

Introduction to GEONETCast

Ben Maathuis, 19-02-2021

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Based on “GEONETCast - DevCoCast Application Manual”, Chapter 1, by Cesar de Mello¹, Matthew Medland and Mike Grant², Tim Jacobs³

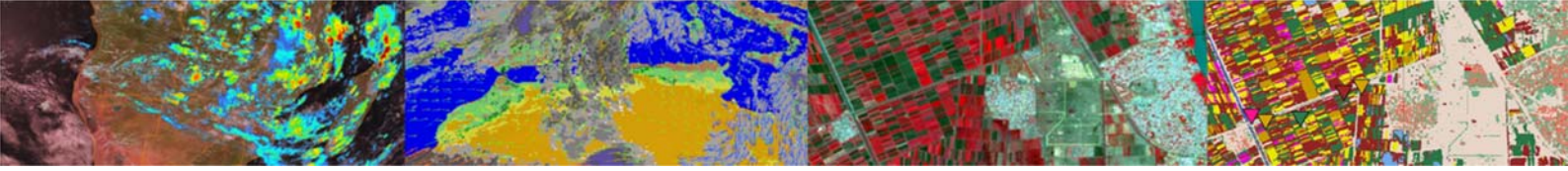


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1 GEO and GEONETCast

The Group on Earth Observations (GEO), an intergovernmental organization, was established in May 2005. It calls for coordination of the Earth Observation systems of various countries, promotes the concept of establishing a Global Earth Observation System of Systems (GEOSS) that will yield a broad range of societal benefits, such as:

- reducing loss of life and property from natural and human-induced disasters;
- understanding environmental factors affecting human health and well-being;
- improving the management of energy resources;
- understanding, assessing, predicting, mitigating, and adapting to climate variability and change;
- improving water resource management through better understanding of the water cycle;
- improving weather information, forecasting and warning;
- improving the management and protection of terrestrial, coastal and marine ecosystems;
- supporting sustainable agriculture and combating desertification;
- and understanding, monitoring and conserving biodiversity.

As of the end of 2019, GEO's Members include 105 national governments and the European Commission. In addition, in excess of 118 intergovernmental, international, and regional organizations with a mandate in Earth Observation or related issues have been recognized as Participating Organizations. Now, GEO has become the largest international organization in the field of Earth Observation. For further information on GEO consult: <http://www.earthobservations.org>.

One of the important GEO tasks is to promote sharing of Earth Observation (EO) data and remarkable developments have been achieved in this regard. One of these achievements is the development of GEONETCast, a global network of data dissemination systems based on satellite broadcast that shares environmental data and derived information products to a world-wide user community in near real-time. This unique GEONETCast network, part of the core GEOSS infrastructure, currently provides reliable, worldwide and low cost access to nearly 800 different Earth Observation (EO) images and products, from over 50 providers around the world. The network consists of three regional broadcasts, and a fourth component, the Russian MITRA satellite data dissemination system, is a potential contributor:

- EUMETCast: operated by the European Organization for the Exploitation of Meteorological Satellites (EUMETSAT), covering Europe, Africa, parts of Asia and the Americas;
- CMACast: operated by the China Meteorological Administration (CMA), covering Asia and parts of the Pacific (a considerable upgrade of the formerly called FengYunCast);
- GEONETCast-Americas: operated by the US National Oceanic and Atmospheric Administration (NOAA), covering North, Central, and South America and the Caribbean.

The three main operators, NOAA, EUMETSAT and CMA, are referred to as GEONETCast Networking Centres (GNC). The coverage of GEONETCast is illustrated in Figure 1. Some of the main providers of satellite data and derived products on GEONETCast are listed in the table 1.



Figure 1: GEONETCast - global coverage

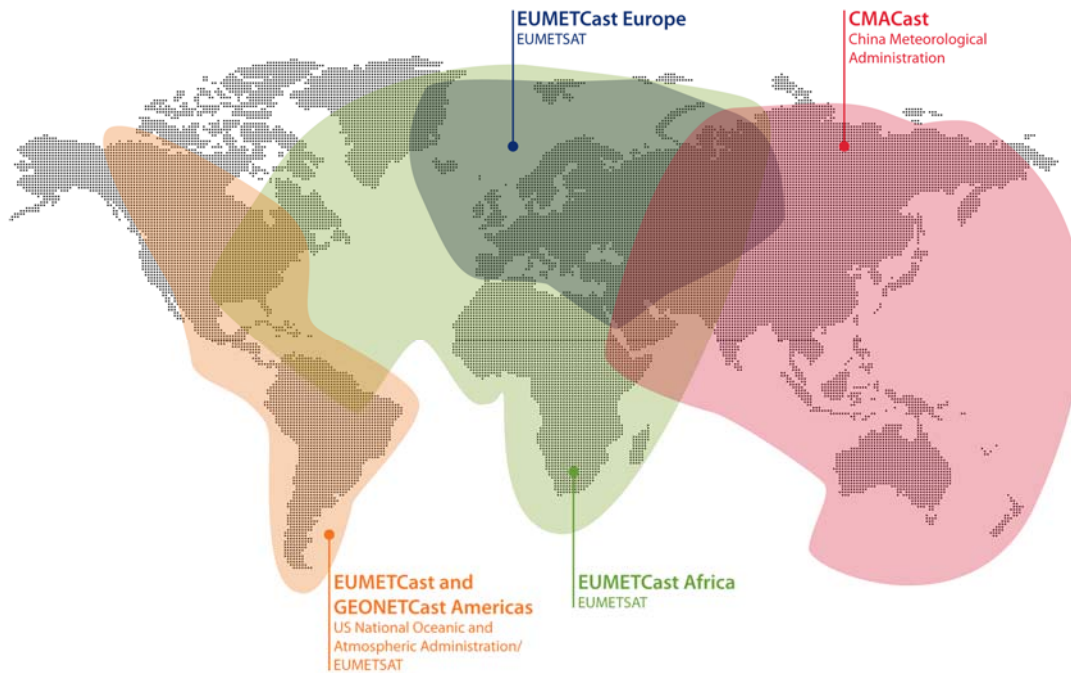
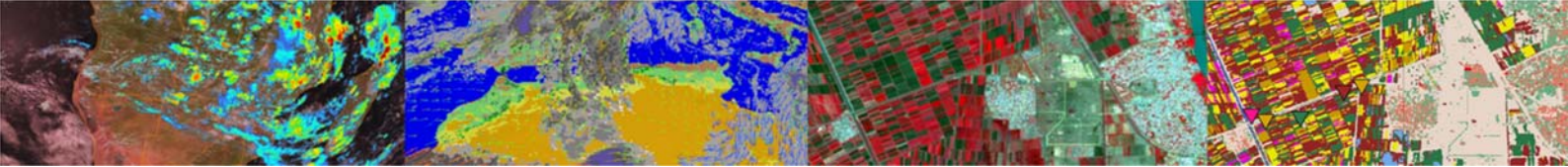


