The EUMETSAT Network of Satellite Application Facilities

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Report on data availability monitoring: MTG-I L2 data timeliness

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0.1	26.3.2026	Christina Köpken-Watts	Initial version
1.0	27.4.2026	Christina Köpken-Watts	Small updates, formatted version

1. Introduction

The reliability and accessibility of satellite data are essential to operational applications, forming the basis for both their utilisation and the production of high-quality derived products. NWP, as a time critical operational application, has stringent requirements for the timeliness and completeness of the data. Also, the timeliness thresholds needed for various NWP applications are constantly evolving, particularly in the context of the development of rapid-update cycle systems and very short-range forecasting systems at many NWP centres.
Therefore, the NWP SAF provides a continuous near-real time data reception and data timeliness monitoring service providing up to date web-based information on a wide range of satellite data types and instruments used in NWP, comprising radiance data sets as well as derived products like atmospheric motion vectors and surface winds. This supports on the one hand the near-real time monitoring and quality assurance for operational NWP systems and on the other hand the setup of systems where knowledge of the characteristics of incoming data streams is necessary.

This report summarizes the timeliness of operationally disseminated products from the new instruments on the MTG-I data products with a focus on L2 products disseminated by EUMETSAT and used in global NWP. Section 2 gives a brief overview of the instruments and products considered here, namely for the flexible combined imager (FCI) the all-sky radiance product (ASR) and the atmospheric motion vectors (AMVs), as well as for the lightning imager LI the lightning flashes (LFL) product. Section 3 explains the timeliness monitoring setup and an overview of the product timeliness from these monitoring results is given in Section 4 for ASR and AMVs and in Section 5 for LFL. Section 6 gives a short summary followed by references in Section 7.

2. MTG-I1 satellite and monitored ASR, AMV and LFL products from FCI and LI

The first satellite of the new generation of EUMETSAT geostationary imager satellites MTG-I1 has been launched on 13 December 2022 carrying as meteorological payload an advanced visible and infrared imager and a new lightning imager.

The new flexible combined imager (FCI) has 12 channels spanning the visible, near-infrared and infrared range from 0.4 µm to 13.4 µm with a horizontal resolution of 2km at sub satellite point. It provides full disc scans with a fast 10 min. repeat cycle in the standard scanning setup. EUMETSAT derives various products from the FCI that are disseminated additionally to the full resolution imagery. Amongst the products, typically the all-sky radiances (ASR) and atmospheric motion vectors (AMVs) are used operationally, especially in global NWP.

ASR is a radiance product providing infrared radiances averaged over an area of 16x16 pixels for IR channels and 32x32 pixels for VIS and NIR channels in the nominal operational instrument configuration, i.e. representing roughly 32x32 km^2 areas. The product provides the all-sky radiance average as well as additionally averages of radiances over cloud free pixels in the segment (called clear-sky radiances) based on cloud mask results from the operational cloud detection processing at EUMETSAT. Additionally, information on the cloud coverage is included as well (see ASR data guide[1]).

AMVs are derived by tracking features like cloud or water vapour structures in sections of consecutive FCI images. The horizonal wind estimate is completed with a height estimate, making use of the optical cloud analysis (OCA) retrievals at EUMETSAT (see AMV data guide[2]).

[1] ASR data guide: https://user.eumetsat.int/resources/user-guides/mtg-fci-l2-asr-data-guide
[2] AMV data guide: https://user.eumetsat.int/resources/user-guides/mtg-fci-l2-amv-data-guide

The lightning imager (LI) measures at a wavelength of 777.4 nm and covers the observed earth disc area using four separate cameras covering complementary northern, southern, western and eastern sections with resolution ranging between about 2 km^2 at sub satellite point to over 90 km^2 further towards the edge of the observed area (see Fig. 1).

