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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Exploring the use of a superconducting gravimeter to evaluate radar estimates of heavy rainfall" *by* Laurent Delobbe et al.

Anonymous Referee #2

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General Comments

This paper presents a study comparing precipitation estimates derived from weather radar observations and gravimeter data. This is an original contribution to the field dealing with a topic of scientific significance, the estimation of the precipitation, from a non-traditional approach. The comparison methods are relatively standard and the results and conclusions well justified. A few clarifications and suggestions that may enhance the quality of the manuscript are listed below, along with some minor formal corrections.

Specific Comments

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Discussion paper

1. Page 2, line 10. Considering TRMM or GPM spaceborne weather radars I think this should be modified: radar-derived -> ground-based radar derived

2. Pages 5 (line 30) - Page 6 (line 1). "The radar beam width is 1 degree ... the lowest radar beam at 0.3 degree elevation is used". If the radar half beam-width is 1 degree, then using a 0.3 degree antenna elevation does not imply substantial beam blockage? Unless the radar antenna is higher than the surrounding terrain.. I think this should be briefly explained in the text.

3. Page 6, line 16. "Intense precipitation is expected to produce a gravity decrease". This is a crucial point of the paper and, perhaps because it is very obvious for the authors, it is only mentioned very briefly. In my opinion this sentence deserves a longer explanation, perhaps one or two additional sentences.

4. Page 6, line 29 (last sentence of section 2.3). Why a 4 minute shift in the timestamp is considered? Please explain briefly (or perhaps simply connect with the previous sentences).

5. Pages 6-7, section Data Selection. The weather radar used operates at C-band so attenuation with heavy precipitation and/or hail is a potential problem. When selecting the events, did authors consider identifying and discarding attenuation cases by checking the radar sector (or specific radials) which extends from the radar site to the gravimeter site? I think this should be commented.

6. Page 9. I found interesting the analysis described where different radar reflectivity thresholds are applied for QPE conversion. The values reported are consistent with those used for QPE estimates in the US National Mosaic and Multi-Sensor QPE (NMQ) system - see Zhang et al (2011), p. 1329 - where different capping dBZ values are considered for pixels classified as convective, warm-rain and hail: 55, 50 and 49 dBZ respectively. I think this could be further commented.

Technical Comments

7. Page 1, line 17 (and elsewhere where amounts are considered). Suggest: larger than -> greater than

8. Page 4, line 19. Please check meaning: change -> changes?

9. Page 4, line 19. Typo: check superindex in nm/s2 -> nm/s[super_index]2 OR nm s[super_index]-2

10. Page 6, line 10. Please check meaning: is evaluating -> is evaluated

11. Page 8, line 12. Figure 8 is cited after Figure 4 and before Figure 5. Please consider reordering/renumbering the figures to cite them in order.

REFERENCE

Zhang, J., et al. (2011). National Mosaic and Multi-Sensor QPE (NMQ) system: Description, results, and future plans. Bulletin of the American Meteorological Society, 92(10), 1321-1338.

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