Hydrol. Earth Syst. Sci. Discuss., 10, C6541–C6546, 2013
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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Overview of the first HyMeX Special Observation Period over Italy: observations and model results" *by* R. Ferretti et al.

Anonymous Referee #1

Received and published: 9 December 2013

This paper documents the field campaign and associated modelling studies undertaken in the Adriatic Sea region of the first HyMeX campaign during some intensive observation periods in 2012. The authors present a thorough explanation of the instrumentation used and the flights that took place during this campaign. They also used 3 different modelling hierarchies to simulate the 3 case studies.

The main area of improvement that stands out is the linking of the meteorological explanations for the observed and simulated cases. Specifically, the authors describe the status of the North Atlantic Oscillation (NAO) at various points in the text and the existence of potential vorticity (PV) anomalies. However, they do not sufficiently link these

two mechanisms to the specific events (e.g. the low pressure system and the cyclone) that they both observed and simulated. I believe that the paper could be improved by more detailed discussion of how these larger scale patterns are interacting or causing the specific heavy precipitation events that are the focus of the paper. Below, I have expanded on these points listed as points 3 and 4 under Major Issues.

Major issues

1. P 11653 It says that "40 vertical levels are used." Need to know more about the vertical resolution of these models: spacing, how well it resolves boundary layer processes. These kinds of facts are important for the simulation of episodes of intense convection.

2. P11654 L2 Should state that no convective parameterisation is used for the inner domain just to be clear. I only inferred this from previous sentences in the paragraph, but the authors need to make this clear if this is indeed the case.

3. NAO index is mentioned several times, but I don't think that the authors make clear the implications for the meteorological events that are subsequently described. Also, is the acronym defined? In section 3 a negative NAO index is said to make "the weather regime favourable for precipitating systems". Is this for generating the system? Maintaining what is already there? What does a negative NAO index even mean? Is an index close to zero (P11657 L22) a neutral NAO or an extreme one? I think that the general reader could use a nice basic explanation of the NAO. Later on when NAO index values are given, another sentence should explain how that number is relevant to the meteorology on that day.

4. P11661 L 24-26 The relationship between the cyclone and the PV anomaly is unclear. Are the authors implying that the PV anomaly caused the cyclone or that the presence of the cyclone enhanced an existing PV anomaly? Also, is PV defined as Potential Vorticity in the text?

5. P11670 L18 What processes are these high resolution models representing well in order to simulate these characteristics? Is it the numerical grid spacing in the horizontal? vertical? orography? Is it the fact that the innermost models are non-hydrostatic?

6. P 11672 L1-8 Observed intensities appear more similar to WRF model experiments. Can the authors comment on why this might be? Is different orography important? or the microphysical schemes?

Minor issues

1. Abstract: Line 4 Should read "...in the Western..."

2. Abstract: Line 18 "operational chains" could be explained more clearly. Later in the paper it becomes more clear, but I think that it should be explained that operational cha ins are different numerical weather prediction models set up with different boundary conditions and some are nested models.

3. Intro L 21: Should read "... that aims to advance scientific knowledge of water cycle variability in the Med...."

4. Page 11647 L 3: Clarify that it is the scientific understanding and prediction of intensive convective systems. The "whose" makes it sounds strange. Try something like: "...of intense convective systems which are still not completely understood and are notoriously difficult to predict."

5. P 11647 L 11: "causalities" should be "casualties"

6. P 11647 L 17 "...were planned."

7. P 11650 L 3-4 The phrase "with altitudes reaching nearly 4000m" does not make sense. Do you mean that "The orography in our region of interest has steep terrain with mountain peaks of nearly 4000 m above mean sea level and this type of variable terrain plays a major role in extreme meteorological events."

8. P11652 L 4-5 This sentence should be clearer. "assured" is not used correctly.

9.P11652 L 9 "potentialities" is not really clear. Here we should use a word like "strengths."

