The Meridional Gradient of Black Carbon in the Upper Troposphere and Lower Stratosphere over Northern Europe

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As part of the Cirrus III campaign, conducted November 23-29, 2006, black carbon (BC) measurements were made with the single particle soot photometer (SP2) that was mounted on the Learjet operated by Envioscope for this field campaign. The SP2 measures the mass and mass equivalent diameter of BC contained in individual particles so that the properties of these climatically important particles can be characterized in great detail.

The BC mass shows a positive trend with latitude, increasing from 0.2 to 1.2 ng m⁻³ from 55º to 70º N, and the number concentration of BC particles also increased from 0.2 to 0.4 cm⁻³. The extinction coefficient, estimated from the fraction of BC in the particles, increased from 0.2 to 1 Mm⁻¹ over this same latitude range.

The microstructure of the soot layers, properties of the BC particles and the implications for radiative forcing will be presented in this study.