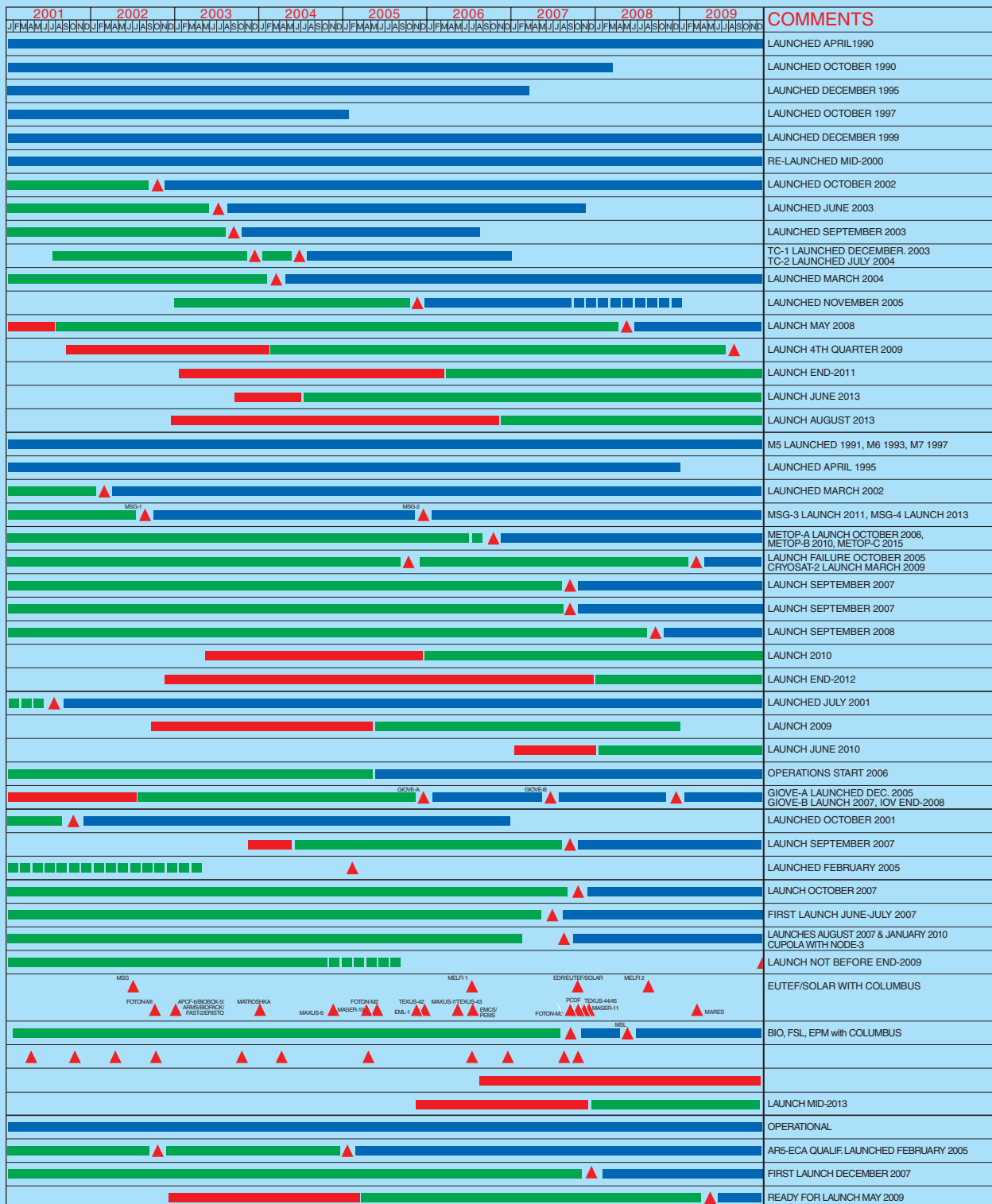


Programmes in Progress

Status end-September 2006



PROJECT	
SCIENTIFIC PROGRAMME	SPACE TELESCOPE
	ULYSSES
	SOHO
	HUYGENS
	XMM-NEWTON
	CLUSTER
	INTEGRAL
	MARS EXPRESS
	SMART-1
	DOUBLE STAR
	ROSETTA
	VENUS EXPRESS
	HERSCHEL/PLANCK
	LISA PATHFINDER
	GAIA
JWST	
BEPICOLOMBO	
EARTH OBSERVATION PROGRAMME	METEOSAT-5/6/7
	ERS-2
	ENVISAT
	MSG
	METOP
	CRYOSAT
	GOCE
	SIMOS
	ADM-AEOLUS
	SWARM
	EARTHCARE
COMMS./NAV. PROGRAMME	ARTEMIS
	ALPHABUS
	SMALL GEO SAT.
	GNSS-1/EGNOS
GALILEOSAT	
TECHNOL. PROG.	PROBA-1
	PROBA-2
	SLOSHSAT
HUMAN SPACEFLIGHT, MICROGRAVITY & EXPLORATION PROGRAMME	COLUMBUS
	ATV
	NODE-2 & -3 & CUPOLA
	ERA
	ISS SUPPORT & UTIL.
	EMIRELIPS
	MFC
	ASTRONAUT FLT.
	AURORA CORE
EXOMARS	
LAUNCHER PROG.	ARIANE-5 DEVELOP.
	ARIANE-5 PLUS
	VEGA
	SOYUZ AT CSG



- DEFINITION PHASE
- MAIN DEVELOPMENT PHASE
- STORAGE
- ▲ LAUNCH/READY FOR LAUNCH
- OPERATIONS
- ADDITIONAL LIFE POSSIBLE

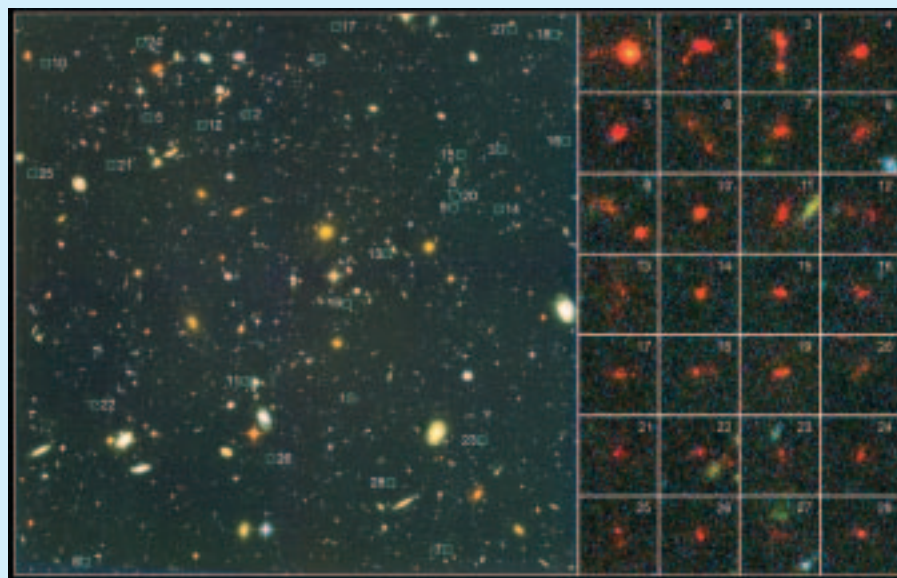
HST

A team of US and European astronomers analysing two of the deepest views of the cosmos made with the Hubble Space Telescope has uncovered a gold mine of more than 500 galaxies that existed less than a billion years after the Big Bang. This sample is the most comprehensive compilation of galaxies in the early Universe, researchers said. The discovery is scientifically invaluable for understanding the origin of galaxies, considering that just a decade ago early galaxy formation was largely uncharted territory. Astronomers then had not seen even one galaxy from when the Universe was a billion years old, so finding 500 in a Hubble survey is a significant leap forward for cosmologists.

Ulysses

On 6 October, Ulysses completed its 16th successful year in orbit. The spacecraft continues its climb to high southern latitudes with all subsystems and science instruments in good health. Science operations are currently being conducted according to a revised payload power-sharing plan. Largely as a result of the gradually improving thermal situation as Ulysses gets closer to the Sun, several instruments not in the core payload category have been able to acquire data for short periods (typically a month). These include the gamma-ray burst experiment and the solar wind electron sensor. Ground segment performance has been excellent, leading to an overall data return for the period of 98.6%. By the middle of November, the spacecraft will have reached 70°S solar latitude, marking the start of the third South Polar Pass.

