

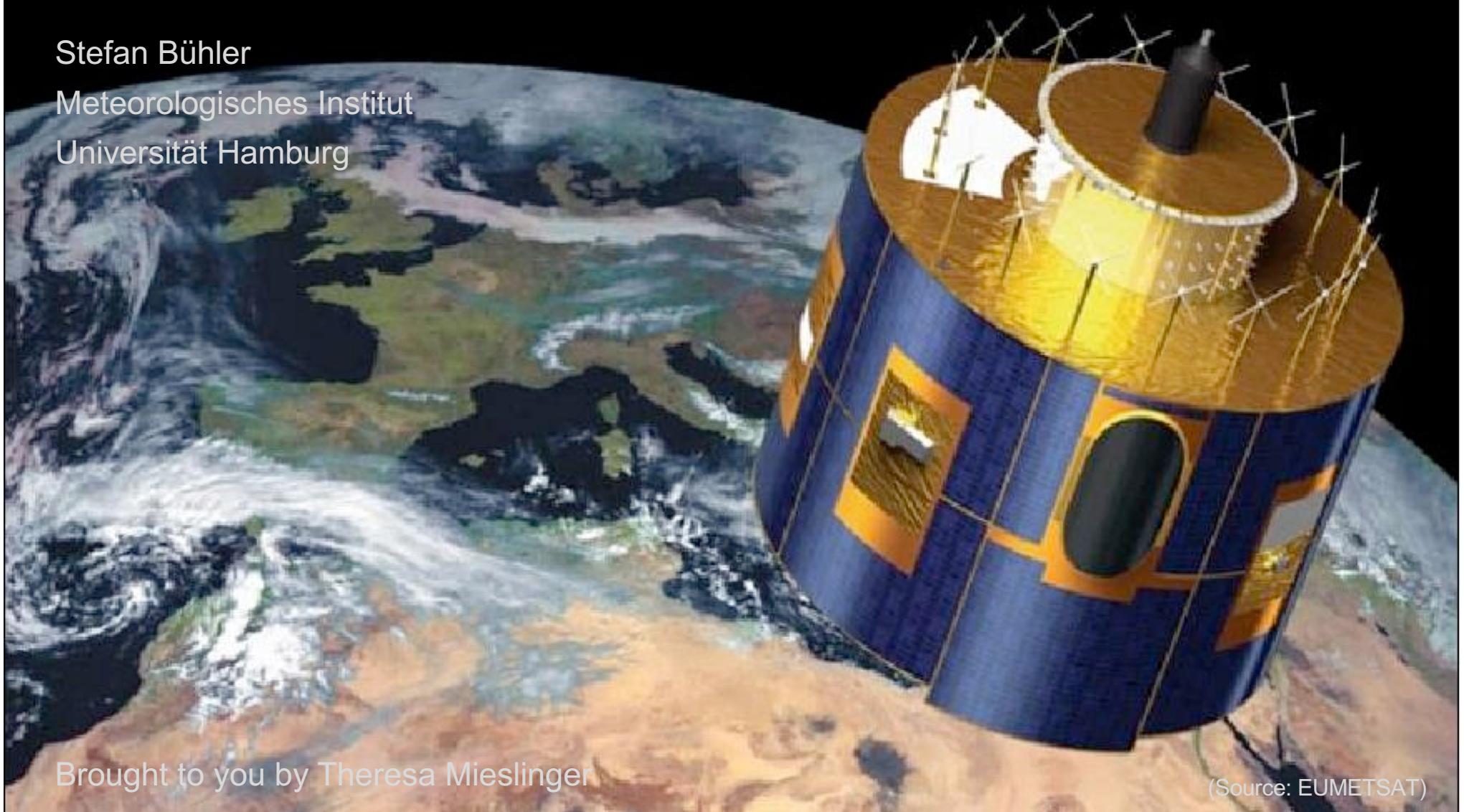
# Satellite of the day: Meteosat-SG SEVIRI

