Satellite application facilities (SAFNWC) in support to nowcasting & very short range forecasting

INM Spain

Under the leadership of the Spanish Meteorological Institute (INM), the SAFNWC is being developed by a Project Team involving Météo-France, SMHI and ZAMG (Meteorological Institutes from Sweden and Austria respectively). The main goal is the development of Nowcasting products derived from both MSG and PPS (Polar Platform Satellite) satellite systems to be delivered to users as SW (software) Packages.

The SAFNWC is responsible for the development and maintenance of the appropriate SW Packages, as well as all related User's support tasks. The User's support is provided through a dedicated Help Desk. The SAFNWC also intends to be a Centre of Excellence for Nowcasting in EUMETSAT.

This project began in 1997 and products had been developed with other satellite data until 2002, when the MSG was launched. In 2002 the Initial Operations Phase was initiated, but the Full Operations Phase will not begin until 2007.

The MSG sensor called SEVIRI has 12 channels and has been producing data since 28th January 2004. During the testing phase, data received from versions MSG 0.0 and MSG 0.1 have been checked. Tuning has been performed on the SEVIRI images and the algorithms for the 12 products have been tested.

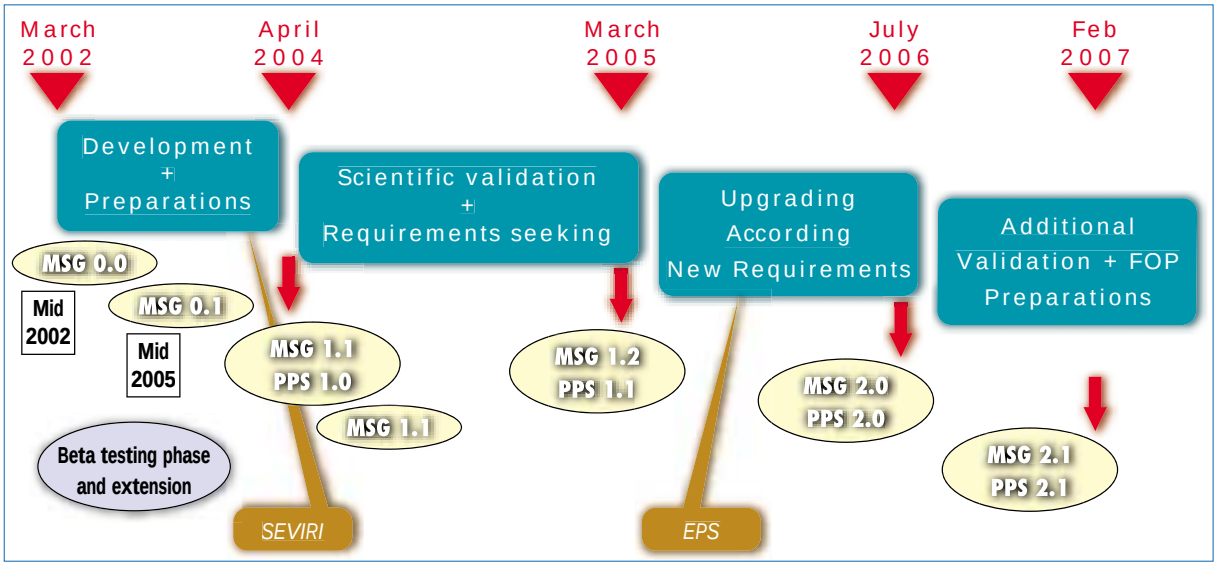


Figure 1: opposite shows the Initial Operations Phase Scheduler.

Since November 2004, the MSG 1.1 version has been distributed to users in 22 different countries. This new version is compatible with Linux and Silicon Graphics IRIS.

In March 2005 version MSG 1.2 will be distributed. This version will improve the quality of the products. From then on, requirements and proposals from the users to develop new products will be considered and executed.

Meanwhile, the EPS (European Polar System) will begin with the METOP 2 programme (note that METOP 1 has never been launched). Also the development of the PPS is being realised with the NOAA data. In July 2006 a new update including the new requirements will be distributed within MSG 2.0. At the end of 2006 a new update of the PPS will be distributed. The project will conclude with MSG 2.1. Figure 2 below summarizes the products developed by the different countries involved in the project.