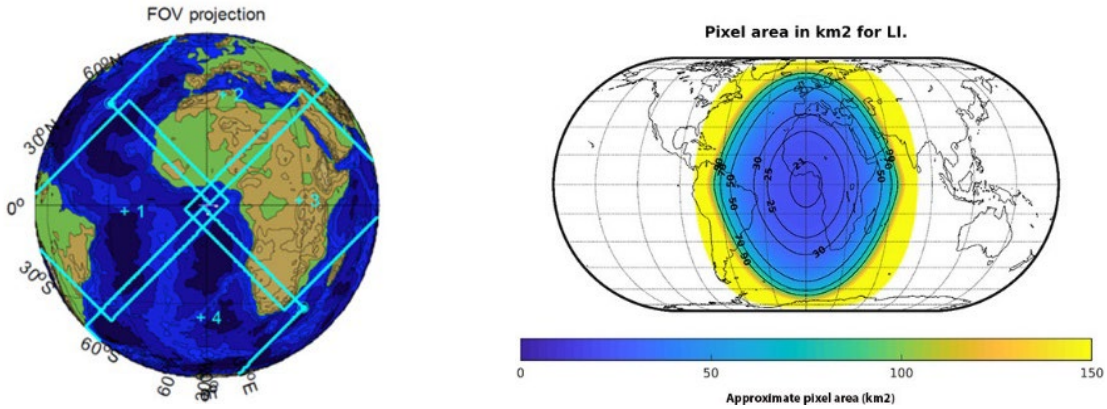


Fig. 1: Schematic picture of the observed area and the pixel area sizes for the lightning imager LI (from https://user.eumetsat.int/resources/user-guides/mtg-li-level-2-data-guide)

Various lightning products are derived from the raw LI observations, including the lightning groups (LGR) and flashes (LFL) as point products as well as several gridded products: accumulated flash area (AFA), accumulated flashes (AF) and accumulated flash density (AFD), which are all localized on the FCI image grid. Here, the timeliness monitoring for the NWP SAF web service is provided for the LI_LFL product.

3. Timeliness monitoring setup

The data availability monitoring looks at data coverage and data timeliness. It is done at two centres, the German Weather Service (DWD) and the UK Met Office to intercompare results and make timeliness statistics independent of potential data reception issues at a single centre. The monitoring is based on all incoming data (without data selection or quality control) and timeliness is measured as the delay between 'time of data bank entry' minus 'observation time' for each observation datum (e.g. each satellite footprint, or data product item location and time). Statistics and corresponding plots are computed and refreshed every 6 hours and the data cut-off time, i.e. the data collection period, is about 12h so that incoming data are normally complete.
The current report and timeliness plots compiled here are based on the DWD monitoring system showing selected results from 2025 and 2026. For up-to-date plots, please refer to the web pages (links are given in Section 7b).

4. Timeliness of ASR and AMV products from FCI

This section summarizes the timeliness for operationally distributed ASR and AMV products with a selection of plots from the near-real time date reception monitoring of the NWP SAF. Please note that the chosen intervals and colours in the plots are identical across the various instruments and products monitored in the NWP SAF data reception monitoring in order to allow an easy visual comparison across data types. The different colours reflect typical timeliness thresholds which are chosen to reflect typical cut-off requirements for NWP systems and also the typical NRT requirements of 2 to 3 hours for globally exchanged data.

Geostationary data products like ASR and AMVs, deriving from imagers with frequent scanning, normally have very high timeliness with a low spread, resulting in this plot setup in uniform blue to green colours for all data if the dissemination is running nominally.

The delay statistics show that both ASR and AMV data are disseminated and arrive with a very high reliability for data numbers and timeliness of the products with only very few occasions of fewer data delivered (see Fig. 2, Fig. 4). Generally, ASRs arrive within 16-22 min. (max. 26 min). and AMVs take slightly longer arriving between 25 – 35 min. (max 37 min.) after the observation time for which the data are valid (see Fig. 3).