Optik, Strahlung, Fernerkundung

Stefan Bühler

Meteorologisches Institut

Universität Hamburg

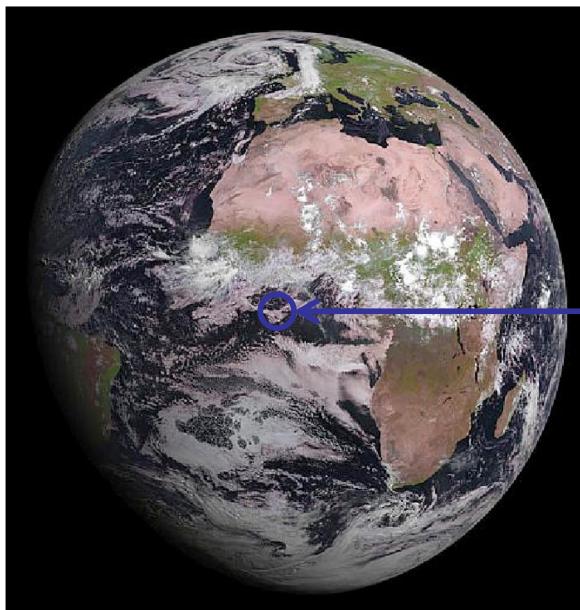


Brought to you by Theresa Mieslinger

(Source: EUMETSAT)

## Spacecraft details

- ▶ Meteosat Second Generation (MSG) : European weather satellite, developed and operated by ESA and EUMETSAT
- ▶ Orbit: geostationary
- ▶ Primary Instrument: Spinning Enhanced Visible and InfraRed Imager (**SEVIRI**)
- ▶ MSG satellites currently in orbit:

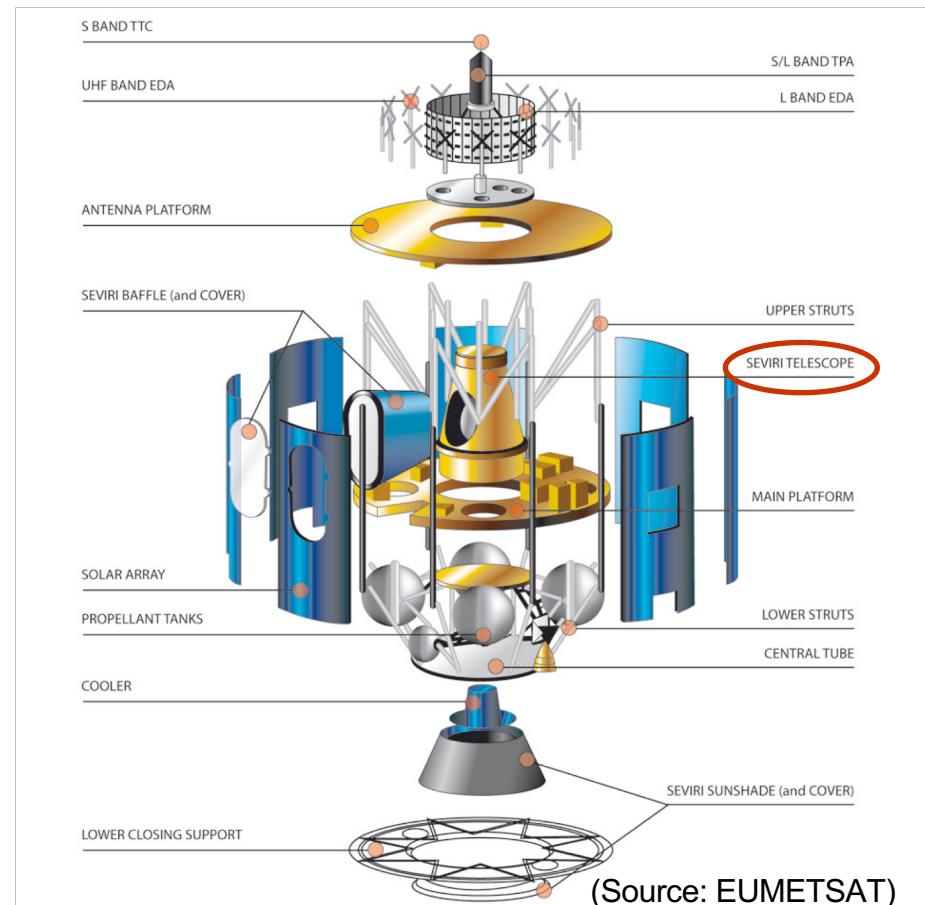
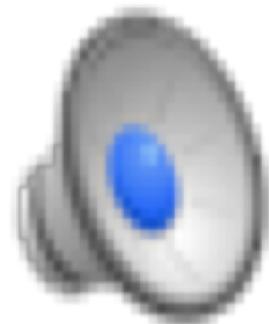


