[OSS] Operational Services Specification

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Change Record

Issue / Revision	Date	DCN. No	Changed Pages / Paragraphs
1	30/12/2020		First Issue of new structure OSS
1A	13/10/2021		Changes: Updated User Support Services with a new service level classification Renamed GDS NOAA to GDS POES Updated GDS-SNPP/JPSS CrIS SDR description Specified EARS contributing stations Addition of EARS-MWRI service Updated GEO DCP description Updated SAF Availability thresholds Updated GOES-East and West descriptions, products and timeliness/availability Moved VIIRS EDRs from GDS-SNPP/JPSS section to TPDS LEO section Updated HY description including HY-2C Merged TPDS Services and Data Distribution Added Data Store and EUMETView Web Services as new Data Access Mechanisms
1B	08/11/2021		Additional changes: Removed Scatsat-1 service Added IMS Snow and Ice Analysis Dataset service Minor updates to document wording
1C	16/12/2022		Additional changes: Minor updates to document wording Removed Metop-A references (EOL) Added Commercial RO Service Removed Megha-Tropiques Service (EOL) Updated section 3.1.1.2 (0° Meteosat Meteorological Products) and 3.1.3.2 (IODC Meteosat Meteorological Products) due to removal of GNOPS-1 and implementation of GNOPS-2 IODC service. Removed references to Meteosat-8 and 41.5°E (EOL)

Issue / Revision	*Date*	*DCN. No*	*Changed Pages / Paragraphs*
			Updated timeliness requirements for Meteosat IODC DCPs Updated Data Store, EUMETView and Data Tailor timeliness requirements Added SMAP service Added SMOS service Added FY-4 service Added OMPS LP EDRs to SNPP EDRs section
1D	16/02/2024		Changes: Added Meteosat Third Generation service Added a separate table row for DCS Service in Section 12.2. Updated description for H-2 Service (section 10.2.9) Added EWC as a new Data Access Mechanism (section 11) Updated source of the commercial radio-occultation data from SPIRE to PlanetIQ for CRO-NOAA Added NOAA-19 ATOVS sounding products to GNAS section 10.2.7 and consequently removed GDS POES section 4.2 Added NOAA-21 as part of the GDS JPSS service, including new VIIRS M-Band and DNB SDR Removal of Aeolus Service due to End of Life. Updated FY-3 Service (section 10.2.3) with FY-3E Added Commercial Radio Occultation Service by NOAA (CRO-NOAA) in section 10.2.16 Added SWOT Service in section 10.2.19 Added Oceansat-3 Scatterometer Service in section 10.2.20 Added TROPICS Service in section 10.2.21 Updated MODIS products in section 10.2.1 Updated Active Fire (to Enterprise Fire) products in section 10.2.12/13 Added references to the new EUMETSAT User Portal
1E	27/02/2025		Removed CrIS SDR section in GDS-JPSS in section 4.2

Issue / Revision	*Date*	*DCN. No*	*Changed Pages / Paragraphs*
			Updated FY-3 global services (section 10.2.3) and RDS EARS (section 5.1) to account for FY-3F services Added EarthCARE products in section 10.2.22 Added KSEM Space Weather products in section 10.2.23 Added altimeter SGDR products to HY-2 service in section 10.2.9 Moved VIIRS SDRs to section 4.2 Updated JPSS Environmental Data Records in section 10.2.13 Removed FY-4A in section 10.1.5 Removed Metop HIRS L1 references (instrument switched-off) Removed Meteor-M N2 section (EOL) Updated links and information regarding EUMETSAT User Portal Updated availability targets for TPDS services Added WIS 2.0 data access service is section 11.2.1 Removed Appendix C (information contained now in the EUMETSAT User Portal)
1F	15/08/2025		Added MTG Africa Service in section 3.2.2 Updated EARS section after EARS-NG became operational: - Added new EARS-NWC (VIIRS) Products - Removed NOAA18/19 - Removed EARS contributing stations Updated MTG-I L1C Service availability from 95% to 99% (OSPRH12025_AI#1, EUM2035042 v1) Removed ASCAT L2 Soil Moisture (SOMO) from section 4.1 Removed Global NOAA ATOVS Service (GNAS) from section 10.2 Added IASI 3D Winds comment in section 4.1.9 Corrected WIS2.0 service availability

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1 INTRODUCTION

1.1 Targeted Readership, Purpose and Scope

The expected readership of this Operational Services Specification (OSS) is the community of users of the services delivered by EUMETSAT.

Its purpose is to specify the operational services that EUMETSAT currently provides to its user community, including:
- the current operational data services, data access mechanisms, and user support services;
- the services that are planned to be classed as operational in the near future, i.e. within one calendar year following the latest release of the OSS.

While the End User Requirements Document (EURD) for a given programme is the agreed baseline during the development of a new EUMETSAT satellite system, this OSS reflects the response of EUMETSAT to user requirements in the operations phase, taking into account the capabilities of all "as built" satellite systems.

The OSS describes the specifications of these services, including the service availability. The OSS also describes the service reporting of the performance actually achieved against the specification.

The operational data services specified in this OSS belong to the following Operational Service Groups:
- Meteosat Services;
- Metop and NOAA Global Data Services;
- Regional Data Services;
- Direct Readout Services;
- Data Collection Services;
- Search and Rescue Services;
- Satellite Application Facility Services;
- Third Party Data Services;
- Data Access Mechanisms;
- User Support Services

The User Support services include information about when the user can expect notifications of interruptions or degradations of the operational data services and the data access mechanisms.

The specifications contained in this OSS are at a service level, and in particular, do not provide details on the lower-level outputs of the services, e.g. the specifications of the individual products delivered as part of EUMETSAT's data services. These outputs are continually evolving and are therefore described separately by:

- the EUMETSAT User Portal, which is available via the website https://user.eumetsat.int/, and provides the most accurate and up-to-date source of information on available products;
- the relevant Product Guides and detailed Service Specifications listed in §1.4.1 and §1.4.2, which are considered the main applicable documents for the Level-1 and Level-

2 products and describe the outputs of the services at the level of detail required for users.

The following services are excluded from the scope of this OSS:

- Products or services that are considered to be demonstrational or pre-operational;
- The dedicated operational services and products provided by EUMETSAT as part of its support to the EU Copernicus Programme (Sentinel-3 etc.), that are now specified in the dedicated Copernicus Service Level Specification (SLS) document [RD. 11], as required by the European Commission;
- Climate services, including delivery of Climate Data Records;
- Direct provision of data and services to partner organizations, described by dedicated agreements.

1.2 Document Structure

The structure of this document closely follows the typology of the services to be provided:

Section 1:	This Introduction;
Section 2:	Definition of reserved terminology used to describe the services
Sections 3-6:	Near Real-Time Operational Services
Sections 7-8:	Data Collection and Search and Rescue Services
Section 9:	Satellite Application Facilities
Section 10:	Third-Party Data Services
Section 11:	Data Access Mechanisms
Section 12:	User Support Services
Section 13:	Performance Reporting;

1.3 Acronyms and Terms

Acronyms are expanded on their first use, and a full list of the acronyms can be found in Appendix A.

1.4 Lower-Level Applicable Documents and Reference Documents

Lower-level applicable documents contain information that further qualifies, or describes in more detail, the service specification baseline, in particular, the outputs of services and specific services.

Reference documents contain information that is related to the provision of the operational services, but does not contain information that forms part of the service specification baseline.

1.4.1 Lower-Level Applicable Documents

[AD. 1] EUMETSAT Product Navigator, http://navigator.eumetsat.int/
[AD. 2] Central Facility MSG Meteorological Products Guide, EUM/OPS/TEN/09/2043
[AD. 3] EPS Generic Product Format Specification, EPS/GGS/SPE/96167
[AD. 4] ATOVS Level-1B Products Guide, EUM/OPS-EPS/MAN/04/0030
[AD. 5] AVHRR Level-1B Products Guide, EUM/OPS-EPS/MAN/04/0029
[AD. 6] ATOVS Level-2 Products Guide, EUM/OPS-EPS/MAN/04/0031.
[AD. 7] IASI Level-1 Products Guide, EUM/OPS-EPS/MAN/04/0032.
[AD. 8] IASI Level-2 Products Guide, EUM/OPS-EPS/MAN/04/0033.
[AD. 9] GOME-2 Product Guide, EUM/OPS-EPS/MAN/07/0445.
[AD. 10] ASCAT Products Guide, EUM/OPS-EPS/MAN/04/0028.
[AD. 11] GRAS Products Guide, EUM/OPS-EPS/MAN/06/0121
[AD. 12] Cloud Products for Nowcasting Applications over Europe (CMA, CT, CTTH) Factsheet, EUM/TSS/USR/19/1107419
[AD. 13] Polar Multi-Sensor Aerosol Product: User Guide, EUM/TSS/MAN/14/742654
[AD. 14] https://user.eumetsat.int/resources/user-guides/eumetsat-advanced-retransmission-service-ears
[AD. 15] NWP SAF, AAPP Version 7 Product Specification, NWPSAF-MO-DS-014.
[AD. 16] NoWCasting SAF CDOP-2 Service Specifications v2013, SAF/NWC/CDOP/INM/MGT/SeSp-v2012
[AD. 17] Rapidly Developing Thunderstorms Convective Warning (RDT) Factsheet, EUM/TSS/USR/19/1054088.
[AD. 18] Ocean and Sea Ice SAF CDOP-2 Service Specification Document, SAF/OSI/CDOP2/M-F/MGT/PL/003
[AD. 19] ASCAT Wind Product Manual, SAF/OSI/CDOP/KNMI/TEC/MA/126
[AD. 20] CM SAF CDOP-2 Service Specifications, SAF/CM/DWD/SeSp
[AD. 21] NWP SAF Service Specification for CDOP-2, NWPSAF-MO-AD-049
[AD. 22] The EUMETSAT Satellite Application Facility on Land Surface Analysis (LSA SAF) Service Specification Document, SAF/LAND/IM/SeSp/1.15
[AD. 23] O3M SAF Ozone and Atmospheric Chemistry Monitoring Service Specification, SAF/O3M/FMI/RQ/SESP/001
[AD. 24] ROM SAF CDOP-2 Service Specifications, SAF/ROM/DMI/RQ/SESP/001
[AD. 25] EUMETSAT Satellite Application Facility on Support to Operational Hydrology and Water Management (H-SAF) Service Specification, SAF/HSAF/SeSpe/1.5

[AD. 26] SARAL/Altika Products Handbook, SALP-MU-M-OP-15984-CN
[AD. 27] EUMETSAT Data Services – Service Descriptions, EUM/OPS/DOC/20/1171691
[AD. 28] Convective Rain Rate (CRR) Factsheet, EUM/TSS/USR/19/1053146
[AD. 29] Cloud Products for Nowcasting Applications in the Indian Ocean Region (CMA, CT, CTTH, CMIC) Factsheet, EUM/SEP/USR/22/1273583

1.4.2 Reference Documents

[RD. 1] EPS Glossary of Acronyms and Terms, EUM/EPS/MAN/LIS/02/002
[RD. 2] Metop Direct Readout AHRPT Technical Description, EUM TD 18
[RD. 3] Metop Administrative Message, EPS.GGS.TN.980021
[RD. 4] NOAA-KLM User Guide, https://www.star.nesdis.noaa.gov/mirs/documents/0.0_NOAA_KLM_Users_Guide.pdf
[RD. 5] MSG End-User Requirements Document, EUM/MSG/SPE/013
[RD. 6] The SEVIRI Instrument, paper by J Schmid, https://www-cdn.eumetsat.int/files/2020-04/pdf_ten_msg_seviri_instrument.pdf
[RD. 7] Meteosat Data Collection and Distribution Service, EUM TD 16
[RD. 8] EPS Programme End User Requirements Document, EUM.EPS.MIS.REQ.93.001
[RD. 9] EUMETCast Daily Log User Guide, EUM/OPS/TEN/08/2862
[RD. 10] EUMETCast – EUMETSAT's Broadcast system for Environmental Data, EUM TD 15
[RD. 11] Copernicus Service Level Specification, EUM/OPS-COPER/SPE/14/694543
[RD. 12] SAF NWC / MSG Output Products Format Definition, SAF/NWC/CDOP/INM/SW/ICD/3
[RD. 13] MTG End-User Requirements Document Version 4C (approved by 90th Council), EUM/MTG/SPE/07/0036

2 TERMINOLOGY

This section introduces the basic definitions used in the specifications of EUMETSAT operational data services, data access mechanisms and support services.

2.1 Basic Definitions

Product: this is a specific set of processed data from a given Satellite/instrument (or several in the case of multi-sensor and multi-satellite products) using a given algorithm / aux data set and formatted in a given way. Attributes of products are:

- Satellite(s),
- Instrument(s),
- Level (Levels 0, 1, 2,...)
- algorithm,
- accuracy,
- format,
- coverage.

Product Group: this is a logical grouping of related products. A Product Group may consist of one or more individual products. Note: In the context of this definition, a product group may also refer to image data.

Operational Service: An operational service represents the end-to-end provision of data from the data's origin though to its reception by the end-user. Attributes of a service are:

- The product groups available via this service.
- The delivery mechanism(s) used by the service.
- The service-level specification (availability, product group attributes)

For each operational service, the attributes of the product groups it provides are detailed in §2.2.2.

Operational Service Group: this is a logical grouping of related operational services. An Operational Service Group may consist of one or more individual operational services.

The following diagram displays the relationships between the definitions used in this document.

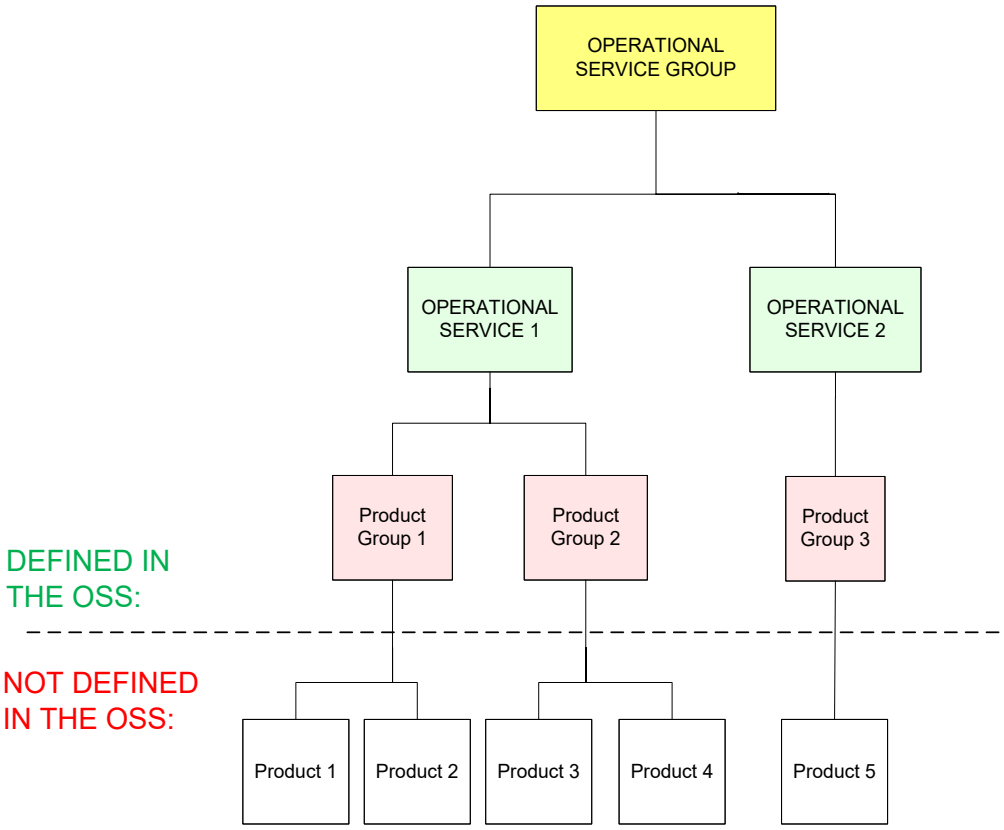

Figure 1 – Overview of Basic Definitions

2.2 Terminology Adopted for Describing Near Real-Time Operational Data Services

Near Real-Time (NRT) operational data services provide processed data obtained from instruments carried on-board satellites which are operated or disseminated by EUMETSAT.

The following information is provided in this document for each of the Mandatory Programme NRT services:

- Product Group Description
- Product Group Attributes: (Timeliness, Accuracy and Coverage, Completeness).
- Data Access Method.
- Availability.

Further explanation of what the above contain is provided in the following sub-sections.

2.2.1 Product Group Description

This section briefly describes each of the product groups provided by the service, and identifies the relevant documentation which further describes the data content.

For the current status of data provision by the various services the reader is referred to the EUMETSAT User Portal https://user.eumetsat.int/.

2.2.2 Product Group Attributes

Product Group Attributes is a generic term used to define for each Product group the following quality attributes:

- Timeliness;
- Accuracy and Coverage;
- Completeness.

2.2.2.1 Timeliness

Timeliness is generally defined to be the target delay between the data being available at the "Input Point" of the system and the data being received at the "Output Point" of the system.

The "Input Point" of the system can be defined as:

- The start of data being acquired by the instrument on-board a satellite, for a given observation;
- The data being provided to an input interface of the EUMETSAT ground segment;
- The data being provided to an input interface of the Dissemination System;

The "Output Point" of the system can be defined as:

- The data being made available at user reception stations (for services utilising Near-Real Time dissemination systems e.g. EUMETCast, Direct Readout);
- The data placed on the GISC (Global Information System Centres) interface located at DWD in Offenbach, Germany (for services provided over the GTS/RMDCN).
- The data being made available at the user interface (for services utilising point-to-point links for dissemination e.g. Data Centre, Data Store);

Notes:
Generally, the timeliness value is only specified for the prime NRT dissemination mechanism, i.e. EUMETCast, and is specified per calendar month.

Specific services may have variations on the definition of their timeliness and where this is the case, it is noted in the corresponding section.

2.2.2.2 Accuracy and coverage

Where relevant, accuracy requirements are defined for the product groups. The accuracy requirements can be very diverse and cover geometric, geographical, radiometric and other aspects as relevant to the service. The geographical coverage of the product is also specified where relevant.

2.2.2.3 Completeness

Completeness reflects the number of elementary components that must be present within the product group for it to be considered acceptable. This is a metric for monitoring the quality of a service. Incomplete product groups may still be disseminated, but the monitoring and reporting will indicate a degraded service.

In some cases a component can be considered complete even if there is some data missing, e.g. missing lines from a SEVIRI (Spinning Enhanced Visible and Infrared Imager) image that are outside the processing area.

2.2.3 Data Access Mechanism

Data Access Mechanism refers to the mechanism adopted for the dissemination of data associated with the service and its data format.

The data, products and services provided by EUMETSAT are made available to users via a number of delivery methods – see §11 for more details.

2.2.4 Service Availability and Operational performance

The availability of a service is defined as the number of nominal products of a particular product group actually sent out to the users, compared with the total number which theoretically could be generated and disseminated by a continuously-running 'perfect system'. Nominal products are those which meet the specified attribute criteria (see section 2.2.2).

Service Availability *to the user* is calculated and expressed as a percentage:

$$\frac{\text{Nominal Products actually disseminated in the month}}{\text{Theoretical Maximum Products possible for that month}} * 100$$

The measured service availability then reflects both planned ("scheduled") outages and any service impacts caused by unforeseen satellite or ground segment problems.

In addition to measuring service availability, EUMETSAT also measures its 'Operational Performance', in terms of the nominal number of products actually disseminated compared with those planned ("scheduled"), i.e. net of the "schedule outages" of satellite systems that are required to implement the operational/maintenance requirements of such systems. The total number of "scheduled products" (net of "schedule outages") per product group, per month, serves as the reference for the calculation of the Operational Performance.

Operational Performance is also calculated and expressed as a percentage:

$$\frac{\text{Nominal Products actually disseminated in the month}}{\text{Total Number of Products scheduled for that month}} * 100$$

The above measures of Service Availability and Operational Performance are also made for all main data services to users that are provided using satellite systems under direct EUMETSAT control and delivered via the prime dissemination mechanism, namely EUMETCast Europe.

Note that, for a given service, the ratio of the Service Availability to Operational Performance provides another interesting indicator, i.e. the measure of the intrinsic capacity of the as-built system to deliver that service.

Both measured service availability and operational performance are available to EUMETSAT's users using different yearly and half-yearly reports (see §13).

When data services to users are not provided using satellite systems under direct EUMETSAT control and in other cases where identifying a scheduled number of products is either not possible or relevant, an alternative definition and measurement of service availability is used and described in this OSS, and in such cases the above concept of Operational Performance is not applicable.

The alternative definition of service availability is generally consistent with the definition of data assumes that any input to a service coming from an element external to EUMETSAT (e.g. NOAA Satellites) is fully available. A performance target is then generally defined based on the estimated statistical availability of the EUMETSAT systems used to deliver the service or group of services.

2.2.4.1 "Scheduled Outages"

Operational requirements associated with the full system supporting a service determine the scheduled outages of the different components of the system and hence the number of "Product Groups Scheduled" in a given period.

In general, the design of the EUMETSAT Ground Segment is such that no single point of failure exists. Therefore, all planned ground segment maintenance activities can be performed using built-in redundancy within the system, with no expected impact on the availability of the service.

Ground Segment maintenance activities can therefore be excluded from the scheduled operational activities affecting the services and scheduled outages are thus limited to satellite and instruments only.

The impact of operational requirements on the "Product Groups Scheduled" therefore depends on two factors:

- routine spacecraft operational requirements;
- instrument-specific operational requirements.

Any scheduled activities that will affect the availability of services listed in this OSS will be notified to the users at least 36 hours in advance.

2.3 Terminology Adopted for Describing Data Access Mechanisms and User Support Services

EUMETSAT also provides several other services. The following information characterise these services:

2.3.1 Service Description

This describes the services specified under the data access mechanisms and user support services, and identifies the relevant documentation that further details the service provision.

2.3.2 Method of requesting service

This describes the method(s) for requesting the provision of a data access mechanism or user support service.

2.3.3 Delivery Media and Format

If applicable, the delivery media and format of the support services are described.

2.3.4 Availability

For data access mechanisms, availability is defined as the ratio of the number of Product Groups received at the “output point” to the number of product groups received at the “input point” to the dissemination system. See §2.2.2.1 for a description of the “output points”.

For User Support Services, service availability figures are provided which are based upon the availability of supporting personnel in the case of the User Helpdesk, and web service availability for the web-based applications.

