

Decorative orange and white geometric shapes, including a circle and lines, located in the top left corner.

# EUMETSAT Headquarters Darmstadt, Germany

## Central Operations Report: July to December 2021





## EUMETSAT Member States



AUSTRIA



BELGIUM



BULGARIA



CROATIA



CZECH  
REPUBLIC



DENMARK



ESTONIA



FINLAND



FRANCE



GERMANY



GREECE



HUNGARY



ICELAND



IRELAND



ITALY



LATVIA



LITHUANIA



LUXEMBOURG



NETHERLANDS



NORWAY



POLAND



PORTUGAL



ROMANIA



SLOVAK  
REPUBLIC



SLOVENIA



SPAIN



SWEDEN



SWITZERLAND



TURKEY



UNITED KINGDOM





- ✓ Introduction
- ✓ Performance Reporting covering EUMETSAT's Services
- ✓ Glossary

Any service changes introduced in the reporting period are presented on our website:

[www.eumetsat.int](http://www.eumetsat.int), under 'Data' → 'Service Status' → 'Product History'



## Introduction

**Welcome to the Central Operations Report for the second half of 2021.**

**The most significant event of the reporting period was, without a doubt, the continuation of COVID-19 pandemic in Europe. EUMETSAT has continued efforts to limit the number of people present on site, focusing on the Operations-critical personnel. From July until December, the number of people present on site were reduced to around 30% of the workforce, this to ensure that critical operations can be performed and, at the same time, high resilience by segregating personnel.**

**Considering the exceptional circumstances, it is rewarding to report that EUMETSAT's operational services were maintained with no measured degradation in the reporting period due to the unusual working conditions for the Operations department and its supporting teams.**

**The availability of the services was generally on, or above target for all services, with the following exceptions:**

- In December 2021, Meteosat-11 and Meteosat-8 experienced concurrent, though unrelated, safe mode events just before Christmas. Priority was given to restoring the Prime Mission via Meteosat-9, so Meteosat-8 IODC products suffered a relatively longer outage. The Prime Mission was fully restored to Meteosat-11 two days later (see [slide 8](#)).**

**After fifteen years in orbit, Metop-A was gradually removed from operational service from October and underwent a series of technology end-of-life test, before being decommissioned and deorbited at the end of November. The satellite was fully passivated and placed into a significantly lowered orbit, and is predicted to reenter Earth's atmosphere in approx. 21 years.**



## Introduction (continued)

A growing trend has been observed, over the last year or more, regarding delivery times for medium to large data and products orders from the EUMETSAT Data Centre. This is the consequence of an overall increasing number of orders, as shown in [slides 58 and 59](#) in this report. To improve data access in the longer-term, EUMETSAT is developing a new portfolio of data access services which will significantly enhance the range of data and imagery available via the Internet. These new services started a pilot phase in September 2020 and in October 2021 a new set of online data access services, namely EUMETView, the Data Store and the Data Tailor, went operational.

During 2021, the operations to prepare for Meteosat-9 relocation to the Indian Ocean were finalized. The actual relocation started on 1 February 2022 and be completed in April. Thereafter, Meteosat-9 will parallel the IODC services currently provided by Meteosat-8, taking over operational responsibility for these services in June 2022.

The Meteosat operations team has also developed and validated the operations necessary to execute a series of technology test activities to be implemented on Meteosat-8 when removed from operational service later in 2022. Meteosat-8 will be decommissioned and reorbited in October 2022.

The Sentinel-6 Michael Freilich satellite in-orbit verification was completed in January 2021 and the commissioning of the ground segment, products and services was completed in November 2021 with the successful In-Orbit Commissioning Review. All Low Rate data and products, equivalent to the reference products currently delivered by Jason-3, and High Rate products and services have been operationally released to the users. Sentinel-6 MF continues to fly in a tandem orbit with Jason-3 until mid-April 2022 when it will take over as the reference altimetry mission.

I wish all readers safe times for 2022 and beyond.

Best regards,

Livio Mastroddi,

Director of Operations and Services to Users



The charts on the service slides in this report present a summary view of the performance of the services within the categories listed here:

- Meteosat Services
- Metop, Suomi-NPP & NOAA Global Data Services (GDS)
- Regional Data Services (EARS)
- Search and Rescue Support
- Jason-3 OGDR Service
- Third-Party Data Services
- EUMETCast
- The EUMETSAT Data Centre
- EUMETSAT's Support to Climate Services
- Helpdesk Service

Several terms with special meaning (e.g. 'Nominal RCs') appear in the slides. A glossary is provided at the end of the report.



**This report presents an overview of EUMETSAT's operational services in the half-year reporting period by means of the following two indicators:**

## **Service Availability:**

The availability of the operational services to users is measured monthly against the maximum amount of products/data which theoretically could be delivered each calendar month of the reporting period, i.e. from a “perfect” satellite system.

## **Operational Performance:**

This quantifies how well EUMETSAT has performed operationally with respect to its service targets, taking into account all planned outages due to special operations such as instrument calibration, decontamination and spacecraft manoeuvres, i.e. the intrinsic limitations of the satellite system.

These two indicators are used for Meteosat and Metop services as delivered over the prime dissemination mechanism, namely EUMETCast Europe. Where statistics are available, they are presented in the charts on the following slides. Comments are provided alongside, which identify any significant events or factors (satellite or ground-segment in nature) that have had impact on the service availability and/or operational performance. Currently, only product generation statistics are available for the Meteosat meteorological products.

**Note:** Events having significant impact on operational services are described on a dedicated slide following this one.



## Events Leading To Significant Operational Impacts

### Meteosat-11 and Meteosat-8 concurrent safe modes

**On Sunday 19th December, Meteosat-11 and Meteosat-8 both entered into safe mode within 11 minutes of each other. Recovery priority was given to the 0° prime mission, resulting in a slightly longer than normal outage for IODC products from Meteosat-8.**

**To properly analyse this unprecedented situation while minimising service outages, it was decided to swap the 0° prime mission from Meteosat-11 to Meteosat-9, which was still available at the time as a backup satellite. The 0° Full Earth Scan imaging, mission, as well as the Data Collection Platform (DCP) and Search and Rescue (S&R) services important for the safety of human life, were fully re-established via Meteosat-9 within two hours of the initial anomaly on Meteosat-11.**

**No correlation has been found between the two concurrent events. The possibility of a security breach leading to malicious commanding of the satellites, or erroneous operations arising from a previously undetected systemic anomaly or failure, was analysed and discarded. The analysis identified the most likely root cause, for both satellites, as a radiation hit on a power protection circuit of the on-board computer.**

**After the recovery of all services via Meteosat-9 and Meteosat-8, the recovery of Meteosat-11 proceeded uneventfully and was completed on Saturday 20th December. The 0° prime mission transitioned back to Meteosat-11 on Sunday 21st December, with Meteosat-9 resuming its backup role.**





## Longer-Term Factors Impacting the Operational Services

Discrete events affecting the services appear on either the previous slide (when significant) or the slide for an individual service (when affecting only that service). This slide, in contrast, lists factors of an ongoing nature.

### Fuel Migration on MSG Satellites

MSG satellites, with four propellant tanks in interconnected pairs, routinely experience gradual propellant movements between tanks that have a very small effect on satellite attitude. During the eclipse period, variations in propellant temperature and density can give rise to larger fuel migrations whose effect on satellite attitude manifests as variations in the geometric image accuracy. Although the image-processing system can mitigate the effects on image quality, not all images can be corrected to achieve the target geometric accuracy. On a yearly basis, 0.75% of IODC service repeat cycles are affected, with higher rates during eclipse seasons (>2% in these periods).

### Thermal Switching on MSG Satellites

A seasonal thermal effect has been observed with MSG satellites where, from March to September, the autonomous on-board switching of thermal heater lines affects fuel migration and leads to an impact on image product quality. For Meteosat-8 and Meteosat-9, with degraded thermal insulation, ground commanding augments the on-board thermal control system to reduce temperature extremes and synchronise most of the effect with non-imaging periods (SEVIRI mirror re-trace). For Meteosat-10 and Meteosat-11, this effect (in isolation) has not yet resulted in a failure to achieve target availability, although modifications to satellite thermal control are ready to be implemented, if necessary. As a mitigation, the Meteosat-11 inclination manoeuvre in 2021 was shifted to November, resulting in a significant reduction of affected repeat cycles in comparison to 2020.

### Metop-B HIRS Instrument Anomaly

Since May 2020, the Metop-B HIRS instrument filter wheel has remained stalled, possibly due to mechanical degradation of the bearing. On advice of NOAA, automated recovery attempts to free the filter wheel by toggling the motor switch have continued in the hope that the filter wheel may restart normal motion; a strategy that worked for the HIRS instruments on NOAA-15 and NOAA-18 under similar circumstances. This has, to date, been unsuccessful for Metop-B HIRS and the data remains unusable, impacting GDS L1, ATOVS L2 and EARS-ATOVS products with dissemination of these stopped.



**This service category comprises the data and products produced with the Meteosat Systems. The orbital locations of and the services supported by the MSG satellites are as follows:**

**Meteosat-11 (at 0°): Prime FES satellite.**

**Meteosat-10 (9.5°E): Rapid-Scan Service (RSS).**

**Meteosat-9 (3.5°E): Serves as the backup for the primary FES service, and also for RSS, operational constraints permitting (annual 28-day service gaps no longer supported, but the monthly 48-hour gaps are currently filled).**

**Meteosat-8 (41.5°E): Indian Ocean Data Coverage FES Service, on a best-effort basis.**

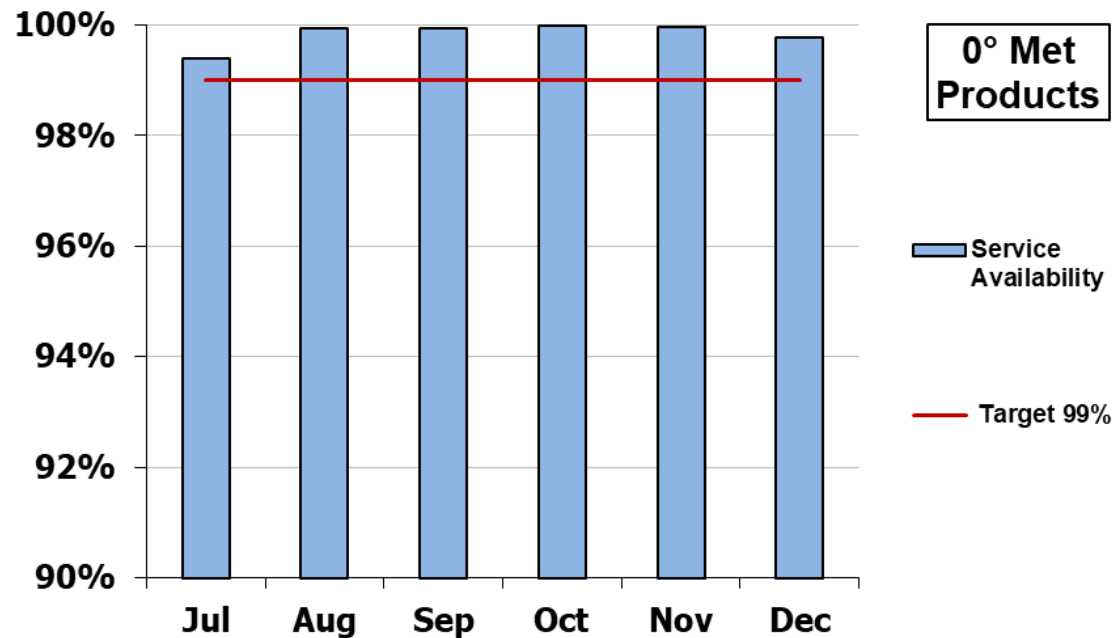
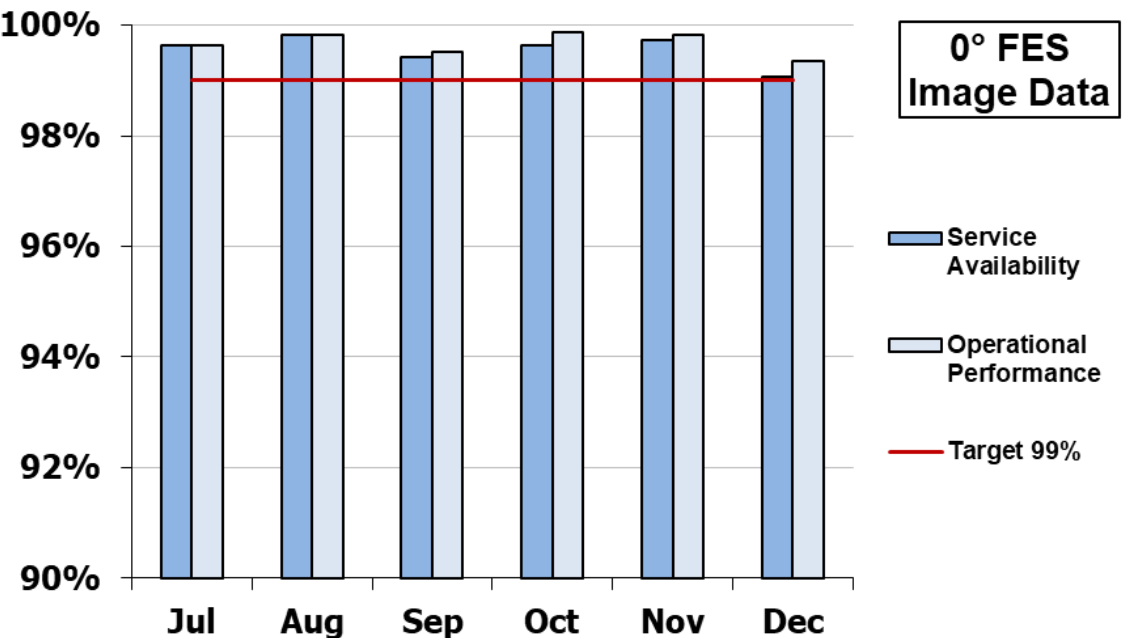
**The individual services covered by the following slides are as follows:**

- **Meteosat L1.5 image data and derived meteorological products for FES, RSS and IODC**
- **Data Collection and Retransmission (the DCP service)**



# EUMETSAT Central Operations Report for July to December 2021

## Meteosat Services x 0° FES Image Data & Derived Meteorological Products



The prime satellite supporting the 0° Full-Earth Scan (FES) service is Meteosat-11. Meteosat-9 has the role of backup. Service Availability and Operational Performance are measured in terms of nominal Level 1.5 Repeat Cycles (RCs) disseminated 'on-time' via EUMETCast Europe. See [slide 7](#) for an explanation of the two indicators.

### Events which impacted availability:

December: 19 Unexpected RCs (5 due to incomplete data, 1 due to FD update, 8 due to safe mode, 5 due to timeliness)  
9 expected RCs due to maintenance

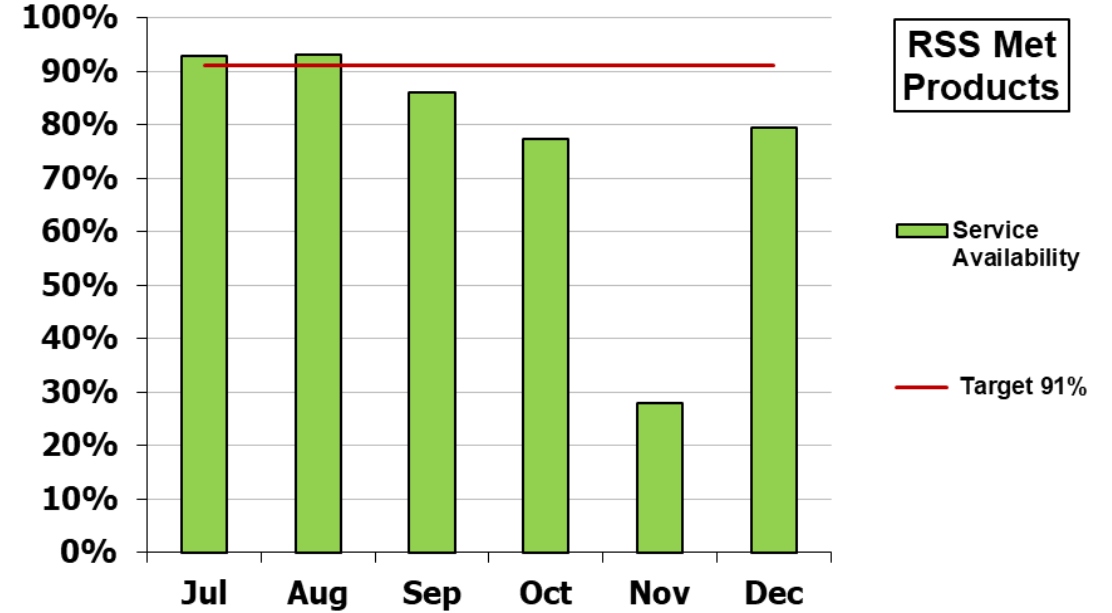
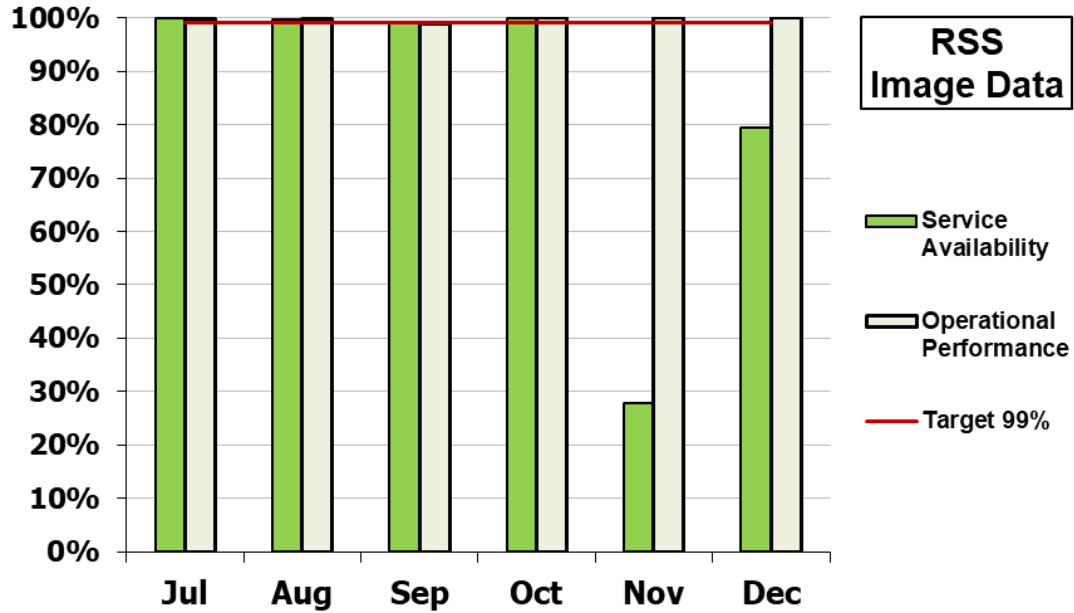
Meteorological products derived from the Full-Earth Scan (FES) images produced by the satellite supporting the 0° service. The chart shows 'end-to-end Service Availability' in terms of complete products disseminated 'on-time' via EUMETCast Europe.

### Events which impacted availability:

None significant.



## Meteosat Services x 9.5°E RSS Image Data & Derived Meteorological Products



The prime satellite supporting RSS is Meteosat-10. Meteosat-9 could be used as backup for the RSS service when Met-10 is unavailable considering all operational constraints. Currently, Met-9 is used to 'gap-fill' during the monthly SEVIRI Full-Earth Scanning 'rests' for Met-10, but not the annual 28-day FES periods. For more info on RSS: [www.eumetsat.int](http://www.eumetsat.int) → [Rapid-Scanning Service](#).

Service Availability and Operational Performance are measured on the basis of nominal Level 1.5 Repeat Cycles (RCs) disseminated 'on-time' via EUMETCast Europe. See [slide 7](#) for an explanation of the two indicators.

Events which impacted availability:

- September: 91 unexpected RCs (3 due to bad frames; 69 due to IMPF Server crash; 11 due to IMPF Server unresponsive; 8 due to timeliness)  
1 expected RC due to Eclipse
- Nov.-Dec.: RSS Month Break from the 9<sup>th</sup> of November until the 7<sup>th</sup> of December

Meteorological products (except MPE) derived from Rapid-Scanning images produced at 9.5°E. The chart shows 'end-to-end Service Availability' in terms of complete products disseminated 'on-time' via EUMETCast Europe. See [slide 14](#) for the availability of RSS MPE products.

Events which impacted availability:

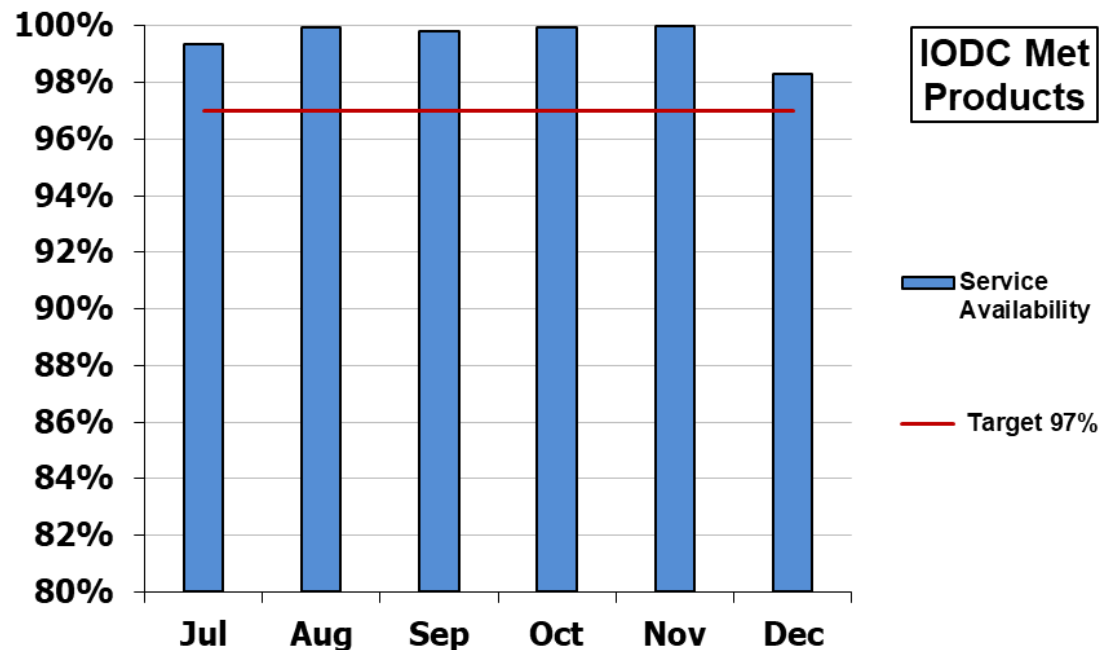
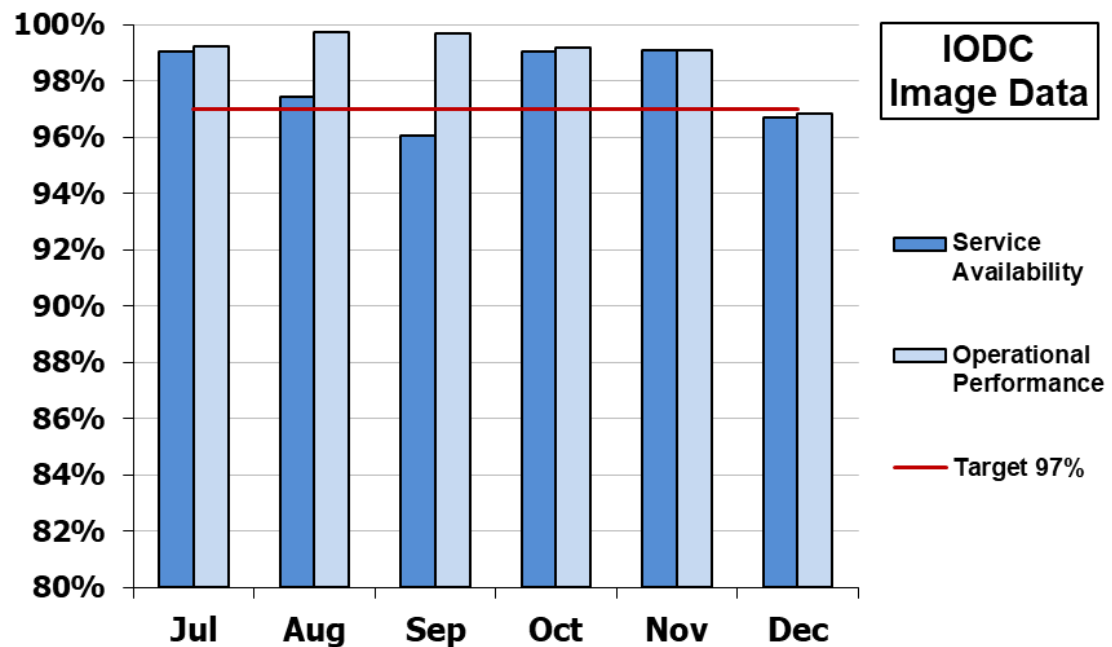
- September: 69 unexpected RCs due to IMPF Server crash
- Nov.-Dec.: RSS Month Break from the 9<sup>th</sup> of November until the 7<sup>th</sup> of December

NOTES:

- 48-hour RSS pauses occur in a 28-day cycle and an annual 28-day pause typically occurs in the winter months. During these periods no meteorological products are generated, even if a backup satellite is used to continue RSS imaging.