Satellite	Launch date	Longitude	Services
Meteosat-11 (MSG4)	15.07.2015	3.4° West	Back-up, In-orbit Storage until required
Meteosat-10 (MSG3)	05.07.2012	0°	Full-Disk Service, Real-time Imagery
Meteosat-9 (MSG2)	22.12.2005	9.5° East	Rapid Scan Service, Real-time Imagery
Meteosat-8 (MSG1)	28.08.2002	3.5° East 41.5° East as of Sept. 21, 2016	Backup service for 0°, RSS (Rapid Scanning Service) gap-filling Backup service for 0°, IODC in parallel with Meteosat-7, full IODC service in 2017

(Source: EUMETSAT)

# SEVIRI instrument characteristics

- ▶ Channels: 4 Visible and Near InfraRed (VNIR) [0.5 – 1.1  $\mu\text{m}$ ],  
including 1 High-Resolution Visible (HRV)  
8 InfraRed (IR) [3.4 – 14  $\mu\text{m}$ ]
- ▶ Temporal resolution:
  - 15-min (full disc)
  - 5-min rapid scans (Europe)
- ▶ Spatial resolution:
  - 1 km Ch 12 (HRV)
  - 3 km Ch 1 – 11 (VIS, IR, WV)
- ▶ Scanning principle (movie):



# SEVIRI Kanäle

Channel No.	Spectral Band ( $\mu\text{m}$ )	Characteristics of Spectral Band ( $\mu\text{m}$ )		Main observational application	
1	VIS0.6	0.635	0.56	0.71	Surface, clouds, wind fields
2	VIS0.8	0.81	0.74	0.88	Surface, clouds, wind fields
3	NIR1.6	1.64	1.50	1.78	Surface, cloud phase
4	IR3.9	3.90	3.48	4.36	Surface, clouds, wind fields
5	WV6.2	6.25	5.35	7.15	Water vapor, high level clouds, atmospheric instability
6	WV7.3	7.35	6.85	7.85	Water vapor, atmospheric instability
7	IR8.7	8.70	8.30	9.1	Surface, clouds, atmospheric instability
8	IR9.7	9.66	9.38	9.94	Ozone
9	IR10.8	10.80	9.80	11.80	Surface, clouds, wind fields, atmospheric instability
10	IR12.0	12.00	11.00	13.00	Surface, clouds, atmospheric instability
11	IR13.4	13.40	12.40	14.40	Cirrus cloud height, atmospheric instability
12	HRV	Broadband (about 0.4 – 1.1 $\mu\text{m}$ )		Surface, clouds	

**Table 1: Spectral channel characteristics of SEVIRI in terms of central, minimum and maximum wavelength of the channels and the main application areas of each channel.**

Quelle: EUMETSAT ([http://oiswww.eumetsat.org/WEBOPS/msg\\_interpretation/msg\\_channels.php](http://oiswww.eumetsat.org/WEBOPS/msg_interpretation/msg_channels.php))

