



Boundary-layer height and Cloud cover in the High Arctic investigated by a ceilometer

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Five years of cloud cover measurements and boundary-layer height estimated from attenuated backscatter profiles from a Vaisala CL51 ceilometer are discussed. The measurements are performed in the High Arctic (latitude 81.3° ; longitude -16.4°) at Villum Research Station, Station Nord in Greenland. The site is at present going through the approval process to become an ICOS atmospheric site labelled SNO. The area around Station Nord is covered by snow/ice from September-July, in some years the snow does not disappear.

The CL51 outputs attenuated backscatter profiles up to 7.7 km every 15 s with a vertical resolution of 10 m. The profiles are used to determine cloud cover and boundary-layer height.

Clouds are determined by applying a threshold value of the attenuated backscatter. If the attenuated backscatter somewhere in the profile exceeds the threshold value, it is taken as an indication of a cloud layer. It is clear that the estimated cloud cover when determined in this way become a function of the chosen threshold value. This point will be discussed.

The analysis shows that for a threshold value of $10^{-5} \text{ sr}^{-1} \text{ m}^{-1}$ the cloud cover at Station North systematically decreases during the spring from 2012 to 2017, and the cloud cover is not showing systematic trends during the summer, autumn and winter. The general trends are in very good agreement with the estimated cloud cover based on a Vaisala proprietary algorithm.

The boundary-layer height was determined by use of the BL software program, which is developed by Vaisala. In a number of examples, the many forms that the boundary-layer height takes will be illustrated and discussed.