## Meteosat Services x 41.5°E IODC Image Data & Derived Meteorological Products



The prime satellite supporting the IODC service at 41.5°E (on a best-effort basis) is Meteosat-8. There is no backup. Service Availability and Operational Performance are measured on the basis of nominal Level 1.5 Repeat Cycles (RCs) disseminated 'on-time' via EUMETCast Europe. See [slide 7](#) for an explanation of the two indicators.

Events which impacted availability:

- September: 13 unexpected RCs (3 due to THS; 5 due to IDRS connection; 2 due to missing lines; 1 due to COMMS; 1 due PEP1 crash; 1 due to Station swap)  
105 expected RCs (21 due to Sun collinearity; 10 due to Horizon timing; 74 due to Eclipse)
- December: 97 unexpected RCs (2 due to FD update; 12 due to RI issue; 48 due to Safe Mode; 20 due to Thermal Instability; 15 due to Timeliness (\*\*))  
4 expected RCs due to MAN

(\*\*): Due to Meteosat-8's increasing inclination, image-processing cycles can sometimes take longer and timeliness be exceeded.

Meteorological products derived from Full-Earth Scan images produced by Meteosat-8 at 41.5°E. The chart shows 'end-to-end Service Availability' in terms of complete products disseminated 'on-time' via EUMETCast Europe.

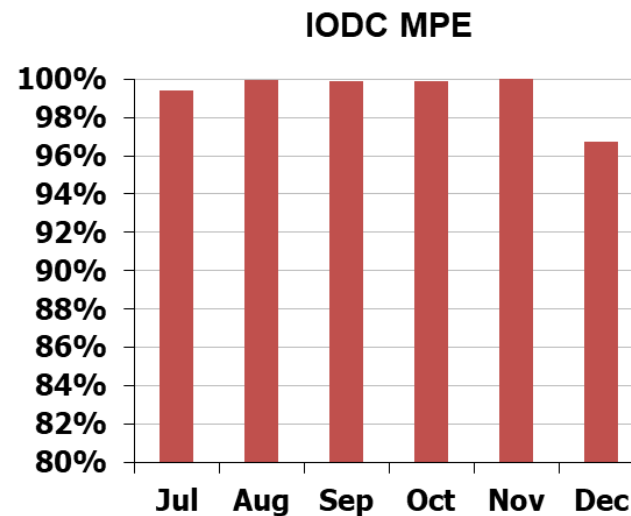
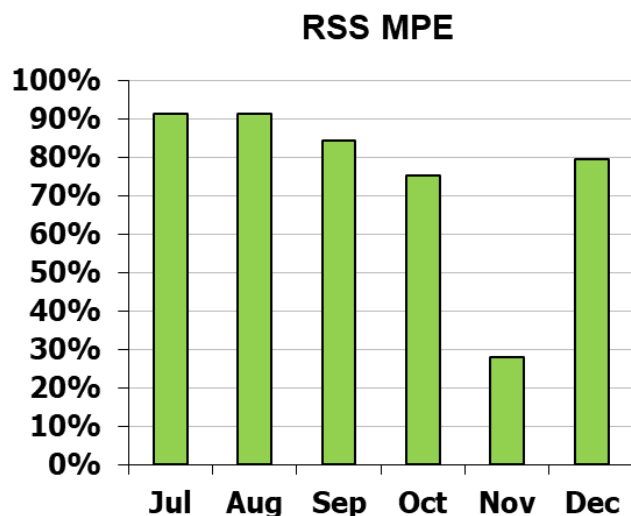
Events which impacted availability:

- December: 48 unexpected RCs due to Safe Mode

NOTE: The availability of MPE products is measured and charted separately (see [slide 14](#)).



## Meteosat Services x MPE Products for the RSS and IODC Services



Multi-sensor Precipitation Estimate (MPE) products are derived from infrared data in Meteosat RSS and IODC imagery, and passive microwave imager data from the US DoD's DMSP satellites. MPE products are used for nowcasting and short-term forecasting, especially useful for regions for which there is no rainfall radar data, such as in Africa and Asia. Availability of MPE products is measured in terms of the number of products disseminated via EUMETCast, as a percentage of those scheduled.

### Events which impacted availability:

RSS yearly break from the 9<sup>th</sup> of November until the 7<sup>th</sup> of December

### Notes:

- The availability of MPE products is presented separately, to take account of their being derived from data from the US DoD's DMSP satellites, the availability of which is beyond EUMETSAT's control and provided by aging instruments.
- RSS Service availability reflects the RSS pauses, during which no met. products are produced.
- The dissemination of MPE products derived from 0° imagery data was discontinued as of 10-July-2019.



## Meteosat Services x DCP Channel Availability at 0°

Data Collection and Retransmission operations at 0° utilise the international and regional DCP channels of the satellite supporting the service (nominally Meteosat-11).

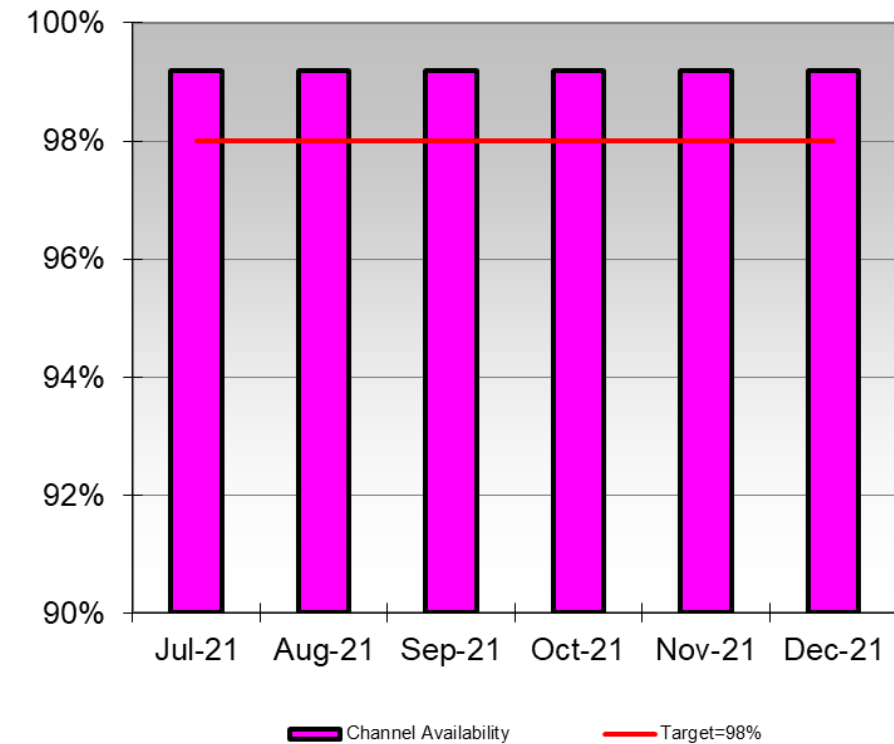
The chart shows the availability of the 0° DCP service. It is measured in terms of the number of hourly reference DCP messages on all operational regional channels which have been successfully received back by EUMETSAT, as a percentage of those sent.

For information concerning the geographical distribution of registered DCPs, please see the next slide.

### Events which impacted DCP Channel Availability:

None significant.

**Note:** Some DCP messages continue to be corrupted/lost due to interference on the satellite link. It is not expected that the cause will be resolvable. EUMETSAT continues to monitor the situation.





# EUMETSAT Central Operations Report for July to December 2021

Meteosat Services x Geographical Distribution of DCPs as of 31 December 2021

www.eumetsat.int

DCPs	Country	DCPs	Country	DCPs	Country	DCPs	Country
6	Albania	1	Finland	4	Mauritania	10	Tanzania
51	Algeria	104	France	4	Mauritius	2	Togo
13	Angola	1	Gambia	23	Mozambique	70	Uganda
2	Armenia	29 ↑	Germany	29	Namibia	68 ↑	UK
2	Austria	13	Ghana	17	Niger	24	Ukraine
6	Belarus	1	Gibraltar	120	Nigeria	1	Union des Comores
2	Benin	1	Greece	10	Oman	67	USA
5	Bhutan	11	Guinea	4	Pakistan	1	Yemen
14	Botswana	2	Guinea-Bissau	3	Philippines	16	Zambia
1	Brazil	9	Indonesia	11	Republic of Moldova	13	Zimbabwe
1	Bulgaria	2	Iran	9	Republic of Seychelles		
7	Burkina Faso	208	Iraq	7	Romania		
60	Cameroon	9 ↑	Ireland	8	Rwanda		
2	Canada	75	Italy	1 ↑	St-Pierre and Miquelon		
4	Cap Verde	3	Ivory Coast	11	Senegal		
2	Central African Republic	3	Kenya	30	Sierra Leone		
4 ↑	Chad	6	Lesotho	1	Slovakia		
3	Congo	11	Libya	42	South Africa		
1	Cyprus	6	Madagascar	2 ↓	Spain		
68 ↑	Dem. Rep. of the Congo	9	Malawi	148	Sri Lanka		
8	Djibouti	3	Maldives	3	Sudan		
1	Egypt	19	Mali	5	Southern Sudan		
1	Falklands	1	Malta	10	Tajikistan (TZ)		

As of the end of December 2021, there were:

1565 registered Data Collection Platforms, belonging to 146 DCP operators, deployed by the 79 countries shown in the table.

Of the total number of registered DCPs, there were 419 units in active operation.

Larger numbers of DCPs are highlighted with darker colours.

Table entries in green = new; Country name in red = DCPs no longer registered.

↑↓ = indicates an increase /decrease in DCPs registered, compared with previous report.





These services refer to the dissemination of global data and products produced as part of the Initial Joint Polar System (IJPS) and the Joint Transition Activities (JTA) agreements between EUMETSAT and NOAA. The JTA is an interim agreement, providing continuity between the Initial Joint Polar System (IJPS) and future Joint Polar System (JPS).

The services provide Level 0, 1 and 2 products derived from the data from the instruments onboard the 3 Metop satellites (Metop-C since July 2019), Suomi-NPP and NOAA-19, as summarised in the following table:

	A-DCS	AMSU	ASCAT	ATOVS	AVHRR	GOME-2	GRAS	HIRS	IASI	MHS	SEM	ATMS & CrIS
<b>Level 0</b>	ABC <sup>(1)</sup>	-	-	-	-	-	-	-	-	-	ABC	-
<b>Level 1</b>	-	ABC, N	ABC	-	ABC, N	ABC <sup>(2)</sup>	ABC	AB, N	ABC	ABC, N	-	S
<b>Level 2</b>	-	-	-	B <sup>(3)</sup> , N	-	-	-	-	ABC	-	-	-

**Legend:** ‘A’, ‘B’ and ‘C’ = Indicates products extracted from the data from the Metop-A, Metop-B (prime) and Metop-C (secondary) satellites, respectively.

Note the following exceptions:

(1) Reduced capability of A-DCS on Metop-B, i.e. only Argos-2 mode.

(2) GOME-2 Trident operations: Metop-A instrument has swath width of 960 km, Metop-B and C have full width of 1920 km.

(3) ATOVS L2 products only for Metop-B (further info – see ATOVS slide )

‘N’ = Level 1 products from the AMSU, AVHRR, HIRS and MHS instruments onboard NOAA-19, and also Level 2 products (ATOVS).

‘S’ = Sensor Data Records for the ATMS and CrIS instruments onboard Suomi-NPP.

The following slides show the monthly availability of the products, identifying any significant events which impacted the service.



**Unless otherwise indicated in the availability slides, the monthly figures are those for ‘timely availability’, where ‘timely’ is used to mean the following:**

- Levels 0 & 1: Available within 2 hours 15 minutes of sensing (Metop and NOAA)
- Level 2: Available within 3 hours of sensing (Metop and NOAA)
- SDRs: Available within 2 hours of sensing (Suomi-NPP)

**The above timeliness targets are those originally specified for the Metop and NOAA-19 data and delivery is currently measured against them. The Level 0 and 1 targets for the primary Metop are by far exceeded since the introduction of (1) the Antarctic Data Acquisition (ADA) service which improved the timeliness of the data, and (2) the multiplexed data transfer between the Svalbard Ground Station and Darmstadt which gave a further timeliness improvement for the data of all 3 Metops.**

**Availability figures are based on the following:**

- Level 0: Production statistics from EUMETSAT’s EPS Product Generation Facility
- Levels 1 & 2: Reception statistics from EUMETSAT’s reference EUMETCast User Station

**The next slide shows the profile of Metop-B passes acquired via the ADA service, which relays half-orbits’-worth of data for most of the 14 to 15 passes possible per day, delivering the first half of each orbit approximately 50 minutes earlier than that via Svalbard.**

**On [slide 20](#) onwards, service availability and operational performance are presented for the data (mostly delivering Level 1) from instruments onboard the 3 Metops, NOAA 19 and Suomi-NPP. Please see [slide 7](#) For explanation of the two metrics.**



Data from the primary Metop satellite, Metop-B, is acquired at NOAA-NSF's ground station on McMurdo Sound in Antarctica and routed to EUMETSAT HQ. This acquisition complements that of Svalbard, and allows the data of the first half of each orbit to be processed and disseminated earlier, thus improving data timeliness of Metop-based products.

The chart shows the average daily passes per month that have been successfully acquired at McMurdo and relayed to Darmstadt in the last 12 months.

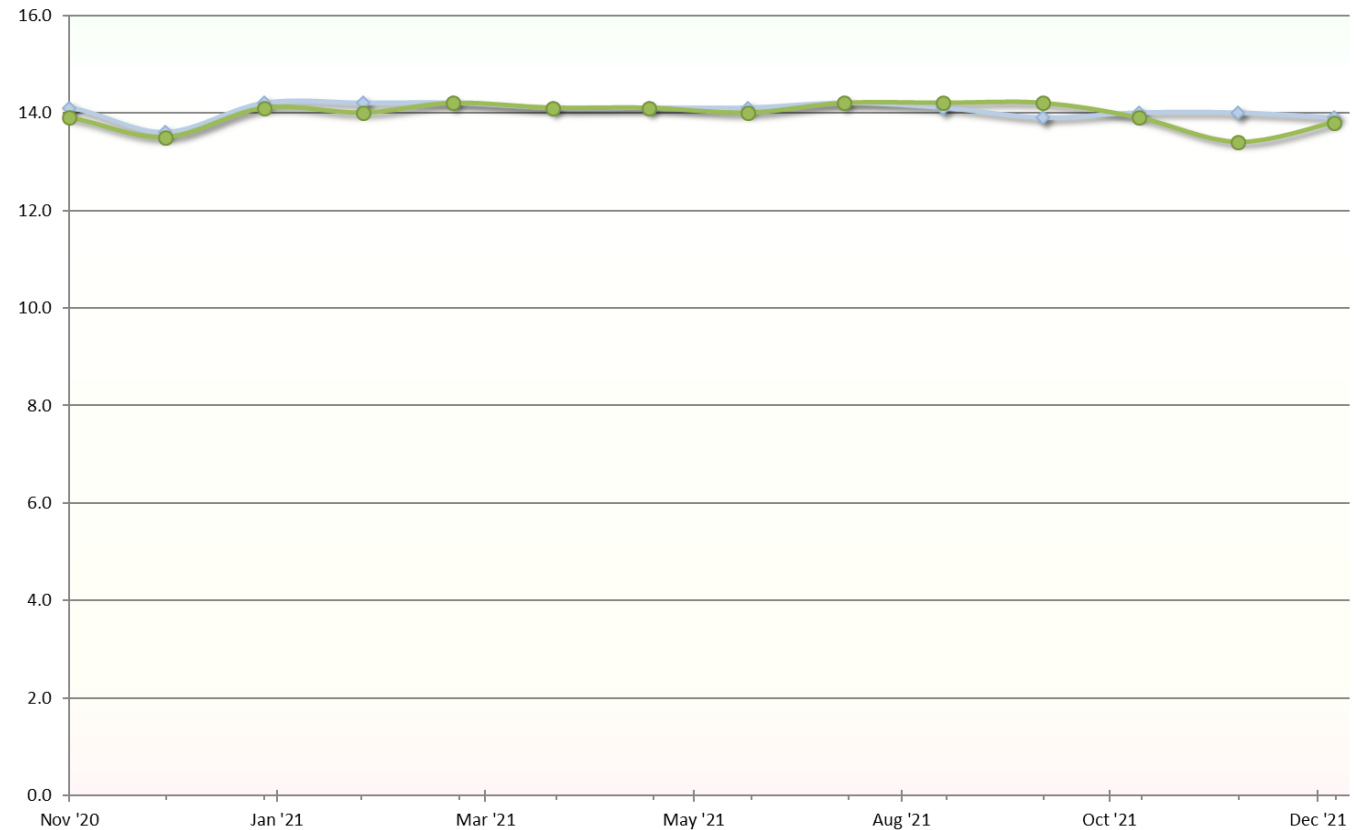
Maximum average orbits / day possible = 14.1

The overall daily average of supported passes in the 12 months shown on chart = 13.9

Events in the reporting period:

None significant

Monthly average of attempted and supported passes per day



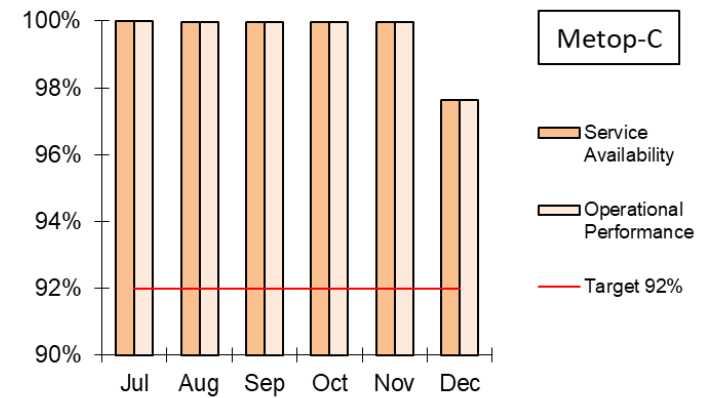
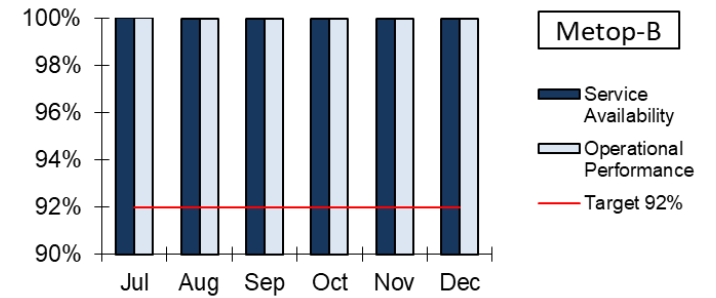
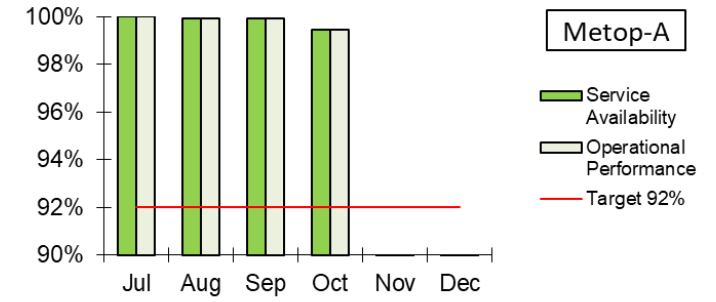


The Metop satellites carry instruments for supporting the Argos Advanced Data Collection System (A-DCS). Environmental data is transmitted by measurement platforms on land or sea, or in the atmosphere, and this is relayed via the Metop satellites and EUMETSAT to CLS in Toulouse, in accordance with a cooperation agreement with CNES.

Metop-A provided the prime Argos-3 A-DCS service, Metop-B just Argos-2 mode (due to the reduced capability of A-DCS onboard that satellite), and Metop-C supports Argos-3.

### Events which impacted availability:

Nov: Metop A EoL





# EUMETSAT Central Operations Report for July to December 2021

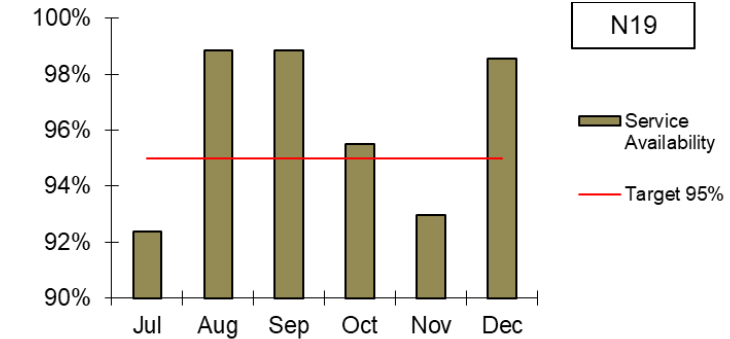
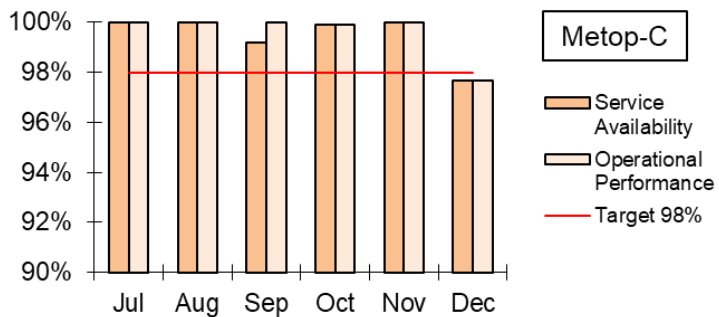
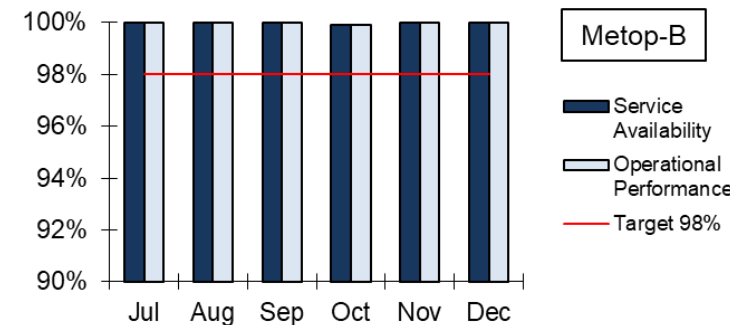
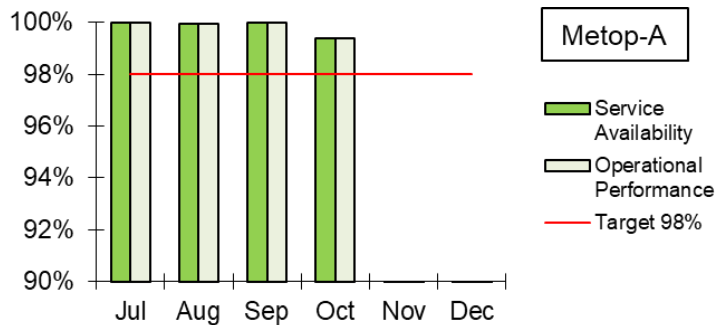
Metop, Suomi-NPP & NOAA GDS x AMSU Level 1B BUFR Products

The Advanced Microwave Sounding Unit (AMSU) is a 15-channel microwave radiometer supplied by NOAA which provides information on atmospheric temperature profiles.

