

Interactive comment on “Evaluation of the boundary layer dynamics of the TM5 model” by E. N. Koffi et al.

Anonymous Referee #1

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General comments

I think this paper could be significantly enhanced by including some further discussion or even recommendations on estimating model transport errors based on the model-observation comparisons of 222Rn and BLHs. As the authors already point out, transport errors are a substantial source of uncertainty in the fluxes estimated in atmospheric inversions. There are already a number of groups using TM5 in atmospheric inversions, but such recommendations need not be limited only to TM5 but in general the use of the new 222Rn emission map and the IGRA BLH dataset for assessing model transport errors.

The paper includes many detailed figures of the comparison of BLHs and 222Rn but I think a couple of figures that summarize (i.e. give a more immediate indication of)

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the comparison between the model and observations and of the seasonal and diurnal cycles could be very helpful. Then some of the detailed figures could be moved into the supplement.

Specific comments

P3, L21: Here the authors mention only surface monitoring stations in regional inversions but not aircraft data, which are often used (e.g. the Kort et al. 2008 study cited here). Model representation of aircraft observations will be also affected by errors in BLH and simulations of boundary layer dynamics. Perhaps this should be mentioned.

P10, L26-27: It is interesting that the modelled nocturnal BLHs tend to be higher than observed in summer but that this is not the case in winter? Can the authors comment on this?

P10, L41: The authors do not discuss comparison of the modelled and observed (at IGRA sites) nighttime BLHs for Cabauw or Trainou.

P11, L7: Please give a quantitative estimate of “better agreement” either stating the improvement in the RMSE or correlation.

P11, L15: Please delete “apparently” – either the InGOS 222Rn flux maps give better agreement or they don’t, so “apparently” is not appropriate here.

P11, L38-39: The authors state that the mismatch between the observed and modelled 222Rn activity concentrations cannot be due the modelled BLH because this matches the observed BLH well. However, I understand that the modelled BLH is determined by vertical interpolation, therefore, I wonder if the vertical resolution in TM5 may be a possible reason for the mismatch?

P13, L1-11: I think this section should be expanded to discuss the influence of compensating errors in the 222Rn fluxes (in the constant versus InGOS flux maps) and in the BLHs and how this might explain the fact that the simulations with the constant fluxes lead to a better comparison with the observations.

Technical comments

P4, L46: “as” should be replaced by “compared to”

P10, L36: delete “also” after “In addition”.

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