Table 1 GEONETCast - some of the main providers of satellite data and derived products

EUMETSAT and its network of Satellite Application Facilities (SAFs)	MSG (also RSS, IODC), Jason and MetOp A/B/C (per local satellite pass) satellite data and meteorological products for atmospheric, land and marine applications
NOAA	GOES, POES (NOAA) S-NPP satellite data and NOAA-NESDIS products for atmospheric and marine applications
CMA, JMA, Roshydros and ISRO	FengYun satellite data and meteorological products for atmospheric, land and marine applications and Himawari satellite data, Electro-L and Meteor satellite data, INSAT satellite data and products.
PML, UCT and BDMS	Various marine products for Africa and land products for Southern Africa (SADC-region).
NASA, NASA-Servir	SMAP, MODIS and GPM products, rainfall forecasts and fire products for Central America.
EUMETSAT, AVISO and CNES	Jason ocean topography - altimetry products
WMO, ECMWF/ U.K. Met Office, Deutscher Wetterdienst, Météo-France, NOAA-NCEP	Observational and forecast products for atmospheric, marine and land applications
COPERNICUS, ESA, VITO and JRC-EC	Selected marine products from Sentinel-3, SMOS, various products for land applications, climatology related products on vegetation, rain, etc.

An up to date listing of available products and data can be obtained by accessing the “GEONETCast Product Navigator” maintained by EUMETSAT (<http://navigator.eumetsat.int/>).



2 The EUMETCast component of GEONETCast

2.1 Introduction

Many developing countries and emerging economies face serious environmental risks and need reliable access to accurate EO data and derived environmental information for their sustainable development. GEONETCast is used to disseminate existing environmental added-value data (both in-situ and satellite-based) from various sources in Africa, South and Central America, Asia and Europe to a broad range of end-users all over the globe. Though the majority of receivers are currently found in Europe and China, the broadcasting system is particularly useful in Developing Countries, where it can help to avoid the high cost of maintaining reliable internet connections that are sufficient in capacity to carry large volume of Earth Observation products (e.g. outside of major cities). Other advantages are:

- The availability of low cost, off-the-shelf receiver equipment;
- The high reliability and data transfer rate;
- The wide variety of freely available images and products, automatically received on a 24/7 basis;
- The long-term commitment to maintain the infrastructure, in particular by EUMETSAT towards Africa;
- The constantly growing receiver network, the growing number of products and (Third Party) data providers.

With GEONETCast the users do not need to repeatedly build ground receiving stations for different satellites. The convenient one-stop solution allows the data from different providers to be broadcast through telecommunication satellites. Access to the data needs a reception terminal similar to a satellite TV or satellite internet receiver.

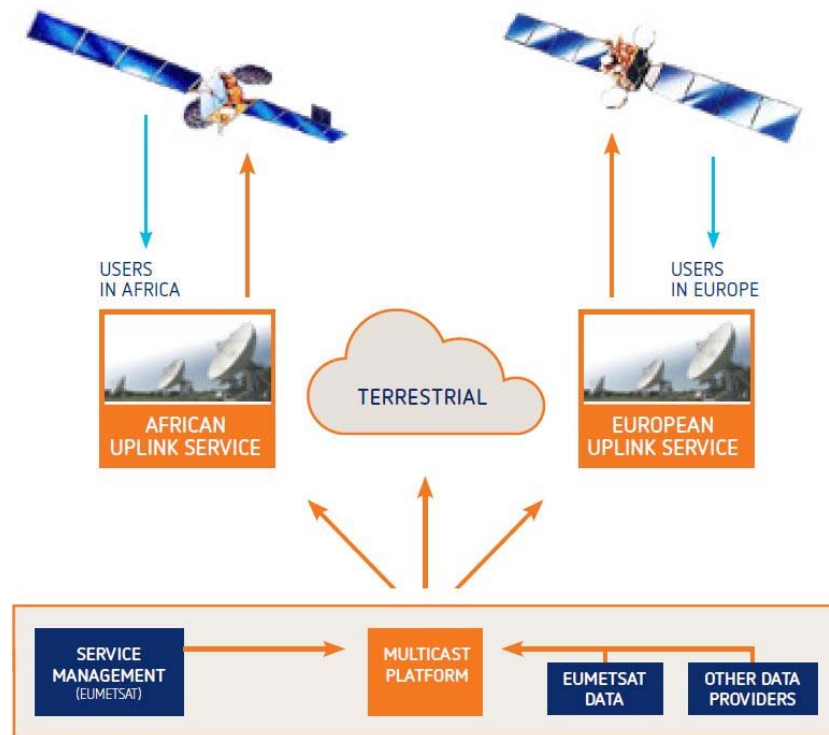
The EUMETCast system is a multicast system that uses standard Digital Video Broadcast (DVB-S2) technology to transport data packets (IP datagrams) over a set of geostationary telecommunication satellites that are also used for satellite internet and satellite TV. This is done in a client/server system with the server side implemented at the EUMETCast uplink site and the client side installed on the many individual EUMETCast reception stations. The components involved include:

- Data providers
- Service management
- Uplink service provider
- Turn around service provider
- Geostationary Communication Satellites
- Reception stations

On the transmission side, EUMETSAT's own and externally provided products are transferred as files via a dedicated communications line from EUMETSAT to the uplink facility. The facility then encodes and transmits them to the communications satellite for broadcast to targeted user receiving stations. Each receiver decodes the signal and recreates the data/products. A single reception station thus can receive any combination of the data services provided on EUMETCast, in accordance with the relevant data policy and after registration to get the (usually free-of-charge) license to access the data/products.



