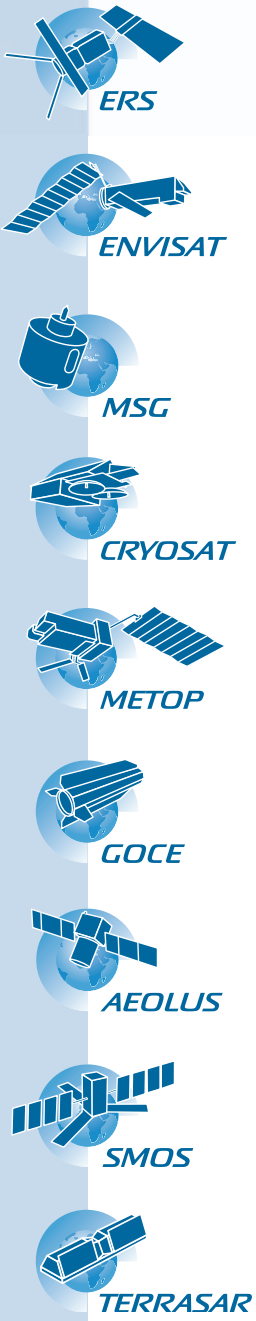
PROJECT news



ERS

Launched: April 1995

ERS-2 again proved to be a very robust satellite throughout 2002, providing high-quality data to the scientific and commercial user communities, supporting the Envisat calibration and validation campaign, and helping civil protection agencies by providing data on natural disaster zones. The current exceptionally good payload and platform performance bodes well for several more years of satellite operation. The satellite is now operating in a new no-gyro mode and tests have confirmed good performance in this new mode.

The ERS archive now contains more than 11 years of continuous data (nearly 1 million high-rate scenes) and 7 years of global atmospheric measurements provided by ERS-2. The commercial demand for the high-rate imagery products increased by some 70% in 2002, to more than 16 000 scenes per year.

ENVISAT

Launched: March 2002

Launched on 1 March by an Ariane-5, Envisat reached its final orbital position on 3 April 2002, and since then has been orbiting in its assigned 35-day repeat cycle, 30 minutes ahead of ERS-2. Both satellites are controlled to fly over the same ground track with ±1 km accuracy.

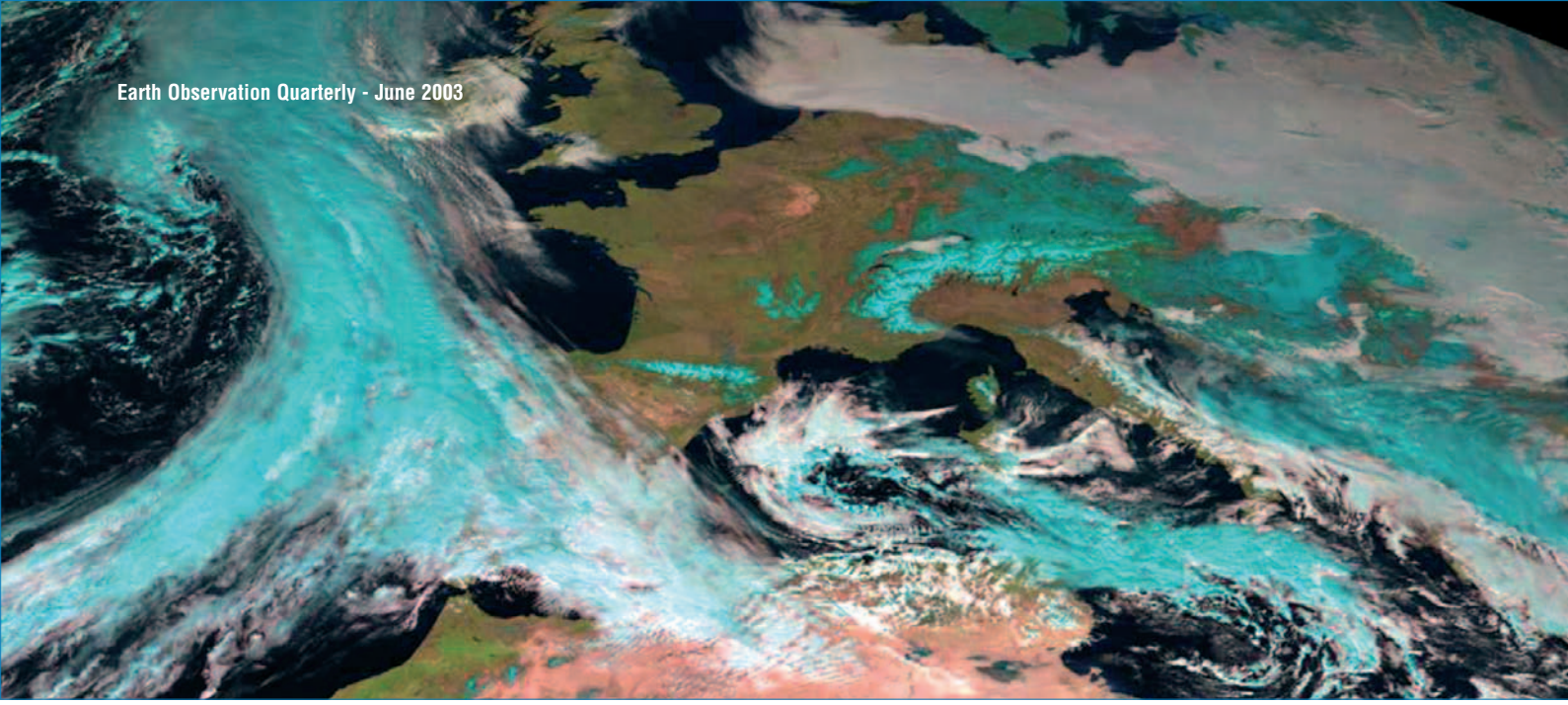
During the first weeks of the mission, all of the satellite's instruments were progressively switched on. The Commissioning Phase continued with the verification of all instrument modes. The Calibration Review in early September confirmed that all instruments were operating nominally, with very stable performance.

