

EUMETSAT PLANS

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1. INTRODUCTION

The European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT), contributes to the World Weather Watch system with a number of operational meteorological satellite programmes. These programmes include the continuation and improvement of the current European geostationary meteorological satellite system and also the EUMETSAT Polar System (EPS), as a contribution to the low earth orbiting, quasi sun synchronous weather satellites system.

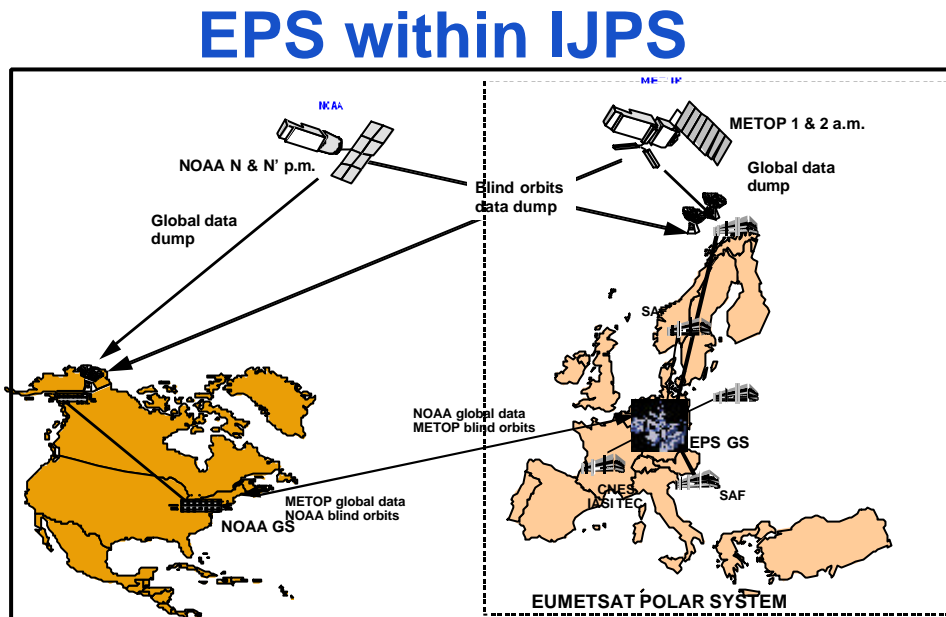
User and Data Services are provided together with these systems.

2. PROGRAMMATIC ASPECTS

2.1 EUMETSAT Polar System (EPS)

The EUMETSAT Polar System (see Fig. 1) will complement the US provided system and together with the latter continue the present NOAA polar orbiting satellite system in the frame of the Initial Joint Polar System (IJPS). The future EUMETSAT satellites of this new polar system are the METOP (METeorological OPERational Satellite) satellites, jointly developed with ESA. They will provide high resolution sounding and also high resolution imagery in global coverage. The EPS Programme activities have started in September 1998, while full approval to the programme was given in June 1999. The first two of the METOP satellites will be operated in the frame of the Initial Joint Polar System (IJPS) together with the present NOAA system of the United States. These METOP-1 and METOP-2 spacecraft are foreseen for a sun synchronous orbit in the 9:30 AM equator crossing (descending node). They will provide polar data from 2005 onwards. With the third spacecraft the converged military and civilian US-

Systems NPOESS will form together with METOP-3 the Joint Polar System (JPS). METOP-3 is planned to be a recurrent copy of METOP-1 and 2. No HIRS/4 will be flown on METOP-3. The whole EPS



programme is planned to cover 14 years of operation.

Fig. 1: The EUMETSAT Polar System (EPS) Programme

2.2 Geostationary Systems

The Meteosat-6 and -7 satellites represent the current operational geostationary satellites. Meteosat-5 is supporting the INDOEX experiment and is currently situated at 63°E over the Indian Ocean. Meteosat-6 provides the rapid scan service, which is operational since 2001. The Indian Ocean Coverage is authorised to be continued until end 2003. Meteosat-7 was launched in the frame of the MTP (Meteosat Transition Programme) in September 1997 and assures the continuity of meteorological geostationary satellite data coverage until the appearance of the new generation of the Meteosat Second Generation (MSG) Spacecraft. Meteosat-7 has the same capabilities as its predecessors. Together with MOP and then after 2002, together with MSG, MTP will be operated as part of a redundant two satellite system. The first spacecraft of the MSG series is scheduled for launch in July 2002. It has an improved observation capability and a lifetime of seven years. Two further spacecraft, MSG-2 and MSG-3 are foreseen.

