

[OSS] Operational Services Specification

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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 delivers to its user community, including:

- the current operational services, including 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 various specifications of these services as well as the reporting mechanisms which document the performance actually achieved against requirements.

The operational data services specified in this OSS belong to the following Operational Service Groups:

- Meteosat Services;
- Metop / NOAA / S-NPP Global Data Services;
- Regional Data Services;
- Direct Readout Services;
- Ocean Surface Topography Mission;
- Data Collection Services;
- Search and Rescue Services;
- Satellite Application Facility Services;
- Third Party Data Services;
- Third Party Data Distribution;

A number of support services are also specified in the OSS:

- Data Access Services;
- User Support Services;

It has to be noted that the specifications contained in this OSS are at service level, and in particular, do not provide details on the outputs of the services, e.g. the specifications of the individual products delivered as part of EUMETSAT’s data services. Because these outputs are continually evolving, they are described separately by:

- the EUMETSAT Product Navigator [AD. 1], which is available via the website www.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, as required by the European Commission [RD. 11];
- 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 3-12: Near Real-Time Operational Services;
- Sections 13-14: Data Access and User Support Services;
- Section 15: 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] Dissemination of Polar Cap Winds Derived from Metop-A AVHRR/3, EUM/OPS/REP/10/0787
- [AD. 13] Polar Multi-Sensor Aerosol Product: User Guide, EUM/TSS/MAN/14/742654
- [AD. 14] EUMETSAT Advanced Retransmission Service Technical Description, EUM TD 14

- [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] Product User Manual for “Cloud Products” (CMa-PGE01 v3.2, CT-PGE02 v2.2 & CTTH-PGE03 v2.2), SAF/NWC/CDOP/MFL/SCI/PUM/01.
- [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

1.4.2 Reference Documents

- [RD. 1] EPS Glossary of Acronyms and Terms, EUM/OPS/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, N, N’ User Guide
- [RD. 5] MSG End-User Requirements Document, EUM/MSG/SPE/013
- [RD. 6] The SEVIRI Instrument, paper by J Schmid
- [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

2. TERMINOLOGY

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

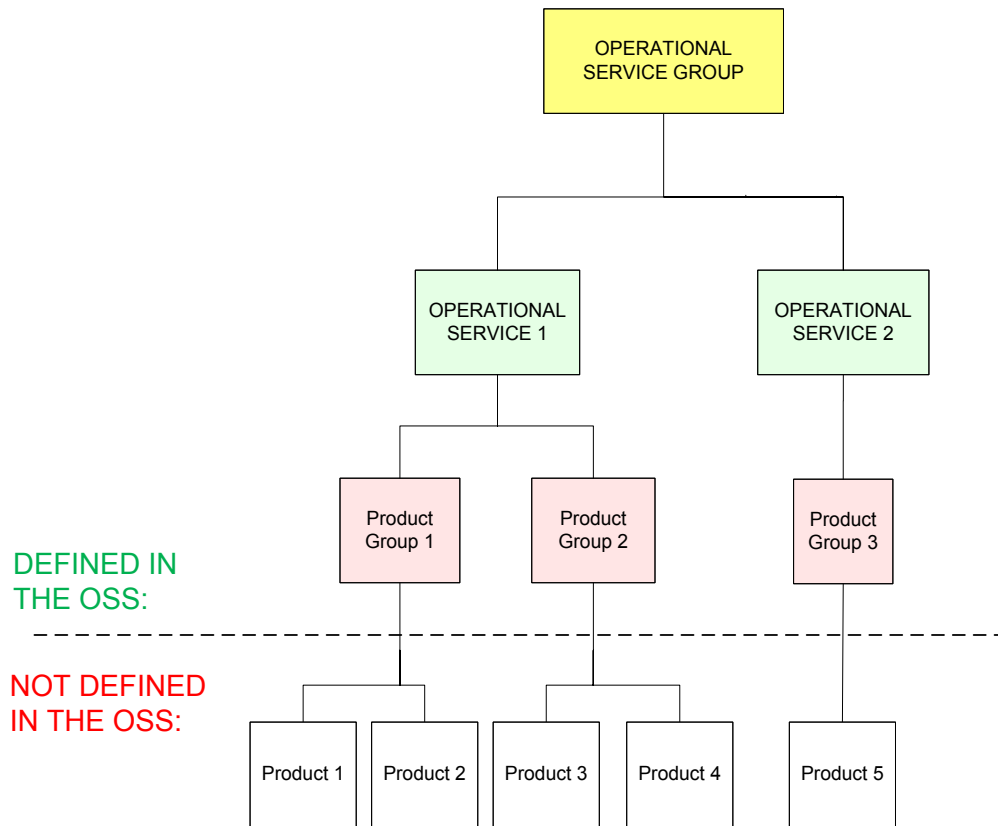


Figure 1- Overview of Basic Definitions

2.2 Terminology Adopted for Describing Real-Time Operational Data Services

Near real-time operational data services provide processed data obtained from instruments carried on-board satellites which are operated or disseminated by EUMETSAT. In general, the following information is provided in this document for each of the operational data 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 Product Navigator [AD. 1].

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 RTH (Regional Telecommunications Hub) GTS 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, Web Services);

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

This Data Access Mechanism is 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 §12 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 above definition of service availability applies to all main services to users that are provided using satellite systems under direct EUMETSAT control and delivered via the prime dissemination mechanism, namely EUMETCast-Europe.

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 measure of performance is 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 published in EUMETSAT’s Central Operations Report (see §14).

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 impossible or irrelevant, 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 timeliness (see §2.2.2.1) adopted for the service or group of services in question, and generally 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 and Support Services

Distinct from the real-time operational data services (which relate to data and product generation), EUMETSAT also provides Data Access and User Support Services. The following information is provided to characterise these services:

- service description;
- service access;
- delivery media and format;
- availability.

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

2.3.1 Service Description

This describes the services specified under the Data Access and User Support groups, and identifies the relevant documentation which further describes the service provision.

2.3.2 Method of requesting service

This describes the method(s) for requesting the provision of a data access or 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 Services, 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.

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3. METEOSAT SERVICES

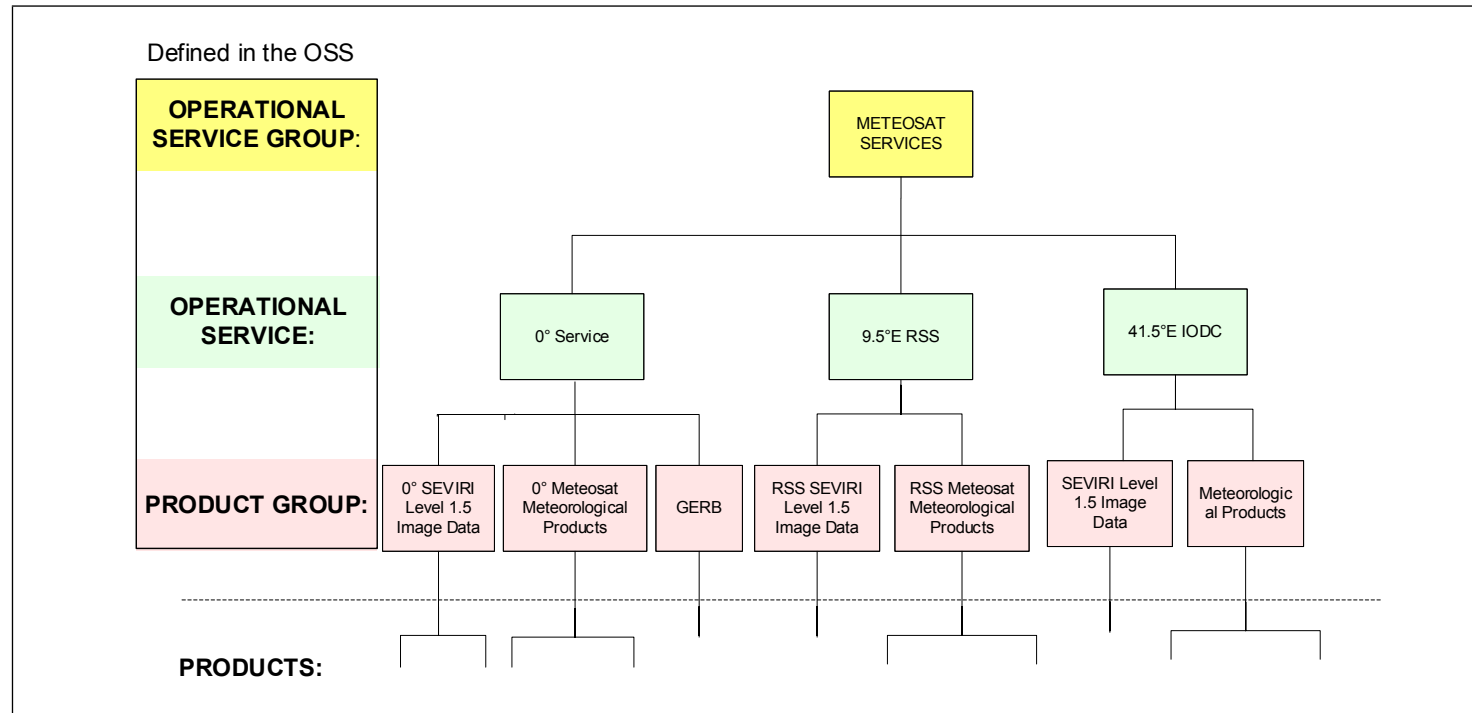


Figure 2 - Overview of Meteosat Services

This operational service group refers to the dissemination of data and products produced from instruments as part of the Meteosat System, which comprises geostationary satellites positioned at approximately longitudes 0°, 9.5°E and 41.5°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;

- 41.5°E IODC: Meteosat-8 ‘Indian Ocean Data Coverage’ data acquired and rectified to 41.5°E

3.1 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 with the precise position decided by the STG-OPS WG. 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 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, linearisation 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.

3.1.2 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 Product Navigator [AD. 1]. In addition EUMETSAT generates a selection of products through NWC SAF to support now-casting as described in the relevant Product User Manual [AD. 17].

3.1.3 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 <http://gerb.oma.be/>

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

3.1.4 Service Specification

Product Group	Product Group Attributes			Data Access				
	Timeliness	Accuracy and Coverage	Completeness	EUMETCast	GTS/RMDC	Direct Diss.	Data Centre	Web Services
0° SEVIRI Level 1.5 Image Data	HRIT: 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: <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> Level 1.0 image was nominally complete, and Level 1.5 image generation process completed successfully 	✓			✓	
	LRIT: 15 mins							✓
0° Meteosat Meteorological Products	15 mins ⁽¹⁾	As specified in [AD. 2]	The products are considered complete if they have been successfully generated from all input data.	✓	✓		✓	✓
GERB	15 mins	n/a	n/a				✓ ⁽²⁾	

⁽¹⁾ Timeliness is measured relative from the time the product repeat cycle is complete and received at the product processing facility.

⁽²⁾ Access to this product is restricted to the identified user community.

3.1.5 Service Availability

Product Group	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	Instrument Operational Requirements
0° SEVIRI Level 1.5 Image Data	Target: 99% ⁽³⁾	<p>The scheduled outages are:</p> <ul style="list-style-type: none"> • 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. 	<p>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.</p>

⁽³⁾ EURD [RD. 5] target = 95%

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 L1.5 image service due to decontamination as described above. -
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.

⁽⁴⁾ EURD [RD. 5] target = 95%

3.2 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 with the precise position decided by the STG-OPS WG.

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

3.2.1 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 (L1.5 Header and L1.5 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.

3.2.2 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 Product Navigator [AD. 1].

3.2.3 Service Specification

Product Group	Product Group Attributes			Data Access				
	Timeliness	Accuracy and Coverage	Completeness	EUMETCast	GTS/RMDCN	Direct Diss.	Data Centre	Web Services
9.5° E RSS SEVIRI Level 1.5 Image Data	5 mins	<p>Nominal Radiometric and Geometric quality if it meets radiometric and geometric accuracy requirements as specified in MSG EURD [RD. 5].</p> <p>The MSG Rapid Scan area will cover a latitude range from approximately 15° to 70° N.</p>	<p>Level 1.0 Image has nominal completeness if:</p> <ul style="list-style-type: none"> 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 <p>Level 1.5 Image has nominal completeness if:</p> <ul style="list-style-type: none"> Level 1.0 image was nominally complete, and Level 1.5 image-generation process completed successfully. 	✓			✓	
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.	✓	✓		✓	

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

3.2.4 Service Availability

Product Group	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	Instrument Operational Requirements
<p>9.5° E RSS SEVIRI Level 1.5 Image Data</p>	<p>Target with no backup satellite: 91%</p> <p>Target with backup satellite: Target: 99%</p>	<p>The scheduled outages are:</p> <ul style="list-style-type: none"> • 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 typically for a few hours around midnight during the eclipse season. 	<p>RSS is a quasi-permanent rapid-scan imaging service. This means that rapid scanning is performed for a certain period and 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.</p> <p>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.</p> <p>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.</p>

Product Group	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	Instrument Operational Requirements
9.5° E RSS Meteosat Meteorological Products	Target: 91%	n/a	<p>Note that products cannot be produced if there are gaps in the L1.5 image service due to the need to operate the SEVIRI instrument in full scan mode as described above.</p> <p>Due to operational reasons, meteorological products are also not generated from the image data produced by a backup satellite in the gaps.</p>

3.3 41.5°E IODC

The 41.5° Service covers all image data and products derived from the Meteosat ‘Full-Earth Scan’, which is performed at 41.5°E longitude. The SEVIRI instrument onboard the Meteosat Second Generation (MSG) satellite 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, with the upper and lower window moving to provide a diurnal mix of Indian Ocean and European coverage per agreement with the STG-OPS-WG. 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].

