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Title: *Aerosol physical properties studied in the European Arctic*

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On the global scale a major unknown of the spatial aerosol distribution is the vertical distribution. Transport in the planetary boundary layer and the free troposphere can be decoupled, resulting in different chemical composition and thus aerosol properties in different layers.

The Arctic region represents a sensitive ecosystem, which is susceptible to even small changes in the local climate.

The Arctic atmospheric boundary layer (ABL) poses a challenge for all models due to its persistent stable stratification and the important role of ice phase microphysical processes in the formation of boundary layer clouds. Moreover, forcing factors as radiation, conduction, turbulence, subsidence and advection processes increase the complexity of the system.

The aerosol studies presented were carried out onboard the r/vOceaniabetween 2000 and 2012, partly within the NASA/MAN program. During each campaign the vesselcruised for six weeks in the European Arctic between 0 and 14° E and 69 and 79° N. There was also a number of land based experiments, within the framework of the POLAR-AOD program or MACRON on Andoya in northern Norway (16° E and 69° N) in 2006.

Full meteorological coverage (wind speed, direction, air mass backtrajectories, relative humidity, air temperature, etc.) was provided by the ship meteo station and using the HYSPLIT model.

Using the obtained data, primary trajectory analyses, source regions of different aerosols were identified. We also examined the spatial and temporal variation of aerosol optical depth in different regions of the European Arctic.

By using relative topography charts it was possible to observe sources flow dynamic, since we could point out the source region of aerosols in the upper air layer and in the same way point to the boundary layer in which the changes can be reflected with some delay.