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The new H-SAF H67 and H68 precipitation products

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H68 precipitation product

H SAF MW-only precipitation products are based on the exploitation of all MW radiometers onboard LEO satellites. They provide Level 2 instantaneous precipitation rate, at a nominal resolution depending on the radiometer characteristics. MW-only gridded products, based on merged precipitation estimates available from the MW radiometer constellation, are in development phase.

H68 is a near real-time Level 3 product providing precipitation rate on a regular grid (0.25°×0.25°) at regular time intervals (30 minutes). It is based on instantaneous precipitation rates available from the H01, H02B, H18, H-AUX-17, H-AUX-20 products. At each 30-min interval, all overpasses of MW radiometers over the MSG full disk area (60° W – 60° E; 60° S – 70° N) are considered and a inter-calibration/merging procedure is applied to provide one precipitation rate estimate in each grid-box.

H68 Inputs

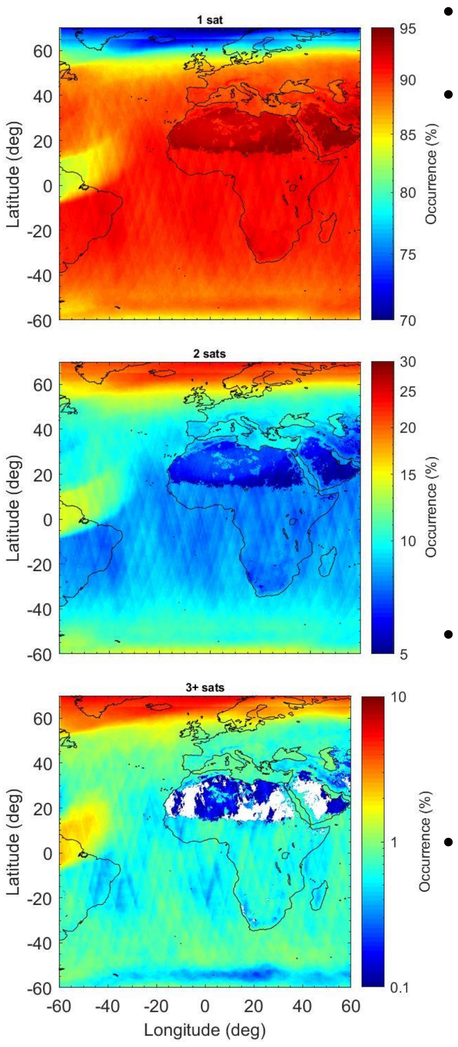
Product ID (Instrument)	Product Description	Algorithm	Currently available satellites	Status/ Availability
H01 (SSMIS)	Precipitation rate at ground by MW **conical scanner SSMIS** (MSG full disk)	**Physically-based Bayesian CDRD**	**DMSP F16/F17/F18**	**Operational**
H02B (AMSU/MHS)	Precipitation rate at ground by MW **cross-track scanners AMSU/MHS** (MSG full disk)	**Neural Network PNPR**	**MetOp-A/B NOAA-18/19 (MetOp-C)**	**Operational**
H18 (ATMS)	Precipitation rate at ground by MW **cross-track scanners ATMS** (MSG full disk)	**Neural Network PNPR**	**Suomi NPP NOAA-20 (JPSS series)**	**Operational**
H-AUX-17 (AMSR-2)	Precipitation rate at ground by MW **conical scanner** AMSR-2 (based on **GMI/DPR** Observational Dataset) (MSG full disk)	**Physically-based Bayesian CDRD**	**GCOM W1**	**Auxiliary: Support to MW-only and MW/IR combined products**
H-AUX-20 (GMI)	Precipitation Rate at ground by GMI – (based on **GMI/DPR** Observational Dataset) (***Global***)	**Neural Network**	**GPM**	**Auxiliary: Support to MW-only and MW/IR combined products**

H68 Outputs:

- Precipitation rate on a regular 0.25°x0.25° grid every 30 min.
- Precipitation phase and quality.
- Number of conical and cross-track satellite overpasses over each grid box (and their sum).
- Satellite type for each overpass (i.e. SSMIS, AMSU/MHS, etc.).