Level 1B products are derived from the data generated by the instruments onboard the 3 Metop satellites and also NOAA-19.

### Events which impacted availability:

- 1 Jul:** N19 Missing data in GAC dump
- 2 Jul:** N19 JEUNO dump not received; N19 PDUs missing
- 6 Jul:** N19 GAC outage from blind orbit support
- 20 Jul:** N19 GAC dump not received
- Nov:** Metop A EoL
- 16 Nov – 3 Dec:** N19 No BOS taken due to Metop A EOL operations
- 9-10 Dec:** Metop C NIU to REFUSE
- 20 Dec:** Metop C SSR WAIT STATE Anomaly



**Notes:**

**Metop-A:** Channels 7 & 8 have failed completely; channel 3 degraded, but the remaining 12 channels remained in spec and were fully usable.

**Metop-B:** Channel 15 has failed completely; channel 7 still exhibiting transient spikes and channel 3 is now out of specification.

**NOAA-19:** Channels 7 & 8: out of specification, but the data is still considered usable for the time-being.

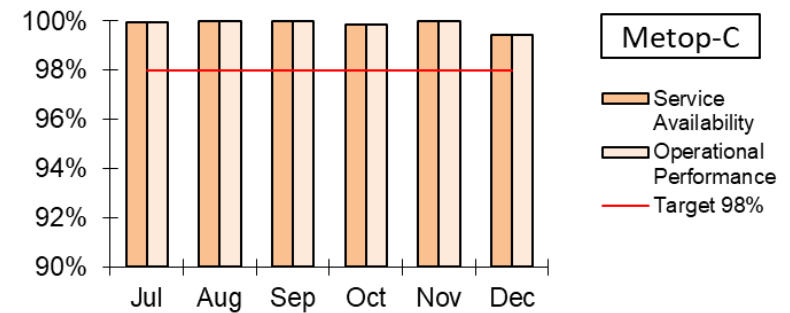
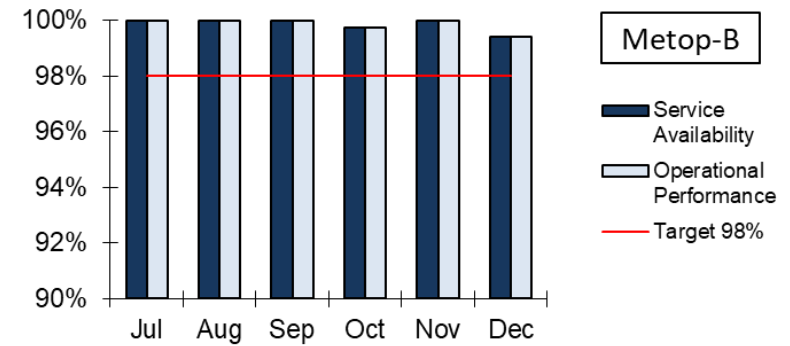
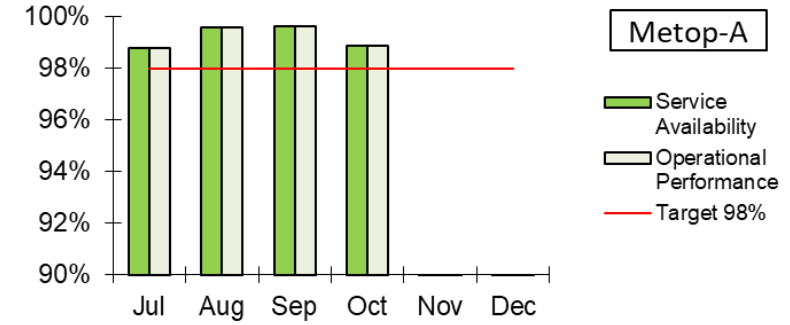


The Advanced Scatterometer (ASCAT) is a C-band radar on the Metop satellites which measures normalised backscatter from the Earth’s surface. The prime objective of ASCAT is to measure wind speed and direction over the oceans, as an input to NWP models. ASCAT data is also used to extract information on soil moisture, sea-ice extent and permafrost boundary. EUMETSAT disseminates sampled Level 1B data and derived Level 2 products over EUMETCast.

Performance of the Level 1B service is measured in terms of the timely availability of the ‘SZF’ products (full resolution - original instrument sampling) on the EUMETCast reference user station.

Events which impacted availability:

Nov: Metop A EoL





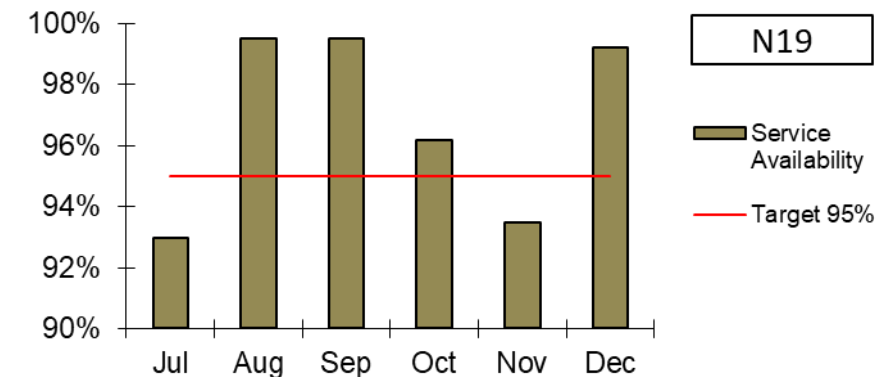
**ATOVS Level 2 product processing transforms the calibrated radiance measurements from the AMSU-A, MHS and HIRS instruments (onboard Metop-B and NOAA-19 satellites) into information on the vertical distribution of atmosphere state parameters, on cloud and surface parameters and total atmosphere contents. All the parameters derived are assembled into one ATOVS L2 sounding product for each satellite.**

**Performance of the Level 2 service is measured in terms of the timely availability of the BUFR-encoded products received on the EUMETCast reference user station (US).**

### Events which impacted availability:

- 1 Jul: N19 Missing data in GAC dump**
- 2 Jul: N19 JEUNO dump not received; N19 PDUs missing**
- 6 Jul: N19 GAC outage from blind orbit support**
- 20 Jul: N19 GAC dump not received**
- 16 Nov – 3 Dec: N19 No BOS taken due to Metop A EOL operations**

**Note: Metop-A ATOVS L2 products were discontinued as of 7 December 2015, due to the failure of channels 7 and 8 of the AMSU instrument on that satellite. Metop-B: No useable data since 27 May 2020 due to an instrument anomaly. Metop-C does not host a HIRS instrument.**



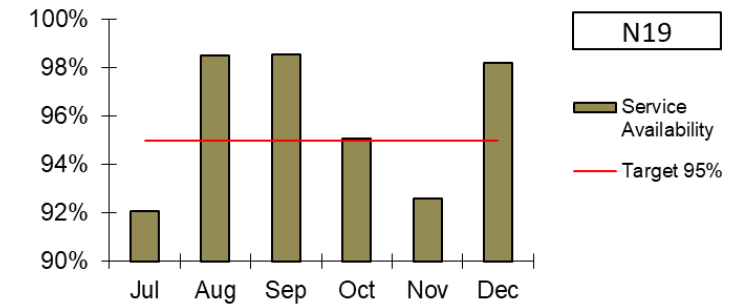
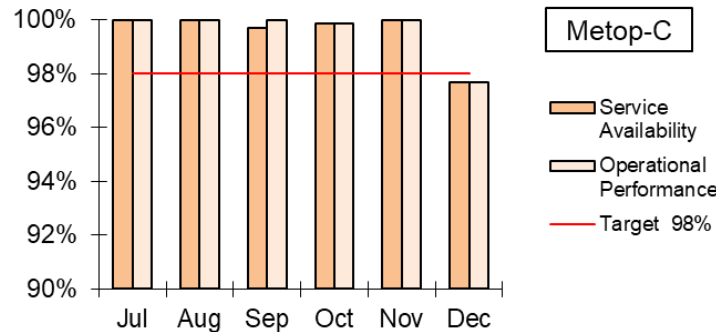
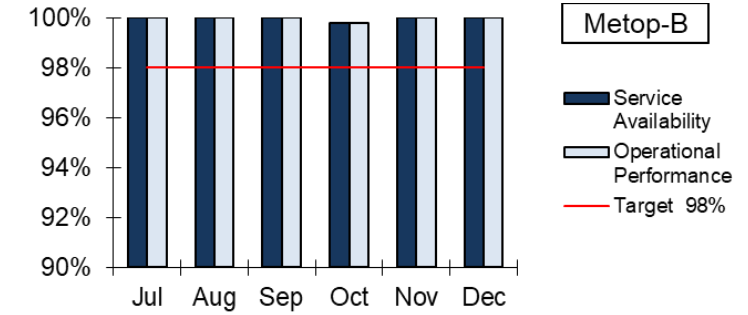
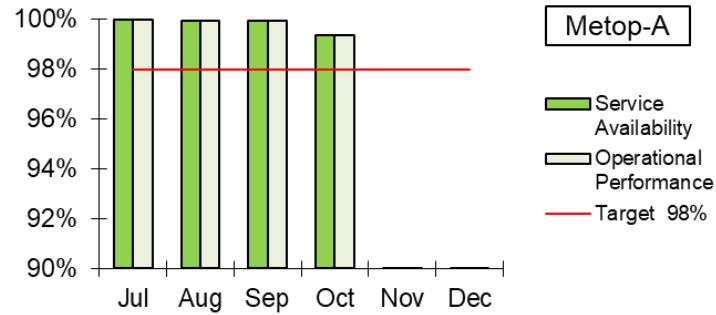


## Metop, Suomi-NPP & NOAA GDS x AVHRR Level 1B Products

The Advanced Very High Resolution Radiometer (AVHRR) is a multi-spectral imaging instrument provided by NOAA which produces global cloud imagery and information on land and sea surfaces. Level 1B products are derived from the data generated by the instruments onboard the Metop and NOAA-19 satellites.

### Events which impacted availability:

- 1 Jul:** N19 Missing data in GAC dump
- 2 Jul:** N19 JEUNO dump not received; N19 PDUs missing
- 6 Jul:** N19 GAC outage from blind orbit support
- 20 Jul:** N19 GAC dump not received
- Nov:** Metop A EoL
- 16 Nov – 3 Dec:** N19 No BOS taken due to Metop A EOL operations
- 9-10 Dec:** Metop C NIU to REFUSE
- 20 Dec:** Metop C SSR WAIT STATE Anomaly







The Global Ozone Monitoring Experiment-2 (GOME-2) is a scanning spectrometer used to measure profiles and total columns of atmospheric ozone and other trace gases. There is an instrument onboard each of the Metop satellites.

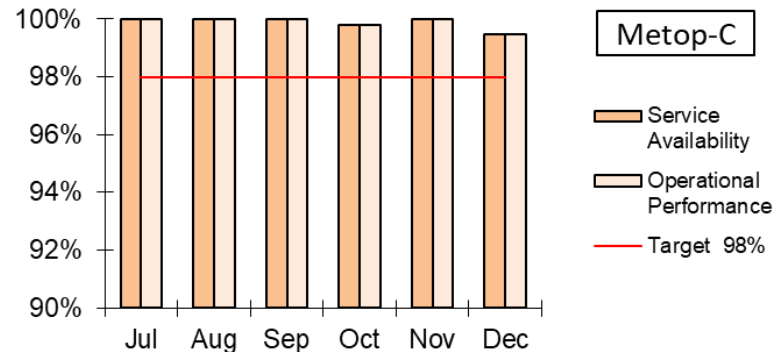
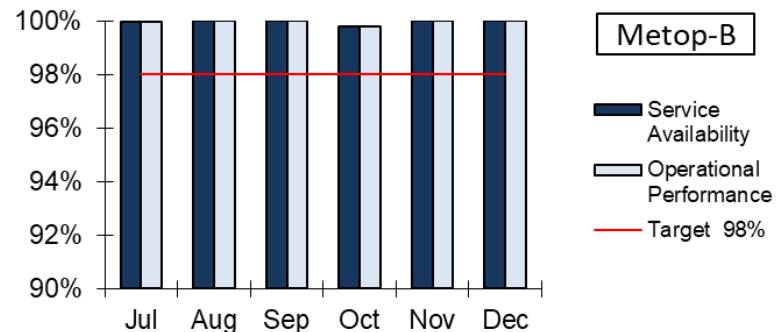
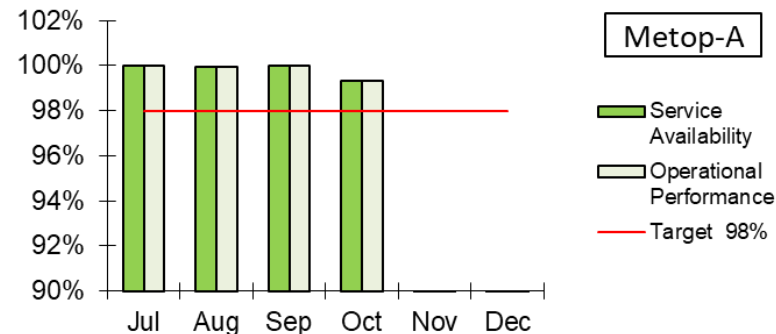
**Events which impacted availability:**

**Nov: Metop A EoL**

The performance of the GOME-2 instruments on all three satellites and the evolution of any degradation are continually monitored.

GOME-2 on Metop-B suffers degradation of throughput which is similar, but not identical, to that seen on Metop-A. GOME-2 on Metop-C has been performing well since the beginning of the mission in November 2018.

See the 'Product Quality Monitoring Reports' via dedicated links in the Metop section on the '[Service Status](#)' page of [www.eumetsat.int](http://www.eumetsat.int) for further performance information. Links to the GOME-2 Newsletter can be found in the reports.





Metop, Suomi-NPP & NOAA GDS x GRAS Level 1B Products

The GNSS Receiver for Atmospheric Sounding (GRAS) instruments provide information on atmospheric profiles using radio occultation of GPS signals from typically between 28 and 31 GPS navigation satellites in operational use.

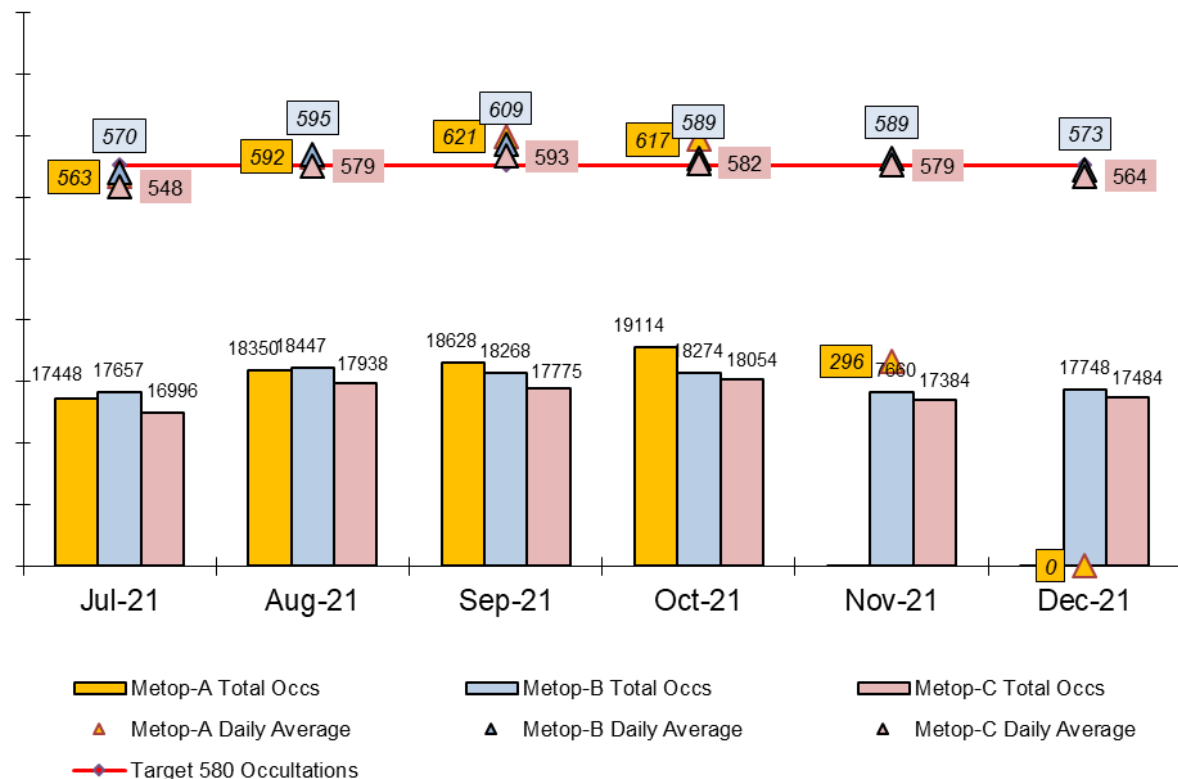
The chart shows for each month:

- (1) the total numbers of GRAS Level 1B occultations (plus geolocation and quality flags) from the 3 Metop satellites disseminated via EUMETCast
- (2) the daily average number of occultations from each Metop provided to users (numbers in italics)

Note that all occultations produced are disseminated, along with appropriate quality flags (including those produced during manoeuvres and recovery from anomalies).

### Events which impacted availability:

Nov: Metop A EoL



Note: The number of occultations is dependent on the number of GPS navigation satellites in view and also various orbital factors.



Metop, Suomi-NPP & NOAA GDS x HIRS Level 1B BUFR Products

The High Resolution Infrared Radiation Sounder (HIRS) measures incident radiation using 19 infrared channels and 1 visible channel, providing information on the atmosphere's vertical temperature profile and water vapour from the Earth's surface to an altitude of about 40 km. Level 1B products are derived from the data generated by the instruments onboard the Metop-A, Metop-B and NOAA-19 satellites (no HIRS on Metop-C).

As can be seen from the note below, the instrument onboard Metop-A was suffering from 'old age', with data quite degraded.

### Events which impacted availability:

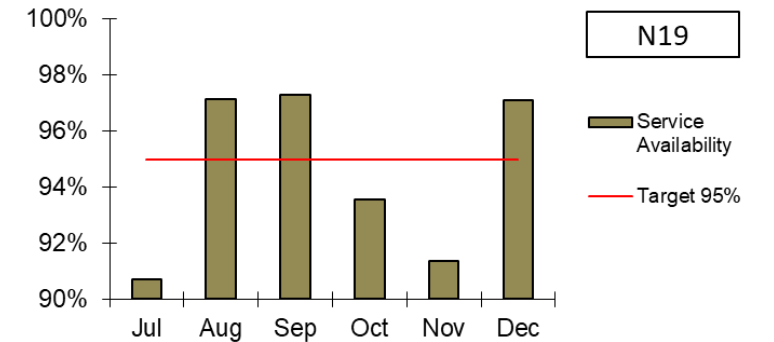
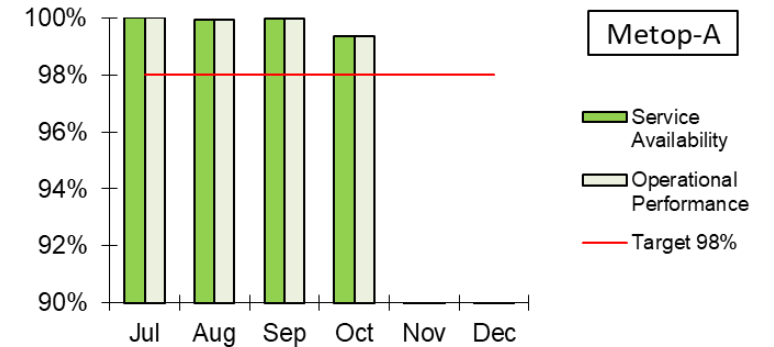
- 1 Jul: N19 Missing data in GAC dump**
- 2 Jul: N19 JEUNO dump not received; N19 PDUs missing**
- 6 Jul: N19 GAC outage from blind orbit support**
- 20 Jul: N19 GAC dump not received**
- 5-15 Oct: N19 CDA ground station maintenance, no BOS available**
- Nov: Metop A EoL**
- 16 Nov – 3 Dec: N19 No BOS taken due to Metop A EOL operations**

### Notes on latest instrument status:

Metop-A: Channels 1-19 out of spec, with large, short-term fluctuations and further degradation likely.

Metop-B: No useable data since 27 May 2020 due to an instrument anomaly

NOAA-19: Channels 1-12: close to, or out of specification, but the data is still considered usable for the time-being.





## Metop, Suomi-NPP & NOAA GDS x IASI Level 1C & Level 2 BUFR Products

The Infrared Atmospheric Sounding Interferometer (IASI) measures the spectrum of infrared radiation in 6000 channels, providing information on atmospheric profiles of temperature, water vapour and trace gases, as well as surface temperature, surface emissivity and cloud characteristics.

