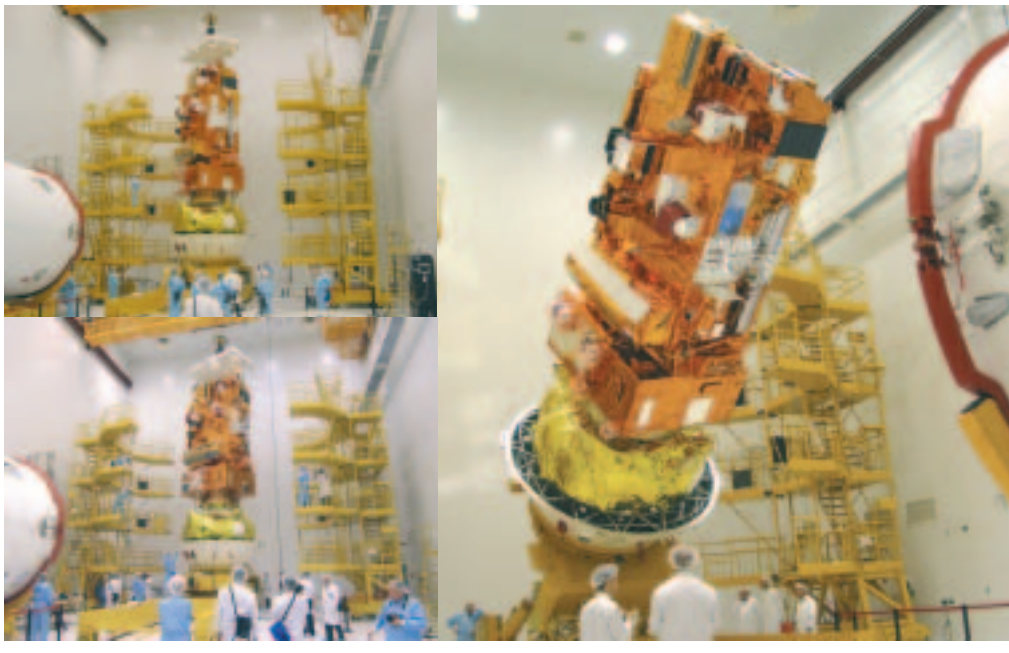
MetOp Poised for Orbit

Europe's First Polar-Orbiting Weather Satellite



The launch campaign for the MetOp-A satellite is the culmination of a long series of successful ESA meteorological efforts and collaboration with Eumetsat. Started in 1971, ESA's Meteosat programme launched Europe's first operational weather spacecraft, Meteosat-1, in 1977. The satellite and its successors met or exceeded all expectations and paved the way for the creation of the operational satellite organisation, Eumetsat, which opened its doors in 1986.

Meteosat has enormous advantages in terms of coverage from its fixed position over the equator in geostationary orbit. However, the 36 000 km altitude prevents detailed measurements of the atmosphere, especially for the much-needed temperature and humidity profiles. Indeed, the need for these measurements was recognised by the international community of meteorologists in the late 1960s, who initially advocated a low-orbit satellite instead of Meteosat.

The US had long understood the importance of meteorology from low polar orbit, and started its series of operational Tiros satellites in 1960, launched by NASA. This series of operational satellites is now in its fifth decade, and the US National Oceanic & Atmospheric Administration (NOAA), following its creation in 1970, has incorporated them into its Polar Environmental Satellite (POES) programme. Notably, NOAA has freely provided the data from these satellites to the international community over the last 45 years. The European meteorological community increasingly recognised this and determined that it should play its part in the provision of data from polar orbit.

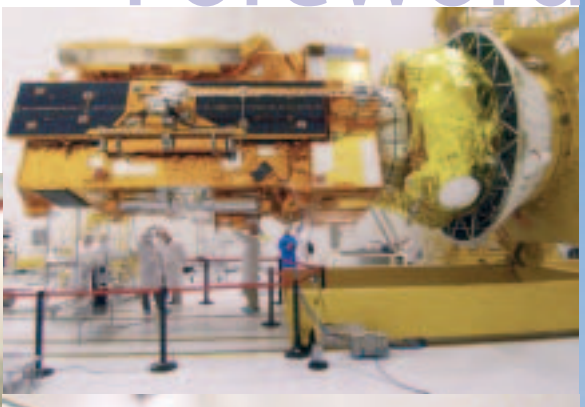
In the late 1980's, ESA began developing the Polar Orbit Environmental Mission (POEM), based on a very large platform carrying both Earth-observation instruments and an operational meteorological package corresponding to that flown on POES. POEM proved an inappropriate vehicle for an operational mission, and it was decided at the Ministerial Council in Granada in 1992 to split the payload across two satellites: the pre-operational observation instruments on Envisat, and the operational meteorological package on the dedicated MetOp.

This pivotal decision led to the preparatory programmes in ESA and Eumetsat. Largely following the model established for the Meteosat Second Generation (MSG), a cooperative programme was built so that ESA developed the MetOp satellite and Eumetsat was responsible for the overall operational system. Notably different from MSG was the provision of the instruments via a variety of partners: CNES, NOAA-NASA, ESA and Eumetsat.

The MetOp development programme (Phase-C/D) kicked off in 1998, aiming at a first launch in 2003 in a series of three. Despite a multitude of delays from development and production difficulties in the externally-provided instruments, the first spacecraft, MetOp-1, achieved flight acceptance in June 2004, albeit with a payload complement that was not fully flight-standard.

Via a complex set of rearrangements and interleaving of the three satellite integration campaigns, it proved possible

Foreword



to mitigate these delays, and the resulting cost impacts were well within the programme margins established in ESA and Eumetsat. As a result of this juggling, the first to be launched was MetOp-2; MetOp-1 is slated for 2010, and MetOp-3 for 2015. In order to avoid the inevitable confusion, the satellites were redesignated in line with the launch order: MetOp-A, MetOp-B and MetOp-C.

MetOp will provide a real advance in the quality and range of data to meteorologists, improving the output from weather prediction models and thus forecasting. This is thanks to a notable improvement in the accuracy and resolution of vertical atmospheric sounding for temperature and humidity afforded by the IASI infrared sounder and the GRAS occultation sensor. These, together with the heritage POES instruments, will allow MetOp to play its ample part in the International Joint Polar System, where it will take over from the NOAA spacecraft in the mid-morning orbit.

In addition to its operational meteorological role, MetOp will make a valuable contribution to climate monitoring, particularly from the ASCAT sea-surface wind scatterometer, and the GOME-2 ozone and trace-gas spectrometer.

The launch of MetOp will mark the start of a new era in European satellite meteorology. It will be extended with the follow-on system for MetOp (Post-EPS) and the Meteosat Third Generation mission, already in preliminary definition.

The highly successful cooperation between ESA and Eumetsat in meteorology paves the way for future cooperative endeavours, such as the Global Monitoring for Environment and Security (GMES) with the European Commission. ESA is developing the GMES space component to support European environmental and security policies. Eumetsat will take part in the system with its own satellites and is expected to be the operator for the GMES atmosphere and ocean services.

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Launch vehicle problems halted three MetOp-A launch attempts on 17–19 July. The latest news on MetOp and its mission can be found at www.esa.int/metop