One of the fathers of the Ulysses mission (and one of its longest-serving Principal Investigators), Johannes Geiss, recently celebrated his 80th birthday. Geiss is a world-leader in the measurement and interpretation of the composition of matter that reveals the history, present state and future of astronomical objects. A symposium



This Hubble image shows 28 of the more than 500 young galaxies uncovered in the analysis of two Hubble surveys. (NASA; ESA; R. Bouwens & G. Illingworth, University of California, Santa Cruz, USA)

devoted to these topics was held in September to honour him and celebrate his birthday. At that meeting, George Gloeckler, his Co-PI on the Ulysses Solar Wind Ion Composition instrument (SWICS), noted that Johannes Geiss was the first to measure the composition of the noble gases in the solar wind when, in the late 1960s, he flew his brilliant foil experiments on five Apollo missions to collect solar wind ions on the Moon. In recent years, Geiss, together with his colleagues on the SWICS team, has determined the isotopic and elemental composition of the solar wind under all solar wind conditions and at all helio-latitudes.

Geiss' quest to measure and understand the composition of matter is not limited to the solar wind, however. He has also played a key role in the *in situ* measurement of molecular ions in comets and the interpretation of these data, and in the study of the composition of plasmas in the magnetospheres of Earth and Jupiter. On behalf of the Ulysses team, we wish Johannes Geiss 'many happy returns' and many more scientific discoveries.

ISO

The 5-year ISO Active Archive Phase is due for completion in December 2006. This is the last phase of ISO, aiming at ensuring the

best use of the legacy provided by the first true infrared observatory in space, in close collaboration with active National Data Centres. Major releases of the ISO Data Archive included:

- the introduction of products derived from systematic manual processing of data, including queryable catalogues and atlases (Highly Processed Data Products). ISO will have about a third of its content populated with Highly Processed Data Products;
- the adoption of an innovative way to document quality information for each observation;
- the characterisation by object type;
- full integration into the Virtual Observatory.

ISO results continue to appear in the refereed literature and are clearly used to prepare proposals with other astronomical facilities. The *ISO Science Legacy* book was published, reviewing the most significant results from papers published until 2005. Over 1380 refereed papers based on ISO data have been published to date. Documentation about the mission, its instruments and data products has been published in the 5-volume *ISO Handbook*. This is accompanied by a legacy of around 200 documents organised in the

ISO Explanatory Library on the ISO web site. Support continued to be provided directly to users in their exploitation of the ISO data throughout the period.

SOHO

SOHO-18 'Beyond the Spherical Sun: A New Era in Helio- and Asteroseismology' was held jointly with the annual meeting of the Global Oscillation Network Group (GONG) 7–11 August at the University of Sheffield, UK. Nearly 130 participants discussed over 150 papers, which will be published as ESA SP-624. A French-Spanish team reported the detection of g modes in the Sun using 10 years of GOLF data. Their results also suggest a solar core rotating significantly faster than the rest of the radiative zone. If confirmed, this could open a new era in the study of the dynamical properties of the central solar interior.

On 9 August a Polish amateur astronomer discovered the 1000th SOHO comet in the Kreutz group of Sun-grazing comets. The 1185th comet discovered in data from SOHO's LASCO and SWAN instruments in total, the faint object is officially designated C/2006 P7 (SOHO) by the Minor Planet Centre of the IAU. Before the launch of SOHO, only some 30 members of the Kreutz group were known. All 1000 Kreutz comets are believed to be fragments of a single comet observed in about 371 BC by Aristotle and Ephorus, and the fragments themselves continue to fragment, making more Sun-grazing comets.

Cassini-Huygens

The Cassini Orbiter mission continues smoothly. Regular observations are published on JPL's web page (<http://saturn.jpl.nasa.gov>). Each Titan flyby brings new surprises as the radar probes new territory. Lakes have been spotted near the north pole but it is not yet known whether they are dry or filled with liquid. Upcoming observations of the same territory

under a different geometry may help to answer this question.

The analysis and interpretation of Huygens data continue. The excellent scientific return of Huygens is well illustrated by the movies recently released by the DISR team (available at <http://saturn.esa.int>). These give a good account of the work done so far by all the teams to understand and interpret the performance of the probe during the descent and the returned science data. A recent detailed interpretation of the Huygens observations by Titan meteorologists suggests that methane was drizzling down on the day of the Huygens landing.

XMM-Newton

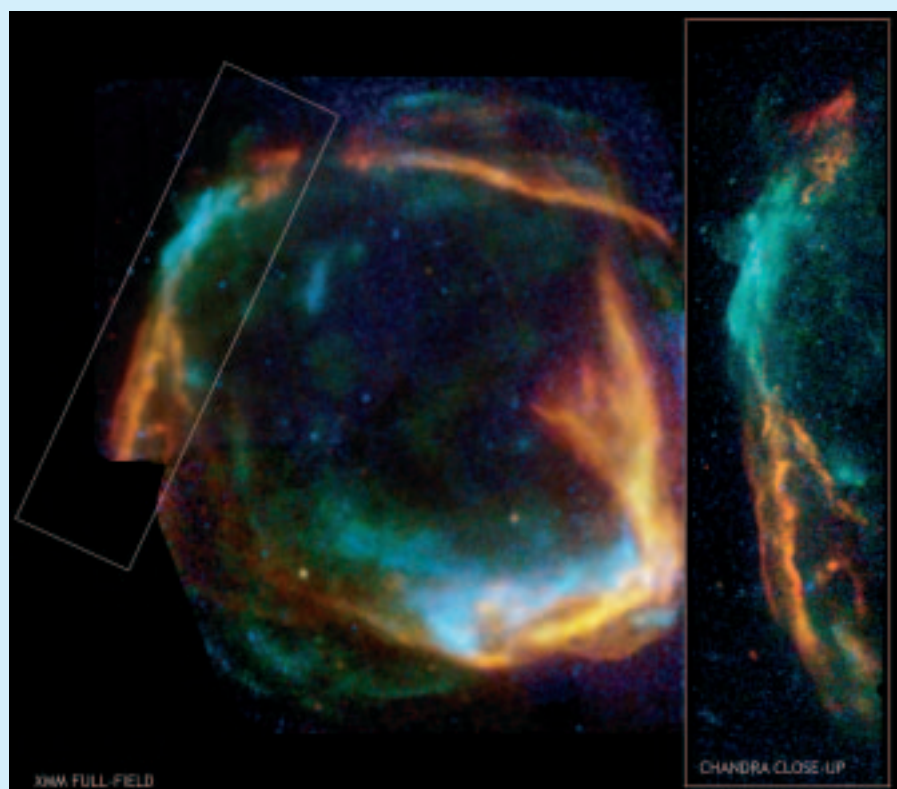
XMM-Newton operations are continuing smoothly, with the spacecraft, instruments and ground segment all performing nominally. The 6th Announcement of Observing (AO-6) opportunity for

observations to be performed between May 2007 and May 2008 has opened. XMM-Newton scientific results have been reported in 1188 refereed papers, of which 181 are from 2006.

A preliminary version of the second XMM-Newton serendipitous source catalogue, 2XMMp, has been released. The catalogue has been constructed by the XMM-Newton Survey Science Centre (SSC) on behalf of ESA. It contains over 150 000 source detections, making it the largest catalogue of astronomical X-ray sources ever produced. The catalogue is derived from the available pointed observations that XMM-Newton has made so far, and covers less than 1% of the sky.

XMM-Newton has found evidence linking stellar remains to the oldest recorded supernova. The combined image from the Chandra and XMM-Newton X-ray observatories of a supernova remnant called RCW 86 shows the expanding ring of debris that was created after a massive star in the

XMM-Newton full field (left) and Chandra close-up (right) images of the oldest recorded supernova, RCW 86. Both images show low-energy X-rays in red, medium energies in green and high energies in blue. (ESA/XMM-Newton; NASA/CXC; Univ. Utrecht, J. Vink)



Milky Way collapsed and exploded. The new observations reveal that RCW 86 was created by a star that exploded about 2000 years ago. This age matches observations of a new bright star by Chinese (and possibly Roman) astronomers in 185 AD and may be the oldest known recording of a supernova.

