Geophysical Research Abstracts
Vol. 17, EGU2015-2300, 2015
EGU General Assembly 2015

Waves in the Turbulent Layer during the Morning Transition to the Convective Boundary Layer at Dome C, Antarctica

Igor Petenko (1,2), Stefania Argentini (1), Giangiuseppe Mastrantonio (1), Margarita Kallistratova (2), Angelo Viola (1), Roberto Sozzi (3), Giampietro Casasanta (1), and Alessandro Conidi (1)

(1) Institute of Atmospheric Sciences and Climate, CNR, Rome, Italy , (2) A.M. Obukhov Institute of Atmospheric Physics, RAS, Moscow, Russia , (3) Regional Agency of Environmental Protection of Lazio, Italy

During January-February 2014, observations were carried out at the Concordia station, Dome C, Antarctica to study the behaviour of atmospheric turbulence in lower two hundred meters. The behaviour of thermal turbulence was observed remotely using a specially developed high-resolution sodar. In contrast to the all previous observations, in this experiment the turbulence pattern in the boundary layer was observed by sodar beginning from the lowest height of $\approx$2 m and with vertical resolution < 2 m. Sodar measurements were accompanied by in-situ measurements of the relevant meteorological variables as well as of some turbulent characteristics. Typical patterns of the diurnal evolution of the spatial and temporal distribution of turbulence detected by sodar were analysed. This study focuses on the transition period between stable stratification and the developed convective activity under the capping temperature inversion layer. Thank to the high resolution of sodar measurements, for the first time it was found that during developing the convection near the surface, above, in the elevated turbulent layer, a clear wave activity occurs. Undulation inside the elevating turbulent layer was observed during the significant part of the time. Mainly, the form of these waves can be classified as “cat eyes”. Oscillations of wavy layers indicated with intense thermal turbulence inside them were characterized by the use of the methods of spectral and correlation analysis. The main characteristics (spatial and temporal scales, vertical extension) of the undulation structures were determined. The prevailing periodicity of the observed undulations is estimated to be 40-50 s. A descend rate of wavy fine turbulent layers was estimated by different ways and varies in the range 1-2 m s-1. The time behaviour of the top and the bottom of wavy layers were determined for the whole observational period.