3.3.1 41.5°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, linearisation 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 both High Rate Information Transmissions (HRIT) in 12 spectral channels.

3.3.2 41.5°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 Product Navigator [AD. 1].

3.3.3 Service Specification

Product Group	Product Group Attributes			Data Access				
	Timeliness	Accuracy and Coverage	Completeness	EUMETCast	GTS/RMDC	Direct Diss.	Data Centre	Web Services
41.5°E IODC SEVIRI Level 1.5 Image Data	HRIT: 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: <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> Level 1.0 image was nominally complete, and Level 1.5 image generation process completed successfully 	✓			✓	
	LRIT: 15 mins							✓
41.5°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.	✓	✓		✓	✓

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

3.3.4 Service Availability

Product Group	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	Instrument Operational Requirements
41.5°E IODC SEVIRI Level 1.5 Image Data	Target: 97% (7)	<p>The scheduled outages are:</p> <ul style="list-style-type: none"> • 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. 	<p>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.</p>

⁽⁷⁾Lower target than that for 0° service, due to the high inclination of Meteosat-8

Product Group	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	Instrument Operational Requirements
41.5°E IODC Meteosat Meteorological Products	Target: 97% ⁽⁸⁾	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 L1.5 image service due to decontamination as described above.

⁽⁸⁾ EURD [RD. 5] target = 95%

4. METOP, SUOMI-NPP AND NOAA GLOBAL DATA SERVICES (GDS)

Defined in the OSS

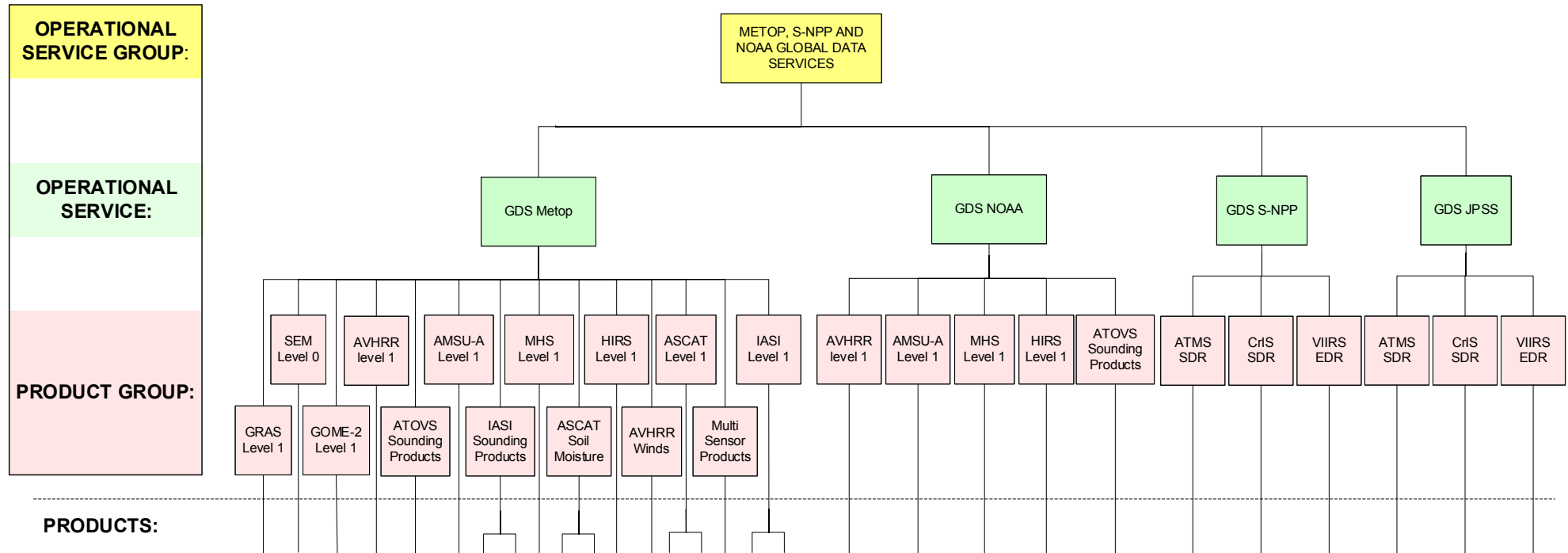


Figure 3 - Overview of Metop, Suomi-NPP and NOAA Global Data Services

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 two satellites provided by NOAA to cover the afternoon orbit and the EUMETSAT Polar System (EPS) providing three Metop satellites to cover the mid-morning orbit. These satellites provide data to support the following operational services:

- **GDS Metop:** Current service supported by the Metop-A, Metop-B and Metop-C low-Earth-orbit polar satellites, providing ‘Global Data Service’ data acquired from the mid-morning orbit. Metop-A and Metop-C are phase-separated from Metop-B by 94° and 240° respectively.
- **GDS NOAA:** Current low-Earth-orbit polar satellite service operated as the “NOAA prime Services Mission for the afternoon orbit”.
- **GDS S-NPP:** The Suomi-National Polar Orbiting Partnership (S-NPP) satellite provides ‘Global Data Service’ data acquired from the afternoon orbit. The GDS S-NPP service complements the GDS NOAA service. S-NPP has the role of the primary operational satellite in this orbit.

4.1 GDS Metop

Seven 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) ATOVS Advanced TIROS Operational Vertical Sounder, package composed of the following instruments:
 - AMSU-A (Advanced Microwave Sounding Unit-A)
 - MHS (Microwave Humidity Sounder)
 - HIRS (High-Resolution Infrared Radiation Sounder)
- 4) IASI Infrared Atmospheric Sounding Interferometer;
- 5) GOME-2 Global Ozone Monitoring Experiment;
- 6) ASCAT Advanced SCATterometer;
- 7) 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 L2 and ATOVS L2.

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, emissivities, 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 HIRS Level 1

The High Resolution Infrared Sounder (HIRS) operates at 20 channels (19 channels in the infrared and one in the visible). Its main purpose is to provide input for the vertical temperature and humidity profile retrievals. In addition, the HIRS pixel resolution serves as the standard grid resolution for all ATOVS level 2 products. HIRS is not available for Metop-C.

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

4.1.6 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 L1 product group consists of the L1C 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.

4.1.7 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].

4.1.8 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].

4.1.9 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 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].

4.1.10 ATOVS Sounding Products

The Advanced TIROS Operational Sounder (ATOVS), in combination with the Advanced Very High Resolution Radiometer (AVHRR), covers the visible, infrared and microwave spectral regions and thus has a wide range of applications: supplementing the retrieval of vertical temperature and humidity profiles, cloud and precipitation monitoring, sea ice and snow cover detection as well as surface temperature determination. ATOVS is composed of the Advanced Microwave Sounding Unit A, the Microwave Humidity Sounder (MHS) and the High Resolution Infrared Radiation Sounder (HIRS/4). The ATOVS sounding products are, however, no longer available from the Metop-A and Metop-C spacecraft.

A full description of the process used to derive these level 2 products is given in [AD. 6].

4.1.11 IASI Sounding Products

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.

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

4.1.12 ASCAT Soil Moisture

The Surface Soil Moisture L2 product is derived from the Advanced SCATterometer (ASCAT) data and given in swath geometry. This product provides an estimate of the water saturation of the 5 cm topsoil layer, in relative units between 0 and 100 [%]. The algorithm used to derive this parameter is based on a linear relationship of soil moisture and SCATterometer backscatter and uses change detection techniques to eliminate the contributions of vegetation, land cover and surface topography, considered invariant from year to year. Seasonal vegetation effects are modelled by exploiting the multiple viewing capabilities of ASCAT. The processor has been developed by the Institute of Photogrammetry and Remote Sensing of the Vienna University of Technology.

A full description of the process used to derive these level 2 products is given in [AD. 10].

4.1.13 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 55°).

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.

4.1.14 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].

4.1.15 Service Specification

Product Group	Product Group Attributes			Data Access				
	Timeliness	Accuracy and Coverage	Completeness	EUMETCast	GTS/RMDCN	Direct Diss.	Data Centre	Web Services
SEM Level 0 ⁽⁹⁾	2 hrs 15 mins ADA Target: 70 mins ⁽¹⁰⁾	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]		✓	✓		✓	
HIRS Level 1		As specified in [AD. 4]		✓	✓		✓	
MHS Level 1		As specified in [AD. 4]		✓	✓		✓	
IASI level 1		As specified in [AD. 7]		✓	✓		✓	

⁽⁹⁾ Access to this product is restricted to the identified user community.

⁽¹⁰⁾ Note: This is the timeliness specification only for the primary satellite where global data is dumped at ADA.

[OSS] Operational Services Specification

Product Group	Product Group Attributes			Data Access				
	Timeliness	Accuracy and Coverage	Completeness	EUMETCast	GTS/RMDCN	Direct Diss.	Data Centre	Web Services
ASCAT Level 1	3 hrs	As specified in [AD. 10]	The composition of the full orbit product will depend on the GOME-2 timeline employed, and will normally consist of Earth observation scans (typically Nadir scanning) and a selection of calibration modes.	✓	✓		✓	
GRAS Level 1		As specified in [AD. 11]		✓	✓		✓	
GOME-2 Level 1		As specified in [AD. 9]		✓			✓	
ATOVS Sounding Products		As specified in [AD. 6]		✓	✓		✓	
IASI Sounding Products		As specified in [AD. 8]		✓	✓		✓	
ASCAT Soil Moisture		As specified in [AD. 10]		✓	✓		✓	
AVHRR Winds	As specified in [AD. 12]	✓	✓		✓			
Multi-Sensor Products	As specified in [AD. 13]	✓			✓			

4.1.16 Service Availability

Product Group	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	Instrument Operational Requirements
SEM Level 0	Target: 98 % ⁽¹¹⁾	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.
HIRS Level 1	Target: 98 %	Out-of-plane manoeuvre: Single burn: ~ 5.5 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.
ASCAT Level 1	Target: 98 %	Out-of-plane manoeuvre: Single burn: ~ 3.5 hrs outage,	The following instrument-specific considerations will result in the unavailability of the ASCAT level 1 product group:

⁽¹¹⁾ EPS EURD [RD. 8] target = 95% (applies to all services in this table)

Product Group	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	Instrument Operational Requirements
		Double burn: ~ 20 hrs outage ¹²	<ul style="list-style-type: none"> 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.
IASI Level 1	Target: 98 %	Out-of-plane manoeuvre: Single burn: ~ 6 hrs outage, Double burn: ~ 20 hrs outage	<ul style="list-style-type: none"> 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. 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.

¹² 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.
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.
ATOVS Sounding Products	Target: 98 %	Out-of-plane manoeuvre: Single burn: ~ 6.25 hrs outage, Double burn: ~ 20 hrs outage	Are driven by applicable outages for MHS Level 1.
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.
ASCAT Soil Moisture	Target: 98 %	Out-of-plane manoeuvre: Single burn: ~ 3.5 hrs outage, Double burn: ~ 20 hrs outage ⁽¹³⁾	See applicable outages for ASCAT 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 which result in a service outage.
Multi-	Target: 98 %	In-plane manoeuvre:	See applicable outages for GOME-2 Level 1.

⁽¹³⁾ 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
Sensor Products		~ 2 hrs outage. Out-of-plane manoeuvre: Single burn: ~ 2 hrs outage, Double burn: ~ 20 hrs outage	

4.2 GDS NOAA

The GDS NOAA operational service consists of AVHRR and ATOVS global data which originates from the NOAA spacecraft ‘afternoon’ orbit. The raw data Global Access Coverage (GAC) is dumped either at the NOAA ground stations in Fairbanks and Wallops Island in the USA or at the CDA located in Svalbard for “blind orbit support”. Similar to the GDS Metop service the GAC data is transferred to the CAF for processing and distribution to the end-users.

4.2.1 AVHRR Level 1

The global products from AVHRR on NOAA satellites are only available at Global Area Coverage (GAC) spatial sampling, namely 5.4 km across track x 3.2 km along track at nadir. See section 4.1.2 for more details.

4.2.2 AMSU-A Level 1

See section 4.1.3 for more details.

4.2.3 MHS Level 1

See section 4.1.4 for more details.

4.2.4 HIRS Level 1

See section 4.1.5 for more details.

4.2.5 ATOVS Sounding Products

See section 4.1.10 for more details.

