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Earth System Dynamics
Discussions

Interactive comment on "Downslope windstorm study in the Isthmus of Tehuantepec using WRF high-resolution simulations" *by* Miguel A. Prósper et al.

Anonymous Referee #1

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This manuscript is a product of hard working and written in detail. However, if it is written concisely it will be much better. I think if it is revised a bit with editing and by incorporating some provided information it will be considered for publication.

Page 1 Line 26: Re-write this sentence concisely: "Wave breaking creates a well-mixed region to the lee of the obstacle that induces flow separation; the generation of a dividing streamline between undisturbed flow above and trapped energy and flow analogous to hydraulics in the lower surficial branch (Smith, 1985b)."

Page 3-4 Section 1.1 is a big with repeating same expression time to time. As this is a scientific paper shorten being on a specific on Mountain wave phenomena, hydraulic

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analog and relation with the Froude number.

Page 4 Line 20: “Fr in (Eq3)” is it equation 3? If so, there is no relation of Fr. Correct it.

Page 6 Line 20; Replace “rugosity” by surface roughness (m)

Page 7 Line 6: “wind episodes”. Where is wind? Figure 2a and 2b say they are 850 hPa level temperature and sea level pressure and also there are no any wind arrows. So, include wind.

Page 9 Line 4: “Isthmus (Figure 3d)”. There is no caption of Figure 3d. Add this including its exact position (lat./long) so that it will can be compared with aforesaid matters.

Page 9 Line 5: “inversion existent at about 800hPa or 2500m”. Seems from about 2000 to 2500 m. correct this. Looks sounding has multiple PBL and discontinuous stratification which refers an importance of study of high resolution data sets. So, mention this kind of information to highlight your approach of methodology.

Page 10 Line 10: “The temperature profile in Fig. 3d evidences that the latter level. . . ”.. What does latter level mean as it is hard to understand? If you are referring a presence of stable layer below 2.5km Figure 3d shows there is a presence of static instability, not stability below 2 km. So, regarding this issue rewrite this.

Page 10 Line 31: “Figure 6a plots the Froude number (Equation 1)” How did you find “$\theta 0$” (method) to calculate N for Froude number?

Please mention figure nos. in following sentences as it will be easy to follow these criteria:

Page 10 Line 17-21: These conditions are: a mountain with steeper lee slope (1) (Figure no. ??) crossed by strong winds (> 15m/s) (2) (Figure no. ??) mostly normal to the barrier (3) (Figure no. ??). A stable layer above the top and less stable above that (4) (Figure no. ??) with cold air advection and large-scale subsidence to maintain the

stability (5) (Figure no. ??) . Apart from this, reverse wind shear above (6) (Figure no. ??) and no cool pool in the lee (7) (Figure no. ??), is also desirable. These conditions are all perfectly met for both locations analyzed, as discussed previously, and indeed intense downslope windstorms occur in both cases.

Page 10 Line 31: Where is Figure 6a as there is no label a, b, c of Figure 6. So, it is hard to follow.

Page 14: Insert figure no. “c” in Figure 7.

How about the subcritical flow before the supercritical flow? Did you observe it within your region of interest before the supercritical flow? If so mention them with a value of Froude number so that it could be better to relate how the subcritical flow was converted to supercritical flow as downslope wind.

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