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A case study on biomass burning aerosols: effects on aerosol optical properties and surface radiation levels

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Abstract. In spring 2006, biomass burning aerosols from eastern Europe were transported extensively to Finland, and to other parts of northern Europe. They were observed as far as in the European Arctic. In the first part of this paper, temporal and spatial evolution and transport of these biomass burning aerosols are monitored with MODIS retrieved aerosol optical depth (AOD) imagery at visible wavelengths (0.55 μm). Comparison of MODIS and AERONET AOD is conducted at Tõravere, Estonia. Then trajectory analyses, as well as MODIS Fire Mapper products are used to better understand the type and origin of the air masses. During the studied four-week period AOD values ranged from near zero up to 1.2 at 0.55 μm and the linear correlation between MODIS and AERONET was very high (~0.97). Temporal variability observed within this four-week period was also rather well explained by the trajectory analysis in conjunction with the fire detections produced by the MODIS Rapid Response System. In the second part of our study, the surface measurements of global and UV radiation at Jokioinen, Finland are used to study the effect of this haze episode on the levels of surface radiation. We found reductions up to 35% in noon-time surface UV irradiance (at 340 nm) as compared to typical aerosol conditions. For global (total solar) radiation, the reduction was always smaller, in line with the expected wavelength dependence of the aerosol effect.

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