The Envisat mission has been operating without the Artemis data-relay satellite until March 2003, resulting in a very high workload for the Kiruna (S) ground station, which was having to handle the recovery of the full global mission (involving 14 orbits per day). The ad-hoc installation of a reception/transmission capability in Svalbard (N) provided an improvement in ground-segment performance from early November. Despite some early problems with Payload Data Segment (PDS) performance, the calibration/validation teams had received sufficient data to allow a successful Calibration Review in September and for the Validation Workshop in December. These events highlighted the Earth Science community's enthusiasm for the quality of the data being provided by all of Envisat's instruments.

METEOSAT SECOND GENERATION (MSG)

Launched: August 2002

After an extensive System Validation Test, a Readiness to Ship Review in March released MSG-1 for transport to Kourou for launch on an Ariane-5 vehicle fitted with



three special shock-attenuation devices. After its successful launch on 28 August and excellent injection into Geostationary Transfer Orbit (GTO), the satellite was thoroughly checked out and moved, by means of three burns of its liquid apogee motor, to its final orbital position. ESOC then handed over control of the satellite to Eumetsat for the commissioning phase, which will last until March 2003.

The first images from the Spinning Enhanced Visible Infrared Radiometer (SEVIRI) and the Geostationary Earth Radiation Budget (GERB) instrument have proved to be of excellent quality. The launch of MSG-1 took place during the Johannesburg World Summit on Sustainable Development, which provided an excellent opportunity to demonstrate the benefits of Earth-observing systems for sustainable development, particularly for the African continent given the satellite's equatorial location.

Following MSG-1's launch, mentioned above, the second Meteosat Second Generation flight unit, MSG-2, was taken out of storage in September and its spacecraft environmental acceptance tests were successfully completed in December. The MSG-3 subsystems and the MSG-1 engineering model remain in storage. In parallel with these activities, the final negotiations with industry for the procurement of a fourth flight unit (MSG-4) were initiated.

MetOp

Launch: Fourth quarter 2005 (MetOp-1)

The integration activites on the first flight model continue, with the start of the MetOp-1 satellite integration and test activities having been achieved. Work at Payload and Service Module level is continuing at full speed for MetOp-2 and -3.

