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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Interactions among drainage flows, gravity waves and turbulence: a BLLAST case study" *by* C. Román-Cascón et al.

Anonymous Referee #3

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The authors documented two wave events, and both are associated with the flow from the mountains in the south. They analyzed the wave and turbulence characteristics and their relationship with a shallow drainage flow. The case analyses here are similar to the ones in Sun et al. (2015, JAS, 72, 1484) with a different dataset. The paper is well organized and clear. The dataset is unique. It seems to me that the authors could say more about connections/interactions between the shallow drainage flow, gravity waves, and turbulence. Figures 9-12 show the temporal variation of turbulent fluxes as a function of time scale, but the maximum time-scale was capped below the shortest gravity wave period identified in Table 3.

One question I have is the relationship between wave propagation direction and the direction of wind convergence. It looks like the drainage flow for either the early shal-

low one or the later deep one was from the mountains in the south, which opposes the ambient weak wind from north. Thus, the wind convergence in the approximate north-south direction could lead to the displacement required for the buoyancy wave. However, the wave propagation direction is about 90 deg (either from or toward) as listed in Table 3. Is this common that the wave propagation direction is approximately perpendicular to the wind convergence direction?

L. 25 on P. 12831. The deeper wind? Maybe the strong wind over a deep layer?

The last sentence before section 3.2.1. The next two sections.

The second line on P. 12834. It seems to me that the depth of a duct layer decides the depth of the wave layer. I am not sure how the depth relates the amplitude of the pressure perturbations.

L. 17 on P. 12835. It is hard to see the lack of turbulence generation the middle (2m?). Maybe the authors can consider showing the momentum and heating fluxes integrated over the relevant time-scales too.

Table 3. Are the wave propagation directions here the directions waves propagation to or from? The second time period, 2005-2025 UTC, has only one wave cycle if the wave period is 22-24 min. Any justification to divide the wave event 1 into two periods? The wavelet signal of p for this period in Fig.6c could be the signal for wave event 2 extended over depending the size of the window where the wavelet is performed.

Figure 1. Since the drainage flow is associated with topography, it would be better to have a topographic map too.

Figure 7. As I understand, Edge area has the lowest elevation, and Area 2 has the highest elevation. However, the pressure at Edge area has the lowest value. This could be real, but different from what I expected.

Figure 8. Are the sharp changes of wind-speed and direction at 100 m and 200 m real? The temperature profile does not have any signal at these levels.

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 12821, 2015.