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Interactive comment on "Atmospheric boundary layer modeling based on mesoscale tendencies and data assimilation at microscale" *by* J. Sanz Rodrigo et al.

J. Sanz Rodrigo et al.

jsrodrigo@cener.com

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Thanks for the review. Let's go point by point:

1."A methodology for the design and testing of boundary layer models for wind energy applications" Yes, since GABLS 1 and 2 are also added to the paper, I guess the "methodology" is more relevant than the "model". We'll change the title to this one.

2. I guess the typo got carried away...

3. Equation (2) is introduced to simplify Eq (1) and use the notation to introduce the mesoscale forcings in equation (3) when we switch from mesoscale to microscale modeling. We use velocity components U and V because the units are in terms of m/s. We

also use this equation and notation in connection to Figures 7 and 8. We'd rather keep the Equation and add more information about the notation used, in particular to "pbl", as pointed out by reviewer #2.

4. E or k... We adopted here the wind engineering notation that normally uses k instead of E for the turbulent kinetic energy. Then, we speak about k-epsilon models, etc. For the von Karman constant we use kappa, the Greek letter, to differentiate.

5. We will replace this sentence with: " ... a relationship amongst k-epsilon coefficients is prescribed in order to obtain consistency with well-established log profiles in surface-layer neutral conditions (Richards and Hoxey, 1993):"

6. Charnock relation. Yes, I will add the original reference to Charnock. In Sanz Rodrigo (2011) the Charnock coefficient is calibrated using Fino1 measurements.

7. Well, the range of cooling rates is not necessarily limited to offshore conditions. It is just an exercise using the latitude and roughness length of Fino1 and then using a wide range of cooling rates leading to z/L values from -20 to 20 at 70 m. In Sanz Rodrigo et al. (2015) we analyzed flux-profile relationships that showed stabilities mainly in the range from -2 to 2 at 80 m. We'll add this reference to indicate the relevant range of stabilities at Fino1.

8. Agreed, we just wanted to provide a historical reference. We'll add the more recent references as well.

9. The power-law exponent "alpha" is convention in wind energy to quantify the wind shear. Similarly, a linear fit is used to characterize wind direction veer. We used these engineering methods here following the wind energy convention but we also mention that their suitability needs to be checked: "While these fitting functions are commonly used in wind energy, their suitability in LLJ conditions is questionable. The regression coefficient from the fitting can be used to determine this suitability."

10. Figures 12 and 13 are efficient ways of plotting a large number of simulations such

that they can be compared. They could be magnified (like Figure 11) but then they should be separated into 4 figures. We believe that it is easier to compare the results with the compact solution of the paper but we can adopt the solution of 4 figures if the editor also prefers larger figures.

11. Hodographs... Maybe this is another meteorology vs wind-energy convention. In wind energy we tend to use wind energy and wind speed rather than velocity components. The paper already includes 13 Figures, which might be 15 following the previous point. We'd rather not include more figures.

12. Agreed, let's not use the QoI acronym.

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