Figure 2: EUMETCast Architecture



EUMETCast Terrestrial is a demonstration dissemination service. It functions like the satellite service, but using a terrestrial network instead of a satellite network.

2.2 Technical features of EUMETCast

In addition to the generic advantages of GEONETCast, EUMETCast has the following features:

- Secure delivery allows multicasts to be targeted to a specific user or group of users thus supporting any required data policy;
- Handling of any file format, allowing the dissemination of a broad range of products;
- Use of DVB-S2 turnarounds allows easy extension of geographical coverage;
- Users are able to receive many data streams via one reception station using off-the-shelf (DVB-S2) equipment;
- As from 30 June 2014 an installed User base of over 220 User stations in Africa, consisting of 178 National Meteorological and Hydrological Services and Environmental agencies, 30 Universities and 12 private users (Source: S. Wannop – EUMETSAT, presented at 11th EUMETSAT Africa User Forum, 27-08-2014), figure 3 shows an update as of December 2018 for EUMETCast Ku and C-band reception over Europe and Africa respectively, currently 2644 subscribers for EUMETCast Europe and 436 subscribers for EUMETCast Africa;
- Highly scalable system architecture.

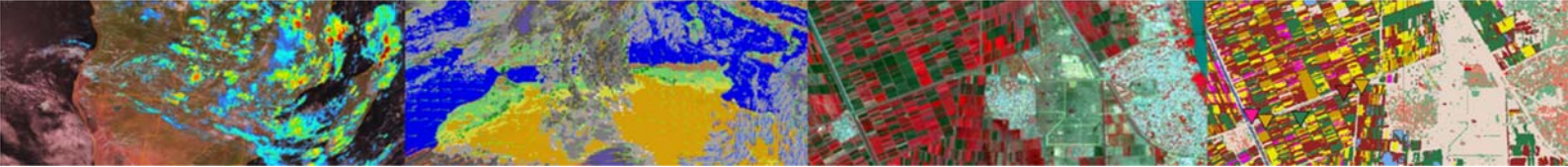
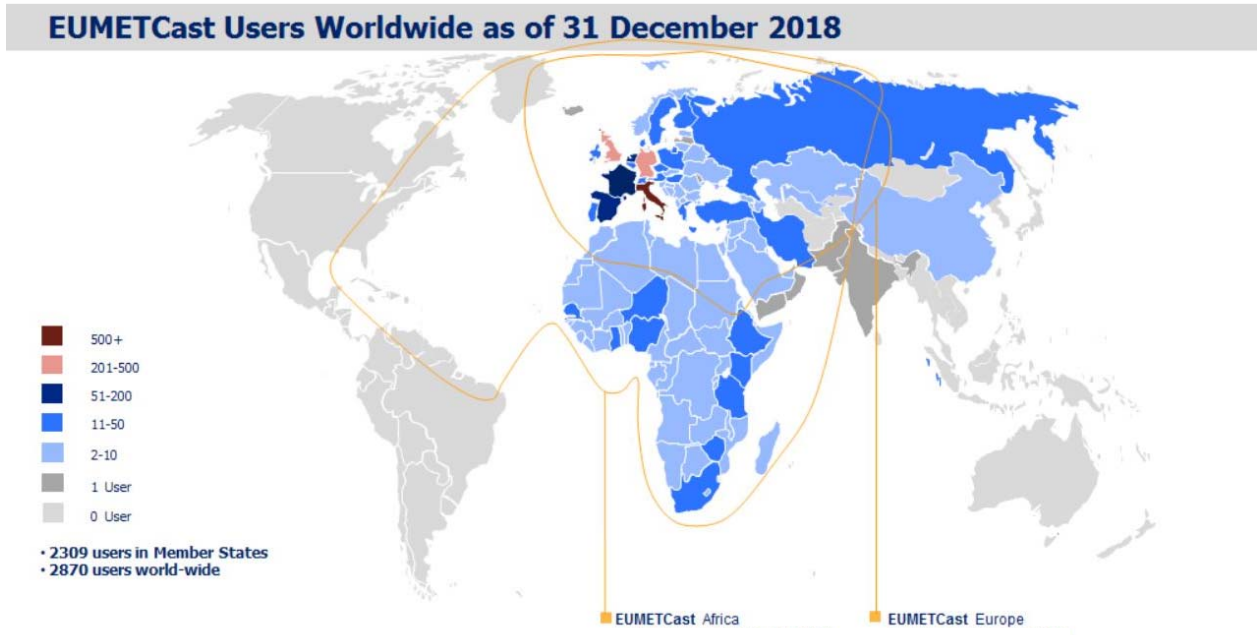


Figure 3: EUMETCast Global User Community



2.2.1 Uplink and Data Providers

The Uplink service provider performs the following tasks:

- Receives all the data to be disseminated from all the data providers;
- Co-ordinates all the transmissions according to the service configuration;
- Encrypts the data according to the user dissemination configuration;
- Applies Forward Error Correction (FEC) to multicast data (FEC techniques transmit additional redundant information to enable the receivers to correct a certain amount of lost data, without requiring retransmission);
- Converts the files into Digital Video Broadcast (DVB-S2);
- Broadcasts the signal using a commercial satellite;
- Receives the multicast data into a local reference reception station for service monitoring.