4.2.6 Service Specification

Product Group	Product Group Attributes			Data Access				
	Timeliness	Accuracy and Coverage	Completeness	EUMETCast	GTS/RMDCN	Direct Diss.	Data Centre	Web Services
AVHRR Level 1	2 hrs 15 mins	As specified in [AD. 5]	The product will be considered complete if valid Measurement Data Records are available for the full orbit (i.e. no missing records).	✓			✓	
AMSU-A Level 1		As specified in [AD. 4]		✓	✓		✓	
HIRS Level 1		As specified in [AD. 4]		✓	✓		✓	
MHS Level 1		As specified in [AD. 4]		✓	✓		✓	
ATOVS Sounding Products	3 hrs	As specified in [AD. 6]		✓	✓		✓	

4.2.7 Service Availability

Product Group	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	Instrument Operational Requirements
AVHRR Level 1	Target: 95 % ⁽¹⁴⁾	n/a	There are no foreseeable instrument operations which result in a service outage.
AMSU-A Level 1	Target: 95 %	n/a	There are no foreseeable instrument operations which result in a service outage.
HIRS Level 1	Target: 95 %	n/a	There are no foreseeable instrument operations which result in a service outage.
MHS Level 1	Target: 95 %	n/a	Depending on the degradation of the instrument performance, MHS will require occasional receiver gain changes (maximum of 3 changes on each of the 5 channels), resulting in product unavailability for a duration of two orbits.
ATOVS Sounding Products	Target: 95 %	n/a	Service outages are driven by any outages for MHS Level 1.

⁽¹⁴⁾ As specified in the EPS EURD [RD. 8]

4.3 GDS S-NPP

The Suomi - National Polar Orbiting Partnership ⁽¹⁵⁾ (S-NPP) mission is intended to bridge the gap between the old (NPOESS) and new systems by flying new instruments, on a new satellite bus, using a new ground data network. The five instruments included as payload aboard S-NPP 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 S-NPP 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 S-NPP data is provided as Sensor Data Records (SDRs) (L1) and Environmental Data Record (EDRs) (L2).

4.3.1 ATMS SDR

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

4.3.2 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 399 channels (for GTS dissemination) and re-encoding the data prior to repacking and renaming the file. EUMETSAT is also receiving and processing VIIRS EDR data from NOAA NDE containing cloud top height and combined cloud cover information. This data is received in netCDF and have a different spatial grid and granule resolution than the CrIS data. As the VIIRS EDRs arrived at EUMETSAT they are decoded and re-gridded. If, at the time of reception of CrIS SDR data processing, collocated VIIRS cloud data are available, these are written in to the CrIS SDRs in the foreseen

⁽¹⁵⁾ Previously known as the NPOESS Preparatory Project (NPP)

positions in the encoding sequence. If the VIIRS EDRs are not available, the CrIS data are processed as before, and the cloud information remains missing.

4.3.3 VIIRS 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. Wind EDRs include wind speed, direction, and height at high latitudes.

EUMETSAT relays Active 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 active fires (AF) 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 Active 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 Active Fires product produced by the Interface Data Processing Segment (IDPS).

4.3.4 Service Specification

Product Group	Product Group Attributes			Data Access				
	Timeliness	Accuracy and Coverage	Completeness	EUMETCast	GTS/RMDCN	Direct Diss.	Data Centre	Web Services
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 ⁽¹⁶⁾	✓	✓			
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	✓	✓ (17)			
VIIRS EDRs	15 mins after products are made available by NOAA	Geolocated data in BUFR format.	-	✓				

⁽¹⁶⁾ The completeness of the product files depends on the completeness and quality of the incoming data which is not under the responsibility of EUMETSAT.

⁽¹⁷⁾ 399 CrIS spectral channels as selected by NOAA

4.3.5 Service Availability

Product Group	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	Instrument Operational Requirements
ATMS SDRs	99.5%	n/a	n/a
CrIS SDRs	99.5%	n/a	n/a
VIIRS EDRs	99.5%	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.

4.4 GDS JPSS

The Joint Polar Satellite System (JPSS) mission is a new series of satellites following on from the IJPS (NPOESS) and bridging satellites using the same ground network as S-NPP. The five instruments included as payload aboard JPSS 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) (L1) and Environmental Data Record (EDRs) (L2).

4.4.1 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.

4.4.2 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 399 channels (for GTS dissemination) and re-encoding the data prior to repacking and renaming the file. EUMETSAT is also receiving and processing VIIRS EDR data from NOAA NDE containing cloud top height and combined cloud cover information. This data is received in netCDF and have a different spatial grid and granule resolution than the CrIS data. As the VIIRS EDRs arrived at EUMETSAT they are decoded and re-gridded. If, at the time of reception of CrIS SDR data processing, collocated VIIRS cloud data are available, these are written in to the CrIS SDRs in the foreseen positions in the encoding sequence. If the VIIRS EDRs are not available, the CrIS data are processed as before, and the cloud information remains missing.

4.4.3 VIIRS 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. Wind EDRs include wind speed, direction, and height at high latitudes.

EUMETSAT relays Active Fire EDRs from the VIIRS instrument on-board the NOAA-20 satellite. The EDRs are generated by NDE in netCDF format and contain pinpoint locations of active fires (AF) 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 Active 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 Active Fires product produced by the Interface Data Processing Segment (IDPS).

4.4.4 Service Specification

Product Group	Product Group Attributes			Data Access				
	Timeliness	Accuracy and Coverage	Completeness	EUMETCast	GTS/RMDCN	Direct Diss.	Data Centre	Web Services
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 ⁽¹⁸⁾	✓	✓			
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	✓	✓ (19)			
VIIRS EDRs	15 mins after products are made available by NOAA	Geolocated data in BUFR format.	-	✓				

⁽¹⁸⁾ The completeness of the product files depends on the completeness and quality of the incoming data which is not under the responsibility of EUMETSAT.

⁽¹⁹⁾ 399 CrIS spectral channels as selected by NOAA

4.4.5 Service Availability

Product Group	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	Instrument Operational Requirements
ATMS SDRs	99.5% ⁽²⁰⁾	n/a	n/a
CrIS SDRs	99.5%	n/a	n/a
VIIRS EDRs	99.5%	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.

⁽²⁰⁾ 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 handed-over at the OIS.
For the delivery to GTS/RMDCN, the ratio between the number of data files delivered to the GTS/RMDCN and the number of data handed-over at the OIS is relevant.

5. REGIONAL DATA SERVICES (RDS)

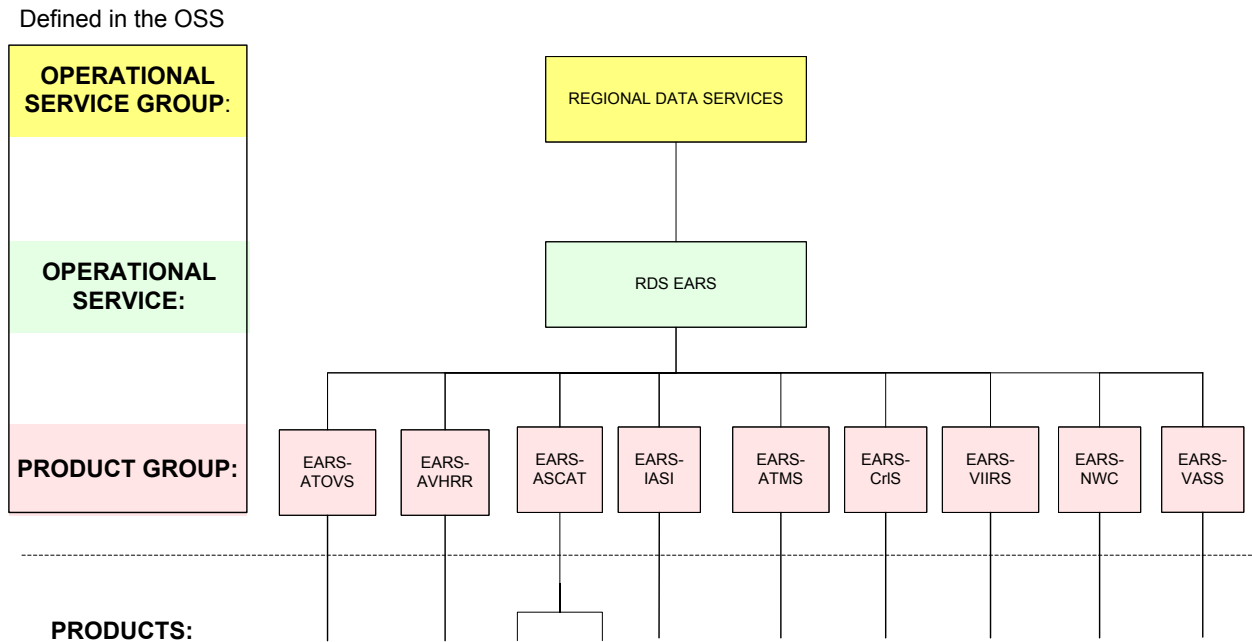


Figure 4 - Overview of Regional Data Services

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.

EARS now comprises of a total of nine separate polar satellite instrument data services; EARS-ATOVS, EARS-AVHRR, EARS-ASCAT, EARS-IASI and EARS-NWC. Each of these EARS services retransmits observations from an instrument or an instrument group and aims at providing a homogeneous service across the NOAA and Metop satellites, when instruments are identical.

With the launch of the Suomi-National Polar Orbiting Partnership (S-NPP) satellite, with its enhanced suite of instruments, three services are provided: EARS-ATMS, EARS-CrIS and EARS-VIIRS.

The addition of the FengYun-3 (FY3) series of satellites provides the latest addition EARS-VASS.

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 and NOAA 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 and NOAA satellites 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 AHRPT stations in Europe and the middle East. 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 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 product and formatting, see [AD. 7].

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. Geographical coverage to be provided by the 5 core European Stations (Kangerlussuaq, Svalbard, Lannion, Athens, Maspalomas) plus potentially Moscow.

5.1.6 EARS-CrIS

Cross-track Infrared Sounder (CrIS) an IASI type Infrared Sounder optimised for meteorological sounding. Compared to IASI: fewer channels (2211 versus 8461), but more Fields of View. The EARS-CrIS service will provide 399 selected CrIS channels. Geographical coverage to be provided by the 5 core European Stations (Kangerlussuaq, Svalbard, Lannion, Athens, Maspalomas) plus potentially Moscow.

EARS-VIIRS

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 initially provided the 16 M-Band channels, with data from the 1 Day/Night channel added to the service during Q1 2016. Regional geographical coverage is currently provided by the 5 core European stations (Kangerlussuaq, Svalbard, Lannion, Athens and Maspalomas).

5.1.8 EARS-NWC

The NOAA and 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 L1b using the AAPP processing package delivered by NWP-SAF and to Level2 using the PPS processing package delivered by NWC-SAF.

5.1.9 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 geographical coverage will initially be the core European EARS direct broadcast reception stations (Athens, Kangerlussuaq, Lannion, Maspalomas and Svalbard), with the potential of adding further stations when opportunities arise. The FY3_IPP Package provided by CMA will be used for product processing to Level 1b.

5.1.10 EARS-MERSI

The EARS-MERSI service provides the 1km resolution product of the MERSI-2 (Medium Resolution Spectral Imager – 2) instruments onboard the CMA’s FY-3 satellite series, starting with FY-3D which is the first satellite of the FY-3 series carrying the MERSI-2 instrument. MERSI-2 is a combination of the MERSI-1 (20 channels) and the VIRR (Visible and Infra-Red Radiometer) (5 channels) instruments onboard FY-3A, -3B and -3C, and thus has 25 channels in total. It has 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 and VIIRS regional services, we provide 1-minute segments removing overlaps between stations. There are 2 files per 1-minute segment. The geographical coverage will initially be the core European EARS direct broadcast reception stations (Athens, Kangerlussuaq, Lannion, Maspalomas and Svalbard).

5.1.11 Service Specification

Product Group	Product Group Attributes			Data Access				
	Timeliness	Accuracy and Coverage	Completeness	EUMETCast	GTS/RMDCN	Direct Diss.	Data Centre	Web Services
EARS-ATOVS	90% of individual products within 30mins Products originating from certain HRPT stations are subject to a reduced timeliness target (Gander, Edmonton, Miami and Monterey = 45 mins.).	As specified in [AD. 14]	n/a	✓	✓			
EARS-AVHRR	90% of individual products within 30mins	As specified in [AD. 14]	n/a	✓			✓	
EARS-ASCAT				✓	✓			
EARS-IASI				✓	✓			
EARS-NWC				✓			✓	
EARS-ATMS	30 mins	ATMS data is currently recieved from the EARS core direct readout stations and Moscow. Other stations to be included when S-NPP / NOAA20 data becomes available from those stations	One file per station pass.	✓ (21)	✓			
EARS-CrIS	30 mins			✓ (22)	✓			

⁽²¹⁾ SDR, all 22 ATMS spectral channels, all Fields of View, calibrated and geolocated. BUFR Format.

⁽²²⁾ SDR, 399 CrIS spectral channels, all Fields of View, calibrated and geolocated. Co-located cloud information derived from VIIRS data. BUFR Format.

Product Group	Product Group Attributes			Data Access				
	Timeliness	Accuracy and Coverage	Completeness	EUMETCast	GTS/RMDCN	Direct Diss.	Data Centre	Web Services
EARS-VASS	90% of individual products within 30mins	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 segments removed before EUMETCast dissemination.	✓ (23)				
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	✓				

⁽²³⁾ SDR, Calibrated and geolocated VIIRS M-Band observations. All 16 VIIRS M-Band channels with no data thinning. VIIRS I-Band and Day and Night Band not included. Geolocation information on tie-point grid. HDF5 product format, lossless compression.

