

Interactive comment on “Bias correction of satellite rainfall estimation using a radar-gauge product” by K. Tesfagiorgis et al.

Anonymous Referee #1

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General comment This paper present a method for adjusting hourly satellite rainfall estimates to radar-gauge rainfall products (NOAA Stage IV). The adjustment is based on applying a pixel-by-pixel bias field that is calculated from ensembles of selected bias factors. The method is compared with other bias correction techniques. Authors concluded that their proposed method (method of ensembles) outperform the other existing methods (L. 11-13 on P. 8931). However, the results presented here do not support this conclusion as further describe in my major comments. Therefore, the approach presented here is interesting and might be worthy of publication in HESSD, however, the manuscript should be subject to major revisions prior to publication.

Major comments:

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1. On p. 8928, L. 14-16, it reads: “For cases, I, IV and V the method of ensembles improved the absolute bias in the original estimation better than the rest of the methods.” However, according to Table 2, bias correction by interpolation seems to perform better than the original method in 4 out of the 5 cases while ensemble method performed better only in 3 cases. Moreover, bias adjustment by interpolation performs better than bias adjustment by ensembles in 4 out of the 5 cases. Also, according to Figs 5-8, rainfall amounts upon interpolation more closely agree with that of ST-IV than upon applying mean ensembles. All this needs to be state, and conclusions should be revised.

2. In Summary and conclusions on p. 8932 first line it reads: “The major results of this work suggest that satellite intensity biases can be corrected using radar products. . .”. This assumes ground based radar products such as ST-IV are better than the satellite products. This assumption, which might not be true, must be stated in the Summary and conclusions section.

Other comments:

3. P8915, L13: “Second, satellite IR products are the only sources of rainfall observation. . .”. Perhaps a major source is more appropriate term.

4. P8916, L11: “US has more radar coverage than point rain-gauges.” This is not clear. Perhaps you meant “US has more independent radar coverage pixels than point rain-gauges.”

5. P8918, L21: NWS was previously defined.

6. P8920, Eq. 1 and Eq. 2: Rh in Eq. 1 and in Eq. 2 represents a different parameter. Use different symbol.

7. P8920, L18: “. . . required number of pixels with positive bias factor values.” Clarify.

8. P8925, L23: “. . . about their optimal values by 10%, . . .”. The parameters range in Fig. 1 span more than 10%. Clarify.

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9. P8926, L5: Should “greater than 7 km” be “greater than 6 km”?
10. P8926, L15: Fig. 3b?
11. P8926, L26: “. . . hourly maximum rainy pixels. . .” -Clarify.
12. P8927, L12: Why were these events/hours chosen? Which objective criteria (if any) were used for the selection?
13. P8928, L21: “The right side. . . after. . . and the left side. . . before. . .” Should after/before be inversed? The same applies to Fig. 4 caption.
14. P8928, L26: According to Table 2 “-0.13 to 0.65” should be “-0.01 to 0.67”.
15. P8929, L6-L11: The lowest correlation coefficient is in September and June, not in the cold season (Feb, Dec). Should “-0.1” in L9 be “-0.01”?
16. P8929, L22-L27: Delete from the text. This is clear from the figures’ legend.
17. P8932, L9: “I” should be “We”.

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