

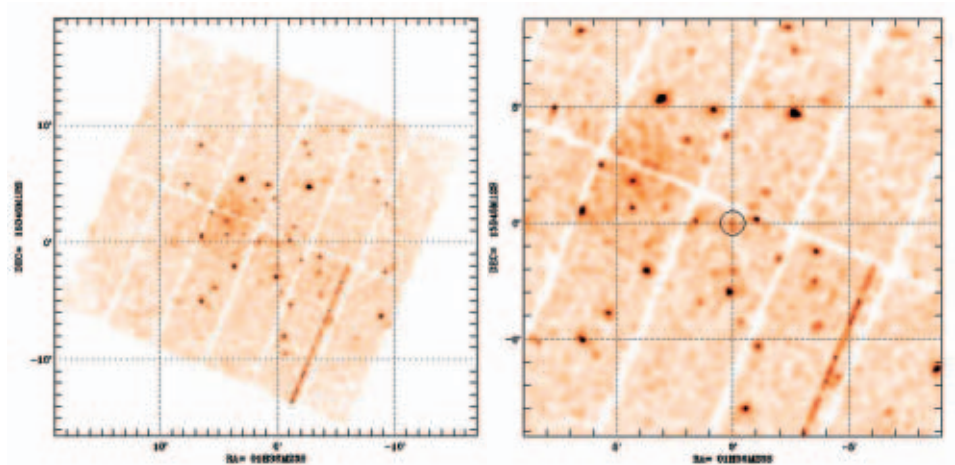
XMM-Newton

The XMM-Newton operations continue to run smoothly. During the first quarter of 2002 some science time was lost, partly due to high solar activity and partly to the fact that the regular XMM-Newton ground stations were needed to support the launch of Envisat.

The fifth eclipse season for the spacecraft passed without any problem. Some instrument-related problems that occurred during previous eclipses did not recur this time.

A number of successful observations have been made of so-called 'Targets of Opportunity' and the early quick-look results have been made public via the Web (see http://xmm.vilspa.esa.es/external/xmm_news/items/sn_2002_ap/index.shtml, and http://xmm.vilspa.esa.es/external/xmm_sched/too/index.shtml).

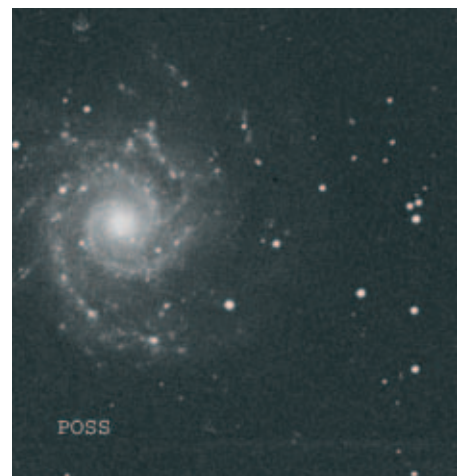
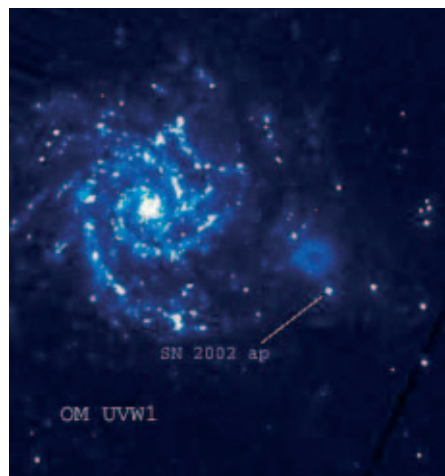
XMM-Newton data processing and data shipment is also running according to plan. A total of 1635 observation sequences have been executed, and the data for 1511 of these have already been shipped. A new and much improved version – especially in terms of calibration – of the XMM-Newton Science Analysis Software (SAS), a co-development



Supernova SN 2002 ap was observed by XMM-Newton on 2 February 2002 for a total of 37 ksec.