Cluster

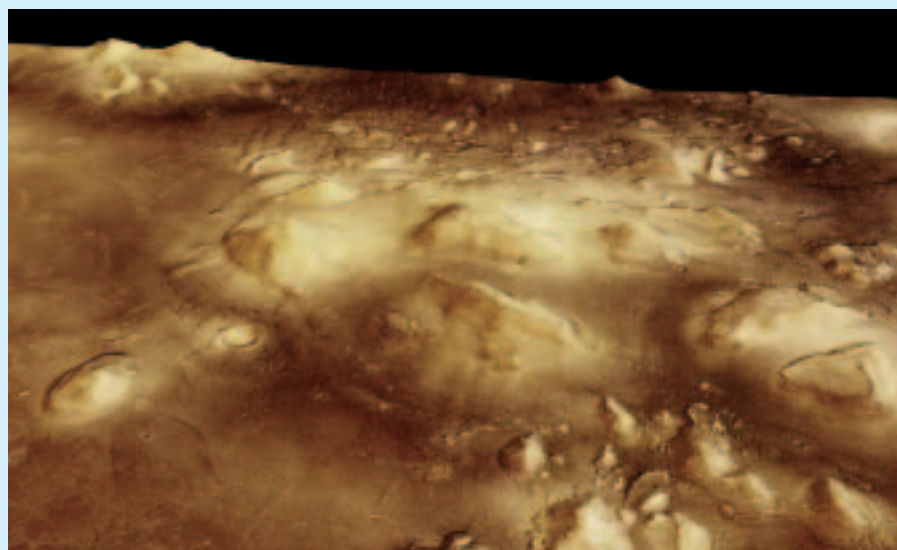
The four spacecraft and instruments are operating nominally and have successfully come through the long eclipse season, including spacecraft-1, which now has very weak batteries. To counteract this, ESOC defined a new mode of operation called 'decoder only', where the computer and all other subsystems are switched off. To warm up spacecraft-1 and recharge the batteries, the instruments were switched off for all the eclipses (15–23 September). The other three satellites recorded data as usual between eclipses.

JSOC and ESOC operations continue nominally. The data return from June 2006 to the end of August 2006 was on average 99.8%. The Cluster Active Archive is also operating nominally. User access is growing every month and a total of 256 users were registered at the end of August (more than 80% increase over the last quarter).

An article on magnetic reconnection in the tail, where Cluster could detect a magnetic null for the first time, was accepted by a new journal: *Nature Physics*. The article was written by a team of Chinese scientists from Peking University together with European scientists. Magnetic nulls are expected in the centre of the reconnection when the two opposite fields cancel each other before reconnecting.

Integral

Integral operations continue smoothly, with the spacecraft, instruments and ground segment all performing nominally. Targets selected in response to the 4th



A perspective view of the Cydonia region of Mars based on images from the High Resolution Stereo Camera aboard Mars Express. Resolution is 13.7 m/pixel; date 22 July 2006. See the 'In Brief' news section of this issue for further information. (ESA/DLR/FU Berlin, G. Neukum)

Announcement for Observing proposals (AO-4) are being observed. AO-4 includes a pilot key programme observation of the galactic bulge region, which attracted a great deal of interest. The scientific community will be invited to propose specific key programmes in AO-5.

Integral scientific results have been reported in 203 refereed (of which 62 are from 2006) and 355 non-refereed publications. The 6th Integral workshop was held at the Space Research Institute (IKI) in Moscow with the theme 'The Obscured Universe'. The workshop was attended by about 180 scientists from around the world. The topics discussed covered nearly all the major scientific areas being investigated using Integral, including the nature of the high-energy cosmic background, massive black holes, and nucleosynthesis and X-ray binaries in our own Galaxy.

Mars Express

In early June, Mars Express celebrated 3 years in space. Most of the summer was spent preparing for, and entering, the power-challenging eclipse/aphelion season. The special Survival Mode was tested and successfully used to sail safely through the

longest eclipses. With the craft being configured for the low-power/aphelion season, payload operations are suspended (except for radio science during solar conjunction) for some 10 weeks. However, thanks to excellent support from the full ground segment, it proved possible to make two sets of coordinated Mars Express-NASA Rover/CRISM spectrometer observations between the low-power/aphelion and the solar conjunction windows. Insufficient downlink capacity was available at the time, and the data will be downlinked after the end of the solar conjunction on 5 November.

The latest major Mars Express discovery was made by the SPICAM team when they found the highest clouds above any planetary surface. The results are a new piece in the puzzle of how the Martian atmosphere works. Until now, scientists had been aware only of the clouds that hug the Martian surface and lower reaches of the atmosphere. Thanks to SPICAM, a fleeting layer of clouds was discovered at an altitude of 80–100 km, most likely composed of carbon dioxide.

A spectacular set of images covering the Cydonia region, and including the famous 'Face on Mars' and its appearance following years of geological processing, were released, and can be found on <http://www.esa.int/marsexpress>

Double Star

The two spacecraft and their instruments are operating nominally. TC-2 has started the eclipse season and TC-1 follows in November.

The European Payload Operation System, which coordinates the operations for the seven European instruments, is running smoothly. Data are acquired using the VILSPA 2 ground station for 3.8 h/day over an average of two passes per day. The availability of the ground station between January and July 2006 was above 99%.

A study on pulsed magnetic reconnection was published in *Annales Geophysicae* using Double Star and Cluster data. It was shown that newly reconnected flux tubes ('flux transfer events') are observed in the equatorial plane by Double Star and at higher latitude by Cluster. This showed that the reconnection site was at least extended over 2 h in local time. Furthermore, Double Star could detect these events during one of its longest observations (about 8 h).

Rosetta

At the end of its first period of solar conjunction, lasting March–May 2006, Rosetta was configured in Passive Cruise Mode during June and July. In this mode, the craft's activity level is reduced and ground contact is limited to once per week. Nevertheless, at the beginning of July it was possible to perform, via time-tagged commands autonomously executed onboard, measurements of the plasma environment with the RPC instruments while Rosetta was crossing the tail of Comet Honda. In August, preparation for the Mars swingby of 25 February 2007 began, with more frequent tracking from ESA's New Norcia and NASA's Deep Space Network ground stations. The fourth periodic payload checkout took place at the end of August, when the scientific instruments were activated in sequence and checked out over a period of 5 days outside of ground contact, and the resulting housekeeping and science telemetry data

downlinked to the ground station at the end of the test. Preliminary analysis indicates that all instruments and the Philae lander are in good health.

On 29 September the second large Deep Space Manoeuvre was executed to target the trajectory for the Mars swingby. The manoeuvre was extremely accurate (0.1%) and placed Rosetta on its final course towards the Red Planet.

Intense analysis, testing and validation activities are under way at the Control Centre in preparation of the next critical mission phases: Mars and Earth swingbys in February and November 2007, respectively, and the first asteroid (Steins) flyby in September 2008. The payload is usually inactive in this cruise period, with the exception of periodic test activities and occasional scientific opportunities. However, payload operations are planned for December, when there will be many test and calibration activities, including major onboard software updates.

Venus Express

After the successful insertion into Venus orbit on 11 April, the spacecraft and its subsystems and the payload passed their in-orbit commissioning with flying colours. The spacecraft is functioning well and all payload elements, with the exception of the Planetary Fourier Spectrometer, show nominal performance. During Venus Orbit Insertion, VIRTIS provided spectacular views of the south pole's cloud structure. On 4 June commissioning concluded and the nominal science mission started. Management of the mission was transferred from the Scientific Projects Department to the Research and Scientific Support Department.

During the initial science phase the instruments already demonstrated that the objectives of the mission can be fulfilled: preliminary temperature and composition profiles of the atmosphere were derived. The feasibility of bi-static radar observations was

demonstrated and the VMC imaging system provided the first sequences of the observations of the cloud movements in the atmosphere. Most spectacular so far have been the observations by VIRTIS at the different wavelengths in the 1–5 μm range. It clearly showed that we can penetrate to different levels deep in the atmosphere and even can relate the observations to distinct surface features.

Venus Express is operated from the VEX Mission Operations team at ESOC with daily 8 h tracking passes via ESA's deep space antenna in Cerberos (E). Payload operations are coordinated by the VEX Science Operations Centre at ESTEC.

SMART-1

The operational mission ended on 3 September, at 05:42:22 UT, when the New Norcia ground station in Australia lost radio contact with the spacecraft. SMART-1 ended its journey in the Lake of Excellence, at 34.4°S/46.2°W. The ~2 km/s impact took place on the nearside of the Moon, in a dark area just near the terminator at a grazing angle of 5–10°. The time and location was planned to favour observations of the event from ground-based telescopes. This was achieved by a series of orbit manoeuvres during the summer, using ingenious combinations of wheel offloading and thruster firings to reach an optimum orbit. The last manoeuvre was performed on 1 September. A final adjustment had to be made as a reanalysis of available lunar data performed at the University of Nottingham (UK) suggested that, in the absence of any further manoeuvres, impact would very likely occur one orbit earlier if SMART-1 clipped the rim of Clausius crater.

The impact concluded a highly successful mission that, in addition to testing innovative space technology, conducted a thorough scientific exploration of the Moon for about a year and a half, gathering data on the morphology and mineralogical composition of the surface in visible, IR and X-ray wavelengths.

