Update of AMSR2 Precipitation standard product to Ver3.0

JAXA/EORC

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【Standard】Precipitation

- **Algorithm PI**
  - Kazumasa Aonashi　(JAXA・Kyoto Univ)
- **Major improvement**
  - NOAA Autosnow data (sea ice and snow cover information) was added to the reference data. The range limitation of the estimated area (less than 60 degrees latitude) has been removed. (already introduced in GSMaP V04)
  - Based on the relationship between the scattering bias of the conventional GSMaP algorithm and the precipitation characteristics observed by the DPR, the following improvements were implemented.
    - The index of the Frozen Precipitation Depth (FPD) is calculated. This index is used to vary the precipitation profile and the density of solid precipitation particles in the forward calculation part. (already introduced in GMI V05 (GSMaP V05))
    - In the retrieval part, the FPD and the ratio of Convective Precipitation (ratioCP) per pixel are estimated. These index and the surface temperature are used to statistically correct the scattering retrieval values. (Newly developed in AMSR2 V05, not yet introduced in GSMaP V05)

【Standard】Precipitation

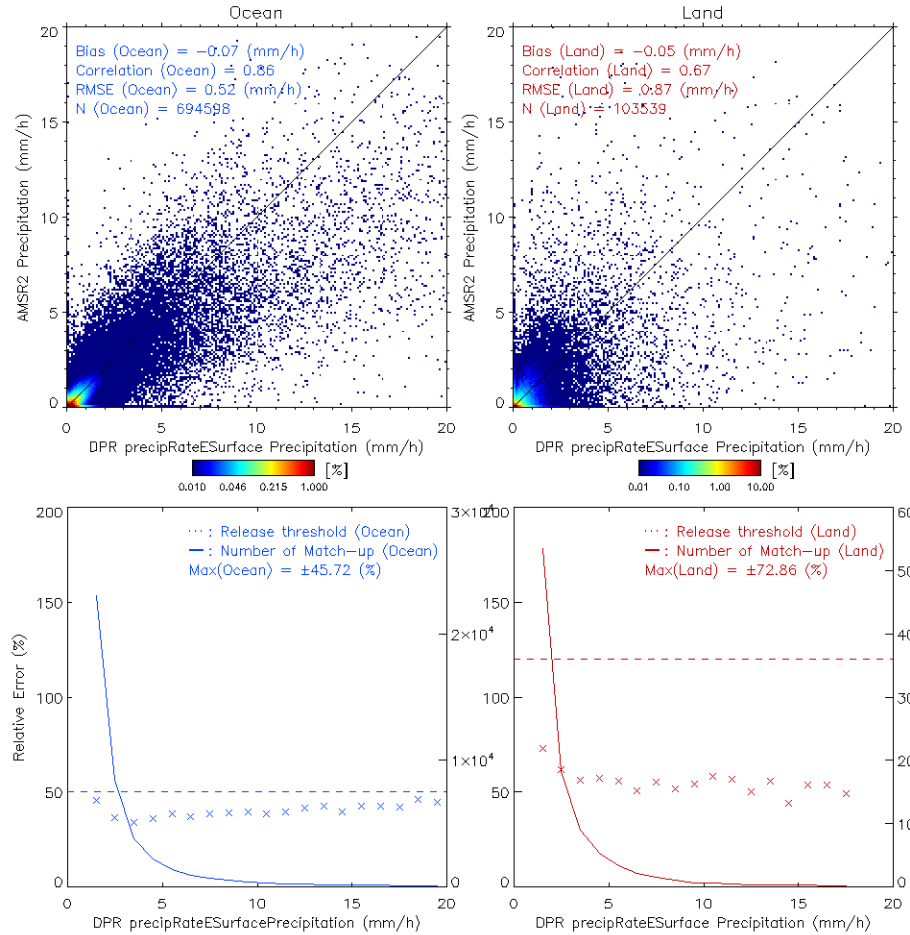
- **Validation method**
  - Simultaneous observation by GPM Dual-frequency Precipitation Radar (DPR) and AMSR2 are averaged in 50 km spatial resolution, and the relative error (ratio of RMSE against average rain rate) is calculated.
    - Comparison of surface rain rate estimated by AMSR2 and DPR when orbit crossing time difference of the GCOM-W and TRMM satellites is within 10 minutes.(Only the 100km width of the nadir is used, which is less affected by DPR sidelobe clutter.)
    - Only the match-up data for which both DPR and AMSR2 are between 0 mm/h and 20.5 mm/h are used.
  - For each of AMSR2 and DPR（with observation local time is at 0-2 am, 0-2 pm）, the monthly mean of the 0.5-degree grid are calculated respectively, and the zonal mean are compared using the grid where the both of AMSR2 and DPR data were retrieved.
  - Period: June 2014 – May 2015, December 2018 – November 2021

