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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Detailed flow, hydrometeor and lightning characteristics of an isolated thunderstorm during COPS" *by* K. Schmidt et al.

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General comments
This paper provides an extensive analysis of satellite and radar measurements to document the life-cycle of an isolated thunderstorm on July 15, 2007 in southwest Germany. The synopsis of those measurements documents well the internal flow structure and hydrometeor distribution of the convective cell. In particular, the overlay of photographs with the various retrieved physical parameters provides a valuable new perception when compared to the previous literature. The day under investigation has been discussed in many recent papers, all of them (to my knowledge) are cited in the

manuscript. In general, the paper is well written and most of the illustrations are ok (see further remarks below).

Specific comments

1. All movies in the supplement are of exceptional quality, particularly movie3 with simultaneous satellite pictures and model results has turned out well. To better document the 3D structure of the event, the supplement could be extended with pictures and/or movies of the flow structures from triple-Doppler analyses (Fig. 3) and simulated cloud characteristics (Fig. 14) for other height levels as well.

2. In the discussion, there are some speculations why only one convective cell formed along the convergence zone. It should also be mentioned, that two smaller cells developed on that day: One in the area of Pforzheim and another one south of the main cell (west of Villingen-Schwennningen).

3. P. 9718, L. 9: The expression "rare event" is misleading in this context, this specific event just happened once. I suggest to remove "during the COPS period, rare" and possibly add a new sentence mentioning that situations with air-mass convection and locally-initiated single thunderstorms were rare during COPS.

4. P. 9719, L. 7: Is convection not typical? I suggest to replace "typical circumstances" with "convection-free conditions".

5. P. 9719, L. 21: The expression "Vosges-Rhine valley-Black Forest-region" is cumbersome and could be replaced by "eastern France and southwestern Germany".

6. P. 9721, L. 1: Please explain the abbreviation IOP before its first use.

7. P. 9721, L. 15: Two satellite loops are introduced and details about the cloud development over the Vosges and Black Forest mountains are given further on. However, the COPS domain and its mountains has not been introduced so far.

For a reader not familiar with COPS, a figure with topographical informations would be helpful before the cloud development over specific mountains is described.

8. P. 9724, L. 14-19: In the model runs from Barthlott et al. (2010), the atmosphere was not generally hostile to thunderstorm development. CAPE-values over 2000 J/kg coincided with almost vanishing CIN. Deep convection did not develop due to the fact that convergence-induced lifting was not strong enough to overcome CIN. This should be clarified in the text.
9. The section on the data sources and the subsection on hydrometeor retrievals are sometimes rather technical and not always of major importance for the reader. I suggest to shorten those paragraphs and provide references for the more interested reader.
10. P. 9731, L. 8: "...relative TO the Black Forest topography..." ?
11. P. 9735, L. 13/14: "... 10 km increases ALMOST linearly with height,..."
12. P. 9740, L. 5: I suggest to remove "acting".
13. P. 9742, L. 7: The synoptic combination → The synergetic use of diverse data sources?
14. P. 9742, L. 13: The abbreviations CAPE and CIN are already introduced, please remove them here. Further more, the authors should mention that no measurements are available near the initiation point of the cell.
15. Please increase the size of Figures 3 and 14.
16. Fig. 11: Please add the respective times on the top of each subfigure (like Figs. 3, 5, 6) and delete them from the caption.

17. Fig. 12 could be enhanced by contour lines or colour shades of orography for a better orientation.

Technical corrections

1. P. 9722, L. 8: an as complete as possible documentation → a documentation as complete as possible
2. P. 9727, L. 12: with a an average → with an average
3. P. 9730, L. 26: fashion → way
4. P. 9737, L. 23: every teen minutes → every ten minutes
5. P. 9738, L. 21: are not be emphasized → are not emphasized
6. P. 9742, L. 24: the the cloud feeding → the cloud feeding
7. P. 9744, L. 16: can be displayed is the same fashion → can be displayed in the same fashion
8. P. 9744, L. 21: time laps movies → time lapse movies
9. P. 9744, L. 29: further sensitivities studies → further sensitivity studies

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 9717, 2012.