EUMETSAT PLANS

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Germany
## EUMETSAT SATELLITE PROGRAMMES

<table>
<thead>
<tr>
<th>Year</th>
<th>Meteosat-5</th>
<th>Meteosat-6</th>
<th>Meteosat-7</th>
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<td>Over Indian Ocean since 7/98</td>
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<td>04</td>
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<td>Hot stand by at 10°E (since 10/02)</td>
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<td>Operational S/C at 0°(since 6/98)</td>
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### MSG

- **MSG-1**
- **MSG-2**
- **MSG-3**
- **MSG-4**

### EPS

- **Metop-1**
- **Metop-2**
- **Metop-3**

### JASON-2

- Planned/Under Approval
METEOSAT
Meteosat Operational Programme (MOP) and
Meteosat Transition Programme (MTP)

Visible (VIS)
0.4 - 1.0 μm
5000 x 5000

Infrared (IR)
10.5 - 12.5 μm
2500 x 2500

Water Vapour (WV)
5.7 - 7.1 μm
2500 x 2500
Meteosat Meteorological Products

Operational products available in near real-time

- Clear Sky Radiances
- Clear Sky Water Vapour Winds
- Climate Data Set
- Cloud Analysis
- Cloud Motion Winds
- Cloud Top Height
- High Resolution Visible Winds
- Sea Surface Temperatures
- Upper Tropospheric Humidity

All of the above products are generated between 1 and 48 times each day on an operational basis. The Climate Data Set is stored for research use. The other products are distributed to users immediately after processing.
Meteosat Climate Products

The ISCCP & GPCP

- **International Satellite Cloud Climatology Project**
  - Clouds described by 80 parameters
  - Every 3 hours, in 2.5° latitude/longitude intervals
  - Global record since 1983

- **Global Precipitation Climatology Project**
  - Estimates of monthly precipitation totals
  - In 1° latitude/longitude intervals
  - Global record since 1986
EUMETSAT Indian Ocean Data Coverage (IODC)

From end of May 1998 Meteosat-5 has been located at 63°E where it supported INDOEX until the end of 1999 and will continue as IODC until at least the end of 2005.
EUMETSAT
Rapid Scanning Service (RSS)

• Resulting from a request to support the Mesoscale Alpine Project (MAP) in September 1999 the backup spacecraft Meteosat-6 was configured to conduct a series of rapid scan operations

• Initially the rapid scan area covered the Alpine region at 5 minute intervals

⇒ In 2000 the scanned area was increased significantly and the repeat cycle fixed to 10 minute intervals. From mid 2001 the Rapid Scanning Service became operational
EUMETSAT ATOVS Retransmission Service (EARS)

Demonstrates potential future dissemination concepts to meet shorter timeliness requirements.
METEOSAT SECOND GENERATION - MSG

• Launched 2002
• Currently under commissioning
• Operations planned from 2004
MSG capabilities

VIS 0.6 µm  VIS 0.8 µm  NIR 1.6 µm  NIR 3.9 µm
WV 6.2 µm  WV 7.3 µm  IR 8.7 µm  IR 9.7 µm
IR 10.8 µm  IR 12.0 µm  IR 13.4 µm  HRVIS
Details of vegetation in Europe – grassland shows up as bright green areas, the forests are dark green. Also noteworthy is the dense fog over the Po area and the poor snow cover over the Central Alps (small cyan-colored areas).