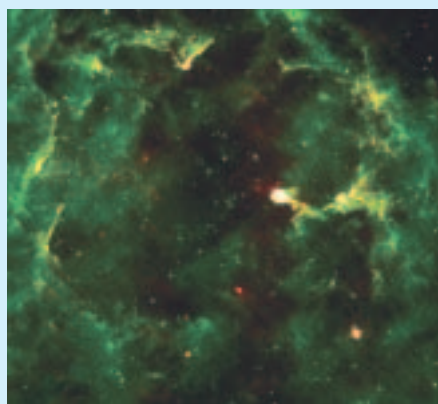
Professional and amateur observers from South Africa, the Canary Islands, South America, the continental USA, Hawaii and many other locations participated in the campaign. The most impressive observation was the IR impact flash seen by the Canada-France-Hawaii telescope. The Joint Institute for Very-long Baseline Interferometry (JIVE) in Europe coordinated a successful joint campaign covering five radio telescopes.

In addition to its mission proper, SMART-1 tested and calibrated parts of the ground segment for the Chinese and Indian space agencies in preparation for their Chang'e-1 and Chandrayaan lunar missions.

Akari (Astro-F)

Akari, Japan's IR astronomical satellite with ESA participation, continues its sky survey and its mapping of our cosmos. New exciting images recently recorded by Akari depict scenes from the birth and death of stars. In the IR camera image of the reflection nebula IC1396 at 9 μm and 18 μm (see photo), it is possible to discern new generations of stars being born in the outer shells of gas and dust ejected by violent massive star formation at the centre of the nebula. Akari's superior quality and high-resolution imaging allowed the clear detection of a shell-like dust cloud surrounding the old star U Hydrae at a distance of about 0.3 light years from the central star, implying that a short and

Akari reveals stars being born in nebula IC1396 (JAXA)



violent mass ejection took place from the star about 10 000 years ago. This image was taken with the far-IR surveyor instrument at 90 μm . Akari is due to complete its first scan of the entire sky in October.

ESA's contributions to the mission are working well: regular and efficient ground station coverage from Kiruna (S) and pointing reconstruction software, developed at ESAC, which is already in routine use. The ESAC team is in close contact with the Open Time users in Europe, to maximise the overall scientific return of the pointed observations programme, despite increasing operational constraints.

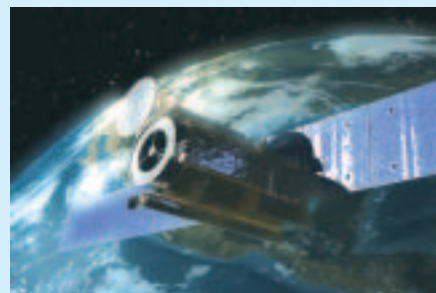
Hinode (Solar-B)

Solar-B was launched on 22 September at 21:36 UT from JAXA's Uchinoura Space Centre and renamed Hinode ('sunrise'). It is a Japan-led mission with US and UK instrument participation and ESA and Norwegian ground support. It is studying the mechanisms that power the solar atmosphere and looking for the causes of violent solar eruptions. The Sun-pointing platform carries three major instrument packages:

- Solar Optical Telescope (SOT), a high-resolution (0.2 arcsec) visual imaging system with a vector magnetograph and spectrograph;
- X-ray Telescope (XRT), for coronal imaging in a wide temperature range from 1 million K to over 30 million K;
- EUV Imaging Spectrograph (EIS), to measure temperatures and flows in the solar corona.

The satellite is in good health. It was injected into an orbit well within the nominal range and then adjusted into its final Sun-synchronous polar orbit. Following spacecraft commissioning, the three scientific instruments will be turned on by the end of October. First observations are planned for November.

Like its predecessor Yohkoh, Hinode started out as a Japan/US/UK mission. In order to



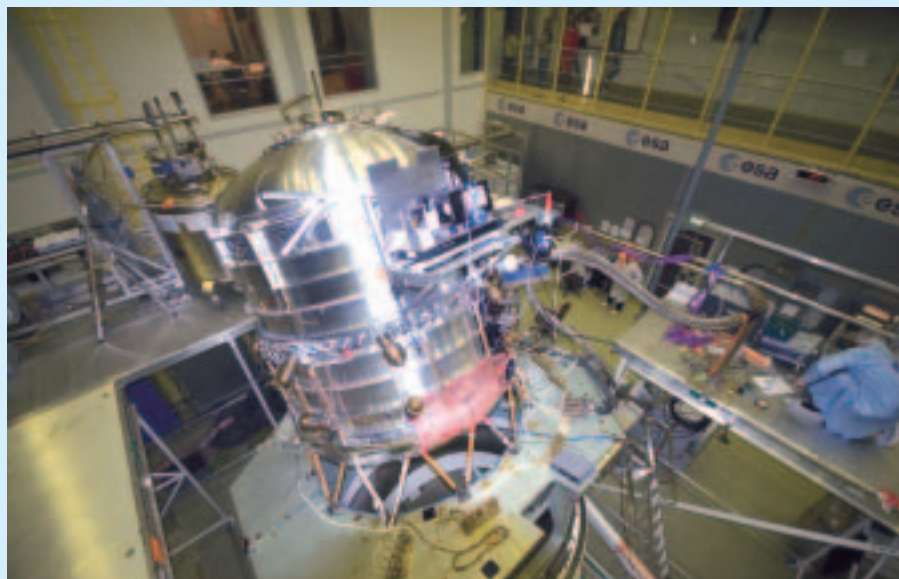
Hinode is operating successfully (JAXA)

enhance the scientific outcome of the mission, ESA joined the Hinode team in 2005 in the form of a coordinated endeavour with Norway. In partnership with the Norwegian Space Centre in Oslo, ESA is providing ground station coverage through the Svalbard Satellite Station. This is the only station in the world that can receive data for each of Hinode's 15 daily orbits. As a result, the data rate of Hinode and hence the scientific return of the mission will be significantly increased, and scientists from ESA's member states will have access to the data. These will be accessible via the European Hinode Data Centre, which is being built at the Institute of Theoretical Astrophysics at the University of Oslo.

Herschel/Planck

The satellite development in industry is progressing well, with the completion of the flight hardware. The improvements to the insulation system of Herschel's cryostat to recover the full lifetime performance have been completed, and the cryostat is back in ESTEC for another round of cryogenic testing. These tests include cryostat lifetime verification and verification of the cryostat internal straylight. The Flight Model (FM) of the Herschel Service Module (SVM) is now fully assembled and in the final stages of its electrical and functional testing. During the summer, the SVM successfully supported the first System Validation Test (SVT), when the spacecraft was controlled by the mission control centre, at ESOC.

The Planck spacecraft FM was returned to Alcatel (Cannes, F) for final electrical testing



The Herschel cryostat in the ESTEC cleanroom during preparation for its straylight test

For the LTP, all the subsystem PDRs have been held and some CDRs have taken place. Good progress is being made despite the many technical challenges. The most critical subsystems are still the inertial sensor vacuum enclosure, the electrostatic suspension front-end electronics and the caging mechanism. Progress has been made on all of these. Breadboard tests confirmed the difficulty in meeting the extremely demanding performance requirements of these subsystems.

In the meantime, tests continue on the LTP various Engineering Models, both to confirm the basic concept of the electrostatic suspension of the inertial sensor in the pendulum facility at the University of Trento and to measure the magnetic susceptibility of the test mass. The test mass is made from a special alloy (73% gold, 27% platinum by mass) designed to minimise this fundamental property, to make the test mass insensitive to the spacecraft magnetic field and its gradient.

The Ground Segment, consisting of the Mission Operation Centre and the Science and Technology Operation Centre, has been defined and will undergo its PDR in October.

The launch is expected to take place at the end of 2009.

and integration of the instruments and telescope. The electrical and functional verification testing is now concentrating on the Planck SVM, and is overall progressing nominally. The telescope FM completed its cryogenic testing with the videogrammetry measurement of the displacements.

On the Herschel telescope, a Tiger Team reviewed the results of the cryo-optical testing and confirmed readiness for integration with the spacecraft.

All Herschel and Planck instruments are in the final stages of their acceptance testing and instrument FM calibration. Planck's instrument testing was completed and the instruments are being delivered for integration. Herschel's instruments are close to the start of their final calibration phase.

the LTP structural integrity during launch, while ensuring the delicate thermoelastic performance during the orbital measurement phases.

All the subsystem and equipment has now been selected and the contracts kicked off with one only exception: the thermal hardware is due to be procured in 2007. An important contract, awarded before the summer, was the parallel development of the two European micropropulsion technologies (needle indium thrusters and slit caesium thrusters). This additional technology development phase was deemed necessary after a previous competitive Invitation to Tender revealed that no technologies were ready for use in LISA Pathfinder. The suitable technology will be selected in the second half of 2007.