## Data Level 1.5

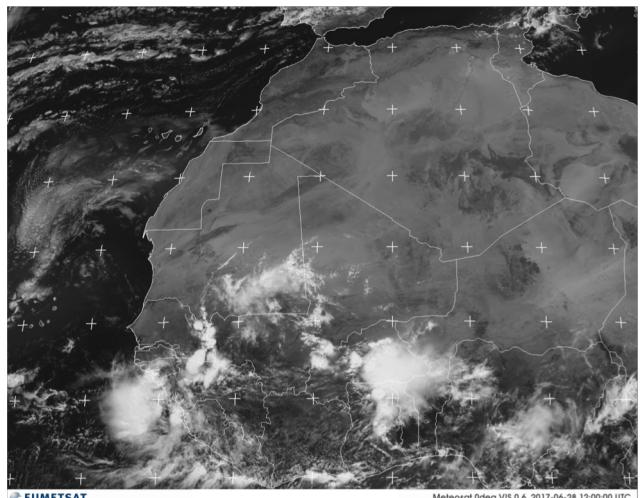
- ▶ raw satellite data, Level 1 data, is geolocated and corrected for radiometric and geometric effects
- ▶ nominal Level 1.5 image size is 3712 x 3712 pixels
- ▶ Data format: the data is distributed as MSG Ground Segment packages

(Source: [ftp://ghrc.nsstc.nasa.gov/pub/doc/grip/gripmsg/MSG\\_Level\\_1\\_5\\_Image\\_Data\\_Format\\_Description.pdf](ftp://ghrc.nsstc.nasa.gov/pub/doc/grip/gripmsg/MSG_Level_1_5_Image_Data_Format_Description.pdf) )

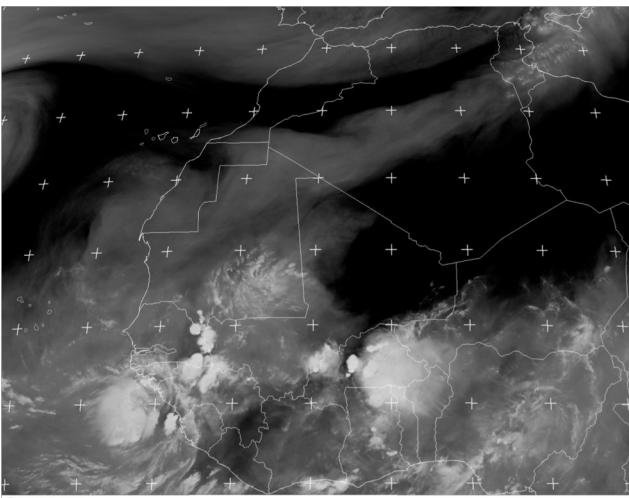
## Example: 2017-06-28 12:00 UTC Western Africa

