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Interactive comment on "Long-live High Frequency Gravity Wavesin Atmospheric Boundary Layer: Observations and Simulations" *by* Mingjiao Jia et al.

Anonymous Referee #2

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Comment on the manuscript "Long-live High Frequency Gravity Waves in Atmospheric Boundary Layer: Observations and Simulations" by Mingjiao Jia et al.

The manuscript presents the results of lidar observations of wave like variations of wind velocity vector vertical and horizontal components in the boundary layer of atmosphere obtained during the field experiment in August-September 2018 in the location of Anqing, China. The experimental results are accompanied by the results of model numerical simulation of the wind field disturbed by the topographical objects. Based on the obtained experimental and computational results the conclusions about mechanism of generation of wave variations of wind velocity are formulated in the manuscript.

Major comments: 1) The general goal of the study is not clear from the manuscript. It may be proposed that this goal is study of atmospheric waves arising under conditions of stable thermal stratification in the boundary layer of atmosphere. But only one event of atmospheric wave on 4-5 September is analyzed in the manuscript with the use of information about the profile of temperature in height. Moreover, even for that event there is no data on temperature profile measured with the radiozonde at 19:15 on 4th September in the manuscript. To improve understanding of this issue, it may be useful to present the temperature profiles in height during all the period of field experiment and carry out the analysis of frequency of wave events not only with taking into account the magnitudes of wind velocity and wind shear, as it is presented in Fig. 6, but also with consideration of the temperature stratification. 2) The representativeness of the estimates of the mean wind velocity. As mentioned in line 6 on p.4, measurement duration of radial velocity in one direction is 10 s during this experiment. For used in the experiment scanning geometry such duration of measurements is insufficient in order to obtain statistically justified estimates of the mean wind velocity components. Actually, it is well known that integral spatial scale of wind turbulence is proportional to the height under ground in the lower atmosphere and can reach a few hundreds of meters at the heights 600-2000 m. To obtain statistically justified estimate of the mean velocity, the velocity fluctuations caused by the turbulent inhomogeneities of all the scales up to hundreds of meters must be averaged. Even for observed in the experiment maximal velocity 10 m/s in order to average velocity fluctuations caused by the turbulent inhomogeneities of velocity field of such spatial scales it requires few hundreds seconds, at least. 3) What is the reason of variations of wave period in Figs 3, 4? Model calculations in Fig. 8 do not reproduce wave period variations. It may be useful to compare the experimental and calculation results in more detail by combining the experimental and calculated data in one plot. It is difficult to compare and understand the results in Figs. 8b, 8c. 4) The code used for numerical modeling must be described in more detail. As it can be proposed, some version of the program CFD Fluent was used in the modeling. Accordingly to Eqs. (2), (3), it is required to set a lot of input turbulent parameters in order to perform the modeling using that code. None of these input parameters is determined experimentally. At least, there is no information about that in the manuscript. If so, there is no any base for quantitative comparison of the experimental and computational results and conclusions about the mechanism of wave generation. Minor comments: 1) Temperature profile curves in Fig.5 should be identified. 2) Parameter N in line 14, p.7 should be expressed by formula. 3) Resolution of wind and temperature experimental data in height should be indicated. 4) Magnitudes of âĎŐA, and âĎŐB in Fig.8 and Table 2 must be indicated.

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