Product Group	Product Group Attributes			Data Access				
	Timeliness	Accuracy and Coverage	Completeness	EUMETCast	GTS/RMDCN	Direct Diss.	Data Centre	Web Services
			segment.					

5.1.12 Service Availability

Product Group	Availability % ⁽²⁴⁾	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	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,	EARS-ASCAT products will not be available when the instrument is in calibration mode.

⁽²⁴⁾ 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 % ⁽²⁴⁾	Scheduled Outages	
		Routine Spacecraft Operational Requirements	Instrument Operational Requirements
		Double burn: ~ 20 hrs outage	
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
EARS-MERSI	90%	n/a	n/a

6. DIRECT READOUT SERVICES

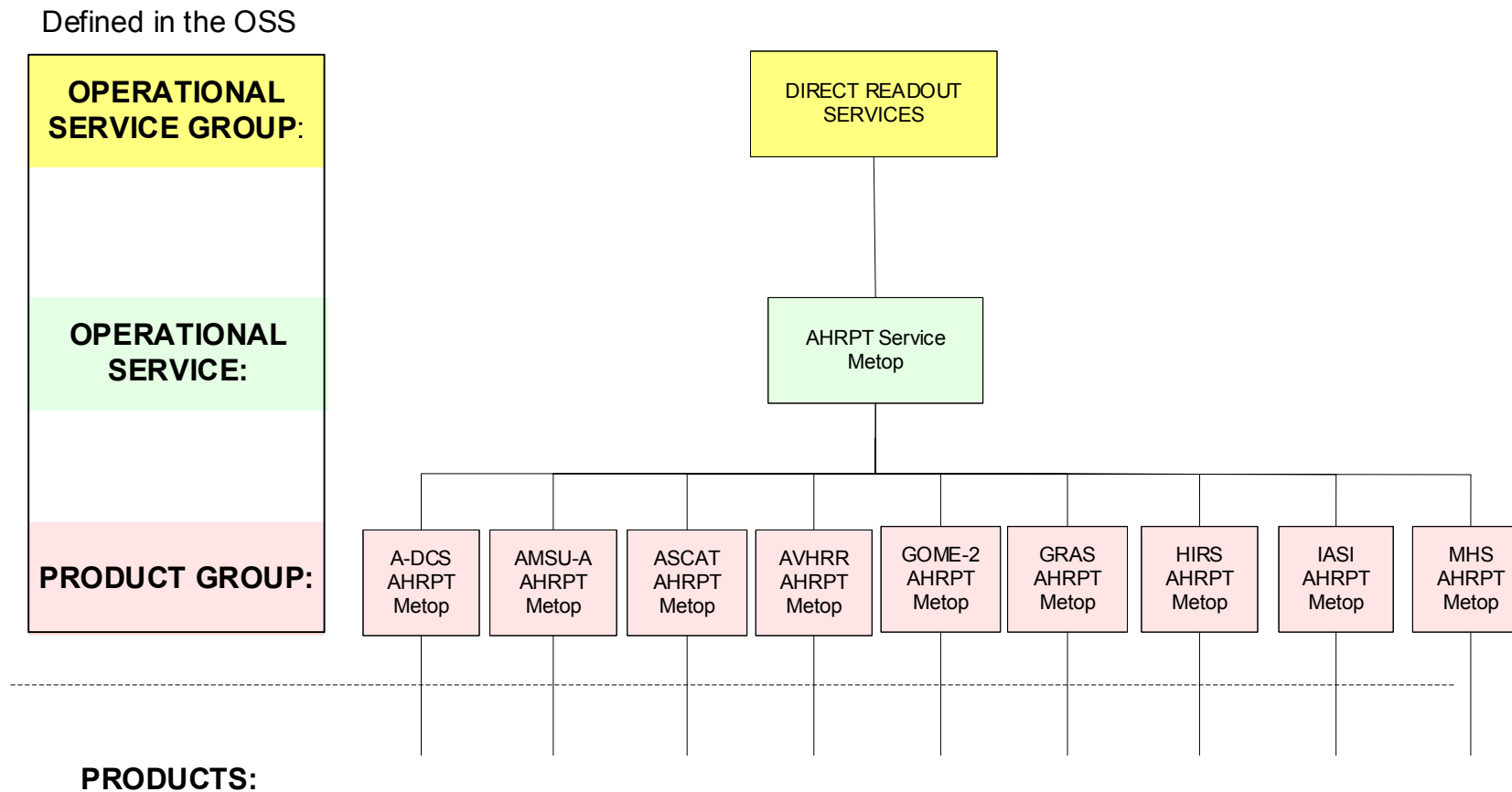


Figure 5 - Overview of Direct Readout Services

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).

6.1 AHRPT Service Metop

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

6.1.1 A-DCS AHRPT Metop

See section 7.2 for more details on the A-DCS instrument.

6.1.2 AMSU-A AHRPT Metop

See section 4.1.3 for more details on the AMSU-A instrument.

6.1.3 ASCAT AHRPT Metop

See section 4.1.8 for more details on the ASCAT instrument.

6.1.4 AVHRR AHRPT Metop

See section 4.1.2 for more details on the AVHRR instrument.

6.1.5 GOME-2 AHRPT Metop

See section 4.1.7 for more details on the GOME-2 instrument.

6.1.6 GRAS AHRPT Metop

See section 4.1.9 for more details on the GRAS instrument.

6.1.7 HIRS AHRPT Metop

See section 4.1.5 for more details on the HIRS instrument.

6.1.8 IASI AHRPT Metop

See section 4.1.6 for more details on the IASI instrument.

6.1.9 MHS AHRPT Metop

See section 4.1.4 for more details on the MHS instrument.

6.1.10 Service Specification

Product Group	Product Group Attributes			Data Access				
	Timeliness	Accuracy and Coverage	Completeness	EUMETCast	GTS/RMDCN	Direct Diss.	Data Centre	Web Services
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						✓		
HIRS 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			
HIRS AHRPT Metop			
IASI AHRPT Metop			
MHS AHRPT Metop			

7. DATA COLLECTION SERVICES

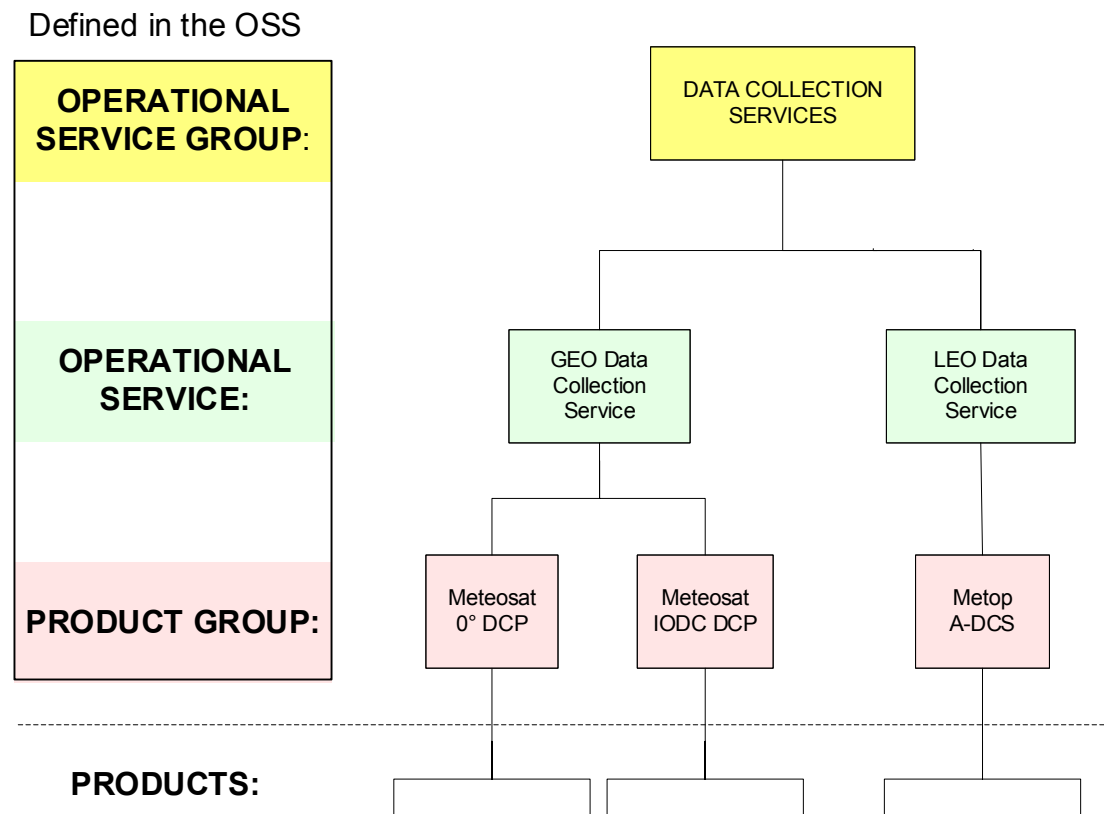


Figure 7 - Overview of Data Collection Services

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 retransmit those DCP data collected from their DCP platforms to their own reception stations and to the Global Telecommunication System (GTS) community. The operation of this service is supported by the second generation Meteosat satellite systems. Further details of the DCP service can be found in [RD. 7]. DCP operators can also download their own DCP messages and gather information about the operation of their DCPs. DCP operators have to register with EUMETSAT for admission to this service (see section 13.3).

7.1.1 Meteosat 0° DCP

The Meteosat 0° DCP supports the following basic functions:

- The transmission of data from DCPs to the satellite.
- The immediate relay of the data by the satellite to the Ground Station.
- The subsequent basic processing and onward distribution of selected data to the user.

The operational satellite is located over the equator at a longitude of 0°; hence the DCS can be used by all DCPs situated within its telecommunications field of view (FOV). A realistic limit of this view is about 75° great circle arc of the sub-satellite point and corresponding to a ground antenna elevation of 5°. This FOV can extend to approximately 80° great circle arc, depending upon local topographical features.

7.1.2 Meteosat IODC DCP

Support to DCP operations provided by the Meteosat Second Generation satellite located at 41.5°E longitude.

7.1.3 Service Specification

Product Group	Product Group Attributes			Data Access				
	Timeliness	Accuracy and Coverage	Completeness	EUMETCast	GTS/RMDCN	Direct Diss.	Data Centre	Web Services
Meteosat 0° DCP	<ul style="list-style-type: none"> The specification for the timeliness for delivery of DCP bulletins to the <u>GTS interface</u> is within 10 mins of arrival at the EUMETSAT MCC. The specification for the timeliness for delivery of DCP messages on <u>EUMETCast</u> is within 10 mins of arrival at the EUMETSAT MCC. 	n/a	n/a	✓ (25)	✓			✓ (26)
Meteosat IODC DCP								

7.1.4 Service Availability

Product Group	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	Instrument Operational Requirements

⁽²⁵⁾ Available data restricted to DCP operators and their partners

⁽²⁶⁾ DCP messages and bulletins are not archived but are available for FTP/Internet retrieval for two weeks.

Product Group	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	Instrument Operational Requirements
Meteosat 0° DCP	Target: 98% ⁽²⁷⁾	n/a	n/a
Meteosat IODC DCP			

7.2 LEO Data Collection Service

The Argos Advanced Data Collection System (A-DCS) is a data collection relay system. The primary objective is the collection and dissemination of data for the scientific community, through measurement of temperature, pressure, humidity, sea levels and location. The data are then transmitted to the user community through the Argos network. Flying the Argos system aboard polar-orbiting satellites provides worldwide coverage. Additionally, incorporating the A-DCS instrument on a moving satellite allows for locating an in-situ platform using Doppler shift calculations. This positioning capability permits applications such as monitoring drifting ocean buoys and studying wildlife migration paths.

As part of the LEO Data Collection Service, EUMETSAT:

- routinely transmits the following data sets to CLS Toulouse:
 - Metop A-DCS level 0 data (i.e. A-DCS source packets, for a full orbit);
 - A-DCS house-keeping data (in engineering form);
 - Metop auxiliary data necessary to process A-DCS data (ephemeris, time correlation data, orbit state vector);
 - Operations Reports.
- broadcasts A-DCS level 0 data via the HRPT service (see section 6);
- provides operational support.

A more detailed description of the data provided is given in [RD. 8]

⁽²⁷⁾ This means that users can expect that 98% or more of the messages transmitted by their DCP will be successfully received, processed and distributed in any given calendar month

7.2.1 Metop A-DCS

A-DCS products as provided by the Metop-A, Metop-B and Metop-C satellites. A full description of the format is provided in [AD. 3].

7.2.2 Service Specification

Product Group	Product Group Attributes			Data Access				
	Timeliness	Accuracy and Coverage	Completeness	EUMETCast	GTS/RMDCN	Direct Diss.	Data Centre	Web Services
Metop A-DCS	2 hrs 15 mins	n/a	The product is considered complete if all A-DCS signals received during an orbit are provided in the L0 product.				✓	✓ (28)
							✓	✓

7.2.3 Service Availability

Product Group	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	Instrument Operational Requirements
Metop A-DCS	The target availability of the Data Collection Service is 92% over a calendar month. The specified availability applies to all users of this service, including EUMETSAT's archive.	n/a	n/a.