### Events which impacted availability:

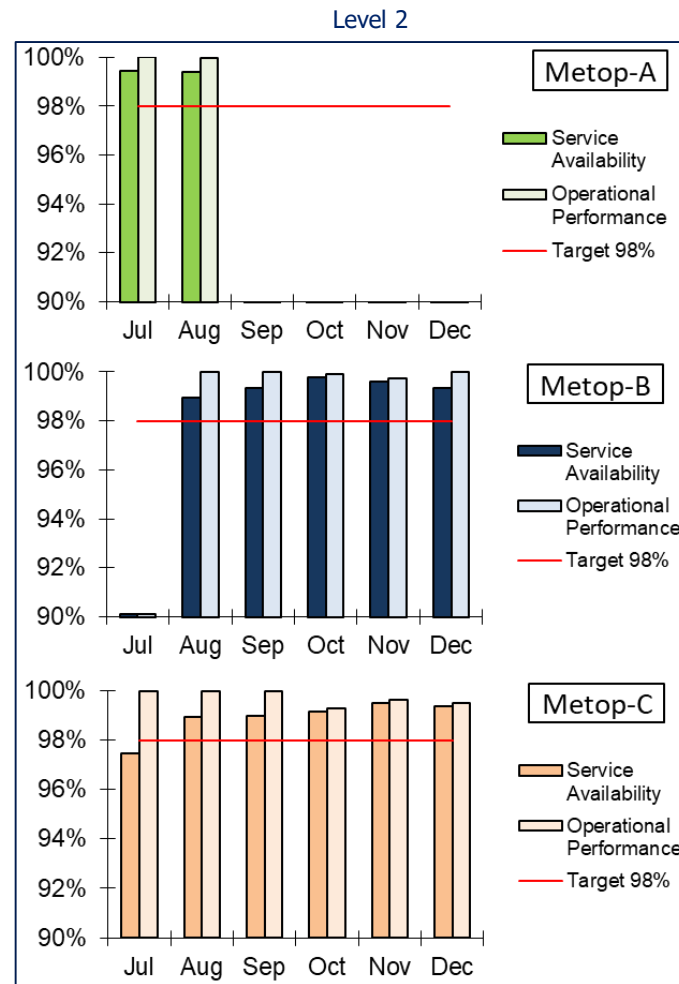
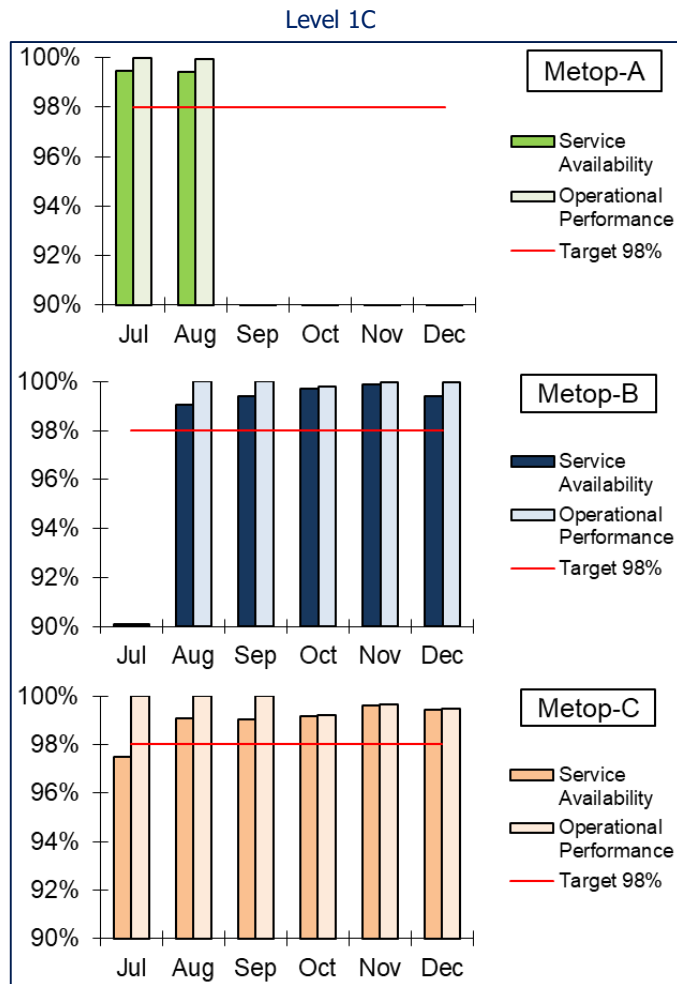
20-23 Jul: M01 IASI LNI1000\_E1 error after Reboot

19; 21 Jul: IASI external calibration

23 Jul: IASI instrument maintenance

Nov: Metop A EoL

Note that external calibrations are performed typically on a monthly basis and these reduce the availability of Level 1 / Level 2 data (relative to that of Level 0) by approximately 0.5 to 0.6% of the scheduled availability.



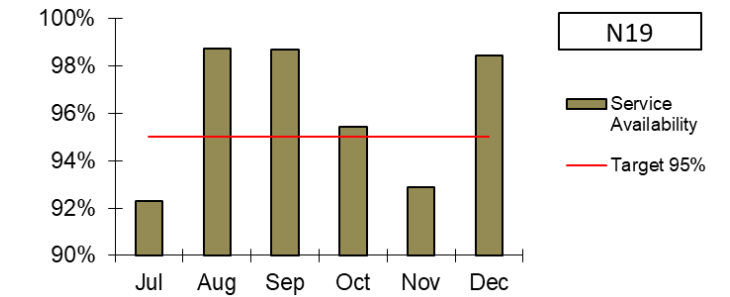
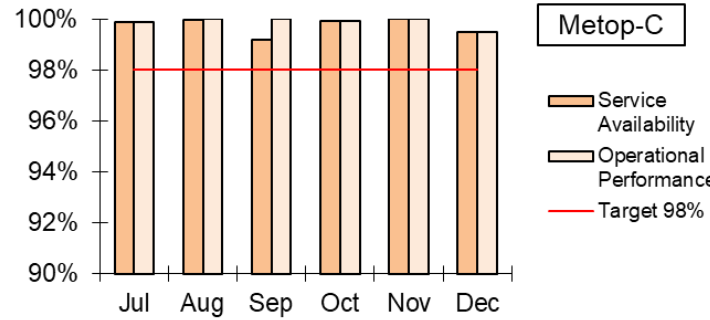
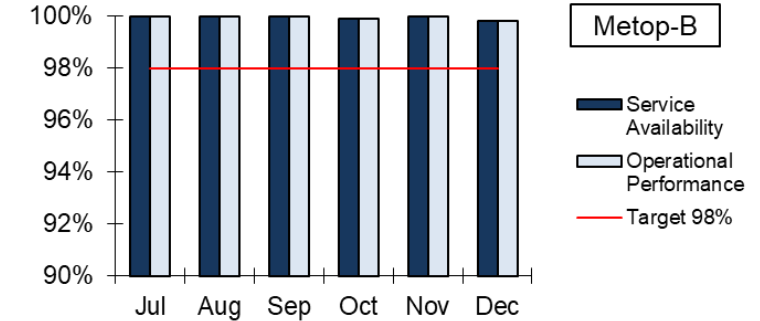
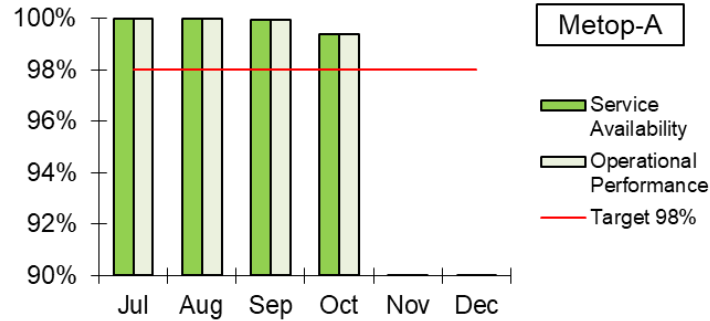


The Microwave Humidity Sounder (MHS) is a 5-channel microwave radiometer providing information on atmospheric humidity profiles primarily, but also cloud liquid water content and precipitation.

Level 1B products are derived from the data generated by the instruments onboard the 3 Metop satellites and NOAA-19.

### Events which impacted availability:

- 1 Jul:** N19 Missing data in GAC dump
- 2 Jul:** N19 JEUNO dump not received; N19 PDUs missing
- 6 Jul:** N19 GAC outage from blind orbit support
- 20 Jul:** N19 GAC dump not received
- 5-15 Oct:** N19 CDA ground station maintenance, no BOS available
- Nov:** Metop A EoL
- 16 Nov – 3 Dec:** N19 No BOS taken due to Metop A EOL operations



### Notes on latest instrument status:

- Metop-A: All Channels within spec.
- Metop-B: All channels within spec.
- Metop-C: All channels within spec.
- NOAA-19: Channel 3 remains out of spec.



Metop, Suomi-NPP & NOAA GDS x SEM Level 0 Data

The Space Environment Monitor (SEM) consists of a pair of instruments on each Metop satellite which provide data to determine the intensity of the Earth’s radiation belts and the flux of charged particles at the satellite’s orbiting altitude.

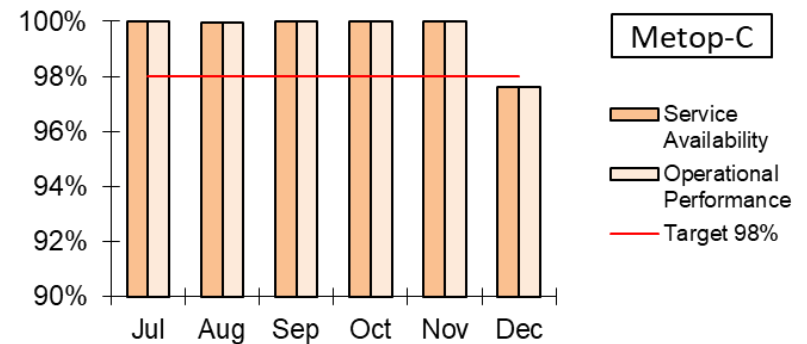
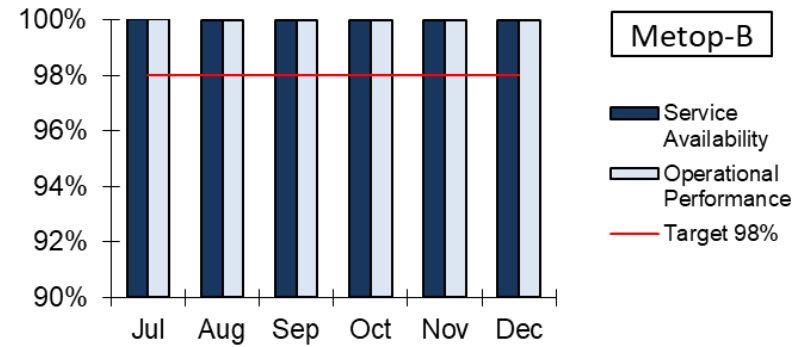
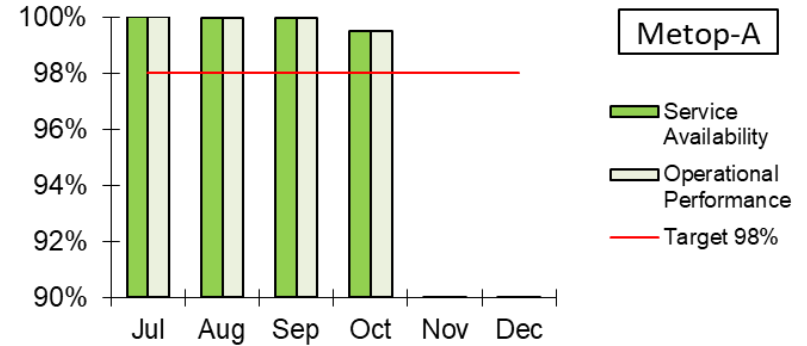
Level 0 data (consisting of the SEM instrument source packets in EPS native format) is provided to NOAA via a dedicated terrestrial line.

Events which impacted availability:

Nov: Metop A EoL

9-10 Dec: Metop C NIU to REFUSE

20 Dec: Metop C SSR WAIT STATE Anomaly



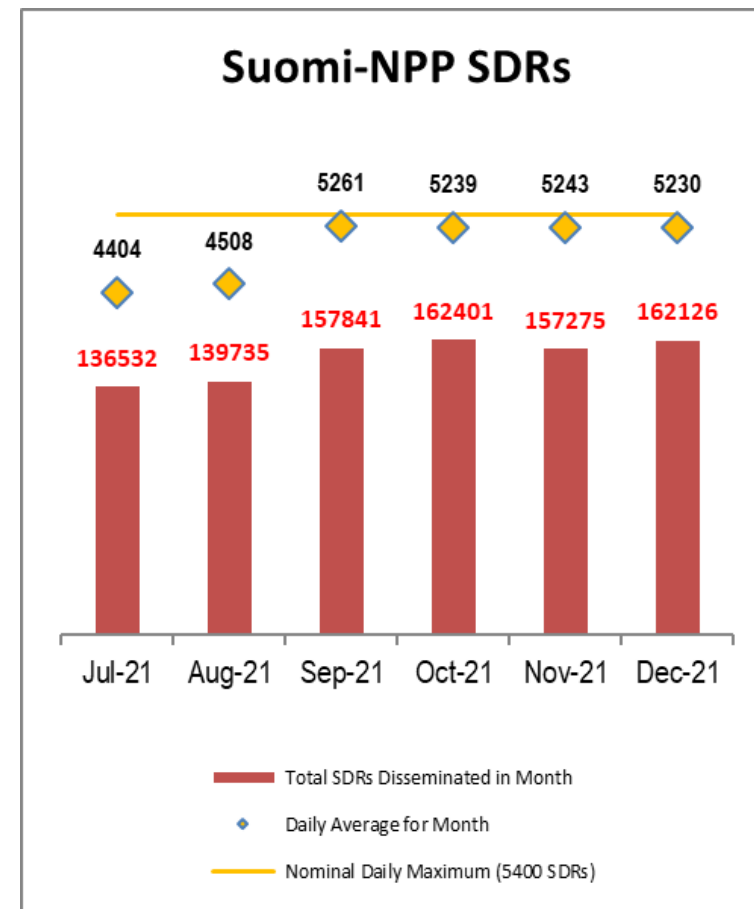


The Global Data Service delivers Sensor Data Records from the ATMS and CrIS instruments (Advanced Technology Microwave Sounder and Cross-track Infrared Sounder respectively) onboard NASA-NOAA's Suomi-NPP (National Polar-orbiting Partnership) satellite.

### Events which impacted availability:

**Jul:** Loss of longwave (LW) infrared IR channels due to SNPP CrIS anomaly

**Aug:** SNPP spacecraft anomaly - all instruments affected





**The Regional Data Services (RDS) are based on direct acquisition of data from Metop and NOAA satellites by a network of HRPT stations, known as EARS (EUMETSAT Advanced Retransmission System). At each station, an EARS node processes the data locally and then relays it on to EUMETSAT for very timely distribution to the user community via EUMETCast and the GTS.**

**The RDS comprises the following services :**

**EARS-ASCAT, EARS-ATMS, EARS-ATOVS, EARS-AVHRR, EARS-CrIS,  
EARS-IASI, EARS-NWC, EARS-VASS, EARS-VIIRS, EARS-MERSI and EARS-MWRI**

**Service performance is measured in terms of the availability of the data on the EUMETCast user reception stations being within 30 minutes of the instrument's observations, unless specified otherwise in the following slides.**

**See EUMETSAT's document TD14, available from the ['Regional Data Services'](#) page of EUMETSAT's website (see 'Related Links') for more general information on the various EARS services, including which HRPT stations contribute to each of the services.**



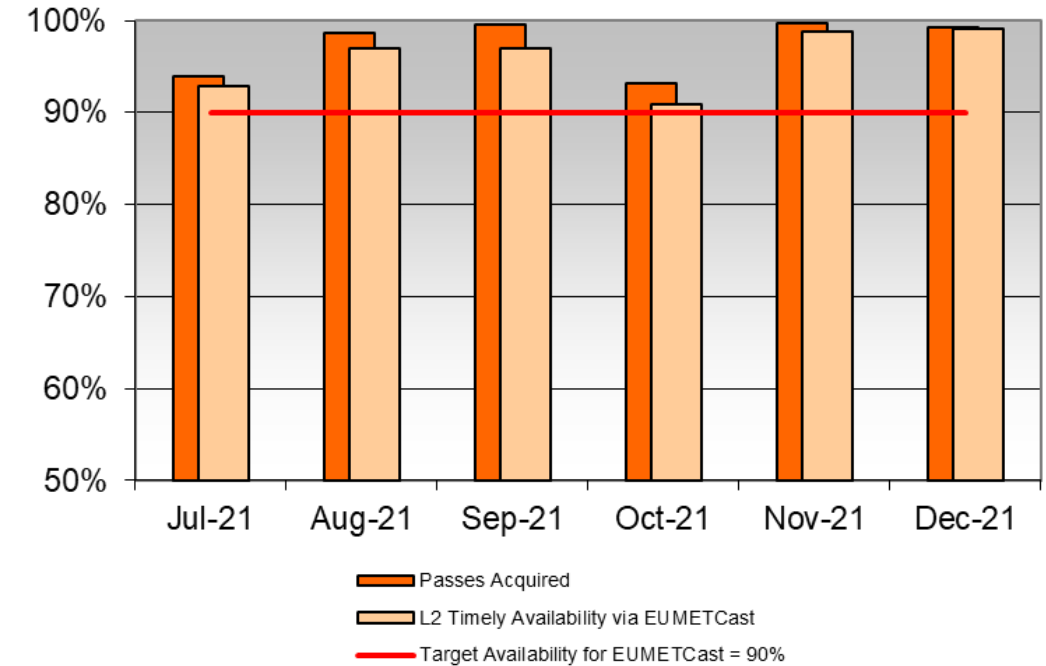


This service provides products derived from the data produced by the ASCAT instruments onboard the Metop satellites.

Level 1 data is produced by the EARS system, and then forwarded to KNMI (Netherlands) for the generation of Level 2 data. Availability shown on the chart is that of the Level 2 data received by users (relative to scheduled passes).

**Events which impacted availability:**

**None significant**



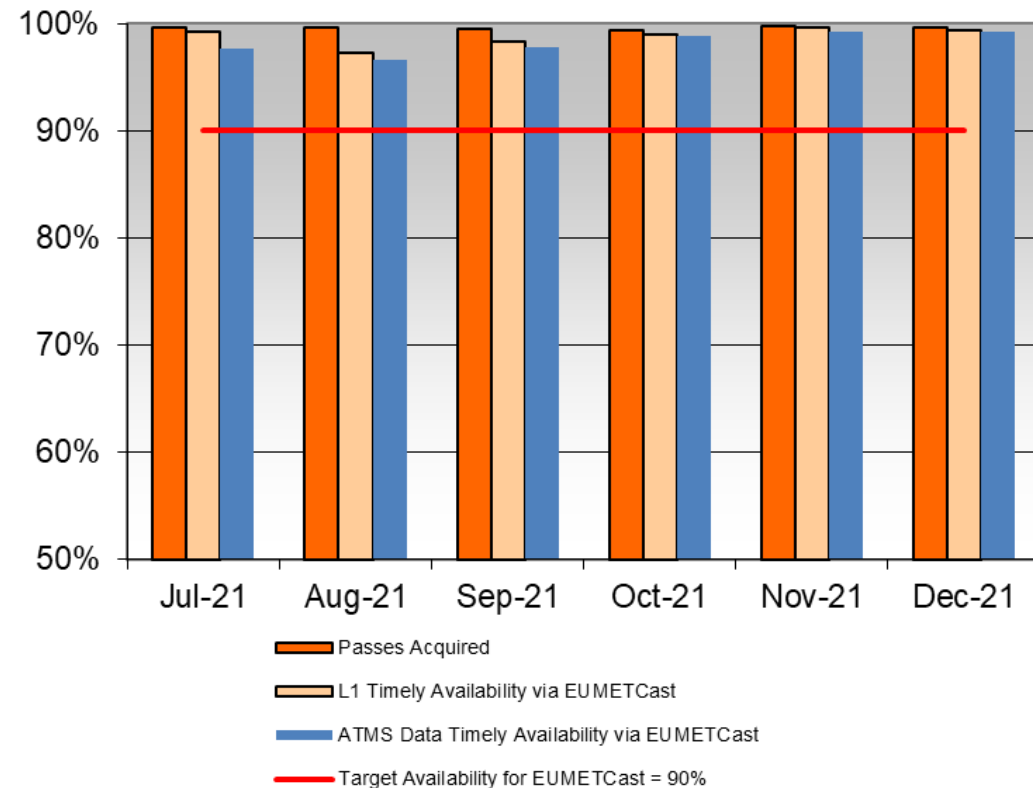


This service provides SDRs derived from the data produced by the ATMS (Advanced Technology Microwave Sounder) instrument onboard NASA-NOAA's Suomi-NPP satellite.

Availability shown on the chart is that of the BUFR-formatted SDRs received by users (relative to scheduled passes).

Events which impacted availability:

None significant





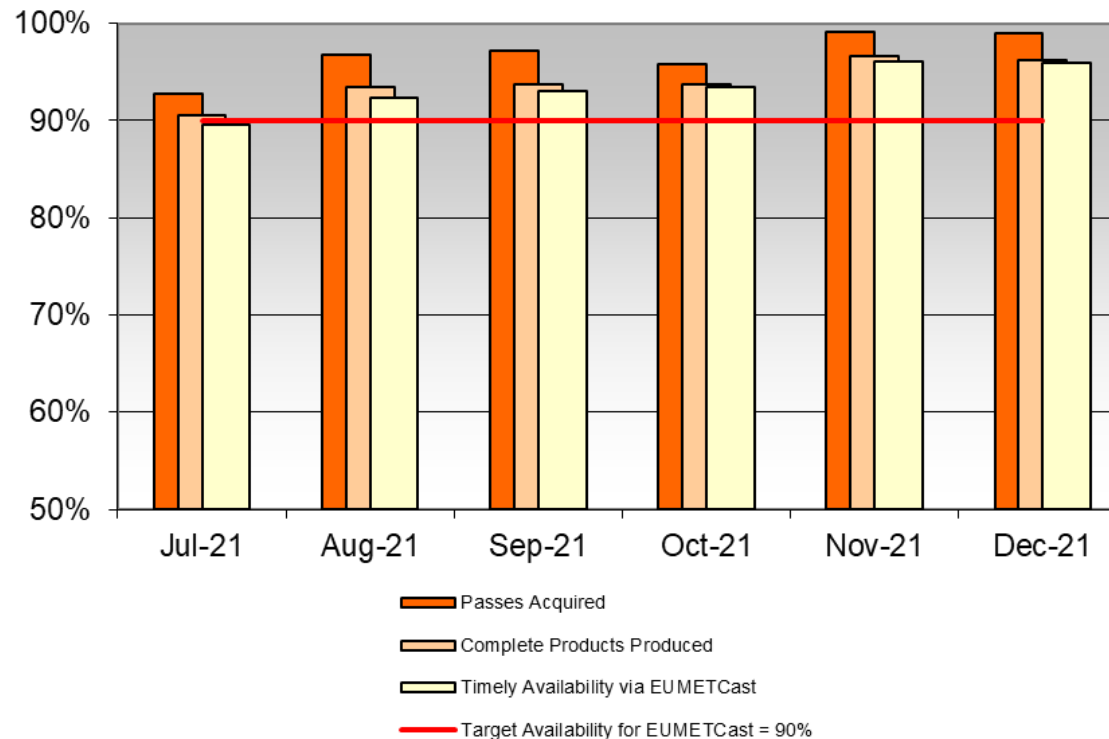
This service provides ATOVS products covering data-sparse areas, derived from AMSU, HIRS and MHS data received by all HRPT stations from the following satellites (listed in order of priority): Metop-B, NOAA-19, Metop-C, NOAA-18, Metop-A. Note that Metop's AHRPT partial coverage data is used.

The availability target shown in red on the chart is that for the products received by users (relative to scheduled ground station passes) and covers Level 1C and 1D products.

Note the less-stringent timeliness target of 45 minutes for data from the Edmonton and Gander stations.

### Events which impacted availability:

July - Muscat Station is Down since 30.05.2021.



