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Aerosol distribution around Svalbard during intense easterly winds

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Abstract. This paper reports on backscatter and depolarization measurements by an airborne lidar in the Arctic during the ASTAR 2004 campaign. A unique weather situation facilitated the observation of the aerosol concentration under strongly forced atmospheric conditions. The vigorous easterly winds distorted the flow past Svalbard in such a way that mesoscale features were visible in the remote-sensing observations: The formation of a well-mixed aerosol layer inside the Adventdalen and the subsequent thinning of the aerosol plume were observed over the Isfjorden. Additionally, mobilization of sea salt aerosols due to a coastal low-level jet at the northern tip of Svalbard resulted in a sloped boundary layer toward north. Mesoscale numerical modelling was applied to identify the sources of the aerosol particles and to explain the observed patterns.

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