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MetOp - the low-orbit weather scout

13 July 2006

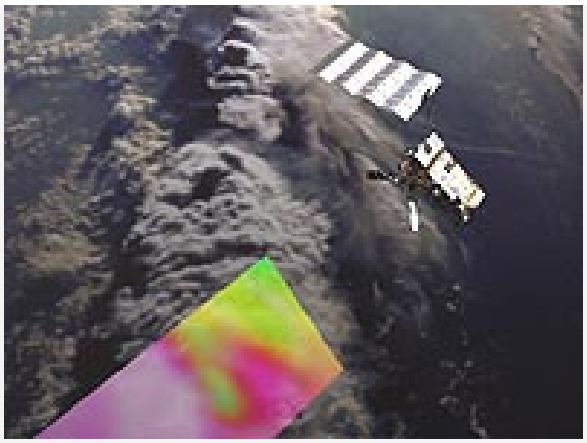
The new MetOp weather satellite

+++ Launch delayed +++ Read more news at www.esa.int/metop +++

The new European weather satellite MetOp will travel from pole to pole. From its low orbital path just 817km above Earth, it can collect more data than any weather satellite that went before it. MetOp is expected to make long-term weather forecasting much more accurate. On 17 July 2006, a Russian Soyuz-Fregat rocket will blast the satellite into space.

Needless to say, the new European weather satellite MetOp (Meteorological Operational Satellite Programme) won't make the weather any better. But it will help us to prepare for it sooner.

"With MetOp, meteorologists will be able to issue reliable five-day forecasts rather than the current three-day forecasts," says Dr Helmut Staudenrausch from the German Aerospace Center (DLR), which advises the Federal Ministry of Transport, Building and Urban Affairs (BMV) on the development and operation of weather satellites. In Germany the Federal Ministry of Defence is responsible for EUMETSAT, the European organisation for the use of meteorological satellites, which will now operate MetOp alongside the geostationary Meteosat satellites.



More data from polar regions

At a height of just 817km, MetOp will circle Earth from pole to pole, scanning a 2000 kilometre-wide strip of the planet's surface. The satellite will take about 100 minutes to make one complete orbit of the planet. Its orbital path will always be at the same angle to the Sun, while Earth rotates below it.

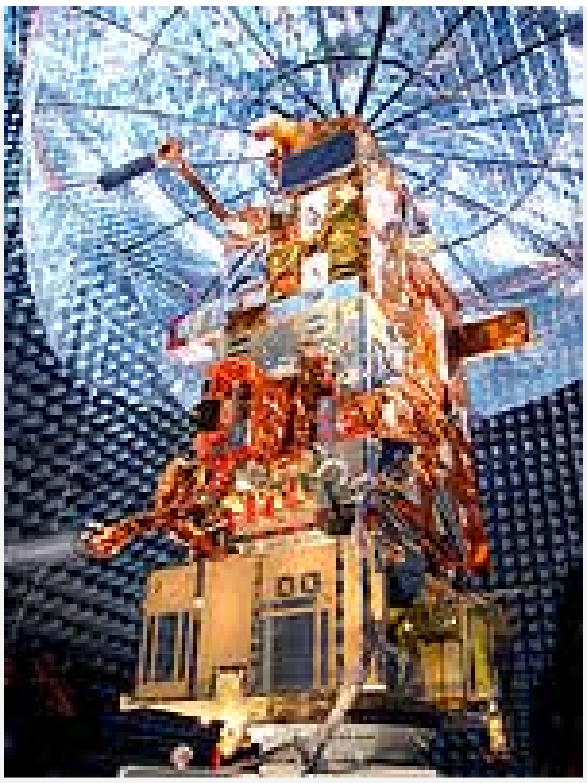
This means that MetOp always crosses the equator at the same local time. While the geostationary Meteosat satellites, which 'hover' 36 000km above the equator, transmit a new image every 15 minutes, MetOp takes five days to scan every point on Earth's surface with all its instruments. But from its low height, the new weather satellite will have a very accurate view of our planet and the atmospheric layers above it.

"The data from MetOp will be especially important for numerical weather forecasting. The more accurately we know the distribution of moisture and temperature in the atmosphere, for example, the better we can calculate future weather," says Dr Helmut Staudenrausch. In other words, MetOp is mainly responsible for longer-term forecasts and less concerned with the question of whether there is likely to be a storm in the next few hours. Forecasting of this type isn't just important for the owners of beer gardens or people who are planning a garden party at the weekend. For farmers and power station operators, accurate weather forecasts can save hard cash.

Collaboration between EUMETSAT and NOAA - transatlantic teamwork

EUMETSAT and NOAA working together

Data from the new satellite will be used by national weather services worldwide. Uwe Kirsche, from the German National Meteorological Service (DWD), believes that MetOp will make it easier for meteorologists to accurately predict bad weather in particular: "Most of our low-pressure systems form out over the North Atlantic. With the data from MetOp, we will have a better idea of what kind of weather is brewing in this region." Up till now, weather data from this region has been relatively scarce. The geostationary weather satellites are directly above the equator and only have an oblique view of the polar region and the North Atlantic. Meteorologists can't even resort to other data sources from this region: although there are numerous weather stations on dry land, in the North Atlantic there are only a few weather buoys to transmit their data to the weather stations.



MetOp at EADS in Toulouse

24-hour observation of Earth from low orbit is provided by a collaboration between EUMETSAT and the American National Oceanic and Atmospheric Administration (NOAA). The satellites of each organisation orbit on a staggered schedule, so that they complement one another. A NOAA satellite starts its first flyover at 5.30am and MetOp takes over observation duties at 9.30am. At 1.30pm, another NOAA satellite passes overhead. The two organisations have agreed on a shared core payload so that meteorologists can better compare the satellite data. Four instruments (AVHRR, AMSU-A, MHS and HIRS) on board the 4300kg MetOp satellites are identical to those installed on the NOAA satellites.

MetOp won't just gather meteorological and climate data but will also monitor atmospheric pollution. The Global Ozone Monitoring Experiment (GOME-2) measures the level of ozone in the upper layers of the atmosphere and also provides information on the gases sulphur dioxide (SO2), bromine oxide (BrO), formaldehyde (CH2O) and chlorine dioxide (OClO). In addition to its main task of measuring temperature and moisture profiles, the Infrared Atmospheric Sounding Interferometer (IASI) also provides data on ozone and the greenhouse gases CO, CH_4 and N_2O.

Passing the baton in space

Europe’s first polar-orbiting weather satellite is a joint project of the European Space Agency (ESA) and EUMETSAT. ESA is responsible for building the weather satellite and launching it into space. On the second day in space, EUMETSAT will take over operation of the satellite until the end of the mission. As well as meteorologists, climate researchers should also be able to receive data from MetOp until at least 2019, providing them with the long-term measurements they need. Because a satellite in space usually only lasts about five years, ESA has another two identical MetOp satellites ‘in stock’. These new satellites will replace their predecessors at five-year intervals.

Related Contacts

DLR Corporate Communications
Tel: +49 2203 601-2116

Fax: +49 2203 601-3249
E-Mail: kommunikation@dlr.de

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