Cloud products (1,2,3) have been developed at Météo-France in Lannion. Precipitation products (4 & 5) have been developed in Sweden and Spain respectively. Air Mass products have been developed in Spain (6, 7 & 8) and Austria (12). The wind product (9) comes from Spain. The Thunderstorm product (11) comes from Météo-France, Toulouse. The automatic satellite image interpretation is an Austrian product. Sweden is in charge of the PPS part.

Cloud products	• Cloud Mask (CMa, 1) • Cloud Type (CT, 2) • Cloud top Temperature & Height (CTTH, 3)	• Cloud Mask (CMa, 1) • Cloud Type (CT, 2) • Cloud top Temperature & Height (CTTH, 3)
Precipitation products	• Precipitating Clouds (PC, 4) • Convective Rainfall Rate (CRR, 5)	• Precipitating Clouds (PC, 4)
Air mass products	• Total Precipitable Water (TPW, 6) • Layer Precipitable Water (LPW, 7) • Stability Analysis Imagery (SAI, 8) • Air Mass Analysis (AMA, 12)	
Wind product	• High-Resolution Winds (HRW, 9)	
Thunderstorm product	• Rapidly Developing Thunderstorms (RDT, 11)	
Conceptual Models product	• Automatic Satellite Image Interpretation (ASII, 12)	

The following figures show several examples of the products available.

Cloud products

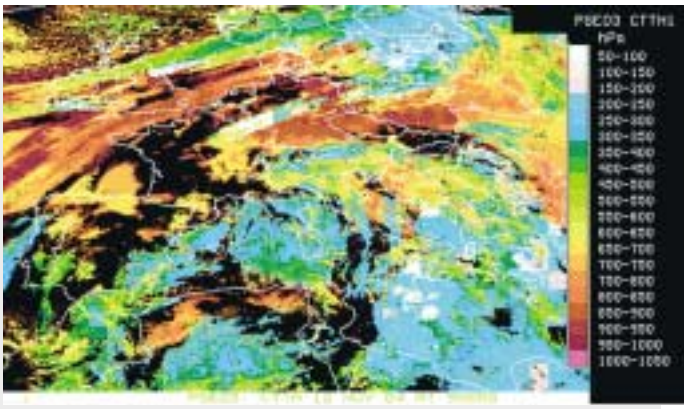


Figure 3: Cloud Mask (Cma)

Delineate all cloud-free pixels in a satellite scene with a high confidence. The product also provides information on the presence of snow/sea ice, dust clouds and volcanic plumes.

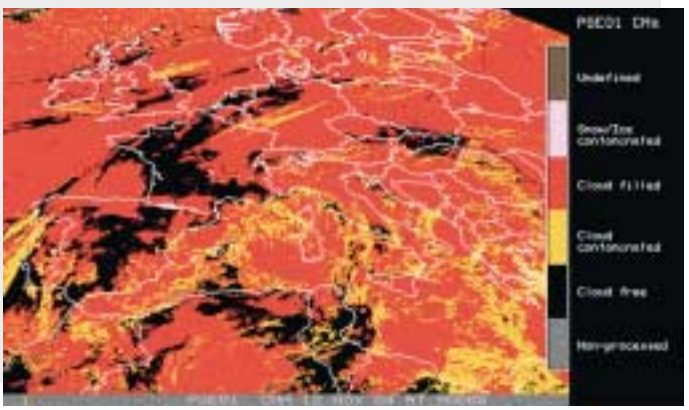


Figure 4: Cloud temperature and Heigh (CTTH)

Contains information on the cloud top temperature and height for all pixels identified as cloudy in the satellite scene.