⁽²⁸⁾ The A-DCS level 0 product is disseminated to CLS Toulouse via the Internet. The products are disseminated in native format in 15-minute PDUs (mini-products).

8. SEARCH AND RESCUE SERVICES

Defined in the OSS

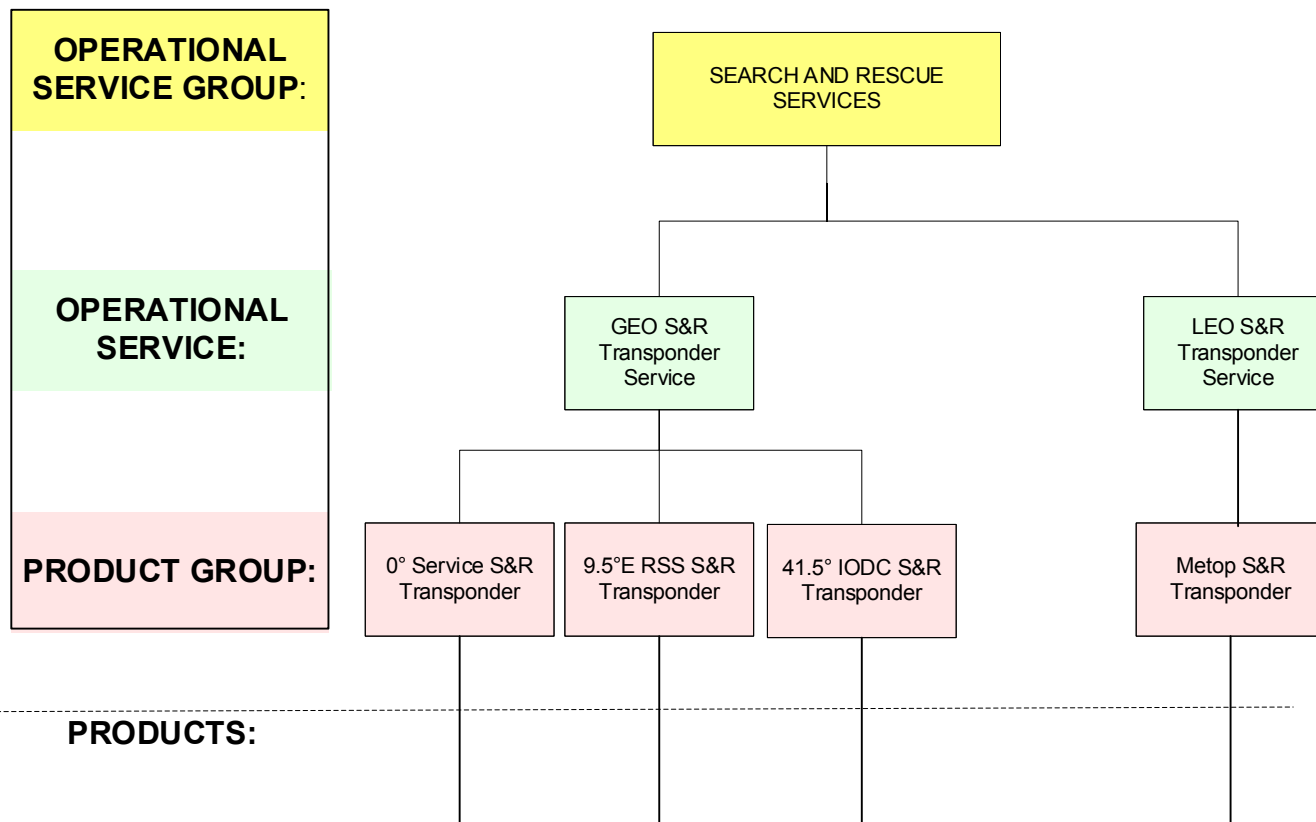


Figure 8 - Overview of Search and Rescue Services

As part of the Search and Rescue (S&R) Service, EUMETSAT provides access to transponders the MSG & Metop spacecraft which relay messages received from search and rescue beacons. The MSG & 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 GEO S&R Transponder Service

8.1.1 0° Service S&R Transponder

S&R transponder onboard the Meteosat Satellite supporting the 0° Service.

8.1.2 9.5°E RSS S&R Transponder

S&R transponder onboard the Meteosat Satellite supporting the 9.5°E Rapid Scan Service.

8.1.3 41.5°E IODC Service S&R Transponder

S&R transponder onboard the Meteosat Satellite supporting the 41°5E IODC Service.

8.1.4 Service Specification

Product Group	Product Group Attributes			Data Access				
	Timeliness	Accuracy and Coverage	Completeness	EUMETCast	GTS/RMDCN	Direct Diss.	Data Centre	Web Services
0° Service S&R Transponder	See www.cospas-sarsat.org					✓		
9.5°E RSS S&R Transponder						✓		
41.5°E IODC S&R Transponder						✓		

8.1.5 Service Availability

Product Group	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	Instrument Operational Requirements
0° Service S&R Transponder	> 99%	n/a	n/a
9.5°E RSS S&R Transponder			
41.5°E IODC S&R Transponder			

8.2 LEO S&R Transponder Service

8.2.1 Metop S&R Transponders

S&R transponders onboard the Metop-A and Metop-B Satellites. Note that there is no transponder onboard Metop-C.

Service Specification

Product Group	Product Group Attributes			Data Access				
	Timeliness	Accuracy and Coverage	Completeness	EUMETCast	GTS/RMDCN	Direct Diss.	Data Centre	Web Services
Metop S&R Transponders	See www.cospas-sarsat.org					✓		
						✓		

8.2.2 Service Availability

Product Group	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	Instrument Operational Requirements
Metop S&R Transponders	> 92%	n/a	n/a

9. SATELLITE APPLICATION FACILITY SERVICES

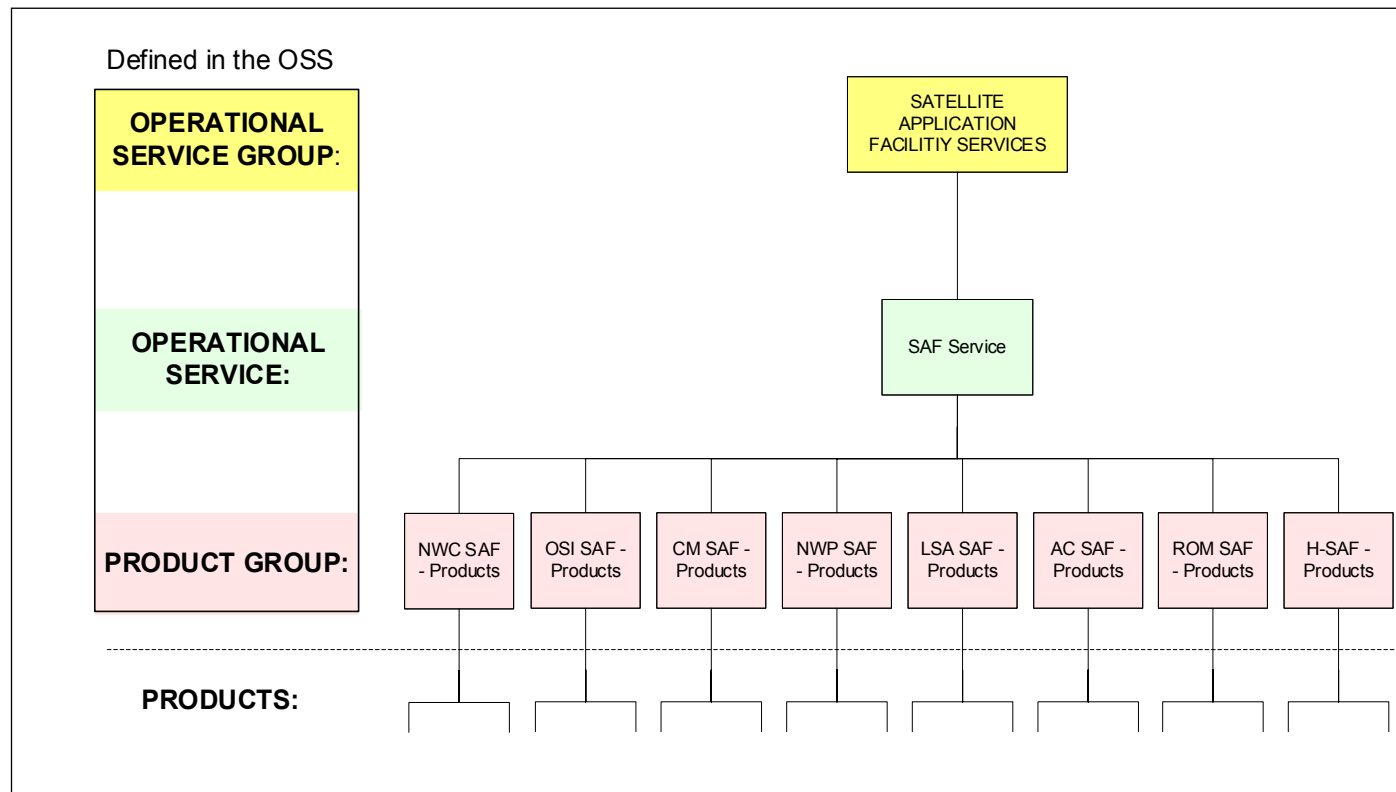


Figure 9 - Overview of Satellite Application Facility Services

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 Product Navigator [AD. 1] 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 onboard 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 either in near-real time (NRT, three hours 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 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			Data Access				
	Timeliness ⁽²⁹⁾	Accuracy and Coverage	Completeness	EUMETCast	GTS/RMDCN	Direct Diss.	Data Centre	Web Services ⁽³⁰⁾
NWC SAF Products	n/a	As specified in [AD. 16]	n/a	✓				✓
OSI SAF Products	2hr - 6hrs	As specified in [AD. 18]	As specified in [AD. 18]	✓	✓		✓	✓
CM SAF Products	n/a	As specified in [AD. 20]	As specified in [AD. 20]				✓	✓
NWP SAF Products	n/a	As specified in [AD. 15]	As specified in [AD. 15]					✓
LSA SAF Products	1hr/3hrs	As specified in [AD. 22]	As specified in [AD. 22]	✓			✓	✓
AC SAF Products	3hrs	As specified in [AD. 23]	As specified in [AD. 23]	✓			✓	✓
ROM SAF Products	3hrs	As specified in [AD. 24]	As specified in [AD. 24]	✓	✓			✓
H-SAF Products	30mins-6hrs	As specified in [AD. 25]	As specified in [AD. 25]	✓			✓	✓

⁽²⁹⁾ Timeliness values applicable to NRT products only.

⁽³⁰⁾ Products are available for retrieval directly from each SAF institute

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% ⁽³¹⁾	n/a	n/a
CM SAF Products	n/a	n/a	n/a
NWP SAF Products	n/a	n/a	n/a
LSA SAF Products	>95%	n/a	n/a
AC SAF Products	>95%	n/a	n/a
ROM SAF Products	>95%	n/a	n/a
H-SAF Products	>95%	n/a	n/a

⁽³¹⁾ 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.

10. THIRD-PARTY DATA SERVICES

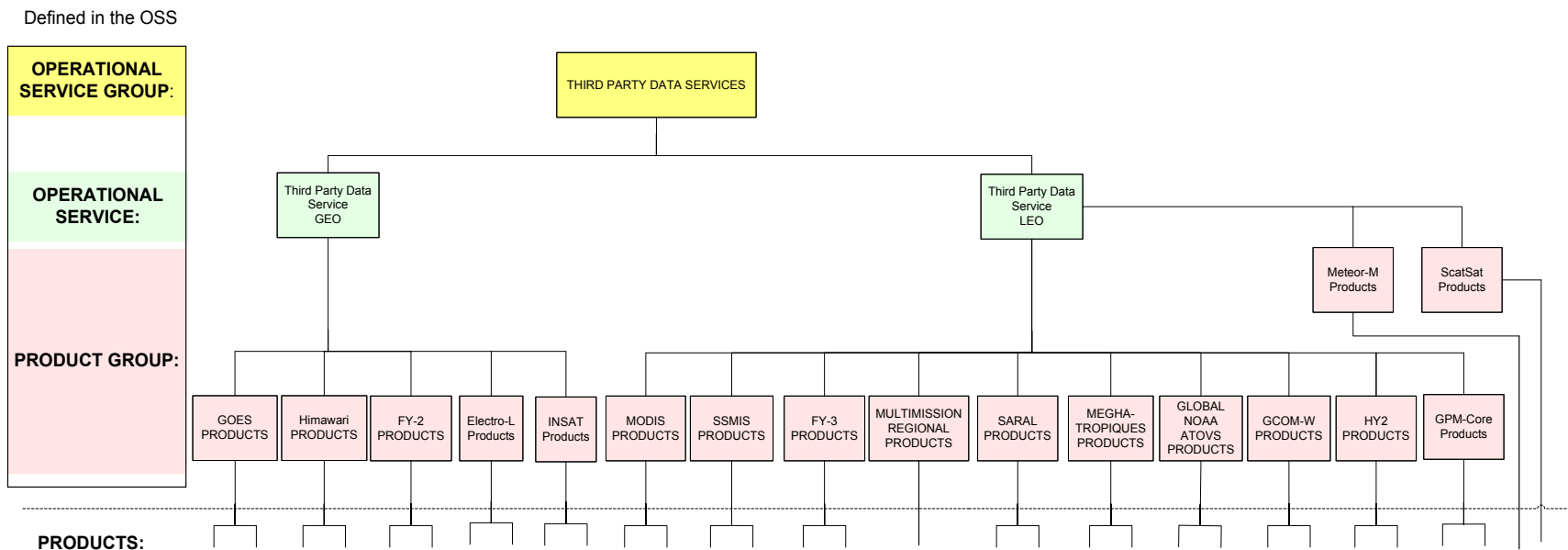


Figure 10 - Overview of Third-Party Data Services

To complement the satellite data and products generated by the EUMETSAT Application Ground Segment, EUMETSAT relays a range of third-party products from partner organisations. The majority are available via EUMETCast.