3 METEOSAT SERVICES

The Meteosat series of satellites are geostationary meteorological satellites operated by EUMETSAT under the Meteosat Second Generation (MSG) and Meteosat Third Generation (MTG). Further information is contained in the following sections:

3.1 Meteosat Second Generation

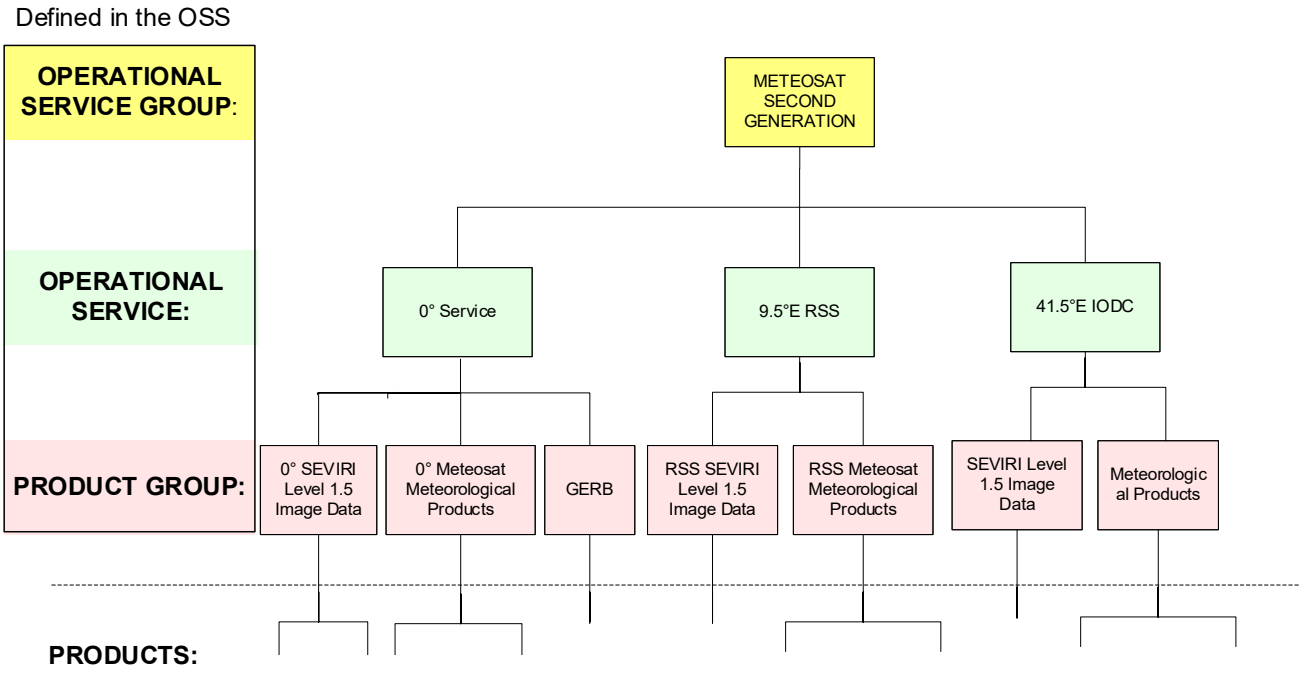

Figure 2 - Overview of Meteosat Second Generation Services

This operational service group refers to the dissemination of data and products produced from instruments as part of the Meteosat Second Generation (MSG) system, which comprises geostationary satellites positioned at approximately longitudes 0°, 9.5°E, and 45.5°E. These satellites support the following operational services:

- 0° Service: Meteosat 'Full-Earth Scan' data acquired and rectified to 0°;
- 9.5°E RSS: Meteosat 'Rapid Scanning Service' data acquired and rectified to 9.5°E;
- 45.5°E IODC: Meteosat 'Indian Ocean Data Coverage' data acquired and rectified respectively to 45.5°E.

3.1.1 0° Service

The 0° Service covers all image data and products derived from the Meteosat 'Full-Earth Scan', which is performed at 0° longitude.

The SEVIRI instrument on the Meteosat Second Generation (MSG) satellites delivers images in the visible and infra-red parts of the electromagnetic spectrum with a resolution of 3 km, plus atmospheric pseudo-sounding and thermal information. The High Resolution Visible (HRV) channel has a resolution of 1 km and only covers a part of the full disc view, covering mainly Africa and Europe. The full-disc view allows frequent sampling, every 15 minutes, enabling monitoring of rapidly evolving events.

Further information on the SEVIRI instrument can be found in [RD. 6].

3.1.1.1 0° SEVIRI Level-1.5 Image Data

Level-1.5 image data corresponds to the geolocated and radiometrically pre-processed and calibrated image data, ready for further processing, e.g. the extraction of meteorological products. Any spacecraft-specific effects have been removed, and in particular, linearization and equalisation of the image radiometry has been performed for all SEVIRI channels. The on-board blackbody data has been processed. Both radiometric and geometric quality-control information is included. The data is transmitted as High Rate Information Transmissions (HRIT) in 12 spectral channels.

3.1.1.1.1 Service Specification & Availability

Product Group	Product Group Attributes		
	Timeliness	**Accuracy and Coverage**	**Completeness**
0° SEVIRI Level-1.5 Image Data	5 mins [(1)]	**Nominal Radiometric and Geometric quality** if it meets radiometric and geometric accuracy requirements as specified in the MSG EURD [RD. 5]	**Level-1.0 Image has nominal completeness if**: • Exhibits <18 missing detector lines (54 for HRV) in the region of interest (scanned Earth area) for any given spectral channel, and • < 12 adjacent missing detector lines (36 for HRV) in the region of interest for any given spectral channel **Level-1.5 Image has nominal completeness if**: • Level-1.0 image was nominally complete, and • Level-1.5 image generation process completed successfully

[(1)] Timeliness is measured relative from the start time of the segment, not the slot.

Product Group	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	**Instrument Operational Requirements**
0° SEVIRI Level-1.5 Image Data	Target: 99% (2)	The scheduled outages are: • Station Keeping, Attitude, Spin-up and down manoeuvres lead to a disturbance of the satellite attitude and consequently to image quality degradation. This several times per year typically over a period of up to three hours; • The eclipse phase may lead to image quality degradation. No interruption in the imaging in the IR channels and in the data dissemination is foreseen; • When the Sun enters the main lobe of the Primary Ground Station (PGS), the system noise temperature increases quickly preventing the reception of all L-Band links. This occurs twice a year around Equinox seasons for around 10 days impacting a few repeat cycles per day. • Degraded image quality due to stray-light (in VIS 0.6, 0.8, 1.6, IR 3.9 and HRV) when the sun gets close to the image field of view occurs typically for a few hours around midnight during the eclipse season. • The swap of a mission from one satellite to another (e.g. after the completion of satellite commissioning when the operational missions are transferred to a new satellite) may result in an outage of a few hours.	If the 0° service cannot be supported by another spacecraft during a SEVIRI decontamination, then the activity will result in the following service impact: SEVIRI decontamination requires that all sensors are switched off, thus interrupting the imaging in all channels, typically over a period of five to six days.

(2) EURD [RD. 5] requirement = 95%

3.1.1.2 0° Meteosat Meteorological Products

The EUMETSAT Application Ground Segment generates a variety of Meteorological Products derived from the Level-1.5 Image Data and ancillary data. The full range of products is described in the Product Guide [AD. 2] and in the EUMETSAT User Portal https://user.eumetsat.int/. In addition, EUMETSAT generates a selection of products by applying the NWC SAF GEO software packages to support now-casting applications. The characteristics of the products are described in the factsheets [AD. 12][AD. 17][AD. 28].

3.1.1.2.1 Service Specification & Availability

Product Group	Product Group Attributes		
	Timeliness	**Accuracy and Coverage**	**Completeness**
0° Meteosat Meteorological Products	15 mins [3]	As specified in [AD. 2]	The products are considered complete if they have been successfully generated from all input data.

Product Group	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	**Instrument Operational Requirements**
0° Meteosat Meteorological Products	Target: 99% [4]	The swap of a mission from one satellite to another (e.g. after the completion of satellite commissioning when the operational missions are transferred to a new satellite) will result in an outage of a few hours.	Note that products cannot be produced if there is an outage of the SEVIRI Level-1.5 image service due to decontamination as described above.

[3] Timeliness is measured relative from the time the product repeat cycle is complete and received at the product processing facility.
[4] EURD [RD. 5] requirement = 95%

3.1.1.3 GERB

The principle objective of the Global Earth Radiation Budget (GERB) mission is to measure the Earth radiation budget, in support of climate research and monitoring.

The GERB instrument is operated by EUMETSAT in coordination with the GERB Operations Team based at Imperial College of Science, Technology and Medicine (ICSTM). GERB data are received at the EUMETSAT ground segment and passed to the GERB ground segment for data processing. For more information on GERB, see https://gerb.oma.be/doku.php

The GERB raw data product consists of the GERB raw data as acquired by the EUMETSAT ground station.

3.1.1.3.1 Service Specification & Availability

Product Group	Product Group Attributes		
	Timeliness	Accuracy and Coverage	Completeness
GERB	15 mins	n/a	n/a

Product Group	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	Instrument Operational Requirements
GERB	Target: 99%	n/a	There are two sun avoidance seasons (SAS) per year which last approximately 70 days each around the equinoxes. During the SAS, there is the danger that the sun may enter the GERB Field of View and destroy the GERB detectors which are not designed to stand the sun view (differently from the SEVIRI ones). During the SAS, therefore, GERB imaging is not performed apart from a few hours immediately after each eclipse exit.

3.1.2 9.5° E RSS (Rapid Scanning Service)

The 9.5°E RSS Service covers all image data and products derived from the Meteosat 'Rapid Scanning Service', which is performed at 9.5°E longitude.

This service provides image data at 5-minute intervals (the same as is currently used for weather radars) covering Europe (latitude range from 15° to 70°) in 12 spectral channels. The baseline scan region is an area that corresponds approximately to the top third of a nominal repeat cycle. The High Resolution Visible (HRV) channel has a resolution of 1 km and only covers a part of the full disc view, covering mainly Europe.

Further information on the SEVIRI instrument can be found in [RD. 6].

3.1.2.1 9.5° E RSS SEVIRI Level-1.5 Image Data

For this service, the baseline scan region is a reduced area of the top third of a nominal repeat cycle, covering a latitude range from approximately 15 degrees to 70 degrees. The service generates repeat cycles at 5-minute intervals (the same as currently used for weather radars). The dissemination of RSS data is similar to the normal dissemination, with image segments based on 464 lines and compatible with the full disk Level-1.5 data scans. Prologue and Epilogue (Level-1.5 Header and Level-1.5 Trailer) have the same structure. Calibration is performed in the same way as in Full Earth Scan mode. Image rectification is to 9.5°E. The 5-minute scans start at 00:00, 00:05, 00:10, 00:15 ... etc. The differences from the nominal Full Earth scan are that for channels 1 - 11, only segments 6 - 8 are disseminated, and for the High Resolution Visible Channel, only segments 16 - 24 are disseminated.

3.1.2.1.1 Service Specification & Availability

Product Group	Product Group Attributes		
	Timeliness	**Accuracy and Coverage**	**Completeness**
9.5° E RSS SEVIRI Level-1.5 Image Data	5 mins	**Nominal Radiometric and Geometric quality** if it meets radiometric and geometric accuracy requirements as specified in MSG EURD [RD. 5]. The MSG Rapid Scan area will cover a latitude range from approximately 15° to 70° N.	**Level-1.0 Image has nominal completeness if**: • Exhibits <18 missing detector lines (54 for HRV) in the region of interest (scanned Earth area) for any given spectral channel, and • < 12 adjacent missing detector lines (36 for HRV) in the region of interest for any given spectral channel **Level-1.5 Image has nominal completeness if**: • Level-1.0 image was nominally complete, and • Level-1.5 image-generation process completed successfully.

Product Group	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	**Instrument Operational Requirements**
	Target: 91%	The scheduled outages are:	RSS is a quasi-permanent rapid-scan imaging service. This means that rapid scanning is performed for a certain period and

Product Group	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	**Instrument Operational Requirements**
9.5° E RSS SEVIRI Level-1.5 Image Data		• Station Keeping, Attitude, Spin-up and down manoeuvres lead to a disturbance of the satellite attitude and consequently to an image quality degradation. This occurs several times per year typically over a period of up to three hours. • The eclipse phase may lead to image quality degradation. No interruption in the imaging in the IR channels and in the data dissemination is foreseen. • When the Sun enters the main lobe of the PGS, the system noise temperature increases quickly preventing from the reception of all L-Band links. This occurs twice a year around Equinox seasons for around 10 days, impacting a few repeat cycles per day. • Degraded image quality due to stray-light (in VIS 0.6, 0.8, IR 3.9 and HRV) when the sun gets close to the image field of view occurs	then interrupted for a short time before rapid scanning continues once more. The period between rapid scanning sessions is used to perform Full Earth Scanning (FES), which is needed to derive navigation information for the image processing system. In addition, this period is used for spacecraft orbit-determination ranging. Baseline operations for MSG RSS is 26 days of continuous rapid scanning followed by 2 days of Full Earth disc scanning for 11 months per year, with the 12th month (typically around Jan/Feb) being devoted to FES. During FES mode, data are not disseminated. This approach has been adopted to preserve the integrity and the lifetime of the SEVIRI scan mechanism. The full disc scan is beneficial as it allows the smoothing-out of any potential irregularity induced in the bearings and their cages by the rapid scan movement which is frequent and short. When a backup satellite is available to support the RSS service, the gaps in RSS scanning by the primary RSS satellite described above can be filled by use of the backup satellite, effectively providing a continuous operational RSS service.

Product Group	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	**Instrument Operational Requirements**
		typically for a few hours around midnight during the eclipse season.	

3.1.2.2 9.5° E RSS Meteosat Meteorological Products

The EUMETSAT Application Ground Segment generates a variety of Meteorological Products derived from the RSS Image Data and ancillary data. The full range of products is described in the Product Guide [AD. 2] and in the EUMETSAT User Portal https://user.eumetsat.int/. In addition, EUMETSAT generates a selection of products by applying the NWC SAF GEO software packages to support now-casting applications. The characteristics of the products are described in the factsheets [AD. 12][AD. 17][AD. 28].

3.1.2.2.1 Service Specification & Availability

Product Group	Product Group Attributes		
	Timeliness	**Accuracy and Coverage**	**Completeness**
9.5° E RSS Meteosat Meteorological Products	15 mins [5]	As specified in [AD. 2]	The products are considered complete if they have been successfully generated from all input data.

Product Group	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	**Instrument Operational Requirements**
9.5° E RSS Meteosat Meteorological Products	Target: 91%	n/a	Note that products cannot be produced if there are gaps in the Level-1.5 image service due to the need to operate the SEVIRI instrument in full scan mode as described above. Due to operational reasons, meteorological products are also not generated from the image data produced by a backup satellite in the gaps.

[5] Timeliness is measured relative from the time the product repeat cycle is complete and received at the product processing facility.

3.1.3 45.5°E IODC

The 45.5° IODC Service covers all image data and products derived from the Meteosat 'Full-Earth Scan', which is performed at 45.5°E.

The SEVIRI instrument on-board the Meteosat Second Generation (MSG) satellite delivers images in the visible and infrared parts of the electromagnetic spectrum with a resolution of 3 km, plus atmospheric pseudo-sounding and thermal information. The High Resolution Visible (HRV) channel has a resolution of 1 km and only covers a part of the full disc view, with the upper and lower window moving to provide a diurnal mix of Indian Ocean and European coverage. The full disc view allows frequent sampling, every 15 minutes, enabling monitoring of rapidly evolving events.

Further information on the SEVIRI instrument can be found in [RD. 6].

3.1.3.1 45.5°E IODC SEVIRI Level-1.5 Image Data

Level-1.5 image data corresponds to the geolocated and radiometrically pre-processed and calibrated image data, ready for further processing, e.g. the extraction of meteorological products. Any spacecraft specific effects have been removed, and in particular, linearization and equalisation of the image radiometry has been performed for all SEVIRI channels. The on-board blackbody data has been processed. Both radiometric and geometric quality control information is included. The data is transmitted as High Rate Information Transmissions (HRIT) in 12 spectral channels.

3.1.3.1.1 Service Specification & Availability

Product Group	Product Group Attributes		
	Timeliness	**Accuracy and Coverage**	**Completeness**
45.5°E IODC SEVIRI Level-1.5 Image Data	5 mins	**Nominal Radiometric and Geometric quality** if it meets radiometric and geometric accuracy requirements as specified in the MSG EURD [RD. 5]	**Level-1.0 Image has nominal completeness if**: • Exhibits <18 missing detector lines (54 for HRV) in the region of interest (scanned Earth area) for any given spectral channel, and • < 12 adjacent missing detector lines (36 for HRV) in the region of interest for any given spectral channel **Level-1.5 Image has nominal completeness if**: • Level-1.0 image was nominally complete, and • Level-1.5 image generation process completed successfully

Product Group	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	**Instrument Operational Requirements**
45.5°E IODC SEVIRI Level-1.5 Image Data	Target: 97%	The scheduled outages are: • Station Keeping, Attitude, Spin-up and down manoeuvres lead to a disturbance of the satellite attitude and consequently to image quality degradation. This several times per year typically over a period of up to three hours; • The eclipse phase may lead to image quality degradation. No interruption in the imaging in the IR channels and in the data dissemination is foreseen; • When the Sun enters the main lobe of the Primary Ground Station (PGS), the system noise temperature increases quickly preventing the reception of all L-Band links. This occurs twice a year around Equinox seasons for around 10 days impacting a few repeat cycles per day. • Degraded image quality due to stray-light (in VIS 0.6, 0.8, 1.6, IR 3.9 and HRV) when the sun gets close to the image field of view occurs typically for a few hours around midnight during the eclipse season. • The swap of a mission from one satellite to another (e.g. after the completion of satellite commissioning when the operational missions are transferred to a new satellite) may result in an outage of a few hours.	SEVIRI decontamination requires that all sensors are switched off, thus interrupting the imaging in all channels, typically over a period of five to six days.

3.1.3.2 45.5°E IODC Meteosat Meteorological Products

The EUMETSAT Application Ground Segment generates a variety of Meteorological Products derived from the Level-1.5 Image Data and ancillary data. The full range of products is described in the Product Guide [AD. 2] and in the EUMETSAT User Portal https://user.eumetsat.int/. In addition, EUMETSAT generates a selection of products by applying the NWC SAF GEO software packages to support now-casting applications. The characteristics of the products are described in the factsheet [AD. 29].

3.1.3.2.1 Service Specification & Availability

Product Group	Product Group Attributes		
	Timeliness	**Accuracy and Coverage**	**Completeness**
45.5°E IODC Meteosat Meteorological Products	15 mins [6]	As specified in [AD. 2]	The products are considered complete if they have been successfully generated from all input data.

Product Group	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	**Instrument Operational Requirements**
45.5°E IODC Meteosat Meteorological Products	Target: 97%	The scheduled outages are: • Station Keeping, Attitude, Spin-up and down manoeuvres lead to a disturbance of the satellite attitude and consequently to image quality degradation. This several times per year typically over a period of up to three hours; • The eclipse phase may lead to image quality degradation. No interruption in the imaging in	SEVIRI decontamination requires that all sensors are switched off, thus interrupting the imaging in all channels, typically over a period of five to six days.

[6] Timeliness is measured relative from the time the product repeat cycle is complete and received at the product processing facility.

Product Group	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	**Instrument Operational Requirements**
		the IR channels and in the data dissemination is foreseen; • When the Sun enters the main lobe of the Primary Ground Station (PGS), the system noise temperature increases quickly preventing the reception of all L-Band links. This occurs twice a year around Equinox seasons for around 10 days impacting a few repeat cycles per day. • Degraded image quality due to stray-light (in VIS 0.6, 0.8, 1.6, IR 3.9 and HRV) when the sun gets close to the image field of view occurs typically for a few hours around midnight during the eclipse season. • The swap of a mission from one satellite to another (e.g. after the completion of satellite commissioning when the operational missions are	

Product Group	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	Instrument Operational Requirements
		transferred to a new satellite) may result in an outage of a few hours.	

3.2 Meteosat Third Generation

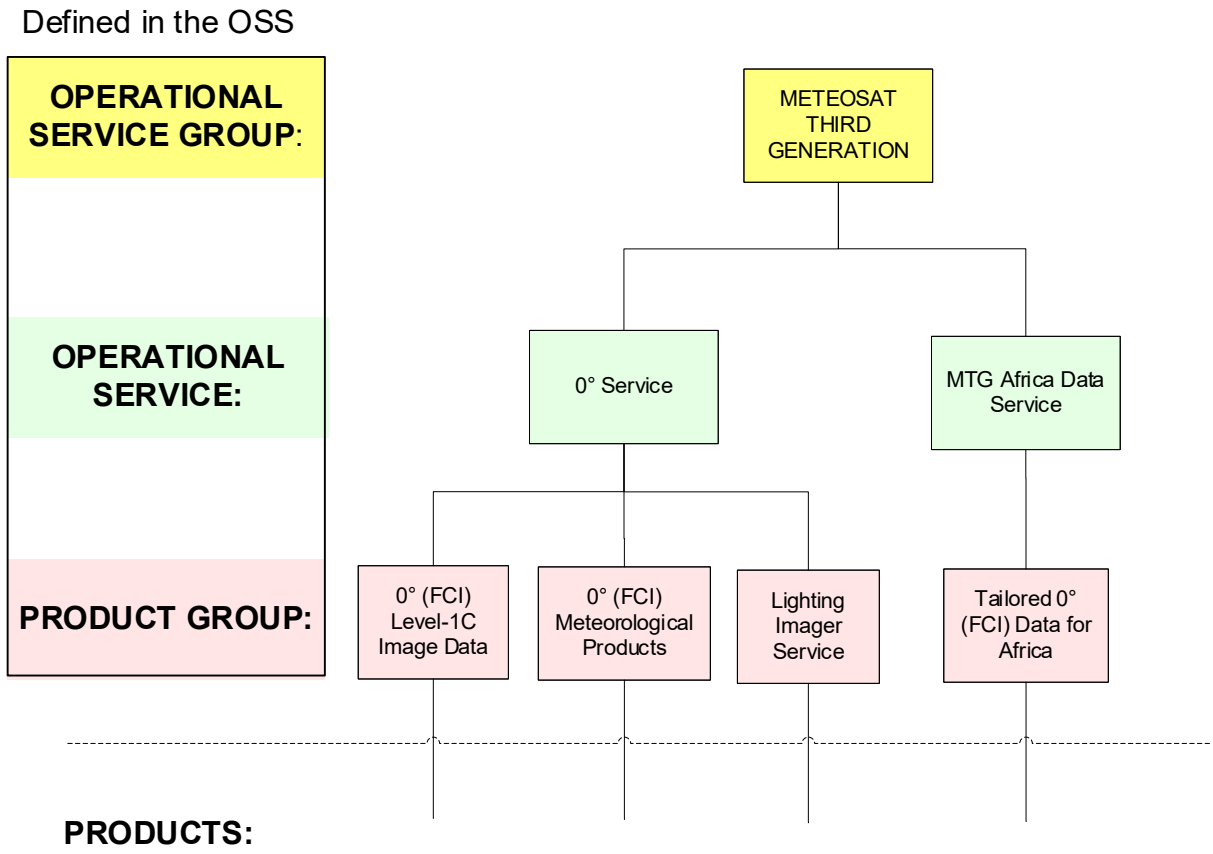

Figure 3 - Overview of Meteosat Third Generation Services

This operational service group refers to the dissemination of data and products produced from instruments as part of the Meteosat Third Generation (MTG) system. The complete constellation consists of three satellites: two imaging satellites (MTG-I1 and MTG-I2) and one sounding satellite (MTG-S1). MTG-I1 (referred as MET-12) is currently providing the 0° service.

