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Estimating length scales for tropospheric turbulence from MU radar and balloon data

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Introduction

Estimating atmospheric turbulence parameters from ST radar measurements is an important issue. The methods used in the literature are based on the hypothesis that radar echoes at altitudes above 2 km result from atmospheric turbulence within the mixed layer (e.g., Naaim and Eskin, 2000). In such conditions, the width of Doppler spectra can be related to the turbulence energy dissipation rate. The higher the scale of turbulence is smaller than the dimension of the radar volume, it depends on the background stability指数B (e.g., Hocking, 1989). The latter parameter is usually estimated on balloonized instruments and is an important parameter for the analysis of turbulence. Several studies have been made using advantage of the high-resolution of radar data for industrial and commercial purposes. Wilson et al. (JAGC, 2011) showed that turbulence levels from FTS measurements are possible using Thruwave analysis. This method can be applied to the vibration analysis of FTS data without considering the noise effects. Tidal layers are clearly identified through the detection of overtones produced by moving and fielding in dry or moist potential temperatures profiles. The radar profile vertical structure is affected in the detection of spectral layers especially with small-scale ranges. Wilson et al. (2008) showed the potential of applying a tidal analysis to radars to provide real-time information for increasing radar layers. Questions or comments? 

Instrumental set-up

The Middle and Upper Atmosphere Radar (MUR) was operated in range imaging (RHI) mode (4 frequencies) from 01 November 2013 to 18 June 2014. The radar was located in Kulwadi (Hindu, 2008) to the west of the radar. The range sampling coverage was 1.3 km to 0.7 km, and the IR was used for imaging the turbulence and radar layers. The radar data were processed in the same radar dataset for each flight. Among the other instruments operated at the same time, two types of radars were used: Vaisala RS460 (Vaisala RS460) and missile RS-66 (Vaisali RS-66). The specification of the radars were given at http://www.mri.ucar.edu/products/vaisala/vaisala_radars.html. Both radars provide PPI (plan view) and profiles at a vertical sampling of 1 km. A total of 28 radars were used during the radar data collection period. The data were collected during eight flights, and the data were collected at night-time. The data were recorded using a nocturnal technique and were propagated by the radar retransmission. The data were analyzed using the radar retransmission method. The data were analyzed using the radar retransmission method. The data were analyzed using the radar retransmission method.

MUR observations

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