EUMETSAT's main responsibility is a timely throughput of the data through the EUMETSAT system. 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 Central Operations Report (COR, see section 14) and providing end-users with announcements concerning missing data (see section 13.2). Information concerning the products delivered via this service is provided in the Product Navigator [AD. 1].

10.1 Third-Party Data Service – GEO

In addition to the Meteosat satellite data, EUMETSAT relays geostationary satellite data from partner organisations such as the National Oceanic and Atmospheric Administration (NOAA), the China Meteorological Administration (CMA) and the Japan Meteorological Agency (JMA).

10.1.1 GOES-East Products

EUMETSAT relays geostationary satellite data originating from the NOAA satellites supporting the operational services at GOES-East (currently GOES-16, located at 75.2°W). The service includes ABI image data, GLM lightning mapper data and Space Weather data from the SEISS instrument in netCDF format.

GOES-East ABI transitioned to 10-minute Flex Mode (Mode 6) Operations in April 2019 and as such the data service is based upon 10-minute full disk imagery. All ABI instrument channels are included at 2 km resolution.

GLM L2 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.

SEISS L1b 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 (currently GOES-17, located at 137.2°W). The service includes ABI image data and GLM lightning mapper data in netCDF format. All ABI channels are included at 2 km resolution.

GOES-West ABI transitioned to 10-minute Flex Mode (Mode 6) Operations in April 2019. All ABI instrument channels are included at 2 km resolution and with a periodicity of 10 or 30 minutes options.

10.1.3 Himawari Products

Image data derived from the JMA Himawari series of satellites supporting the service at 140°E (follow-on to MTSAT at 145°E).

10.1.4 FY-2 Products

Image data and meteorological products derived from the CMA FengYun-2 series of satellites supporting the services at FY-2H, located at 79°E and FY-2G, located at 105°E.

10.1.5 Electro-L Products

Near real time HRIT image data from the Electro-L series of satellites as created and supplied by ROSHYDROMET. Electro-L N1 is located at 75°E and Electro-L N2 at 76°E.

10.1.6 INSAT-3D Products

Meteorological data derived from the INSAT-3D satellite 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			Data Access				
	Timeliness	Accuracy and Coverage	Completeness	EUMETCast	GTS/RMDCN	Direct Diss.	Data Centre	Web Services
GOES-East Products	ABI – 10mins ⁽³²⁾	n/a	n/a	✓				
	GLM – 45mins ⁽³²⁾	n/a	n/a	✓				
	SEISS – 15mins ⁽³²⁾	n/a	n/a	✓				
GOES-West Products	ABI – 10mins ⁽³²⁾	n/a	n/a	✓				
	GLM – 45mins ⁽³²⁾	n/a	n/a	✓				
Himawari Products	30mins (EUMETCast) ⁽³³⁾	n/a	n/a	✓				
FY-2 Products	2.5hr (EUMETCast)	n/a	n/a	✓				
Electro-L Products	20mins ⁽³⁴⁾	n/a	n/a	✓				
INSAT-3D	80mins ³⁵	n/a	90%	✓				

³² At least 90% of the data after being made available by NOAA

⁽³³⁾ After data are made available at JMA

⁽³⁴⁾ After products are made available at the ROSHYDROMET FTP server.

⁽³⁵⁾ At least 90% of the data within 80 minutes of sensing time.

10.1.8 Service Availability

Product Group	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	Instrument Operational Requirements
GOES-East Products	Specified=95% Target=98%	n/a	n/a
GOES-West Products	Specified=95% Target=98%	n/a	n/a
Himawari Products	Specified=90% ⁽³⁶⁾ Target=98%	n/a	n/a
FY-2 Products	Specified=95% Target=98%	n/a	n/a
Electro-L Products	Target=99% ⁽³⁷⁾	n/a	n/a
INSAT-3D	Specified=95%	n/a	n/a

⁽³⁶⁾ At least 90% of the data within 30 minutes of being made available at JMA

⁽³⁷⁾ Ratio between the number of product files (per data type) received by the EUMETCAST reference station and the number of corresponding data files available on the ROSHYDROMET FTP server.

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. Some of this data is reduced prior to redistribution via EUMETCast.

10.2.2 SSMIS Products

The Special Sensor Microwave Imager / Sounder (SSM/I) 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 (MWS-2), Microwave Radiation Imager (MWRI), Infra Red Atmospheric Sounder (IRAS), Hyperspectral Infrared Atmospheric Sounder (HIRAS, from FY-3D onwards) and Microwave Temperature Sounder (MWS-2) instruments on-board the Fengyun-3 series of polar-orbiting satellites. The data are reformatted to BUFR using the AAPP software. The reformatted data in parallel to the native HDF5 format are disseminated to the users via EUMETCast and GTS. MWRI data is no longer available from the FY-3B satellite.

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 altimetric measurements designed to study ocean circulation and sea surface elevation with the same accuracy as the one provided by ENVISAT and complementary to the Jason mission. 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 Scatsat-1 Service

The ScatSat mission was designed by the Indian Space Research Organisation (ISRO) following the failure of OSCAT on Oceansat-2. It is supposed to bridge the gap until Oceansat-3 is available. It is a single instrument mission with an improved version of the OSCAT scatterometer. Data will have a higher spatial resolution of the gridded products than the original OSCAT. The data will be processed at the NRSC in Shadnagar, India and there provided to the EUMETSAT interface to the Academic/Governmental network. This will include the following:

- L2B HDF-5 files for Surface winds (for all users)

10.2.7 Megha-Tropiques Products

Megha-Tropiques is a joint CNES-ISRO Earth observation mission to study convective systems and their influence on weather and climate in the tropics. The mission will also contribute to the forecasting of cyclone and monsoon systems, as well as climate monitoring of the Earth radiation budget, precipitation and water vapour.

The Megha-Tropiques satellite carries four main instruments: The Microwave Analysis and Detection of Rain and Atmospheric Structures (MADRAS), a microwave imager; the Sounder for Probing Vertical Profiles of Humidity (SAPHIR), a microwave water vapour sounder; Scanner for Radiation Budget (ScaRaB), a broadband radiometer and the Radio Occultation Sensor for Atmosphere (ROSA), a radio occultation instrument.

The initial Megha-Tropiques data service was intended to encompass the MADRAS and SAPHIR L1A2 data. Due to the demise of the MADRAS instrument, only SAPHIR L1A2 data is included. The data are reformatted from the native HDF format to BUFR.

10.2.8 Meteor-M N2 Products

Russian Federal Service for Hydrometeorology and Environmental Monitoring (ROSHYDROMET) provides EUMETSAT with products initially only from the MTVZA-GY instrument onboard the Meteor-M N2 spacecraft covering atmospheric temperature and humidity profiling. The data are processed by ROSHYDROMET, obtained from their servers by EUMETSAT and then disseminated to the users.

10.2.9 Global NOAA ATOVS Service

The purpose of the EUMETSAT Global NOAA ATOVS Service (GNAS) is to provide products from the ATOVS instruments onboard the non-IJPS NOAA satellites (N-15 and N-18) to the users in NRT. The data reception is performed by NOAA through their ground stations at Wallops and Fairbanks. The L1b data processing is performed by NOAA and the products are then transferred directly to the EUMETSAT Central Application Facility and processed/reformatted there using AAPP-software. The data are then disseminated to the users.

10.2.10 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 L1 and L2 data processing is first performed by JAXA and the products are then transferred directly to EUMETSAT before being reformatted into BUFR format. The data are then disseminated to the users.

10.2.11 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-2A and HY-2B satellites. The HY-2 spacecraft carry a payload of four instruments in addition to a CNES provided DORIS instrument for precise orbit determination. These are a radar altimeter (ALT), a conical scanning microwave radiometer (MWI), a conical scanning scatterometer (SCAT), and a calibration microwave radiometer (CMR). HY-2A data are received via two NSOAS marine ground stations in China, one at Beijing and one at SanYa. Data are stored onboard the spacecraft and dumped over the stations. NSOAS process the data in its ground segment to derive the following products:

- Altimeter Products: IGDR data from the radar altimeter
- Scatterometer Products: L2B ocean surface scatterometer winds,
- Microwave Radiometer Products: L2A product from the microwave radiometer

10.2.12 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:

- L1 BUFR Files for Brightness products
- L2 HDF5 Files for Precipitation products

More details can be found in the Product Navigator [AD. 1].

10.2.13 ADM-Aeolus Products

The Atmospheric Dynamics Mission Aeolus (ADM-Aeolus) mission by ESA is a single-instrument mission carrying the first satellite-based wind profiling LIDAR (ALADIN - *Atmospheric Laser Doppler Instrument*) in space. The data reception is performed by ESA and the higher-level data processing by ECMWF. Main products are clear-air wind profiles which are available from ECMWF in NRT which are repackaged by EUMETSAT and distributed in BUFR format conforming to WMO naming convention.

10.2.14 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 modifies off-nadir parameters before disseminating restricted reduced-volume files.

10.2.15 Service Specification

Product Group	Product Group Attributes			Data Access				
	Timeliness	Accuracy and Coverage	Completeness ⁽³⁸⁾	EUMETCast	GTS/RMDCN	Direct Diss.	Data Centre	Web Services
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	✓	✓		✓	
Scatsat-1 Products	200mins ⁽³⁹⁾	n/a	90%	✓				
Megha-Tropiques Products	15mins after products are made available by ISRO	Global coverage within 20°N and 20°S	n/a	✓	✓			
Meteor-M N2 Products	n/a	n/a	n/a	✓				
Global NOAA ATOVS Service	40mins after products are made available by NOAA	As specified in [AD. 4]	n/a	✓				
GCOM-W Products		n/a	n/a	✓				

⁽³⁸⁾ 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.

⁽³⁹⁾ At least 90% of the data within 200 minutes of sensing time

Product Group	Product Group Attributes			Data Access				
	Timeliness	Accuracy and Coverage	Completeness ⁽³⁸⁾	EUMETCast	GTS/RMDCN	Direct Diss.	Data Centre	Web Services
	n/a							
HY-2 Products	Altimeter: 15mins ⁽⁴⁰⁾	Global	n/a	✓				
	Scatterometer: 20mins							
	Microwave Radiometer: 20mins							

⁽⁴⁰⁾ After products are made available by NSOAS.

Product Group	Product Group Attributes			Data Access				
	Timeliness	Accuracy and Coverage	Completeness ⁽³⁸⁾	EUMETCast	GTS/RMDCN	Direct Diss.	Data Centre	Web Services
GPM-Core Products	L1C BT: 80 minutes from sensing time	Global	90%	✓				
	L2A: n/a	Global	n/a	✓				
ADM-Aeolus Products	15 mins ⁽⁴¹⁾	Global	n/a	✓	✓			
CFOSAT SWIM Service	200 mins		90% ⁽⁴²⁾	✓				

10.2.16 Service Availability

Product Group	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	Instrument Operational Requirements
MODIS Products	>99.5% ⁽⁴³⁾	n/a	n/a
SSMIS Products	>99.5%	n/a	n/a

⁽⁴¹⁾ At least 80% of data after products are made available by ECMWF

⁽⁴²⁾ At least 90% of data received from CNES

⁽⁴³⁾ As based on the EUMETCast availability requirements indicated in section 12.1

Product Group	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	Instrument Operational Requirements
FY-3 Products	> 95%	n/a	n/a
Multi-mission Regional Products	>99.5%	n/a	n/a
SARAL Products	>95%	n/a	n/a
Scatsat-1 Products	>90%	n/a	n/a
Megha-Tropiques Products	>99.5%	n/a	n/a
Meteor-M N2 Service	>95%	n/a	n/a
Global NOAA ATOVS Service	> 95% ⁽⁴⁴⁾	n/a	n/a
GCOM-W Products	>95%	n/a	n/a
HY-2 Products	>95%	n/a	n/a
GPM-Core Products	>99.3% ⁽⁴⁵⁾	n/a	n/a
ADM-Aeolus Products	>81% ⁽⁴⁵⁾	n/a	n/a
CFOSAT SWIM Service	>99.3% ⁽⁴⁵⁾	n/a	n/a

⁽⁴⁴⁾ Ratio between the number of product files (per data type) received by the EUMETCast reference station at EUMETSAT-CAF and the number of corresponding data files made available by NOAA over a 28 day period.