Currently A1 Telekom Austria Group provides End-to-End communication link. The raw meteorological data (satellite data) are received via satellite at the EUMETSAT headquarters in Darmstadt, processed at Eumetsat Data Center and further transferred via the Telekom Austria Group backbone to Teleport Aflenz, one of Europe's largest satellite relay stations. From there the data are sent to EUTELSAT E10A, a communication satellite broadcasting the data all over Europe and EUTELSAT 8WB for reception in Africa.

The content transmitted from EUMETSAT represents a continuous data stream of up to 69 Mbit/s. In order to avoid the impact of heavy rain or snowfall which might jam or slow down the transmission of the uplink signal considerably to the EUTELSAT satellite Telekom Austria Group has appropriate infrastructure resources to provide a geographically redundant relay station at Vienna-Arsenal additionally to the Teleport Aflenz site (SW of Vienna) including the related redundant and alternative network links. (<https://www.a1.group/en/newsroom/2014-9-4-telekom-austria-group-provides-distribution-for-eumetsat-services>).



2.2.2 Multicast to specific user(s) via Data File Encryption/Decryption

The EUMETCast system allows files to be independently targeted towards a single user, or group of users, thus enabling secure control of access to the data at individual file and individual user level. The encryption of the data is performed by the EUMETCast uplink and decryption by the EUMETCast Client Software installed on the reception station. Most of the provided data or products are encrypted with user key (password) of the target user(s), making them only available after the user has registered to receive them and has been granted access (license, usually free-of-charge) in accordance with the Data Policy in play (e.g. EUMETSAT Data Policy for the EUMETSAT data and products). This requirement to register also gives the providers a clear view of the number of EUMETCast receiving stations registered for their products, thus promoting the sustained delivery. Registration can be done online using EUMETSATs "Earth Observation" Portal (available at: <https://eoportal.eumetsat.int>).

To enable the corresponding decryption by the EUMETCast Client Software on the receiver side, the user's station will need to be equipped with a EUMETCast Key Unit (EKU). The EKU is connected simply via USB and EUMETSAT manages the distribution of the EKU devices to registered users.

2.2.3 Service Management and Service Directories

The service configuration management is done by EUMETSAT, who provides the service configuration (bandwidth, users, dissemination parameters, etc.) to the DVB uplink provider. Management of the satellite transponder bandwidth capacity available to EUMETCast is achieved with channels and by the use of a priority scheme.

The DVB multicast management software adapts the uplink stream according to the relative priorities of the data waiting to be transmitted on a particular channel.

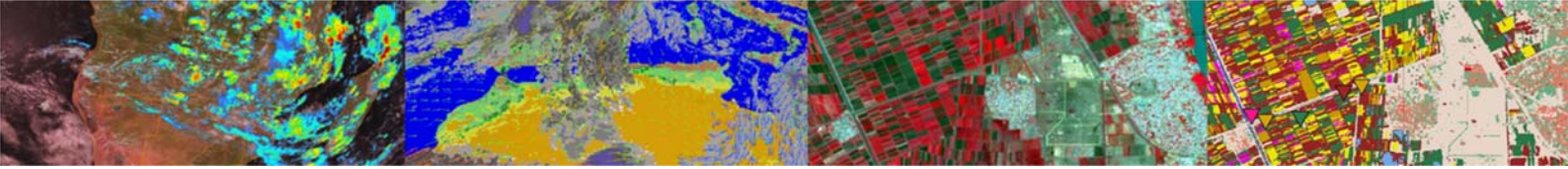
The EUMETCast interface is based on a concept called 'Service Directories', entry points into which the data to be multicast are transferred. To organize the flow, each service directory is associated with a distribution list, which identifies all the EUMETCast users entitled to receive the data transferred to the directory. The service directory structure is also used to allocate bandwidth characteristics to a particular set of products or directories.

2.2.4 Telecommunication Satellites

The satellites used by the uplink providers to relay the EUMETCast multicast form part of the EUTELSAT satellite fleet:

- EUMETCast Europe Service has moved to DVB-S2 standard on 14th of August 2014. The DVB-S2 standard gives a more flexible and affordable implementation for the future EUMETCast Europe data profile. This allows the service to expand without disrupting the existing services for the users. To receive the DVB-S2 service the users are required to install a DVB-S2 receiving device, use the new configuration settings and point the antenna to EUTELSAT™ 10A (located at 10° East);
- EUMETCast Africa Service has moved to EUTELSAT™ 8 WEST, located at 8° West. This communication satellite carries a Ku/C-band payload of 50 transponders (40 Ku-band, 10 C-band) with European African and western Asia coverage. Under the current arrangements provided by the Africa turnaround provider, EUMETCast is available via one of the C-band transponders.

The agreements with the satellite and turnaround providers are renewed through a fixed procurement



procedure, which may cause changes to the satellite being used. But this is not frequent, as the agreements span multiple years typically.

The other components, like GEONETCast Americas (GNC-A) and CMACast are disseminated through Intelsat-21 (IS-21 transponder - 19C, C-band, situated at 58° West) and AsiaSat-9 (uses a 36MHz C-band transponder of AsiaSat-9 satellite, situated at 122° East), also using the DVB-S2 standard.

For further information on GNC-A, see: <https://www.geonetcastamericas.noaa.gov/>

For further information on CMACast, see: <http://www.nsmc.org.cn/en/NSMC/Channels/cmcast.html>

2.2.5 High reliability through Network supervision

Reference reception stations are used to monitor the status of the system. There are reference reception stations at each data provider, the uplink service provider and on every turnaround service provider. Each data provider is responsible for the end-to-end monitoring of its own data. EUMETSAT monitors the end-to-end service relative to the data provided by EUMETSAT.

