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

Anonymous Referee #2

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This manuscript assess the possibility to drive micro-scale RANS models for wind energy application, with forcing's from meso-scale models. On the basis of the three GABLS cases it nicely analyze the performance when different model configurations and model couplings are done.

The authors clearly present the results of a quite complex exercise. The manuscript is clearly written and graphs are clear and to the point.

P2 L6 What "larger scales" are meant here temporal or spatial?

P2 L5 MOST is not the theory for neutral conditions, it is the theory that extends from neutral to non-neutral conditions.

P2 L10 At this stage it is unclear what "micro-scale models" are. P2L15 Do the authors mean "ABL models" or "microscale models"?

P4L3" Hence, contrary to the original GABLS3 set-up, we allow the mesoscale forcing to retain its uncertainties, for the sake of a more generalized mesoscale-to microscale methodology, and then relax the microscale model simulation towards the profile observations to correct the hour-to-hour bias." I think this needs some more wording to become clear to the general reader.

P4 L26 How is this coordinate system oriented?

P4 L23 "This meso-micro methodology" Do the authors mean a "one –way coupling" ? Please reformulate.

P5 L 8-9. Why the subscript "pbl" for the turbulent diffusion tendency

P5 L17 are these terms height dependent? Unclear how the height information of the observations is incorporated.

P6 L1 or is it just the diurnal time scale itself?

P9 Conclusion for GABLS1 not much difference Fig 3 needs some more explanation. Stability is plotted with a color code

P10L L4 humidity is not relevant as long as clouds are absent.

P10 L9-12: This is unclear formulated. Are the 5 cycles 5 times the 48 hour periods? How then can consecutive days have almost the same temperature and wind? Also look at the formulation of the caption of fig 4

P10 L17-20. A higher k can be a sign of the model being less dissipative, as it is unable to get rid of the turbulent kinetic energy.

P11L6 Is 19 m/s correct?

P11 L10-13 Is there anything to say about the quality of the advective terms in the

meso-scale simulation?

P12 L3 Fig 7. If I add the individual components I would expect the signature of U_cor to stand out more clearly in U_tend.

P12 L3 Fig 7. Bosveld et al. (2014) attributed the strong tendency after midnight to U_adv. Please comment.

P12 L3 Fig 7. The strong peak at midnight in U-adv is after 60 minute filtering only 60 minute wide. This means that in the original data it is even narrower in time, and may indicate a very sharp front. Much sharper then is found in the RACMO run of Bosveld et al. (2014) and much sharper then observed.

Textual comments:

P1L11 insert " cases" P1L15 " from the Cabauw meteorological tower" P2 L5 "site measurements at standard height" P2 L5 "relying" P3 L13 Bass -> Baas (see also P4 L18 and P4 L22) P4 L1 unclear sentence P9 L3 long -> high P9 L9 than -> as P12 L21 "even though the filtering process, .." incorrect formulation P12 L25 "a" should be "at", "than" should be "as". In general please check carefully throughout the manuscript for misspelling! P12 L30 add "This results in an imbalance of forces . . .." P15 L1 the term "footprint" is confusing, you may want to use " structure" P15 L1 change to " . . . even though more simplified physics is used."