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Hydrology and Earth System Sciences
Discussions

Interactive comment on "On the skill of high frequency precipitation analyses" *by* A. Kann et al.

Anonymous Referee #1

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The paper compares the results of an operational, nation-wide applied quantitative precipitation estimation (QPE) algorithm to the measurements of a very dense, independent rain gauge network.

The operational QPE makes use of the measurements of 270 Austrian automatic weather stations (TAWES, "Teilautomatische Wetterstationen") as well as of the data from 5 operational weather radars, operated by Austro Control. The operational "Integrated Nowcasting through Comprehensive Analysis" (INCA) system, which works at a 15 min. temporal resolution, is refined to a 5 min. resolution system called "rapid-INCA".

At a limited area of 300 km^2 the output from rapid-INCA is compared to the measurements of the WegenerNet, a network of 151 rain gauges on a nearly regular 1.4 km $\times$ 1.4 km grid.

The evaluation is done at two different time scales: observations of three convective cases are discussed in detail and a long term evaluation based on 6 months (April to September 2011) is presented.

The paper provides a disillusioning insight into the quality of state-of-the-art QPE. Relative biases (underestimation) in the order of 50 %, RMSE values in the order of the estimates occur not only for the convective cases but even for the long term evaluation. Thus, the paper presents new data on a relevant scientific question within the scope of HESS.

There are some gaps in the description of the applied methods. This limitation is alleviated by proper references. Nevertheless, the authors could provide some more detailed information on how the operational QPE is performed. Its description in the paper is a little vague. Using the cited papers, the traceability of the results is given.

The title of the paper is a little misleading. I expected an investigation showing the advances of (temporally) high resolved QPE to those of a lower temporal resolution. The paper does not vary the temporal resolution and thus it does not show the (relative) "skill of high frequency precipitation analyses".

The paper is in its present version of good quality with reference to its structure, language, abstract and so on. Nevertheless, there are a few minor remarks that should be considered by the authors:

- The distances of the WegenerNet to the two nearest radars should be clearly indicated, as well as the lowest unhidden elevation angle or measuring height of the radars at the WegenerNet. – I suppose, the long distances and limited visibility explain a part of the bad correspondence between the radar derived precipitation amount and the WegenerNet measurements.
- The way how precipitation intensity is derived from the radar data should be explained in more detail. The "maxcappi approach" is not a common way to derive

QPE (it preserves (e.g.) all problems with a bright band). Why and how is it applied?

- (page 11606, line 21ff:) "In climate research, precipitation re-analyses ... are employed ... and are therefore of high ... relevance." The fact that something is done is no proof that is of any relevance. Further, climate precipitation re-analyses are not familiar with "high frequency precipitation analyses".
- The radar data are scaled by monthly precipitation sums. Nevertheless, there is a bias of 80 % underestimation compared to WegenerNet on a 6 month basis. Should not the scaling of the radar data remove (or minimize) this bias?
- (Equation 1) Instead of $\leq$ it should be $\geq$.
- The authors propose to use a different interpolation method on the rain gauge measurements for convective events. The reason is, that the TAWES rain gauges do not represent small scale features in a proper way. I doubt that a different interpolation method can help here. Missing information due to a coarse spatial resolution is not remedied by a different interpolation method but only by additional measurements. It might be true, that precipitation overestimation can be reduced by limiting the impact of a rain gauge to a smaller area. Nevertheless, a missed convective cell will result in precipitation underestimation as long as it is not detected by the rain gauge network.
- I would add a linefeed in page 11616 line 4 and in page 11618 line 8.
- Figure 2: please mark the area of the WegenerNet.
- Figure 3: Why is the figure not centered above Austria? The figure shows more Bavaria than Austria, but in Bavaria there are no TAWES stations.
- Figure 4: The "small black rectangle" indicating WegenerNet is invisible on my printout.

- Figure 5: Why are all precipitation amounts beyond 1 mm/5 min indicated in red? They are hardly distinguishable. (Corresponding question for Figures 3 and 4.)

The paper should be publishes with minor changes.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 11605, 2014.