We would like to thank Referee#1 for his/her review of our paper and the important comments and suggestions provided. Please, find below our responses to the Referee's comments and the details on how we will address them in the new version of the manuscript.

1. Referee comment: P3, L41: 'Could' should be 'Cloud'

Authors' Reply: the sentences will be changed in the revised manuscript.

2. Referee comment: P5 L35 and P5 L46: correct the 'spatial sampling of 1.11' to 'sampled every 1.11' – it is an angular measurement, not spatial.

Authors' Reply: the sentences will be changed in the revised manuscript.

3.1 Referee comment: P7, section 3.2: it may be useful to clarify whether the training database was generated using system-specific simulations, or random. This is somewhat critical since is system specific then the database could have a wet-weather bias.

Authors' Reply:

The training database was generated using simulation of different precipitation events "in order to cover the different seasons and different meteorological situations and precipitation regimes". The selection of the simulations in terms of season, typology of event and geographical location was performed in order to optimize the completeness and representativeness of the database for the area of interest (see Casella et al., 2013). In detail, over the European/Mediterranean area we have considered 15 different meteorological events with different precipitation regimes for each season over different geographical areas. In the simulations over the African and South Atlantic area we have considered the different climatic regions and a sufficient number of simulations in order to obtain a reliable representation of the climate variability of each region. For a detailed list of the simulated events please see Answer (5) to Referee 2.

In the training phase we have considered only the elements of the database with a corresponding rain rate greater than 0 mm/h. The problem of the wet-weather bias has been faced using, in the retrieval process, a screening procedure in order to eliminate the no-rain pixels (see Sanò et al., 2015).

According to the Referee's suggestion, the sentence will be changed to clarify this point in section 3.2 of the revised version of the manuscript.

Revised version (Section 3.2 "The training database", lines 12-18, pag. 7):

Simulated events were selected in order to cover the different seasons and different meteorological situations and precipitation regimes. The selection of the simulations in terms of season, typology of event and geographical location was performed in order to optimize the completeness and representativeness of the database for the area of interest (see Casella et al., 2013). In detail, over the European/Mediterranean area we have considered 15 different meteorological events for each season over different geographical areas. Simulations over African and South Atlantic area were chosen also on the basis of the TRMM-PR observations (in particular the Rain Type flag and the Freezing level height) and on the basis of different climatic regions in order to cover as much as possible the climatic variability in the area of interest with a limited number of simulations.

3.2 Referee comment: Also, was the PR data used in the database? I presume so, in which case this does explain some of the good performance against the PR later on.

Authors' Reply:

As detailed in previous reply, the training database has been created using only simulated data. The TRMM-PR and GPM-Ku band radar data were not included in the database and they have been used as reference in the verification study.

4. Referee comment: P8, L9: while the 183+-7 GHz can be sensitive to the surface, it should be noted that this channel (and neighbouring channels) are essential for near surface precipitation.

Authors' Reply:

We agree with the Referee. The 183+-7 GHz and neighbouring channels are essential to estimate the near surface precipitation as mentioned in section 3.1, P6 L24-32, section 3.3, P7 L25-30, and in fact their contribution is an important part of the retrieval algorithm (inputs 2-5 of the NN, P8 L 47-50). The 183+-7 GHz channel, however, can be strongly affected by the signal due to surface emission in cold and dry conditions reducing the accuracy of surface rain rate estimation. The meaning of the sentence P8, L9 is that the new input Δ_{24} can drive the NN to detect these conditions, and to obtain more reliable rain rate estimation.

5. Referee comment: P10, L23-25: the GPM DPR has the same swath width as the TRMM PR.

Authors' Reply:

In the verification study of PNPR v2 we chose to use the GPM-KuPR as its characteristics are similar to those of the TRMM-PR. In the sentence we meant that the GPM-KuPR, similar to the TRMM PR, has a wider swath than the GPM-KaPR band radar.

We will rephrase the sentence as follows:

In this study we have considered only the GPM-KuPR products because of the similarity with the TRMM-PR and because its larger swath size compared to the GPM-KaPR offers better chances to find coincident observations with ATMS"

6. Referee comment: P11, section 4.2: I didn't find at any stage a cautionary note that the satellite radars are insensitive to light precipitation - PR is essentially insensitive to rain intensities <0.7 mm/hr, the DPR c. <0.5 mm/hr.

Authors' Reply:

According to the Referee's suggestion, a sentence will be added to clarify this point in section 5 "Summary and conclusion" of the revised version of the manuscript.

Revised version (Section 5 "Summary and conclusion", P15 line 8):

" It should also be noted that the results presented in this study may be affected by the low sensitivity of spaceborne precipitation radars to light precipitation. This aspect will be further investigated through validation procedures based on ground radars and rain gauges (i.e., Puca et al., 2014), and further studies and dedicated activities are foreseen on these important aspects within the on-going scientific collaboration between the EUMETSAT H-SAF and the NASA/JAXA PMM Research Program."

7. Referee comment: P15, L22-23: the correlations mentioned from Kidd et al 2016 are at 15 km resolution – the plotted data is summarized at 1 degree resolution.

Authors' Reply:

We thank the referee for pointing this out. The sentence will be rephrased in the revised manuscript as follows:

Revised version (Section 5 "Summary and conclusion", lines 18-23, pag. 15):

Kidd et al. (2016) have analyzed the performance of precipitation retrieval of the NASA Goddard PROFiling (GPROF) algorithm version developed for cross-track PMW sensors (MHS). Using quality controlled ground-based radar data over the United States from 6 March 2014 through 5 March 2015, and computing the statistical scores (at the native - 15.88 km x 15.88 km - retrieval resolution) over a 1° x 1° grid, they have found CC < 0.50 over the western U.S., and > 0.60 over the eastern U.S.

Tables/Figures:

8. Referee comment: Table 2: useful to include the spatial resolution in the caption.

Authors' Reply:

The suggestion is accepted. The caption will be rephrased in the revised manuscript.

9. Referee comment: Figure1: Are the orientations of the individual boxes the correct way around; I would expect that as latitude extends away from the Equator that the plotted x-dimension of the box would increase compared to the y-dimension.

Authors' Reply: We agree with the Referee. We modified the figure and we also added some details concerning the simulated events. The figure in the revised manuscript will be the following:



Figure 1

9. Referee comment: Figure 4/7: Include dates/resolution in the caption – and might be worth considering changing the resolution since the images are currently very noisy.

Authors' Reply:

The suggestion is accepted. The captions will be rephrased in the revised manuscript.

The choice of the resolution used stems from a compromise between a detailed analysis of the results, more noisy, and an analysis using data averaged over a larger area that could hide some critical aspects concerning the performance of PNPR v2 (e.g. surface precipitation estimation over coastal area, or intense events with a limited spatial extension). The use of the same resolution at $0.5^{\circ}x \ 0.5^{\circ}$ for statistics and figures is a good compromise to reduce problems related to geolocation and time synchronization between satellite and radar and leads to a more direct and consistent evaluation of the results. Based on these considerations, it seems more appropriate to maintain the current resolution despite it appears more noisy.

10. Referee comment: Figure 5/6: Remove the 0.001-0.01 part of the plots (since there is no data in this region!).

Authors' Reply: The suggestion is accepted. The plots will be updated in the revised manuscript