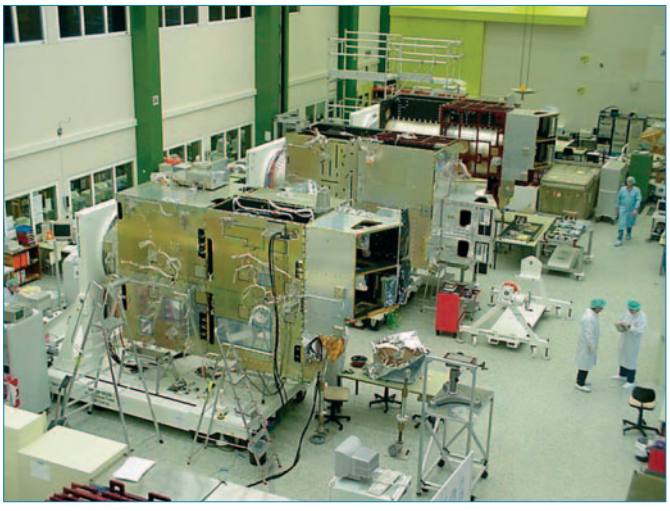
The Satellite Qualification Review was being held in this period and was aimed at evaluating the results of the important module level testing to examine the preparation of the satellite level integration and to check the qualification status of all elements of the design. The results were very successful, with only some issues of "normal work" remaining to be solved.

In parallel, EUMETSAT have performed their own Critical Design Review on the overall Polar System. ESA, and the MetOp team, actively supported the review.

The first flight model of IASI is now well into its acceptance cycle, with the delivery to MetOp foreseen in the summer. A number of problems have been identified in this process, e.g. with the (redundant half) of the corner cube mechanism, and the acoustic sensitivity of the laser sub-system. The way forward on these issues is being investigated.

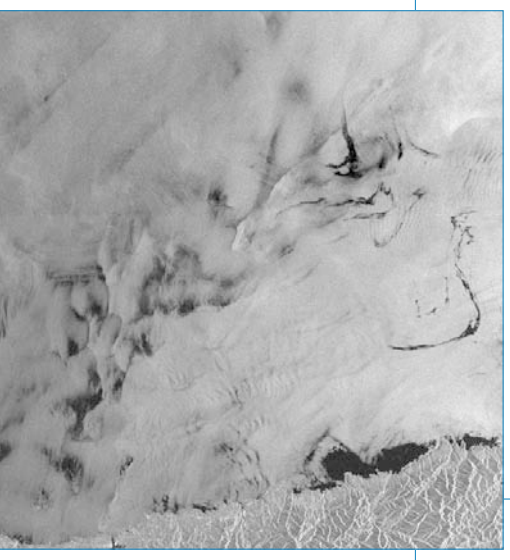
The second flight model of GOME-2 has just been delivered to MetOp. One performance issue has now been identified which points towards a degradation of the gratings used in the instruments. The cause of this is not yet clear, but the solution to the problem may required a subsequent retrofit.

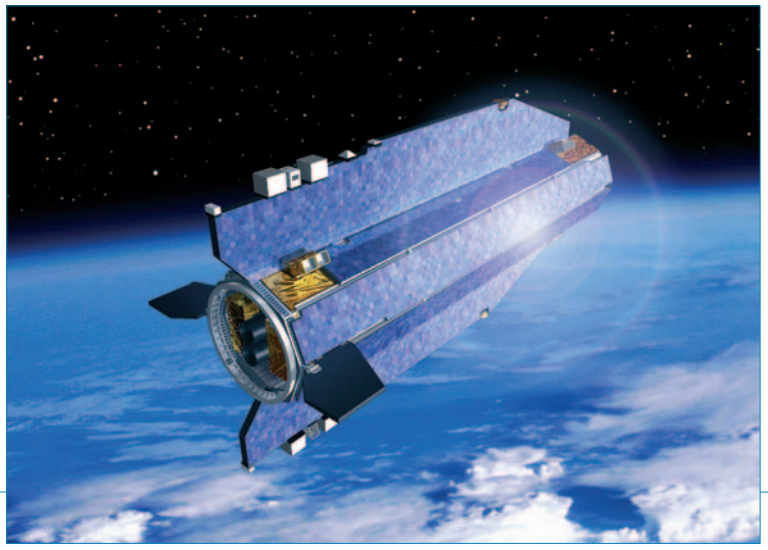
The GRAS instrument continues to make progress, albeit rather slowly. The antenna metallization issue has been resolved, by the selection of gold to replace the silver previously used.



