

Comments to the manuscript "Turbulence Detection in the Atmospheric Boundary Layer using Coherent Doppler Wind Lidar and Microwave Radiometer" by Pu Jiang, Jinlong Yuan, Kenan Wu, Lu Wang, and Haiyun Xia

Manuscript presents the experimental results intending on demonstration of the possibility of vertical profiling the refractive index structure constant based on estimation of the turbulent kinetic energy dissipation rate and gradients of wind velocity and potential temperature from data of wind coherent lidar and microwave radiometer. For determining the refractive index structure constant, Eq. (4) in the manuscript is used. Eq. (4) follows from the formulae listed in Tatarskii, 1961 (see References in the manuscript).

The main remark to the manuscript is following. V.I. Tatarskii wrote in Tatarskii, 1961, that these formulae are true for the surface layer of the atmosphere. As to the heights above the surface layer, he noted, a lot of experiments are required to test applicability of these formulae. Actually, as it follows from the ground experiment described in the manuscript, Eq.(4) does not work even in the surface layer under the stable conditions, it gives the refractive index structure constant values which differ from the scintillometer results by two orders. The temperature stratification in the atmosphere is stable one at the heights exceeding the boundary layer height independently on the stratification in the boundary layer. Thus, Eq. (4) does not work over the boundary layer in any case.

The rest remarks are following.

1) Lines 15-16: "..... the mean error and standard deviation is $1.09 \times 10^{-15} \text{ m}^{-2/3}$ and $2.14 \times 10^{-15} \text{ m}^{-2/3}$, respectively."

That says about nothing. Relative units are more informative.

2) Line 70. Eq. (1) is listed in Tatarskii, 1961, for the temperature structure constant. Relation between the refractive index structure constant and the temperature one is commonly known.

3) Lines 108-109: " In the vertical direction of 0-2.17 km, 2.17-4.76 km, and 4.76-11.26 km, the range resolution is 26 m, 52 m, and 130 m, respectively."

Pulsed lidars have dead zone, diapason "0-2.17 km" is not true. The same is for Figs. 2,4,6.

In Fig. 2e, instead of "-8 -2" should be " $10^{-8} \text{ } 10^{-2}$ ". The same is for Figs.4g, 6d.

4) Line 122:

What means " the DAVIS weather station"?

5) Lines 123,129: "The receiving and transmitting ends of LAS are located at the height of 55 m at site A and site B respectively. "temperature data recorded at the height of 2m, 8m, and 18m"

Difference in heights leads to difference in the refractive index structure constant about three times. The structure constant decreases with height.

6) Figs. 2f,5 say about nothing. The potential temperature and its gradient should be instead of temperature and temperature gradient to see the temperature stratification and its variations with height.

7) The Richardson number in Fig. 6c is positive. That means, during measurements there was stable temperature stratification in the atmosphere. The applicability of Eq.(4) in such conditions is under question. As well as correctness of the profiles in Fig.7. Figs. 2g, 3 (green dots) demonstrate that at stable conditions there is large difference between the results of the scintillometer and calculations based on Eq. (4).