On 13 January 2024, the Calibration and Obturation Mechanism (COM) of the Flexible Combined Imager (FCI) onboard MTG-I1 experienced a major anomaly, resulting in the loss of its primary onboard calibration sources for both the VNIR and IR channels. In response, EUMETSAT implemented a ground-based mitigation strategy to address the issue. However, this anomaly may impact the availability figures for MTG-I1 FCI services.

3.2.1 0° Service MTG Imager

The 0° Service MTG-I covers all image data and products derived from the Meteosat 'Full-Earth Scan', which is performed at 0° longitude.

3.2.1.1 0° (FCI) Level-1C Image Data

The MTG Flexible Combined Imager (FCI) hosted on the MTG-I generates simultaneously images at various spatial resolutions for 16 spectral channels, including 4 at high spatial resolution. Normal Earth full disc scanning can be operated on a single satellite (e.g. when only one imaging satellite is operational in orbit) or conducted with a backup strategy when two MTG-I satellites are available in-orbit. This scanning mode correspond to the Full Disc Scanning Service (FDSS).
FDSS Level-1C image data corresponds to the geolocated and radiometrically pre-processed and calibrated image data, ready for further processing, e.g. the extraction of meteorological products (Level-2).

3.2.1.1.1 Service Specification & Availability

Product Group	Product Group Attributes		
	Timeliness	**Accuracy and Coverage**	**Completeness**
0° (FCI) Level-1C Image Data	15 min.[7]	If it meets the following accuracy requirements [RD. 13] : 1) Spectral requirements 2) Radiometric requirements 3) Spatial & temporal requirements 4) Geometric requirements	**Level-1 Image has nominal completeness if**: • If the FCI image meets the acquisition requirements [RD. 13] • If less than 5% of the radiance samples in the image are declared missing samples **Level-1C Image has nominal completeness if**: • Level-1 image was nominally complete, and • Level-1C image generation process completed successfully, as specified in the RD1

[7] Timeliness is computed as the difference between the foreseen end of acquisition of the last contributing data (e.g. from a sample, a dwell, a swath, granule, a segment, an image) by EUMETSAT (at satellite level), and the end of reception of the corresponding data by the users (i.e. before decryption and decompression).

Product Group	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	Instrument Operational Requirements
0° (FCI) Level-1C Image Data	Target: 99% [8]	Scheduled and unscheduled outages: 4% per year at satellite level + 0.5% due to planned GS maintenance. The quality of around 5% of the acquired *datasets* per year may be degraded for some channels during *eclipse* seasons. The scheduled outages are: • *Satellite* orbit manoeuvres and wheel off-loading manoeuvres: there can be up to a few tens of manoeuvres per year, each with the *outage* lasting up to 3 h. • *Satellite yaw-flip*: this occurs twice a year and with the *outage* lasting up to half a day each time. • Sun, *satellite*, ground station co-linearity effect (Ka reception degradation): the co-linearity occurs twice a year around the Equinox seasons for around 10 days, impacting a few *repeat cycles* per day. • The swap of a mission from one *satellite* to another will result in an *outage* of a few hours. • Swap of FDSS from one imaging S/C to another would result in an *outage* of a several hours on the FCI (the exact amount of time is still an Open Issue) • E*clipse* season quality degradation: will occur typically for a few hours around midnight. There are 2 *eclipse* seasons per year, each lasting 42 days as long as the orbital inclination is controlled within 1° or longer for higher orbital inclinations.	If the 0° FDSS Service cannot be supported by another backup spacecraft during a FCI decontamination, then the activity will result in the following service impact: Instrument decontamination requires that the Infrared sensors are switched off, thus interrupting the imaging in these channels (NIR and IR). The decontamination may also degrade the other (VIS). *Outage* is typically one day and a half once or twice per year.

[8] EURD [RD. 13] requirement = 95%

3.2.1.2 0° (FCI) Meteorological Products (Level-2)

The EUMETSAT Application Ground Segment generates a variety of Meteorological Products derived from the Level-1C Image Data and ancillary data.

The list of products to be generated from the MTG missions, the respective generation philosophies, and the decision where each product is generated (at the EUMETSAT HQ or within the Satellite Application Facility (SAF) network) are decisions taken by the Council. In this section, only Level-2 products related to the FDSS are defined.

3.2.1.2.1 Service Specification & Availability

Product Group	Product Group Attributes		
	Timeliness	**Accuracy and Coverage**	**Completeness**
0° (FCI) Meteorological Products (Level-2)	20 min.[9]	As specified in [RD. 13]	The products are considered complete if they have been successfully generated from all input data.

Product Group	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	**Instrument Operational Requirements**
0° (FCI) Meteorological Products (Level-2)	Target: 95% [10]	If there is an outage that causes an interruption of the *Dataset* acquisition and Level-1 products, or a processing outage at L2PF level, as logical consequence the Level-2 products cannot be generated.	Level-2 products cannot be produced if there is an outage of the FCI Level-1C image service due to decontamination as described above.

[9] Timeliness is computed as the difference between the foreseen end of acquisition of the last contributing data (e.g. from a sample, a dwell, a swath, granule, a segment, an image) by EUMETSAT (at satellite level), and the end of reception of the corresponding data by the users (i.e. before decryption and decompression).
[10] EURD [RD. 13] requirement = 95%

3.2.1.3 Lighting Imager Service

The Lightning Imager (LI) acquisition provides a real time lightning location and detection (cloud-to-cloud and cloud-to-ground strokes, with no discrimination between the two types).
There are no LI Level-1 datasets to be disseminated, only Level-2.

3.2.1.3.1 Service Specification & Availability

Product Group	Product Group Attributes		
	Timeliness	**Accuracy and Coverage**	**Completeness**
Lighting Imager Level-2	2 min.[11]	As specified in [RD. 13]	The LI products are disseminated in either 10-second chunks (event based products) or 30-second (accumulated products). The full repeat cycle is a configurable time interval between 1 minute and 20 minutes, being 10 minutes the default.

Product Group	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	**Instrument Operational Requirements**
Lighting Imager Level-2	Target: 95% [12]	Note: If there is an outage that causes an interruption of the *dataset* acquisition and Level-1 products, or a processing outage at L2PF level, as logical consequence the Level-2 products cannot be generated.	There are no instrument-specific operational constraints, aside from non-periodic calibrations, which will affect the generation of Level-1 and Level-2 products.

[11] Timeliness is computed as the difference between the foreseen end of acquisition of the last contributing data (e.g. from a sample, a dwell, a swath, granule, a segment, an image) by EUMETSAT (at satellite level), and the end of reception of the corresponding data by the users (i.e. before decryption and decompression).
[12] EURD [RD. 13] requirement = 95%

3.2.2 MTG Africa Data Service

The MTG Africa data service covers FCI image data and products derived from the Meteosat 'Full-Earth Scan', which is performed at 0° longitude, and tailored in order to provide the best fit for the needs of the African user community.

3.2.2.1 Tailored 0° (FCI) Data for Africa

The MTG Africa data service provides a subset of MTG data derived from the FCI Full Disc Scanning Service (FDSS). The service comprises tailored FCI L1C data in netCDF4, and a set of centrally generated RGBs (GeoTIFF). In addition, there is a selection of tailored L2 data from EUMETSAT's central facility and SAFs.

For more information regarding MTG-I FCI Level-1C and Level-2 data, see sections 3.2.1.1 and 3.2.1.2.

3.2.2.1.1 Service Specification & Availability

Product Group	Product Group Attributes		
	Timeliness	Accuracy and Coverage	Completeness
Tailored 0° (FCI) Data for Africa	20 min	See 3.2.1.1 and 3.2.1.2.	See 3.2.1.1 and 3.2.1.2.

Product Group	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	Instrument Operational Requirements
Tailored 0° (FCI) Data for Africa	Target: 90%	See 3.2.1.1 and 3.2.1.2.	See 3.2.1.1 and 3.2.1.2.

4 METOP AND NOAA GLOBAL DATA SERVICES (GDS)

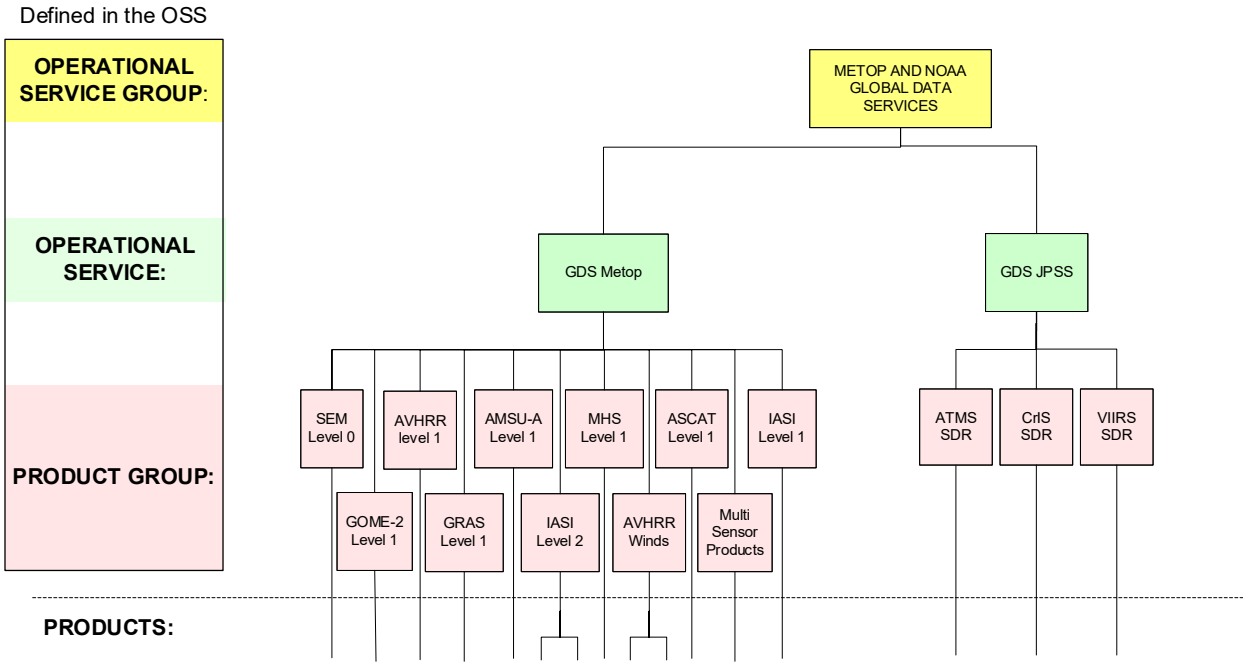

Figure 4 - Overview of Metop and NOAA Global Data Services

This operational service group refers 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 between the Initial Joint Polar System (IJPS) and future Joint Polar System (JPS). Under the IJPS and JTA agreements, the system shared by EUMETSAT and NOAA currently consists of five polar-orbiting satellites, namely three satellites provided by NOAA to cover the afternoon orbit and the EUMETSAT Polar System (EPS) providing two Metop satellites to cover the mid-morning orbit. These satellites provide data to support the following operational services:

- **GDS Metop:** Current service supported by Metop-B and Metop-C low-Earth-orbit polar satellites, providing 'Global Data Service' data acquired from the mid-morning orbit. Metop-C is phase-separated from Metop-B by 180°.
- **GDS JPSS**: The Joint Polar Satellite System (JPSS) was established as the civilian successor to the restructured National Polar-orbiting Operational Environmental Satellite System (NPOESS). This service is supported by NOAA-20 (also named JPSS-1), NOAA-21 (also named JPSS-2), and the Suomi-National Polar Orbiting Partnership (S-NPP) satellite, providing 'Global Data Service' data acquired from the afternoon orbit.

4.1 GDS Metop

The following data dissemination services are provided within the framework of the EPS Programme, based on the following instruments flown on the Metop satellites:

1) SEM Space Environment Monitor;
2) AVHRR Advanced Very High Resolution Radiometer
3) AMSU-A (Advanced Microwave Sounding Unit-A)
4) MHS (Microwave Humidity Sounder)
5) IASI Infrared Atmospheric Sounding Interferometer;
6) GOME-2 Global Ozone Monitoring Experiment;
7) ASCAT Advanced SCATterometer;
8) GRAS Global Navigation Satellite System (GNSS) Receiver for Atmospheric Sounding.

Note that only the AVHRR and the ATOVS package instruments are provided for data originating from both Metop and NOAA satellites, the remaining instruments are flown on Metop only.

The Metop Global Data Service provides near real-time products to the user community generated from instrument data. Instrument data recorded during the last orbit of Metop are dumped to the Central Data Acquisition Station (CDA) located in Svalbard. In addition, the Metop satellite designated as the “Primary” mission dumps descending orbit global data at the McMurdo Ground Station (MG-1), under the Antarctic Data Acquisition (ADA) service. This allows dumping global meteorological sensor data stored on the satellite’s on-board recorders twice per orbit, thereby ensuring improved timeliness in the delivery of data as measured throughout the Metop orbit. The Metop satellites designated as secondary dump global data at the CDA only.

The data received at the CDA and MG-1 stations is transferred to EUMETSAT headquarters, where they are processed and then disseminated to the user.

MG-1 is available for reception of data from the primary Metop satellite for approximately 14 orbits per day, in addition to the corresponding number of dumps currently acquired by the Svalbard ground station. The service characteristics derived from data acquired by these instruments are defined in the following sections.

4.1.1 SEM Level-0

The Space Environmental Monitor (SEM-2) is a multi-channel, charged-particle spectrometer that provides measurements to determine the intensity of the Earth's radiation belts and the flux of charged particles at the satellite altitude. SEM actually consists of two instruments: the Total Energy Detector (TED) and the Medium Energy Proton and Electron Detector (MEPED). It provides knowledge of solar terrestrial phenomena and also provides warnings of solar wind occurrences that may impair long-range communication, high-altitude operations, damage to satellite circuits and solar panels, or cause changes in drag and magnetic torque on satellites.

The SEM L0 product consists of the SEM instrument source packets, in EPS Native format. Further information on the SEM instrument can be found in [RD. 4].

4.1.2 AVHRR Level-1

The Advanced Very High Resolution Radiometer (AVHRR) operates at 5 different channels simultaneously in the visible and infrared bands, with wavelengths specified in the instrument channels description. Channel 3 switches between 3a and 3b for daytime and night-time. As a high-resolution imager (about 1.1 km near nadir), its main purpose is to provide cloud and surface information such as cloud coverage, cloud top temperature, surface temperature over land and sea, and vegetation or snow/ice. In addition, AVHRR is used in the processing of other instrument data like IASI1 and Level-2 and ATOVS Level-2.

A full description of the processes used to derive these Level-1B products is given in [AD. 5].

4.1.3 AMSU-A Level-1

The Advanced Microwave Sounding Unit-A (AMSU-A) is a 15-channel microwave radiometer that is used for measuring global atmospheric temperature profiles and will provide information on atmospheric water in all of its phases (with the exception of small ice particles, which are transparent at microwave frequencies). AMSU-A is composed of two instruments A1 and A2. AMSU-A measures Earth radiance at the frequencies (in GHz) listed in the instrument channel information.

A full description of the processes used to derive these Level-1B products is given in [AD. 4].

4.1.4 MHS Level-1

The Microwave Humidity Sounder (MHS) is a 5 channel instrument used to provide input to the retrieval of surface temperatures, emissivity, and atmospheric humidity. In combination with AMSU-A information, it can also be used to process precipitation rates and related cloud properties, as well as to detect sea ice and snow coverage.

A full description of the processes used to derive these Level-1B products are given in [AD. 4].

4.1.5 IASI Level-1

The main objective of the Infrared Atmospheric Sounding Interferometer (IASI) is to provide high resolution atmospheric emission spectra to derive temperature and humidity profiles with high spectral and vertical resolution and accuracy. Additionally it is used for the determination of trace gases such as ozone, nitrous oxide, carbon dioxide and methane, as well as land and sea surface temperature, emissivity and cloud properties. The IASI Level-1 product group consists of the Level-1C full spectral product, a reduced subset product and the Principle Component Compression products. A description of the process used to derive these Level-1 products is given in [AD. 7].
As a baseline the generation of the product depends on the AVHRR product (AVHRR radiance analysis is part of IASI Level-1 product, AVHRR is used to derive cloudiness information). Earth location is done through AVHRR.

4.1.6 GOME-2 Level-1

The Global Ozone Monitoring Experiment-2 (GOME2) spectrometer measures profiles and total columns of ozone and of other atmospheric constituents that are related to the depletion of ozone

in the stratosphere and its production in the troposphere, as well as to natural and anthropogenic sources of pollution.

A full description of the process used to derive this Level-1B product is given in [AD. 9].

4.1.7 ASCAT Level-1

The prime objective of the Advanced SCATterometer (ASCAT) is to measure wind speed and direction over the oceans, and the main operational application is the assimilation of ocean winds in NWP models. Other operational applications, based on the use of measurements of the backscattering coefficient, are sea ice edge detection and monitoring, monitoring sea ice, snow cover, soil moisture and surface parameters.

The core of all these Level-1 products is triplets of the normalised radar backscattering cross-section (σ_0) data (which is derived from the on-board radar measurements).

A full description of the process used to derive these Level-1 products is given in [AD. 10].

4.1.8 GRAS Level-1

The GNSS (Global Navigation Satellite System) Receiver for Atmospheric Sounding (GRAS) probes the vertical profile of the atmosphere by observing GPS (Global Positioning Satellite) in a limb sounding geometry. GRAS observes rising and setting occultations in velocity and anti-velocity direction, providing a minimum of 500 profiles per satellite and per day with high vertical resolution. The raw data can be processed further to profiles of bending angle over impact parameter at Level-1B and to refractivity, temperature, and humidity over altitude at Level-2, covering the stratosphere and troposphere.

A full description of the process used to derive this Level-1B product is given in [AD. 11].

4.1.9 IASI Level-2

The main objective of the Infrared Atmospheric Sounding Interferometer (IASI) is to provide high-resolution atmospheric emission spectra to derive temperature and humidity profiles with high spectral and vertical resolution and accuracy. Additionally, it is used for the determination of trace gases such as ozone, nitrous oxide, carbon dioxide, carbon monoxide and methane, as well as land and sea surface temperature, emissivity and cloud properties.

IASI data are also interpolated on a given number of pressure levels to obtain IASI three-dimensional wind profiles over the polar regions (product referred as IASI 3D Winds).

A full description of the process used to derive these Level-2 products is given in [AD. 8].

4.1.10 AVHRR Winds

The AVHRR data from the IR 10.8 channel is used to derive winds from tracking the motion of clouds at various heights below the tropopause in the Polar Regions (latitudes higher than 55º).
A full description of the process used to derive these Level-2 products is given in [AD. 12].

In addition to the single Polar satellite products, AVHRR data is also used to derive global wind products using multiple Metop satellites.

Dual global wind products are based on image pairs derived from consecutive data from the Metop satellites. Triplet polar-wind products implement the tracking of the same feature along three successive images acquired from each of the Metops.

4.1.11 Multi-Sensor Products

Polar Multi-Sensor Aerosol Products (PMAp) parameters are derived from Level-1 data from three Metop sensors: GOME-2, AVHRR and IASI. PMAp provides aerosol optical depth (AOD), aerosol type (fine mode, coarse mode (dust), volcanic ash) over ocean surfaces. It also provides cloud optical depth (COD) and cloud top temperature information at a global scale.

A full description of the process used to derive these Level-2 products is given in [AD. 13].

4.1.12 Service Specification

Product Group	Product Group Attributes		
	Timeliness	**Accuracy and Coverage**	**Completeness**
SEM Level-0	2 hrs 15 mins ADA Target: 70 mins(13)	n/a	The product will be considered complete if valid Measurement Data Records are available for the full orbit (i.e. no missing records).
AVHRR Level-1		As specified in [AD. 5]	
AMSU-A Level-1		As specified in [AD. 4]	
MHS Level-1		As specified in [AD. 4]	
IASI Level-1		As specified in [AD. 7]	
GOME-2 Level-1		As specified in [AD. 9]	
ASCAT Level-1		As specified in [AD. 10]	
GRAS Level-1		As specified in [AD. 11]	
IASI Sounding Products	3 hrs	As specified in [AD. 8]	The product will be considered complete if valid Measurement Data Records are available for the full orbit (i.e. no missing records).
AVHRR Winds		As specified in [AD. 12]	
Multi-Sensor Products		As specified in [AD. 13]	

(13) This is the timeliness specification only for the primary satellite where global data is dumped at ADA.

4.1.13 Service Availability

Product Group	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	**Instrument Operational Requirements**
SEM Level-0	Target: 98 %	**In-plane manoeuvre:** ~ 6.5 hrs outage. **Out-of-plane manoeuvre:** Single burn: ~ 6.5 hrs outage, Double burn: ~ 20 hrs outage	Instrument calibration activities will result in a service outage. MEPED Calibration (duration 6.4 min) is typically carried out every Tuesday. TED Calibration (1 Orbit / 101 min) is typically carried out every fifth Tuesday. Depending on the degradation of the instrument performance, SEM TED will require occasional bias level changes (max 20 changes), resulting in product unavailability for a duration of two orbits.
AVHRR Level-1	Target: 98 %	**Out-of-plane manoeuvre:** Single burn: ~ 2 hrs outage, Double burn: ~ 3.5 hrs outage	There are no foreseeable instrument operations which result in a service outage.
AMSU-A Level-1	Target: 98 %	**Out-of-plane manoeuvre:** Single burn: ~ 6.25 hrs outage, Double burn: ~ 20 hrs outage	There are no foreseeable instrument operations which result in a service outage.
MHS Level-1	Target: 98 %	**Out-of-plane manoeuvre:** Single burn: ~ 5.5 hrs outage, Double burn: ~ 20 hrs outage	Depending on the degradation of the instrument performance, MHS will require occasional receiver gain changes (max 3 changes on each of the 5 channels), resulting in product unavailability for a duration of two orbits.
IASI Level-1	Target: 98 %	**Out-of-plane manoeuvre:** Single burn: ~ 6 hrs outage, Double burn: ~ 20 hrs outage	• Depending on radiometric performance, IASI will require decontamination. It is estimated that decontamination will be required no more than once every 18 months, and each decontamination operation will result in an outage of 7 days. • Routine External calibration of the IASI instrument is performed on a monthly (29-day cycle) basis and results in a service outage of 4 hours.