Cloud products

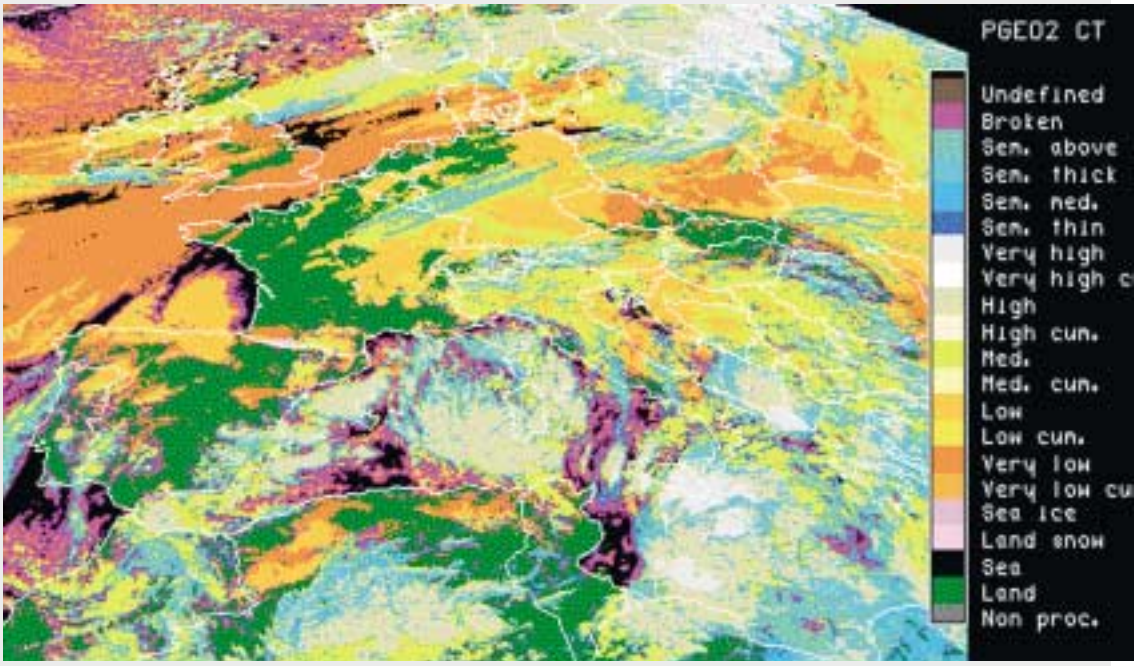


Figure 5: Cloud Type (CT)

Detailed cloud analysis with information on the major cloud classes : fractional clouds, semi-transparent clouds, high, medium and low clouds (including fog) for all the pixels identified as cloudy in a scene.

Precipitation products

Figure 6: Precipitating Clouds

Probability of precipitation intensities in pre-defined intensity intervals.

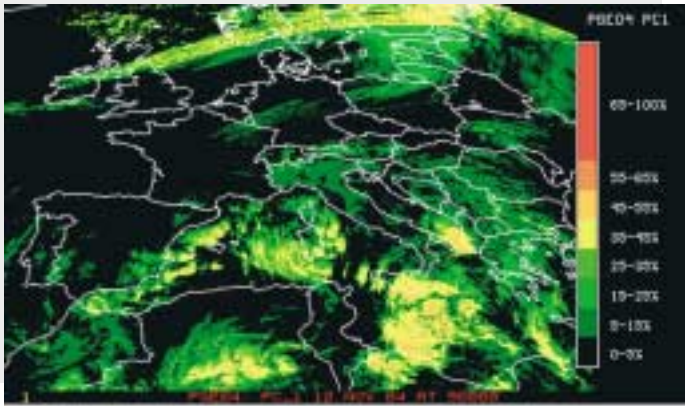


Figure 7: Convective Rainfall Rate (CRR)

Precipitation estimated rate associated to convective clouds. The final output is a numerical calibrated product (in mm/hr) divided into classes in an image format.

Air mass products

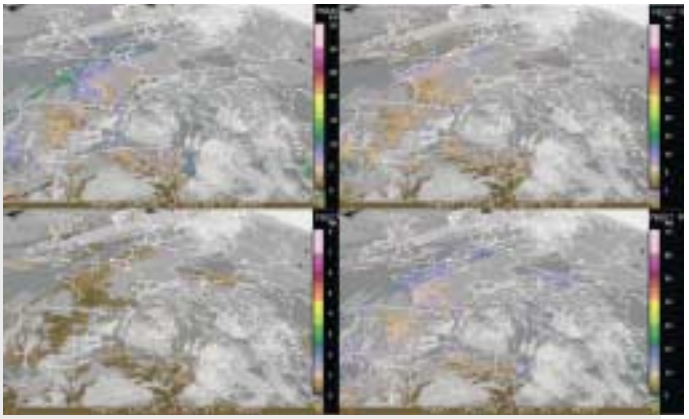


Figure 8: Total Precipitable Water (TPW)

Total amount of liquid water, in mm, if all the atmospheric water vapour in the column from the Earth's surface to the "top" of the atmosphere were condensed.