LISA Pathfinder

The SMART-2/LISA Pathfinder Implementation Phase contract is progressing well. The main system activity during the reporting period was the consolidation of the spacecraft design and the redefinition of the LISA Technology Package (LTP) Central Assembly accommodation inside the spacecraft. This activity was required in order to guarantee

The LISA Pathfinder Engineering Model proof-mass undergoing magnetic susceptibility testing at the International Bureau of Weights and Measures (BIPM) in Paris



Microscope

The system- and satellite-level PDR was held on 13 February 2006 and closed on 13 April 2006 by the CNES Steering Committee. The approval to proceed with Phase-C/D was not given owing to delays in the development of critical technologies: the field-emission electric propulsion (FEED) and T-SAGE inertial sensor. Since the Microscope FEED development at ESA is closely linked to that

on LISA Pathfinder, CNES decided to postpone the Phase-C/D until the end of the development/qualification phase of the LISA Pathfinder FEOP, planned for September 2007.

In the period March–June 2006, CNES studied alternative propulsion solutions to the slit FEOP. Two backup solutions were analysed: the needle FEOP being studied within the LISA Pathfinder parallel FEOP Phase-1 and the micronewton proportional cold-gas thruster (based on the technology development for Gaia). CNES presented the results of the analysis to their Board on 28 June, which recommended focusing on the nominal slit FEOP solution and monitoring with ESA support the development of the backup solutions.

Phase-B for the T-SAGE accelerometer development at ONERA was closed in May, though a delta-Phase-B is required in order to implement the recommendations of the PDR to solve the outstanding issues before starting Phase-C.

Gaia

In early July, Gaia passed the System Requirements Review, the first major milestone in the life cycle of a project. The board members declared that it had met all the objectives; this was very important because it forms the basis for the start of the detailed design activities.

The competitive selection of subcontractors continues according to the rules of the Agency. At the time of writing, more than a third of the nearly 80 procurements have been successfully completed. The progress of this activity is critical for the overall schedule stability of Gaia. The major risks, such as flight CCD production, mirror polishing and the detailed design work on the payload module, are all well in hand and progressing satisfactorily. No impact on the overall schedule for a launch at the end of 2011 has been identified.

In agreement with the Gaia Science Team, a number of dedicated working groups have

been implemented to deal respectively with the specifics of the overall science data flow and the radiation characterisation of the CCDs.

The Gaia Science Team met at regular intervals to be briefed about the progress of the project, to provide advice as required and to discuss scientific matters.

JWST

NASA has reached a Technology Readiness Level (TRL) 6 for five out of ten JWST critical technologies: the Sunshield membrane; the Primary Mirror Segment Assembly; the Sidecar ASIC; and the Near-IR and Mid-IR Focal Plane Assemblies. The last three elements are part of the NIRSpec and MIRI instruments. Following recent problems in vibro-acoustic tests, the NASA-provided NIRSpec Micro Shutter Array will be the last item to reach TRL-6, in December 2006.

NASA-provided software platforms and EGSE were delivered to the MIRI and NIRSpec instrument developers. European personnel also received the training to operate this equipment.

The build-up of the NIRSpec industrial consortium is reaching completion, with the

last two procurements being finalised. The NIRSpec subsystems CDR campaign is starting.

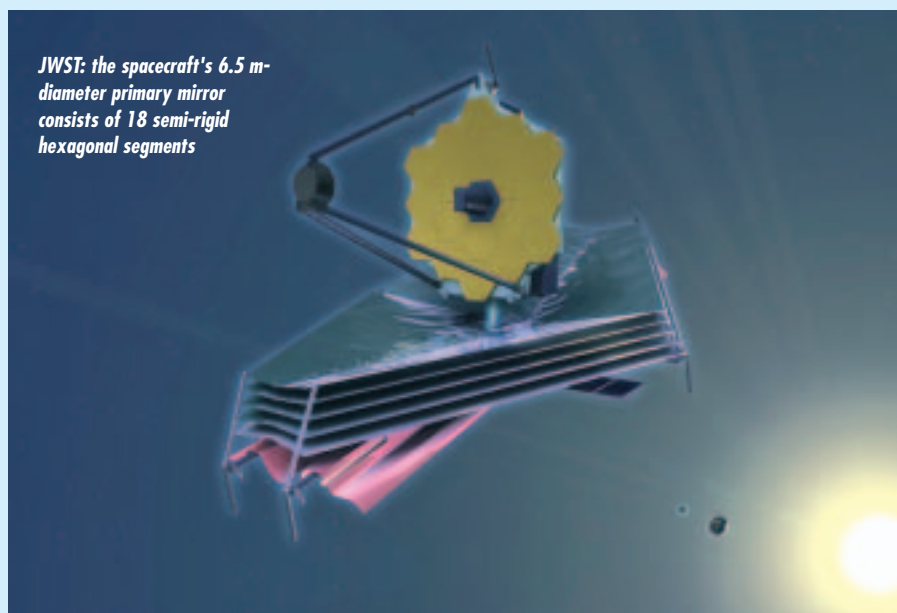
Problems were encountered during the environmental and operational lifetime testing of the NASA-provided Micro Shutter Array flight-like devices. During the random vibration test, shutters remained stuck in the closed position and wire bonds and flex mounts broke. However, stiction problems remain the biggest concern.

The MIRI subsystem CDR campaign was concluded before the summer break. The action plan to close all open issues is consistent with the preparation of the MIRI optical system CDR, scheduled to kick-off in December.

Parts and subassemblies for the instrument Verification Model are being manufactured and tested. The MIRI Contamination Control Cover was delivered after successful vibration and cryogenic testing.

Finalisation of the 'Definition Phase of the JWST Launch Services' contract is under way. This definition phase will cover activities from now until 3 years before launch, and is meant to assist NASA and the JWST Prime Contractor during the development of the mission.

JWST: the spacecraft's 6.5 m-diameter primary mirror consists of 18 semi-rigid hexagonal segments



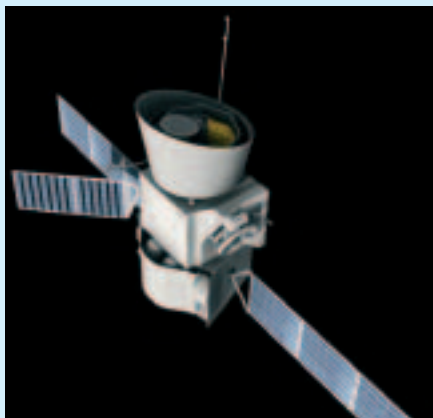
BepiColombo

The BepiColombo mission scenario foresees a Soyuz-Fregat launch in August 2013 and arrival at Mercury in August 2019 for a nominal 1-year scientific mission.

Proposals from Alcatel Alenia Space and Astrium were received on 17 May 2006 in response to the Invitation to Tender for the Implementation Phase. The Tender Evaluation Board, supported by a large team of specialists, performed a detailed evaluation of the proposals and recommended selection of the Astrium proposal. Both contenders were informed of this result on 6 July. Subsequent negotiations took place to integrate Alcatel Alenia Space within the core team. The contract proposal will be submitted to the Industrial Policy Committee at the end of January 2007. The cost-at-completion will be submitted to the Scientific Programme Committee (SPC) for approval in February 2007.

The third Science Working Team meeting was held in Padova (I) 26–28 September. The instrument design and prototyping is proceeding according to plan, but the immediate allocation of funds is of concern to some Principal Investigators. The project places particular emphasis on model philosophy, verification and procurement schedule for the present work with the Experimenter teams until detailed interface and accommodation work can be started with the Prime Contractor. The financial commitment from the Lead Funding Agencies to support the payload on the Mercury Planetary Orbiter is being obtained in accordance with the Science Management Plan. The proposed text of the Multi-Lateral Agreement between ESA and the Lead Funding Agencies has been informally discussed between all parties and is now being distributed for final approval. Likewise, a bilateral agreement between ESA and Roskosmos was drafted for the Mercury Gamma-ray and Neutron Spectrometer.

The joint Memorandum of Understanding with JAXA for the Mercury Magnetospheric



The BepiColombo composite: the Mercury Transfer Module attached to the MPO and MMO spacecraft

Orbiter is awaiting JAXA approval, after which it will be submitted to the SPC.

The technology demonstration work for gridded ion thrusters is continuing on the Astrium RIT thruster and the QinetiQ T6 engine; almost 5000 h of thrust time has been achieved.

LISA

The Mission Formulation activity with Astrium GmbH is in its Phase-2 and is proceeding well. Following consolidation of the mission baseline architecture design, some trade-offs of alternative configurations were performed. These deal with alternative payload concepts, including off-axis telescope, in-field-of-view pointing and single proof-mass configuration.