Product Group	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	**Instrument Operational Requirements**
			Depending on geometric conditions, outages due to Moon Calibrations may occur. This may cause an outage of roughly 15 minutes per orbit for 10 consecutive orbits, approximately 4 times per year.
GOME-2 Level-1	Target: 98 %	**In-plane manoeuvre:** ~ 2 hrs outage. **Out-of-plane manoeuvre:** Single burn: ~ 2 hrs outage. Double burn: ~ 20 hrs outage	• Depending on the degradation and evolution of the instrument performance, GOME will require occasional updates to timelines and channel separation settings, resulting in an outage of 1 orbit / ~101 mins each time. It is estimated that such updates will occur approximately twice per year.
ASCAT Level-1	Target: 98 %	**Out-of-plane manoeuvre:** Single burn: ~ 3.5 hrs outage, Double burn: ~ 20 hrs outage [14]	The following instrument-specific considerations will result in the unavailability of the ASCAT Level-1 product group: • monthly external calibration over 3 transponders located in central Turkey (frequency once per 29-day cycle); The calibration occurs in 4 passes on 4 successive days, affecting about 6 minutes of data each. • full external calibration campaign (frequency about once per two years for each satellite, lasting two to three 29-day cycles, a total of 126 to 189 passes). Each outage is about 6mins per pass. The need for full external calibration campaigns will evolve during the lifetime of the spacecraft. • Gain Compression Monitoring, frequency once per 4 weeks, on A Monday, with 2 weeks between M01 and M02. About 6 minutes of data is affected, however this is mostly over land.

[14] Improvements to product processing will allow products to be generated between burns, resulting in 2 x 3.5 hrs outages

Product Group	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	**Instrument Operational Requirements**
GRAS Level-1	Target: 98 %	**In-plane manoeuvre:** ~ 6 hrs outage. **Out-of-plane manoeuvre:** Single burn: ~ 6 hrs outage, Double burn: ~ 2 x 6 hrs outage	There are no foreseeable instrument operations which result in a service outage.
IASI Sounding Products	Target: 98 %	**Out-of-plane manoeuvre:** Single burn: ~ 6 hrs outage, Double burn: ~ 20 hrs outage	See applicable outages for IASI Level-1.
AVHRR Winds	Target: 98 %	**Out-of-plane manoeuvre:** Single burn: ~ 2 hrs outage, Double burn: ~ 2 x 2 hrs outage	There are no foreseeable instrument operations that result in a service outage.
Multi-Sensor Products	Target: 98 %	**In-plane manoeuvre:** ~ 2 hrs outage. **Out-of-plane manoeuvre:** Single burn: ~ 2 hrs outage, Double burn: ~ 20 hrs outage	See applicable outages for GOME-2 Level-1.

4.2 GDS JPSS

The Joint Polar Satellite System (JPSS) mission is a new series of satellites following on from the IJPS (NPOESS) and flying new instruments, using a new ground data network. This mission is currently supported by NOAA-21, NOAA-20 and S-NPP satellites.

The five instruments included as payload aboard JPSS satellites are:

1) Advanced Technology Microwave Sounder (ATMS)
2) Cross-track Infrared Sounder (CrIS)
3) Clouds and the Earth's Radiant Energy System (CERES)
4) Visible Infrared Imager Radiometer Suite (VIIRS)
5) Ozone Mapping and Profiler Suite (OMPS)

The Global JPSS Service is based on the ATMS, CrIS and VIIRS data acquired, processed and formatted by the NOAA / NPOESS Data Exploitation (NDE) and Product Distribution and Acquisition (PDA) projects. The data will consequently have a timeliness value typical for global data and the geographical coverage of these data sets is global. Global JPSS data is provided as Sensor Data Records (SDRs) (Level-1) and Environmental Data Record (EDRs) (Level-2).

4.2.1 ATMS SDR

The Advanced Technology Microwave Sounder (ATMS) is a new Microwave Sounder combining the capabilities of AMSU-A and MHS in a single instrument.

4.2.2 CrIS SDR

The Cross-track Infrared Sounder (CrIS) is an IASI-type Infrared Sounder optimised for Meteorological Sounding of the atmosphere. The CrIS SDRs are additionally tailored by decoding the BUFR data, retaining only a subset of channels (for GTS dissemination) and re-encoding the data prior to repacking and renaming the file.

4.2.3 VIIRS SDR

The Visible Infrared Imaging Radiometer Suite (VIIRS) instrument on board the prime JPSS satellite collects visible and infrared images and global observations of the land, atmosphere, cryosphere and oceans, providing full daily coverage both in the day and night side of the Earth. VIIRS has 22 spectral bands covering the spectrum between 0.412 µm and 12.01 µm, including 16 moderate resolution bands (M-bands) with a spatial resolution of 750 m at nadir, 5 imaging resolution bands (I-bands) – 375 m at nadir, and one panchromatic day-night band (DNB) with a 750 m spatial resolution throughout the scan.

Both for the VIIRS M-Band and DNB, a granule with 48 instrument scans contains 768 lines along the track. EUMETSAT distributes the VIIRS M-Band and DNB data, including the geo-location files.

4.2.4 Service Specification

Product Group	Product Group Attributes		
	Timeliness	**Accuracy and Coverage**	**Completeness**[15]
ATMS SDRs	15 mins after products are made available by NOAA	All 22 ATMS spectral channels, all Fields of View, calibrated and geolocated, in BUFR Format.	Segments each containing 32 seconds of observations
CrIS SDRs	30 mins after products are made available by NOAA.	All 2211 CrIS spectral channels, all Fields of View, calibrated and geolocated. Co-located cloud information derived from VIIRS data, in BUFR Format.	Segments each containing 32 seconds of observations
VIIRS SDRs	30 mins after products are made available by NOAA	17 VIIRS spectral channels, calibrated and geolocated, in netCDF Format.	Segments each containing 85 seconds of observations

[15] The completeness of the product files depends on the completeness and quality of the incoming data which is not under the responsibility of EUMETSAT.

4.2.5 Service Availability

Product Group	Availability % [16]	Scheduled Outages	
		Routine Spacecraft Operational Requirements	Instrument Operational Requirements
ATMS SDRs	95%	n/a	n/a
CrIS SDRs	95%	n/a	n/a
VIIRS SDRs	85%	n/a	n/a

[16] The data availability requirements of the EUMETCast distribution for the defined data is described as the ratio between the number of product files (per data type) received by the EUMETCast reference station and the number of corresponding data files available by NOAA. For the delivery to GTS, the ratio between the number of data files delivered to the GTS and the number of data available by NOAA.

5 REGIONAL DATA SERVICES (RDS)

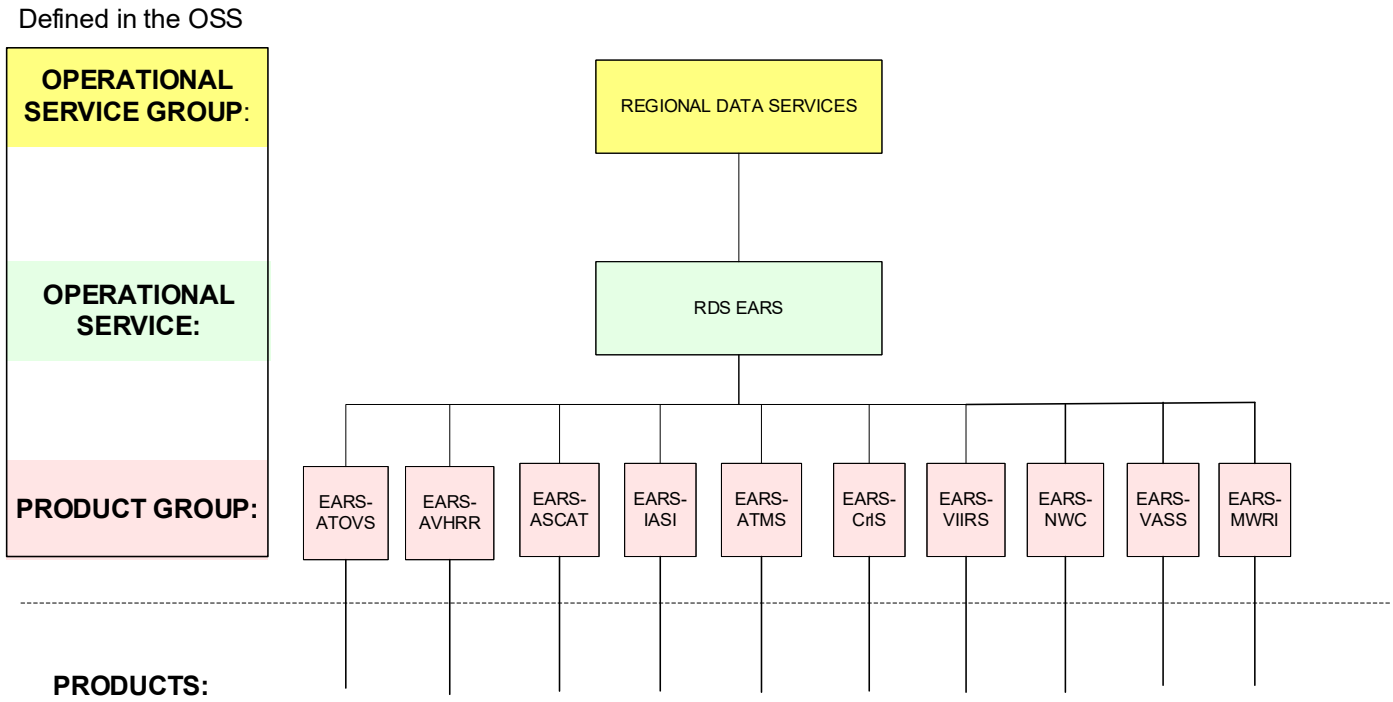

Figure 5 – Overview of Regional Data Services

5.1 RDS EARS

The aim of the EUMETSAT Advanced Retransmission Service (EARS) is to provide polar satellite data from the EUMETSAT Metop and National Oceanic and Atmospheric Administration (NOAA) satellites with improved timeliness suited to the needs of European operational short range regional numerical weather prediction models. This service has now been expanded to include data from the China Meteorological Administration satellites (CMA). The geographical coverage of EARS is primarily over data-sparse sea areas around Europe.

The EARS service comprises the following individual polar satellite instrument data services:

- EARS-ATOVS
- EARS-AVHRR
- EARS-ASCAT
- EARS-IASI
- EARS-NWC (AVHRR)
- EARS-NWC (VIIRS)
- EARS-ATMS
- EARS-CrIS
- EARS-VIIRS
- EARS-VASS

- EARS-MERSI
- EARS-MWRI

Each of these EARS data services retransmits observations from an instrument or an instrument group, while aiming at providing homogeneous services across the NOAA, Metop and FY-3 polar meteorological orbiting satellites.

The stations supporting these EARS services are:

- Core EARS European Stations:
  - Svalbard (SVA)
  - Maspalomas (MAS)
  - Kangerlussuaq (KAN)
  - Athens (ATH)
  - Lannion (LAN)

The mapping between stations, satellites and EARS services can be found in Regional Data Service/EARS | EUMETSAT.

More details on the specification of the EARS services can be found in [AD. 14].

5.1.1 EARS-ATOVS

Sounder data is produced by a set of the instruments making up the Advanced TIROS Operational Vertical Sounder (ATOVS) and is used to obtain information about the vertical profile of temperature and humidity in the atmosphere. The radiation measurements from the ATOVS instruments can be assimilated directly into numerical models of the atmosphere. The EUMETSAT Advanced Retransmission Service (EARS) provides instrument data from the Metop satellites collected via a network of HRPT stations.

For a detailed description of the ATOVS and AVHRR Processing Package (AAPP) product format, see [AD. 15], and BUFR format, see [AD. 3].

5.1.2 EARS-AVHRR

The Advanced Very High Resolution Radiometer (AVHRR) is a multipurpose imaging instrument used for the global monitoring of cloud cover, sea surface temperature, ice, snow and vegetation characteristics. The EUMETSAT Advanced Retransmission Service (EARS) provides AVHRR instrument data from the Metop collected via a network of HRPT stations. Segments of one-minute duration are disseminated to users via EUMETCast. These segments can be concatenated together by users to construct a regional pass.

5.1.3 EARS-ASCAT

The ASCAT Wind Product contains measurements of the wind direction and wind speed at 10 m above the sea surface. The measurements are obtained through the processing of scatterometer data originating from the ASCAT instrument on the Metop satellites. In the context of this regional service, the data is acquired both from the last 30 minutes of the ASCAT Metop main Svalbard

dump, as well as from several other AHRPT stations. All data are acquired and processed jointly by the EARS ground system and the Koninklijk Nederlands Meteorologisch Instituut (KNMI) within 45 minutes. The Level-1 data is generated by the EARS ground system and the Level-2 wind data by KNMI. These products are intended for assimilation in Regional Numerical Weather prediction models, where high timeliness is very important in order to address the short model cut-off times.

For a detailed definition of the EARS-ASCAT product, see [AD. 19]

5.1.4 EARS-IASI

The EARS-IASI service geographical coverage is given by the set of HRPT stations in [AD. 14]. [AD. 14] also lists desired HRPT stations for additional coverage. The EARS-IASI provides the redistribution of a limited set of IASI channels and a Principle Component Scores products with processing, formatting and dissemination mechanism as defined in [AD. 14].

For a detailed definition of the EARS-IASI Level-1C and Level-2 products and formatting, see [AD. 7] and [AD. 8].

5.1.5 EARS-ATMS

Advanced Technology Microwave Sounder (ATMS) combining capabilities of AMSU-A1, AMSU-A2 and MHS in a single compact, power efficient and long life instrument. The EARS-ATMS service will provide all 22 ATMS channels.

5.1.6 EARS-CrIS

The Cross-track Infrared Sounder (CrIS) provides soundings of the atmosphere with 2211 spectral channels, over 3 wavelength ranges: LWIR (9.14 - 15.38 um); MWIR (5.71 - 8.26 um); and SWIR (3.92 - 4.64 um).

5.1.7 EARS-VIIRS

Visible Infrared Imager Radiometer Suite (VIIRS) with heritage from AVHRR and MODIS. VIIRS is composed of 22 Channels, with a resolution of 375m for the 5 I-Band channels, 750m for the 16 M-Band channels and 750m for 1 Day/Night (DNB) channel. The EARS-VIIRS service provides the 16 M-Band channels and data from the 1 Day/Night channel.

5.1.8 EARS-NWC (AVHRR)

The Metop AVHRR raw data as produced by the EARS-AVHRR service (1-minute segment) will be used as input. This data will then be processed to Level-1B using the AAPP processing package delivered by NWP-SAF and to Level-2 using the PPS processing package delivered by NWC-SAF.

5.1.9 EARS-NWC (VIIRS)

The NOAA20/21 VIIRS raw data as produced by the EARS-VIIRS service (1-minute segment) will be used as input. This data will then be processed to Level-1B using the AAPP processing package delivered by NWP-SAF and to Level-2 using the PPS processing package delivered by NWC-SAF.

5.1.10 EARS-VASS

The Regional FY-3 Sounder Service (EARS-VASS) provides Level-1 products from the sounder instruments MWTS-II, MWHS-II and IRAS. This service will provide all FOVs and all channels of the MWTS-II, MWHS-II and IRAS sounder instruments. Together these three instruments are referred to as the Vertical Atmospheric Sounding System (VASS). The FY3_IPP Package provided by CMA is used for product processing to Level-1B.

5.1.11 EARS-MERSI

The EARS-MERSI service provides the 1km resolution product of the MERSI (Medium Resolution Spectral Imager) instruments containing 25 channels on-board the CMA's FY-3 satellite series. FY-3D carries the MERSI-2 instrument which provide 2048 pixels across-track and ~400 lines in a 1-minute segment.

The data is processed to Level-1 using the CMA provided processing package (FY3_IPP). As with the AVHRR regional service, EARS-MERSI provides 1-minute segments removing overlaps between stations. There are 2 files per 1-minute segment.

5.1.12 EARS-MWRI

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). 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.

5.1.13 Service Specification

Product Group	Product Group Attributes		
	Timeliness	**Accuracy and Coverage**	**Completeness**
EARS-ATOVS	30 mins	As specified in [AD. 14]	n/a
EARS-AVHRR			
EARS-ASCAT			
EARS-IASI			
EARS-NWC (AVHRR)			
EARS-NWC (VIIRS)			
EARS-ATMS	30 mins	As specified in [AD. 14]	One file per station pass.
EARS-CrIS			
EARS-VASS	90% of individual products within 30 mins	As specified in [AD. 14]	Two files per station pass.
EARS-VIIRS	90% of products within 30 minutes, target 15 minutes.	Core European EARS direct readout reception stations	Completeness: Segments each containing 1 minute of observations for both SVMC M-Band and SVDNBC DNB channels. Duplicate

Product Group	Product Group Attributes		
	Timeliness	**Accuracy and Coverage**	**Completeness**
			segments removed before EUMETCast dissemination.
EARS-MERSI	90% of products within 30 minutes, target 15 minutes.	Core European EARS direct readout reception stations	Segments containing 1-minute of observations, removing overlaps between stations. There are 2 files per 1-minute segment.
EARS-MWRI	90% of products within 30 minutes, target 15 minutes.	Core European EARS direct readout reception stations	One file per station and pass.

5.1.14 Service Availability

Product Group	Availability % [17]	Scheduled Outages	
		Routine Spacecraft Operational Requirements	Instrument Operational Requirements
EARS-ATOVS	90%	**Metop Out-of-plane manoeuvre:** Single burn: ~ 6.25 hrs outage, Double burn: ~ 20 hrs outage	MHS will require infrequent modifications to the receiver gain depending on the degradation of the instrument performance and this will evolve during the lifetime of the spacecraft. Such modifications will result in product unavailability for a duration of two orbits.
EARS-AVHRR	90%	n/a	There are no routine instrument operations that result in a service outage.
EARS-NWC (AVHRR)	90%	n/a	There are no routine instrument operations that result in a service outage.
EARS-NWC (VIIRS)	90%	n/a	There are no routine instrument operations that result in a service outage.
EARS-ASCAT	90%	**Metop Out-of-plane manoeuvre:** Single burn: ~ 6.25 hrs outage, Double burn: ~ 20 hrs outage	EARS-ASCAT products will not be available when the instrument is in calibration mode.
EARS-IASI	90%	**Metop Out-of-plane manoeuvre:** Single burn: ~ 6 hrs outage. Double burn: ~ 20 hrs outage	EARS-IASI products will not be available when the instrument is in calibration mode.
EARS-ATMS	90%	n/a	n/a
EARS-CrIS	90%	n/a	n/a
EARS-VASS	90%	n/a	n/a
EARS-VIIRS	90%	n/a	n/a

[17] The availability is defined as the ratio of the actual number of individual product files made available at the EUMETSAT reference user station within the target timeliness and the number of scheduled product files during the reporting period. The reporting period is the calendar month.

Product Group	Availability % (17)	Scheduled Outages	
		Routine Spacecraft Operational Requirements	Instrument Operational Requirements
EARS-MERSI	90%	n/a	n/a
EARS-MWRI	90%	n/a	n/a

6 DIRECT READOUT SERVICES

Direct readout services cover the direct transmission of data from the satellites to local user stations. Following the discontinuation of MSG Direct Dissemination, this only covers Metop AHRPT services.

6.1 AHRPT Service Metop

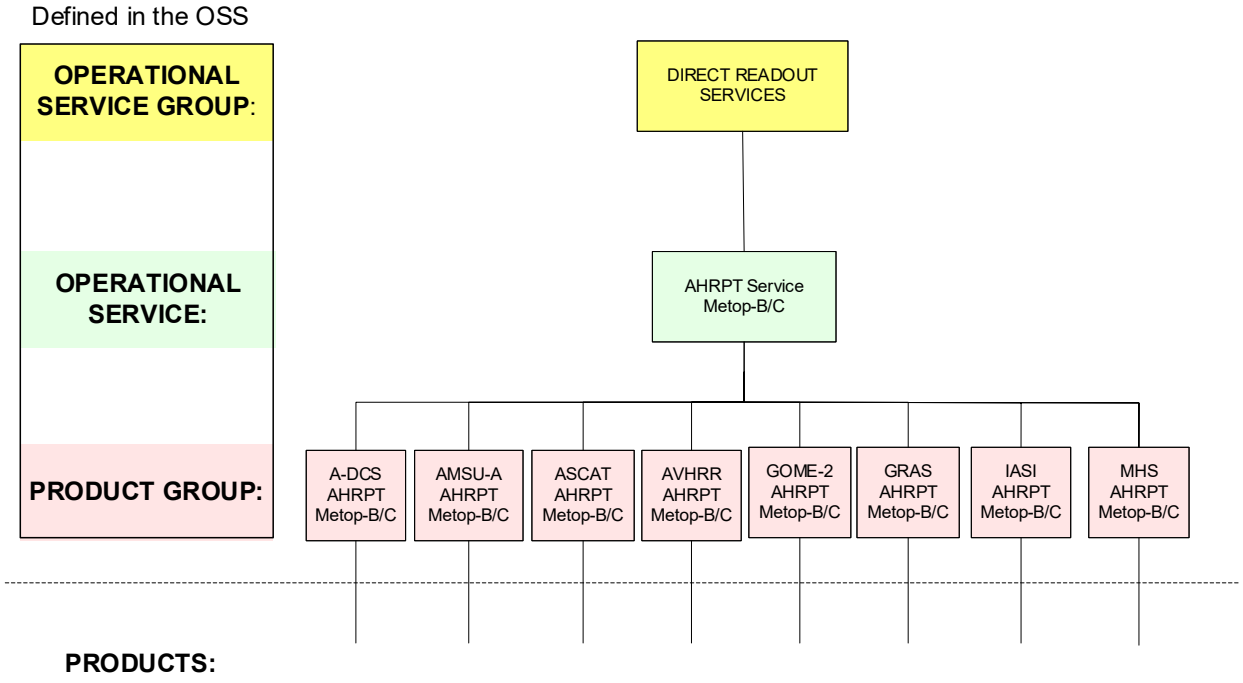

Figure 6 – Overview of Direct Readout Services

The Direct Readout Service provides local user stations with real-time transmission of data, limited to the instantaneous sub-satellite observation. Readout of all instrument data can be achieved via Advanced High Resolution Picture Transmission (AHRPT).

