



Arctic smoke - the role of biomass burning for the chemical composition and aerosol content of the Arctic atmosphere

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Arctic haze is a late winter/early spring phenomenon characterized by high concentrations of aerosols and trace gases originating from anthropogenic sources in Europe and northern Asia. In the past, because of typically much lower concentrations, less attention has been paid to pollutants in the Arctic in summer. However, from a climate-forcing perspective, the summer is particularly interesting because of the abundance of solar radiation. Here we show that biomass burning is a dominant source of pollutants in the Arctic in summer. In summer 2004, pan-Arctic enhancements of light absorbing aerosols were observed as a result of boreal forest fires. In spring 2006, a record-high pollution event in the European Arctic was due to agricultural waste burning in Eastern Europe. Previous records for ozone at two Arctic stations were exceeded by more than 20 ppb, and most other pollutants measured also showed record-high levels. We also provide evidence that deposition of smoke particles reduced the albedo of the snow during the two events. A multi-year tracer transport model simulation shows that biomass burning must be expected to be the largest source of Arctic pollutants in the summer. The paper is concluded with an outlook to relevant activities during the International Polar Year.