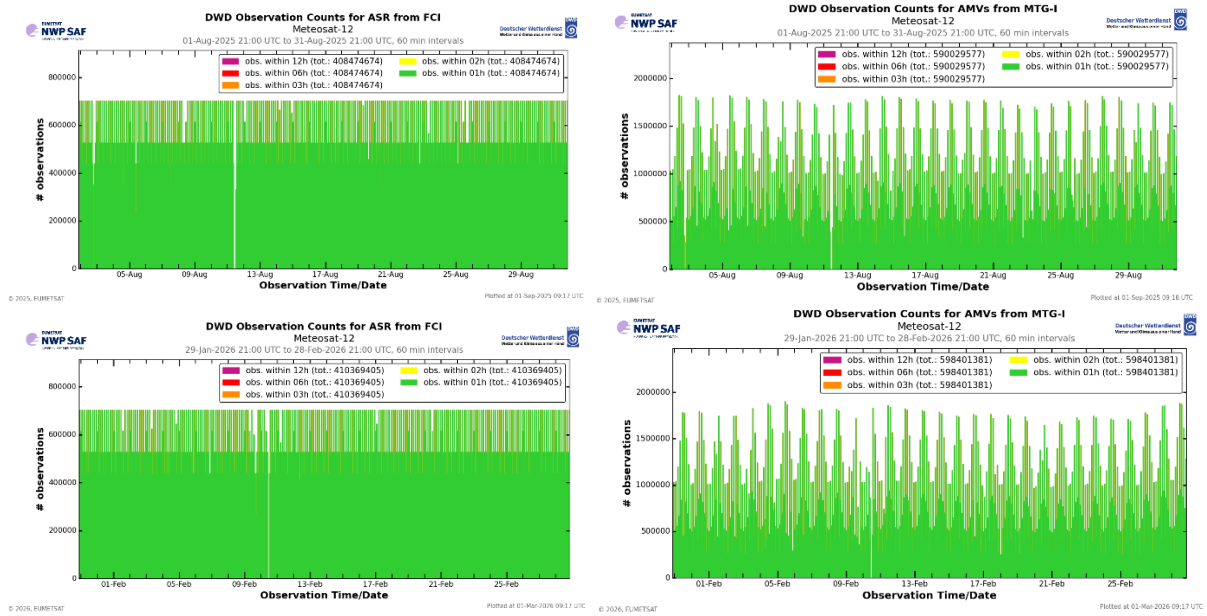


Fig. 2: Time series of number of data arriving within certain delay thresholds (with green arriving with less than 1 hour delay, see colour bar) for ASR (left) and AMVs (right) for wo selected months, August 2025 (top row) and February 2026 (bottom row).