3 SPACECRAFT AND INSTRUMENTS

3.1 EUMETSAT Polar System

The METOP satellites of the EUMETSAT Polar System (EPS) will be launched into a sun synchronous, near polar orbit with an equator crossing time of 09:30 AM (descending node), i.e. the so called morning orbit. The main mission objectives for the system are Operational Meteorology and Climate Monitoring. In addition the Search and Rescue Instruments and also the Space Environment Monitor are embarked. To achieve these objectives the appropriate payload will be embarked on METOP, with a number of sounding instruments. The HIRS/4 (High Resolution Infrared Radiation Sounder) instrument, the AMSU-A (Advanced Microwave Sounding Unit - A) and the MHS (Microwave Humidity Sounder) instrument as successor instrument of AMSU-B (MHS is a EUMETSAT development), will provide the continuity to the current polar sounding capabilities onboard the NOAA-15, 16 and NOAA-M spacecraft. Highly improved sounding capability will be provided by the IASI (Infrared Atmospheric Sounding Interferometer) instrument, both in accuracy and also vertical and horizontal resolution. The sounding payload is complemented by the AVHRR/3 (Advanced Very High Resolution Radiometer) multi-spectral imager, which will provide global visible and infrared imagery at high horizontal resolution. EPS products comprise centrally processed level 1 products from all instruments and level 2 sounding products from ATOVS and IASI and a large number of level 2 and higher products from the distributed Satellite Application Facilities. Figure 2 shows an example of a level 1 product.

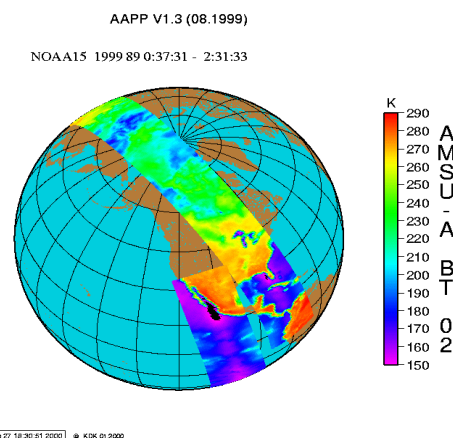


Fig. 2: AMSU-A Channel 2 Brightness temperatures as example for a global product.

Additional sounding capabilities will be provided by the GOME-2 instrument for Ozone sounding and also by the GRAS (GPS Radio-Occultation Atmospheric Sounder) instrument, which will make use of the information on the atmosphere and ionosphere contained in the GPS navigation satellite signals through the radio-occultation technique.

An Advanced Scatterometer (ASCAT) will provide improved capability to retrieve wind vectors at the ocean surface.

3.2 Geostationary Satellites

3.1.1 Meteosat Transition Programme

The current Meteosat Operational System as well as the Meteosat Transition Programme Satellite (Meteosat-7) have as payload a three channel imager with broad band channels in the visible, infrared and water vapour region of the spectrum. The imager yields a full disk image every 30 minutes. The resolution at the sub satellite point is 2.5 km for the visible, 5 km for the infrared and water vapour channels. There are 5000 x 5000 pixel of visible and 2500 x 2500 pixel of infrared and water vapour channel data per full disk image. The spacecraft is spin stabilised with 100 rotations per minute. The products include satellite winds, sea surface temperatures, upper level tropospheric humidity.

3.1.2 Meteosat Second Generation

The Meteosat Second Generation spacecraft will also be a spin stabilised satellite. Its payload will comprise the Spinning Enhanced Visible and Infrared Imager - SEVIRI) with 12 different spectral channels in the visible and infrared region of the spectrum. Some sounding capabilities exist for total Ozone and water vapour, also for stability parameters (see Fig. 3 for SEVIRI Channels). The resolution of the image data at the sub satellite point are 3 km with exception of the High Resolution Visible channel (HRV), where the resolution is planned to be 1 km. The full disk image is planned to be composed of 3750 x 3750 pixels

(except for HRV) (see Fig. 4). It is planned to provide one full disk image every 15 minutes. In HRV mode a higher sequence can be achieved. Products planned to be derived from these data include wind vectors, cloud cover, cloud top temperature, cloud top height, sea surface temperature and stability parameters.