A more detailed description of the Metop AHRPT Service data content is provided in [RD. 2]. Metop-B and Metop-C satellites provide data as part of the AHRPT service, which consists of the following:

- A-DCS AHRPT Metop
- AMSU-A AHRPT Metop
- ASCAT AHRPT Metop
- AVHRR AHRPT Metop
- GOME-2 AHRPT Metop
- GRAS AHRPT Metop
- IASI AHRPT Metop

- MHS AHRPT Metop

Details on these instruments can be found in the corresponding sections 4 and 7.

6.1.10 Service Specification

Product Group	Product Group Attributes		
	Timeliness	**Accuracy and Coverage**	**Completeness**
A-DCS AHRPT Metop	The data shall be made available immediately to user stations within the visibility of the satellite.	The HRPT output shall permit a geo-location equivalent to that specified for the instrument data services in §4.1.	The product will be considered complete if data is generated continuously during the course of a full orbit. Individual users will only receive data whilst the satellite is visible from their reception station.
AMSU-A AHRPT Metop			
ASCAT AHRPT Metop			
AVHRR AHRPT Metop			
GOME-2 AHRPT Metop			
GRAS AHRPT Metop			
IASI AHRPT Metop			
MHS AHRPT Metop			

6.1.11 Service Availability

Product Group	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	Instrument Operational Requirements
A-DCS AHRPT Metop	In order to support the HRPT service, the availability of the HRPT transponders shall be better than 95.5%	The spacecraft-related scheduled outages are described in the relevant instrument service subsections in §4.1	The instrument-related scheduled outages are described in the relevant instrument service subsections in §4.1
AMSU-A AHRPT Metop			
ASCAT AHRPT Metop			
AVHRR AHRPT Metop			
GOME-2 AHRPT Metop			
GRAS AHRPT Metop			
IASI AHRPT Metop			
MHS AHRPT Metop			

7 DATA COLLECTION SERVICES (GEO & LEO)

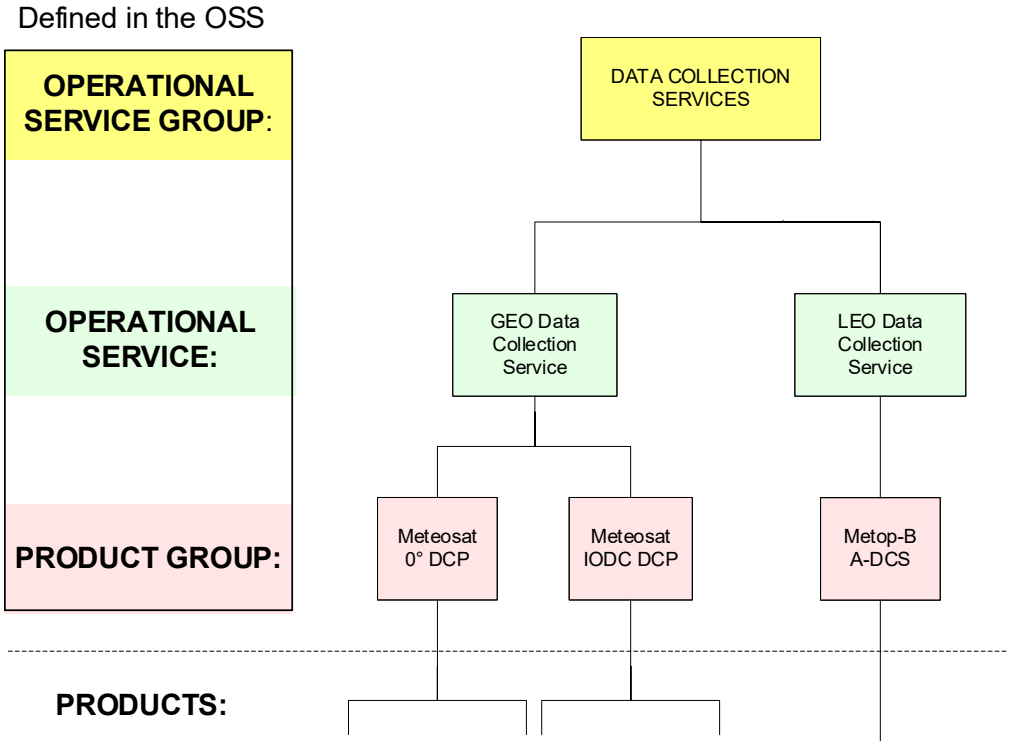

Figure 7 – Overview of Data Collection Services

Two different systems provide data collection and relay:

- GEO Data Collection Service: Geostationary system based on DCPs
- LEO Data Collection Service: Low Earth Orbit system based on ARGOS beacons

7.1 GEO Data Collection and Retransmission Service

The GEO Data Collection and Retransmission Service enables Data Collection Platform (DCP) Operators to use the Meteosat system to relay environmental data collected from DCP platforms equipped with certified DCP transmitters. The GEO DCS, initially established with the first generation of Meteosat satellites, has continued and expanded with Meteosat Second Generation (MSG). This trend continues with the Meteosat Third Generation (MTG) satellites as well.

The GEO DCS supports the following basic functions:

- The transmission of data from DCP transmitters to the satellite.
- The immediate relay of the data by the satellite to the EUMETSAT ground station.
- The subsequent basic processing and onward distribution of selected data to the user.

The Meteosat IODC DCP and Meteosat 0° DCP missions support the same basic functions for certified DCP transmitters situated within their telecommunications field of view.

GEO DCS data are distributed to users as DCP messages or DCP bulletins containing DCP messages.

A DCP transmitter can be configured to transmit data in different modes of operation (transmission schedules) and based on this the DCPs are categorised into self-timed (transmitting at regular intervals) or alert (when the value of one or more measured parameters exceeds a pre-set threshold).

Further details of the GEO DCS can be found in [RD. 7].

7.1.1 Meteosat 0° DCP

Support to DCP operations is provided by MTG-I1 satellite located over the equator at a longitude of 0°.

7.1.2 Meteosat IODC DCP

Support to DCP operations is provided by the Meteosat Second Generation satellite located at 45.5°E.

7.1.3 Service Specification

Product Group	Product Group Attributes		
	Timeliness	Accuracy and Coverage	Completeness
Meteosat 0° DCP	On EUMETCast - within 3 mins of arrival at the EUMETSAT MCC. On DCS Web Service – within 10 mins of arrival at the EUMETSAT MCC. On GTS – within 10 mins of arrival at the EUMETSAT MCC	n/a	n/a
Meteosat IODC DCP			

7.1.4 Service Availability

Product Group	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	Instrument Operational Requirements
Meteosat 0° DCP	98%	n/a	n/a
Meteosat IODC DCP			

8 SEARCH AND RESCUE SERVICES

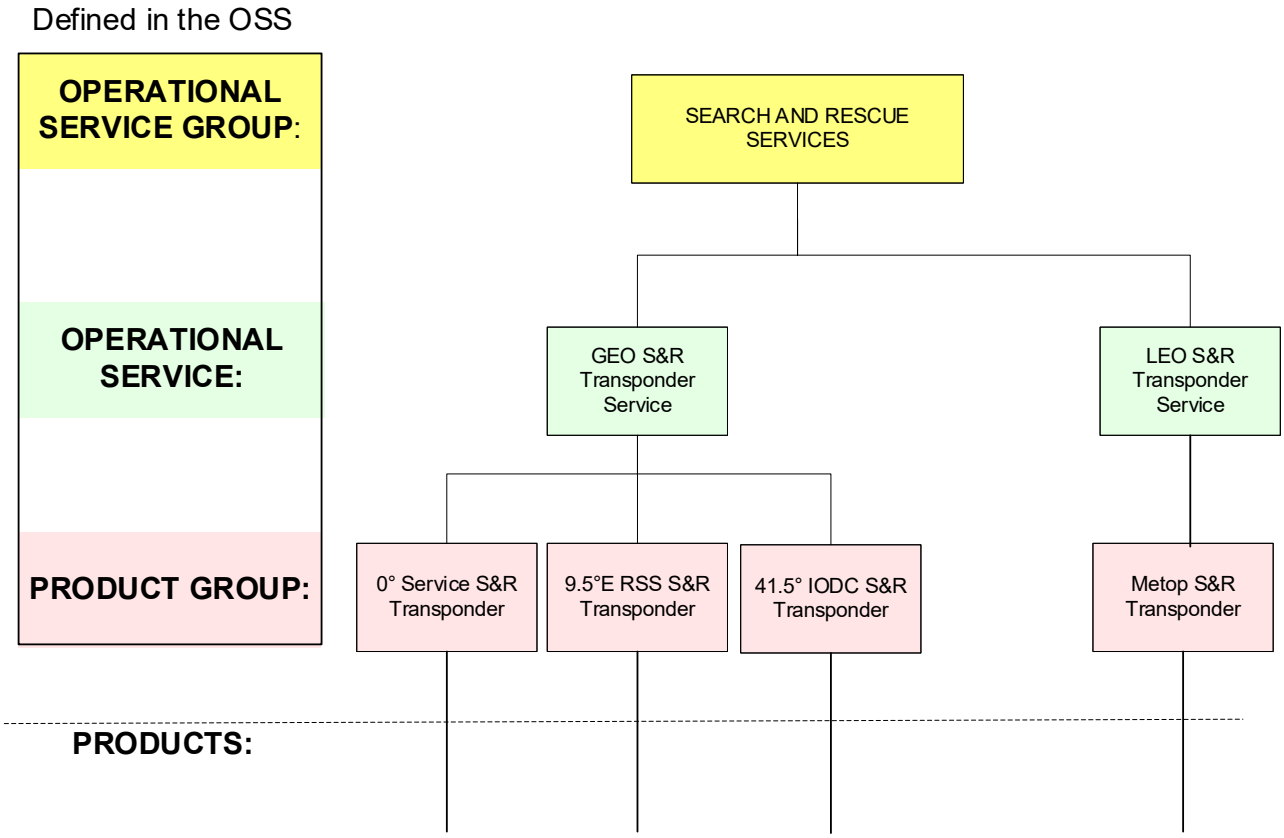

Figure 8 - Overview of Search and Rescue Services

As part of the Search and Rescue (S&R) Service, EUMETSAT provides access to transponders on board the MSG, MTG & Metop spacecraft, which relay messages received from search and rescue beacons. The MSG, MTG & Metop satellites are part of the constellation of satellites that constitutes the space segment of the Cospas-Sarsat international satellite system for search and rescue, whose aim is to provide distress alert and location information to appropriate rescue authorities for maritime, aviation and land users in distress.

A detailed description of the S&R service can be found at www.cospas-sarsat.org

8.1 Meteosat S&R Transponder Service

8.1.1 0° Service S&R Transponder

S&R transponder on-board the Meteosat Satellite supporting the 0° Service.

8.1.2 9.5°E RSS S&R Transponder

S&R transponder on-board the Meteosat Satellite supporting the 9.5°E Rapid Scan Service.

8.1.3 45.5°E IODC Service S&R Transponder

S&R transponder on-board the Meteosat Satellite supporting the 45.5°E IODC Service.

8.2 LEO S&R Transponder Service

8.2.1 Metop S&R Transponders

S&R transponders on-board the Metop-B satellite. Note that there is no transponder on-board Metop-C.

8.2.2 Service Specification

Product Group	Product Group Attributes		
	Timeliness	Accuracy and Coverage	Completeness
Metop-B S&R Transponder	See www.cospas-sarsat.org		

8.2.3 Service Availability

Product Group	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	Instrument Operational Requirements
Metop-B S&R Transponder	92%	n/a	n/a

9 SATELLITE APPLICATION FACILITY SERVICES

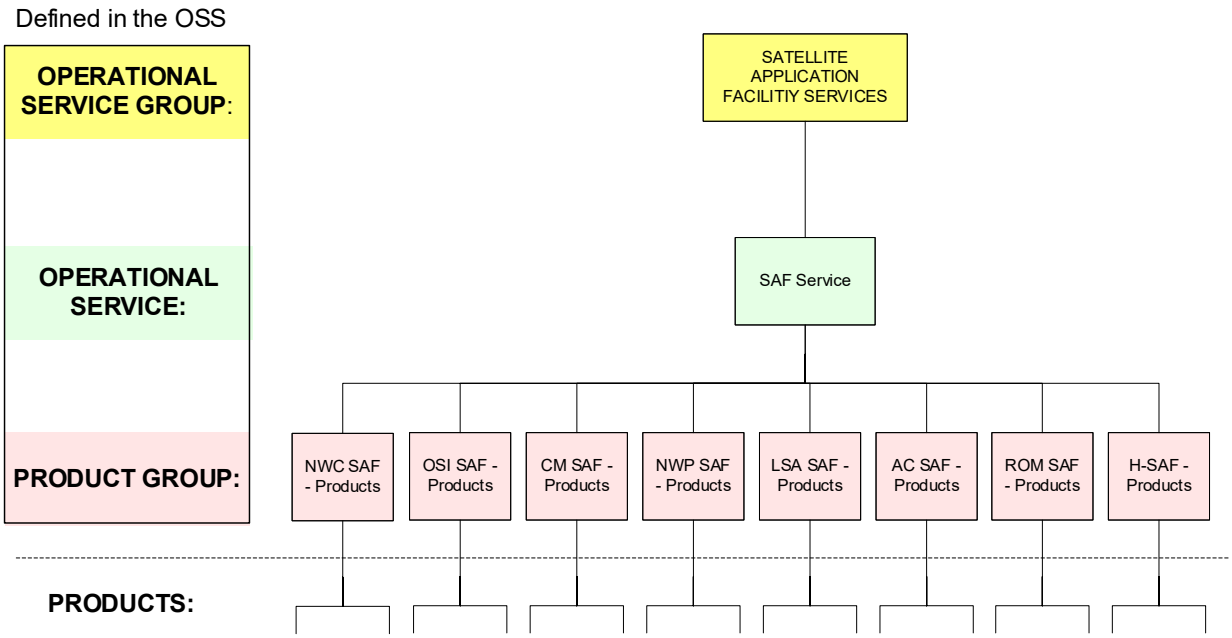

Figure 9 - Overview of Satellite Application Facility Services

The Satellite Application Facilities (SAFs) are a distributed network of thematic application facilities responsible for necessary research, development, and operational activities not carried out by the central facility. The SAFs are located within the National Meteorological Services (NMS) of EUMETSAT Member States, or other agreed entities linked to a user community.

SAFs deliverables can be a specific piece of software to be made available users for use in their own environment, or data and products made available in near real-time or off-line.

9.1 SAF Service

There are currently eight SAFs, all of which are providing products and services on the following application themes:

- Support to Nowcasting & Very Short Range Forecasting (NWC SAF).
- Ocean and Sea Ice (OSI SAF).
- Climate Monitoring (CM SAF)
- Numerical Weather Prediction (NWP SAF)
- Land Surface Analysis (LSA SAF)
- Atmospheric Composition and UV Radiation (AC SAF)
- Radio Occultation Meteorology (ROM SAF)
- Support to Operational Hydrology and Water Management (H-SAF)

Each SAF is led by the NMS of a EUMETSAT Member State, in association with a consortium of government bodies and research institutes from other EUMETSAT Member States and

Cooperating States. The lead NMS is responsible for the management of each complete SAF project and for ensuring the delivered service adheres to the specification as defined in the dedicated SAF service specification document. The research, data and services provided by the SAFs complement the standard meteorological products delivered by EUMETSAT's Central Application Facility in Darmstadt, Germany and form part of the overall EUMETSAT Application Ground Segment.

See the EUMETSAT User Portal https://user.eumetsat.int/ for detailed information on each of the SAF products.

9.1.1 NWC SAF Products

The main goal of the NWC SAF is to produce software packages that support Nowcasting and Very Short Range Forecasting. The software, which is for local installation at the user's site, processes data from Meteosat Second Generation (MSG) spectrometer SEVIRI and the AVHRR sensors on-board NOAA, and Metop satellites.

9.1.2 OSI SAF Products

The OSI SAF is an answer to requirements, from the meteorological and oceanographic communities of EUMETSAT Member and Cooperating States, for comprehensive information derived from meteorological satellites at the ocean-atmosphere interface. The OSI SAF offers a precious complement to in-situ data, based on continuously increasing temporal and geographical resolution products with coastal to global coverage. The OSI SAF operationally generates, validates and distributes, in near-real time and off-line, products related to four key parameters of the ocean-atmosphere interface.

9.1.3 CM SAF Products

The CM SAF operationally generates, validates, distributes and archives high-quality datasets for specific climate application areas, through the exploitation of satellite measurements with state-of-the-art algorithms, to derive information about the climate variables of the Earth system. CM SAF is also engaged in training customers in the use of CM SAF products. The products provided by the Climate Monitoring SAF are parameters of the energy and water budget.

9.1.4 NWP SAF Products

The NWP SAF exists to increase the benefits derived from numerical weather prediction by developing techniques for more effective use of satellite data, and to improve the exploitation of data and products from EUMETSAT satellites programmes, and related programmes of other agencies. The products provided by the NWP SAF are mainly software modules for processing satellite data and web-based data monitoring reports.

9.1.5 LSA SAF Products

The aim of the LSA SAF is to take full advantage of remotely sensed data on land, land-atmosphere interactions and biosphere applications. A strong emphasis is put on developing and implementing algorithms that will allow an operational use of data from EUMETSAT satellites. The LSA SAF system operationally generates, validates, distributes and archives a set of parameters involved in

the surface radiation budget, evapotranspiration, vegetation cover, daily snow cover and fire-related products. The products provided by the SAF on Land Surface Analysis are related to the surface energy and water budget.

9.1.6 AC SAF Products

The Satellite Application Facility for Atmospheric Composition and UV Radiation (formerly known as Ozone and Atmospheric Chemistry Monitoring SAF) operationally generates, validates, distributes and archives ozone and atmospheric chemistry products, to support the services of the EUMETSAT Member States in weather forecasting, as well as monitoring of ozone depletion, air quality and surface UV radiation. The products provided by the AC SAF are parameters of the atmospheric trace gases, aerosols and surface UV radiation. They are produced in either near-real time (NRT, 3h from sensing) or offline (15 days from sensing).

9.1.7 ROM SAF Products

The ROM SAF (formerly known as the GRAS Meteorology SAF) operationally generates, validates, distributes and archives high-quality GPS Radio Occultation (RO) datasets for NWP applications and specific climate application areas, through the exploitation of satellite measurements with state-of-the-art algorithms, to derive information about the atmosphere and climate variables of the Earth system. The ROM SAF is also engaged in developing an RO processing software package containing modules for assimilation of RO data in NWP models.

9.1.8 H-SAF Products

The H-SAF operationally generates, validates, distributes and archives high-quality data sets and products for operational hydrological applications, starting from the acquisition and processing of data from Earth observation satellites in geostationary and polar orbits, operated both by EUMETSAT and by other satellite organisations. The retrieval of products uses data from microwave and infrared instruments for the best possible accuracy compatible with satellite systems available now, or in the near future.

9.1.9 Service Specification

Product Group	Product Group Attributes
	Accuracy, Coverage and Timeliness
NWC SAF Products	As specified in [AD. 16]
OSI SAF Products	As specified in [AD. 18]
CM SAF Products	As specified in [AD. 20]
NWP SAF Products	As specified in [AD. 15]
LSA SAF Products	As specified in [AD. 22]
AC SAF Products	As specified in [AD. 23]
ROM SAF Products	As specified in [AD. 24]
H-SAF Products	As specified in [AD. 25]

9.1.10 Service Availability

Product Group	Availability	Scheduled Outages	
		Routine Spacecraft Operational Requirements	Instrument Operational Requirements
NWC SAF Products	n/a	n/a	n/a
OSI SAF Products	95% (18)	n/a	n/a
CM SAF Products	95%	n/a	n/a
NWP SAF Products	n/a	n/a	n/a
LSA SAF Products	95% (19)	n/a	n/a
AC SAF Products	97.5% (16)	n/a	n/a
ROM SAF Products	500 (20)	n/a	n/a
H-SAF Products	95% (16)	n/a	n/a

(18) Timeliness is defined from the last satellite input data arrival in the production centre to the product availability at the entry point of the distribution network.
(19) End-to-end availability with the nominal level of quality and within specified timeliness.
(20) Of those Level-1B NRT products with correct instrument operation and available to the ROM SAF within 2h15m, more than 500 shall daily be processed to Level-2 and disseminated to users within 3 hours of observation time.

