Geosci. Model Dev. Discuss., 7, C2790–C2793, 2014
www.geosci-model-dev-discuss.net/7/C2790/2014/

Geoscientific Model Development Discussions

Interactive comment on "The implementation of a MiXed Layer model (MXL, v1.0) for the dynamics of the atmospheric boundary layer in the Modular Earth Submodel System (MESSy)" *by* R. H. H. Janssen and A. Pozzer

Anonymous Referee #3

Received and published: 23 December 2014

First of all I would like to thank the authors for the quick answer to my first comments.

Second, I'm satisfied with the all answers gave to my comments except regarding point 1, which was my main concern to the manuscript.

The authors are right when describing the parts of the model already shown by van Heerwaarden and Vilà. However, my point was that all the equations presented by the authors were already described not in a single paper but in different previous works. Consequently, keeping in mind that most of the present manuscript is devoted to the MXL model, this is more a MXL review than a paper explaining how MXL is imple-

mented in MESSy and how it works. In this sense, I totally agree with the authors when they say "working with MXL/MESSy may find it helpful to get an overview of all equations used in this model in one paper. Besides, . . ." However, to my opinion this will be totally fulfilled if a technical report is included in the distribution of MESSy, as many models do.

To clarify this point, besides some general books, I refer some previous research works (some of them already cited by the authors) where the different parts of the MXL model have been already described.

1. Heat budget: Tennekes (1973), Tennekes and Driedonks (1981), Pino et al. (2006). 2. Moisture budget: van Heerwaarden et al. (2009, 2011) 3. Momentum budget: Fedorovich (1995), Conzemius and Fedorovich (2006), Schröter et al. (2013). 4. Non-reactive species: Culf et al. (1997), de Arellano et al. (2004), Casso-Torralba et al. (2008), Wyngaaard (2010), Pino et al. (2012, 2013). 5. Chemistry: Vilà-Guerau de Arellano et al. (2009), Ouwersloot et al. (2011), Vilà-Guerau de Arellano et al. (2011), van Stratum et al. (2012), Ouwersloot et al. (2012). 6. Land surface and model: van Heerwaarden (2009, 2010, 2011)

Finally, I can imagine that Vilà et al. (2015) don't only provide a general description of the MXL, or only deal with momentum parameterization (this work is only referred at pages 7200 and 7218 of the manuscript). Could the authors clarify what is the detail of the MXL model given by Vilà et al. (2015) in their book (in press)? I suspect that in this reference all the equations regarding MXL model are already included and explained in detail. If I'm right, I cannot accept the paper as it is.

To be accepted, the authors should rewrite it, avoiding most of the description of the MXL and focusing on the comparison of the model results including the MXL module against some experimental campaigns. In this sense, I assume that working at MPI-Mainz give the authors a large amount of observational data analyzing different aspects of the boundary layer, for instance, aerosols or chemistry.

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Interactive comment on Geosci. Model Dev. Discuss., 7, 7197, 2014.