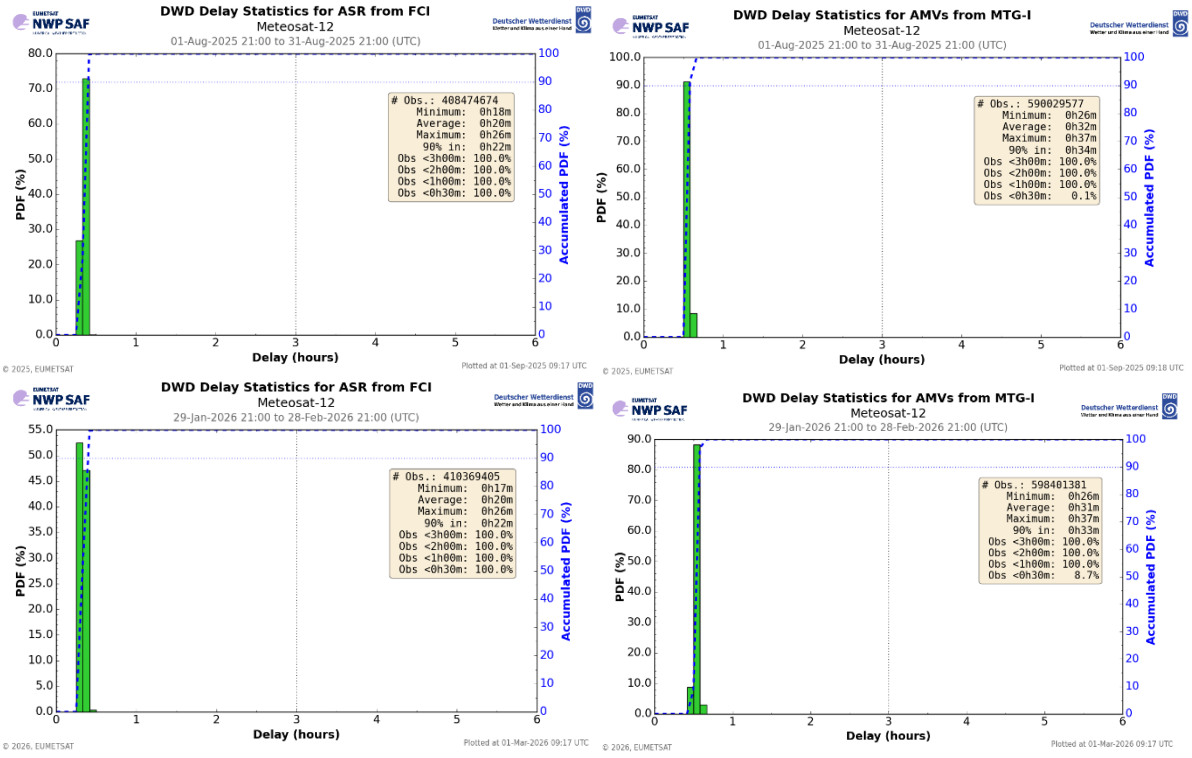
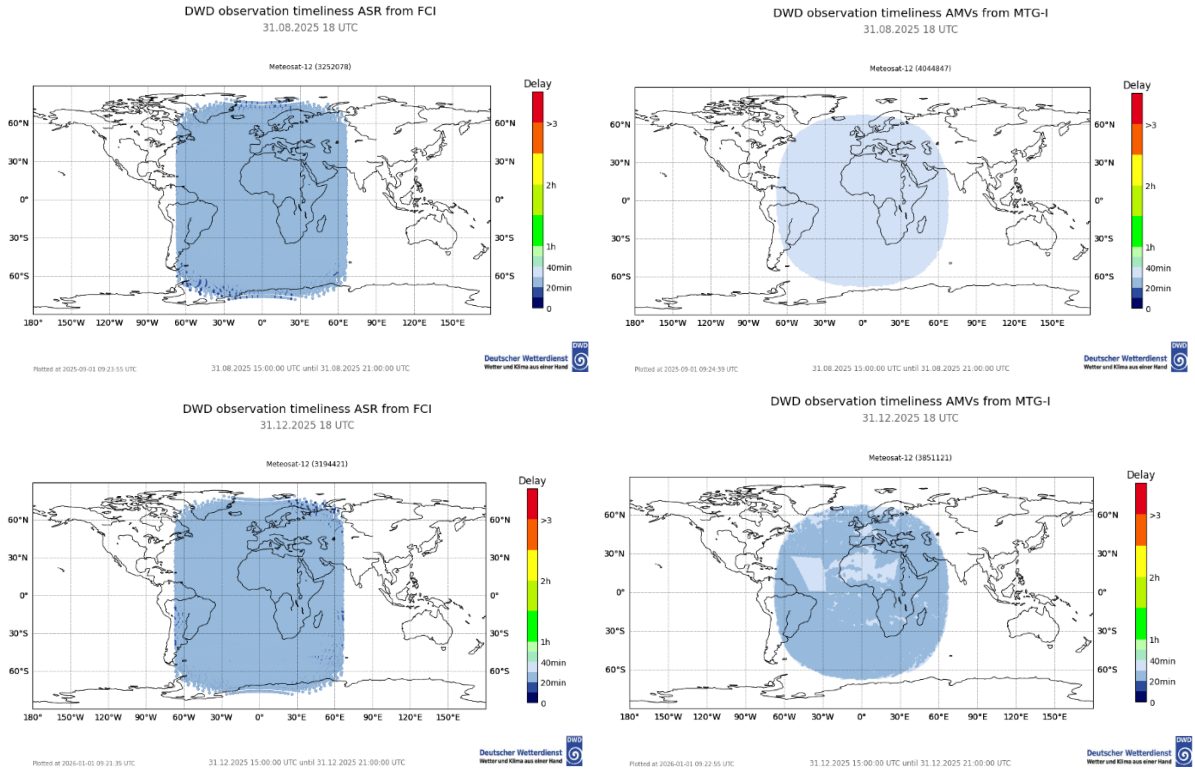