10 THIRD PARTY DATA SERVICES

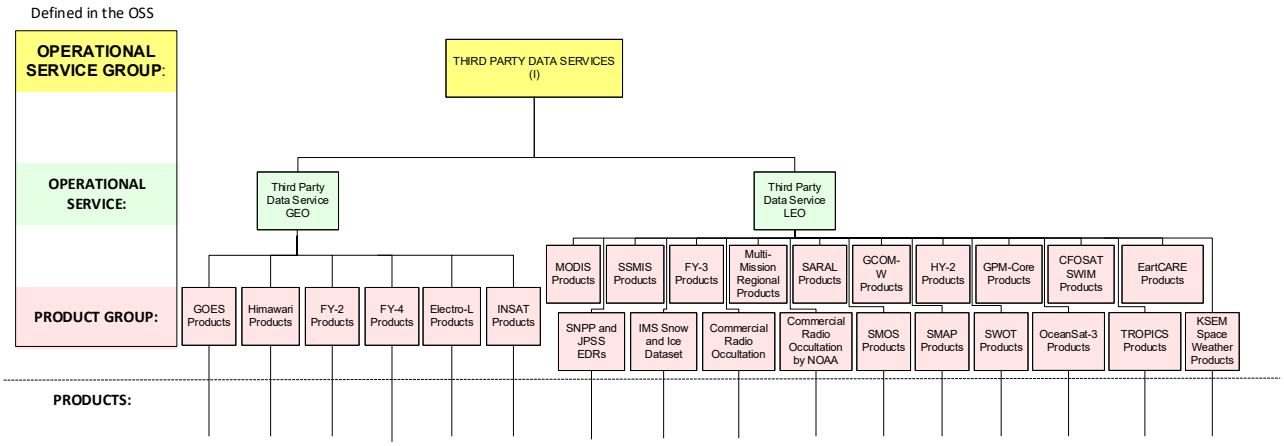

Figure 10 - Overview of Third-Party Data Services (1)

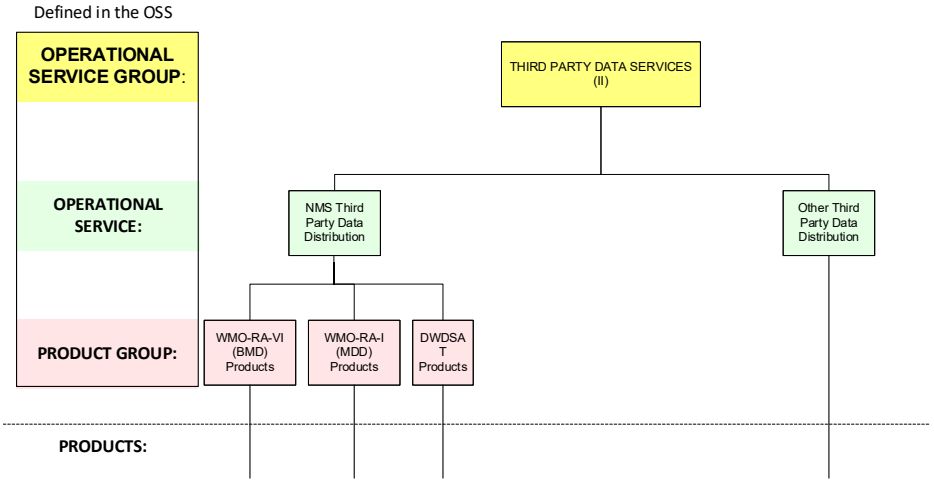

Figure 11 - Overview of Third-Party Data Services (2)

To complement the satellite data and products generated by the EUMETSAT Application Ground Segment, EUMETSAT provides access to a range of third-party products from partner organisations.

EUMETSATs main responsibility is a timely throughput of the data through the EUMETSAT system (turnaround timeliness). The quality, completeness and timeliness of the data from sensing to the delivery to the EUMETSAT interface remain the responsibility of the data provider. In addition, for certain product groups, EUMETSAT performs further processing of this data (e.g. sub-sampling, format conversion) before disseminating it to the end-user. EUMETSAT is responsible for monitoring the delivery of this data via the various delivery mechanisms, reporting

on the performance via the EUMETSAT Operations Status Report (OSR, see section 13) and providing end-users with announcements concerning missing data (see section 12.2). Information concerning the products delivered via this service is provided in the EUMETSAT User Portal https://user.eumetsat.int/.

10.1 Third-Party Data Service – GEO

EUMETSAT relays geostationary satellite data from partner organisations such as the National Oceanic and Atmospheric Administration (NOAA), the China Meteorological Administration (CMA),the Japan Meteorological Agency (JMA) and the Indian Space Research Organisation (ISRO)

10.1.1 GOES-East Products

EUMETSAT relays geostationary satellite data originating from the NOAA satellites supporting the operational services at GOES-East (currently located at 75.2°W).

From the GOES-East ABI instrument, EUMETSAT disseminates ABI Level-1B and ABI Level-2 products (Aerosol Optical Depth (AOD), Aerosol Detection (ADP), Rainfall Rate Quantitative Precipitation Estimation (RRQPE), All-Sky Radiance (ASR) and Clear-Sky Radiance (CSR)).

From the GOES-East GLM instrument, EUMETSAT disseminates GLM Level-2 products (flashes, groups, events) with a 20-second refresh rate are provided by NOAA in netCDF format and then accumulated to five-minute compressed tar files, so that the frequency of distribution is one file every five minutes.

From the GOES-East Space Weather instrument suite, EUMETSAT disseminates SEISS Level-1B, SUVI Level-1B and EXIS Level-1B data is acquired from NOAA's PDA and redistributed in their native netCDF format.

10.1.2 GOES-West Products

EUMETSAT relays geostationary satellite data originating from the NOAA satellites supporting the operational services at GOES-West (located at 137.0°W).

From the GOES-West ABI instrument, EUMETSAT disseminates ABI Level-1B and ABI Level-2 products (All-Sky Radiance (ASR) and Clear-Sky Radiance (CSR)).

From the GOES-West GLM instrument, EUMETSAT disseminates GLM Level-2 products (flashes, groups, events) with a 20-second refresh rate are provided by NOAA in netCDF format and then accumulated to five-minute compressed tar files, so that the frequency of distribution is one file every five minutes.

No GOES-West Space Weather products are currently disseminated by EUMETSAT.

10.1.3 Himawari Products

Image data derived from the JMA Himawari series of satellites supporting the service at 140°E.

10.1.4 FY-2 Products

EUMETSAT provides image data and meteorological products derived from the CMA FengYun-2 series of satellites: FY-2H, located at 79°E and FY-2G, located at 105°E.

All channels are distributed in 2 km spatial resolution in XRIT format.

10.1.5 FY-4 Products

EUMETSAT redistributes FY-4B Level-1 GIIRS (Geostationary Interferometric Infrared Sounder) data in unmodified HDF-5 format. FY-4B is located at 133°E.

FY-4 satellites represent CMA's second generation of geostationary satellites with improved network transmission and enhanced imagery scanning capability.

10.1.6 Electro-L Products

Near real time HRIT image data from the Electro-L series of satellites as created and supplied by ROSHYDROMET. Electro-L N3 is located at 76°E.

The provision of data from Electro-L N2 to EUMETSAT was stopped by ROSHYDROMET in 2020.

10.1.7 INSAT-3D Products

Meteorological data derived from the INSAT-3D satellite series (currently INSAT-3DS) provided by the Indian Space Research Organisation (ISRO) located at 82°E, covering 20°E to 150°E and 50°N to 50°S.

10.1.7 Service Specification

Product Group	Product Group Attributes			
	Product	Timeliness[21]	Accuracy and Coverage	Completeness
GOES-East Products	ABI Level-1B	10mins	n/a	n/a
GOES-East Products	ABI Level-2	10mins	n/a	n/a
GOES-East Products	GLM	45mins	n/a	n/a
GOES-East Products	Space weather (SEISS, SUVI, EXIS)	15mins	n/a	n/a
GOES-West Products	ABI Level-1B	10mins	n/a	n/a
GOES-West Products	ABI Level-2	10mins	n/a	n/a
GOES-West Products	GLM	45mins	n/a	n/a
Himawari Products	Himawari instrument	10mins	n/a	n/a
FY-2 Products	All	60mins	n/a	n/a
FY-4 Products	GIIRS Level-1	30mins	n/a	n/a
Electro-L Products	All	30mins	n/a	n/a
INSAT-3D	All	30mins	n/a	n/a

[21] The timeliness specified for Third-party data services, unless otherwise specified, refers to turnaround timeliness and not end-to-end timeliness from sensing time.

10.1.8 Service Availability

Product Group	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	Instrument Operational Requirements
GOES-East Products	95%	n/a	n/a
GOES-West Products	95%	n/a	n/a
Himawari Products	90%	n/a	n/a
FY-2 Products	95%	n/a	n/a
FY-4 Products	90%	n/a	n/a
Electro-L Products	95%	n/a	n/a
INSAT-3D	90%	n/a	n/a

10.2 Third-Party Data Service – LEO

10.2.1 MODIS Products

Regional and global products derived from the Moderate-resolution Imaging Spectroradiometer (MODIS) payload hosted on the National Aeronautics and Space Administration (NASA) Terra and Aqua LEO satellites.

EUMETSAT redistributes Level-2 (Chlorophyl-Alpha) products in netCDF format.

10.2.2 SSMIS Products

The Special Sensor Microwave Imager / Sounder (SSMI/S) is an eleven-channel, eight-frequency, linearly polarized passive microwave radiometer system. The instrument is flown on board the United States Air Force Defense Meteorological Satellite Program (DMSP) series of satellites. It is the successor to the Special Sensor Microwave/Imager (SSM/I). EUMETSAT disseminates BUFR format files based on the Environmental, Imaging, Lower Atmospheric Sounding and Upper Atmospheric Sounding channels.

10.2.3 FY-3 Products

EUMETSAT receives and disseminates sounding data from the Microwave Humidity Sounder (MWHS-2), Microwave Radiation Imager (MWRI and MWRI-2), Infra-Red Atmospheric Sounder (IRAS), Hyperspectral Infrared Atmospheric Sounder (HIRAS-2 from FY-3E) and Microwave Temperature Sounder (MWTS-2 and MWTS-3), as well as data from the Wind Radar (WinRAD) instruments on-board the Fengyun-3 series of polar-orbiting satellites. The MWTS, MWHS, and MWRI data are reformatted to BUFR using the AAPP software. The reformatted data in parallel to the native HDF5 format are disseminated to the users.

10.2.4 Multi-Mission Regional Products

MODIS and AVHRR data are used to retrieve tropospheric winds (speed, direction, and height) in the polar regions by tracking cloud and water vapour features. Much of this information cannot be generated fast enough for use in early NWP model runs due to the delay in obtaining MODIS and AVHRR data (typically 1-4 hrs). To improve the timeliness of the wind data, direct broadcast (DB) sites provide real-time access to water vapour winds (wvap) BUFR files from MODIS data, as well as IR cloud-drift winds (cdft) BUFR files from both MODIS and AVHRR data.

10.2.5 SARAL products

SARAL is a joint CNES-ISRO mission, for which EUMETSAT performs the processing and dissemination of the Operational Geophysical Data Record (OGDR) products. The aim of the SARAL mission and AltiKa payload is to provide altimetry measurements designed to study ocean circulation and sea surface elevation with the same accuracy as the one provided by ENVISAT. The SARAL OGDR products are provided to the operational and research user communities in support of: Marine meteorology and sea state forecasting; Operational oceanography; Seasonal forecasting; Climate monitoring and Ocean, Earth System and climate research.

10.2.6 GCOM-W Products

The Japan Aerospace Exploration Agency (JAXA) provides to EUMETSAT marine based products, including precipitable water and sea surface temperature, which are calculated based on the observation data acquired by the Advanced Microwave Scanning Radiometer 2 (AMSR2) aboard the Global Change Observation Mission 1st – Water "SHIZUKU" (GCOM-W1). The SHIZUKU was launched on May 18, 2012. The data reception is performed by JAXA through their ground stations at Svalbard or Japan. The Level-1 and Level-2 data processing is first performed by JAXA and the products are then transferred directly to EUMETSAT. The Level-1 data are then reformatted into BUFR format. All data are disseminated to the users.

10.2.7 HY-2 Products

Haiyang (HY) is a series of satellites operated by China's National Satellite and Ocean Application Service (NSOAS), with HY-2 products being produced by the HY-2B, HY-2C and HY-2D satellites. The HY-2B spacecraft carries a payload of five instruments in addition to a CNES provided DORIS instrument for precise orbit determination. These are a radar altimeter (ALT), a conical scanning microwave radiometer imager (MWRI), a conical scanning scatterometer (SCAT), a laser retroreflector array (LRA) and a calibration microwave radiometer (CMR).
HY-2C and HY-2D contain the same instruments as HY-2B except for the microwave radiometer.
HY-2 data are received via two NSOAS marine ground stations in China, one at Beijing and one at SanYa. Data are stored on-board the spacecraft and dumped over the stations. NSOAS process the data in its ground segment to derive the following products:

- Altimeter Products: IGDR, OGDR and SGDR data from the radar altimeter
- Scatterometer Products: Level-1B and Level-2B ocean surface scatterometer winds (Level-1B disseminated only via EUMETCast Terrestrial)
- Microwave Radiometer Products: Level-2A product from the microwave radiometer

Radiometer and scatterometer products are also reformatted to BUFR format by EUMETSAT and distributed to users, in addition to the original NSOAS products.

10.2.8 GPM-Core Products

The GPM mission is provided by NASA and JAXA, with the Core Observatory satellite of the constellation providing measurement data for rain and snow precipitation from just two instruments: the GPM Microwave Imager (GMI) and Dual-frequency Precipitation Radar (DPR). The GMI uses 13 different microwave channels to measure different types of precipitation through clouds. The DPR uses its two radar frequencies to provide three-dimensional information about precipitation at different heights, such as size. Data is retrieved from the satellite using NASA's Tracking and Data Relay Satellite System (TDRSS) and sent to EUMETSAT, where the products are formatted and sent out to. This will include:

- Level-1 BUFR Files for Brightness products
- Level-2 HDF5 Files for Precipitation products

More details can be found in the EUMETSAT User Portal https://user.eumetsat.int/.

10.2.9 CFOSAT SWIM Service

CFOSAT is a joint mission of the Chinese (CNSA) and French (CNES) space agencies with the goal to monitor the ocean surface winds and waves. CFOSAT carries two main instruments: SWIM (Surface Waves Investigation and Monitoring), a wave scatterometer supplied by CNES, and SCAT, a wind-field scatterometer supplied by CNSA. EUMETSAT receives SWIM data from CNES and reformats nadir an off-nadir parameters to two separate products in BUFR format. Both, original data and reformatted data are disseminated to users.

10.2.10 S-NPP Environmental Data Records (EDRs)

NDE generates polar winds from VIIRS for the Arctic and Antarctic from 65 degrees latitude pole-wards. Tropospheric winds are measured by tracking the motion of cloud features in the overlapping region of three successive orbits. A triplet of images is used to facilitate consistency checking and quality control. Atmospheric Motion Vector (AMV) EDRs include wind speed, direction, and height at high latitudes.

EUMETSAT relays Enterprise Fire EDRs from the VIIRS instrument on-board the SNPP satellite. The EDRs are generated by NDE in netCDF format and contain pinpoint locations of Enterprise Fires as identified by a fire detection algorithm. The algorithm is an adaptation of the MODIS Collection 6 algorithm and uses Level-1 M-band data from the VIIRS instrument to generate the VIIRS Enterprise Fire data. VIIRS infrared bands have a spatial resolution of 750 meters at nadir, and 375 meters at nadir for the imagery bands, as such, the sensor is sensitive enough to detect fires at sea, which is an improvement over the previous Enterprise Fires product produced by the Interface Data Processing Segment (IDPS).

EUMETSAT also relays OMPS Limb Profiler (LP) EDRs from the Ozone Mapping and Profiler Suite (OMPS) instrument onboard the SNPP and NOAA21 satellites. The data are derived from observations (between 290-1,000 nm) detected by the OMPS Limb Profiler (LP) with an estimated vertical resolution of 700 m at nadir.

A number of S-NPP Environmental Data Records are being distributed on EUMETCast in the frame of Copernicus. The provision of these EDRs was initially referred to as the 'SNPP4C' service. The products are:

- VIIRS Ocean Colour
- VIIRS Sea Surface Temperature (SST)
- VIIRS Aerosol Optical Depth (AOD)
- OMPS Total Column Ozone EDR
- OMPS Ozone Nadir Profile

The specification and availability of the SNPP4C Service is provided in [RD.11].

10.2.11 JPSS Environmental Data Records (EDRs)

EUMETSAT relays Enterprise Fire EDRs from the VIIRS instrument. The EDRs are generated by NDE in netCDF format and contain pinpoint locations of Enterprise Fires as identified by a fire detection algorithm. The algorithm is an adaptation of the MODIS Collection 6 algorithm and uses Level-1 M-band data from the VIIRS instrument to generate the VIIRS Enterprise Fire data. VIIRS

infrared bands have a spatial resolution of 750 meters at nadir, and 375 meters at nadir for the imagery bands, as such, the sensor is sensitive enough to detect fires at sea, which is an improvement over the previous Enterprise Fires product produced by the Interface Data Processing Segment (IDPS).

EUMETSAT relays Sea Surface Temperature (SST) EDRs from the VIIRS instrument on-board the prime JPSS satellite (from other NOAA satellites it is executed in the frame of Copernicus. See below). The Advanced Clear-Sky Processor for Oceans (ACSPO) System produces SST in each cloud-free pixel over water. The data are organised in 10 min granule files in netCDF4 format, compliant with the Group for High-Resolution SST (GHRSST).

A number of JPSS Environmental Data Records are being distributed on EUMETCast in the frame of Copernicus. The provision of these EDRs was initially referred to as the 'JPSS4C' service. The products are:

- VIIRS Ocean Colour
- VIIRS Sea Surface Temperature (SST), from SNPP and NOAA-20.
- VIIRS Aerosol Optical Depth (AOD)
- OMPS Total Column Ozone EDR
- OMPS Limb Profiler Ozone EDR
- OMPS Ozone Nadir Profile

The specification and availability of the JPSS4C Service is provided in [RD.11].

10.2.12 IMS Snow and Ice Analysis Dataset

The United States National Ice Centre (USNIC) produces IMS Daily Northern Hemisphere Snow and Ice Analysis dataset (1x1 km spatial resolution) using the Interactive Multisensor Snow and Ice Mapping System (IMS). EUMETSAT receives the IMS data from NOAA PDA and then redistributes them via EUMETCast Terrestrial.

10.2.13 Commercial Radio Occultation Service

The Commercial Radio Occultation (RO) service uses commercial radio occultation data procured from the contractor Spire, originating from the STRATOS Radio Occultation payload on the Lemur-2 satellites. EUMETSAT generates bending angle Level-1B products in BUFR and netCDF formats, based on raw measurements provided by Spire's nanosatellite constellation.

10.2.14 Commercial Radio Occultation Service by NOAA (CRO-NOAA)

The Commercial Radio Occultation by NOAA (CRO-NOAA) service uses commercial radio occultation data received from NOAA, procured from the commercial providers SPIRE or PlanetIQ. EUMETSAT generates Level-1B products in BUFR products and netCDF formats.

The service will be complimentary to operational EUMETSAT CRO service.

10.2.15 SMOS Service

The Soil Moisture and Ocean Salinity (SMOS) mission is an ESA project to provide, from microwave L-band measurements, global observations of variability in soil moisture and sea surface salinity due to continuous exchange in Earth's water cycle between the oceans, the atmosphere and the land.

EUMETSAT redistributes Level-2 products in netCDF format.

10.2.16 SMAP Service

The Soil Moisture Active Passive (SMAP) mission operated by NASA is an orbiting observatory that measures the amount of water in the surface soil everywhere on Earth. The Level-1C data products are calibrated and geolocated instrument measurements of surface radar backscatter cross-section and brightness temperatures, with a 1km resolution.

EUMETSAT redistributes these Level-1C brightness temperature products from the SMAP passive microwave sensor in BUFR format.

10.2.17 SWOT Service

The Surface Water and Ocean Topography (SWOT) satellite is a joint collaboration between NASA, CNES, CSA and UKSA. SWOT will perform a global survey of the Earth's surface water, collecting detailed measurements of how water bodies change over time. The satellite's primary payload will be the Ka-band SAR interferometric (KaRIn) system with 2 swaths of 50 km each. The payload will also comprise a microwave radiometer, and a nadir looking altimeter, along with instruments for precise orbit determination.

Only the data from the nadir altimeter will be made available in Near Real-Time and only these OGDR-N data (1 Hz + 20 Hz, full resolution) in netCDF are forwarded to EUMETSAT. EUMETSAT redistributes OGDR data in BUFR format.

10.2.18 Oceansat-3 Scatterometer Service

Oceansat-3 is the follow-on of ISRO's major ocean satellite mission Oceansat-2 and the gap-filler, single instrument Scatterometer satellite, Scatsat-1. The payload consists of four instruments, the Oceansat Scatterometer (OSCAT-3), the Ocean Colour Monitor (OCM-3), a Sea Surface Temperature Monitor (SSTM) and the ARGOS-4 data collection system (ADCS-4).

EUMETSAT receives Level-1B and Level-2B from ISRO and redistributes Level-1B and Level-2B to users in original HDF-5.

10.2.19 TROPICS Service

The "Time Resolved Observations of Precipitation structure and storm Intensity with a Constellation of Smallsats" (TROPICS) mission was selected by NASA to provide nearly all-weather observations of three-dimensional temperature and humidity, as well as cloud ice and precipitation horizontal structure, at high temporal resolution. The mission is a collaboration between NASA, NOAA, the University of Wisconsin – Madison, MIT Lincoln Laboratory and others.

The mission comprises a constellation of five satellites, one (Pathfinder) in a sun-synchronous polar orbit and the other four satellites in inclined orbits. Each satellite has an identical microwave spectrometer performing cross track scanning.

EUMETSAT acquires TROPICS Level-1B data in BUFR and netCDF format and redistributes them to the users.

10.2.20 EarthCARE Products

EarthCARE (Earth Cloud, Aerosol and Radiation Explorer) is a cooperation mission between ESA and JAXA. The mission comprises a single satellite in a sun-synchronous orbit with an equator crossing time of 14:00 (descending) and an inclination of 97.1 degrees at a height of 393 km. This results in an orbit length of 92.5 minute. The satellite was launched successfully on 28 May 2024.

The EarthCARE satellite carries two passive instruments, the Multispectral Imager (MSI) and the Broadband Radiometer (BBR), and two active instruments, the Atmospheric Lidar (ATLID) and the Cloud Profiling Radar (CPR). JAXA provides the CPR and ESA the other instruments.

ESA and JAXA will perform a cooperative processing and data distribution scheme based on downlinks via X-band to the Kiruna and Inuvik reception stations. In Europe ESA's Centre for Earth Observation (ESRIN) is responsible for processing, archiving, and distribution of the science data.

EUMETSAT acquires MSI Level-1C and CPR Level-2A data in netCDF format and redistributes them to the users.

10.2.21 KSEM Space Weather Products

The geostationary GEO-KOMPSAT-2A (GK2A) satellite, operated by the Korea Meteorological Administration (KMA), and positioned at 128.2° East, carries in addition to the AMI imager, also a suite of space weather monitoring instruments (KSEM).

The KSEM suite consists of three separate detectors, a Particle Detector (DP) which measures electrons and protons, an advanced magnetometer (MAG), and a Charging Monitor (CM) which measures the actual charging of the satellite itself. All data are accumulated or averaged over 1 minute and 5 minute intervals and made available on a daily basis.

All available KSEM-DP, -MAG, and -CM data from GK2A KSEM, in 1-minute and in 5-minute sampling intervals, in netCDF format, is acquired by EUMETSAT and redistributed to the users.

