

Interactive comment on “An ensemble study of HyMeX IOP6 and IOP7a: sensitivity to physical and initial and boundary condition uncertainties” by A. Hally et al.

Anonymous Referee #1

Received and published: 30 January 2014

The manuscript represents a nice study on the impact of various sources of uncertainty (with the focus on perturbing the tendencies of 3 different physical parameterisation schemes) in convection permitting models. It is well written and the figure quality is good. The manuscript very much follows earlier work (w.r.t. model, diagnostics) of Hally et al (QJ2013), but sensitivity investigations on 4 different ICBC and on cold microphysics are added. While Hally et al (QJ2013) applied the methodology on pre-Hymex cases, the present study examines two Hymex cases. The results are evaluated in a 'classical' way, i.e. the individual ensemble members are investigated in a deterministic manner (e.g. Taylor diagrams), and the same sequence of figures (six each)

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are displayed for both cases, rendering the text very descriptive and, being very critical, giving the manuscript a 'catalogue like flavor'.

Overall, the results are neither surprising nor ground-breaking, but, given that the comments below are taken into account, the manuscript is worth being published.

Minor:

1) Recently, there appeared a number of articles that are very relevant for the present manuscript: please add (and discuss) the following references (from the COSMO community):

* Gebhardt C, Theis SE, Paulat M, Ben Bouallegue Z. 2011. Uncertainties in COSMO-DE precipitation forecasts introduced by model perturbations and variation of lateral boundaries. *Atmospheric Research* 100: 168-177.

* Keil, C., F. Heinlein and G. C. Craig 2014: The convective adjustment time-scale as indicator of predictability of convective precipitation. *Quart. J. Roy. Meteor. Soc.*, DOI:10.1002/qj.2143

* Kühnlein, C., C. Keil, G. C. Craig, C. Gebhardt 2014: The impact of downscaled initial condition perturbations on convective-scale ensemble forecasts of precipitation. *Quart. J. Roy. Meteor. Soc.* DOI:10.1002/qj.2238

* Peralta C, Bouallegue ZB, Theis SE, Gebhardt C, Buchhold M. 2012. Accounting for initial condition uncertainties in COSMO-DE-EPS. *J. Geophys. Res.* 117: D07108, doi:10.1029/2011JD016581.

2) As pointed out above, the results are presently investigated purely in a deterministic manner. The probabilistic perspective would complement this ensemble study nicely, and I recommend to compute probabilistic scores like BSS or ROC (as in Hally2013)?

3) I feel it difficult to discern the tiny differences in the (numerous) Taylor diagrams. Is it possible to condense the information? Could one extract more valuable information

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from Taylor diagrams based on, say, 3 hourly precipitation sums?

4) Do you have an idea why IFS based forecasts are worst for IOP6? Is the resolution difference (16km vs 2.5km) and/or the 6 h availability of BC problematic?

5) p7745 l 14: Are there more informative (daytime) CAPE observations? Did you look at forecast CAPE values?

6) p7749 l 22: Please define 'normalized standard deviation'.

7) p7768 Fig.4 and following captions: Please add 'daily' and give respective date.

8) p7776 Fig 11: ICBC7a

Typos: p7745 l 1: omit 'in' p7750 l15: delete once 'were compared'

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 1, 7739, 2013.