The possibility of stable maintenance of the triangular constellation, thus removing the breathing angle, was analysed. The conclusion is that this option cannot be considered any further for two main reasons: the required thrust authority would be far above the FECP capabilities, and the noise induced by this active/permanent thrust would severely degrade the measurement sensitivity of the LISA system.

Technology Development Activities Invitations to Tender will be released shortly to cover optical mechanisms, optical bench and telescope characterisation.

NASA is currently initiating an NRC review to decide on the prioritisation of the Beyond Einstein programme elements (LISA, Con-X and the JDEM probes). The target date for the final decision is October 2007. The LISA project is well under way in updating the documents that are expected to be required. In parallel, NASA is supporting the mission formulation activity. Regular Quarterly Progress Meetings and Technical Interchange Meetings are held to exchange information and results and jointly to consolidate the mission design.

GOCE

Substantial progress has been made with the gradiometer instrument over the past few months. Three Accelerometer Sensor Head (ASH) Flight Models (FMs) have been assembled and tested at ONERA. Five ASHs have therefore been completed to date; a sixth is being assembled and is expected to enter acceptance testing before the end of October. Alcatel Alenia Space has integrated the three Front-End Electronic Unit FMs, the Thermal Control Electronic Unit Proto-Flight Model (PFM) and the Gradiometer Accelerometer Interface Electronic Unit PFM and nearly completed the final functional testing. Moreover, the upgrade of the Structural Thermal Model of the Gradiometer Core, which will be used during the satellite FM test campaign, has also been completed.

On the platform side, there was a severe setback on 19 July when an anomaly in the Electrical Ground Support Equipment (EGSE) triggered a chain of events that ultimately led to an over-voltage on the platform PFM, causing the failure of one power converter of the Command and Data Monitoring Unit (CDMU) PFM and stress on many electronic components of the Power Conditioning and Distribution Unit (PCDU) PFM. Both units were demounted and returned to their manufacturers for further investigation and recovery. The EGSE unit was also returned for correction. As a consequence, the functional testing of the platform PFM had to be stopped, while the closed-loop functional testing of the Drag Free Attitude Control

System on the platform Engineering Model Test Bench continue. In order to minimise impact on the overall schedule, it was decided to use the time to recover the CDMU and PCPU PFMs to pack and ship the platform PFM and associated EGSE to the satellite prime contractor. Platform PFM transportation took place during the last week of September. It was agreed that industry will continue to work double shifts until completion of the assembly, integration and test programme.

Final acceptance testing of the first of two identical Ion Thruster Assemblies (ITA FM1) was successfully completed in September. ITA FM2 testing then began and will be followed by the integration of ITA FM1 and FM2 on a panel where the xenon gas feed system and the two Ion Propulsion Control Units have already been integrated. Functional tests are expected to take place throughout October and November, before final delivery of the full Ion Propulsion Assembly PFM in December.

The Factory Acceptance Test of Version 1 of the ground segment's Calibration and Monitoring Facility & Reference Planning Facility was completed in July. The pre-acceptance review of Version 2 of the Level 1 to Level 2 High Level Processing Facility of the European GOCE Gravity Consortium was held in July. Development of the Flight Operations Segment and the Payload Data Segment continue according to plan, and entry into the Ground Segment Overall Validation phase is expected soon.

CryoSat-2

The Contract for the Phase-C/D/E1 development of the CryoSat-2 satellite was signed with Astrium GmbH on 26 July 2006. Almost all of the subcontractor contracts have also been negotiated and kicked off. Manufacturing is in progress and many items of the flight structure, including composite panels and machined elements, are ready for integration.

Most equipment has seen some design evolution (owing to obsolescence of electronic parts, for example) while in a few cases

limited redesign has been necessary to absorb the impact of the redundant SIRAL and to eliminate minor weaknesses found during the original CryoSat development. In three cases the manufacturer is developing a new equipment design to replace obsolescent equipment used in the original CryoSat. Consequently a series of delta-CDRs at equipment level have been held, leading up to the system-level delta-CDR starting in November 2006. The major lower-level delta-CDR for SIRAL was completed in July.

A 3-month delay in the star tracker delivery was announced, which appears to be a knock-on effect from damage incurred during testing of a star tracker in another programme. Since the same design is used in several ESA programmes, the possibility of optimising the production sequence and schedule to reduce the delay for CryoSat, without introducing delay to the other programmes, is being investigated.

The process of approving all electronic parts has been almost completed during this reporting period.

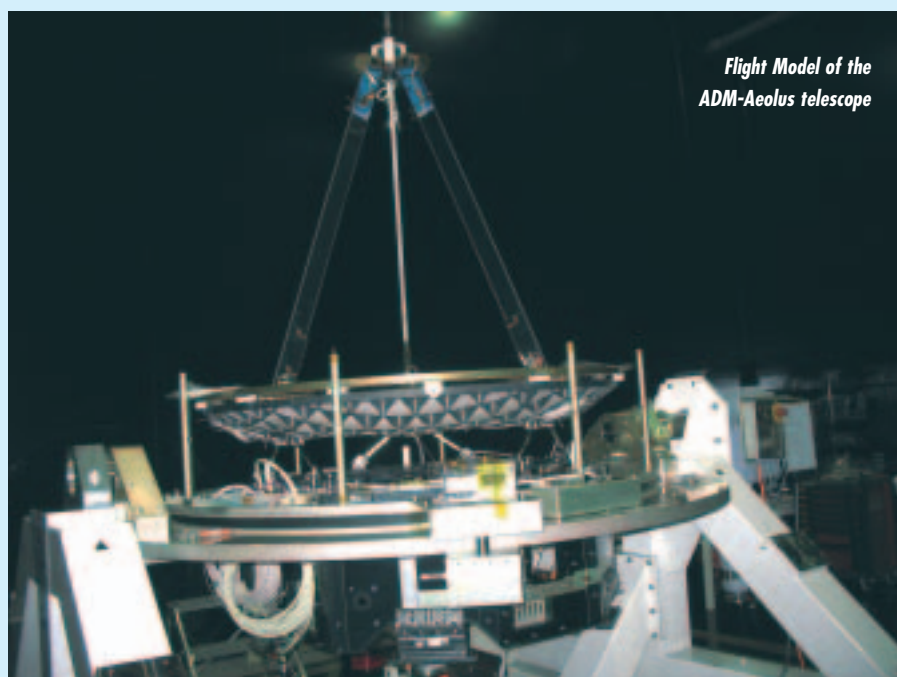
Close-out work on the various components of the Payload Data Ground Segment has finished and the facilities hibernated. No

further activities will be undertaken until 2007. The launch is scheduled for March 2009.

SMOS

Delivery of subsystem units for the payload protoflight model continues. All LICEF receivers have been delivered, and are being used to populate the arm segments of the structural model to undergo the 'on farm' antenna pattern characterisation at the Technical University of Denmark. All three arm measurements have been completed; still to be measured is the central hub structure with one adjacent segment of each arm. Once all the antenna characterisation is completed, the LICEF receivers will be transferred to the FM arm segments that are under integration with electrical, radio-frequency and optical harness, thermal control hardware, and other subsystems such as the noise sources of the calibration subsystem.

Platform integration of the recurrent Proteus platform has progressed significantly at the Alcatel Alenia Space facilities (Cannes, F). It is interrupted owing to the resumption of the Calypso launch campaign. Rockot launcher



Flight Model of the ADM-Aeolus telescope

interfaces were reviewed in the Preliminary Mission Analysis Meeting involving ESA, CNES, Alcatel, Eurockot and Khronichev.

For the overall SMOS ground segment, the PDR has been completed. While the elements of the flight operations ground segment, both on the CNES and the ESA side, were found to be in an adequate development state, the payload data ground segment, including the data processors for level-1 and -2 data products, were judged to be schedule-critical. Backup solutions were suggested by the Board for investigation and eventual implementation by the project.

The building refurbishment and preparations for the X-band receive antenna are progressing nominally for installing the ESA-part of the ground segment at ESAC (E).

ADM-Aeolus

The FM platform with tanks, pipework and harness installed was shipped to Astrium Friedrichshafen (D) for integration of the flight electronics units. Tests on the flight software using the onboard computer and the first platform electronics units are showing satisfactory results. The silicon carbide FM telescope integration is complete and its performance is excellent. All electronic units of the flight instrument except the laser have been bench-tested together; their performance is excellent.

There have been further thermo-mechanical problems with the laser. As a result, the thermal-vacuum test of the Qualification Model will now start in November.