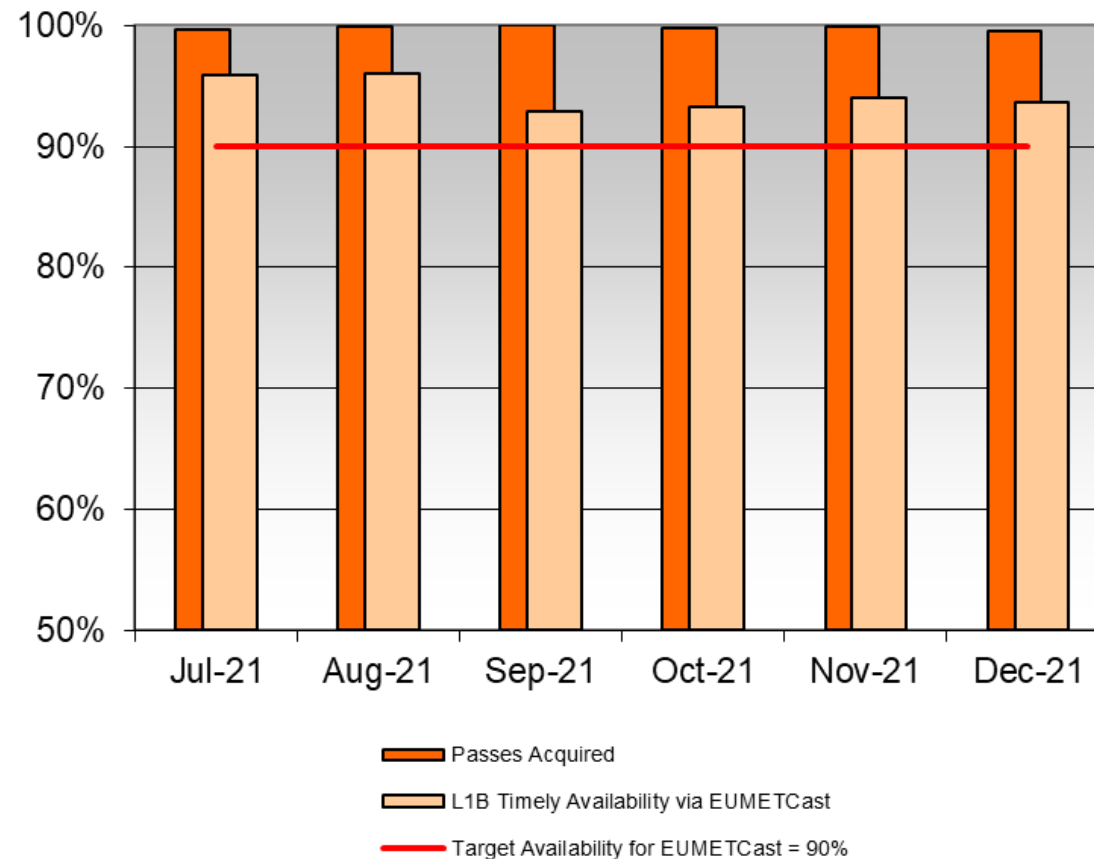


This service provides data from the AVHRR instruments onboard NOAA-19 and the Metop satellites. AHRPT partial coverage data and data from the Fast Dump Extract System (FDES) are used from the Metops.

Availability shown on the chart is for Level 0 data received by users (relative to scheduled regional passes). Note that no higher-level products are generated.

Events which impacted availability:

None significant.



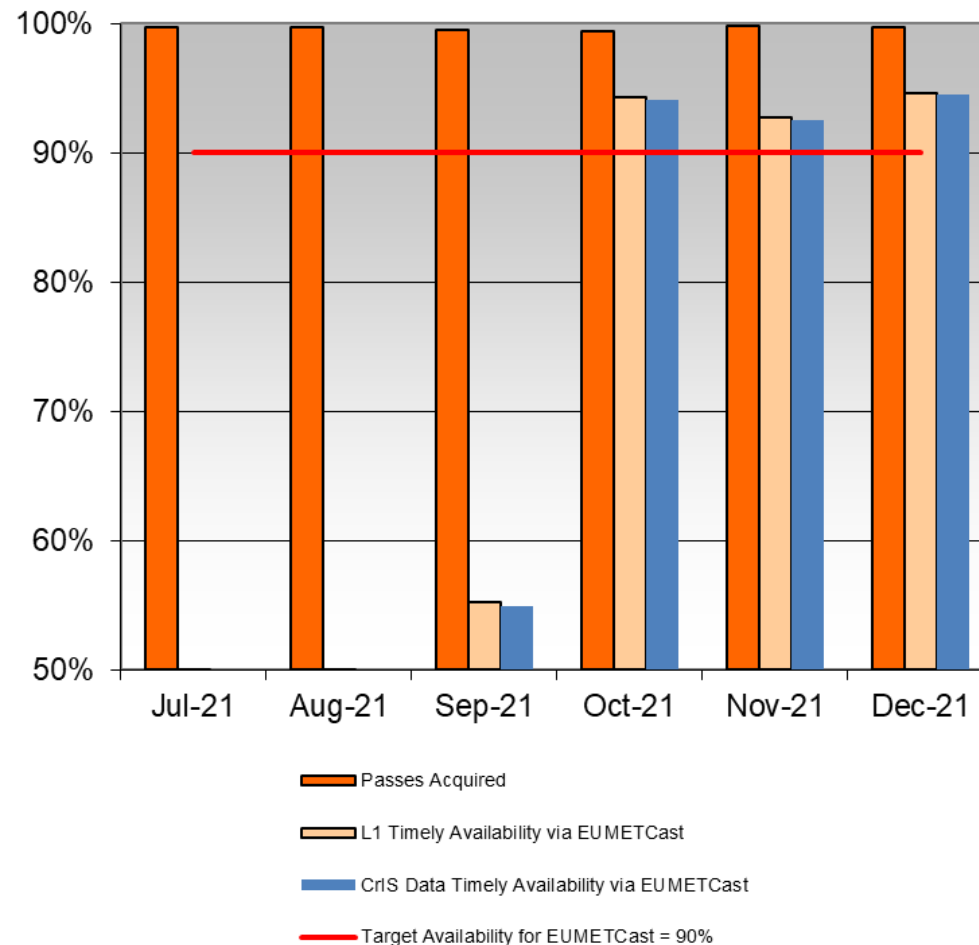


This service provides SDRs derived from the data produced by the CrIS (Cross-track Infrared Sounder) instrument onboard NASA-NOAA's Suomi-NPP satellite.

Availability shown on the chart is that of the BUFR-formatted SDRs received by users (relative to scheduled passes).

### Events which impacted availability:

Jul to Sep - NPP CrIS instrument anomaly





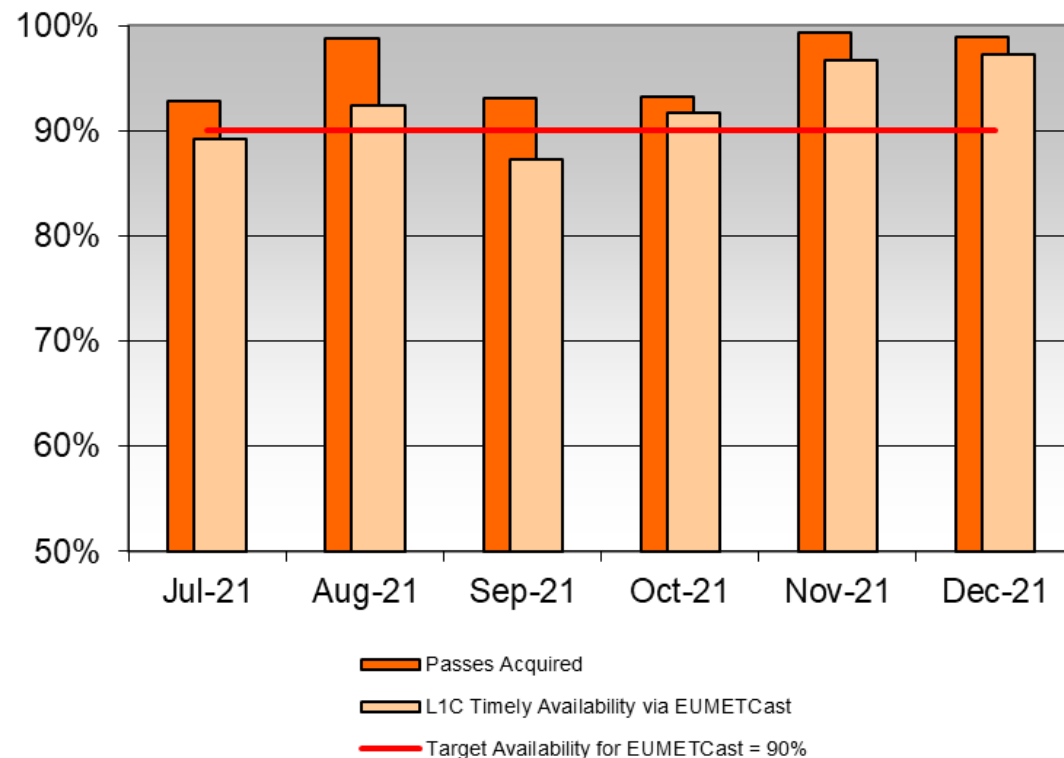
This service provides products derived from the data produced by the IASI instruments onboard the Metop satellites.

Availability shown on the chart is that of the L1C and L2 data received by users (relative to scheduled passes). The products comprise calibrated and geolocated IASI observations containing both 300 Principle Component Scores and 500 original IASI channels, cloud/scene analysis information, BUFR formatted, suitable for nowcasting applications.

### Events which impacted availability:

Jul METOP-B IASI instrument Anomaly

Sep Gander Station - No Metop B Data received





This service delivers Level 2 cloud products derived from data produced by the AVHRR instruments onboard Metop-B and NOAA-19.

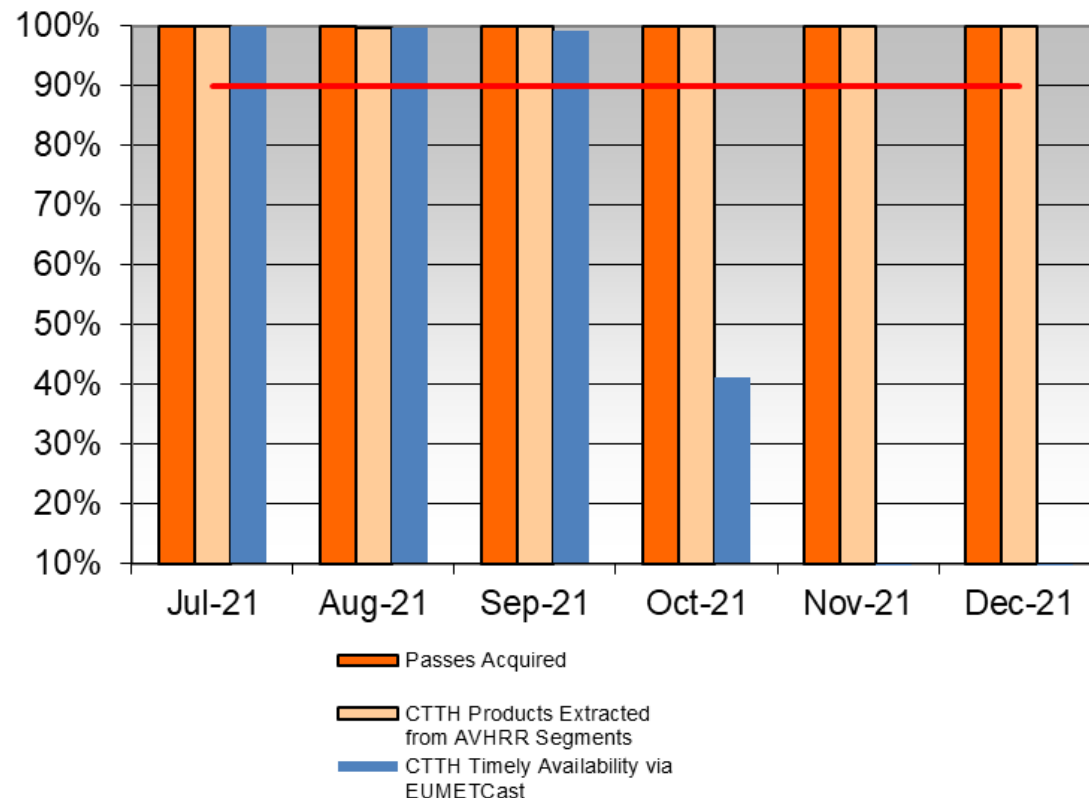
Three types of product are delivered:

- Cloud-Top Temperature and Height (CTTH)
- Cloud Mask (CM)
- Cloud Type (CT)

Availability shown on the chart is currently only that of the CTTH products received by users (relative to scheduled passes).

### Events which impacted availability:

**Oct – Dec Timeliness issues with AVHRR NWC products**





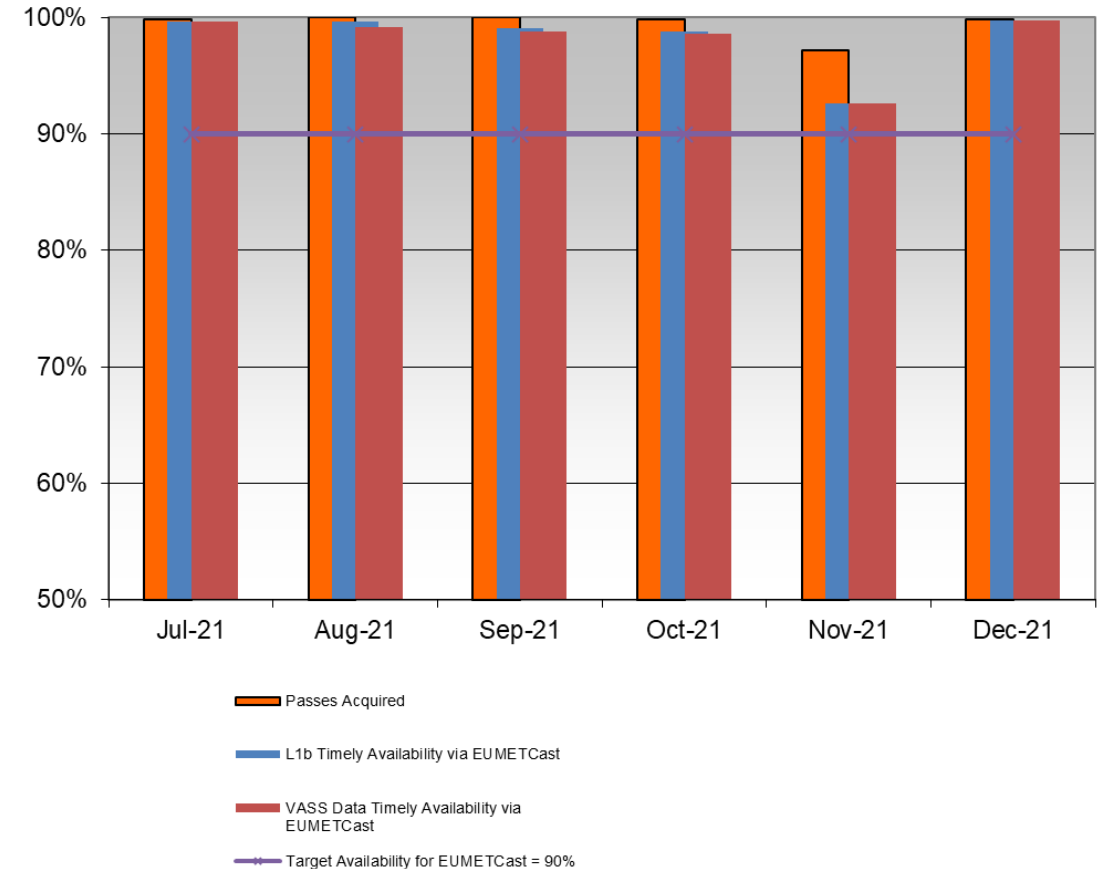
The EARS Vertical Atmospheric Sounding Service (VASS) delivers data processed to L1B from the MWS (Microwave Humidity Sounder) and MHTS (Microwave Temperature Sounder) instruments onboard the FY-3D satellite of the China Meteorological Administration (CMA).

Availability shown on the chart is that of the BUFR-formatted L1B data relayed via EUMETCast.

The HRPT stations contributing to the VASS service are Athens, Kangerlussuaq, Lannion, Maspalomas, and Svalbard.

### Events which impacted availability:

None significant.







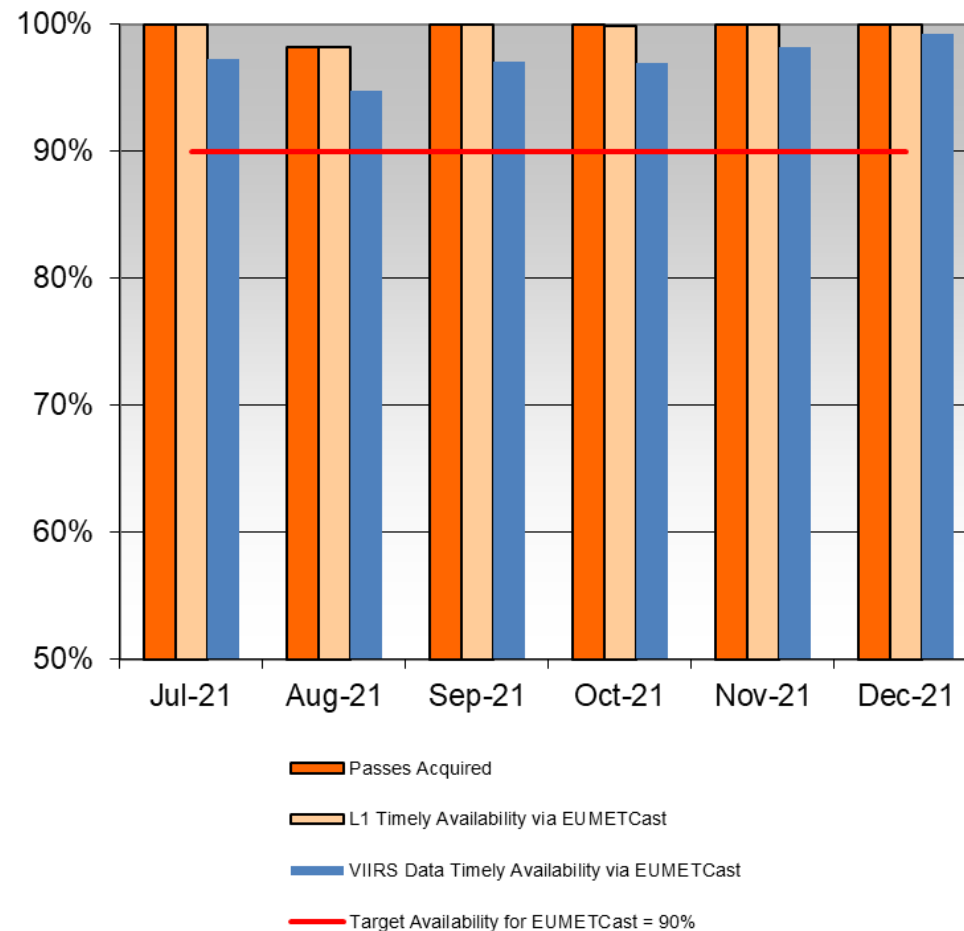
This service delivers products based on M-Band data from the Visible Infrared Imaging Radiometer Suite (VIIRS) instrument onboard NASA-NOAA's Suomi-NPP satellite.

Availability shown on the chart is that of the L1 SDR products received by users (relative to scheduled passes).

The HRPT stations contributing to the VIIRS service are Athens, Kangerlussuaq, Lannion, Maspalomas, and Svalbard.

### Events which impacted availability:

None significant.



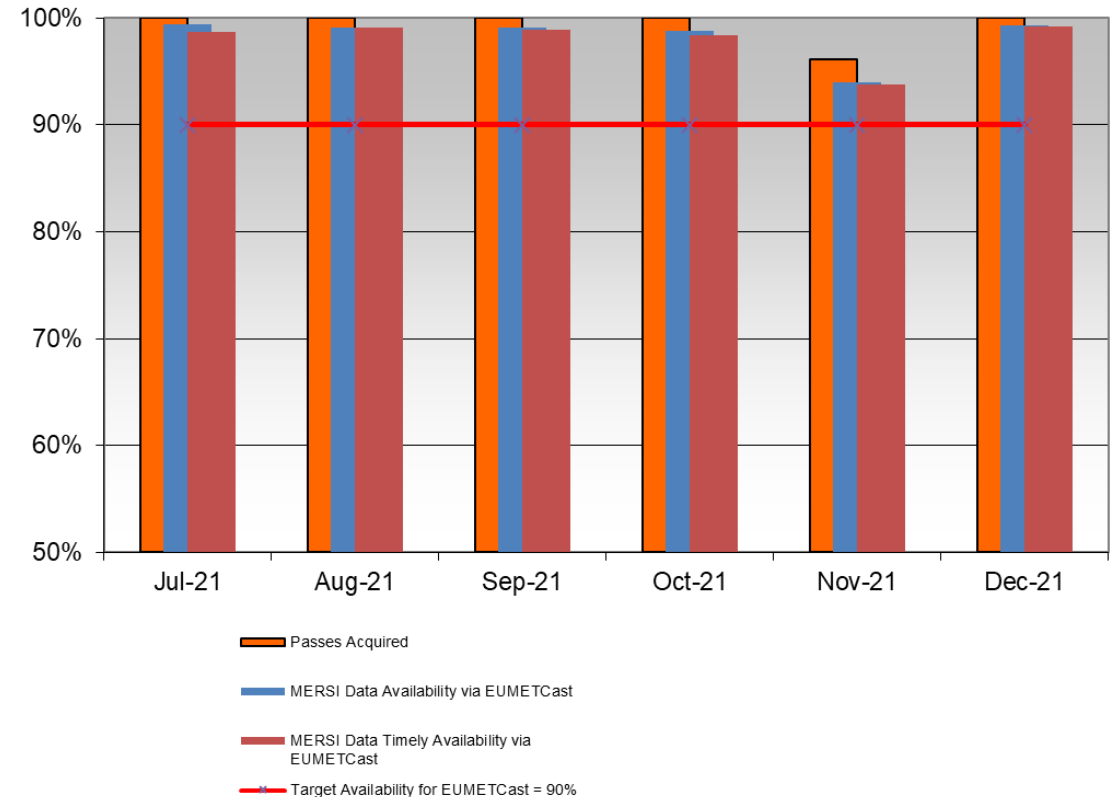


The new EARS-MERSI service provides the 1 km resolution product of the MERSI-2 (Medium Resolution Spectral Imager – 2) instruments onboard the CMA’s FY-3 satellite series, starting with FY-3D which is the first satellite of the FY-3 series carrying the MERSI-2 instrument.

MERSI-2 is a combination of the MERSI-1 (20 channels) and the VIRR (Visible and Infra-Red Radiometer) (five channels) instruments onboard FY-3A, -3B and -3C, so has 25 channels in total. It has 2048 pixels across-track and ~400 lines in a 1-minute segment.

### Events which impacted availability:

None significant.





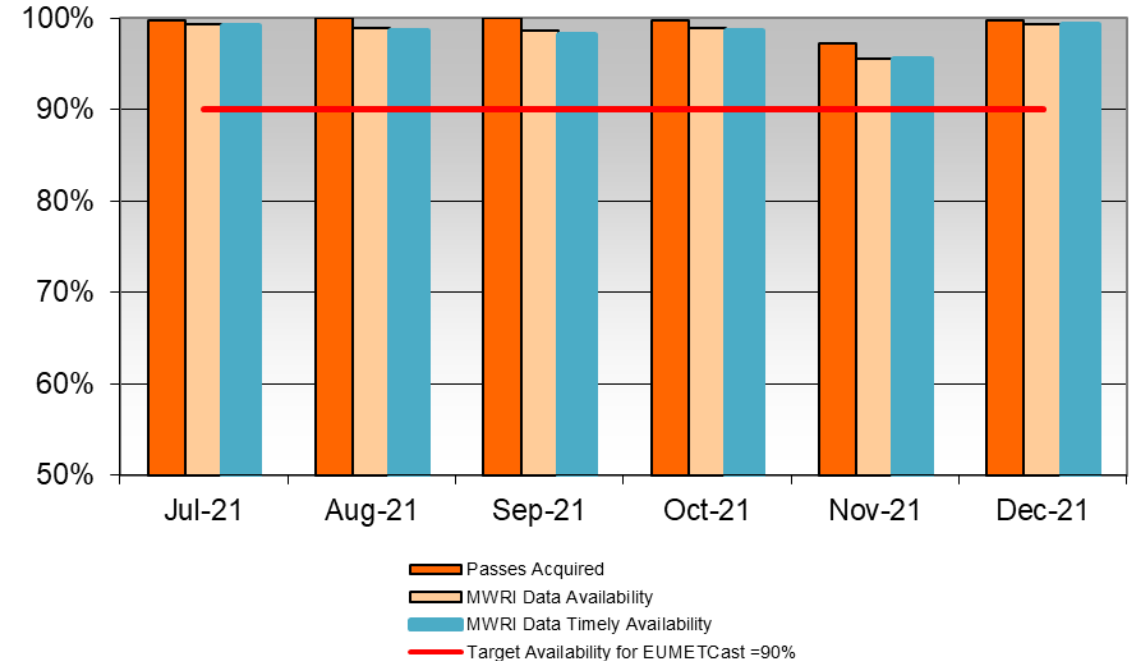
The EARS-MWRI service collects data from the Micro-Wave Radiation Imager (MWRI) instrument, on board the FY-3D spacecraft, operated by CMA.

