

Interactive comment on “Atmospheric boundary layer dynamics from balloon soundings worldwide: CLASS4GL v1.0” by Hendrik Wouters et al.

Anonymous Referee #1

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General Comments

This is a well-written manuscript which documents a powerful new software tool which the authors are making publicly available. This tool should allow researchers to perform extensive experiments related to boundary layer growth and development, including sensitivity to land surface and atmospheric inputs and parameters. The input datasets are global and extend back to 1981, allowing for easy application of experiments across climate regimes and seasons, and allowing users to test the representation of boundary layer dynamics in climate and earth system models. The authors include analysis of an initial experiment to demonstrate the first-order performance of the model. This

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projects looks like it could be extremely beneficial to the broad scientific community. I am fully in favor of this manuscript being published in Geoscientific Model Development. I document a few very minor suggestions below.

Minor Suggestions

1. Section 2.1, line 15: “for which one also adds the entrainment flux driven by shear”: I’m not quite sure what this phrase means. Do you mean that the component driven by shear is included in the $0.2 \cdot (\text{buoyancy flux})$ term, or that it should be added to this term? If it’s the latter, you should change the word “for” to “to”.
2. Line 18: Which parameters in the Penman-Monteith and other empirical equations are fixed and which are locally and/or seasonally determined from the input datasets?
3. Figure 2: It took me a while to find the big X for the BLLAST experiment location, in part because much of the X is on top of country lines. Perhaps you can use a different symbol.
4. Section 3, line 3: When you first mention daytime tendencies, can you clarify what time period the resultant values are averaged over? I imagine it is from sunrise through the time of the second sounding. Since the local timing of this second sounding is at different times of day in different longitudes, might this introduce a spatial bias since BL growth rates are not uniform over the course of the day?
5. Page 12, line 2: Here you mention the observed daytime tendencies when you are discussing the results from the three intensive campaigns. Are the results you show actually subdaily averages since you have more than two soundings per day?
6. Figure 3: the correlation plots are quite busy, making it a touch hard to find the three symbols of interest. Maybe you can make the grey lines a little bit lighter grey so the symbols are easier to see.
7. Page 13, line 8: It is not clear to me where the 22% value comes from. Please clarify.

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