- ▶ Imagery

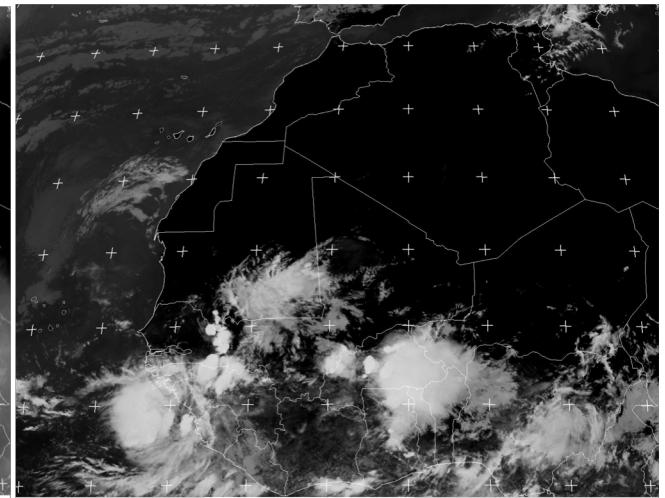
VIS 0.6  $\mu\text{m}$



WV 6.2  $\mu\text{m}$



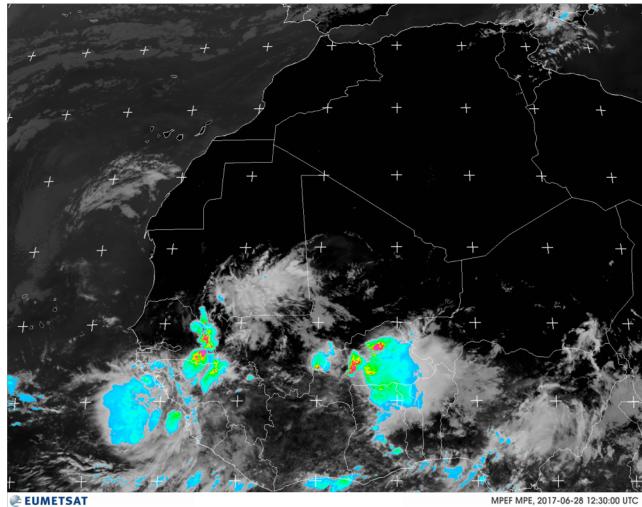
IR 10.8  $\mu\text{m}$



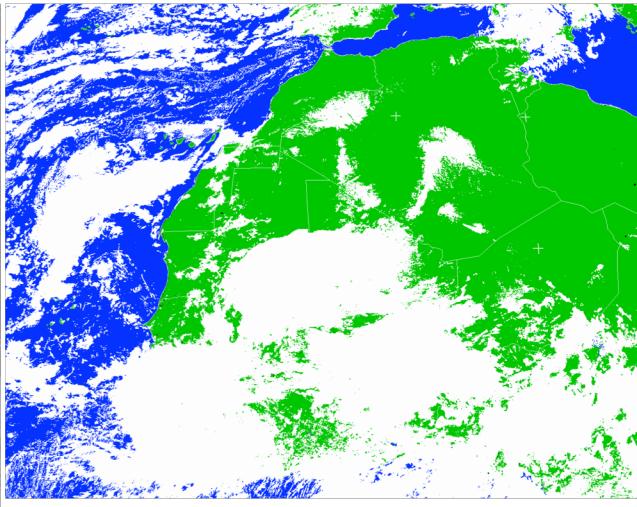
(Source: <http://oiswww.eumetsat.org/IPPS/html/MSG/> )