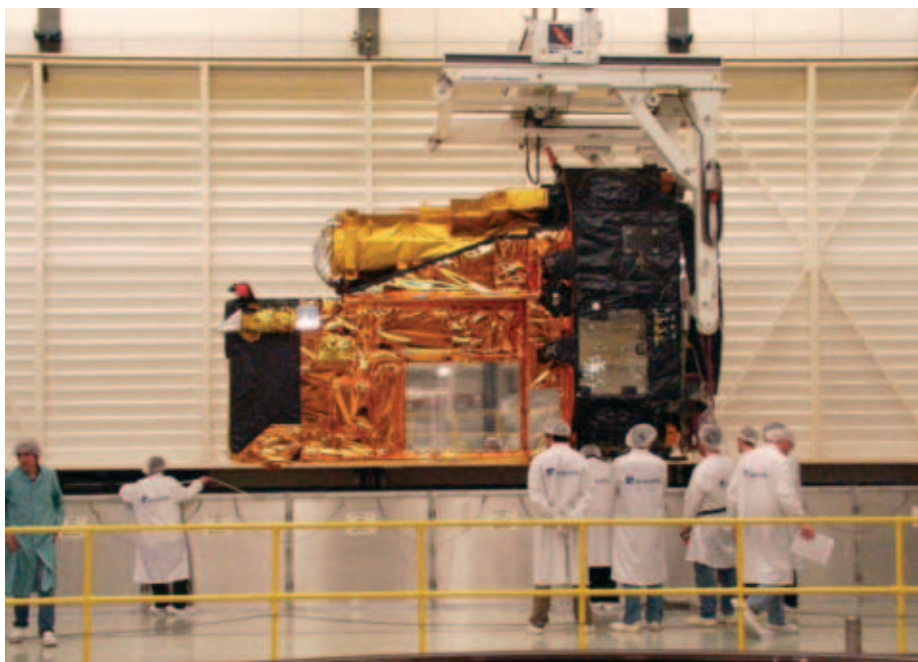
Left: EPIC PN full image centred on SN 2002

Right: Closeup of a circle of 30 arcsec radius around the supernova



The left image of the M74 host galaxy taken in the near-UV with the Optical Monitor (OM) on board XMM (UVW1 filter: 2450-3200 Å) clearly shows the presence of the supernova. On the right is the optical Palomar Sky Survey image of M74. Both images are 10x10 arcmin. The bluish ring-like structure in the UV image north of the SN is an instrument artefact

Integral flight model being moved to the Large Solar Simulator at ESTEC (NL) for thermal-vacuum testing



between ESA and the Survey Science Centre (SSC), has been released.

Work on the first phase of development of the XMM-Newton Science Archive (XSA) is nearing completion, with public release scheduled for April 2002.

Integral

The Integral spacecraft has completed its acoustic vibration test campaign without any major problems. The flight-model environmental test campaign in the ESTEC facilities is continuing with the thermal-vacuum and thermal-balance testing. This challenging test is the last environmental checkout before final functional verification. Everything is

therefore on track for the Flight Acceptance Review scheduled for July. The current plan is to ship the spacecraft to the launch site in August for a launch in October 2002.

The payload calibration campaign, during which the performance of the scientific instruments was verified using radioactive sources, has been successfully completed. The instrument flight-acceptance review is progressing satisfactorily and is scheduled to be completed in May.

