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Atmospheric Chemistry and Physics Discussions

Interactive comment on "A science-based use of ensembles of opportunities for assessment and scenario study: a re-analysis of HTAP-1 ensemble" *by* E. Solazzo and S. Galmarini

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Thanks to the reviewer's comments we have improved the papers in many aspects: text, references, and figures. Specifically in light of the comments of reviewer 3, we have spent considerable efforts trying to clarify the aim of the study which is to warn about the misuse of multimodel ensemble and to be more careful prior to infer conclusions out of non-inspected MM ensembles. Response to Reviewer 1 Lines 41-42: The statement: "An inspected ensemble should always produce a result that is more accurate than the simple average of the multi model results" seems to me as a bit too strong. I can imagine the situation (for example when the models are independent and

accurate) that each new model in the ensemble improves, at least slightly, the accuracy. Response: We have reworded the sentence there Lines 54-55: “Under this condition, biases of opposite signs cancel out . . .”. In fact independent models can have various biases – all of them can be positive or negative or partially positive/negative. Hence the statement above is not necessarily true. Response: We have reworded the sentence there Lines 199-202: As the authors indicated the Talagrand diagram is created by sorting the ensemble results to define bins and counting the number of measurement within each bin. Then in order to have any reasonable statistics the number of measurement should be much greater than the number of ensemble members. Otherwise rank histogram is simply not a proper tool for the analysis and should not be used at all. I suggest to put clearly such a statement. Response: indeed we use the Talagrand diagram to show that the ensemble is not properly generated, as there are more members than variability to span. We have added the remark in the conclusions section. Lines 268-269: In principle measurement errors should be also taken into account in the procedure for reducing the ensemble, but in case where they are significantly smaller than the model ones, RMSE is sufficient measure. Response: We have added the remark in the revised text Lines 295-297: I agree with the conclusion on the importance of the inspection of the available results prior to their use in further analysis. However, it would be very nice to make this conclusion more practical, for example, by proposing an algorithm for such screening process. In fact the authors described it (lines 139-144) but I suggest to include a diagram that could in clear way show all the steps that should be done in analyzing any ensemble results. Inspection would be a part of this procedure. One of the aspects is that prior to any analysis it is seldom when one knows from scratch which models should be selected for the ensemble. This means that it is better to start with more models, and then to reduce the ensemble basing on the comparison with measurements. This process, however also depends on what kind of analysis is supposed to be performed i.e. for which purpose the ensemble is created, and which measures or indicators should be applied. That’s why I suggest to include a kind of diagram presenting all these elements. The diagram

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could serve as a starting point for defining good practices in using ensemble methodology in air quality problems. Response: We feel that such a diagram is a little out of the scope of the present study, which takes one existing example to show the misuse of ensemble modelling, and we think that the one example would not support a 'best practice guideline' for all ensemble applications. Indeed, such a stepwise suggestions as to how ensemble of models should be generated is the focus of a previous paper (Kioutsioukis and Galmarini, 2014) and we wish not to duplicate the conclusions here.

Typographical errors: Line 62: Potempsky -> Potempski DONE Line 187: to me -> to be DONE

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 30523, 2014.

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