Geophysical Research Abstracts
Vol. 13, EGU2011-9554-1, 2011
EGU General Assembly 2011

A Seasonal Climatology of the Boundary Layer at GEOSummit Station, Greenland using an Acoustic Sounder

William Neff (1), Brie Van Dam (2), Detlev Helmig (2), and Mathew Shupe (3)

(1) NOAA Earth System Research Laboratory, Physical Sciences Division, Boulder, United States (william.neff@noaa.gov, 303 497 6020), (2) Institute of Arctic and Alpine Research, University of Colorado, Boulder, CO, (3) Cooperative Institute for Research in the Environmental Sciences, University of Colorado, Boulder, CO

The boundary layer can be a critical factor in diagnosing chemical exchange processes over snow surfaces that are chemically active – as has been the case in studies at the South Pole over the last decade. For the first time, data from a high resolution sodar are providing a climatology of the boundary layer (BL) at Summit Station Greenland. The instrument consists of nearly collocated transmit and receive antennas (so as to eliminate the delay due to reverberation in the transducer used in the transmission of the acoustic pulse). A 12-ms pulse ($\sim$2 m resolution) is used with a 1-s repetition period. The minimum range is on the order of 4 m while the maximum range is 160 m. Routine transmission of the data from Summit Station has been implemented to provide real-time monitoring of the system performance. For analysis, an automatic height-detection algorithm has been adapted from one applied to data from the South Pole and used to test some simple scaling relationships using surface turbulence data (Neff et al., 2008, Atmos. Env.). The BL-depth detection algorithm is based on developing a number of characteristic height profiles of the amplitude of the echo received by the sodar, averaged over one-half hour. For strongly to weakly stable BLs, the algorithm is quite robust. Under some very stable, light-wind conditions, reflections from objects on the snow create false echoes that complicate the automatic algorithm. Other complications occur under high-wind and/or heavy snow-fall conditions. In this poster, we focus on an initial climatology developed using data from early June 2010 through the winter of 2010-2011. In this climatology we will describe persistent boundary layers some 10-30 m deep for extended periods. Other cases suggest boundary layer depths less than the 4-m minimum range of the sodar. Comparisons with surface turbulence and meteorological data can be found in the presentation by Van Dam et al. in this session.