

Interactive comment on “Parameterization of vertical diffusion and the atmospheric boundary layer height determination in the EMEP model” by A. Jeričević et al.

Anonymous Referee #1

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It is a well written and interesting manuscript. It should eventually be published but I have a few comments that I ask the authors to consider.

- 1) In Eq.(13) the authors introduce a new bulk Richardson number, but its looks pretty standard. Explain the novelty in the new bulk Richardson number.
- 2) It is argued that the Grisogono scheme for K is to be recommended as compared to standard formulations. This is partly argued 1) by comparison with LES simulations and 2) by comparing r values of model simulations of concentrations of nitrogen, sulphurdioxide and sulphate carried out with two K parameterizations, one of which is the parameterization suggested by Grisogono. The authors find that the r value for the

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Grisogone scheme is generally larger (better) than for the standard scheme. It should be checked if the difference in r is statistical significant (compare the two distributions). This exercise should be done for all predictions of chemical species throughout the manuscript.

3) Similarly for the boundary layer height, is the improvement in r using the new bulk Richardson number statistically different and what is the level of significance when compared to the traditional method?

4) It seems that the ability to predict the height of the marine boundary layer (Lisbon and Torshavn) is poor.

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