

GPROF V7 and beyond: Assessment of current and potential future versions of the GPROF passive microwave precipitation retrievals against ground radar measurements over the continental US and the Pacific Ocean

Response to reviewer comments

This document contains the responses to each reviewer's comments. For each comment, the author's response and, if applicable, the corresponding changes in the manuscript are listed. Line numbers of changes are given with respect to the revised manuscript. We thank both reviewers for investing their time to read our revised manuscript and making us aware of outstanding typographical errors.

# 1 Comments from reviewer 1

In what follows, line and figure numbers are given with respect to the revised manuscript.

## 1.1 Typographical errors

### Reviewer comment 1

l. 75 remove this in “The principal motivation this is that PMW...”

#### Author response:

Instead of removing 'this' we suggest to insert 'for' to make clear what the motivation refers to.

#### Changes in manuscript:

##### Changes starting in line 71:

The principal motivation for this is that PMW precipitation estimates of frozen precipitation and over snow-covered and mountain surfaces are particularly uncertain, and, since they constitute only a minor part of the total validation data, corresponding larger retrieval errors may not be reflected in the overall validation statistics.

### Reviewer comment 2

l.105 I would replace “described (Kirstetter et al 2012)” with “described in Kirstetter et al 2012”.

#### Author response:

We have corrected this in the revised version of the manuscript.

#### Changes in manuscript:

##### Changes starting in line 99:

These estimates are produced specifically for GPM ground validation and are gauge-corrected to match monthly accumulations following the approach described ~~(Kirstetter et al., 2012)~~ by Kirstetter et al. (2012).

### Reviewer comment 3

l. 190-191 redundant: “The distance between the centers of neighboring pixels of the GMI swath is approximately 13.5 km in along-track direction and 5 km in across-track directions at the center of the swath”. I suggest to replace with: “The distance between the centers of neighboring pixels of the GMI swath is approximately 13.5 km in along-track direction and 5 km in across-track directions”.

#### Author response:

We thank the reviewer for this suggestion. We will also replace 5 km with 6 km because that is closer to the actual across-track distance between pixel centers.

#### Changes in manuscript:

##### Changes starting in line 184:

The distance between the centers of neighboring pixels of the GMI swath is approximately 13.5 km in along-track direction and ~~5 km~~ 6 km in across-track direction ~~at the center of the swath.~~

### Reviewer comment 4

L.286 0.5deg seems a bit more than 5 km. Should it be 0.05? But maybe 5 km in this case is just fine since you introduced the collocated resolution as 5km.

#### Author response:

We want to thank the reviewer for pointing out this inconsistency. In fact, the sentence in question referred to the resolution of the bias maps, which is 5 ° and not 0.5 °. We have reformulated the sentence to make this clear and inserted the correct resolution.

#### Changes in manuscript:

##### Changes starting in line 184:

~~At the 0.5° resolution considered here,~~ Aggregated to the 5° resolution used for the analysis presented in Fig. 3, the biases of GPROF V7 and the GPROF-NN retrievals are well correlated with those of GPM CMB and exhibit similar variability throughout the assessed years.

### Reviewer comment 5

l.379 correct prevision with previous

**Author response:**

We have corrected this in the revised version of the manuscript.

**Changes in manuscript:**

**Changes starting in line 352:**

The increase in ocean precipitation for GPROF V7 and the GPROF-NN retrievals can be explained by the inclusion of light precipitation from MIRS where GPM CMB doesn't detect rain and an increase in ocean precipitation in GPM CMB V7 compared to the ~~prevision~~previous version of GPM CMB, upon which the GPROF V5 apriori database was based on over ocean surfaces.

## 2 Comments from reviewer 2

Reviewer 2 did not request any changes to the manuscript.

# Bibliography

Kirstetter, P.-E., Hong, Y., Gourley, J. J., Chen, S., Flamig, Z., Zhang, J., Schwaller, M., Petersen, W., and Amitai, E.: Toward a Framework for Systematic Error Modeling of Spaceborne Precipitation Radar with NOAA/NSSL Ground Radar-Based National Mosaic QPE, *Journal of Hydrometeorology*, 13, 1285 – 1300, <https://doi.org/10.1175/JHM-D-11-0139.1>, 2012.