



Acoustic remote sensing of the ABL wind structure in Moscow city

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The dynamics of wind velocity V in the atmospheric boundary layer (ABL) above Moscow city have been analyzed by long-term data of sodar measurements. The Doppler 'MODOS' sodar of METEK firm (Germany) production operates at Moscow University since 2004. Besides, data of two cup anemometers on 7 and 15 m heights inside 'dead zone' of the sodar have been added to analysis. The methodical questions of comparison between in situ and sodar data about V are discussed in details. The profile of wind velocity V in the air layer from 7 to 500 m has been received and analyzed in average of eight last years from 2004 to 2012.

In average it is close to logarithmical law up to 60 m so that this value seems to be equal to the surface air layer height. It should be noted that sodar due to its high spatial resolution (20 m) allows studying the ABL fine-structure. Among others, the daily course of V has been investigated in details at different heights. It demonstrates clear daily maximum and nocturnal minimum at any height below 80 m and, vice versa, nocturnal maximum and daily minimum above 140 m everywhere. The air layer from 80 to 140 m represents intermediate zone of smoothed daily course of V . In general this zone corresponds to cross-over height (ideal level where the daily course of wind velocity is absent) but it is noted by important additional feature – minimum in the morning which is statistically significant.

Besides, with using of the sodar data it's possible to study mostly interesting weather phenomena such as thunderstorm. Total sampling of this weather event was equal to 137 cases in Moscow from 2004 to 2012. Averaged values both of V , and of its vertical component W have been analyzed during these thunderstorms. As it was shown both V , and W values are increased at the moment of this phenomenon starting. The wind velocity at this moment is in average nearly on 1 m/s higher than three hours before thunderstorm and this increase is statistically significant with 0.95 confidence probability.

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