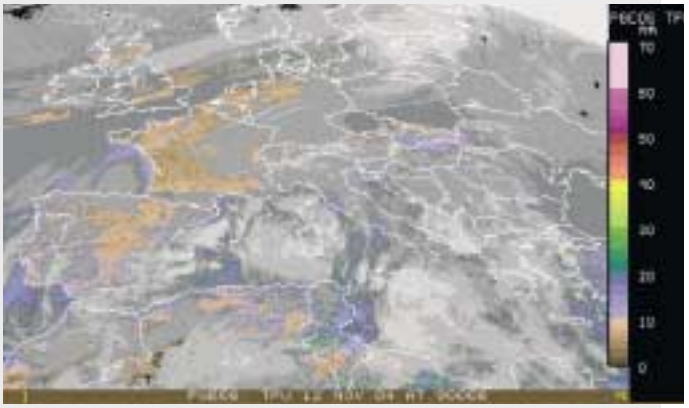


Figure 9: Layer Precipitable Water (LPW)

Water vapour contained in a vertical column of unit cross-section area in three layers in the troposphere: Low Layer (>840HPa), Middle Layer & High Layer (<437hPa). TPW is provided for validation purposes.

Figure 10: Stability air Imagery (SAI)

Provide estimations of the atmospheric instability in cloud-free areas. Among all stability indexes, Lifted Index (LI) has been chosen.

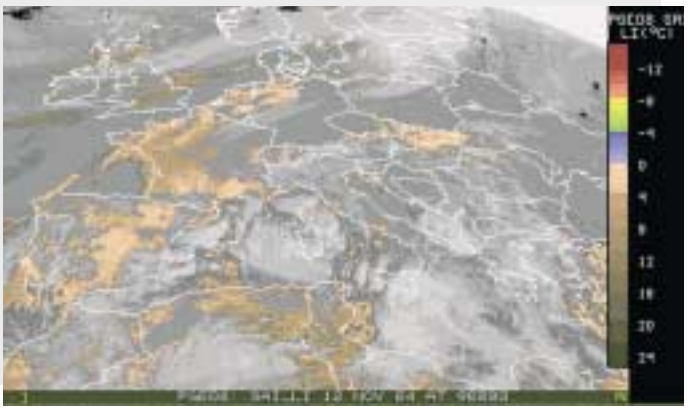
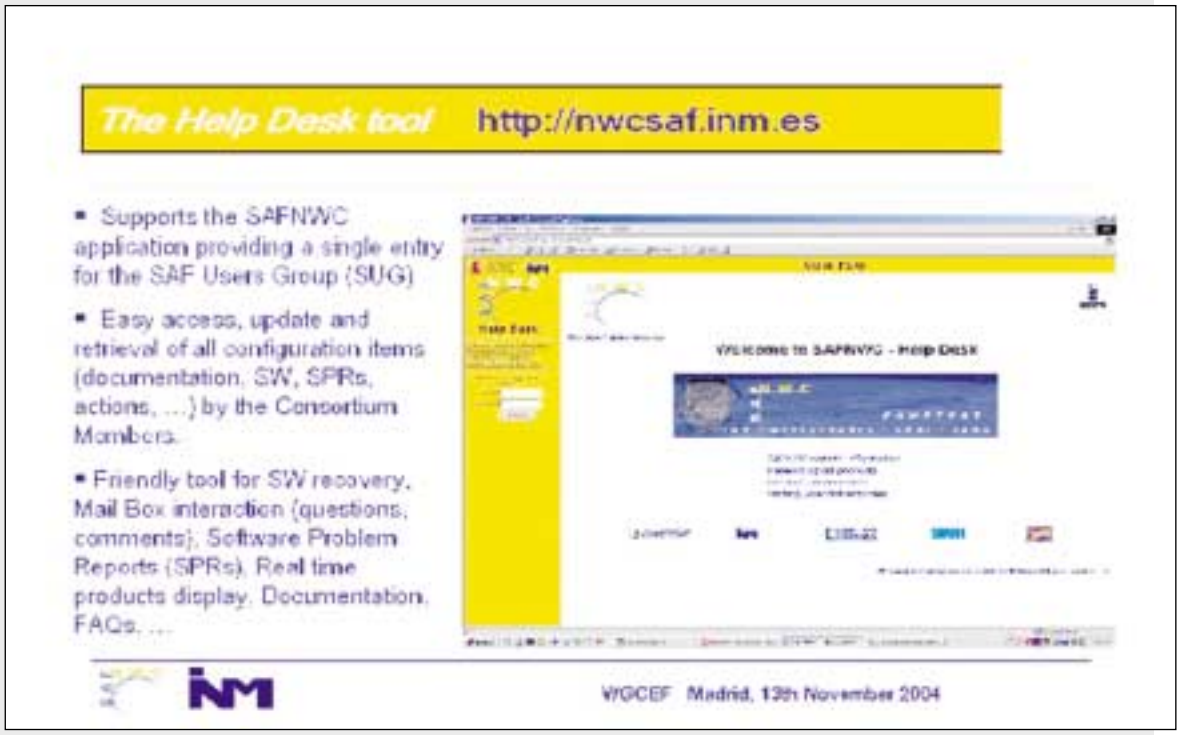


