**Report on Metoesat satellite.**

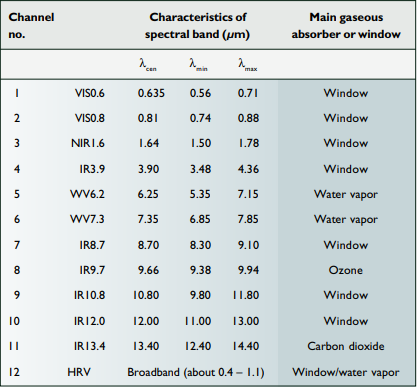
MTG is an abbreviation for Meteosat Third generation system which was established through a joint venture between EUMETSAT (European Organization for the Exploitation of Meteorological Satellites) and ESA (European Space Agency). This project consists of four satellite units from Metetosat-6 to Meteostat-9, from which Metetosat-6 and 7 are positioned above the Indian Ocean while Meteostat-8 and 9 are positioned above Africa.

One of the primary product of this satellite system is the land surface albedo which is the fraction of sunlight reflected from the surface of the earth, this product is referred to as MSA (Meteosat surface albedo) which is generated through using MFG (Meteosat First Generation) data this products covers two regions: area centered at 0° longitude from 1982 to 2006 and area centered at 63°E from 1998 to the present. The temporal resolution of this data is 10 day composite with a spatial resolution of 3km, this includes white-sky albedo and black-sky albedo in visable and NIR (0.4-1.1 μm). The surface albedo can be effected by the surface properties as more impurities in the surface corresponds to less albedo.

The MSG has a image repeat cycle of 15 min, with 30 min for (Meteosat) having 12 spectral channels. MSG consists of 4 satellites MSG 1, 2, 3 and 4

The primary instuments in the MSG series are the SEVIRI sensor and the GERB ( Geostationary Earth Radiation Budget) instrument. SEVIRI would be explained below. On the other hand the primary use or objective of GERB is to observe the Earth’s radiation budget. The GERB instrument is on MSG 1 and MSG 2. GERB monitors the radiation budget in terms of climate change, food production and natural disaster prediction which is achieved by measuring the top layer of the atmosphere, the sorthwave and emmited longwave of the region. GERB includes two instruments the IOU (Instrument Optical Unit) imager device and the Instrument Electronics Unit (IEU) data handeling device.

Some of the Products generated from Meteosat are based on the data provided from the SEVIRI sensor the spatial resolution of the generated product is 3km spatial resolution. SEVIRI is an abbreviation for Spinning Enhanced Visible and Infrared Imager which in simpler terms has 12-channel imager observing the earth-atmosphere system, from which 11 channels observe the full disk of the earth with a 15-min repeat cycle, while the HRV (High resolution Visible) channel covers half of the full earth disk in the east to west direction and full disk in the north-south direction. The HRV has a spatial resolution of 1.67 km. The cannel detail for SEVIRI are as follows:



The basic use and working of the afro mentioned channels are as follows:

**VIS 0.6 and VIS 0.8:** These channels primary resource is cloud detection and tracking of cloud movement, aerosol monitoring along with land surface temperature and vegetation monitoring. These two channels are known from AVHRR of the NOAA polar orbiting satellite.

**NIR 1.6:** The primary resource of this channel is the ability to discriminate between snow and cloud cover, Ice and water clouds and aerosol monitoring.

**IR 3.9:** The primary resources of this channel is low cloud and fog detection, supports measurement of land and sea surface temperature at night time, low level wind coverage from cloud tracking.

**WV 6.2 and WV7.3:** The primary resources of these two channels are water vapor and wind observation.

**IR 8.7:** This channel provides quantitative information on cirrus clouds and assist the discrimination process between ice and water clouds.

**IR 9.7:** Tracking Ozone patterns that represent the wind motion in the lower stratosphere

**IR 10.8 and IR 12.0:** These two channels are split window channels, the primary resource these channel offer are measuring of sea, land surface and cloud-top temperatures along with assisting in the detection of cirrus and volcanic ash cloud.

