p.17 l.11

The initial thermal field is assumed to be horizontally uniform, using the vertical in a horizontal plane.. The temperature profile from the radiosonde on 5 September. is applied as inlet and outlet boundary in this model. The topography is set at as fixed temperature wall, since the heat flux on at the ground is was unavailable. In this work, buoyant flows are developed with low velocity and small temperature variations in each layer. The Boussinesq approximation is applied for each thin layer. Boussinesq approximation, which treats density ρ_{re}(z) as a constant value at altitude z in all solved equations, except for the gravity and buoyancy term in the momentum equation. The fluctuation of (z) is caused by temperature T(z), neglecting the influence of pressure. The density (z) is approximated as:

$\rho(z)=\rho_{ref}(z)-\rho_{ref}(z)\beta(T(z)-T_{ref}(z))$ (5)

where β is the thermal expansivity, and T_{ref}(z) is the reference temperature at altitude z. The Boussinesq approximation is similar with to the anelastic approximation in this form. The main difference between the Boussinesq approximation and anelastic approximations is that the anelastic approximation considers the influence of both pressure and temperature in fluctuations of ρ. Considering computational convenience and convergence, the Boussinesq approximation is adopted in this work.

p. 18 l.9

Based on this result, wind profiles u_z with different wind shear, and topography with different height of hills A and B are employed in the CFD numerical simulations. A detailed list of boundary conditions is presented in Table 2. The corresponding simulated results of the zonal winds and vertical winds above the lidar for all cases are shown in Fig. 8. It should be noted that a time of 0 represents a stable steady state in all cases except cases 7 and 8., not the real time after the simulations started running. Here, the stable state indicateswe mean by a steady state that which pertains the state when the atmospheric flow varies stably with men flow, wave motions and turbulence due to the fully developed turbulent activities, i.e., when the wind-inlet passed through the ABL and varies stably above the lidar stationturbulence is fully developed. In cases 7 and case 8, a time of 0 is defined as that when the simulations started running and the velocity-inletinput velocity flowed from the western boundary at the same time.

p.23 l.10

Comparing withA 2D model is used in this simulation rather than, a 3D model which in principle can more accurately simulate the atmospheric flow with complete information. The simulation results will be more accurate with reasonable boundary conditions in 3D model. , Considering the direction of the low-level jet and the maximum background wind flow in complex mountain areas, theis zonal transect in this case is appropriate in thisfor a 2D model:. tThe influence of terrain on atmospheric flow is mainly in this direction. However, the 2D model cannot simulate the information in another dimension, e.g., lateral flow around the hillside and the blocking effect of the low terrain on both sides, leading to additional errors compared with a 3D model. Nevertheless, as a simplification of the actual mountain model, the comparison between the numerical simulation results and field experiments shows that the two-dimensional models can simulate the actual topographic flow well in some cases (Miller and Davenport, 1998; Toparlar et al., 2017; Walmsley et al., 1984). Furthermore, Ssome basic theories and empirical formulas of complex mountain wind field are built on the basis of a two-dimensional model. In addition, a 2D model consumes much less computing resources and time than a 3D models. Therefore, the two-dimensional terrain simulation of the mountain wind field has a wide range of theoretical significance and practicabilityapplicability. The additional errors with only 2D model are acceptable for studying GWs. By using this simplified 2D model, the influence of terrain on GWs can be still analyzed.