MWRI is a conical scanning microwave imager at five frequency points with dual polarizations (10 channels); see instrument characteristics in the table below. The sensor measures thermal microwave emission of land and ocean surfaces, and measures various forms of water in the atmosphere, clouds, and surfaces.

The MWRI imager can penetrate clouds, providing an all-weather measurement capability. The spatial resolutions are from 12 to 80 km, depending on the wavelengths. At higher-frequency channels, such as 89 GHz, the scattering signature from the cloud and precipitation are also good indicators for detecting rainfall over land and ocean.

### Events which impacted availability:

**Nov:** The number of scheduled passes is smaller due the FY-3D Orbital Control





## Search & Rescue Support

**EUMETSAT supports the Cospas-Sarsat System for Search and Rescue (SAR) by flying transponders onboard its MSG and Metop satellites (with the exception of Metop-C).**

**The Cospas-Sarsat System is designed to provide distress alert and location data to assist SAR operations, using a constellation of geostationary and low-altitude Earth-orbiting satellites to relay signals from distress beacons to ground terminals. More information concerning the system can be found on [www.cospas-sarsat.org](http://www.cospas-sarsat.org).**

MSG: During the reporting period, SAR coverage was provided as follows:

- 0°: Meteosat-11 (continuous coverage)
- 3.5°E: Meteosat-9 (switched off – available as backup)
- 9.5°E: Meteosat-10 (continuous coverage)
- 41.5°E: Meteosat-8 (continuous coverage)

Metop-A and Metop-B have provided full-time SAR support during the reporting period, with no outages. Metop-C does not support SAR.



## Jason-3 OGDR Service

**This service delivers the ‘Operation Geophysical Data Record’ (OGDR) products, derived from the altimetry data acquired from the Jason-3 satellite.**

**The Jason-3 mission is a cooperative undertaking between EUMETSAT, NOAA, CNES and NASA, and also involves the European Union, as a Copernicus mission. The European role in Jason-3 operations is funded by Copernicus.**

**Jason-3 has been supporting the primary service since 1 July 2016. EUMETSAT and NOAA process the data from the satellite in near real-time, and disseminate and archive the products. The chart on the next slide shows the availability of the products over EUMETCast within the timeliness constraint of 3 hours from the time of sensing.**



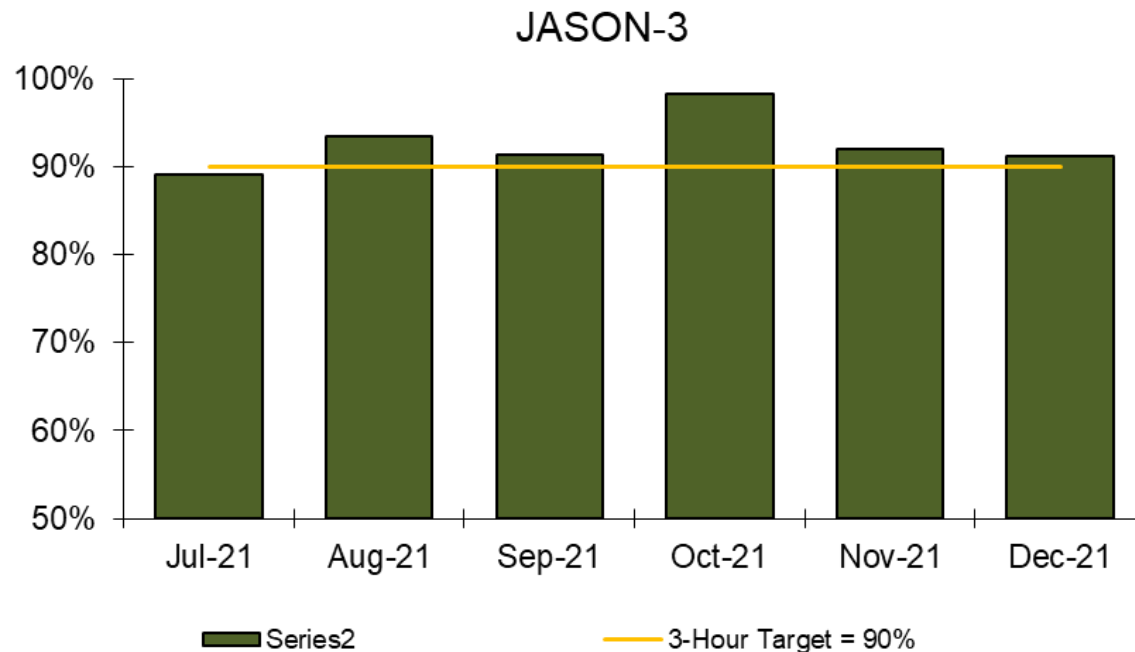
## Jason-3 OGDR Service

The chart shows the availability of the Jason-3 Operational Geophysical Data Record (OGDR) products disseminated via EUMETCast.

### Events which impacted availability:

The several connectivity issues at the Usingen Earth Terminals did slightly impact the end-to-end availability of the Jason-3 OGDR products delivered within 3h, especially in July, but the performance on average remains above target over the quarter.

**Note:** In general, redumps are taken at next visibility (or by other ground station) in cases of problematic passes and connection problems – this minimises data loss, although some impact on timeliness occurs





**In addition to its own satellite data and meteorological products, EUMETSAT also distributes data and products from partner organisations as part of an international cooperation agreement.**

**Image data from the following geostationary satellites is made available via EUMETCast, Direct Dissemination and the Internet:**

- NOAA's GOES-16 ('GOES-East') at 75.2°W, and GOES-17 ('GOES-West') at 137.2°W
- JMA's Himawari-8 at 140.7°E
- CMA's FY-2G at 99.5°E, and FY-2H at 79°E (also selected meteorological products).

**Meteorological products based on LEO satellite data are also disseminated:**

- Microwave Sounder products from CMA's FY-3C and FY-3D (only provided to National Met. Services)
- Level 1 products derived from data of the MODIS instrument on NASA's Terra & Aqua satellites
- EUMETSAT SSMIS products derived from sounder data of the DoD's DMSP satellites (F16)
- Operational Geophysical Data Records (OGDRs) from the AltiKa instrument of ISRO/CNES's SARAL mission.

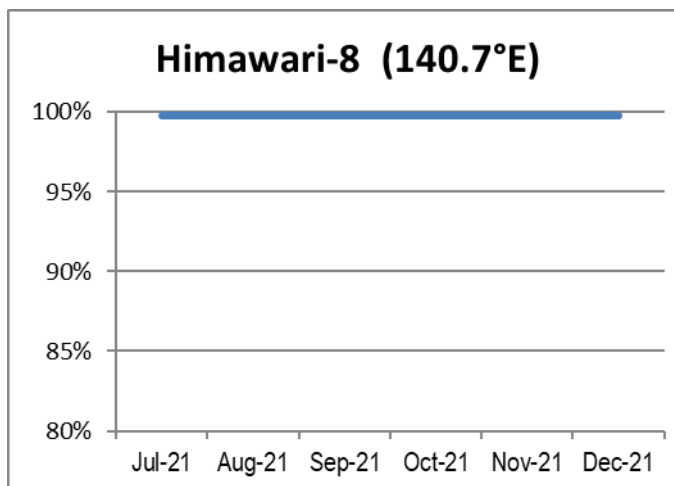
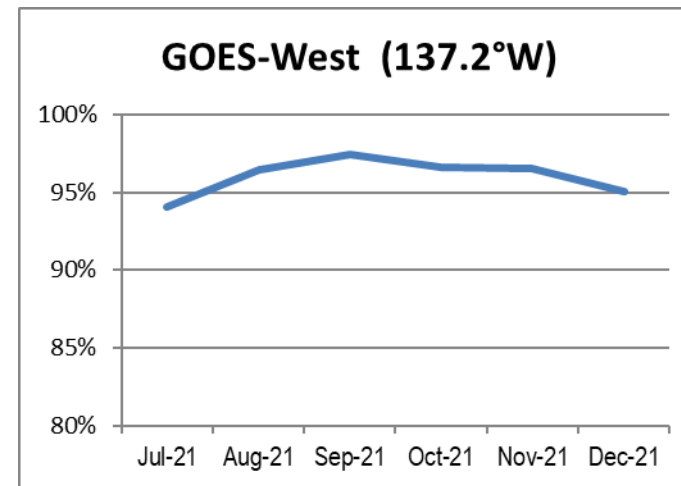
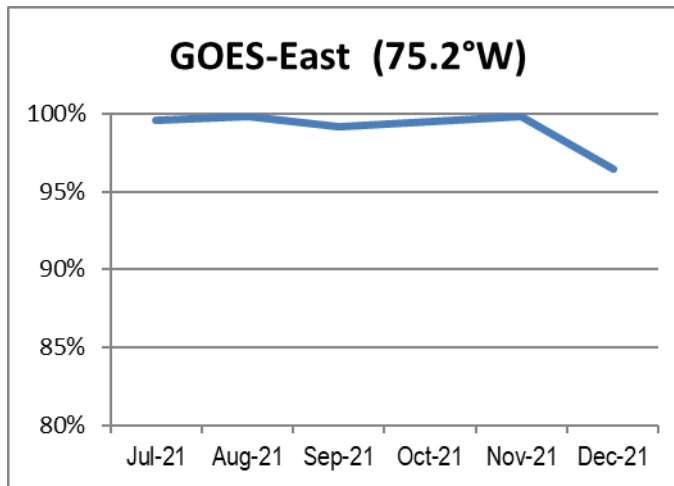
**The charts on the following slides show the availability of the data via EUMETCast.**



The charts on this slide show the timely availability (as a percentage of expected) of image data originating from the geostationary satellites operated by NOAA and JMA (Japan Meteorological Agency), as disseminated via EUMETCast.

Events which impacted availability:

None significant.



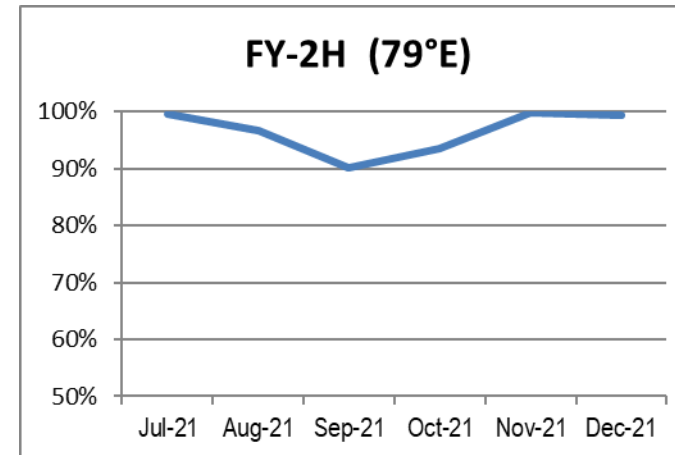
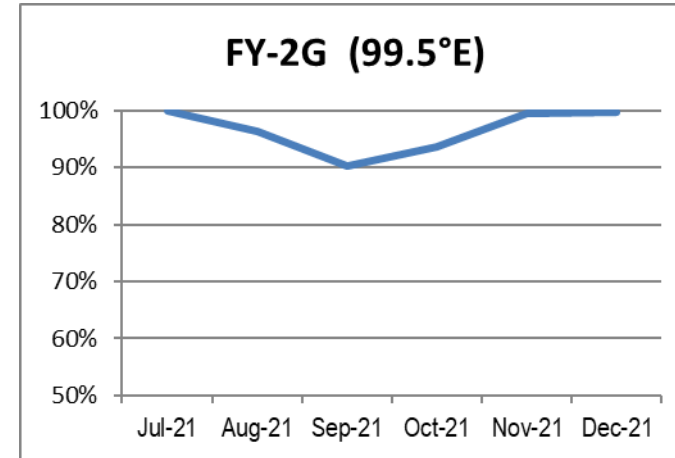




The charts here show the timely availability (as percentage of expected) of selected meteorological products generated from the data acquired by the Fengyun geostationary satellites operated by the China Meteorological Agency (CMA), as disseminated via EUMETCast.

Events which impacted availability:

None significant



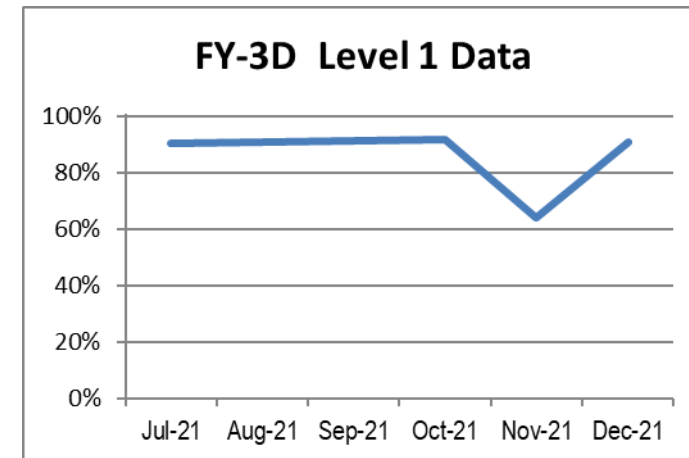
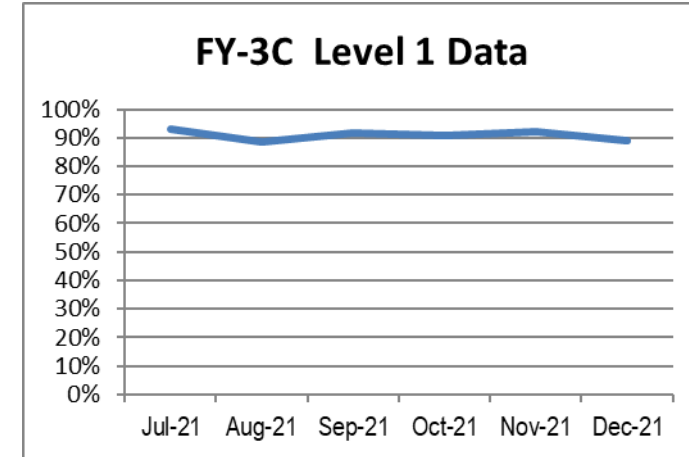


This section presents charts which show the availability of data and products for LEO satellites operated by partner organisations, as disseminated via EUMETCast.

On this slide: Level 1 data from microwave sounder instruments onboard China Meteorological Agency's (CMA's) Fengyun FY-3C and FY-3D satellites (made available only to National Met. Services and ECMWF). Availability shown as percentage of expected.

Events Which Impacted Availability:

None significant





## Third-Party Data Services → LEO Satellite Data & Products (2 of 3)

This slide presents further charts showing the availability of certain LEO satellite products from partner organisations, as disseminated via EUMETCast. Availability shown in terms of total products disseminated /month and equivalent daily average/month.

**MODIS Products:** Various regional products derived from the instruments hosted on NASA's Terra and Aqua LEO satellites.

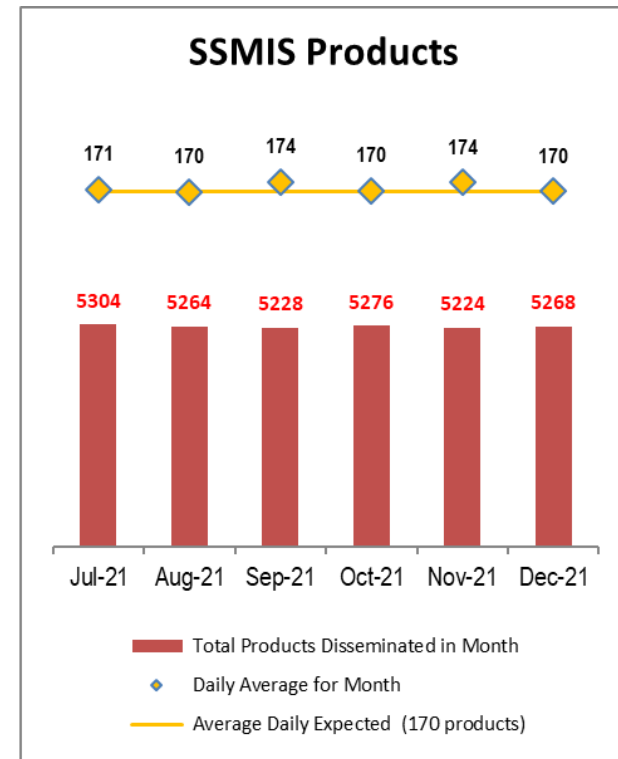
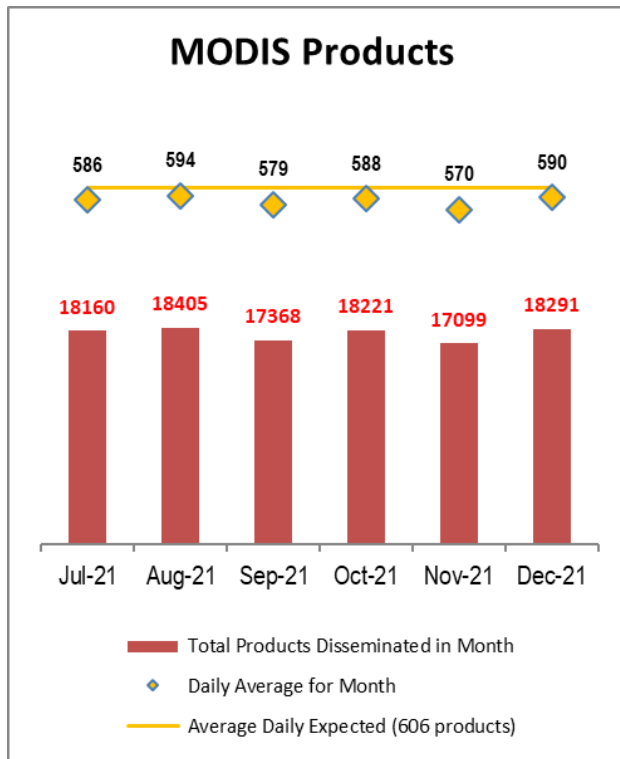
**SSMIS Products:** Extracted from SDR data from the 'Special Sensor Microwave Imager Sounder' radiometer onboard the near-polar-orbiting, sun-synchronised DMSP satellite (F16). Each product contains one orbit of data, comprising 4 BUFR component products: IMA, ENV, LAS and UAS.

### Events which impacted availability:

None significant

### Note:

The dissemination of MODIS L2 products was discontinued at the end of November 2020. The 'Average Daily Expected' products has been reduced accordingly.





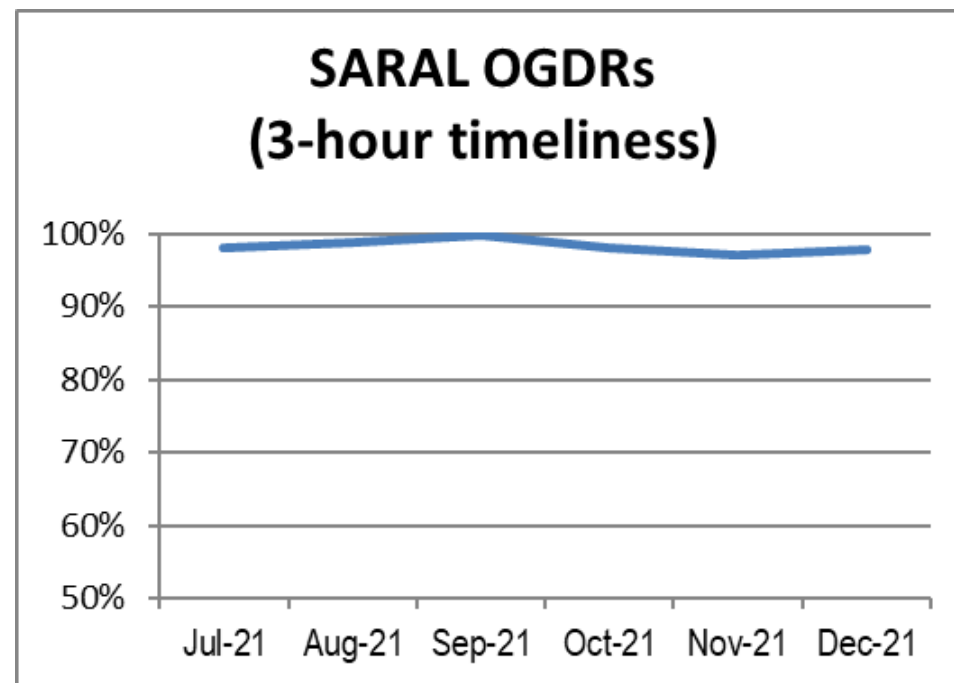
This slide presents a chart showing the availability via EUMETCast of near-real-time Operational Geophysical Data Records (OGDRs), which are produced at EUMETSAT from the data from the 'AltiKa' Ka-band altimeter instrument of ISRO/CNES's SARAL mission.

Each OGDR corresponds to one orbit of data, and their availability is shown as a percentage of the scheduled passes.

75% of the OGDR products shall be made available to the users within 3 hours from data onboard acquisition and 95% of the products within 5 hours.

**Events which impacted availability:**

**None significant.**





**EUMETCast is EUMETSAT's primary dissemination mechanism for the near real-time delivery of satellite data and products generated by the EUMETSAT Application Ground Segment. Third-party data and products from partner organisations are also delivered by the system, which is based on Digital Video Broadcast (DVB) technology.**

**Both EUMETCast Europe and EUMETCast Africa services utilize DVB-S2 technology, the former supported by a Ku-Band transponder on EUTELSAT-10A, and the latter by a C-Band transponder on EUTELSAT-8.**

**For more information about EUMETCast and the services which it supports, please visit the ['EUMETCast'](#) page on the EUMETSAT website (via 'Data' → 'Data Delivery').**

**The chart on the following slide shows the availability of the system for the last 12 months, which includes the half-year reporting period.**



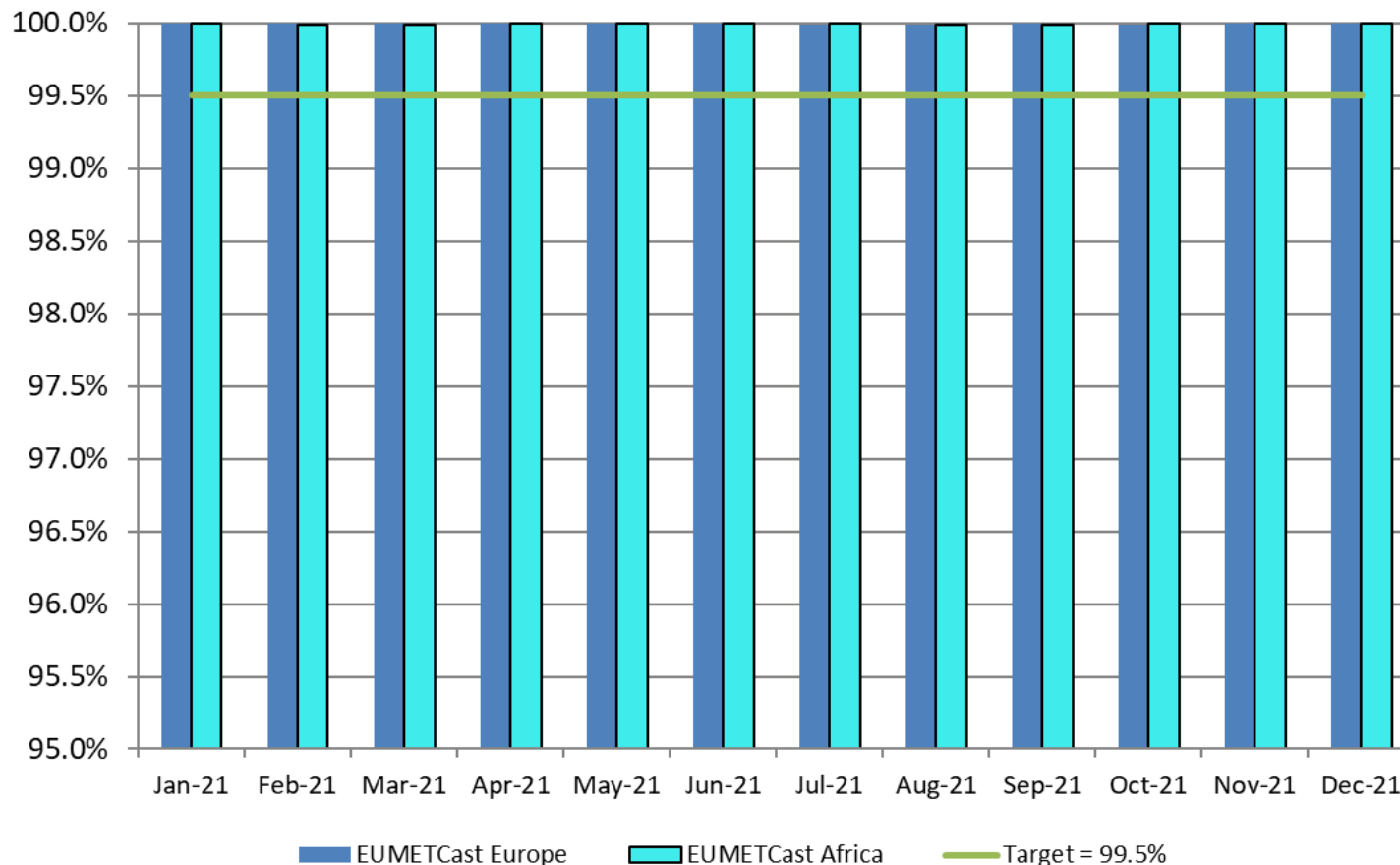
## EUMETCast x System Availability for the Year-To-Date

The chart here shows the monthly system availability for the 2 EUMETCast services covering Europe and Africa respectively.