10.2.22 Service Specification

Product Group	Product Group Attributes		
	Timeliness[22]	**Accuracy and Coverage**	**Completeness [23]**
MODIS Products	n/a	n/a	n/a
SSMIS Products	n/a	n/a	n/a
FY-3 Products	n/a	n/a	n/a
Multi-mission Regional Products	n/a	n/a	n/a
SARAL Products	3 hours / 75% 5 hours / 95%	As specified in [AD. 26]	n/a
GCOM-W Products	n/a	n/a	n/a
HY-2 Products	Altimeter: 15mins	Global	n/a
	Scatterometer: 20mins		
	Microwave Radiometer: 20mins		
GPM-Core Products	Level-1C BT: 80 minutes from sensing time	Global	90%
	Level-2A: n/a	Global	n/a

[22] The timeliness specified for Third-party data services, unless otherwise specified, refers to turnaround timeliness and not end-to-end timeliness from sensing time.
[23] The completeness of the product files depends on the completeness and quality of the incoming data and/or the processing software, neither of which are under the responsibility of EUMETSAT.

Product Group	Product Group Attributes		
	Timeliness[22]	**Accuracy and Coverage**	**Completeness** [23]
CFOSAT SWIM Service	15 mins	Global	90% [24]
S-NPP EDRs [25]	15 mins after products are made available by NOAA	AMV geolocated data in BUFR format. Enterprise Fire products in netCDF format.	n/a
JPSS EDRs [26]	15 mins after products are made available by NOAA	Enterprise Fire products in netCDF format.	n/a
IMS Snow and Ice Analysis Dataset	24 hours from the nominal time of the data sets	Global	n/a
Commercial Radio Occultation Service	165 minutes from sensing (end-to-end timeliness)	n/a	n/a
Commercial Radio Occultation Service by NOAA (CRO-NOAA)	165 minutes from sensing (end-to-end timeliness)	n/a	n/a
SMOS Service	10 mins after products are made available by ESA	Global	n/a
SMAP Service	10 mins after products are made available by NASA	Global	n/a

[24] At least 90% of data received from CNES
[25] Not including SNPP4C service, for which the specification and availability is provided in [RD.11]
[26] Not including JPSS4C service, for which the specification and availability is provided in [RD.11]

Product Group	Product Group Attributes		
	Timeliness[22]	**Accuracy and Coverage**	**Completeness** [23]
SWOT Service	n/a	n/a	n/a
Oceansat-3 Scatterometer Service	200 minutes from sensing (end-to-end timeliness)	n/a	n/a
TROPICS Service	10 mins after products are made available	n/a	n/a
EarthCARE	10 mins after products are made available	n/a	n/a
KSEM Space Weather Products	15 mins after products are made available	n/a	n/a

10.2.23 Service Availability

Product Group	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	Instrument Operational Requirements
MODIS Products	90%	n/a	n/a
SSMIS Products	90%	n/a	n/a
FY-3 Products	90%	n/a	n/a
Multi-mission Regional Products	90%	n/a	n/a
SARAL Products	90%	n/a	n/a
GCOM-W Products	90%	n/a	n/a
HY-2 Products	90%	n/a	n/a
GPM-Core Products	90%	n/a	n/a
CFOSAT SWIM Service	90%	n/a	n/a
S-NPP EDRs [27]	95%	n/a	Lunar Rolls are required to support VIIRS calibrations. This may cause an outage of roughly 15 minutes per calibration and occur approximately 9 times per year.
JPSS EDRs [28]	95%	n/a	Lunar Rolls are required to support VIIRS calibrations. This may cause an outage of roughly 15 minutes per calibration and occur approximately 9 times per year.
IMS Snow and Ice Analysis Dataset	85%	n/a	n/a

[27] Not including SNPP4C service, for which the specification and availability is provided in [RD. 11]
[28] Not including JPSS4C service, for which the specification and availability is provided in [RD. 11]

Product Group	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	Instrument Operational Requirements
Commercial Radio Occultation Service	85%	n/a	n/a
Commercial Radio Occultation Service by NOAA (CRO-NOAA)	85%	n/a	n/a
SMOS Service	90%	n/a	n/a
SMAP Service	90%	n/a	n/a
SWOT Service	90%	n/a	n/a
Oceansat-3 Scatterometer Service	90%	n/a	n/a
TROPICS Service	90%	n/a	n/a
EarthCARE Products	90%	n/a	n/a
KSEM Space Weather Products	90%	n/a	n/a

10.3 NMS Third Party Data Distribution

EUMETSAT provides a selection of bespoke services designed to support environmental monitoring, as well as operational forecasting activities. External data providers, including major meteorological centres, are responsible for the content of these services. The content, typically, includes meteorological observations and forecast data. This service is for the exclusive use of National Meteorological Services (NMS).

Services provided by external (to the EUMETSAT Application Ground Segment) data providers may be restricted to a specific user group and in some circumstances, the data are licensed. Where licensed, the external data providers are responsible for the licensing process.

The provision of the data to EUMETSAT is the responsibility of the data provider. Further information about the services can be found in the EUMETSAT User Portal https://user.eumetsat.int/.

10.3.1 WMO-RA-VI (BMD) Products

The Basic Meteorological Data (BMD) product is provided by GISC Offenbach (DWD). The DWD, acting on behalf of the World Meteorological Organisation (WMO), is responsible for ensuring that the BMD content is delivered to EUMETSAT. Access to these products is restricted to the WMO members (National Meteorological Services and partner organisations) of the WMO Regional Association VI.

EUMETSAT is responsible for ensuring that WMO-RA-VI products are successfully transmitted via EUMETCast.

10.3.2 WMO-RA-I Products

The WMO-RA-I model output data is provided by different data providers (such as ECMWF, UKMO and DWD). The DWD RTH Offenbach, acting on behalf of WMO, is responsible for ensuring that the WMO–RA-I content is delivered to the EUMETCast uplink for dissemination. The MDD products can be grouped in two categories: observation data organized as WMO GTS bulletins that have a short lifetime and need to be disseminated in near real-time and other products such as forecast model runs that are typically disseminated within a few hours.

The WMO–RA-I stream has been reorganised to allow users to have a better access on the products disseminated. The new WMO–RA-I model data products are disseminated without LRIT wrapping and the data providers directly send their data to the EUMETCast Uplink server. The timeliness, completeness, accuracy and coverage requirements cannot be precisely defined at the service level as they are different for each product. The timeliness can be specified for the real-time observations and the non-real-time data such as model forecast data.

EUMETSAT is responsible for ensuring that WMO-RA-I products are successfully transmitted via EUMETCast.

10.3.3 DWDSAT Products

DWDSAT products are provided by DWD. DWD is responsible for ensuring that the DWDSAT content is delivered to the EUMETSAT.

10.3.4 Service Specification

Product Group	Product Group Attributes		
	Timeliness	Accuracy and Coverage	Completeness
WMO-RA-VI (BMD) Products	n/a	n/a	n/a
WMO-RA-I (MDD) Products	For real time observation 10 minutes, for other products 1 hour	n/a	n/a
DWDSAT Products	n/a	n/a	n/a

10.3.5 Service Availability

Operational Service	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	Instrument Operational Requirements
WMO-RA-VI (BMD) Products	90%	n/a	n/a
WMO-RA-I Products	90%	n/a	n/a
DWDSAT Products	90%	n/a	n/a

10.4 Other Third-Party Data Distribution

These products, which support specific-user applications, e.g. deforestation in Africa, or fire monitoring in Europe, are a result of the many cooperation agreements EUMETSAT has in place with partner organisations. The provision of the data to EUMETSAT is the responsibility of the data provider. Further information about the services can be found in the EUMETSAT User Portal https://user.eumetsat.int/.

10.4.1 Service Specification

Product Group	Product Group Attributes		
	Timeliness	Accuracy and Coverage	Completeness
Other Third Party Data Distribution	n/a	n/a	n/a

10.4.2 Service Availability

Operational Service	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	Instrument Operational Requirements
Other Third Party Data Distribution	90%	n/a	n/a

11 DATA ACCESS MECHANISMS

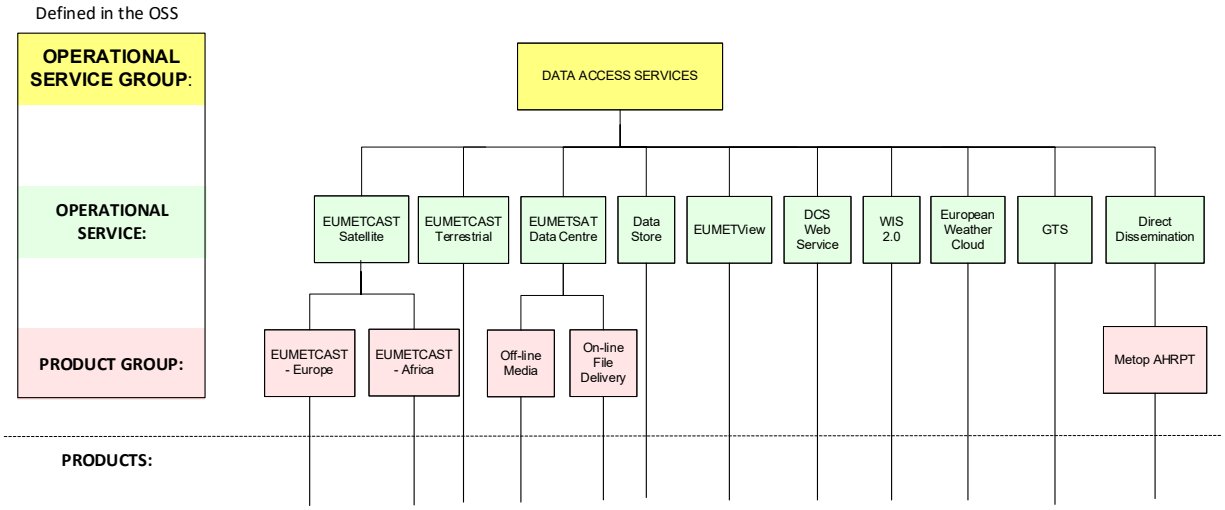

Figure 12 - Overview of Data Access Mechanisms

The data and services provided by EUMETSAT are made available to users via the Data Access Mechanisms described in this chapter. The following portfolio of push and pull mechanisms provide access to NRT data (and derived imagery), with some additionally providing access to historical data.

Further information on each of the data access mechanisms, as well as the data access mechanisms available for each Product Group, can be found on the User Portal https://user.eumetsat.int/.

Further description of all products disseminated via these data access mechanisms can be found in the data catalogue of the User Portal.

To determine the data access mechanisms available for each Product Group, please visit the User Portal

11.1 Push Data Access

"Push" data access mechanisms grouped under the name "EUMETCast" work on a registration basis and continuously push a selectable subset of available near real-time products to users.

11.1.1 EUMETCast

EUMETCast is a multicast system based upon a client/server system with the server side implemented at EUMETSAT headquarters and the client side installed on the individual EUMETCast reception stations. The multicast stream is transported to the user via Satellite networks (EUMETCast Satellite service) or terrestrial networks (EUMETCast Terrestrial service).

Each receiving station decodes the signal and recreates the data/products according to a defined directory and file name structure. A single reception station can receive any combination of the services provided on EUMETCast. Data for which access is restricted, in accordance with EUMETSAT Data Policy, is made secure using encryption.

11.1.1.1 EUMETCast Satellite

On EUMETCast Satellite, the multicast is transferred via a dedicated communications line from EUMETSAT to the uplink facility. There the multicast is encoded into a DVB signal and transmitted to a geostationary communications satellite for broadcast to user receiving stations. Each receiving station decodes the signal and recreates the original multicast stream. There are currently two different services covering Europe and Africa:

EUMETCast Europe: is provided via EUTELSAT 10A located at 10° East, supplying coverage across Europe, North Africa and the Middle East. Under the current arrangements, EUMETCast Europe is available via two of the wide beam Ku-band transponders.

EUMETCast Africa: is provided via EUTELSAT 8 W located at 8° West.

For more information on this satellite see: www.eutelsat.com

The reception areas covered by each of these can be found on the EUMETSAT Website https://www.eumetsat.int/ .

11.1.1.2 EUMETCast Terrestrial

On EUMETCast Terrestrial the multicast is transferred via a multicast-enabled dedicated network to the user. Users must be eligible to connect to the national research networks (NRENS) and the research network must be included in the EUMETCast Terrestrial network. In exceptional cases access can be made available via commercial Internet.

The EUMETCast Client stations decode the multicast back into files according to the subscription of the user.

EUMETCast Terrestrial is used to deliver all data that is available on EUMETCast Satellite, as well as unique data flows not included in the EUMETCast Satellite network. Because it contains all data available on EUMETCast Satellite, it can be used as a back-up to EUMETCast Satellite, provided the user has sufficient network bandwidth available.

11.1.2 Global Telecommunications System (GTS)

Established by the World Meteorological Organisation, the GTS is used by national meteorological services throughout the world to receive, send and relay meteorological data and products. The Regional Meteorological Data Communication Network (RMDCN) is used by WMO Region VI to carry the GTS traffic within Europe. EUMETSAT and its partners use the GTS to deliver the following services:

- Some Metop/NOAA Global Level-1 and Level-2 Products
- Regional EARS products
- Some Meteosat Meteorological products.
- Basic Meteorological Data

- Data Collection and Retransmission service DCP bulletins

For services provided over GTS, the output point for measuring availability is the RTH (Regional Telecommunications Hub), located at DWD Offenbach, which is the interface to the GTS.

11.1.3 Direct Dissemination

The Metop Direct Readout Service provides to local user stations the real-time transmission of data limited to the instantaneous sub-satellite observation. The data source is the satellite as it passes over the user's field of view. Data are distributed as a stream containing Channel Access Data Units (CADUs), which require further processing to produce Metop L0 products. The data are receivable via an Advanced High Resolution Picture Transmission (AHRPT) reception station.

11.2 Pull Data Services

"Pull" data access mechanisms enable users to download products (data or imagery) via their own Internet service through an Application Programming Interface (API) or a Graphical User Interface (GUI).

11.2.1 EUMETSAT Data Store

Provides users with a download service for data available on online storage. As noted above, the EUMETSAT Data Store is – and will be in the near future the only service – for the on-demand access (download and tailoring) of all mission and re-processed EUMETSAT data. Users can discover and download data and products "as is" in a fast, simple way. The service provides access through a Web-UI and via Application Programming Interface (API). Product customisation can be performed passing products via a shopping cart to the Data Tailor Web Service (format transformation, regional sub-setting, and product aggregation).

The completeness of the products available in Data Store (which can be found in https://user.eumetsat.int/) meet the requirements specified in the previous sections, for each applicable data service.

11.2.2 EUMETView

Enables the generation and provision in near real-time of licensed (restricted) and non-licensed (essential) imagery created from EUMETSAT products, with the addition of new features in a scalable, highly available, fast, responsive and reliable service. Processed Meteosat, Metop and other satellite near-real time imagery, visualised products and RGB composites can be viewed directly from this online interface Web-UI or API (via OCG getcapabilities).

The completeness of the products available in EUMETView (which can be found in https://user.eumetsat.int/) meet the requirements specified in the previous sections, for each applicable data service.

11.2.3 DCS Web Service

The DCP Messages are accessible via HTTP retrieval using the internet Web Service (https://service.eumetsat.int/dcswebservice/).

11.2.4 WIS 2.0 Service

The WMO Information System 2.0 (WIS 2.0) is a framework for data sharing. It makes international, regional, and national data sharing simple, effective, and inexpensive. This infrastructure will gradually replace the Global Telecommunication System (GTS).

Users can search for the dataset and related topic in a Global Discovery Catalogue, and then subscribe to that topic on a Global Broker to receive notifications when new data is available.

Please note that in this document WIS 2.0 is considered a "pull data service" because the core data are pulled by the Global Caches. However, the notifications are pushed to the Global Brokers and the overall flow uses a Pub/Sub (Publisher/Subscriber) model.

More information available in https://wis2.dwd.de/gdc/.

11.2.5 European Weather Cloud

The European Weather Cloud (EWC) connects the cloud environments of ECMWF and EUMETSAT into a larger entity, providing unified access to online data, functions, and services from both organisations. The key feature of the EWC is the provisioning of data proximate computing facilities to the meteorological community to boost their developments, ease access to large datasets and potentially support their operational services.

The EWC is available for Member and Co-Operating States of EUMETSAT and ECMWF for Official Duty Use (NMHS, or groups of NMHSs, and other nominated organisations carrying official duties), as well as a number of identified purposes in support of EUMETSAT and ECMWF's mission (e.g. usage by the EUMETSAT Satellite Application Facilities, or in the context of specific annual R&D calls or calls for special projects).

The service consists of cloud resources provided by EUMETSAT and ECMWF and controlled by a cloud management portal hosted at both ECMWF and EUMETSAT. Users are given an account (tenancy) on one of these portals, and can deploy and manage their virtual resources and application environments to both cloud infrastructures (EUMETSAT and ECMWF) regardless of the home location of their tenancy.

The EWC tenants are envisaged to employ the data services of the providing organisations, including e.g., EUMETSAT Big Data Services (BDS), EUMETCast Terrestrial AMT service, ECMWF MARS access, and Climate Data Store (CDS) API. Additionally, EUMETSAT provides centrally managed temporary EWC data buckets for data that are not available in Data Store and for EUMETSAT or external data required by many users simultaneously.

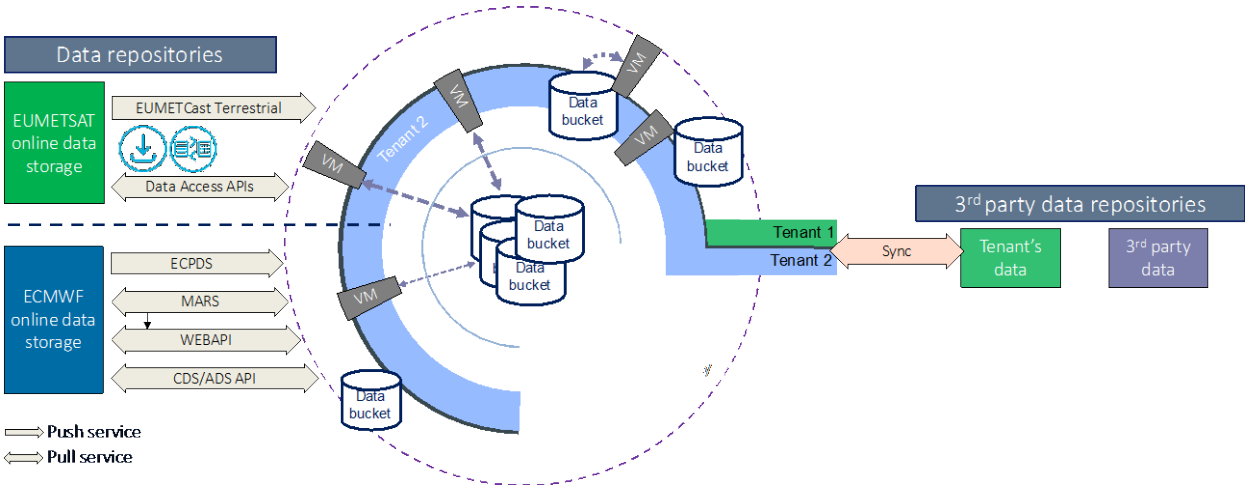

Figure 13 - EWC Context diagram

Users deploy their own applications and are responsible for the maintenance and the application environment they operate in the EWC. Terms and Conditions including eligibility to use the service, roles, and responsibilities are available at: Terms and Conditions for the Use of European Weather Cloud Operational Service.

Member State Computing Representatives (https://www.ecmwf.int/en/about/contact-us/computing-representatives) manage their Member State's resources.

More information on the EWC is available at the EWC web page: https://europeanweather.cloud and in the EWC Knowledge Base: https://confluence.ecmwf.int/display/EWCLOUDKB

11.2.5.1 User Support

EUMETSAT and ECMWF provide support in EWC-specific problems and in using cloud resources for meteorological domain-specific applications. The EWC User support is provided jointly with EUMETSAT and ECMWF via ECMWF Jira at: https://jira.ecmwf.int/servicedesk/customer/portal/9.

The support is provided during business hours only.

Service Element	Description	Target
Time to first response	Lead time to respond to the ticket and start the task	1 day on business hours
Time to resolution plan of service request	Time to assessment and to the resolution plan of the service request including support requests and service change requests	8 business days
Lead time to on-board	Lead time to on-board new user counted from the approval by Computing Representative / R&D project and Special Project acceptance	3 business days (after approval)

11.2.5.2 End user documentation

End user documentation is publicly available in EWC Knowledge base, located at ECMWF Jira: https://confluence.ecmwf.int/display/EWCLOUDKB/European+Weather+Cloud+Knowledge+Base

11.2.6 EUMETSAT Data Centre

The EUMETSAT Data Centre is the long-term repository of all scientific data obtained or derived from EUMETSAT satellites. The archiving process is automated and is carried out 24 hours a day, every day of the year. The archive also provides a comprehensive data retrieval service including an on-demand user access to the data catalogues and other information.

Note: The on-demand user data access is successively transitioned from the Data Centre to the new, cloud based download service Data Store (see below). A lot of the historic data is already available from the Data Store and all new mission data – including MTG and EPS-SG – as well as reprocessed data will be made available from the Data Store. Collections available on the Data Store will successively be removed for access on the Data Centre. In case of data needs that cannot be satisfied at present via the Data Store, users can request access to hidden collections in the Data Centre contacting the User Helpdesk.

In addition to the archiving of data generated in real time, the Data Centre also archives data generated from backlog and reprocessing activities. Backlog processing ensures the highest possible availability of data in the archive by processing any data received at the ground stations, which have not been processed in real-time due to anomalies. By contrast, re-processing ensures that the data available in the archive is of the highest quality by processing the raw data with the latest processing software available. The Data Centre is capable of storing a minimum of two baselines of data for any given sensing period.

Data still available via the Data Centre can be supplied with full spectral and geographical coverage or in subsets chosen by the user. Meteorological Data and Products are ordered online (via the User Portal). See section 12 for contact details and section 12.3 for details regarding the User Portal.

Note: As the retrieval services do not modify the archived products, it is not necessary to detail the quality of the retrieved products – by default the product retrieved is of the same quality as that archived. When the product is reformatted by the retrieval process the quality of the product will be maintained.

11.2.6.1 On-line File Delivery

Online delivery is by HTTP Download.

11.2.6.2 Off-line Media

Off-line media is no longer available in the operational data access from the Data Centre. In special circumstances and on request via the User helpdesk, dedicated deliveries on media might be arranged.

11.2.6.3 Order Delivery Times

It is difficult to predict the delivery times of individual orders, as the Data Centre uses shared resources to retrieve and process the archived data for submitted orders. Depending on the volume and composition of orders being processed, the order delivery time can vary substantially.