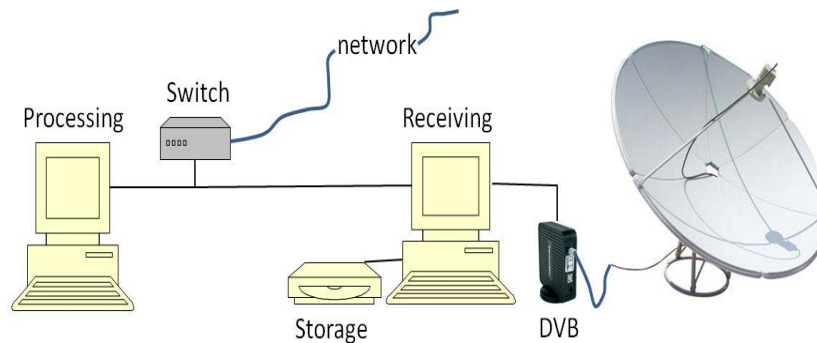


3 EUMETCast user station

3.1 Introduction

A single reception station can potentially receive all the data being transmitted from one communication satellite (one broadcast beam), independent of the data provider(s). The figure below is showing the main components of a simple reception station.

Figure 4: EUMETCast Ground Receiving components



3.2 Reception Station components

Based on EUMETSAT's substantial tests and user experiences, a typical EUMETCast reception station comprises:

- a standard PC with a DVB-S2 receiver / router connected (e.g. via USB, internal PCI card or through additional network card), see also table 2 below;
- a satellite prime focus or off-set antenna fitted with:
 - a digital universal V/H LNB for Ku-band (EUMETCast-Europe),
 - a circular polarization feed horn, band pass filter (in areas with radar interference) and special LNB for C-band (like EUMETCast-Africa Service).
- EUMETCast Client Software and in most instances the EUMETCast Key Unit (EKU) are also required to decode and decrypt the DVB-S2 signal.

It is recommended to set up two PCs – one for DVB-S2 reception (and file serving to the network) and the other for processing. As peaks in hard disk and bus usage could interrupt DVB data reception, it is recommended that no processing or visualization of the data, not even unpacking of compressed files, is performed on the dedicated reception PC. The second PC can accommodate those.

EUMETSAT provides a step-by-step guide in the EUMETCast Technical Description (EUM TD 15, 2019). Also consult this document for an up-to-date list of tested PC and DVB card configurations.

The cost of EUMETCast reception stations is kept to a minimum by utilizing industry open standards to the maximum extent possible, thus allowing the use of off-the-shelf equipment, available from satellite TV and/or satellite internet providers. In addition to the above front-end equipment, EUMETCast Client Software and EKU, data processing/visualization software is often required depending on the actual application and user's needs, making it a flexible solution.



Table 2: DVB-S2 devices recommended by EUMETSAT

Company Name	Model	Type	EUMETCast Service Support	OS Support	Further info by Company	EUMETCast Setup Info	Used by EUM
Ayecka	Ayecka SR1	Router LAN	EUMETCast Europe Africa (All Services)	All	Ayecka SR1 Satellite Receiver	SR1 Setup Guide (v4A)	Yes
Newtec	MDM6000	Router LAN	EUMETCast Europe Africa (All Services)a	All	Newtec MDM6000 Satellite Modem	MDM6000 Setup Guide (v1F)	Yes
Novra	Novra S300E or S300N	Router LAN	EUMETCast Europe Africa (All Services)	All	Novra S300E Satellite Receiver	S300 Setup Guide (v2D)	Yes
Omicom	Pro Omicom 16/32 PSK	PCI Card	EUMETCast Europe Africa (All Services)	Windows, Linux	Pro Omicom 16/32 APSK PCI	Omicom Windows Setup Guide (v1C) For Linux Guide contact Email	Yes
TBS	TBS 6903 TBS 6908	PCIe	EUMETCast Europe Africa (All Services)	Windows, Linux	TBS-6903 Professional DVB-S2 Dual Tuner Card TBS-6908 Professional DVB-s2 Quad Tuner Card	TBS-6903/6908 Windows Setup Guide (v2) TBS DVB-S2 Receivers EUMETCast LINUX Setup Guide (v2)	Yes
TBS	TBS 5925	USB	EUMETCast Europe Africa (All Services)	Windows, Linux	TBS-5925 Satellite Receiver	TBS-5925 Windows Setup Guide (v1F) TBS DVB-S2 Receivers EUMETCast LINUX Setup Guide (v2)	Yes
TBS	TBS 5927	USB	EUMETCast Europe Africa (All Services)	Windows, Linux	TBS-5927 Satellite Receiver	TBS-5927 Windows Setup Guide (v1) Linux Guide will be available soon	



3.3 EUMETCast Key Unit and Client Software

EUMETSAT provides the EUMETCast Client Software (TELLICAST) and the EUMETCast Key Unit (EKU) required to decrypt the DVB signal, in the case of the Client Software, and to facilitate access to the licensed or restricted services in the case of the EKU. They are provided together as a USB dongle and a CDROM, which together form the EUMETCast Package. This EUMETCast Package is available to all registered users and includes:

- The latest version of the EUMETCast Client Software (TELLICAST);
- EKU Run-Time-Environment, available for both MS Windows and Linux systems;
- A selection of DVB card driver software and configuration settings;
- Installation documentation, troubleshooting notes, readme files, Tellicast license notes, etc.

The EUMETCast Client Software is available for both MS Windows and Linux systems and performs the following processes:

- Decryption of data based on a key code;
- Error correction and management of received files.

As the current EUMETCast operates a TELLICAST server, the TELLICAST client software is mandatory. Per computer on which the software is installed, a license fee is charged. A single license fee is included in the price of the software CDROM (currently 60 EURO). The software installation procedure can be performed and when prompted the username and password have to be entered which are provided by EUMETSAT.