Fig. 3: PDF of data delays for ASR (left) and AMVs (right) for two example periods, the month of August 2025 (top panels) and February 2026 (bottom panels). In addition to monthly plots, the NWP SAF monitoring also provides daily delay statistics to provide additional information in case of stronger variations in current timeliness (not shown here).



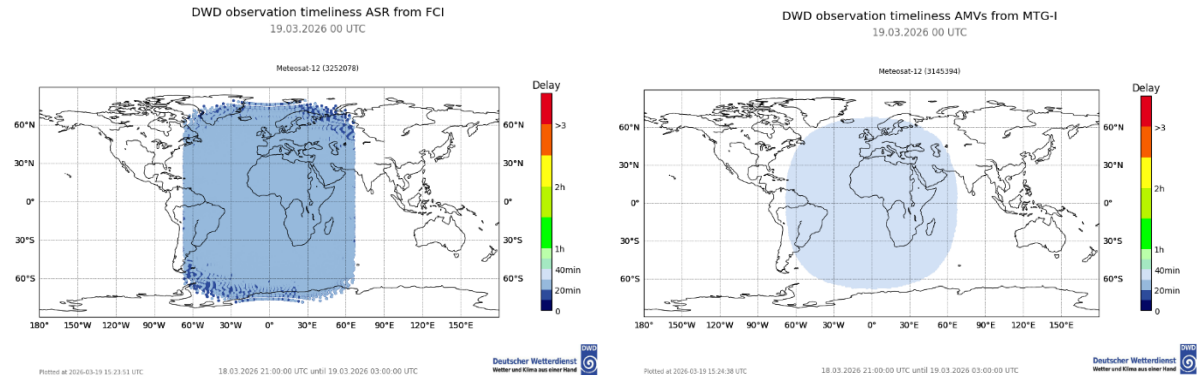


Fig. 4: Examples of a 'delay coverage' plots showing the data timeliness across the geographical coverage for an instrument and data type. Timeliness is plotted for all data within monitoring time slots comprising 6h of data, here for 18 UTC at 31 August 2025 (top), 18 UTC on 28 February 2026 (middle) and 19 March 2026 (bottom) for ASR (left) and AMVs (right). Note that since several geostationary disc scans fall within a 6h monitoring period, data points are overlaying each other in the coverage plots.

5. Timeliness of LI level 2 products

The LI data are disseminated following a different approach to the radiance and AMV products. Observations and derived L2 products are sent as many small files comprising data for short time intervals of 10 seconds (for LGR, LFL) and 30 seconds (AF, AFD, AFA) respectively. This reflects the immediate nature of the lightning flash information and enables a usage comprising from nowcasting applications needing immediate input on the current situation as well as in NWP where cut-offs are normally of the order of ~10 min. for rapid update systems or ~2h or even longer for global NWP.

Therefore the Fig. 5 provides an overview of the number of data product files per day and their typical sizes for several months of received data in 2025. The data reception monitoring combines these many individual data files to produce statistics over the usually considered four 6h periods per day.