Left: All three METOP PLM flight models simultaneously in the Astrium's Friedrichshafen clean room facilities.

Above: Image by MSG-1 on 12 February 2003 (Courtesy of Eumetsat)

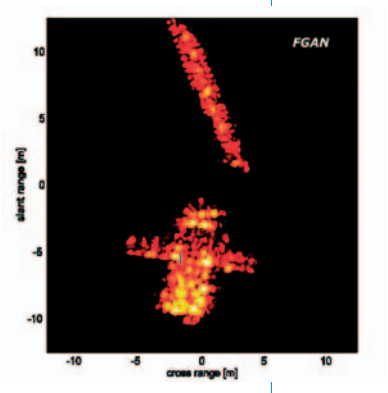




Above: ERS SAR acquisition of 22 December 2002 (orbit 40114). The rightmost dark area is with high probability an oil slick. The image is over Galicia and Asturias regions

Right: Artist's impression of Goce

Radar image of Envisat taken by FGAN TIRA ground based radar in Wachtberg Germany (Courtesy of FGAN)



Failure of the AMSU and HIRS instruments during the MetOp environmental testing has required their return to the U.S., where the problems are being investigated and repaired.

EUMETSAT and NOAA have recently agreed a "Joint Transition Agreement" which deals with the respective roles of the NPOESS system and EPS/METOP in the 2010 time frame. The agreement preserves a strong role for Europe in respect of the infrared atmospheric sounding mission in the morning orbit. Steming from this agreement is a possibility to have a rapid relaunch capability for MetOp, in case of a launch or early orbit failure. This concept is being evaluated.

InfoTerra/TerraSAR and Fuegosat

The consolidation phases for the InfoTerra/TerraSAR and the Fuegosat Earth Watch elements, approved at the Ministerial Council in Edinburgh in November 2001, were started.

The InfoTerra/TerraSAR mission is designed to provide geo-information services for institutional and commercial users exploiting data mainly from L- and X-band synthetic-aperture radars operating from two satellites - TerraSAR-L and TerraSAR-X - flying in tandem. The consolidation phase is addressing all aspects of the mission architecture. It encompasses, in particular, a Phase "B" of the TerraSAR Space and Ground Segment, which is now being initiated.

Fuegosat is a demonstrator mission for a future Fuego constellation, aimed at providing early forest-fire warning and monitoring in the Mediterranean region and at similar latitudes across the rest of the world. The initial consolidation-phase actions are to refine the mission and system concepts and learn from the precursor German BIRD mission.

