

ESOC and The Stations



The Establishment

ESOC was again a magnet for many visitors, attracting more than 3500 during a single event, the *'Long Night of the Stars'*, attended by Mrs Edelgard Bulmahn, the German Minister of Education, Science and Research. On this, her second visit to ESOC in 2004, she took the opportunity to announce the German Government's decision to purchase a plot of land in the immediate vicinity of the current site and make it available for an extension of ESOC, signalling strong political support for ESA and space activities in Germany.

The ESOC crèche was inaugurated at the end of September, representing an important milestone in the implementation of ESA's Policy on Equal Opportunities and Gender Diversity. Further building works completed during the year included an extension to the Operations Control Centre to accommodate a new Navigation Facility, and remodelling of the reception area in the building that houses the ESOC conference facilities.

Several important workshops took place at ESOC during the year, including an international TT&C workshop, an EGOS workshop, and a Galileo Information Day. The latter was an initiative of the Regional Government of Hesse as a means to promote the development of European navigation-system applications in this region of Germany.

The Control Centre

Several important changes were made at the ESOC Control Centre in 2004 in preparation for the challenging new missions, including the installation of dedicated facilities for Venus-Express, as well as for the Huygens landing on Titan. The existing Earth-observation Control Centre area, dedicated to ERS-2 and Envisat, has been considerably expanded in order to accommodate forthcoming missions such as CryoSat in 2005, GOCE in 2006 and ADM-Aeolus in 2007. A completely new facility, the Communications and Computer Centre (CCC) was also completed in 2004, allowing more efficient control of the operational IT infrastructure. Substantial efforts to improve the resilience of the control-centre systems and boost the capacity of the communications Local and Wide Area Networks are beginning to deliver results.

The new Navigation Facility infrastructure element that will support all current and future navigation activities consists of a control room with meeting and office space, and a computer infrastructure on ESOC's operational network. It will be used operationally for the first time in support of MetOp-1's GRAS experiment (GNSS Receiver for Atmospheric Sounding), and for other ESA and third-party projects, including high-precision orbit determination for Earth-observation mission science data exploitation



The ESOC Communications and Computer Centre (CCC)

(currently ERS-2 and Envisat) and GNSS-related activities. This new navigation facility therefore underwrites ESA's expertise in the field of Global Navigation Satellite Systems in support of a multitude of institutional and industrial users.

The Stations

The already high utilisation of the ESA worldwide network of stations in 2003 was surpassed in 2004, with more than 50 000 hours of tracking being provided to the various classes of missions using the ESOC facilities, including:

- Deep-space missions: Mars-Express and Rosetta through New Norcia
- Near-Earth missions: XMM-Newton, Clusters 1-4, Integral and SMART-1 through Kourou, Perth, Maspalomas and Villafranca
- LEO missions: ERS-2 and Envisat through Kiruna and Svalbard.

The upgrading of the station network continued with the addition of an X-band capability to the Perth station, and rapid progress in the construction of the Cebreros antenna at ESA's second deep-space facility. Substantial work was also completed at the Kiruna station, with the installation of a second 13 metre terminal and the redeployment of a modern multi-mission Monitoring and Control System. These upgrades ensure that the station network will be able to support the complete range of currently planned ESA missions fully independently.

Redu

Redu continued to serve as the prime TT&C (Telemetry, Tracking and Command) station for the Integral mission. In-orbit-testing activities continued for both ESA projects and third-party missions, complementing the TT&C services offered. In addition to providing Artemis data-relay mission control for Envisat and Spot-4, the station successfully supported several commercial Artemis L-band mobile payload users. It was also connected to the ATV Control Centre in Toulouse (F) to interface with the Artemis data-relay feeder link antenna. Redu also completed three years of successful operation of Proba-1, ESA's first microsatellite launched to demonstrate new technologies for future European spacecraft, during which it has provided images of the Earth for both the scientific and educational communities.

Villafranca

ESA's Villafranca site in Spain (VILSPA) became the European Space Astronomy Centre (ESAC) in April. The station has continued to provide primary or backup TT&C support to a large number of ESA missions (Cluster, XMM-Newton, Integral, Envisat, ERS-2). Support was also provided to SMART-1 using the recently refurbished 12 metre parabolic antenna, which has been converted from C-band to the X- and Ka-bands in order to operate the KaTE experiment. The Double Star mission (DSP1 and DSP2 spacecraft) of the Chinese Space Agency and the Centre for Space Science and Applied Research have also been regularly supported. The XMM-Newton Space Operations Centre (SOC) and the ISO Dedicated Centre, both located at ESAC, performed perfectly throughout the year and activities associated with the development of the ESA Planetary Archives continued.

European Deep-Space Network

The construction of ESA's second deep-space ground station at Cebreros made very good progress. A major milestone was achieved on 24 November when the 35 m-diameter antenna



The 15 m antenna at the Kiruna ground station in Sweden

reflector was lifted onto its pedestal. All RF components have been delivered and integrated, and are now being commissioned. The target for operational readiness is end-September 2005, in order to support the Venus-Express mission.

International Cooperation

International cooperation between ESA and the national space agencies (CNES, DLR) in Europe has continued in the area of mutual network cross-support, notably with support to the French Helios-2A satellite using the Perth station for its LEOP operations, as well as with the preparation of further network activities for Syracuse-III A (CNES) and TerraSAR-X (DLR-Astrium).

An ambitious test involving Envisat and the Japanese DRTS spacecraft aimed at demonstrating the compatibility of the two systems and their ability to communicate in space in the Ka band was initiated with JAXA (Japan).

Several contacts have been made with China, particularly with the Chinese National Space Agency, the Xi'an Satellite Control Centre and the Beijing Institute for Tracking and Telecommunications Technology. In addition,

network support was provided to the two Chinese Double Star satellites using ESA's Villafranca station.

Last but not least, important Inter-Operability Advisory Group (IOAG) meetings took place between the World's major space agencies in 2004 to agree on the application of worldwide standards and the coordination of network evolution.



Lifting into position of the Cebreros 35 m antenna reflector on 24 November