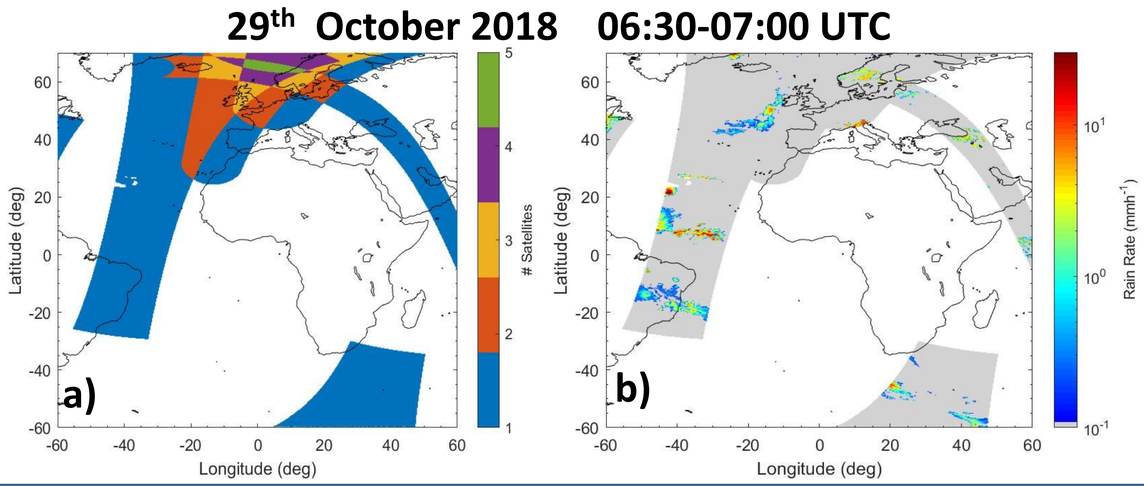
UNDER DEVELOPMENT

The H68 inputs (e.g. H01, H02, etc.) are inter-calibrated taking as reference the GPM combined product DPR-GMI (2B-CMB- V05). The merging procedure is based on a classification taking into account the characteristics of the sensors.



- 2 years of data (2014-2105).
- Percent of occurrence of one, two and three or more satellite overpasses in each grid box in 30 minutes. Only overpasses relative to valid Level 2 precipitation rate products are shown (e.g., H-AUX-17 from AMSR2 is flagged over desert).
- The inter-tropical zone presents only one satellite overpass per grid box in 30 minutes in most cases.
- The occurrence of two or more satellite overpasses increases moving toward the polar regions.

29th October 2018 06:30-07:00 UTC



Example case.

- a) Number of satellite overpasses over each grid box in the considered half-hour interval.
- b) Corresponding instantaneous precipitation rate.

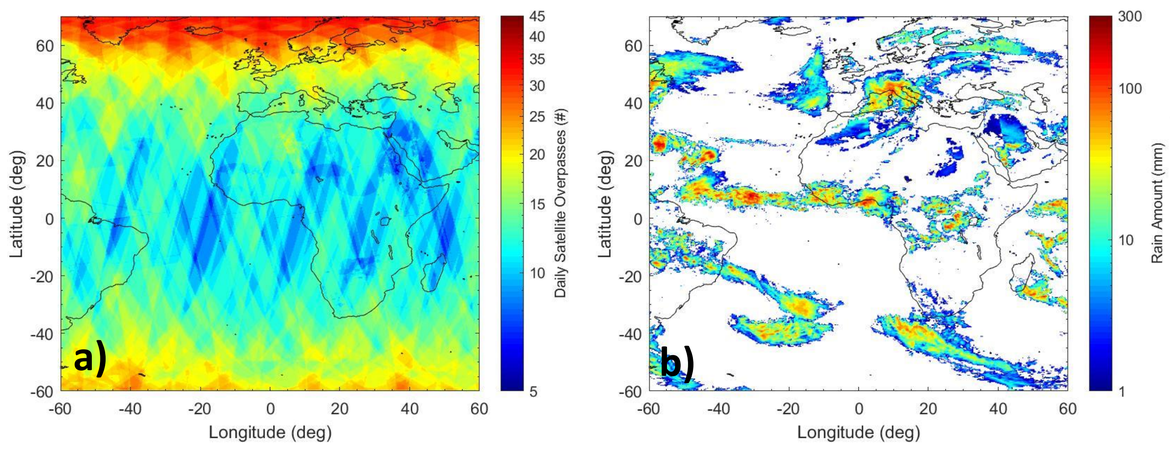
H67 precipitation product

H67 is a Level 3 product based on instantaneous precipitation rates available from the H68 product, providing 24-hour cumulated precipitation every 6 hours (00 06 12 18 UTC) on a regular 0.25°×0.25° grid. The integration over 24 hour time interval is performed assuming that, for each grid-box, the precipitation rate remains constant between subsequent half-hour intervals, until another MW radiometer overpass is available. The product is in development phase. It will be delivered 6-8 hours after the actual reference time (not in NRT).

