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Behaviour of Atmospheric Boundary Layer Height at Dome C, Antarctica

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The Antarctic Atmospheric Boundary Layer presents characteristics which are substantially different from the mid-latitudes ABLs. On the Antarctic plateau two different extreme situations are observed. During the summer a mixing height develops during the warmer hours of the day although the sensible heat flux is reduced compared to that at mid-latitudes. During the winter a long lived stable boundary layer is continuously present, the residual layer is never observed, consequently the inversion layer is connected at the free atmosphere. To understand the stable ABL process the STABLEDC (Study of the STAble Boundary Layer Environmental at Dome C) experimental field was held at Concordia, the French Italian plateau station at Dome C, during 2005. In the same period the RMO (Routine Measurements Observations) started. The data included turbulence data at the surface, temperature profiles by a microwave profiler (MTP-5P), a mini-sodar and radio-soundings.
In this work we will show the results of a comparison of the ABL height at Concordia (3233 m a.s.l) during the summer and the winter using direct measurements and parameterization.
The winter ABL height was estimated directly using experimental data (radio-soundings and radiometer temperature and wind velocity profiles) and different methods proposed in literature. The stable ABL height was also estimated using the formulation proposed by Zilitinkevich et al. (2007) for the long-lived stable boundary layer. The correlation of ABL height with the temperature and wind speed is also shown.
The summer mixing height was instead estimated by mini-sodar data and compared with the height given by the model suggested by Batchvarova and Gryning (1991) which use as input the turbulence data.