

Overview

This paper investigates the possibility of using the TB observations from the Microwave Radiance Imager-Rainfall Measurement (MWRI-RM) onboard the Fenyung-3G (FY-3G) satellite to reconstruct the 3D reflectivity profiles. The algorithm is based on a deep learning approach and uses the Ku profiles observed by the Precipitation Measurement Radar (PMR) onboard FY-3G as reference truth. Three deep learning models were trained using different sets of predictors, and two case studies are analyzed.

General Comments

The authors have carefully answered the reviewers' comments. The main issues raised in the first part of the review process have been addressed. In particular, the test statistics have been calculated on an independent dataset, thus avoiding the possible correlation between the training and test datasets. Good work. Prior to publication, I would like to suggest only minor changes to the text and figures.

Minor Comments

- 1) Line 167: I guess it is the 30th of November and not the 31st of November.
- 2) Lines 172-173: it is not clear to me how the authors distinguish “ocean” observations from “land” observations. Are you using a surface mask? I would like to suggest that the authors clarify this.
- 3) Lines 250-252: It is not clear to me whether the coastal scenario includes only samples where the radar observations are over the ocean, with part of the passive microwave FOV over land, or all observations where the passive microwave FOV is partly over land, partly over the ocean, with no reference to the position of the radar observations. I would like to suggest that the authors clarify this.
- 4) Figure 4, Figure 6 and Figure 8: it is rather strange that the lon and lat labels do not correspond to the grid shown on the map (center columns of Figure 4 and Figure 6 and panels (a), (b), and (e) of Figure 8). I would like to suggest changing the grid position.
- 5) Figure 5 and Figure 7: to make things clearer, I would like to suggest adding the measure units to the axes of the scatterplots - e. g., Target Reflectivity (dBZ), Reconstructed Reflectivity (dBZ). I also suggest changing the maxima of the colour bar scale. This will highlight the distribution of the scatterplots over the plane - in my opinion, the observations where the radar reflectivity is NaN are less interesting. Perhaps a maximum of 1.5 of the normalized density would be better for both figures.
- 6) Line 330-331: I would suggest adding the abbreviations in Figure 6 to the text. - e. g., “At 4 km altitude, PMR observations showed high reflectivity predominantly in the southern parts of Beijing (**BJ**, 39.5°N, 115.8°E) and central Hebei (**HB**, 39.1°N, 116.2°E)”
- 7) Line 366-368: it is not necessary to mention the position of Beijing and Central Hebei a second time in the text, while I would suggest adding the abbreviation for Tianjin.: “In addition to the precipitation echoes observed by PMR-Ku over southern Beijing, central Hebei, and Tianjin (**TJ**, 39.2°N, 117.0°E),...”

- 8) Line 376-377: I would suggest that the abbreviations given in Figure 8 should also be included in the text - e.g. *“It is worth noting that ground-based radar coverage is limited in remote regions, such as northern Shanxi (**SX**, 39.6°N, 113.0°E) and Inner Mongolia (**IM**, 40.0°N, 112.0°E)...”*. I did not understand whether when the authors speak of Shanxi (e.g., label of Figure 8) and Northern Shanxi (e.g., L. 376) they are referring to the same area. I would like to suggest that the authors clarify this.
- 9) Figure 6: I would like to suggest adding the region abbreviations to all maps in the centre column.
- 10) Figure 8: I would suggest to add the abbreviations also to (e)
- 11) Figure 8 - caption: It is not clear to me what the authors are referring to when they write *“Panel (b) highlights the locations of Shanxi (SX) province and Inner Mongolia, labeled in red font.”*. I would like to suggest adding the red font or deleting this part of the caption.
- 12) Figure B1 and Figure B2: Thanks to the authors for adding these maps. Thanks to the authors for adding these maps. If possible, I would like to suggest changing the limits of the colormaps to emphasise the signal. For example, for the first panel in the left column of Figure B1 (Khanun Observations 50.3 GHz_V) a minimum value of 220 K would be more useful to highlight the precipitation signal. At the same time, it seems to me that the maxima value for the colormaps in Figure B2 are too low. For example, in the first panel of the left column of Figure B2 (Khanun Observations 50.3 GHz_V), almost the whole map seems to be characterized by the same value also at 50.3 GHz, and this seems a bit strange to me - but I don't know TB values, so maybe it's just my impression. I would also like to suggest that the titles, colorbars and lat/lon labels be enlarged - the increments between lat and lon labels can also be increased if there is too little space. I would also suggest adding the abbreviations used in Figure 6 and in Figure 8 to the plots of Figure B2.