Both services are based on DVB-S2 technology, with EUMETCast Europe being disseminated via Ku-band and EUMETCast Africa via C-band.

### Events which impacted availability:

None significant.

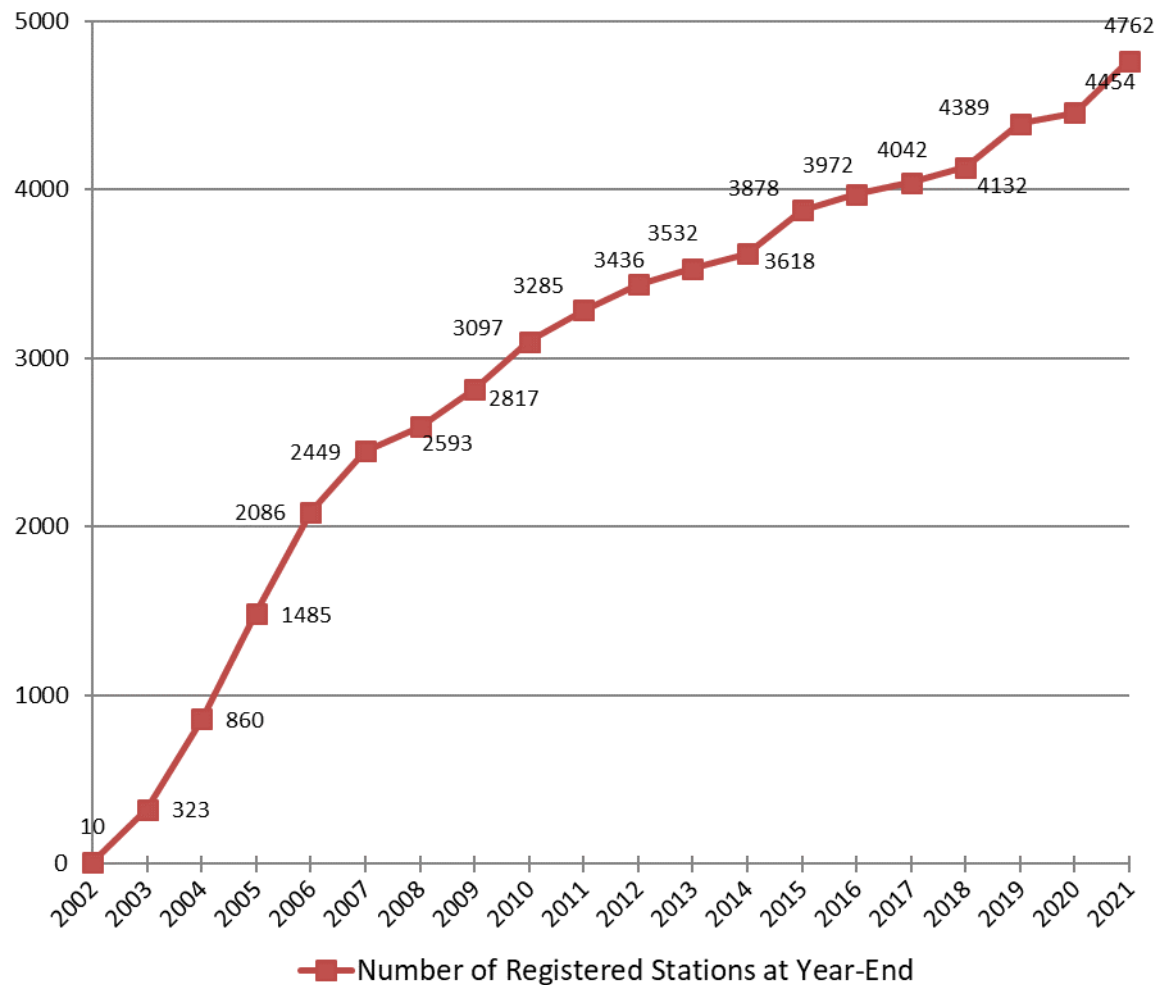




## EUMETCast x Registered User Stations

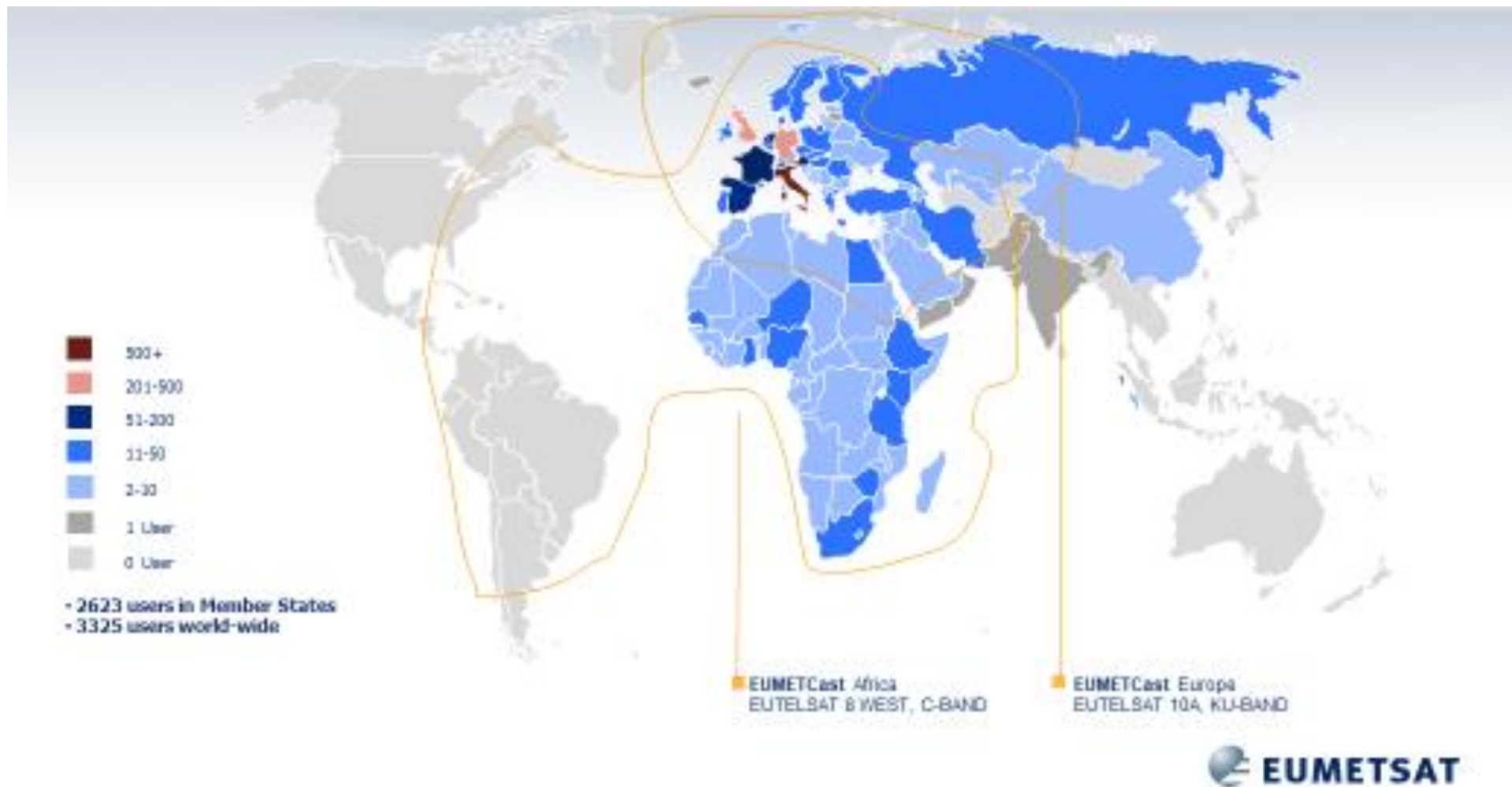
The chart shows the trend of registrations of EUMETCast user stations since the establishment of the system in 2002, up until the end of the reporting period.

Note that the number of registered user stations is larger than the number of users (shown on the next slide) due to some organisations possessing several user stations.





## EUMETCast x Users Worldwide as of 31 December 2021







**EUMETSAT's Data Centre archives all payload data acquired from EUMETSAT's operational satellites and most of the products derived from that data.**

**The Data Centre allows registered users to request data and products from the archive by use of its online 'self-service' ordering mechanism and supplies the requested items via physical media and the Internet. It also allows 'bulk orders' for long time-periods of data and 'standing orders' for repeated delivery of data / products over specified time periods to be requested for special needs.**

**Charts on the following themes appear on the next 3 slides:**

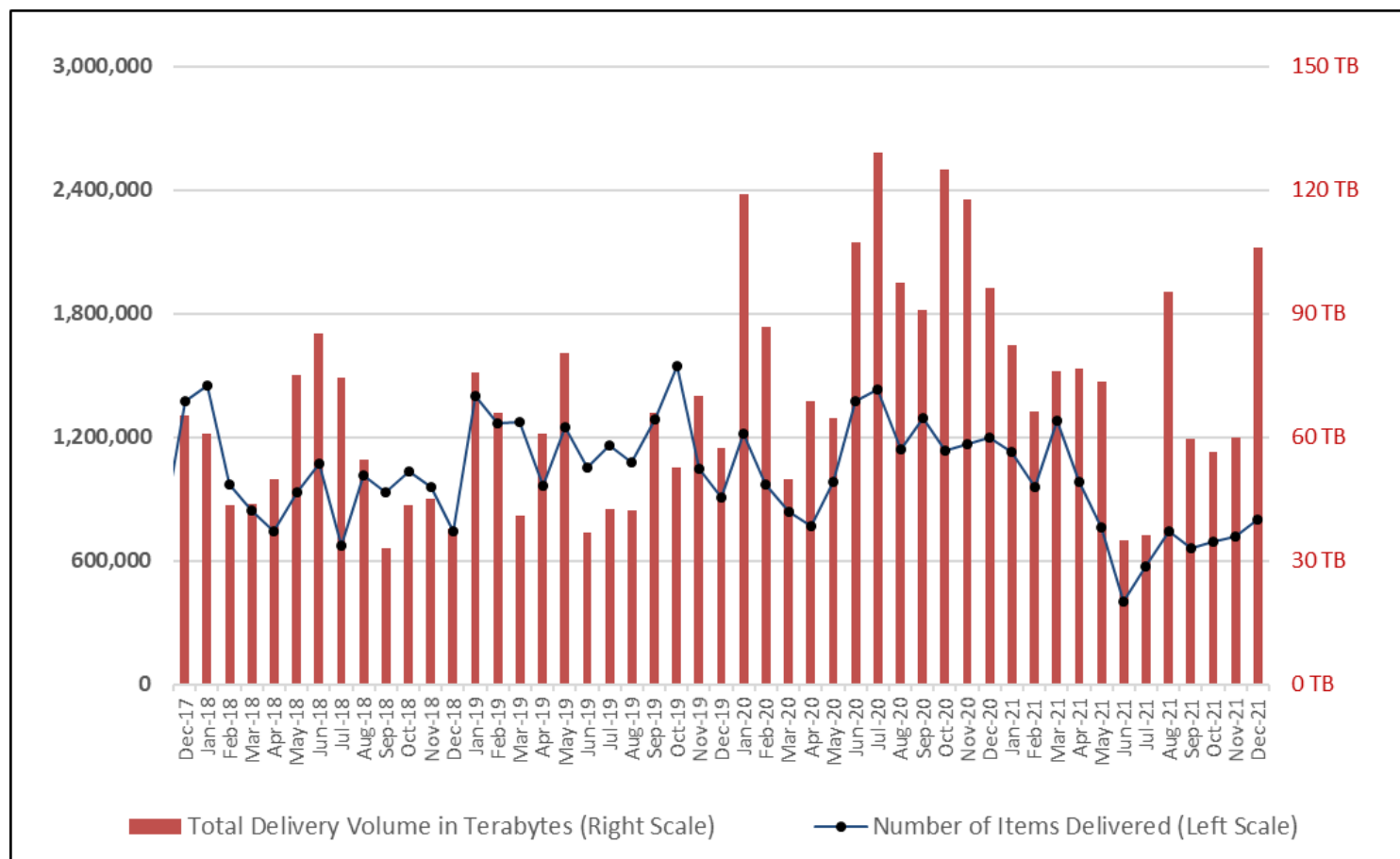
- Data Delivered: Total Volume versus Items**
- Archive Orders versus Data To Be Retrieved**
- Archive Order Delivery-Time Trends**

**Note that the charts do not include orders and deliveries of Climate Data Records (CDRs). Although the volumes of CDR deliveries are large (typically many TBs), they are not logged in the automated statistics provided by EUMETSAT's Data Centre.**



The chart shows the number of items delivered monthly to the users by the Data Centre, and the corresponding monthly total volumes of data delivered, in the 3 years up to and including the end of the current reporting period.

Items comprise images, products and ancillary files, and the statistics include all items supplied for all types of orders (regular, bulk and standing).





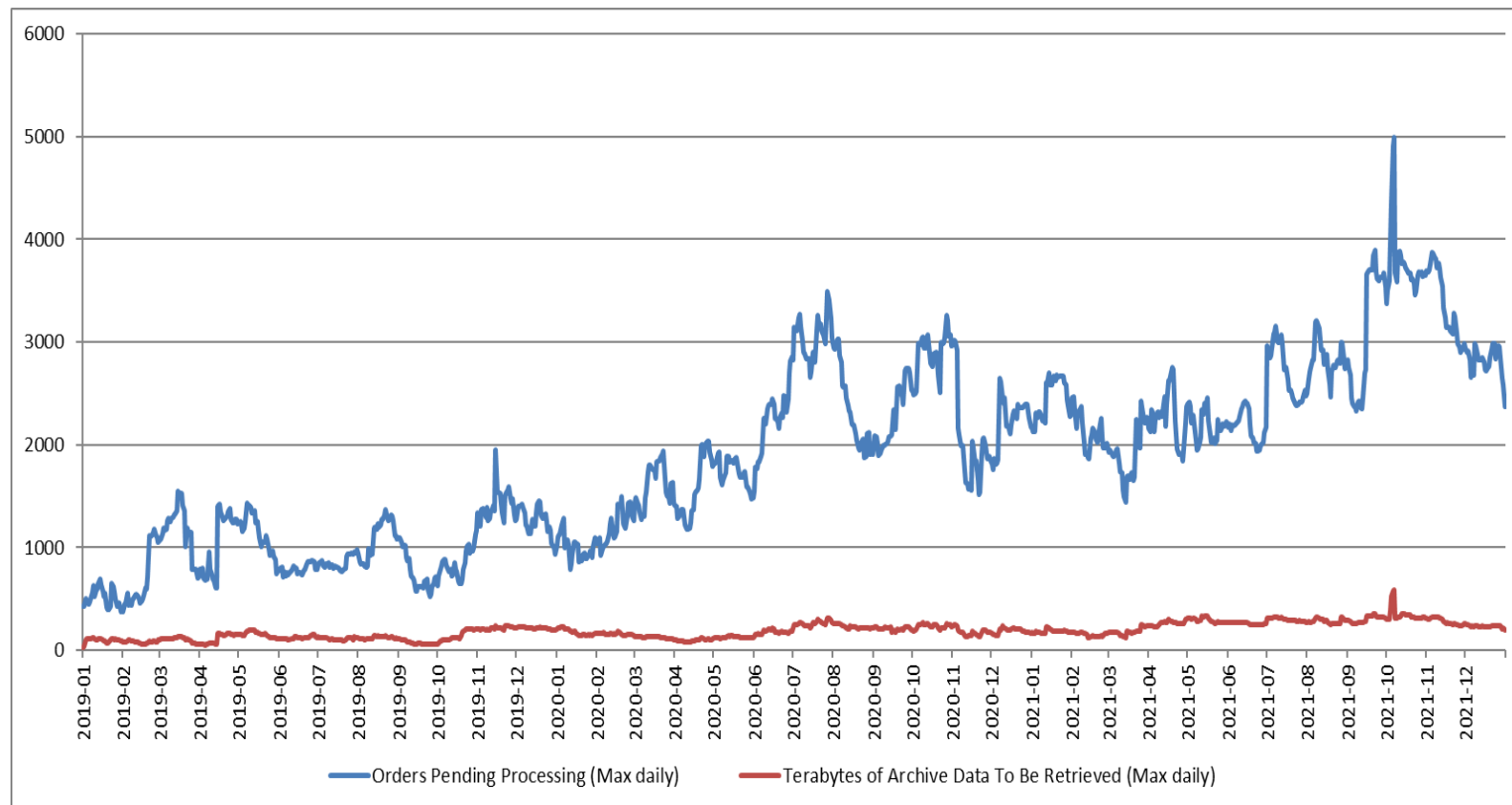
## The EUMETSAT Data Centre x Archive Orders versus Data To Be Retrieved

The chart shows the day-by-day profile of archive orders awaiting processing, against the related volume of data needing to be retrieved from the archive and processed to satisfy the queued orders.

The chart is based on observed daily maximum orders and estimated retrieval volumes which are recorded automatically for each day of the year.

The day-by-day profile of archive orders awaiting processing has been showing a largely increasing trend since December 2018 while the volume of Archive data (to be) retrieved remains stable.

These somewhat counter-intuitive facts are attributable to significant increases in the numbers of small and medium orders, while the numbers of large orders have decreased.



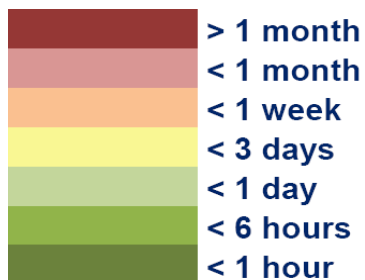


# EUMETSAT Central Operations Report for July to December 2021

## The EUMETSAT Data Centre x Archive Order Delivery-Time Trends

The 3 charts show delivery-time ranges for Data Centre orders according to 3 categories of order size (Small, Medium & Large), for each of the half-year periods shown on the horizontal axis. The left-hand scales help to show the proportions of the total orders delivered in the indicated time ranges (note: standing orders not included).

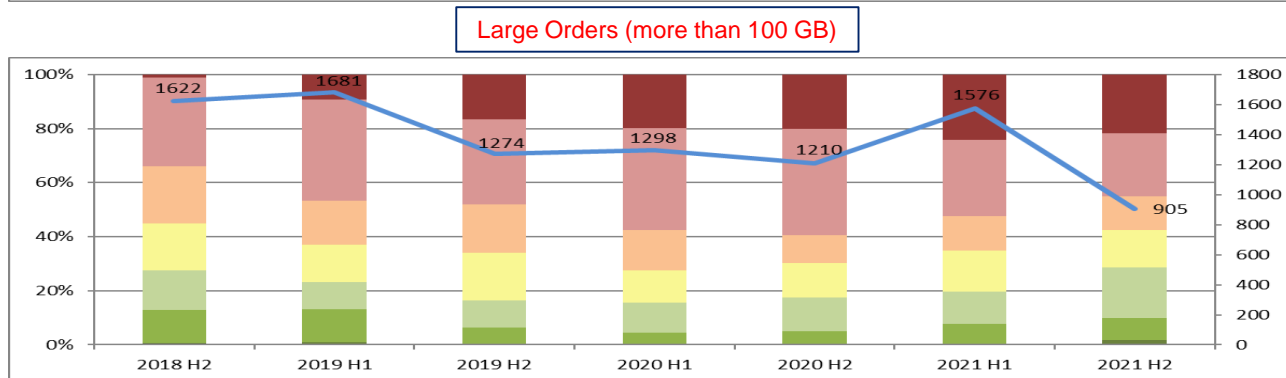
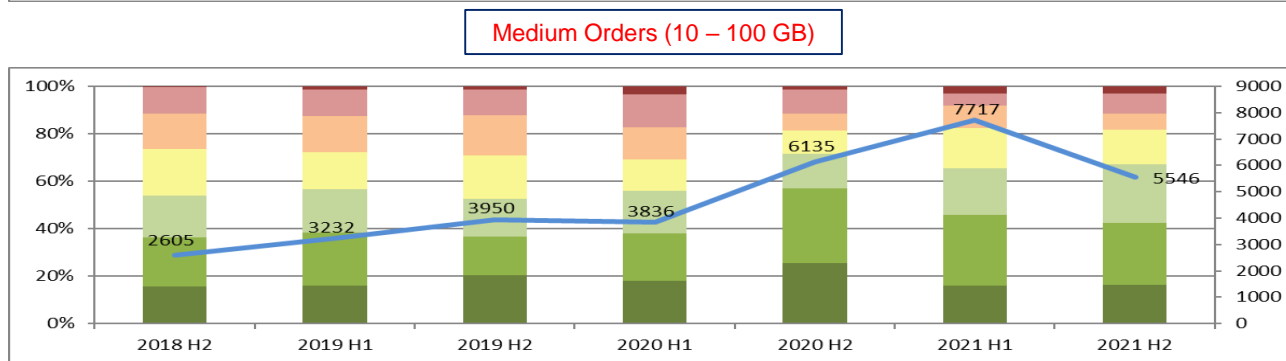
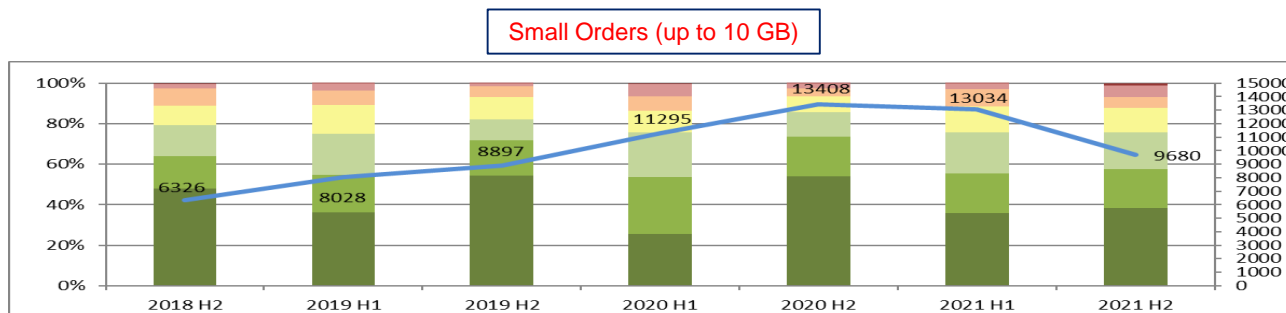
The colour-coding for the delivery-time bands on each of vertical bars on each chart is as follows:



The blue lines indicate the total orders per half year for each category (right-hand scales apply).

