crucial for the radiative forcing calculations. we estimate a strong negative radiative forcing of 40 W m^{-2} , for the most polluted days by use of the analysed ground based data, MODIS AOD and a multi-stream model for radiative transfer of solar radiation in the atmosphere.

Stohl, A. Berg T., Burkhardt J. F., Fjæraa A. M., Forster C., Herber A., Hov Ø., Lunder C., McMillan W. W., Oltmans S., Shiobara M., Simpson D., Solberg S., Stebel K., Ström J., Tørseth K., Treffeisen R., Virkkunen K., and Yttri K. E. (2006) Arctic smoke - record high air pollution levels in the European Arctic due to agricultural fires in Eastern Europe, submitted to *Atmospheric Chemistry and Physics* *Atmospheric Chemistry and Physics Discussions*, Vol. 6, pp 9655-9722, 5-10-2006