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One year boundary layer aerosol size distribution data from five nordic background stations

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Abstract. Size distribution measurements performed at five different stations have been investigated during a one-year period between 01 June 2000 and 31 May 2001 with focus on diurnal, seasonal and geographical differences of size distribution properties. The stations involved cover a large geographical area ranging from the Finnish Lapland (67° N) down to southern Sweden (56° N) in the order Värriö, Pallas, Hyytiälä, Aspvreten and Vavihill. The shape of the size distribution is typically bimodal during winter with a larger fraction of accumulation mode particles compared to the other seasons. Highest Aitken mode concentration is found during summer and spring during the year of study. The maximum of nucleation events occur during the spring months at all stations. Nucleation events occur during other months as well, although not as frequently. Large differences were found between different categories of stations. Northerly located stations such as Pallas and Värriö presented well-separated Aitken and accumulation modes, while the two modes often overlap significantly at the two southernmost stations Vavihill and Aspvreten.

A method to cluster trajectories was used to analyse the impact of long-range transport on the observed aerosol properties. Clusters of trajectories arriving from the continent were clearly associated with size distributions shifted towards the accumulation mode. This feature was more pronounced the further south the station was located. Marine- or Arctic-type clusters were associated with large variability in the nuclei size ranges.

A quasi-lagrangian approach was used to investigate transport related changes in the aerosol properties. Typically, an increase in especially Aitken mode concentrations was observed when advection from the north occurs, i.e. allowing more continental influence on the aerosol when comparing the different measurement sites. When trajectory clusters arrive to the stations from SW, a gradual decrease in number concentration is experienced in all modes as latitude of measurement site increases.

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