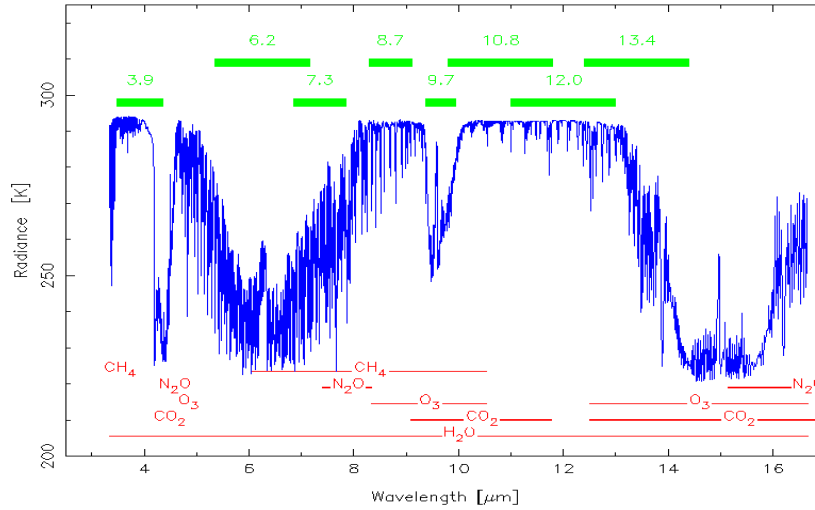
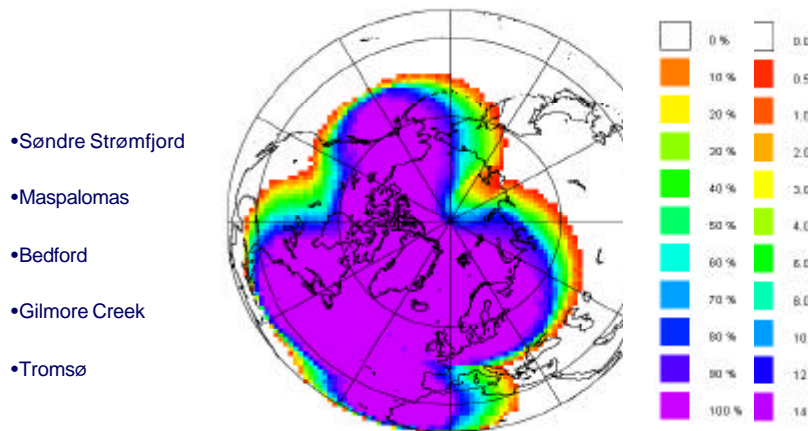


Fig. 3: SEVIRI Channel Characteristics.

4. ATOVS RETRANSMISSION SERVICE

The members of the HIRLAM Group (Denmark, Finland, Ireland, The Netherlands, Norway, Spain,

Geographical Coverage



Sweden and Iceland) approached EUMETSAT in November 2000 to assess the feasibility of a fast Fig.

4: Geographic Coverage of the EARS

delivery service of HRPT based ATOVS data for the Northern Atlantic (see Figure 4) and European Area. The aim was to provide ATOVS level 1a and level 1c data within a timeliness of 1 hour to cover the needs of EUMETSAT Member States regional and local Numerical Weather Prediction requirements for sounder data. A pilot project was started with the goal to distribute the data of five HRPT stations. The goal is that the service within the pilot project starts in October 2002. The initial operational phase is approved until end 2004. Details can be seen on EUMETSAT's web page (see on <http://www.eumetsat.de>, the EARS (EUMETSAT ATOVS Retransmission Service) home page is in preparation.)

5. CONCLUSIONS

The above presented systems represent the EUMETSAT contribution to the global system of satellite observation within the World Weather Watch and the Global Observation System. Considerably improved sounding capabilities are expected to provide a major contribution towards the improvement of operational meteorological services, in particular Numerical Weather Prediction. An important contribution to climate monitoring will arise from the coming programmes and satellites. Further contributions from EUMETSAT will include optional programmes like the Jason-2 data processing and distribution.

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