A workshop for potential users was held at ESTEC at the end of September. All users expected a significant impact from the satellite on Numerical Weather Prediction. There will be many other benefits in climatology. There was widespread support for follow-on missions to avoid a data gap before the first post-MetOp satellite. This included some suggestions for cooperation with the US, where there is at present no comparable mission.

Launch of the satellite remains scheduled for September 2008.

Swarm

Phase-B of the satellite activities with EADS Astrium GmbH is progressing. The Satellite System Requirement Review is completed. Feasibility and preliminary mission analysis studies have been initiated with Arianespace, Kosmotras and Eurockot.

Procurement activities for the satellite units and instruments are well advanced, with subcontractor bids for critical elements of the programme already in the negotiation phase and close to kick-off. Other offers are in preparation.

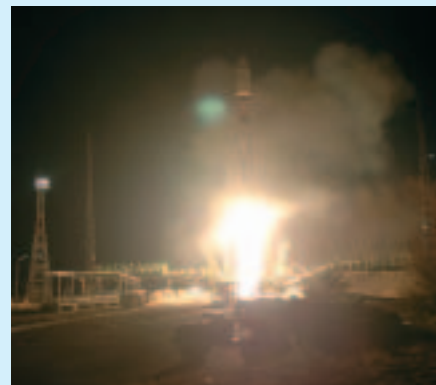
Phase-B of the Electrical Field Instrument is progressing. Breadboard activities of the critical elements are near completion.

The Absolute Scalar magnetometer Phase-B is underway with LETI, Grenoble (F), under the leadership of CNES. The breadboard activities of the instrument are near completion. The manufacturing of the Engineering Model has started. The PDR is planned for mid-December.

MetOp

The planned launch date for MetOp-A of 17 July could not be kept. After three consecutive launch attempts, all halted by the Soyuz ground control system through a variety of relatively minor operational problems, the launcher's maximum period allowable in a fuelled condition was exceeded and it had to be returned to the manufacturer (TskB in Samara) for refurbishment. The satellite was returned to the integration facilities for storage.

Starsem and its industrial partners analysed the causes of the launch interrupts and identified technical solutions that allowed the launch campaign to restart on 30 August consistent with a launch on 7 October.



Launch of MetOp-A from Baikonur Cosmodrome on 19 October aboard a Soyuz-2/Fregat

Reactivation of the campaign meant that some essential and time-consuming activities had to be repeated. These were mainly solar array preparation, instrument cleaning and, finally, a satellite functional test.

MetOp was remated with its Fregat upper stage and reencapsulated to form the 'Upper Composite'. Unfortunately, during the transfer of the Upper Composite from the integration facilities to the transport train, a handling error caused a mechanical shock. This necessitated an investigation to check the integrity of the flight hardware, including mechanical analysis of the loads induced on the spacecraft and a detailed visual inspection that required MetOp's return to the cleanroom and removal from the fairing. The inspection revealed no damage to the satellite, and complementary analyses from the launcher authorities (TskB, NPO-L and EADS-Casa) and the spacecraft industry (Astrium) demonstrated that the allowable specifications for MetOp loads were not exceeded.

These additional activities meant that the launch date had to be delayed, to 17 October. Final preparations, formal rehearsals and simulations for both the launch and early orbit phase, satellite in-orbit verification and routine operations phases of the MetOp mission were completed. Both ESOC and Eumetsat Ground Systems are ready for the satellite launch. The 17 October launch attempt was halted by another Soyuz ground control system problem and the 18 October attempt was thwarted by high-altitude winds, but MetOp successfully reached orbit on 19 October.

MSG

Meteosat-8/MSG-1

A reset of the Central Data Management Unit (CDMU) resulted in the satellite entering safe mode on 23 September 2006. Although the exact cause is not yet known, it is likely to be a single event upset, as similar situations have been observed on the Spacebus 3000 CDMUs. After nominal reconfiguration, the satellite became the operational satellite again on 10 October 2006. Satellite condition is nominal and the instrument performance remains of excellent quality.

Meteosat-9/MSG-2

After successful commissioning, MSG-2 became the hot standby for Meteosat-8. With Meteosat-8 entering safe mode on 23 September, MSG-2 automatically became the operational satellite for the data delivery until the switch back to Meteosat-8 on 10 October. The satellite (now renamed Meteosat-9) shows flawless nominal operations.

MSG-3

MSG-3's flight PROM has been integrated and tested. It is planned to put MSG-3 in long-term storage by the end of the year, awaiting launch in early 2011.

MSG-4

Preparation activities for MSG-4's thermal-vacuum test and optical-vacuum tests have been completed. MSG-4 is now waiting for its test slot at Alcatel Alenia Space in Cannes (F); the thermal-vacuum test is expected to start by mid-November.



Thomas Reiter working in the Destiny laboratory, 10 September

the third member of the Expedition-13 ISS crew and is carrying out the long-duration Astrolab mission. Also launched, and commissioned in the US Lab Destiny, were ESA's European Modular Cultivation System, the -80°C Freezer (MELFI) and the Percutaneous Electrical Muscle Stimulator.

On 9 September Space Shuttle *Atlantis* (STS-115) was launched to the ISS, marking the return to major assembly work on the Station with the installation of the P3/P4 truss – the first configuration change for the ISS since November 2002.

The Space Station Control Board has made progress on the scheduling of the remaining Shuttle flights to the ISS, with the Columbus launch on flight 1E on 17 October 2007.

Space Infrastructure Development

The Columbus ground processing Phase-1 at the Kennedy Space Center was completed, including the integrated leak test which demonstrated that the ESA module is the least susceptible Station module in this respect. Columbus is now in storage at the KSC until April 2007.

A European commercial carrier, the Astrium-built ICC-Lite, has been baselined as the payload bay structure to support the SOLAR observatory and EuTEF facility payloads on

the Columbus launch, saving several hundred kg of structural mass compared to its US counterpart.

Qualification and acceptance of the Columbus Control Centre is now almost complete, following the completion of the review (Q&AR) with the Board on 21 July.

The ATV *Jules Verne* spacecraft hardware and software is stable; acoustic and leak tests were completed and preparation is under way for the final major environmental test, the thermal-vacuum test. The second of three functional qualification test campaigns has started on the Flight Simulation Facility (FSF) at Les Mureaux (F), and a number of functional qualification tests were performed, and some major bilateral interface tests were also completed. However, some problems during functional qualification testing, which is on the critical path for the programme, are still being encountered on test platforms, usually caused by equipment front ends, and qualification testing will now continue through into early 2007, resulting in a launch date not earlier than mid-June 2007.

Qualification and acceptance of the ATV Control Centre is almost complete and the corresponding Q&AR review has started. Operations qualification for the *Jules Verne* mission is well under way, with many parts

Human Spaceflight, Microgravity & Exploration

Highlights

Space Shuttle *Discovery* (STS-121) was launched to the ISS on 4 July with ESA astronaut Thomas Reiter aboard. He became

of the pre-qualification programme completed. The operations product verification review has taken place and the Board meeting in October gave the go-ahead for the start of the simulations and training programme.

The implementation review of the ISS operations services contract was completed and plans were agreed with industry for the work up to end-2007. This includes the Columbus and *Jules Verne* launches as well as the final transition from development to operations programme.

Node-3 functional testing was completed and mechanical activities, in preparation for acceptance and shipment early next year, are under way. However, NASA has indicated that it would like to transfer more activities from KSC to Europe; negotiations on these activities are under way, for which NASA will fund the European prime contractor of Alcatel Alenia Space in Turin (I).

Roskosmos has announced to the SSCB that it is planning on a long delay, to end-2009, for the launch of its Multipurpose Laboratory Module (MLM). This will entail a corresponding delay for the European Robotic Arm (ERA). Plans are already in place to store the flight unit, freeze all activities in Russia and go into team-keeping mode with Dutch Space.

Utilisation Planning, Payload Developments and Preparatory Missions

The SURE proposals review (32 proposals, four of which are industrial projects) is under way and the peer review of the 49 bedrest study proposals (15 science disciplines) is in preparation.

Precursor missions: Maser-11 Phase-A/B studies are almost completed and Phase-C/D will follow directly. The Phase-C/D Texus-44/45 Request for Quotation is starting in 2006, with a launch planned for end-2007, and Foton-M3 payload development activities are progressing well for a launch in September 2007.

Columbus payloads: European Drawer Rack (EDR)/Protein Crystallisation Diagnostics



Christer Fuglesang preparing for his EVA during Shuttle mission STS-116 in December 2006

Facility (PCDF) integration has been concluded and Phase-C/D experiment development for Increment-16 is under way. The deployment of the first experiments for the Fluid Science Laboratory (FSL) and Biolab, as well as the Flywheel Exercise Device, is envisaged for flight 1E, together with the upload on 1E of various consumables for human physiology experiments.