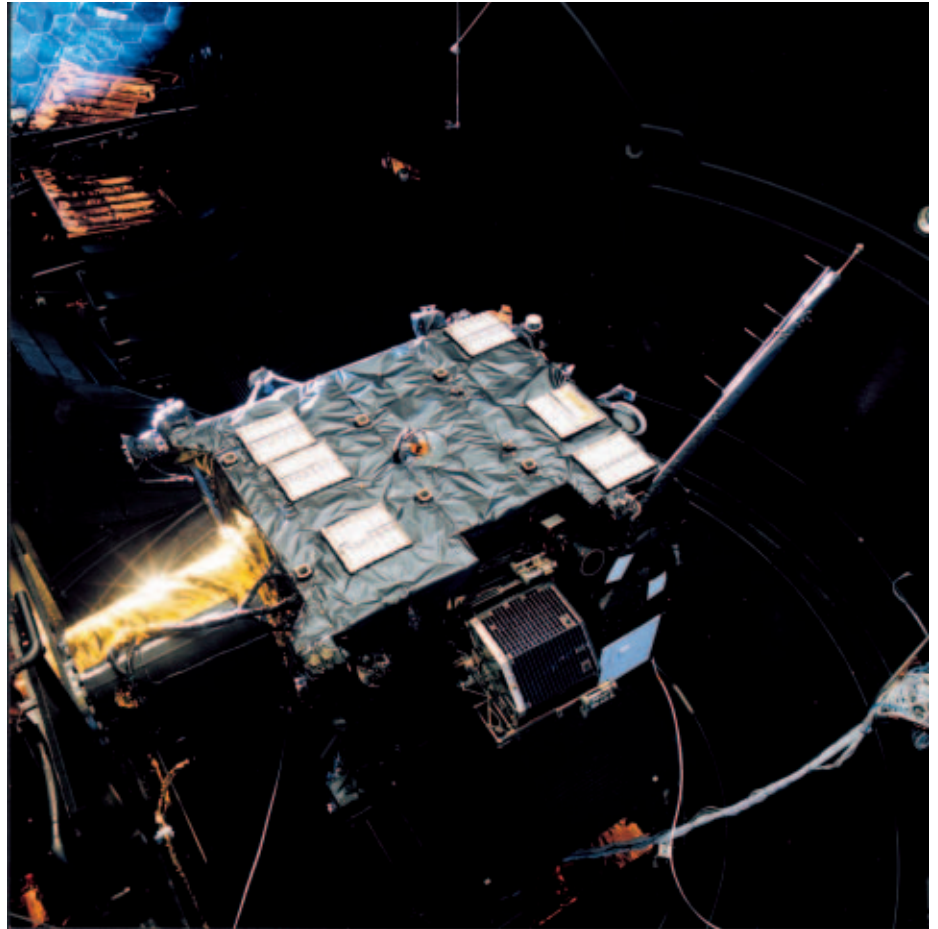
The mission Final Design Review has been successfully completed. Production of the Proton launcher system for Integral is proceeding according to the agreed master schedule. However, due to delivery delays, the engines and certain control-system elements are now on a critical path.

The final ground-segment integrated test has been successfully completed. This test involved the Integral Science Operations Centre at ESTEC (NL), the Mission Operations Centre and spacecraft simulator at ESOC (D), and the Integral Science Data Centre in Geneva (CH).

Rosetta

The flight-model spacecraft has successfully undergone thermal-vacuum testing in February/March. This has demonstrated that the spacecraft can function nominally in vacuum at extreme hot and cold temperatures, as well as that the thermal-control system will keep the units within acceptable temperature limits during the near-Sun and deep-space phases of the mission.

The spacecraft is now being prepared for its mechanical acceptance testing, and the complete environmental test programme should be completed by the end of July 2002. After some refurbishment, the flight spacecraft will be shipped to the launch site in September. All subsystems are functioning nominally and the flight transponders, which were previously a very time-critical item, have now been delivered. The electrical qualification model programme is continuing in parallel and is being used to verify all software functions and operational procedures.



The scientific payload is continuing to operate nominally on the flight-model spacecraft. Two experiments are requesting to exchange their detectors, which will be performed during the refurbishment phase. The Experiment Flight Operations Review (EFOR) process will take place for each payload during the second quarter of 2002.

The Lander was successfully separated from the Orbiter after the thermal-vacuum test, underwent a set of modifications, and was then re-installed. An independent working group has studied the previously critical landing gear and has made various recommendations regarding its design and verification in order to improve the gear's robustness.

The ground segment's development is progressing according to plan. The New Norcia ground station is still on schedule to be ready by August 2002. Various validation tests have taken place, whereby ESOC has directly commanded both the proto-flight and electrical-qualification spacecraft. Radio-frequency (RF) compatibility tests using a spacecraft RF suitcase and a reference ground station are underway. So far, no new problems

The Rosetta flight spacecraft in the Large Space Simulator (LSS) at ESTEC in February 2002

with the overall RF system, including the transponder, have been detected.