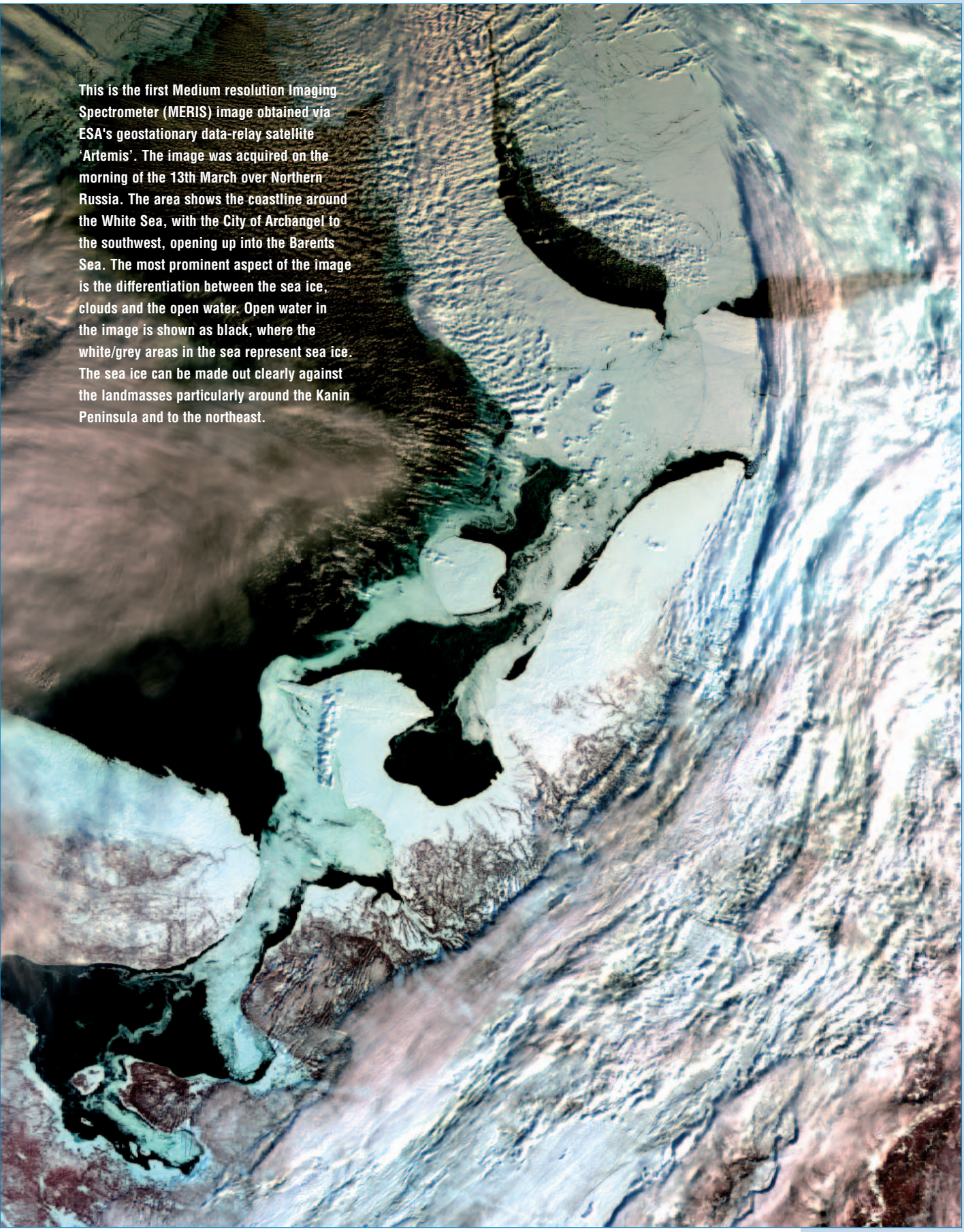
EARTH EXPLORERS

The Earth Explorer Missions are research/demonstration missions intended to advance our understanding of the Earth's environment and to demonstrate new observing techniques. They are part of the Agency's Earth Observation Envelope Programme (EOEP), and can either be large missions labelled Core missions, or smaller missions, the Opportunity missions.

CryoSat

Launch: Second half of 2004

CryoSat is an Opportunity mission designed to measure thickness variations in the polar ice sheets and the thickness of floating sea ice. Its data are to be used to study the mass balances of the Antarctic



This is the first Medium resolution Imaging Spectrometer (MERIS) image obtained via ESA's geostationary data-relay satellite 'Artemis'. The image was acquired on the morning of the 13th March over Northern Russia. The area shows the coastline around the White Sea, with the City of Archangel to the southwest, opening up into the Barents Sea. The most prominent aspect of the image is the differentiation between the sea ice, clouds and the open water. Open water in the image is shown as black, where the white/grey areas in the sea represent sea ice. The sea ice can be made out clearly against the landmasses particularly around the Kanin Peninsula and to the northeast.

Mock-Up of ADM-Aoelus

and Greenland ice sheets, to investigate the influence of the cryosphere on global sea-level rise, and to provide important observations of sea-ice thickness for use in Arctic and global climate studies.

The project is now in the middle of the main development phase (Phase-C/D) and some items of flight-model equipment have already been delivered to Astrium GmbH (D), the satellite prime contractor. Development of the ground segment is progressing according to plan.

GOCE

Launch: February 2006

The Gravity Field and Steady-State Ocean Circulation (GOCE) mission is the first Earth Explorer Core mission. Its two main instruments - the Electrostatic Gravity Gradiometer (EGG) and the Satellite-to-Satellite Tracking Instrument (SSTI) - will deliver data that will enable scientists to derive unique models of the Earth's gravity field on a global scale and with unprecedented accuracy and spatial resolution.