10. P11652 L 25 use "differ" not "differentiate"

11. P11653 L 26 Word "father" sounds strange here. Perhaps "parent domain" or coarse resolution or outermost domain?

12. P11654 L 19 Are the five water species different hydrometeors? Please clarify.

13. P11657 L 8 Please change meso-low to a "mesoscale low pressure system"

14. P11657 L 4 "only a few events"; L5 "or a deep trough"; L9 "associated with a PV anomaly"; L10 "by low predictability"

15. P11661 L 5-6 " reproduced the southern cell fairly well"

16. P11662 L 19-22 The sentence is very unclear. Perhaps break it up and write 2 sentences. Also, "cumulated" should be "accumulated."

17. P11664 L 18 "begun" should be "began"

18. P11664 L 16 change "high differential reflectivity" to "large, positive values of differential reflectivity". Also, it would be useful to add a little explanation of why these large positive values of differential reflectivity imply that the convective core is co-located with these large values.

19. P11665 L 1 Figure 12 should be Figure 13 I think. Please check.

20. P11665 L 4-5 I can see the increase at 6km but not at 10 km in figure 12. Please double-check that this is the figure you intended to show.

21. P11665 L 22 "reveals very good agreement ..."; L 27 "but displayed"

22. P11666 L 3-4 "over northern" and "over southern"; L8 "appears when comparing"

23. P11666 L 14 "This produced..." The word "this" refers to what? The forecast in

general? the PV anomaly?

24. P11668 L 1 "eastward across" ; L19 "since lightning was not recorded."

25. P11669 L17 Typo? "5Terre"

26. P11671 "This result implies" not infers. To infer means to conclude (something) from evidence and reasoning rather than from explicit statements. for example: "from these fac ts we can infer that crime has been increasing" To imply means to indicate the truth or existence of (something) by suggestion rather than explicit reference."salesmen who use jargon to imply superior knowledge"

27. Conclusions section: P11672 L 20 define CI as Central-Italy; L 21 run should be ran; L25 precipitation should be singular; should be " forecasted events well."

28. P11673 L27 "The model reproduced....precipitation well."

29. P 11674 L4 "It is noteworthy that"; L7 Have HPE and LT been defined in the conclusions section? I think that would be useful for readers in case some people read the Conclusions section first before reading the paper from start to finish.

30. P116674 L 16 "This will be the aim of future works." What is "this"? Please be clearer and specific if possible. For example, "An evaluation of the parameterizations with the COSMO model..." or is it the microphysical schemes or the horizontal resolution or boundary conditions. It would be good to give an idea to the reader of what should be investigated next.

Figures & Tables

1. Table 4 in the caption should be "convection explicitly (Yes) or uses a convective parameterization (No)."

2. Table 4 "size" of COSMO models. Does this mean number of members? If so, that might be clearer than using the word size.

3. Fig 4 (b) and (c) are very very difficult to read. the font is so small that these figures should be explained in much more detail in the figure caption.

4. Table 5 Need to define RS.Are they radiosondes?

5. Figure 2. Please describe the region in the caption. As there are no visible lat/lon axes. "Synoptic analysis over Western Med. region..." Also, a colorbar would be useful.

6. Fig 3. Need to define axes with labels Lat/Lon

7. Fig 4 (a) what is the intensity of? "VMI of reflectivity..."; also the symbols for lightning should be defined in the figure caption, because they are hard to see and to differentiate from the wind vectors.

8. Fig 6 If those vectors are wrong can they be removed from the plot? By including them, it makes the reader think: "why are they wrong?" so can you please explain why they might be wrong if you keep them in the figure?

9. Fig 10 Cannot read the numbers on the colorbar until we zoom into 400% on screen. Can these numbers be enlarged please?

10.Fig 13 and Fig 20 captions should be consistent and they are different.

11. Fig 21 resolution is quite poor. Can data be re-plotted?

12. Figure 22. When looking on screen and zooming in to 400% I still cannot read the time axis or the y-axis. Can the resolution be improved? Or the data re-plotted?

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