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Changes in aerosol properties during spring-summer period in the Arctic troposphere

A.-C. Engvall¹, R. Krejci¹, J. Ström^{2,3}, R. Treffeisen⁴, R. Scheele⁵, O. Hermansen⁶, and J. Paatero⁷

¹Department of Meteorology, Stockholm University, Stockholm, 10691, Sweden

²Department of Applied Environmental Science – Atmospheric Science Unit, Stockholm University, Stockholm, 10691, Sweden

³Norwegian Polar Institute, 9296 Tromsø, Norway

⁴Alfred-Wegener-Institut für Polar- und Meeresforschung, Telegrafenberg A43, 14473 Potsdam, Germany

⁵Koninklijk Nederlands Meteorologisch Instituut, Postbus201. 3730, AE, De Bilt, The Netherlands

⁶Norsk institutt for luftforskning, Postboks100, 2027 Kjeller, Norway

⁷Finnish Meteorological Institute, P.O.B. 503, 00101 Helsinki, Finland

Abstract. The change in aerosol properties during the transition from the more polluted spring to the clean summer in the Arctic troposphere was studied. A six-year data set of observations from Ny-Ålesund on Svalbard, covering the months April through June, serve as the basis for the characterisation of this time period. In addition four-day-back trajectories were used to describe air mass histories. The observed transition in aerosol properties from an accumulation-mode dominated distribution to an Aitken-mode dominated distribution is discussed with respect to long-range transport and influences from natural and anthropogenic sources of aerosols and pertinent trace gases. Our study shows that the air-mass transport is an important factor modulating the physical and chemical properties observed. However, the air-mass transport cannot alone explain the annually repeated systematic and rather rapid change in aerosol properties, occurring within a limited time window of approximately 10 days. With a simplified phenomenological model, which delivers the nucleation potential for new-particle formation, we suggest that the rapid shift in aerosol microphysical properties between the Arctic spring and summer is mainly driven by the incoming solar radiation in concert with transport of precursor gases and changes in condensational sink.

[Final Revised Paper](#) (PDF, 529 KB) [Discussion Paper](#) (ACPD)

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