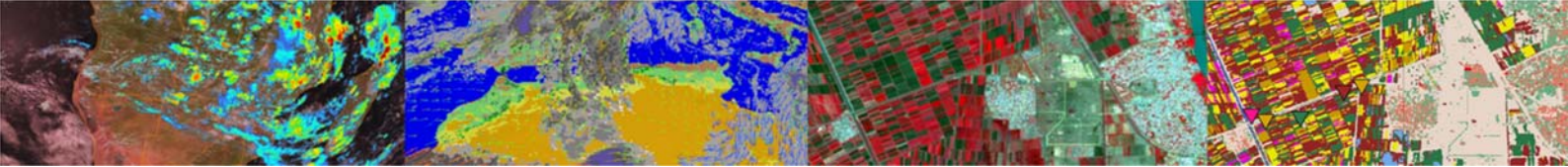
Figure 5: Tellicast client software window for some menu options



The EUMETCast Key Unit (EKU) is the USB device used in conjunction with the EUMETCast Client Software to provide reception of services that require separate registration, licensing and/or have restricted access. The current cost of a single EKU is 40 EURO. EUMETSAT is the sole supplier of the EKU's and included in the delivery package is the EKU Run-Time-Environment software, for both MS Windows and Linux systems.

Figure 6: The EUMETSAT Key Unit





3.4 Antenna size, pointing and satellite parameters

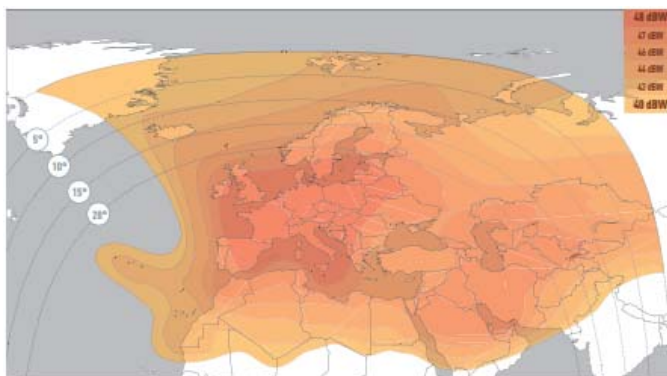
Antenna size depends on the location where the ground receiving station is installed and the frequency band (Ku, C) used. Further information is provided in table 2, followed by the satellite footprints and reception parameters. For pointing the antenna and determining the line of sight vector (like elevation, azimuth and eventual obstructions) use can be made of the dish pointing utility available at: <http://www.dishpointer.com/>.

There are also mobile smartphone apps, like <http://www.esys.com.pl/satfinder/?lang=en> which can also be used for initial location of the satellite in the sky.

Table 3: Antenna dimensions for various regions

Band	Location	Antenna Size
Europe (Ku-band)	within the "core" geographical footprint of the spacecraft, the area bounded by the 40 dBW contour depicted in the EUTELSAT™ 10A graphic Footprint, see figure 7	120cm or smaller (non-professional users 85 cm)
Europe (Ku-band)	within the "extended" geographical coverage (remote European islands, Turkey East of Ankara and Eastern European countries)	1.8m or larger
Africa (C-band)	within the "core" geographical footprint, the area bounded by the inner contour depicted in the EUTELSAT™ 8 W graphic Footprint, see figure 8	2.4m or larger
Africa (C-band)	within the "extended" geographical coverage (e.g. Madagascar, La Reunion, Mauritius and parts of North America)	3.7m or larger

Figure 7 EUTELSAT 10A Ku Band coverage and satellite transponder settings (for DVB-S2)



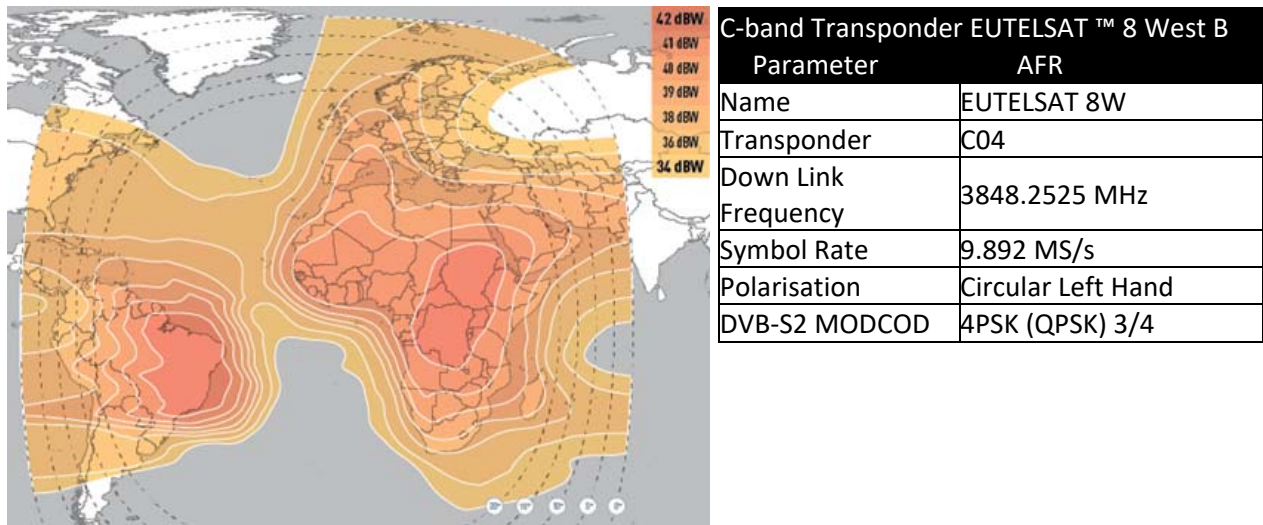
Ku-band Transponder EUTELSAT™ 10A Parameter	BAS-HVS1	HVS2
	Name	EUTELSAT 10A
Transponder	C4	C10
Down Link Frequency	11325 MHz	11387.5 MHz
Symbol Rate	33000 kS/s	33000 kS/s
Polarization	Horizontal	Horizontal
Transmission standard	DVB-S2	DVB-S2
MODCOD 1 (basic)	8PSK3/5	-
MODCOD2 (high volume)	16APSK2/3	16APSK2/3

The second transponder transmits on the same polarisation (horizontal) and same frequency band (low) as the first transponder. Therefore, the same antenna and LNB can be used to receive both transponders simultaneously, provided the antenna is large enough for the High Volume Service. To receive the HVS-2, the coaxial cable from the antenna can be split and connected to a separate DVB receiver router attached to a second network interface to the reception PC or to a separate reception PC.