Delivery times for medium and large orders have increased over the last year as a consequence of the increasing number of orders overall, as shown on the previous slide. Worth noting is the planned operational release of the new EUMETSAT Data Store and the growing availability of data from there, which will enable direct download of data via the Internet – this is expected to lead to a change in demand for the existing user-ordering method.

For more information, please see [‘New Data Access Services’](#) on the EUMETSAT website.





**EUMETSAT contributes to climate monitoring and climate change analysis by recalibrating and reprocessing sensor data and products from Meteosat and Metop satellites held in its archive. Improved processing algorithms are applied to the data collected since the 1980's, producing data records with improved overall consistency, with artefacts introduced during past satellite lifetimes corrected.**

**The following slide gives an overview of the new Climate Data Records made available in EUMETSAT's archive in the reporting period.**

**For further information on EUMETSAT's role in Climate Monitoring and the European Climate Projects in which it is involved, please see the '[Monitoring Climate](#)' page whose link can be found on the 'What We Do' section under 'About Us' on the EUMETSAT website.**

Successful closure of the Copernicus Climate Change Service activity and preparations for the follow-on occupied most of the last quarter.

### Published in 2021/H2:

- NOAA AVHRR GAC Polar AMV TCDR extension Release 1
- Meteosat 0° AMVs TCDR Release 2

### Previously produced, pending publication:

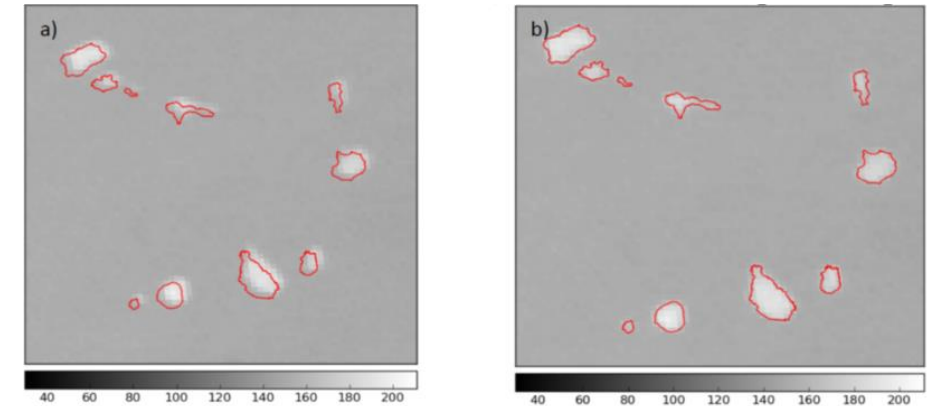
- NOAA AVHRR GAC AMV Release 2
- Meteosat SEVIRI FCDR (recalibrated IR M8-11)
- Optimal Cloud Analysis (OCA) L2 Release 1
- GOME-2 IASI AVHRR PMAp Aerosol TCDR
- GOME-2 L1B FDR Release 3
- TIROS-N, NOAA-6 to -19, Metop-A/-B AVHRR GAC L1c FDR

### Produced in 2021/H2:

- Meteosat MVIRI IR FCDR R2 [improvement likely in 2022]
- Meteosat MVIRI All-Sky Radiances TCDR [ditto]
- Metop-A/-B IASI SST [decision on fitness for publication in 2022]
- Metop -A/-B IASI L2 trace gases TCDR for AC SAF: SO<sub>2</sub> & CO completed

### To be produced in 2022/H1:

- Metop-A/-B IASI L2 trace gases TCDR for AC SAF: O<sub>3</sub>
- Meteosat AMVs for IODC TCDR Release 1



Meteosat-2 MVIRI image from 13 June 1985, showing geolocation improvements in the reprocessed version (right) vs the original (left)



**EUMETSAT's User Helpdesk provides support to the users of EUMETSAT's services, handling enquiries, registrations, user feedback comments, problems experienced and enhancement requests.**

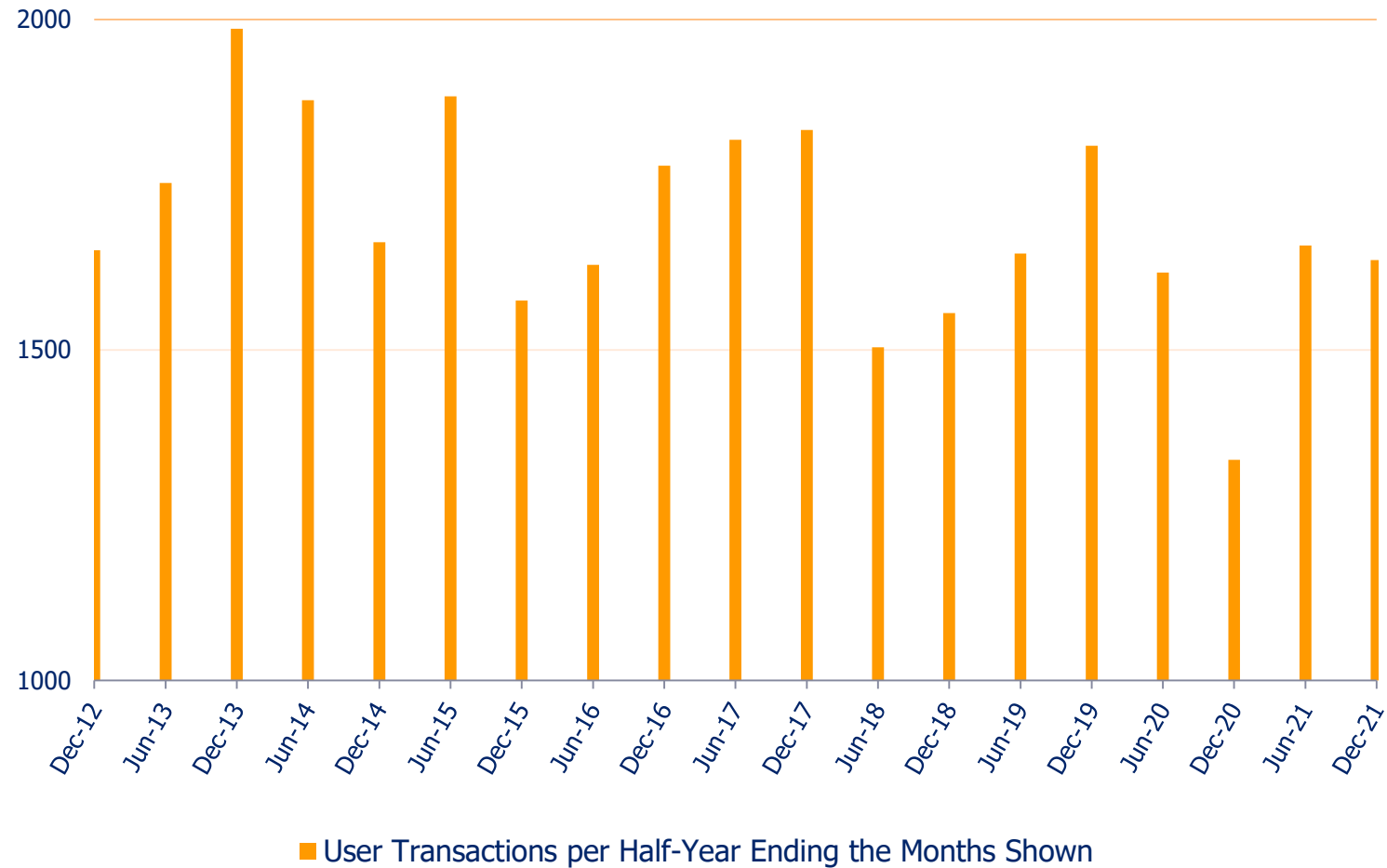
**This section includes charts on the following subjects:**

- **User interaction history of the last 10 years**
- **The countries and groups that gave rise to the largest numbers of user interactions in the reporting period**
- **Breakdown of those user interactions by category**



The chart shows the number of user interactions handled by EUMETSAT's User Helpdesk in each half-year of the last 10 years.

The next two slides focus on the user interactions for the current reporting period, in which a total of 1636 interactions were handled.



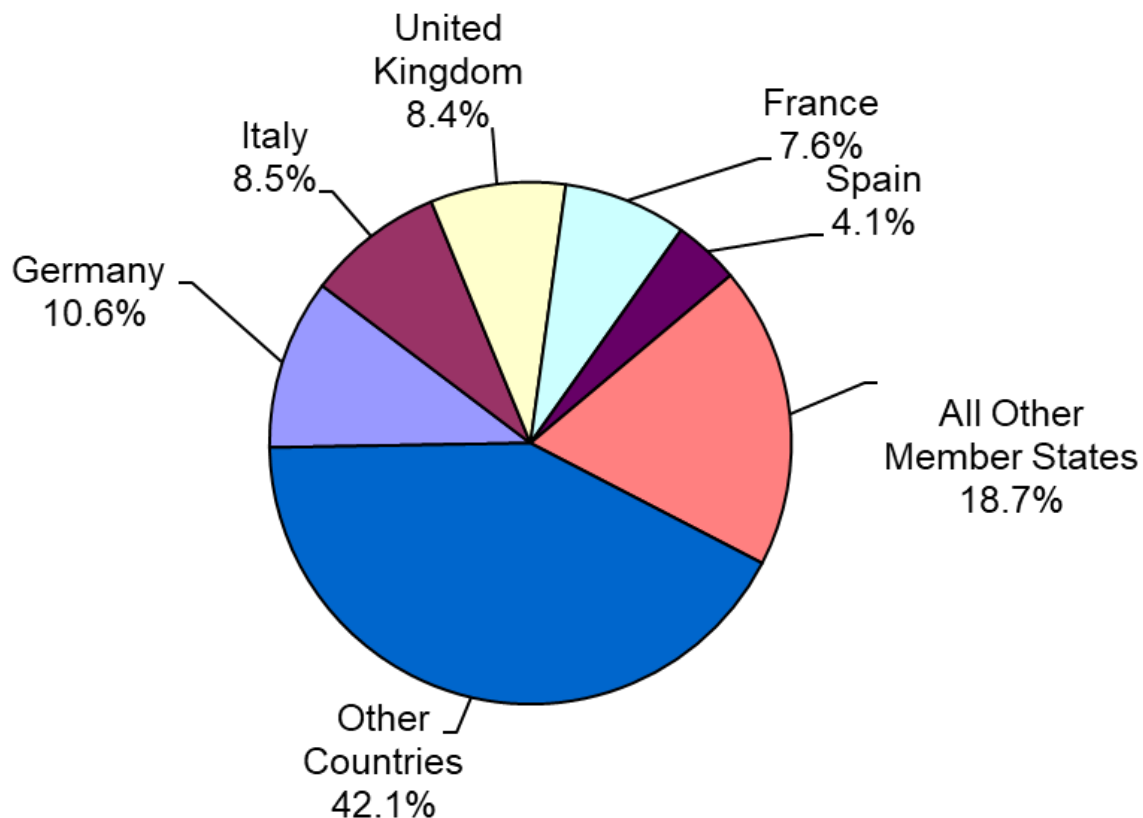




The chart shows the interactions in the second half of 2021 from:

(1) the 5 countries that gave rise to the largest numbers of interactions, and

(2) the split of the remainder of the interactions between other Member States and other countries.





The chart shows the numbers of user interactions in the second half of 2021 for:

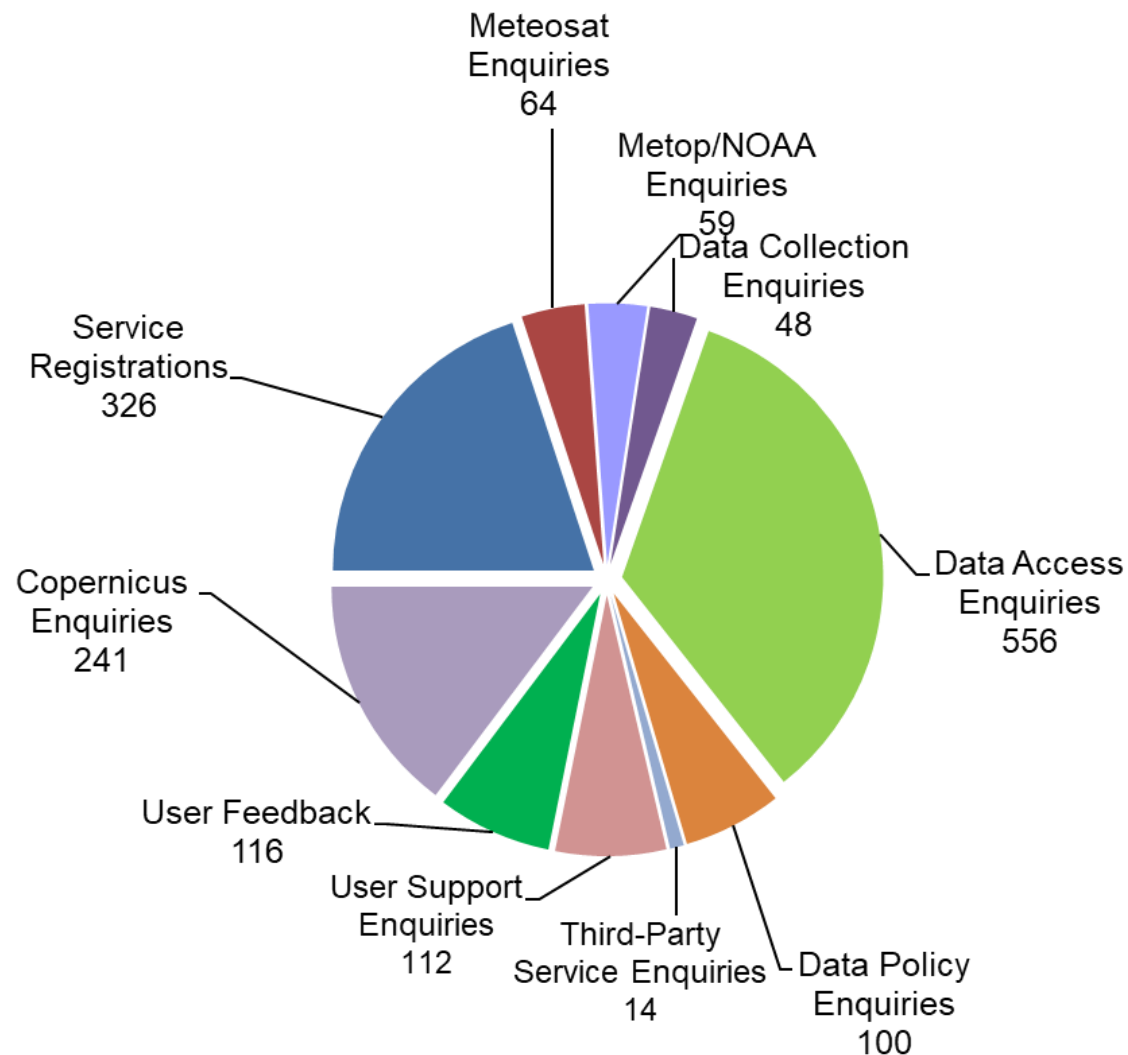
- Service Enquiries (8 categories)
- Service Registrations
- User Feedback

Total interactions for the half-year came to 1636.

Notes:

(1) 'User Support Enquiries' on the chart refer to enquiries related to service messages, web information and training.

(2) 'User Feedback' includes comments on our services and suggestions for improvement





**The following information is available on the EUMETSAT website, [www.eumetsat.int](http://www.eumetsat.int) :**

**Under "SATELLITES" tab on the menu-bar, links to sections on the following subjects:**

- **Products, services and delivery mechanisms**
- **Training courses and materials**
- **Service Status, including a link to UNS, our User Notification Service**

**In addition, details of all products can also be found in EUMETSAT's Product Navigator, accessible under 'Quick Links' from the website's menu-bar.**



Special terms used in this report are explained in the table below (continued on several subsequent slides).

Term	Context in which used	Description
A-DCS	Metop-SNPP-NOAA GDS	ADVANCED DATA COLLECTION SYSTEM. Metop instruments contributing to Argos programme. Acquisition and transmission of signals from transmitters on buoys, ships, land sites and mobiles.
AMSU-A	Metop-SNPP-NOAA GDS	ADVANCED MICROWAVE SOUNDING UNIT-A. Multi-channel microwave radiometer
ASCAT	Metop-SNPP-NOAA GDS	ADVANCED
ATOVS	Metop-SNPP-NOAA GDS	ADVANCED TIROS OPERATIONAL VERTICAL SOUNDERS. Calibrated radiance measurements from the AMSU-A, MHS and HIRS instruments are transformed into various parameters and assembled in the ATOVS L2 product.
AVHRR	Metop-SNPP-NOAA GDS	ADVANCED VERY HIGH RESOLUTION RADIOMETER. Multi-spectral imaging instrument which produces global visible, near-infrared and infrared imagery of clouds, oceans and land surfaces.
CMA	Third-Party Data	China Meteorological Administration ( <a href="http://www.cma.gov.cn/en2014/">http://www.cma.gov.cn/en2014/</a> )
Colinearity	Meteosat	Sun, satellite and ground station come into alignment twice a year, giving rise to disruption of uplink and downlink signals, resulting in partial loss of some images.
DCP	Meteosat	A 'Data Collection Platform' measures and transmits environmental data which is relayed by Meteosat satellite first to EUMETSAT's central operations, and then forwarded on to the DCP operator via direct, EUMETCast or GTS dissemination.
FDES	Regional Data Services	Fast Dump Extract System: This mechanism provides fast access to the most recent part of each X-band dump and transfers the relevant data to the EARS system for Level 1 processing.



Term	Context in which used	Description
FES	Meteosat	Full-Earth Scanning, where the SEVIRI instrument scans the full Earth disc (c.f. RSS).
GDS	Metop-SNPP-NOAA GDS	GLOBAL DATA SERVICE. This is EUMETSAT's service delivering L0, L1 and L2 data and products based on instrument data acquired from the Metop, S-NPP and NOAA Low-Earth-Orbiting satellites.
GOME-2	Metop-SNPP-NOAA GDS	GLOBAL OZONE MONITORING EXPERIMENT-2. Scanning spectrometer instrument used to measure profiles and columnar amounts of ozone and other atmospheric constituents.
GRAS	Metop-SNPP-NOAA GDS	GNSS RECEIVER FOR ATMOSPHERIC SOUNDING. Bending angle / radio occultation instrument for temperature and water-vapour profiling in the troposphere and stratosphere with high vertical resolution.
GTS	General	The 'Global Telecommunications System', established by the WMO, is used by national meteorological services to exchange meteorological data and products. See also 'RMDCN'.
HIRS	Metop-SNPP-NOAA GDS	HIGH-RESOLUTION INFRARED RADIATION SOUNDER. Heritage atmospheric soundings of temperature and humidity in cloud-free conditions.
IASI	Metop-SNPP-NOAA GDS	INFRARED ATMOSPHERIC SOUNDING INTERFEROMETER. A multi-purpose sounding instrument used for enhanced atmospheric soundings of temperature, humidity and trace gases in cloud-free and partly-cloudy conditions, as well as surface temperature, cloud characteristics and surface emissivity.
IODC	Meteosat	Indian Ocean Data Coverage: FES L1.5 image data, met products and DCPs, from Met-8 at 41.5°E.
JMA	Third-Party Data	Japan Meteorological Agency ( <a href="http://www.jma.go.jp/jma/indexe.html">http://www.jma.go.jp/jma/indexe.html</a> )



Term	Context in which used	Description
Level 0	Metop-SNPP-NOAA GDS	An instrument's raw data which has been demultiplexed from the total set of data dumped from one orbit of the Metop satellite.
Level 1.0	Meteosat	The raw image data acquired from a Meteosat satellite and preprocessed at the ground station, which is then received by a EUMETSAT image-processing facility, to be geometrically rectified and radiometrically corrected.
Level 1.5	Meteosat	Level 1.0 image data that has been corrected for radiometric and geometric non-linearity and is accompanied by the appropriate ancillary information that allows the user to calculate the geographical position and radiance of any pixel.
Level 1A	Metop-SNPP-NOAA GDS	Instrument data in full resolution with radiometric and geometric (i.e. Earth location) calibration computed and appended but not applied.
Level 1B	Metop-SNPP-NOAA GDS	Calibrated, earth-located and quality-controlled product, in the original pixel location, packaged with ancillary, engineering and auxiliary data.
Level 1C	Metop-SNPP-NOAA GDS	In the case of the IASI spectra, Level 1B data after the application of the apodization function.
Level 1D	Metop-SNPP-NOAA Regional Data	For EARS-ATOVS, AVHRR derived cloud information on HIRS grid.
Level 2	Metop-SNPP-NOAA GDS	Earth-located values converted to geophysical parameters at the same spatial and temporal sampling as the Level 1B and 1C data.



Term	Context in which used	Description
MHS	Metop-SNPP-NOAA GDS	MICROWAVE HUMIDITY SOUNDER. 5-channel microwave instrument for atmospheric humidity sounding in all weather conditions.
NOAA	Metop-SNPP-NOAA GDS and Third-Party	National Oceanic and Atmospheric Administration ( <a href="http://www.noaa.gov/">http://www.noaa.gov/</a> )
Nominal RCs	Meteosat (0° SEVIRI)	SEVIRI repeat cycles consisting of geometrically and radiometrically-corrected data in all 12 channels, with less than 18 missing detector lines in the scanned Earth area for any given spectral channel (54 for HRV), where less than 12 of those lines (36 for HRV) are adjacent to each other.
'On-Time'	All	The data or product has been generated or received 'on-time' at a specified location (e.g. at generation facility or EUMETCast user station respectively) within the relevant timeliness constraint.
OOP	Metop	'Out-Of-Plane' manoeuvre, i.e. one conducted with a Metop satellite in order to adjust the inclination of its orbit.
PGF	Metop performance charts	The Metop 'Product Generation Facility' is the part of the EPS CGS (Core Ground System) which generates Level 0 data and controls the generation of Level 1 and 2 products by the relevant PPFs (Product Processing Facilities).
Repeat Cycles (or RCs)	Meteosat (0° SEVIRI)	The period in which the MSG SEVIRI instrument performs one scan and then is repositioned ready for the next repeat cycle. A nominal repeat cycle (a scan of the entire Earth disc) has a duration of 15 minutes.



Term	Context in which used	Description
RMDCN	General	The 'Regional Meteorological Data Communication Network' is used by WMO Region VI to carry GTS traffic within Europe. See also 'GTS'.
RSS	Meteosat (9.5° SEVIRI)	Rapid-Scan Service (for MSG), where the repeat cycle has a duration of only 5 minutes, covering the latitude range of 15 to 70°N.
SEM	Metop-SNPP-NOAA GDS	The 'Space Environment Monitor' consists of a pair of instruments which provide data to determine the intensity of the Earth's radiation belts and the flux of charged particles at the satellite's orbiting altitude.
SEU	Satellite or instrument outages	'Single Event Upset', the term used to refer to an effect on onboard electronics caused by charged particles (e.g. solar), possibly resulting in a switch-off of an electronic system.
SEVIRI	Meteosat Second Generation (MSG)	Spinning Enhanced Visible and Infra-Red Imager