## ► Visualized products

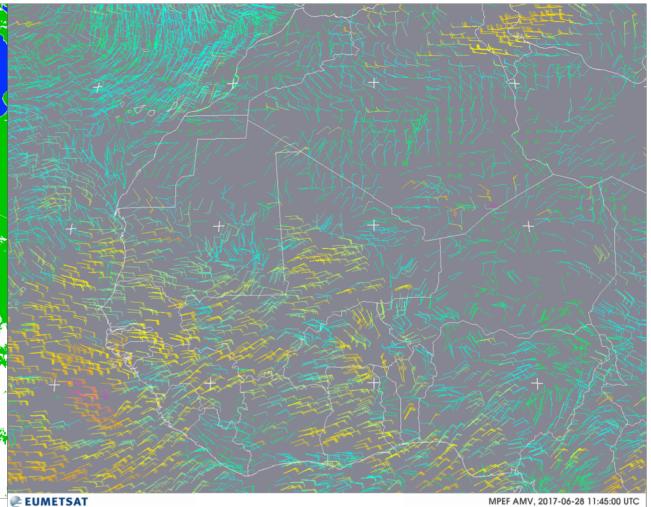
Multi-Sensor Precipitation Estimate



Cloud mask

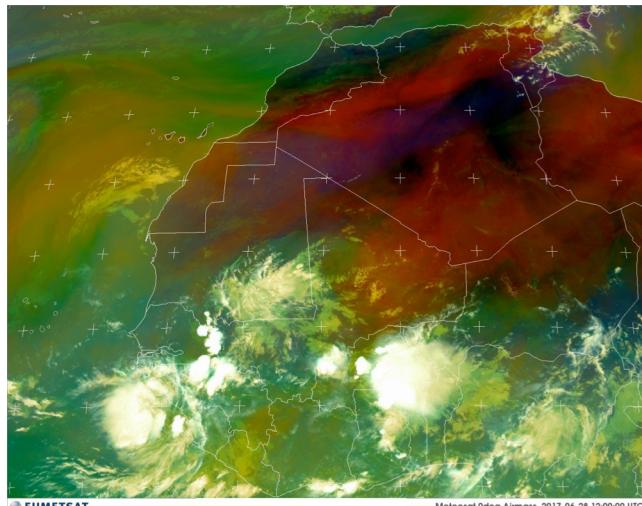


Atmospheric motion vectors

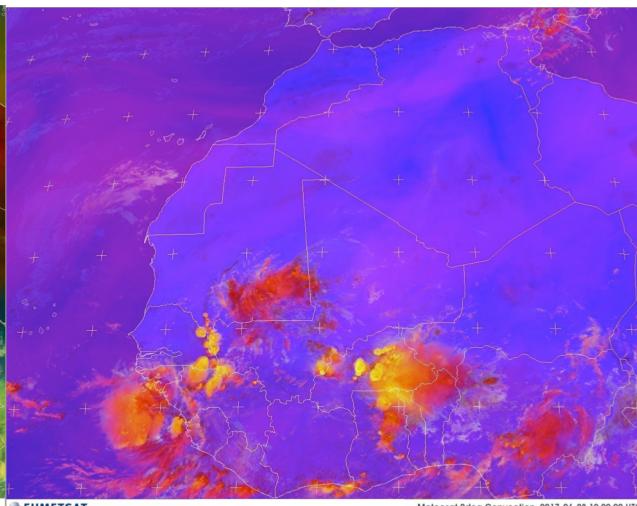


## ► RGB composites

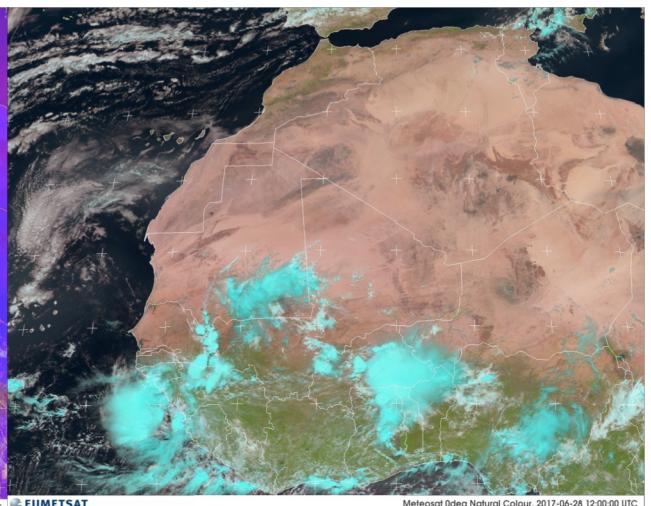
Air mass



Convection



Natural color



(Source: <http://oiswww.eumetsat.org/IPPS/html/MSG/> )

## Data products

- ▶ **Aerosols:** Aerosol Properties Over Sea, Volcanic Ash Detection
- ▶ **Precipitation:** Multi-Sensor Estimate, High Resolution Index
- ▶ **Radiance:** Clear Sky Radiances, All Sky Radiances
- ▶ **Clouds:** Cloud Mask, Cloud Analysis Image, Cloud Top Height
- ▶ **Atmospheric motion:** Atmospheric Motion Vectors, Divergence
- ▶ **Vegetation:** Normalised Difference Vegetation Index
- ▶ Tropospheric Humidity
- ▶ Active Fire Monitoring
- ▶ Total Ozone
- ▶ Sea Surface Temperature

## Data usage

- ▶ Climate studies
- ▶ Operational weather forecast
- ▶ Cloud and aerosol studies