

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 #2

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MANUSCRIPT NHESS-2013-421 An ensemble study of HyMeX IOP6 and IOP7a: sensitivity to physical and initial and boundary condition uncertainties by A. Hally et al.

The paper presents a study of two heavy precipitation episodes occurred in southern France during the HyMeX field campaign SOP1 in October 2012, that represent quite typical convective rainfall events for the area. The impact of initial/boundary conditions as well as the sensitivity to perturbations in the physics are evaluated implementing a suitable ensemble methodology. The manuscript represents a valuable contribution in the field of ensemble forecasting at convective scales and integrates/confirms previous studies performed by the authors, which are referred in the text. The Scientific and

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Presentation quality is good, the paper results interesting, well-organized and easy to read. Therefore I believe that just some minor corrections (as detailed below) are needed before the paper is suitable for publication.

- Pag. 7741, line 24: “large upper-level trough”. Maybe it is “large scale upper-level trough”

- p. 7742, l. 4: I would suggest “low-level convergence possibly reinforced by an evaporative cold pool”. As far as I know, the triggering mechanism is the convergence associated with flow-orography interaction. Then the cold pool may form and impact as well on the convective system development.

- p. 7742, l. 8: “at meso-scale”. Mesoscale ranges between 2000 and 2 km, stopping short of synoptic-scale phenomena (AMS glossary). “kilometric resolution” would be better.

- p. 7742, l15: “They also showed . . .”

- p.7742, l24: I do not like “overcoming predictability”, I would prefer “cope with” or something similar.

- p. 7742, l.27-30: I found this sentence a bit misleading. “Knowing which uncertainties” seems that you know a-priori which are the uncertainties that are important. However, it is clear that you try to take into account all the sources of error (IC, BC, model) and the dynamics of the system will “select” those that grow faster.

- p. 7744, l.7: “Mediterranean HPE simulations” are sensitive to IC and BC, not “Mediterranean HPEs” themselves.

- p. 7745, l.2 “associated with”

- p. 7745, l.24: “warm unstable air converged”. Was it really convergence or orographic uplift?

- p. 7748, l.8: turbulent parameterization time tendencies

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- p. 7748, l.9-13: Are the microphysics perturbations of WC and MT the same or different? In other words, do WC and MT differ only for the turbulence perturbations, or also for microphysics perturbations?
- p. 7749, l. 3 “ECMWF member simulation”, otherwise it seems you are running IFS
- p. 7749, l. 12: How did you compute the averaged rainfall displayed in Fig. 5? Is it an average over the n. of grid points? And what about observations? Did you interpolate raingauges on a grid or just compute the average rainfall on the n. of observations in the domain?
- p. 7750, l. 15: were compared is repeated twice
- p. 7751, l.24: it is not clear what is the role of the orography that should be increased. In the event description you wrote just something about convergence.
- p. 7752, l.11: indicates
- Fig. 5 and Fig. 10: it would be interesting to see the same figures including also the precipitation of the perturbed runs of the ensemble, just to have an idea of the impact of physical perturbations on the total precipitation. I am not suggesting to insert new figures in the paper, but maybe a comment if relevant.
- p.7753, l.16: ECMWF member simulation
- p.7753, l.28: “for cases...” In the present form it seems a general conclusion, valid for all the cases characterized by precipitation in mountainous areas. I do not believe it can be really a general result.
- p.7754, l.24: “Plots (not shown)”: what are the plotted fields illustrating this?
- p.7755, l.13: Mediterranean HPE simulations”
- p. 7758, l.1-5: is the intensity of the flow or the direct orographic lifting the very key factor?

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- p. 7758, l.11-12: Comment: I would expect a much larger impact of the ICs wrt BCs, given the short forecast range.
- References: Drobinky et al. is now available on-line with a doi <http://dx.doi.org/10.1175/BAMS-D-12-00242.1> Instead of the two papers of Fiori et al., you may want to cite Fiori et al paper on JAS <http://journals.ametsoc.org/doi/abs/10.1175/2010JAS3359.1>
- Figs 4, 9: please, specify the period of accumulation.
- Figs. 5, 10: please specify the date

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