**IR 13.4:** In cloud free areas/ clear sky cases it assists the calculation of temperature measurement from the lower troposphere.

There are various products produced by the Meteosat series, the operational meteosat meteorological products are handled by the MPEF, the MTP (Meteosat transition program) products are specifically produced by the MPEF ( Meterological Product Extraction Facility) the core products are wind products extracted from three channels in near-real time. The current operational products are as follows:

**CLA (Cloud analysis products):** In simpler terms this product provides scene analysis results on a scale of 100 km x 100 km or better along with providing information on cloud cover, cloud-top temperature, cloud type and phase and assisting the generation of atmospheric motion vectors (AMV) which can provide information on wind speed and direction.

**Cloud-top height (CTH):** as the name implies this product is a derived product image which provides information regarding cloud height at a resolution of 3 x 3 super pixel resolution. The main use of this product is in aviation meteorology as it provides hights with a vertical resolution of 300m.

**Clear-Sky radiance:** This product provides the mean radiance of cloud free pixels in [W m−2 sr−1 (cm−1) −1]

**Tropospheric humidity (TH):** This product provides estimates of mean-relative humidity for two tropospheric layers. The first layer humidity product is referred to as upper tropospheric.

**Atmospheric motion vectors:** These products in simpler terms are very important as far as numerical whether prediction. This product would be derived from cloud and water vapor motion using primarily the 0.6- or 0.8-µm channel, the 10.8-µm channel, and the 6.2- and 7.3-µm channels, respectively

**ISCCP dataset (IDS**): continues the support to the International Satellite Cloud Climatology Program (ISCCP) providing three different data formats.

**Climate dataset (CDS):** provides statistical information about the scene classes in a processed segment 984 | JULY 2002 (nominally 32 × 32 pixels). It is a concise summary of the radiances observed in a segment and potentially very useful for climatological studies of cloud and radiation fields.

**Total ozone product (TOZ):** This uses the 9.7-µm channel and other SEVIRI channels and correlative data, and is derived with a regression algorithm (Orsolini and Karcher 2000; Engelen et al. 2001). The ozone observations are useful for monitoring and forecasting UV radiation at the ground level.

Then there are SAF products which are satellite application facilities some of he examples are as follows:

* **Examples of products from the Ocean and Sea Ice SAF include**

1. Atlantic sea surface temperature,
2. surface radiative fluxes over the Atlantic,
3. sea ice (polar Atlantic), that is, ice edge/cover/type.

• Examples of products from the Climate SAF are

1. cloud parameters,
2. surface radiation budget components,
3. radiation budget components at the top of the atmosphere,
4. Humidity composite products.

• Examples of targeted products from the Land Surface Analysis SAF are

1. vegetation parameters and biophysical indicators,
2. snow cover,
3. land surface temperature,
4. soil moisture,
5. surface albedo,
6. evapotranspiration, and
7. Shortwave and longwave radiation parameters.

Other primary features that can be extracted from the MSG data are as follows:

**Visable imagery:** As the name implies it refers to satellite imagery in the visable spectrum in primarily daylight conditions which can be used for monitoring cloud cover, land cover and atmospheric conditions.

**Infrared Imagery:** As the name implies this referes to the imagery in the infrared specterumn which primarily deals with capturing temperature variations in the earth’s surface and atmosphere. This can be used from monitoring cloud-top temperatures, identifying areas of precipitation and temperature data.

**Water Vapor imagery:** this corresponds to the collection of atmospheric moisture patterns and humidity variations.

**Multispectral Imagery:** refers to the creation of composite images that can be used in land-use classification and vegetation monitoring.

**Derived Products:** As the name implies these are products derived from satellite data such as sea surface temperatures, atmospheric motion vectors and etc. These products can be used in weather forecasting, climate monitoring and etc.

These datasets are often provided in standard formats such as NetCDF, HDF, or GeoTIFF. The specific format may depend on the data distribution policies of EUMETSAT or the organization providing access to the satellite data.