For EUMETCast Africa DVB dissemination on the EUTELSAT 5 West service has been terminated by the end of July 2018. Since 1 May 2018 EUTELSAT 8W is used for the new EUMETCast Africa Service (AFR-1) and is based on DVB-S2 to take advantage of the better spectral efficiency of the broadcast. Previously the data was provided based on a turn-around service but now the data is directly disseminated to EUTELSAT 8WB.



Figure 8: EUTELSAT 8 West coverage and satellite transponder setting



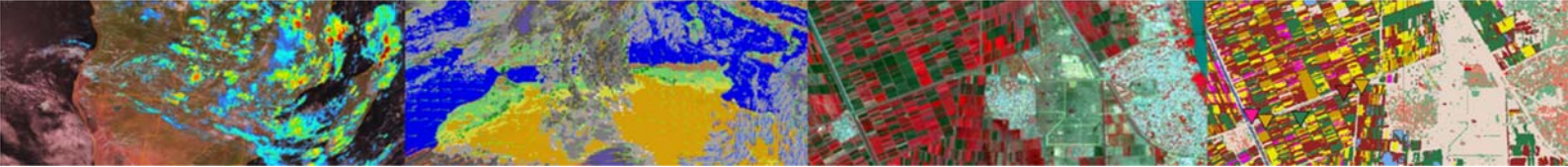
The plots assume that antennas are correctly pointed, the LNB and reception equipment is state of the art and the cables are not too long or low loss ones are used. Smaller antennas (e.g. used for TV reception) will still provide good reception at fair weather conditions, but will increasingly suffer under rain and snow.

4 EUMETCast configuration for 3rd party data Provision

Not all data contained in the GEONETCast data stream is originating from EUMETSAT, CMA or NOAA (the three main GEONETCast Networking Centres). As it is important to get some idea of the data dissemination infrastructure which has been established a more detailed description is provided here describing how some of the products produced by 3rd Party Data Providers are handled and finally disseminated and received at the User stations.

There are many so called 3rd Party Data providers, also from Africa, e.g. like products originating from the SADC and ECOWAS region. Normally, the files from 3rd Party Data Providers are transferred via FTP/INTERNET to the EUMETSAT Operations Internet Server (OIS), an FTP server located at EUMETSAT in Darmstadt (Germany). EUMETSAT then further processes and/or transfers the uploaded products either to the uplink site in Usingen (Germany), where they are converted into a DVB (Digital Video Broadcast) Multicast data stream and transmitted via EUMETCast, or via RMDCN/internet networks for data-exchanges with other GEONETCast components (e.g. to CMA for the south-east Asia broadcast or to NOAA for the GEONETCast Americas broadcast).

Satellite images and derived products are provided to EUMETSAT in various ways. The products from NOAA are disseminated via EUMETCast by first pushing them via FTP from NOAA to EUMETSAT, who in turn pushes them to the DVB uplink server for EUMETCast dissemination on Ku-band and C-band Africa.



5 Data reception on a local reception station

5.1 Registering for EUMETCast

On a continuous basis a large amount of data is being transmitted and can be received having established a reception station. Users can gain access to, and manage, subscriptions to EUMETSAT data, products and services and to apply for the EUMETCast Key Unit and necessary Tellicast software after registering through the online Earth Observation Portal (EOP), at <https://eoportal.eumetsat.int/>.

Once having obtained a username and password, the new user can provide the details as to which service to register, e.g. EUMETCast and the Africa C-Band Reception. Subsequently the Data Usage (e.g. “Educational Use”, see also the definitions) and field of application have to be provided. Then the new user can specify the different data types which are currently provided. This listing is continuously changing, reflecting the actual status of all products disseminated. Last but not least one has to indicate the required number of EUMETCast Client Software License Packages and EKUs and provide the payment details. For registered users other options are available, e.g. using the “View/Extend Licenses” to modify the data received or to request new products. It is important to check the license from time to time to see if new relevant services / products are offered which can only be received if one has subscribed!

After registration or modification of the license the EUMETCast subscriber is contacted by EUMETSAT (ops@eumetsat.int) and further information is provided through email. For new users or for modification of data types requested, EUMETSAT reviews these requests, also with respect to the origin of the applicant or the institute represented. Some services, e.g. those from some 3rd Party Data providers, are restricted or require additional approval. Also data provided through some of the services are restricted to national meteorological organizations and are not being provided to users outside these communities! This process typically takes about six weeks and upon confirmation of the payment for the Client software license and EKU (for each system at total of 100 EURO) EUMETSAT ships these items through registered mail to the applicants address.

Figure 9: The EO Portal

The screenshot displays the 'My Data Access' section of the EUMETSAT EO Portal. It features six service cards arranged in a 2x3 grid, each with an icon, a title, a description, and a call-to-action button.

- EUMETCAST SATELLITE:** Access to near real-time data through DVB satellite with a guaranteed service level. Available data: Meteosat, Metop, Jason, Copernicus Sentinel-3 marine data and third party products. Button: **Subscribe**
- COPERNICUS ONLINE DATA ACCESS:** Download service via Internet for Copernicus data. Available data: Sentinel-3 marine data. Button: **Access**
- DATA CENTRE:** Ordering and delivery service for data with latency of more than 3 hours, historical and long-term archive data. Available data: Meteosat, Metop, Jason and Copernicus Sentinel-3 marine data. Button: **Access**
- EUMETCAST TERRESTRIAL DEMONSTRATION:** Access to near real-time data through terrestrial networks. Restricted to agencies only. Available data: Meteosat, Metop, Jason, Copernicus Sentinel-3 marine data and third party products. Button: **Subscribe**
- EUMETSAT FTP DATA ACCESS:** Download service via Internet for EUMETSAT data. Button: **Subscribe**
- DIRECT DISSEMINATION:** Metop Direct Readout Service. Button: **Subscribe**

Below the grid is a section titled 'My subscriptions to operational service news' containing one card:

- USER NOTIFICATION SERVICE:** E-mail announcement service providing updates on operational services. Button: **View/Edit**



5.2 Establishing a local EUMETCast reception station yourself

Once the confirmation has been received from EUMETSAT that the license is granted and the Client software and EKU have been shipped a station can be established. In most countries the required computer hardware, (prime focus) parabolic antenna, (C-Band) LNB, coax cable and connectors are readily available. It might be more difficult to acquire a DVB-S2 (see table 2) locally but various web shops offer these devices.