⁽⁴⁵⁾ Derived figure based on availability of EUMETSAT ground segment elements.

11. THIRD-PARTY DATA DISTRIBUTION

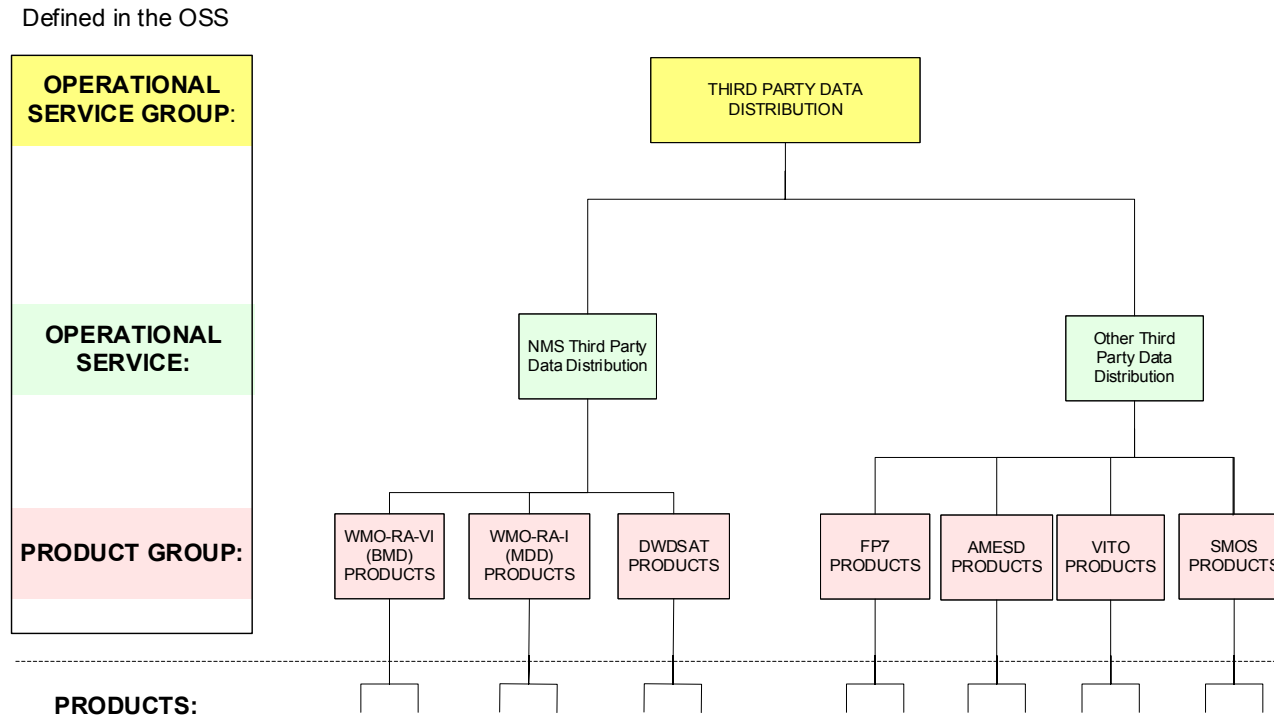


Figure 11- Overview of Third-Party Data Distribution

EUMETSAT mainly provides data retransmission services and hence the main responsibility is a timely throughput of the data through the EUMETSAT system. The quality, completeness and timeliness of the data from sensing to the delivery to the EUMETSAT interface remain the responsibility of the data provider. EUMETSAT is responsible for ensuring that this data is successfully transmitted via EUMETCast. Service outages relating to the delivery are announced by EUMETSAT and information concerning the products delivered via this Service is provided in the Product Navigator [AD. 1].

11.1 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 EUMETCast is the responsibility of the data provider. Further information about the services can be found in the Product Navigator [AD. 1] by searching on the data provider.

11.1.1 WMO-RA-VI (BMD) Products

The Basic Meteorological Data (BMD) product is provided by the Deutscher Wetterdienst (DWD). The DWD, acting on behalf of the World Meteorological Organisation (WMO), is responsible for ensuring that the BMD content is delivered to the EUMETCast Uplink. 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. Service outages relating to the delivery on EUMETCast are announced by EUMETSAT

11.1.2 WMO-RA-I (MDD) Products

The Meteorological Data Dissemination (MDD) product 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 MDD 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 MDD stream has been reorganised to allow users to have a better access on the products disseminated. The new MDD (also called WMO-RA-I) 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. Service outages relating to the delivery are announced by EUMETSAT.

11.1.3 DWDSAT Products

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

11.2 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 EUMETCast is the responsibility of the data provider. Further information about the services can be found in the Product Navigator [AD. 1] by searching on the data provider.

11.3 Service Specification

Product Group	Product Group Attributes			Data Access				
	Timeliness	Accuracy and Coverage	Completeness	EUMETCast	GTS/RMDCN	Direct Diss.	Data Centre	Web Services
WMO-RA-VI (BMD) Products	n/a	n/a	n/a	✓				
WMO-RA-I (MDD) Products	For realtime observation 10 mins, for other products 1hr	n/a	n/a	✓		✓		
DWDSAT Products	n/a	n/a	n/a	✓				
Other Third Party Data Distribution	n/a	n/a	n/a	✓				

11.4 Service Availability

Operational Service	Availability %	Scheduled Outages	
		Routine Spacecraft Operational Requirements	Instrument Operational Requirements
WMO-RA-VI (BMD) Products	>99.5% ⁽⁴⁶⁾	n/a	n/a
WMO-RA-I (MDD) Products	>99.5%	n/a	n/a
DWDSAT Products	>99.5%	n/a	n/a
Other Third Party Data Distribution	>99.5%	n/a	n/a

⁽⁴⁶⁾ As based on the EUMETCast availability requirements indicated in section 0

12. DATA ACCESS SERVICES

Defined in the OSS

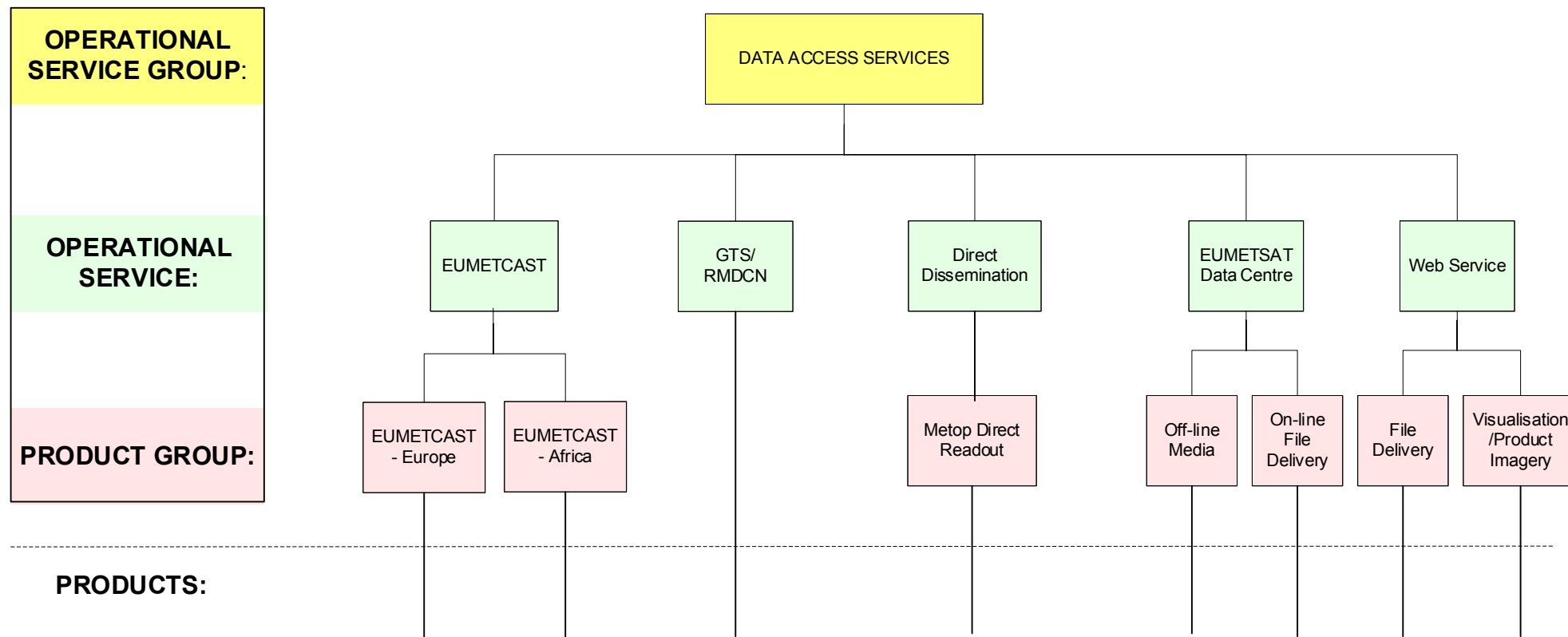


Figure 12 - Overview of Data Access Services

The data, products and services provided by EUMETSAT are made available to users via the Data Access services described in this chapter.

Further information on each of the data access mechanisms can be found on the EUMETSAT website www.eumetsat.int

12.1 EUMETCast

EUMETCast is the prime dissemination mechanism used to deliver the products generated by the EUMETSAT Application Ground Segment, but is also used for the dissemination of products originating from other centres. EUMETCast utilises the services of a satellite operator and telecommunications provider to distribute data files using Digital Video Broadcast (DVB) to a wide audience located within the geographical coverage zone which includes most of Europe and certain areas in Africa.

Within the current EUMETCast configuration, the multicast system is based upon a client/server system with the server implemented at the EUMETCast uplink site at EUMETSAT's headquarters in Darmstadt, Germany, and the client application installed on the individual EUMETCast reception stations. The telecommunication suppliers provide the DVB multicast distribution mechanism. Data/product files are transferred via a dedicated communications line from EUMETSAT to the uplink facility. These files are encoded and transmitted to a geostationary communications satellite for broadcast to user receiving stations. 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 provided services. See [RD. 10] for a full description of EUMETCast.

There are currently two different services covering Europe and Africa. The reception areas covered by each of these services can be found on the EUMETSAT website www.eumetsat.int.

12.1.1 EUMETCast-Europe

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

12.1.2 EUMETCast-Africa

EUMETCast Africa is provided via EUTELSAT™ 8 W located at 8° West, supplying coverage over Europe, Africa, Atlantic and Indian Ocean, and South America. Under the current arrangements, EUMETCast Africa is available via one partial C-band transponder.

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

12.2 Global Telecommunications System (GTS)/RMDCN

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/RMDCN to deliver the following services:

- Metop/NOAA Global Level 1 and 2 Products
- Regional EARS products
- Meteosat Meteorological products.
- Basic Meteorological Data
- Data Collection and Retransmission service DCP bulletins

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

For more information on GTS/RMDCN see the EUMETSAT website www.eumetsat.int

12.3 Direct Dissemination

Direct Dissemination (or ‘Direct Read-Out’) is the traditional way to receive the image data and products directly from LEO satellites that acquire atmospheric/earth observation data. The Metop service is described further in §6. Note that to receive such data, users need dedicated reception station equipment (AHRPT).

12.4 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 provides a comprehensive data retrieval service including on-line access to the data catalogues and other information.

In addition to the archiving of data generated in real time, the Data Centre also archives data generated from back-log and reprocessing activities. Back-log 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 can be supplied with full spectral and geographical coverage or in subsets chosen by the user.

Meteorological Data and Products are accessed online (via the EO Portal). See section 13 for contact details and section 13.4 for details regarding the EO Portal.

For more information on this service see the EUMETSAT website www.eumetsat.int.

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.

12.4.1 On-line File Delivery

Online delivery is by HTTP Download.

For individual orders of a total size of up to 1 Terabyte (TB), the Data Centre makes the data available to the end-user within 24 hours from order submission, under an overall order load on the system of not more than 1TB/day, made up of any number of orders of any size.

12.4.2 Off-line Media

EUMETSAT Data Centre products can be delivered on the following variety of off-line media: BLU-RAY single layer and dual layer, DVDROM, DVDR Double Layer, LTO Generation 4 and 5 tapes.

Offline media orders retrieved from the Data Centre are delivered via postal services and require a contact telephone number to be provided with the user account information

12.4.3 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)	80% within 6 hours
Small orders (0 GB < retrieval size < 10 GB)	80% 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

12.5 Web Services

Negating the need for satellite reception station equipment, Internet delivery offers an affordable way to transfer smaller volumes of data and products.

For more information on this service see the EUMETSAT website www.eumetsat.int.

12.5.1 File Delivery

A limited range of products are made available on the EUMETSAT operational FTP server for direct retrieval by interested users:

Low Rate SEVIRI Image data. In addition, the DCP Messages are accessible via HTTP retrieval using the Internet web service,

12.5.2 Visualisation/Product Imagery

Samples of processed Meteosat & Metop near-real time imagery, visualised products and RGB composites can be viewed directly from this website. For more information on this service see the Images section of the EUMETSAT website www.eumetsat.int.