Composite image using NIR 1.6, VIS 0.8 and VIS 0.6

MSG-1, 14 July 2003, 10:00 UTC
Snow over the Alps, displaying the Alpine valleys in beautiful clarity. Composite image using the high resolution visible channel (HRVIS) and IR 10.8

MSG-1, 8 September 2003, 12:00 UTC
Hurricane "Isabel" over the Atlantic.
Composite image produced from channels VIS0.6, NIR1.6, IR3.9, WV6.2, WV7.3 and IR10.8
EUMETSAT POLAR SYSTEM

- Scheduled launch Oct 2005
- 14 years of operation
ATOVs and AVHRR provide continuity to current system.
EPS provides GLOBAL products

Composite of 14 level products of one day from HIRS

Global Products are dump-based

EPS provides local AHRPT/LRPT service
EPS provides continuity to the current polar system:

Example AVHRR

Ackermann, 2001
New Technology provides enhanced capabilities for Infrared Sounding
HIRS/4 IR Channels

IASI Bands

Band 1

Band 2

Band 3

\( T_b \) (K)

\( v \) (cm\(^{-1}\))

13.35 7
13.97 5
13.65 6
14.2 4
14.5 3
14.7 2
14.9 1

11 7.32 12 6.53
17 4.13
18 3.98
19 3.76

14.9
14.7
14.5
14.2
13.65
13.97
13.35

5.0 µm
7.14 µm
10.0 µm
12.5 µm
3.85 µm

11.1
9.7
12.47
12.5
7.14
5.0
Potential for Trace Gas Retrieval

Clerbaux et al., 2003
Proven Research Instruments become operational
Improved Earth Coverage with ASCAT during one day
Potential scatterometer land application: Vegetation and Surface Roughness

- Scale compatible with major vegetation biomes and soil groups (climate-driven)
- Compared to AVHRR and SMM/I, global scatterometer maps exhibit more contrasts (Prigent et al., in press)
GOME-2 channels and potential for retrieval of species

Source: ESA, Callies et al. 2000
GOME-2 Level 1 Ground Processor Prototype Output Example for CGS product (1granule)

GOME/ERS-2 30 November 1999
Global ozone total column concentration. Low concentration of ozone over north Atlantic and north Europe due to dynamically induced ozone loss in the lower and middle stratosphere. Source: DLR

Level 2 and higher products will be generated in the SAF

Munro, 2003
GOME/ERS-2 15-16-17 July 1998: NO$_2$ total column concentration over Europe (left) and the USA (right): High concentration (orange) over areas with dense population (Po valley, The Netherlands, England, US East coast)

Source: DLR
First use of Radio Occultation technique in operations requires development of a whole system.
GRAS: limb sounding by occultation of GPS signals

From Luntama (2000)
Global distribution of simulated EPS
GRAS Observations over 24 h
GRAS is a system

GSN coverage for the GPS constellation is > 200 % => service availability via redundancy
Satellite Application Facilities (SAF)

Integrated part of the distributed
EUMETSAT Ground Segment
## SAF Network Overall Planning

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<td>SAF in support to Nowcasting &amp; Very Short Range Forecasting</td>
<td>Development Phase (completed)</td>
<td>IOP (running)</td>
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<td>SAF on Ocean and Sea Ice</td>
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<td>IOP (running)</td>
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<td>SAF on Land Surface Analysis</td>
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The EUMETSAT Ground Segment delivers products/services required by EUMETSAT Users. It has a distributed architecture, including:

- Central facilities at EUMETSAT HQ
- Satellite/Mission Control
- Data Acquisition/Dissemination
- Image Data Processing/Preprocessing: level 1
- Meteorological Products Extraction: selected level 2
- Multi-mission Archiving and Retrieval Facility (U-MARF)
- Ground Stations: Primary, Back-Up and Support
- Network of Satellite Applications Facilities hosted by national Met Services
- Other level 2 products and selected level 3

This system supports applications through a ground segment that includes:

- Meteorological Products Extraction Facility (MPEF) at EUMETSAT HQ, Darmstadt
- Unified Meteorological Archive and Retrieval Facility (U-MARF) at EUMETSAT HQ, Darmstadt

Users interact with the system through satellite application facilities within the Member States, which provide decentralized processing and generation of products.
Optional Programme Jason-2

EUMETSAT responsibilities:

• Earth terminal, ground network
• Operational product processing and distribution
• User interface