

Arctic atmospheric boundary layer measurements by a wind lidar during Polarstern cruise ARKXXVIII/2.

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The representation of the atmospheric boundary layer (ABL) in the Arctic is a major challenge for numerical weather forecast and regional climate models. Reference data sets are rare, particularly over the ocean areas. By using a Doppler wind lidar it is possible to measure vertical and horizontal profiles of wind, turbulence and aerosols. The Fram-Strait is of great interest, since the coupling of the ocean and sea-ice surface with the ABL (and the free atmosphere above) determines the wind-driven sea-ice export of the Arctic.

The ‚Halo-Photonics Streamline‘ wind lidar is used, which is a scanner and can operate with a maximum range of 10km. The operation principle of the lidar is backscattering at aerosol particles and clouds and the use of the Doppler effect. The lidar operates at a wavelength of $1.5\mu\text{m}$ with a pulse rate of 20kHz and its eye-safe.

The instrument was used for the first time during the Polarstern cruise ARKXXVIII/2 in the Arctic and the results are compared with radio sounding data. First analysis show good results for cloud and atmospheric boundary height. Wind speed and direction are realistic and thus they offer a high quality data set for the verification of forecast and climate models.