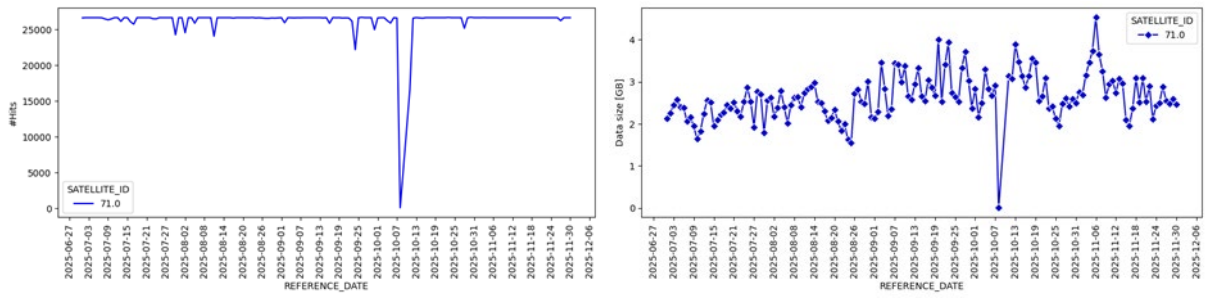


Fig. 5: Time series of the number of data product files per day and their typical sizes combined for the level 2 LI products for data received between beginning of July 2025 and end of November 2025.

The data product files contain information only for the (grid-)points with observed flashes. No information is provided for areas without flash activity or where one of the four cameras may have been inactive due to operational issues. Therefore, the number of data points in the products varies with time with their total number being a function of overall flash activity with a typical diurnal cycle. This is visible both in the coverage plots (see examples in Fig. 6) as well as in the timeseries with

number of data and the timeliness information (see Fig. 7) here based on the LFL product. The timeliness for the LI-LFL data product is extremely good with most data arriving with less than a minute delay and only some of the data arriving with longer delay of up to 10-29 min (see Fig. 7 and 8). Other L2 products arrive with a very stable, but longer delay of about 10 min. (see Fig 8). The delay performance of product generation and dissemination is very stable and reliable in time.