H67 Outputs:

- Cumulated precipitation over the past 24h.
- Number of conical and cross-track satellite overpasses over each grid box (and their sum).

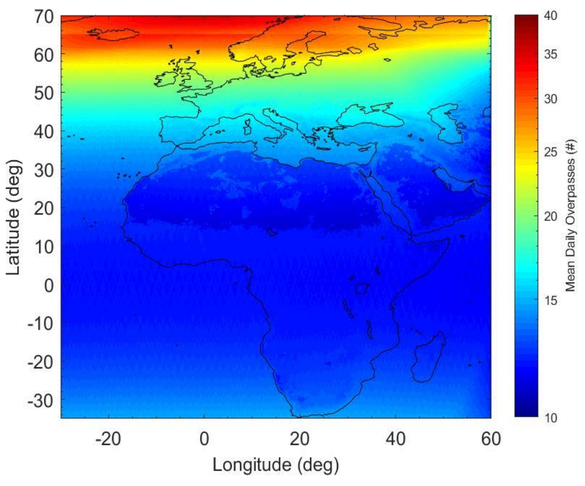
29th October 2018 00:00-23:59 UTC



Example case.

- a) Daily number of satellite overpasses over each grid box.
- b) H67 24-h cumulated precipitation, without inter-calibration of MW Level 2 products (under development).

No inter-calibration of MW Level 2 products (UNDER DEVELOPMENT)

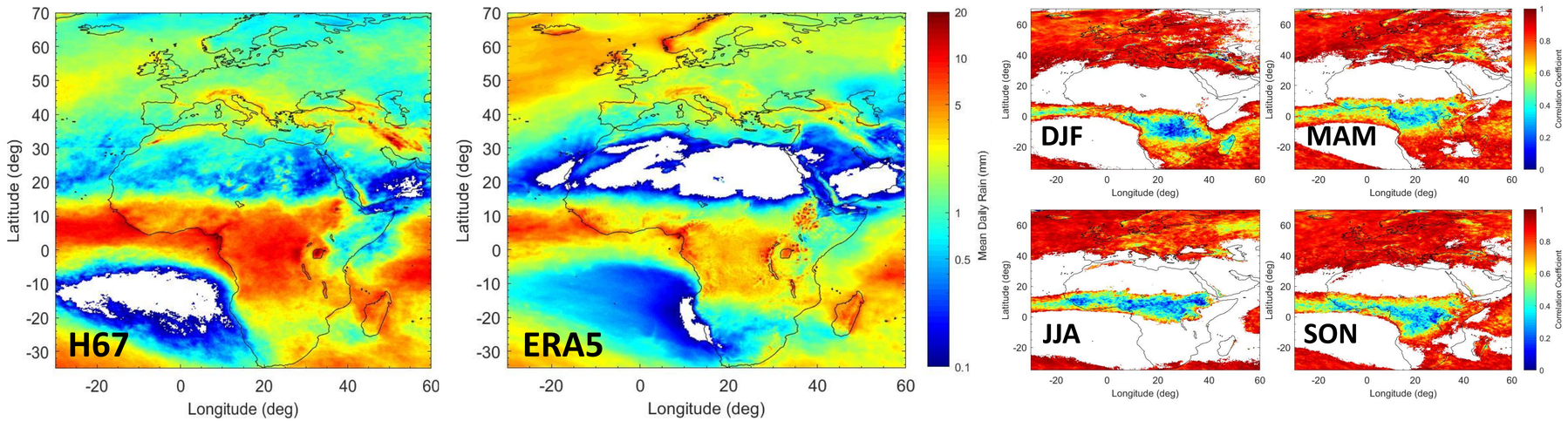


- Mean daily number of satellite overpasses over each grid box for 2 years data (2014-2015).
- The number decreases from the inter-tropical zone toward the Polar regions.

H67 vs ERA5

Mean Daily Precipitation

Correlation Coefficient



- Good agreement at mid-latitudes. Underestimation in northern Atlantic (Ocean and coastal regions). Overestimation over Equatorial region and over Sahara and Arabian peninsula (to be fixed).
- Stable results throughout the seasons for correlation coefficient (calculated only when H67>=1 mm day^{-1} and ERA5>=1 mm day^{-1}) with good performances at mid-latitudes and lower performances over Equatorial region.

Acknowledgments

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