



## A bipolar perspective of the boundary layer and associated synoptic influences at South Pole Station, Antarctica and Summit Station, Greenland

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Several observational programs have studied the atmospheric boundary layer (ABL) at South Pole Station, Antarctica, and Summit Station, Greenland, both sites at about 3km ASL on icecaps in both polar regions. In these field programs sodars played a key role in documenting the behavior of the boundary layer under distinctly different weather regimes: At the South Pole, high on the Antarctic ice sheet, the ABL is far from the Southern Ocean storm track and often exhibits prolonged quiescent cold spells punctuated by warm advection events above a shallow stable ABL [Keller *et al.*, 2021; W D Neff, 1999]. Summit Station is adjacent the Atlantic storm track and influenced by extratropical storms with attendant Atmospheric Rivers [Mattingly *et al.*, 2018; W Neff, 2018; W Neff *et al.*, 2014], decaying hurricanes, and large-scale Atlantic blocking events that bring warm air and clouds over the relatively smaller icesheet.

Sodar data from the South Pole were gathered in 1977, 1978, 1993, and 2003 (the final year in support of the *Antarctic Tropospheric Chemistry Investigation*, ANTICI [W Neff *et al.*, 2018]). Summit Station has seen sodar operations that started in 2008 in support of studies of the dynamics of ozone and nitrogen oxides at Summit Station [Van Dam *et al.*, 2013] and beginning in 2010, extending through early 2021, in support of the ICECAPS (*Integrated Characterization of Energy, Clouds, Atmospheric state, and Precipitation at Summit*) study of cloud and radiation influences on the energy balance over the ice sheet [Shupe *et al.*, 2013]. Of particular interest at Summit Station is the internal boundary structure observed during fog episodes [Cox *et al.*, 2019] and during changes in synoptic weather patterns e.g. Figure 3 in [Shupe *et al.*, 2013] which also shows examples of supporting remote sensing observations. In this presentation we will compare and contrast sodar observations taken at these two icecap sites and describe several interesting events occurring in the last several summers over the Greenland icecap as seen in sodar and supporting observations at Summit Station.

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