Area:All 2014/06～2015/05, 2018/12～2021/11

【Standard】Precipitation

Ver.2

AMSR2/PRC(V2)−DPR(06A)

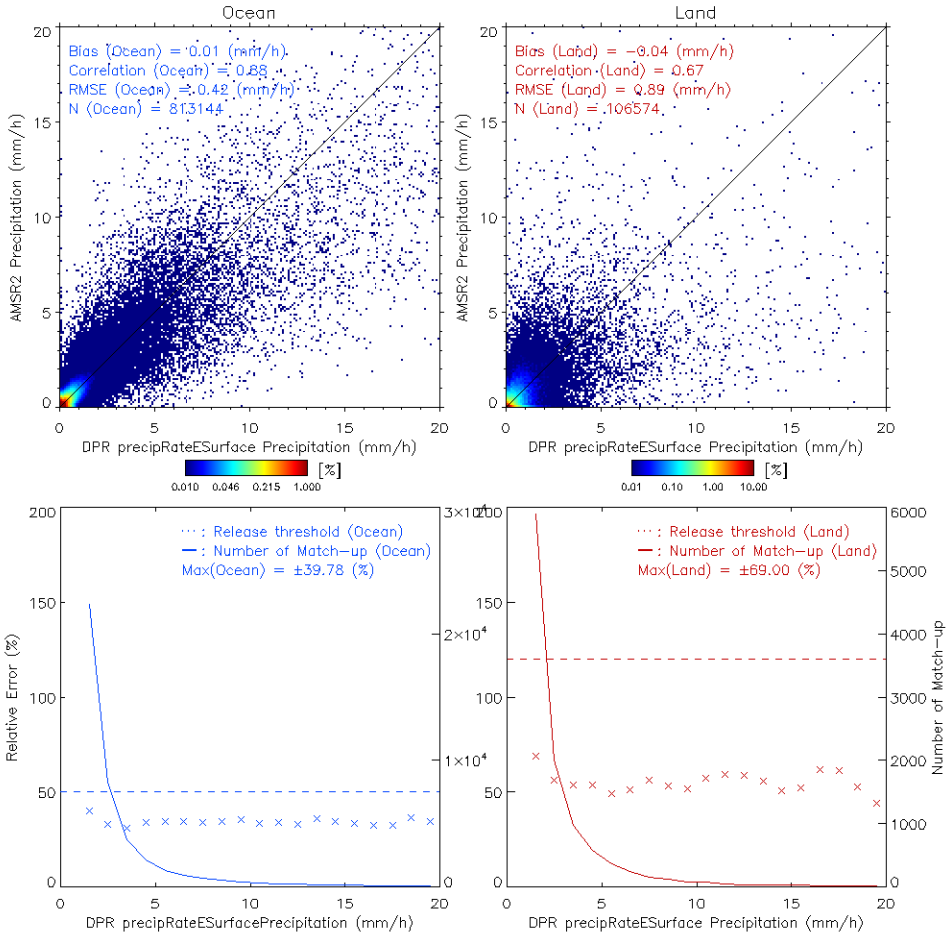


AM2 PRC: V2
DPR Ver: 06A

Relative Error (ave)
Sea : 41.50 (%)
Land : 66.15 (%)

Ver.3

AMSR2/PRC(V3)−DPR(06A)