The following table provides a guide to what users can expect:

Order size		Delivery time (monthly averages)
Fast orders (i.e. max 10 items, online delivery)		70% within 6 hours
Small orders	(0 GB < retrieval size < 10 GB)	70% within 1 day
Medium orders	(10 GB < retrieval size < 100 GB	90% within 1 week
Large orders	(retrieval size > 100 GB)	50% within 1 week

11.3 Availability

11.3.1 Push Data Access

Data Access Mechanism	Method of Requesting Access	Delivery Media and Format	Timeliness	Availability %
EUMETCast Satellite	Registration for EUMETCast delivery is by the User Portal. Reception using a EUMETCast reception station.	Multicast system based on Digital Video Broadcast-Satellite (DVB-S/S2).	As defined in each product group section	99.5%
EUMETCast Terrestrial	Registration for EUMETCast delivery is by the User Portal. Reception using a EUMETCast reception station.	Multicast system similar to the satellite service delivered through a terrestrial network instead of a satellite network. The network used is the National Research and Education Network (NREN) and the GÉANT infrastructure and in exceptional cases via commercial Internet.	As defined in each product group section	99.5%
GTS	See the EUMETSAT website https://eumetsat.int/	See the EUMETSAT User Portal https://user.eumetsat.int/ for a description of all products disseminated via GTS.	As defined in each product group section	99.5%
Direct Dissemination (Readout)	Station registration for Direct Readout delivery can be done via the User Portal. Reception using an Advanced High Resolution Picture Transmission reception station (AHRPT).	All Metop instrument data via L-Band formatted in Channel Access Data Units (CADU)	As defined in each product group section	99.5%

11.3.2 Pull Data Access

Data Access Mechanism	Method of Requesting Access	Delivery Media and Format	Timeliness	Availability %
EUMETSAT Data Store	Registration and licensing https://user.eumetsat.int/search-view?facets=%7B%22contentTypes%22:%5B%22Data%22%5D%7D	GUI web service, API access via Restful API; EUMDAC (EUMETSAT Data Access Client)	As defined in each product group section + 30 minutes for Meteosat related products (due to aggregation of segments) As defined in each product group section + 90 minutes for Metop related products (due to aggregation of segments)	Service Availability (GUI and APIs): 95%
EUMETView	No registration required for the essential view. Registration and licensing for the licensed visualisation and some functionality is via the user portal	**Visualisation/Product Imagery:** A set of HTML pages visible in a web browser with the addition of data picking values and data download capabilities. API access via OGC get capabilities.	As defined in each product group section + 15 minutes for Meteosat RSS related products (due to aggregation of segments) As defined in each product group section + 30 minutes for Meteosat FES related products (due to aggregation of segments) As defined in each product group section + 3 hours for Metop ((due to aggregation of segments, excluding accumulated orbit layers)	Service Availability (GUI and APIs): 95%

Data Access Mechanism	Method of Requesting Access	Delivery Media and Format	Timeliness	Availability %
DCS Web Service	Registration for FTP delivery is via an offline form from the user portal Registration for DCP messages using HTTP is via the EUMETSAT User Helpdesk (OPS@eumetsat.int)	Direct FTP or online HTTP	As defined in each product group section	99.5%
WIS 2.0	No registration is required to download core data, but recommended data may have some access controls.	Connection via MQTT broker and data delivery via the Internet. Data publishers decide which encodings (data formats) to use following WMO technical regulations.	As defined in each product group section	95%
EWC	See section 11.2.5	See section 11.2.5	n/a	Availability of deployments and reachability of the VM/service: 99%[29] Availability of cloud management services: 99%[28]

[29] Measured over a month, excluding planned service interruptions. Maintenance windows are announced in EWC KB Blog

Data Access Mechanism	Method of Requesting Access	Delivery Media and Format	Timeliness	Availability %
EUMETSAT Data Centre	Registration and access to the Online ordering Application for the Data Centre is via the user portal	**On-line File Delivery:** Direct FTP or online HTTP	n/a	**Archiving Service:** 99.9% of the time computed over a 1 month period
			n/a	**On-Line Ordering Service:** 99.5%.

12 USER SUPPORT SERVICES

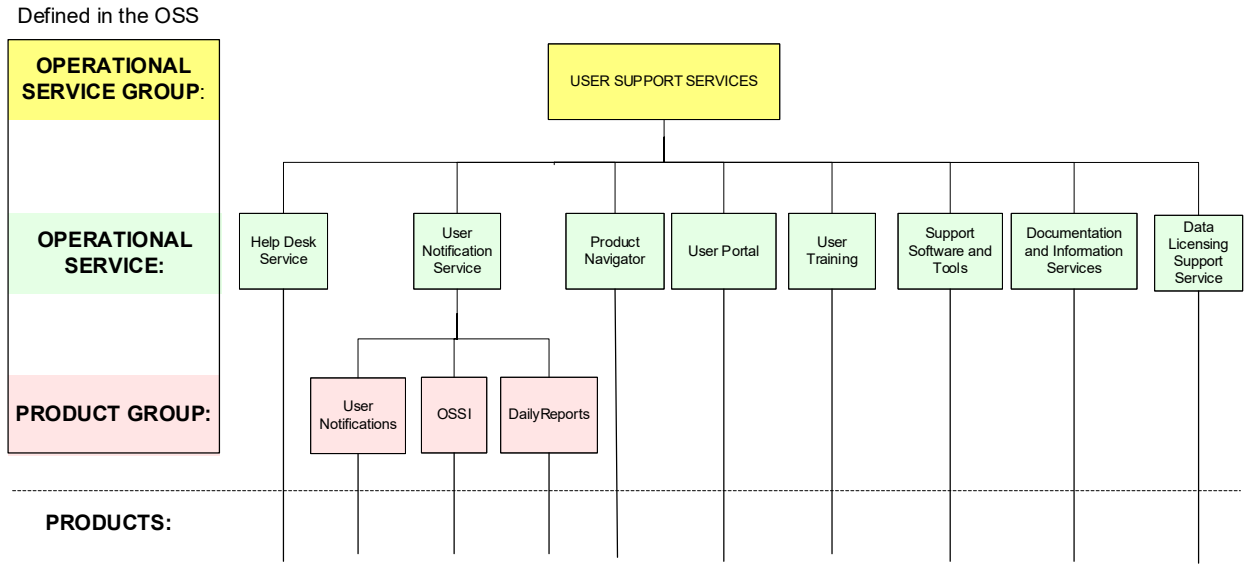

Figure 14 - Overview of User Support Services

User Support Services enhance the usage of EUMETSAT Datasets and Services within both the EUMETSAT Member States and the WMO Member States and comprise the following:

- The distribution of operational information to users (mainly concerning the status/planning of the services);
- A helpdesk function offering a number of off-line services;
- The provision of training to users, in line with the EUMETSAT Training Strategy and the 5-year Training Plan
- The provision of documentation, information, support tools and software to users**;**
- The provision of Data Licences to the users.

12.1 Helpdesk Service

The User Service Helpdesk offers support to existing and future users of operational services and to all visitors of the EUMETSAT website and User Portal.

The User Service Helpdesk provides:

- Enquiry answering service;
- General support on available services;
- Registration service support;

The response time of the Helpdesk Function depends on whether the user request involves a bespoke response or an off-the-shelf response. Regular assessments of users' satisfaction with all the services provided by EUMETSAT are made.

12.2 User Notification Service (UNS)

The User Notification Service comprises the following:

- **User Notifications**: comprises alert (unplanned), maintenance (planned) and service enhancement (updates) messages informing users of temporary or permanent changes to operational services. Notifications can be accessed via the User Portal (https://user.eumetsat.in), the UNS website (https://uns.eumetsat.int/), an email subscription service and in some cases disseminated through the relevant data access service, e.g. EUMETCast, GTS. The messaging service of the WIS is used to relay notifications concerning data provided through the WIS. A dedicated notification service is provided for the Metop Direct Dissemination service, the Multi-mission Administrative Message, (MMAM) [RD. 3].
- **Operational Service Status Indicator (OSSI)**: web tool to provide a simple NRT visual overview of the status (availability/timeliness) of a selection of operational services disseminated via the EUMETCast satellite services and data access mechanisms.
- **Daily Reports**: A report containing the confirmation of all files disseminated and received via EUMETCast for a specific product group covering a full calendar day. For more information, see the EUMETCast Daily Log User Guide [RD. 5].

In order to relate these User Notification Services to the available EUMETSAT Data Services and Data Access Mechanisms (sections 3 to 11), three types of service levels are defined:

- **Services Level 1**
  - 24/7 Alert service
  - Displayed in OSSI (for EUMETCast only)
  - Meteosat, Metop and NOAA GDS, DCS, S&R, SAFs, RDS EARS (Core Stations)
  - Third Party Services: All GEO Ring (NOAA, JMA, CMA)

- **Services Level 2**
  - 8/5 Alert service
  - Not displayed in OSSI
  - Other Third Party Data – Processed by EUMETSAT e.g. RDS EARS (Contributing Stations)

- **Services Level 3**
  - Alert only when service is down for an extended period (e.g. 5-days)
  - Not displayed in OSSI
  - Other Third Party Data – Not processed by EUMETSAT

Data Services **(examples)**	Service Level	UNS Alert	OSSI
Meteosat, Metop and NOAA GDS, All GEO Ring (NOAA, JMA, CMA)	1	24/7	Yes
SAFs S&R	1	24/7	No
DCS (Meteosat and Metop)	1	24/7	No
RDS EARS – Core stations	1	24/7	No
GOSAT	2	8/5	No

Other TPDS – Not processed at EUM	3	Extended outage - only	No
Data Access Mechanisms	Service Level	UNS Alert	OSSI
EUMETCast-S Europe	1	24/7	Yes
EUMETCast-S Africa	1	24/7	Yes
EUMETCast-T	1	24/7	No
GTS	1	24/7	No
Data Centre	1	24/7	No
Data Store	1	24/7	No
EUMETView	1	24/7	No

Other information/access services such as the corporate EUMETSAT website, the Registration Portal, or the SFTP data access services are not monitored via the UNS (and not included in the OSSI).

The service level corresponding to each particular Data Service can be found in the EUMETSAT User Portal https://user.eumetsat.int/.

12.3 User Portal

Users can log in to the User Portal to access data through the different data access services we offer, manage their data licences, and subscribe to service notifications.

The User Portal be accessed directly via the URL: https://user.eumetsat.int .

12.4 User Training

The user training services are delivered in line with the EUMETSAT strategy and multi-annual training plan approved by the Council of EUMETSAT. The scope of the training activities addresses the applications of satellite data to weather forecasting, climate monitoring and wider environmental monitoring, consistent with the EUMETSAT products and service portfolio.
Training activities and resources take the form of:

- Cooperation in international training activities (including WMO VLab, EUMETCAL);
- Classroom and online training: distinct online or classroom courses or a blend of both. Most often these are in partnership with a SAF, Centre of Excellence or other international project;
- Learning materials: resources from courses (presentations and notes) and stand-alone online modules (such as the ASMET series) often produced in partnership with COMET or EUMeTrain;
- Organisation of short-term mobility placements;
- Organisation of training placements;
- Organisation of visiting trainers.

EUMETSAT has established a dedicated Training Channel on EUMETCast, which is used to broadcast the following training material:

- **Training Applications:** Typically training applications which run and use updated input information (e.g. satellite imagery);
- **Themed Training material**: particular training modules/files following a broadcast schedule which is regularly updated and posted on the EUMETSAT website;
- **Third-Party Training material**: training packages provided directly by third-party data providers.

12.5 Support Software and Tools

EUMETSAT makes available a set of interactive tools and software programs. The software programs are divided into two groups:

- **Free and unrestricted -** software freely available for which a signed licence or the formal acceptance of licensing conditions are not required;
- **EUMETSAT Licensed software** - software tool available free of charge but for which a signed licence or the formal acceptance of licensing conditions are required.

Details of the available tools and software can be found in the EUMETSAT website .

12.6 Documentation and Information Services

EUMETSAT provides a comprehensive set of web pages offering information about Products and Services including technical documentation (e.g. User Guides, Product Validation Reports and Product Format Guides), supporting software tools and a range of training material.

The entire EUMETSAT catalogue, including all web pages and documentation, can be found in the EUMETSAT User Portal https://user.eumetsat.int/.

12.7 Data Licensing Support Service

Data Licences are required to receive a subset of EUMETSAT data. This covers:

- Provision of new Data Licences;
- Renewal of existing Data Licences.

12.8 Service Availability

User Support Service	Method of Requesting Service	Delivery Media and Format	Availability %
Helpdesk Service	Help Desk requests can be made via: Tel: +49 6151 807 3660/3770 Fax: +49 6151 807 3790 E-Mail: ops@eumetsat.int Post: EUMETSAT Eumetsat-Allee 1 64295 Darmstadt Germany.	Responses to Help Desk requests shall be provided by e-mail or post as requested by the initiator. The preferred method is via e-mail.	All enquiries concerning the operational services are handled during normal office hours, Monday to Thursday 08:30–17:15, Friday 08:30–16:00 CET / CEST. Note: User requests may be sent at any time by email or letter but will only be processed during normal office hours. "Off-the-shelf" responses to queries and complaints are dispatched within 3 working days. Note: "Off-the-shelf" responses are those for which the Helpdesk has a readily available answer, e.g. satisfied by the provision of existing documents or by standard answers to frequently asked questions. For user queries and complaints which require a “bespoke” response, an interim response is dispatched within 3 working days and a complete response within 15 working days. Note: If this should not be possible then the user is notified in the interim response of the date by which the response will be provided.

User Support Service	Method of Requesting Service	Delivery Media and Format	Availability %
User Notification Service	**User Notifications:** To receive e-mail notifications, it is necessary to subscribe via https://user.eumetsat.int/	**User Notifications:** End-users can receive messages either: • directly (via email), • online (via the messaging website at https://masif.eumetsat.int/uns/) • from the dissemination systems (via EUMETCast, GTS or Direct Dissemination (Admin message only))	**User Notifications:** Target availability of the system used to generate and display messages is 98% EUMETSAT notifies the End-Users one week in advance of the foreseen interruptions of services (outage). Note: This applies in particular to the scheduled outages identified in section 2.2.4.1.
	OSSI: Accessible via the User Portal https://user.eumetsat.int/dashboard	**OSSI:** A set of HTML pages visible in a web browser.	**OSSI:** Target availability of the system used to generate and publish the OSSI is 99.5%.
	Daily Reports: End-Users automatically subscribe to receiving a Daily Report when they subscribe to the equivalent product group using the User Portal https://user.eumetsat.int/	**Daily Reports:** The file format is ASCII and consists of records in delimiter-separated values (“|”).	**Daily Reports:** Target availability of the Daily Reports is in accordance with the availability of EUMETCast, i.e. 99.5%.

User Support Service	Method of Requesting Service	Delivery Media and Format	Availability %
Documentation and information Service	A comprehensive set of information for users of our satellite data and services is provided via the User Portal https://user.eumetsat.int/ .	The user portal provides access to a range of online resources: training opportunities, user guides, how to videos, software and tools, and Jupyter Notebooks, to help users exploit and use our data.	Target availability of the EUMETSAT User Portal is > 98.5% during office hours.
User registration and data subscription service	Part of the user portal service, users can create and maintain an account which provides access to data and service notifications.	Online subscription pages allow users to subscribe to EUMETCast, request and manage their data licences and to subscribe to service notifications.	Target availability of the EUMETSAT User Portal is > 98.5% during office hours.

13 PERFORMANCE REPORTING

The reporting on the performance and availability of EUMETSAT's operational services is provided in EUMETSAT's Operations Status Reports (OSRs), published on a half-yearly basis, and for the public in the Annual Reports published on a yearly basis.

For the calendar half-year under review, the OSR provides charts which plot monthly service availability to the user and operational performance of the main services described in this OSS, as defined in §2.2.4.

The OSRs are published within 8 weeks of the end of the reporting period and presented to the Member States.

The Annual Reports are made available on the EUMETSAT Website https://www.eumetsat.int/, via the 'Annual Reports' page (Annual Reports | EUMETSAT).

APPENDIX A ACRONYMS

Acronym	*Description*
A-DCS	Advanced - Data Collection System
AAPP	ATOVS and AVHRR Pre-processing Package
AC	Atmospheric Composition and UV Radiation (as in AC SAF)
AD	Applicable Document
ADA	Antarctic Data Acquisition
ADM	Atmospheric Dynamics Mission
AHRPT	Advanced High Resolution Picture Transmission
ALADIN	Atmospheric Laser Doppler Instrument
AMSU-A	Advanced Microwave Sounding Unit-A
ASCAT	Advanced SCATterometer
ATMS	Advanced Technology Microwave Sounder
ATOVS	Advanced TIROS Operational Vertical Sounder
AVHRR	Advanced Very High Resolution Radiometer
BMD	Basic Meteorological Data
BUFR	Binary Universal Form for the Representation of meteorological data
CDA	Central Data Acquisition Station
CDOP	Continuous Development and Operations Phase
CERES	Clouds and the Earth's Radiant Energy System
CFOSAT	Chinese-French Oceanography Satellite
CLS	Collecte Localisation Satellites (an Earth-monitoring & surveillance company)
CM	Climate Monitoring
CMA	China Meteorological Administration
COD	Cloud Optical Depth
CrIS	Cross-track Infrared Sounder
DB	Direct Broadcast
DCP	Data Collection Platform
DMSP	Defence Meteorological Satellite Program (of the US DoD)
DORIS	Doppler Orbitography and Radiopositioning Integrated by Satellite
DVB	Digital Video Broadcast
DWD	Deutsche Wetterdienst (German weather-service organisation)
EARS	EUMETSAT Advanced Retransmission Service
ECMWF	European Centre for Medium-Range Weather Forecasts

Acronym	*Description*
EDR	Environmental Data Record
EMI	European Meteorological Infrastructure
EO	Earth Observation
EOL	End of Life
EPS	EUMETSAT Polar System
ESA	European Space Agency
EURD	End-User Requirements Document
EWC	European Weather Cloud
FES	Full Earth Scan
FOV	Field Of View
FSD	Foreign Satellite Data
FY	Fengyun (China's weather satellites)
GAC	Global Access Coverage
GCOM	Global Change Observation Mission
GDS	Global Data Services
GEO	Geostationary Orbit
GERB	Global Earth Radiation Budget
GISC	Global Information System Centres
GOES	Geostationary Operational Environmental Satellite
GOME	Global Ozone Monitoring Experiment
GNSS	Global Navigation Satellite System
GPM	Global Precipitation Measurement
GPS	Global Positioning System
GRAS	GNSS Receiver for Atmospheric Sounding
GTS	Global Telecommunication System
HIRAS	Hyperspectral Infrared Atmospheric Sounder
HIRS	High-Resolution Infrared Radiation Sounder
HRIT	High Rate Information Transmissions
HRPT	High Resolution Picture Transmission
HRV	High Resolution Visible
IASI	Infrared Atmospheric Sounding Interferometer
ICSTM	Imperial College of Science, Technology and Medicine
IJPS	Initial Joint Polar System
IODC	Indian Ocean Data Coverage

Acronym	*Description*
IR	Infra-Red
JAXA	Japan Aerospace Exploration Agency
JMA	Japan Meteorological Agency
JPEG	Joint Photographic Experts Group
JPS	Joint Polar System
JPSS	Joint Polar Satellite System
JTA	Joint Transition Agreement
KNMI	Koninklijk Nederlands Meteorologisch Instituut
LEO	Low Earth Orbit
LRIT	Low Rate Information Transmissions
LRUS	Low Rate User Station
LSA	Land Surface Analysis
MADRAS	Microwave Analysis and Detection of Rain and Atmospheric Structures
MCC	Mission Control Centre
MDD	Meteorological Data Dissemination
MEPED	Medium Energy Proton and Electron Detector
MERSI-2	Medium Resolution Spectral Imager -2
MHS	Microwave Humidity Sounder
MMAM	Multi-mission Administrative Message
MODIS	Moderate-resolution Imaging Spectroradiometer (instrument on NASA's Terra satellite)
MSG	Meteosat Second Generation
MTG	Meteosat Third Generation
MWHS-2	Microwave Humidity Sounder - 2
MWTS-2	Microwave Temperature Sounder - 2
NASA	National Aeronautics and Space Administration
NDE	NPOESS Data Exploitation
NMS	National Meteorological Service
NOAA	National Oceanic and Atmospheric Administration
NPOESS	National Polar-orbiting Operational Environmental Satellite System
NPP	National Polar Orbiting Partnership
NRT	Near real-time
NSOAS	National Satellite and Ocean Application Service
NWC	Nowcasting

Acronym	*Description*
NWP	Numerical Weather Prediction
OGDR	Operational Geophysical Data Record
OIS	Operational Internet Service
OMPS	Ozone Mapping and Profiler Suite
OSI	Ocean and Sea Ice
OSS	Operational Services Specification
OSSI	Operational Service Status Indicator
OSR	Operations Status Report
OSTM	Ocean Surface Topography Mission
PGS	Primary Ground Station
PMAp	Polar Multi-Sensor Aerosol Products
PN	Product Navigator
PPS	Product Processing System
RD	Reference Document
RDS	Regional Data Services
RMDCN	Regional Meteorological Data Communication Network
RMS	Root Mean Square
RO	Radio Occultation
ROM	Radio Occultation Meteorology
ROSA	Radio Occultation Sensor for Atmosphere
RSO	Real-time Services and System Operations (EUM Division)
RSS	Rapid Scanning Service
RTH	Regional Telecommunication Hub
S-NPP	Suomi-National Polar Orbiting Partnership
S&R	Search and Rescue
SAF	Satellite Application Facility
SAPHIR	Sounder for Probing Vertical Profiles of Humidity
SARAL	Satellite with ARgos and ALtiKa
SAS	Sun Avoidance Season
ScaRaB	Scanner for Radiation Budget
SEM	Space Environment Monitor
SEVIRI	Spinning Enhanced Visible and Infrared Imager
SDR	Sensor Data Records
SGDR	Sensor Geophysical Data Record

Acronym	*Description*
SLS	Service Level Specification (for Copernicus)
SMOS	Soil Moisture Ocean Salinity
SSMI/S	Special Sensor Microwave Imager / Sounder
SSO	Single Sign-On
SWIM	Surface Waves Investigation and Monitoring
TDRSS	Tracking and Data Relay Satellite System
TED	Total Energy Detector
UMARF	Unified Meteorological Archive and Retrieval Facility
UNS	User Notification Service
VIIRS	Visible Infrared Imager Radiometer Suite
VIS	Visible
WMO	World Meteorological Organisation
VNIR	Visible and Near-InfraRed
WV	Water Vapour