The Rosetta Science Operations Centre has undergone an implementation review and is on course for verification after the payload commissioning in orbit during 2003.

Detailed preparations are progressing for the launch campaign in Kourou, French Guiana. The manufacture of the Ariane launch-vehicle is going according to plan and the unique Rosetta requirements, due to the escape mission scenario, are being addressed between the project and Arianespace.

Herschel/Planck

The system-design activities for both spacecraft have progressed well, with the main emphasis on instrument-interface definition and subsystem and unit

specification. The procurement activities were very intense during the quarter. Subcontractors were brought on board at a high pace as result of the successful completion of various proposal evaluations and decision processes.

The first tests of the radio-frequency characteristics at 30 and 100 GHz of the Planck telescope and baffle designs were successfully carried out at the end of March in the high-frequency test facility at Alcatel in Cannes (F).

The development of the large, 3.5 m-diameter, Herschel silicon-carbide telescope has also progressed according to plan, working towards a planned Critical Design Review in April 2002. Progress in the development of the Planck reflectors has also been nominal.

The development statuses of four of the five instruments were reviewed as part of the Instrument Baseline Design Review. This review resulted in many actions to be followed-up by the instrument development teams, but also in a good baseline for convergence of the instrument interface documentation. Manufacture of the first hardware development models has also been started. The fifth instrument, LFI, has gone through a de-scoping exercise in order to stay within the budget constraints and is now being prepared for its Baseline Design Review in June 2002.

The launcher interface definition exercise with Ariane resulted in confirmation of compatibility in terms of ascent and injection trajectories, mechanical environment and pre-launch operations.

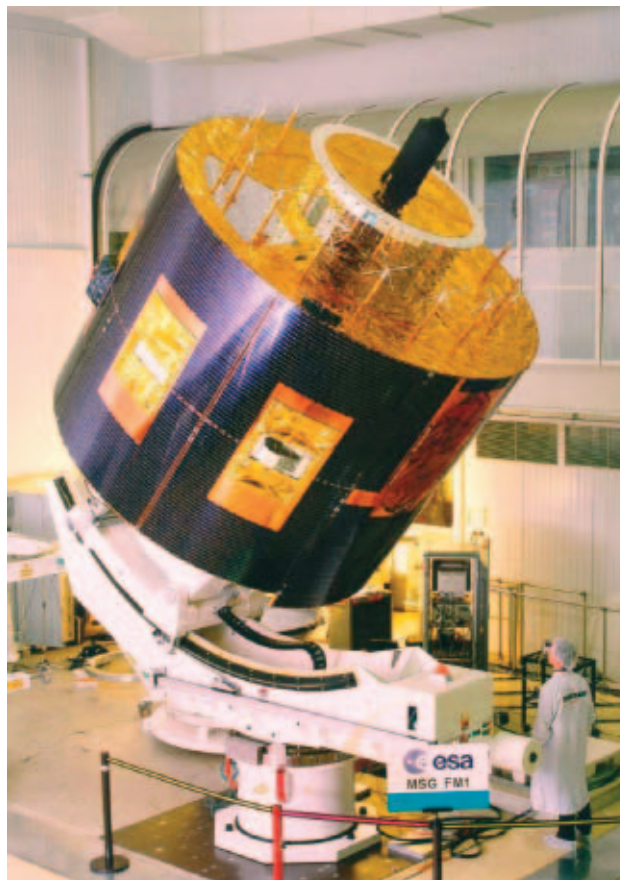
Meteosat Second Generation

Preparations for the launch of the MSG-1 spacecraft are proceeding on schedule. Based on the non-availability of a co-passenger for an Ariane-4 launch in July 2002, Arianespace has committed to an Ariane-5 launcher that will provide a shock environment as smooth as Ariane-4. This is being accomplished by the introduction



RF testing of a Planck development model

of a series of three specific shock-absorbing devices, mounted on the launch vehicle. Following a successful shock analysis, the launch date has been set for 13 August 2002, on Ariane flight V513. To meet this launch date, the MSG-1 spacecraft will be flown from Cannes (F) to Kourou (Fr. Guiana) on 13 May 2002 aboard a Russian Antonov aircraft.