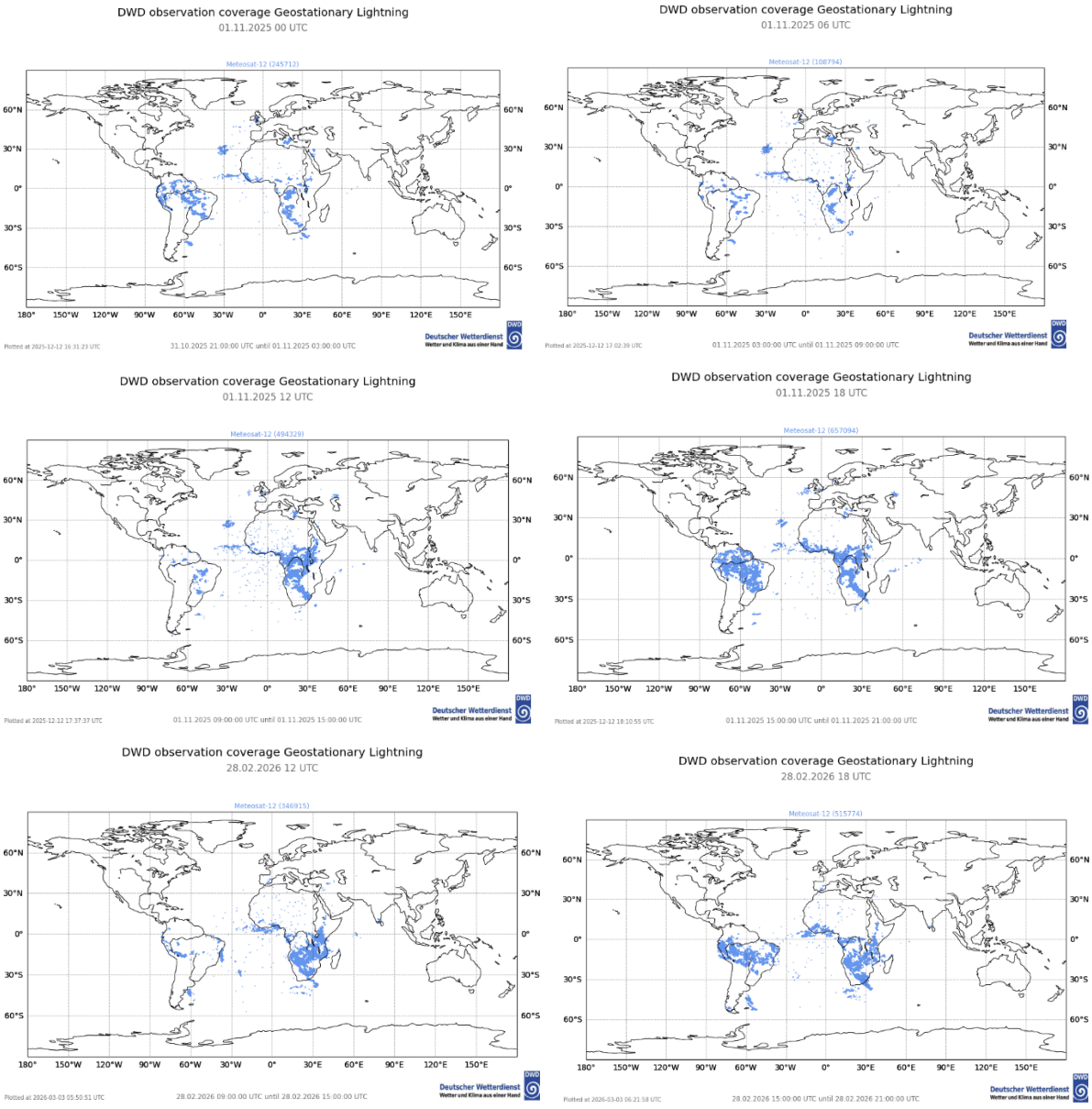


Fig. 6: Examples of a coverage plots showing the varying locations of flashes in the lightning flashes product LFL. Plots show coverage for 6h monitoring time windows around 00 UTC, 06 UTC, 12 UTC, 18 UTC for the 1 November 2025 (top four plots) and 12 UTC, 18 UTC on 28 February 2026 (two bottom plots).

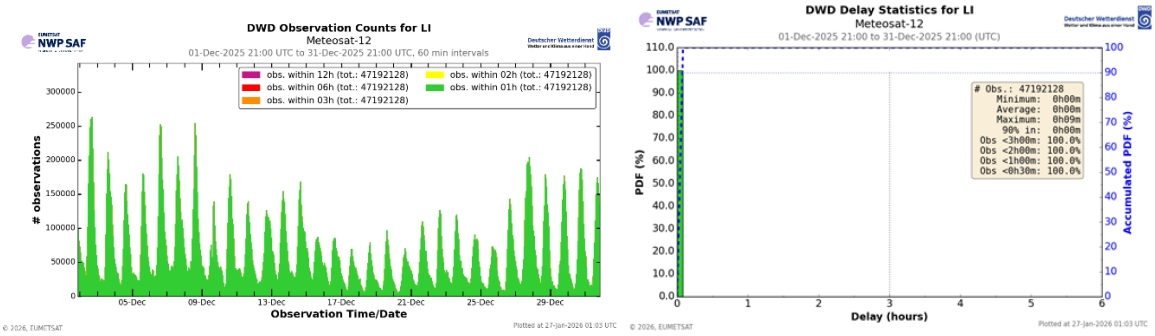


Fig. 7: Time series of number of data arriving within certain delay thresholds (with green arriving with less than 1 hour delay, see colour bar) for the LI product LFL (left) for the month of December 2025 and the corresponding PDF of data timeliness (right). Note that the plots intentionally follow the same layout and timeliness thresholds as for all other types of monitored satellite data within the reception monitoring for better comparability of plots.