12.6 Service Availability

Data Access Service	Method of Requesting Service	Delivery Media and Format	Availability %
EUMETCast	Registration for EUMETCast delivery is by the EO Portal. Reception using a EUMETCast Reception station.	Multicast system based on Digital Video Broadcast-Satellite (DVB-S/S2). See the Product Navigator [AD. 1] for a description of all products disseminated via EUMETCast.	>99.5% ⁽⁴⁷⁾
GTS/RMDCN	See the EUMETSAT website www.eumetsat.int	See the Product Navigator [AD. 1] for a description of all products disseminated via GTS.	>99.5%
Direct Dissemination (Readout)	Station registration for Direct Readout delivery can be done via the EO 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)	>99.5%
EUMETSAT Data Centre	Registration and access to the Online ordering Application for the Data Centre is via the EO Portal	On-line File Delivery: Direct FTP or online HTTP	Archiving Service: target availability is 99.9% of the time computed over a 1 month period On-Line Ordering Service: The Data Centre on-line interface target available to users is 99.5%.

⁽⁴⁷⁾ Note: availability for EUMETCast-Africa is dependent on successfully received files at the EUMETCast-Europe reference stations.

Data Access Service	Method of Requesting Service	Delivery Media and Format	Availability %
		Off-Line Media: Postal delivery of media (BLU-RAY ROM, DVDR, DVDR Double Layer, LTO Generation 4 and 5 tapes, Photographic images).	Off-Line Media: n/a
Web Services	<p>File Delivery: Registration for FTP delivery is by the EO Portal</p> <p>Registration for DCP messages using HTTP is via the EUMETSAT website www.eumetsat.int</p>	File Delivery: Direct FTP or online HTTP	File Delivery: >99.5%
	<p>Visualisation/Product Imagery: Directly from the EUMETSAT website www.eumetsat.int</p>	Visualisation/Product Imagery: A set of HTML pages visible in a web browser.	Visualisation/Product Imagery: >99.5%

13. USER SUPPORT SERVICES

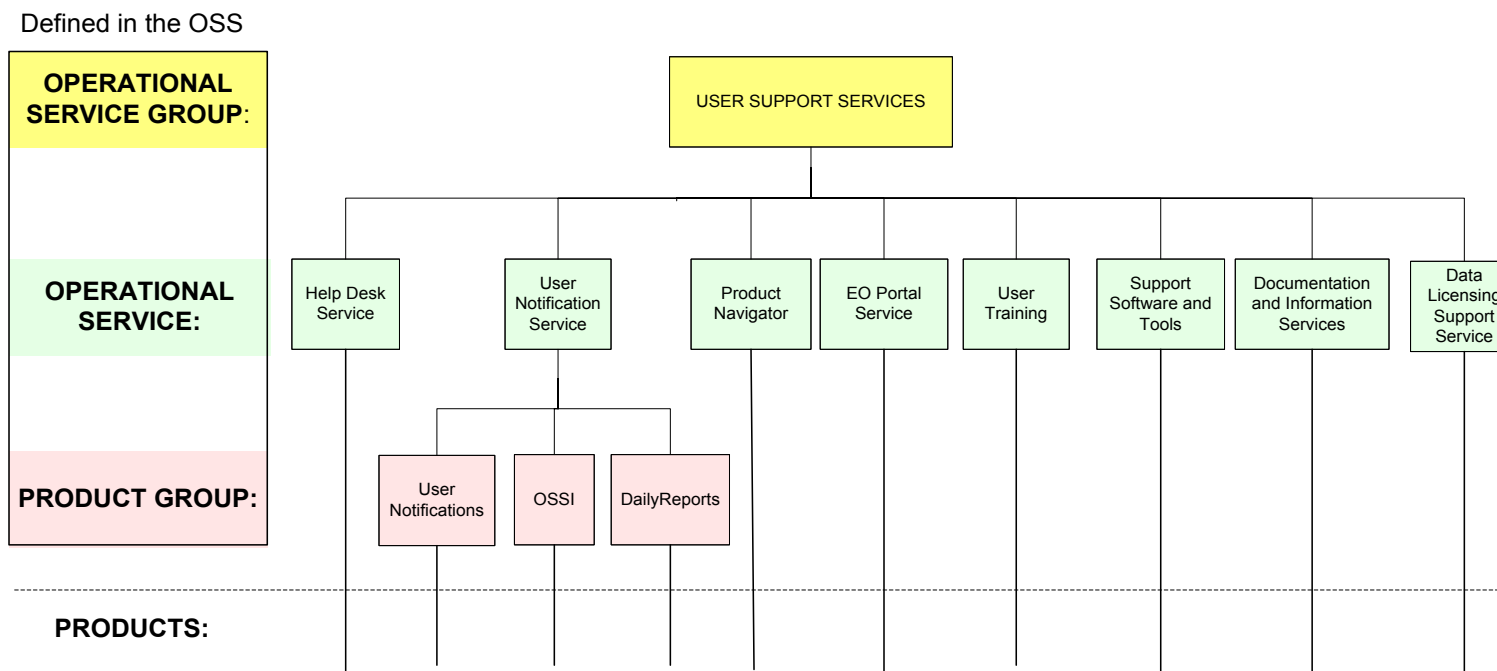


Figure 13 - Overview of User Support Services

User Support Services enhance the usage of EUMETSAT Datasets and Services both within 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.

13.1 Helpdesk Service

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

- Enquiry answering service;
- General support on available services;
- Registration service support;
- User assistance for ordering meteorological data and products from the EUMETSAT Data Centre Archive;

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.

13.2 User Notification Service (UNS)

The User Notification Service comprises the following:

- **User Notifications:** comprises News Alerts (outages), Weekly Operations Schedule (planned maintenance & product enhancements) Administration Messages (previous 24hrs of operational news), Metop Admin Message (Direct Broadcast message) [RD. 3] and special messages to operational partners and MS-NMS operational contact points. End-users can receive message either directly (via email/ftp), online (via the messaging website), or from the dissemination systems (via EUMETCast, RMDCN, GTS or Direct Dissemination for Metop Admin Messages).
- **Operational Service Status Indicator (OSSI)** – web tool to provide a simple NRT visual overview of the current status (availability/timeliness) of operational services.
- **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].

13.3 Product Navigator Service

The EUMETSAT Product Navigator is the central collection discovery service for all EUMETSAT data and products including third-party products disseminated via EUMETCast. Users can search for data, order data via the EUMETSAT Data Centre (see also section 12.4), and subscribe to EUMETCast disseminated services.

The EUMETSAT Product Navigator can be used to search and obtain details about the following resources from EUMETSAT:

- Climate – describes a climate product type;
- Dataset – describes a satellite product type;
- Document – describes supporting documents, e.g. product guides, validation reports;
- Software – describes software available from EUMETSAT.

Each product is presented with a brief description and a range of important information such as coverage, how the product is disseminated, for whom it is available, what the typical file formats are, examples of file naming conventions, and dissemination frequency. Links are provided to where the product can be accessed as well as to more information on the product itself.

The Product Navigator [AD. 1] can be accessed directly via the URL: <http://navigator.eumetsat.int/>.

13.4 EO Portal Service

By using a Single Sign-On (SSO), users can register with the Earth Observation Portal (EO Portal), to gain access to and manage their subscriptions to data, products and services provided by EUMETSAT. To access the EO Portal for the first time, users need to create a user account. Once the account has been created, users can login using their username and password.

The EO Portal can be accessed directly via the URL: <https://eoportal.eumetsat.int> .

13.5 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 class room 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 Graduate Trainee Fellowships;
- 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.

13.6 Support Software and Tools

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

- **Freeware software** - software freely available for which a signed licence or the formal acceptance of licensing conditions are not required;
- **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 Product Navigator [AD. 1] or from the EUMETSAT website www.eumetsat.int.

13.7 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. All web pages and documentation can be found at the EUMETSAT website www.eumetsat.int.

13.8 Data Licensing Support Service

Data Licenses are required to receive a subset of EUMETSAT data disseminated via EUMETCast or FTP file delivery. This service deals with support to the users for all issues related to EUMETSAT data licenses. This covers:

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

13.9 Service Availability

User Support Service	Method of Requesting Service	Delivery Media and Format	Availability %
Helpdesk Service	Helpdesk requests can be made via: Tel: +49 6151 807 3660/3770 Fax: +49 6151 807 3790 E-Mail: ops@eumetsat.int	Responses to Help Desk requests shall be provided by telephone, fax, 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, letter or fax but will only be processed during normal

User Support Service	Method of Requesting Service	Delivery Media and Format	Availability %
	<p>Post : EUMETSAT Eumetsat-Allee 1 64295 Darmstadt Germany.</p>		<p>office hours.</p> <p>"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.</p> <p>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.</p>
<p>User Notification Service</p>	<p>User Notifications: To receive e-mail/ftp notifications it is necessary to subscribe via: https://eoportal.eumetsat.int To receive notifications via the Dissemination systems (e.g. EUMETCast or direct dissemination), users must first register with the EO portal.</p>	<p>User Notifications: End-users can receive messages either:</p> <ul style="list-style-type: none"> • directly (via email), • online (via the messaging website at www.eumetsat.int/uns) • from the dissemination systems (via EUMETCast, RMDCN or GTS or Direct Dissemination) 	<p>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.</p>

User Support Service	Method of Requesting Service	Delivery Media and Format	Availability %
		(Admin message only))	
	OSSI: Accessible via: www.eumetsat.int/ossi/ and embedded in the EUMETSAT homepage.	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 EO Portal	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%.
Product Navigator	Directly via the URL: https://navigator.eumetsat.int/	n/a	Target availability of the EUMETSAT website is >98.5% during office hours.
EO Portal	Directly via the URL: https://eoportal.eumetsat.int	n/a	Target availability of the EUMETSAT website is >98.5% during office hours.

User Support Service	Method of Requesting Service	Delivery Media and Format	Availability %
User Training	<p>Accessible via the EUMETSAT website: www.eumetsat.int or Help Desk.</p>	<p>The training sessions are available in a wide variety of formats, including PowerPoint, Flash, HTML, VisitView and various video formats - many of which are supplemented with audio commentary.</p>	<p>Target availability of the EUMETSAT website is > 98.5% during office hours.</p>
	<p>Registration for EUMETCast Training Channel is by the EO Portal. Reception using a EUMETCast Reception station.</p>	<p>Training files delivered to the users' target directory structure on their visualisation/PC. Each training package will contain an index HTML file which will serve as a navigation aid to the contents of the training package.</p>	<p>Based on the availability of EUMETCast, > 99.5%.</p>
Support Software and Tools	<p>All these products can be downloaded directly from the EUMETSAT website www.eumetsat.int.</p>	<p>The utilities are provided in tar, zip or jar packages depending on the type of utility and the target operating system. They can be downloaded directly from the website noting that in some cases the utilities are licensed.</p>	<p>These utilities are available for download indefinitely. Target availability of the EUMETSAT website is > 98.5% during office hours.</p>
Documentation and Information Service	<p>Published documentation can be downloaded from the EUMETSAT website www.eumetsat.int. Additionally hard copies can be requested from User Service</p>	<p>Documentation/Information can be viewed online in HTML format or downloaded in PDF. Hard copy versions are provided by post.</p>	<p>Only the latest version of any document is provided. Target availability of the EUMETSAT website is > 98.5% during office hours.</p>

[OSS] Operational Services Specification

User Support Service	Method of Requesting Service	Delivery Media and Format	Availability %
	Helpdesk, by e-mail, post or fax.		
Data Licensing Support Service	Queries and requests concerning Data Licenses are made through the EO Portal Service Subscriptions page or via the Helpdesk.	Confirmation of an agreed licence is sent by email and information is updated in the user account in the EO Portal.	Responses to data license queries and requests are dispatched within 15 working days. Note: If this should not be possible then the user is notified in the interim period of the date by which the response will be provided.

14. PERFORMANCE REPORTING

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

For the calendar half-year under review, the COR 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 reports are published within 8 weeks of the end of the reporting period, and they are made available on the EUMETSAT website www.eumetsat.int, via the 'Service Status' page, accessible from the 'Data' menu.

APPENDIX A ACRONYMS

<i>Acronym</i>	<i>Description</i>
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
COR	Central Operations Report
CrIS	Cross-track Infrared Sounder
DB	Direct Broadcast
DCP	Data Collection Platform
DMSP	Defense 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
EDR	Environmental Data Record
EO	Earth Observation

<i>Acronym</i>	<i>Description</i>
EPS	EUMETSAT Polar System
ESA	European Space Agency
EURD	End-User Requirements Document
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
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
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

<i>Acronym</i>	<i>Description</i>
KNMI	Koninklijk Nederlands Meteorologisch Instituut
LEO	Low Earth Orbit
LRIT	Low Rate Information Transmissions
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
MODIS	Moderate-resolution Imaging Spectroradiometer (instrument on NASA's Terra satellite)
MSG	Meteosat Second 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
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
OSTM	Ocean Surface Topography Mission
PGS	Primary Ground Station
PMAp	Polar Multi-Sensor Aerosol Products
PN	Product Navigator

<i>Acronym</i>	<i>Description</i>
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
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
SLS	Service Level Specification (for Copernicus)
SMOS	Soil Moisture Ocean Salinity
SSM/I-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
WV	Water Vapour