GOCE passed several important milestones in 2002, the most important one being the successful conclusion of the Space Segment Preliminary Design Review in April.

The year also saw the continued build-up of the industrial consortium through a competitive selection process for all equipment contracts, with authorisation to industry to proceed with space-segment development (Phase-C/D) having been given in May. The Ground Segment Requirements Review was successfully concluded in November.

ADM-Aeolus

Launch: October 2007

The Atmospheric Dynamics Mission (ADM) is an Earth Explorer Core mission that will provide global wind profiles throughout the atmosphere up to 16 km altitude. The measurements will be made by a Doppler wind lidar operating in the ultraviolet.

It will be the first time ever that wind profiles have been measured from space and this experimental mission is expected to show the great usefulness of complete wind data sets for Numerical Weather Forecasting. The resulting time series of measured wind fields will also be useful for studies of climate and the transport of chemical species and energy.

The industrial contract was kicked-off with Astrium Ltd. (UK) as prime contractor on 1 July 2002. Astrium SAS in Toulouse (F) is the subcontractor selected to develop the instrument, and Astrium GmbH in Friedrichshafen (D) is subcontracted for the platform's electrical subsystems. The satellite's design, which has been consolidated around a 1.5 m-diameter telescope, is already sufficiently advanced to allow the Invitations to Tender (ITTs) for the majority of the onboard subsystems and equipment to be issued in early 2003.

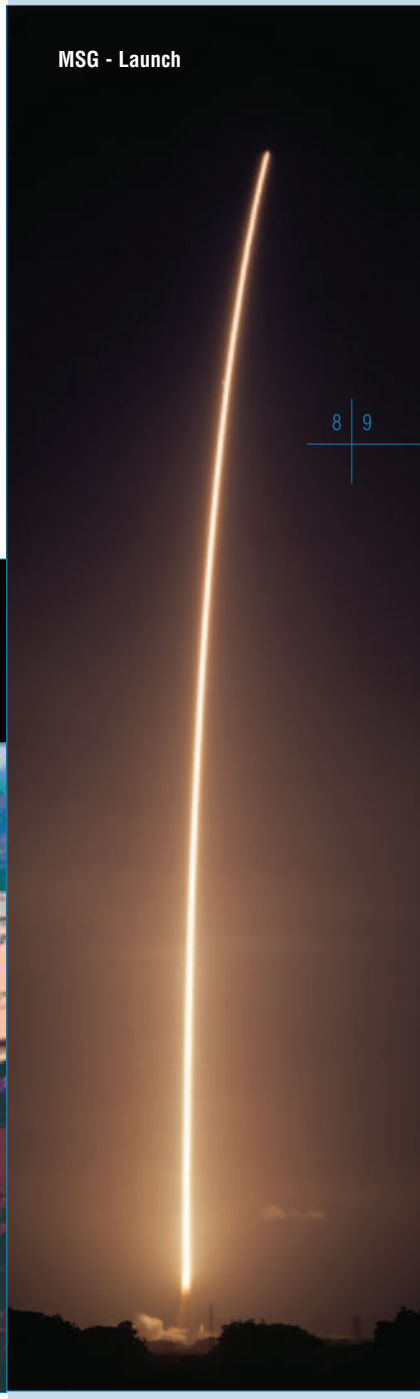
SMOS

Launch: Early 2007

The Soil Moisture and Ocean Salinity (SMOS) is an Opportunity mission that will observe two key variables of the Earth's system, namely soil moisture over land and salinity over the oceans, to advance the development of climatology, meteorology and hydrological models. It will also provide new insight into snow and ice structure, thereby helping to advance our understanding of the cryosphere.

SMOS re-uses the generic Proteus platform developed by CNES, accommodating an innovative instrument designed as a two-dimensional interferometer acquiring brightness temperatures at L-band (1.4 GHz). The promising results of Demonstrator Pilot Projects, funded by the ESA Technology Research Programme and led by EADS-CASA (Spain), to consolidate this novel instrument technology enabled the SMOS project to enter its main design and development phase (Phase-B) in November.

Artist's impression of SMOS (Photo: CNES/MIRA Production)



MSG - Launch