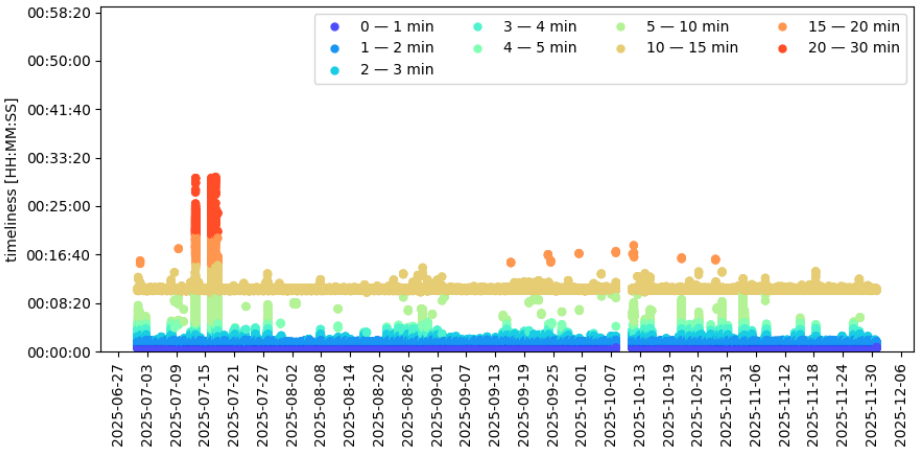


Fig. 8: Time series of data timeliness for the combined LI level 2 products for data received between beginning of July 2025 and end of November 2025 showing the timeliness of the received L2 data files. Data within certain timeliness thresholds are additionally indicated with a colour scale and thresholds having here been adapted to the very short delay times achieved for the LI data.

6. Conclusions

The data reception, including specifically the timeliness of the disseminated data, has been monitored for several L2 products from the MTG-I1 platform of specific interest for operational assimilation in NWP. The products are all received with very high reliability and consistent and stable data numbers with only very few and infrequent occurrences of reduced data counts.

The ASR and AMV products for FCI on Meteosat-12 which continue the already widely assimilated current products from the MSG / SEVIRI instrument are produced with very high reliability and good timeliness sufficient especially for global NWP assimilation setups for which they are primarily intended. The ASRs arrive within 16-22 min. (max. 26 min). and AMVs take slightly longer arriving between 25 – 35 min. (max 37 min.) after the observation time for which the data are valid.

For the lightning information from LI, the LFL L2 product has been monitored as an example product of interest for NWP which is taken as representative in terms of timeliness and dissemination as all derived lightning products are produced in the same ground processing step. The timeliness for the LI data product is extremely good with most data arriving with less than a minute delay and only few of the data arriving with longer delays of up to 10-29 min. This makes the data suitable both for nowcasting applications requiring quasi- instantaneous information and rapid-cycle-update short range NWP with very stringent cut-off times, as well as global NWP with longer data cut-offs.

7. References

a. References to product guides

AMV data guide: MTG FCI L2 AMV data guide | EUMETSAT - User Portal
(https://user.eumetsat.int/resources/user-guides/mtg-fci-l2-amv-data-guide)

ASR data guide: MTG FCI L2 ASR data guide | EUMETSAT - User Portal
(https://user.eumetsat.int/resources/user-guides/mtg-fci-l2-asr-data-guide)

LI user guide: MTG LI level 2 data guide | EUMETSAT - User Portal
(https://user.eumetsat.int/resources/user-guides/mtg-li-level-2-data-guide)

b. Links to the NWP SAF NRT data availability monitoring pages

Overview of current data status for all monitored data types:
Data Status | NWP SAF
(https://nwp-saf.eumetsat.int/site/monitoring/nrt-availability/data-status/)

Data coverage plots:
Data Coverage Monitoring | NWP SAF
(https://nwp-saf.eumetsat.int/site/monitoring/nrt-availability/data-coverage/)

Data timeliness plots:
Data Timeliness | NWP SAF
(https://nwp-saf.eumetsat.int/site/monitoring/nrt-availability/data-timeliness/)