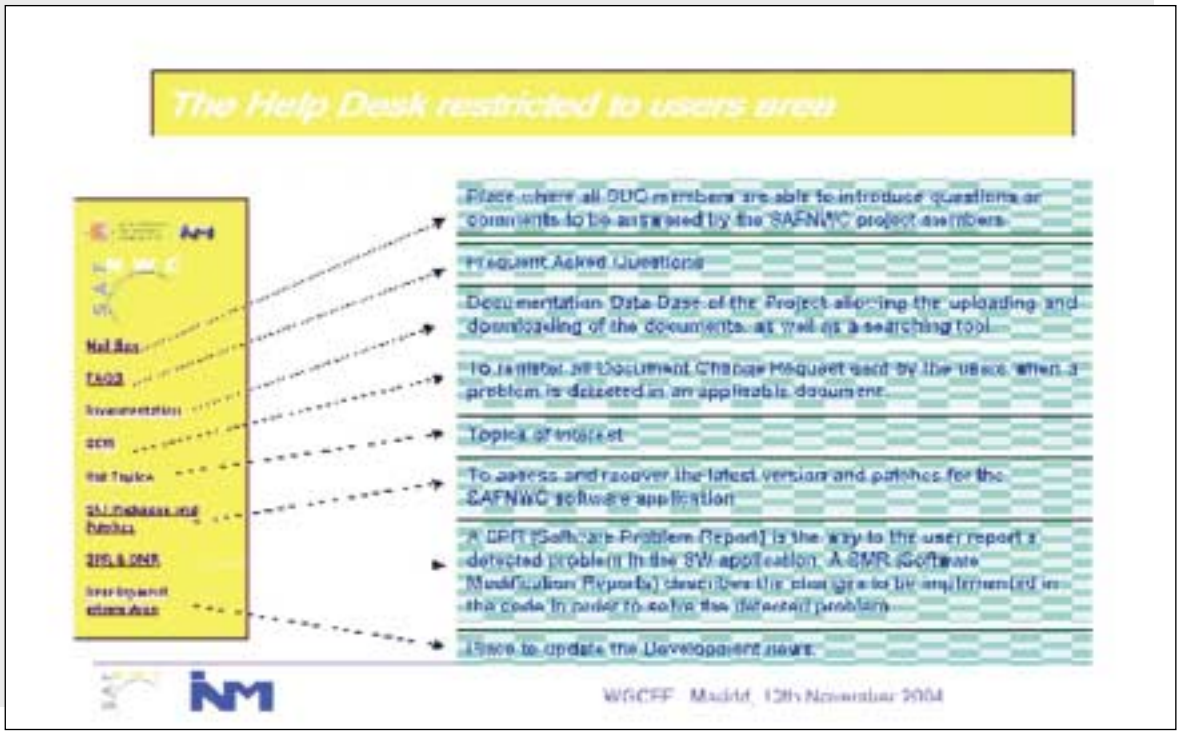
Figure 11: Air Mass Analysis (AMA)

Evaluates basic quantities describing air masses (upper and middle level humidity, mean temperature, atmospheric stability, cloud pattern, etc) to combine them into one integrated classification of the air mass.

Help Desk

The figures 12 below explain the use of the Help Desk





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