



Convective mixing layer height during the summer at Dome C, Antarctica

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High temporal and spatial resolution mixing layer height measurements were performed with surface-layer mini-sodar at the French-Italian station of Concordia, on the Antarctic plateau, during the summer 2011-2012. The instrument resolution allowed monitoring the summer mixing layer evolution during an entire cycle, i.e. a very shallow nocturnal boundary layer followed by a typical daytime growth. The mixing layer height, variable between ~ 10 m and 300-400 m depending on the diurnal insolation, was analysed as function of the mean and turbulent structure of the low atmosphere. The retrieved values were compared with those calculated using a well-known prognostic equation. Observed and forecasted value were in a fairly good agreement, with an index of agreement (IoA) of 0.57. The role of subsidence was carefully examined and discussed. It was shown that the agreement between modelled and experimental values improves significantly (IoA = 0.84) if the subsidence value in the prognostic equation is varied during the day.

To determine a simpler formulation, useful in applications that do not need more sophisticated techniques, dimensional analysis was used to propose and validate a new diagnostic equation, that depends on the surface buoyancy flux, the background stability and the buoyancy parameter.