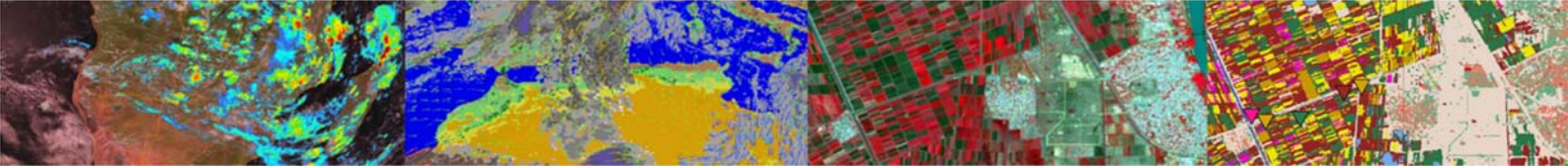
To establish a suitable location for the antenna make use of www.dishpointer.com and select the appropriate satellite, zoom in to your location and check if this potential location has a free line of sight to the satellite. Note that if in the neighbourhood of e.g. an airport there might be interference (use of ground radar for air traffic handling). In such a case ensure that the location selected is shielded from direct exposure to such a device. This can be achieved simply by selection of an antenna location whereby there are concrete buildings in between the source of interference and the parabolic antenna. To minimize the effect of interference and other weather effects, like strong winds (especially in the case of a larger parabolic antenna), it is advised to place the antenna on the ground and not on top of a building (where possible). Also ensure that the distance between the antenna and the computer is not too long, preferably less than 60-80 metres, else consider the use of good quality coaxial cable, and eventually an amplifier.

Once a location on the ground surface has been established, the easiest way is to just dig a hole (of 50 by 50 by 50 cm) and fill it with concrete and place an iron pole with a diameter of about 7-10 cm, with a length of about 2 to 3 metres, upright in the centre. Once the concrete has hardened the parabolic antenna can be mounted at the top of the pole. In most cases the local antenna vendor also knows how to point the antenna. The vendor can be asked to come and point the antenna and will likely bring along a small TV set and a decoder. The vendor can directly connect the decoder to the LNB using a short coaxial cable and can adjust the antenna and directly see the effect in terms of signal strength on the decoder. To ensure that the antenna is pointed to the appropriate satellite the decoder needs to be tuned with the correct transponder settings (see chapter 3.5). A frequency chart with a listing of television channels, e.g. for EUTELSAT 8 West B at 8.0°W can be found online at <https://www.lyngsat.com/Eutelsat-8-West-B.html>. The signal strength indicator on the decoder can be used for accurate pointing of the antenna. Once maximum signal strength has been established the antenna can be fixed and the coaxial cable can be connected to the DVB-S2. If driver and software are already installed on the receiving computer and the appropriate settings are provided for the LNB and Satellite Transponder then after tuning the signal should be locked. Further information can be obtained from "EUMETCast - Broadcast System for Environmental Data (TD 15)". Note that all the information and technical descriptions are also included on the CDROM provided by EUMETSAT.

The next step in the process is the selection of the Data Services. Within the DVB-S2 software there is an option to adjust the Data Services settings. Here the appropriate Multicast Channel and Program Identifiers (PIDs) have to be added, currently only PID 100 for the AFR Service. For an up to date list see also:

<https://eumetsatspace.atlassian.net/wiki/spaces/DSEC/pages/700055570/Channels+and+Packet+Identifiers+PIDs>.

After connection with the satellite has been established and the PIDs have been added the EKU and Tellicast software has to be installed. These are straightforward installations which are fully documented for multiple operating systems. All information and step by step PowerPoint presentations are included on the CDROM provided by EUMETSAT.



6 Conclusions

At relatively low costs and using off-the-shelf equipment a GEONETCast ground reception station can be established which offers the possibility to receive large amounts of near real time environmental data without internet connection. It should be noted however that additional tools are required for e.g. data management and visualization of the images and products received.

The objective of this document however is to provide the necessary background information so a good overview is obtained on GEONETCast, with respect to:

- The organizations behind GEONETCast, the various components of the system and linkage between those;
- The various geostationary satellites used for data dissemination;
- The way data is uploaded by various organizations and 3rd Party Data Providers;
- Components of a ground reception station;
- Registration for EUMETCast services;
- Some practical guidelines to establish a receiving station yourself.

Together with the online resources provided (also see References) these should ensure a “smooth landing in GEONETCast”.



7 References

Additional online technical documentation:

EUM TD 15 (2021): TD15 - EUMETCast, EUMETSAT's Broadcast System for Environmental Data. Technical description, Issue v8F, 28 January, 2021. EUMETSAT, Darmstadt, Germany.

<https://www.eumetsat.int/media/44096>

<https://eumetsatspace.atlassian.net/wiki/spaces/DSEC/overview>

Group on Earth Observation (GEO):

<http://www.earthobservations.org>

<http://www.earthobservations.org/geoss.php?smid=500>

EUMETSAT:

<http://www.eumetsat.int>

<https://www.eumetsat.int/eumetcast>

GEONETCast Product Navigator:

<http://navigator.eumetsat.int/>

Earth Observation Portal:

<https://eoportal.eumetsat.int>