Destiny payloads: on-orbit recertification of the Microgravity Science Glovebox (MSG) is almost complete, the Material Science Laboratory (MSL) flight model pre-ship review has started, and development of ANITA, which will be deployed on ATV-1 and accommodated in an Express rack on Destiny, is approaching completion.

Following launch on STS-121 (ULF-1.1) and commissioning, MELFI and EMCS are supporting the scientific programme. The

Portable Glovebox has been used for the BIO-2 experiments that were performed during the Soyuz-13S visiting flight. During that flight, A. Ansari, acting as a short-term medical test subject, performed several human physiology experiments. The experiment programme executed by Russian cosmonaut P. Vinogradov (Increment-13) was successfully concluded.

ISS Education

Preparation of the education programme the Christer Fuglesang STS-116 mission (December 2006) is under way, and filming of the experiment has been approved by Principal Investigator.

The ARISS (Amateur Radio on the ISS) radio contact with the ISS and Thomas Reiter was organised in Patras, Greece on 29 July, with the participation of the Greek Minister of Education. The UTBI experiment (University of Valencia) was launched on Soyuz-13S.

Development and testing of the CASPER experiment (University of Dublin) is proceeding, with the launch targeted for Progress-23P.

Astronaut Activities

As part of his mission aboard the ISS, Thomas Reiter performed an EVA of more than 6 hours with NASA astronaut Jeff Williams. They completed all the preparation activities for the next ISS truss assembly (installing the motor controller on the radiator joint), deploying the new camera to monitor the condition of the Shuttle's carbon-carbon structures, installing two materials experiments (MISSE-3 and -4) and performing additional tasks.

Most Astrolab experiments have been already initiated by Thomas Reiter and will be performed repeatedly. More experiments and consumables were uploaded on Soyuz-13S and more will follow on Progress-23P.

Although the plans have not yet been formalised, ESA astronauts Leopold Eyharts and Frank De Winne have started to train as prime and backup for a mini-increment of 2–3 months after the launch of Columbus. They will be followed by a Canadian during stage 1J/A (with André Kuipers as backup) and then a JAXA astronaut during stage 1J.

Hans Schlegel was selected as a crewmember aboard Columbus/Shuttle flight 1E, in addition to Christer Fuglesang (12A.1, December 2006) and Paolo Nespoli (10A, Node-2 flight in August 2007).

The first ESA ATV training was provided to the Expedition-15 crew in September when the Russian prime and backup crewmembers received 'ATV Part 1 Training' at the European Astronaut Centre (EAC). Some 20 weeks of ISS crew training will be implemented at EAC for Columbus, ATV and payloads during the next 12 months.

Exploration

For ExoMars, now in Phase-B1 under Alcatel Alenia Space-Italy as prime contractor, the selection process of the second-level contractors has progressed with the issue in early August of the Invitations to Tender for

the Descent Module Entry, Descent and Landing System (EDLS), Descent Module Support Structure and Rover Egress System (SES) and the Carrier/Orbiter. The Request for Quotation for the Rover Vehicle was released. All proposals have been received and are being evaluated.

Industrial activities began in early September with Galileo Avionica for the Drill and the Sample Preparation and Distribution system (SPDS) design and breadboard, and with Aerosekur for the airbag design and breadboard. The Planetary Protection support contract kicked-off at end-August with SEA/Open University.

Work has progressed on both the baseline mission, based on a Soyuz launcher and relying on a NASA telecommunications orbiter, and an enhanced option requiring an Ariane-5 launch. The latter option would allow an independent European mission with its own telecommunications orbiter and would provide the opportunity for continuing Mars Express-type science. A close examination was made of the overall project schedule, which resulted in a critical assessment of the 2011 launch target, which was considered to be very tight. The 2013 launch would provide a robust schedule with several months' contingency.

On the payload side, a series of instrument interface meetings between ESA, the prime contractor and each Pasteur instrument teams allowed good progress in the design and definition of the instrument interfaces. An assessment of the Pasteur payload mass allocation began in early July and continued into August to check whether some of the payload instrument requests could be accommodated.

The Geophysics and Environment Package (GEP) status review activities began with a first meeting in early July and continued through August and September. Further investigations are ongoing.

A preliminary meeting took place with Roskosmos to discuss potential cooperation in ExoMars. Of particular interest is the procurement of Radioisotope Heater Units

(RHUs) of the type developed for the Russian Mars-96 mission. A follow-up technical meeting with BIAPOS, the company that developed and manufactured these devices, took place in early September with encouraging results. A meeting is foreseen in the near future to address the possibility of broader ESA/Roskosmos cooperation on the rover, airbags, parachute design and development.

Under the Exploration Core programme, the overall objectives and strategy for 2006–2009 were drawn up in line with the programme proposal resulting from the Berlin Ministerial Council in December 2005.

For the general exploration technologies and preparation for lunar exploration, several activities are under preparation. Habitation and life-support activities are being proposed for approval, dealing with further development of Melissa, development of the ALISSE advanced life-support system evaluator, further development of the ARES air-revitalisation system and further definition of exploration habitation requirements, for near-term implementation.

System-level studies are being proposed for *in situ* resource utilisation, better definition of ISS use for exploration and lunar mission analysis specifically addressing Lagrange orbits.

The Mars Sample Return Phase-A2 contract kicked off at end-August. Two precursor mission definition studies (autonomous rendezvous and soft/precision landing) will be performed after a first system design refinement loop.

Four tenders for approved planetary protection/RHU units/radiation-related activities of the Core programme were issued; proposals were received and are under evaluation.

Crew Space Transportation System

The Programme Declaration for the CSTS preparatory programme and a side document recording statements by participating States and ESA's Director General in connection with subscriptions were finalised on 29 September.

ESA and Roskosmos are discussing an exchange of letters that will establish the formal basis for conducting the preparatory programme as a cooperative undertaking. A fully-fledged agreement in accordance with the requirements of both agencies will be worked out and signed at a later stage. In parallel, the two parties will discuss and put in place the necessary measures to launch programme activities at both Agency and industrial level.

The ESA procurement process for industrial activities is being launched so that a contract can be awarded to industry as soon as possible.

Vega

The qualification test campaign for the launcher's upper composite started at the beginning of August in the ESTEC Test Centre. In September, it passed its vibration tests mounted on a shaker while some 400 accelerometers and 40 strain gauges measured the movements and deformation of the structure. Acoustic tests are scheduled for mid-October.

The Vega upper composite is prepared for testing in the Large European Acoustic Facility at ESTEC



The earthworks at the Soyuz Launch Site

The qualification test of the Zefiro-23 forward skirt was successful on 22 September. The test plan at the component level to characterise the skirt mechanical characteristics is under way.



The Zefiro-9 performance recovery plan was concluded. A slight modification of the propellant formulation and an increase in the expansion ratio were proposed. The modifications were reviewed in the Zefiro-9 CDR that began in September.

The composite structure for the P80 Demonstration Model firing test arrived in French Guiana during July, and the propellant casting was successful in August. Integration of the nozzle, igniters and sensors is proceeding according to schedule. The first firing test is planned for end-November.

Soyuz at CSG

The construction site has changed considerably in the past few months. Temporary facilities such as offices, changing rooms and catering facilities, were erected around the site. The stone crusher was erected and put to work, allowing the rock debris from the flame chute excavation to be used elsewhere. The foundations of the Launch Operation Centre and for the air-conditioning facility were laid. Hoisting equipment is being installed around the building construction sites.

The excavation of the flame chute is proceeding at a good pace, although problems have been encountered. It was discovered that the rock layer where the pillars of the launch table would have rested

is not uniform. Instead, the construction company is building a concrete pillar, 8 m in diameter and 8 m deep, to reach the rock ceiling. The impact on the planning is being analysed and measures will be taken to regain the time needed for this unforeseen activity.

The CDR for the Launch System is scheduled for late October. The next industrial CDR for the Russian deliveries will be held in three steps, one for each major industrialist involved. The first began in late September, with the other two before the end of the year.

FLPP

An Authorisation To Proceed (ATP) was awarded to industry in July for the Vinci Expander Demonstrator first contract, funded by FLPP-2. The NGL ELV and Building Blocks system concept studies began after national agencies agreed on the Launcher System Workshop conclusions. The first set of industrial activities for the Intermediate eXperimental Vehicle (IXV) was completed. The second set began, while IXV activities to be funded by FLPP-2 are upcoming, with the Statement of Work being finalised.

For the consolidated FLPP contract with NGL, all technical and contractual clarifications were received and contract signature is planned in October. Pending finalisation of negotiations, industrial activities were launched by ATP.

