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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Contrasting stable water isotope signals from convective and large-scale precipitation phases of a heavy precipitation event in Southern Italy during HyMeX IOP 13" *by* Keun-Ok Lee et al.

Anonymous Referee #2

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General remarks

A case study of a heavy precipitation event over southern Italy during HyMeX IOP13 in October 2012 has been discussed by far-reaching and detailed interpretation of model output. However the only validation of the results presented are numerous rain-gauge data from stations in southern Italy. Although the analysis of the model results are sophisticated and as far as possible reliable and in accordance with known synoptic and sub-synoptic flow pattern, any link to real processes is missing due to missing observations.

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Discussion paper

By the title the authors guide the reader to a case study of combined convective and large scale precipitation formation. But this is only partly the case. Studying the manuscript we can learn, that with the use of the selected models, how much in detail we can interpret and consequently use the COSMOiso model for small scale precipitation analysis and thus for forecasting issues. This should clearly be indicated in the title and it should be stated in the abstract that trajectory calculation and simulated stable water isotope analysis give valuable additional information for weather interpretation and forecasting purposes. The authors are asked to rephrase the title accordingly and to rewrite the abstract and conclusions. Otherwise, a case study based on model data only and without any supporting data (with the exception of the precipitation data) is not sufficient for publication.

After redirecting the scope of the paper, precipitation process information based on trajectory and SWI model output can be a helpful tool to examine actual weather situations governed by mutual evaporation-condensation processes. This is relevant scientific research and within the scope of ACP as the paper introduces additional parameters in operational weather analyses. The relevant SWI literature is cited by the authors, and the model set up is explained sufficiently. The analysis of the model results is accurate and detailed. The description of the flow field and the evaporation-condensation cycle are reliable. The structure of the paper is comprehensible. Some comments on figures, abbreviations, text etc. see “minor points”.

I recommend the paper for publication in ACP after redirecting the purpose of the paper.

Minor points P 1, l 15 (new): Moisture transport pathways embedded in large scale flow and associated . . . P 2, l 26: The paper “Diagnostic study of a HyMeX heavy precipitation event over Spain by investigation of moisture trajectories (Röhner, L., Nerding, K.-U., Corsmeier, U., 2016, Quarterly journal of the Royal Meteorological Society)“ shows the analysis of a HPE by combination of simulations and observations including moisture trajectories. In “Sodemann et al. (2017)” the potential of airborne measurements of SWI (during HyMeX) is shown. P 3, l 15: better: . . . condensation cycles

during. . . P 3, l 20f: explain the expression in brackets in a separate sentence for better readability. P 4, third paragraph: abbreviations SI, IOP, P1, P2 have been explained before in the abstract. P 6, l 21: refer to Fig. 1 P 6, l 26: refer to Fig. 2 P 8, l 13: . . . transported from northern Africa . . . P 8 l 15: isn't it 314 – 330 K instead of 308 – 326 K? P 8, l 23: isn't it western edge of the Ty-box instead of north-eastern edge? P 8, last paragraph: this paragraph should be removed to section 4. P 9, l 9: The cold front is often mentioned in the text but never indicated in the figures (with exception of Fig. 14, conceptual model). Section 4.1: The caption "Distribution of SWIs . . . prior to HPE" does not fit to the text: the interval with precipitation (16 UTC to 07 UTC) is discussed in this paragraph. P 12, l 15: Figs. 8c and 8d do not exist. P 15, l 24: . . .(grey encapsulated area in Fig. 14a). In the figure the area is called "blue encapsulated). Figure 3: use isobars for showing the surface pressure field. Indicate the position of the cold front. Figure 5: skip the upper and middle color bars. Figure 8: a color bar is missing. Figure 10: changing color bars for the sub-figures makes it difficult to interpret figure differences. Figure 13: as Fig. 10. Figure 14: the color differences (grey, blue, yellow shading) is difficult to read if manuscript is printed.

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Discussion paper