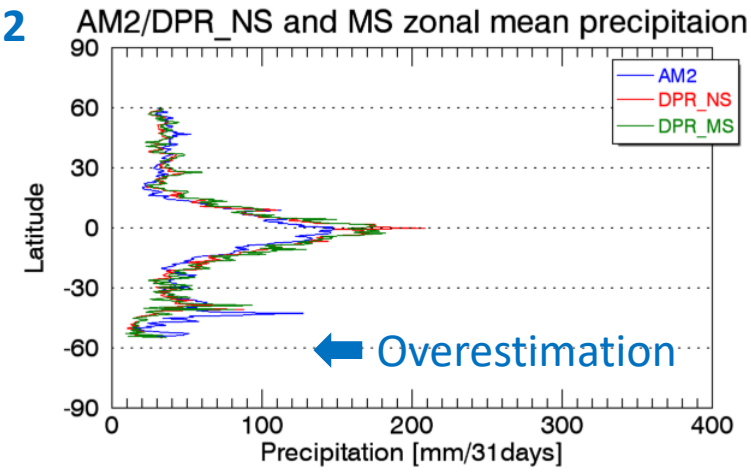


AM2 PRC: V3
DPR Ver: 06A

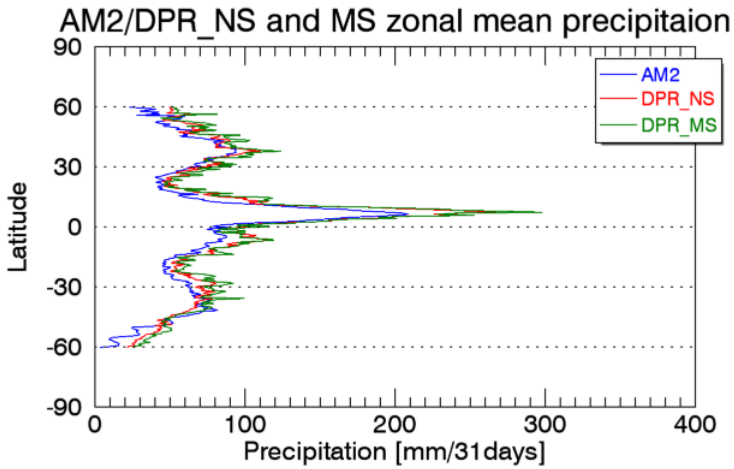
Relative Error (ave)
Sea : 36.65 (%)
Land : 62.44 (%)

【Standard】Precipitation

Ver.2

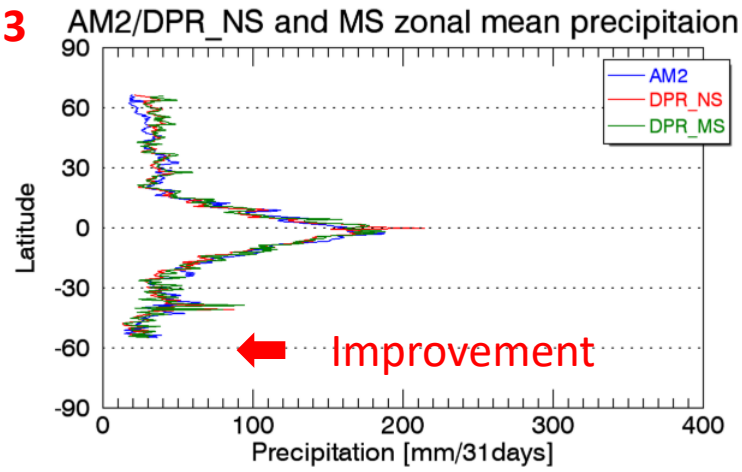


Land

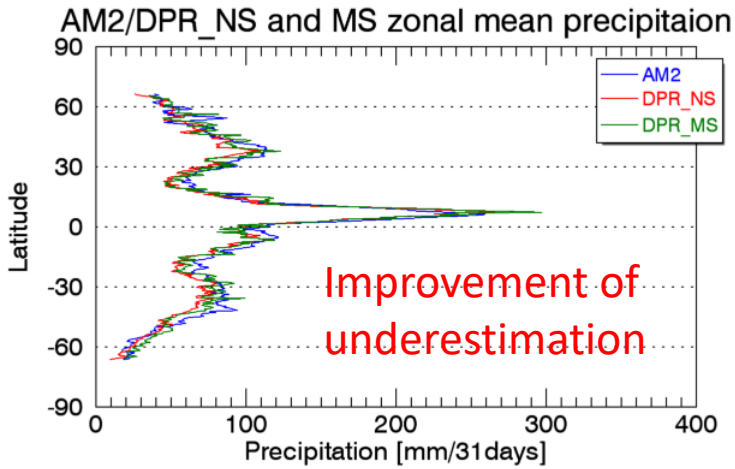


Ocean

Ver.3



Land



Ocean

Summary

Standard product list

Updated

Geophysical Parameter (Version)	Release Accuracy	Standard Accuracy	Target Accuracy	**Latest Validation Results**
Integrated water vapor (V2.2)	±3.5 kg/m^2	±3.5 kg/m^2	±2.0 kg/m^2	**RAOB:±2.5 kg/m^2 GPS:±1.5 kg/m^2**
Integrated cloud liquid water (V2.2)	±0.10 kg/m^2	±0.05 kg/m^2	±0.02 kg/m^2	**±0.04 kg/m^2**
Precipitation (V3)	**Ocean ±50 % Land ±120 %**	**Ocean ±50 % Land ±120 %**	**Ocean ±20 % Land ±80 %**	**Ocean ±37 % Land ±62 %**
Sea Surface temperature (V4.1)	±0.8 ºC	±0.5 ºC	±0.2 ºC (as zonal mean)	**±0.47 ºC (RMSE) ±0.2 ºC (as zonal mean)**
Sea surface wind speed (V4)	±1.5 m/s	±1.0 m/s	±1.0 m/s	**±0.96 m/s**
Sea ice concentration (V3)	±10 %	±10 %	±5%	**±9 %**
Soil moisture (V3)	±10 %	±10 %	±5 %	**±4 %**
Snow depth (V2)	±20 cm	±20 cm	±10 cm	**±18 cm**

Achieved standard accuracy | **Achieved target accuracy**