Testing of MSG-1 at Alcatel Space Industries

The MSG-2, MSG-3 and engineering-model spacecraft will remain in storage until after the MSG-1 launch.

MetOp

Following the consolidation of the restructured Assembly, Integration and Verification (AIV) programme, activities at Astrium in Friedrichshafen (D) have generally proceeded as planned. Evidence of the 'interleaving' approach now being taken can be found in the Astrium integration facilities, where the three Payload Modules – MetOp-1, -2 and -3 – are presently in various stages of integration.

The flexibility allowed for in the revised approach could accommodate, with minimum impact, unanticipated delays in the delivery of some customer-furnished instruments. In particular, the AVHRR and HIRS instruments are currently being reworked, and the A-DCS instrument experienced functional problems during acceptance testing, which have since been resolved with a work-around solution.

During the reporting period, Service Module (SVM) integration has been started at Astrium in Toulouse (F). The first GOME-2 flight model has completed its acceptance testing at Galileo Avionica in Florence (I), and is now undergoing calibration in TPD-TNO in Delft (NL). The first ASCAT flight model has been successfully acceptance tested and is now being integrated with the Payload Module. Good progress was also made in debugging the complex on-board software of the GRAS instrument, which has allowed the commencement of the acceptance testing.

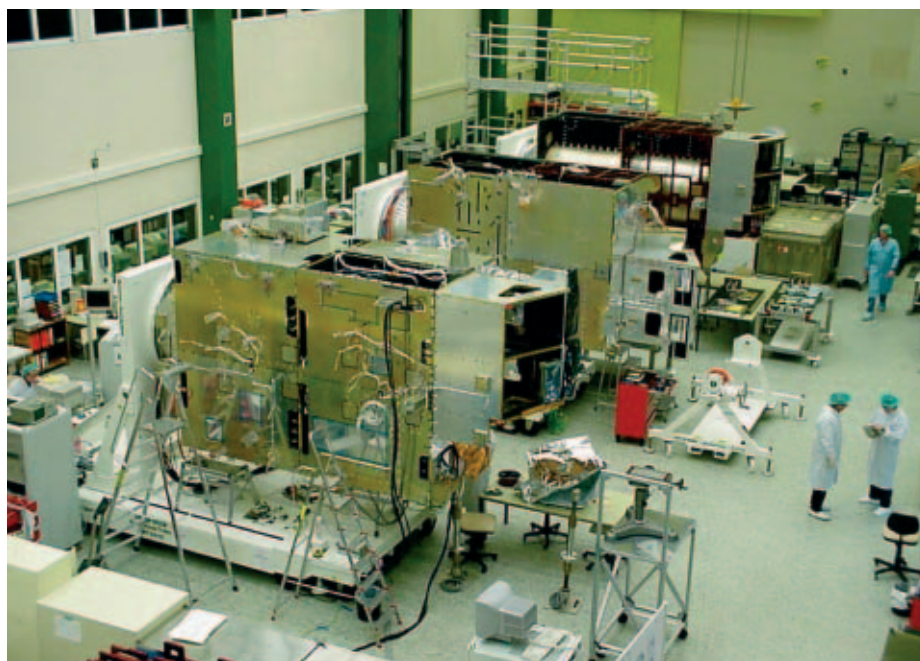
The IASI instrument has entered a very important phase with the starting of its Critical Design Review, which will hopefully have a successful outcome. Nevertheless, the IASI delivery schedule remains critical for the programme.

Work continues with Starsem and Astrium on finalising the launcher/satellite interface documentation and the associated industrial design dossier for MetOp.

Eumetsat is currently finalising, with ESA involvement, the wrap-up of the System Preliminary Design Review. The Core Ground-Segment Critical Design Review is planned for this coming summer.

Envisat

Following the successful launch of the Envisat satellite on 1 March 2002, the solar-array deployment and the attitude acquisition were performed within less than one and a half hours after launch. Less than two days after launch, orbit manoeuvres were performed to set Envisat drifting towards its final orbit, 30 minutes ahead of ERS-2 and with the



same orbital ground track. This was achieved by 3 April.

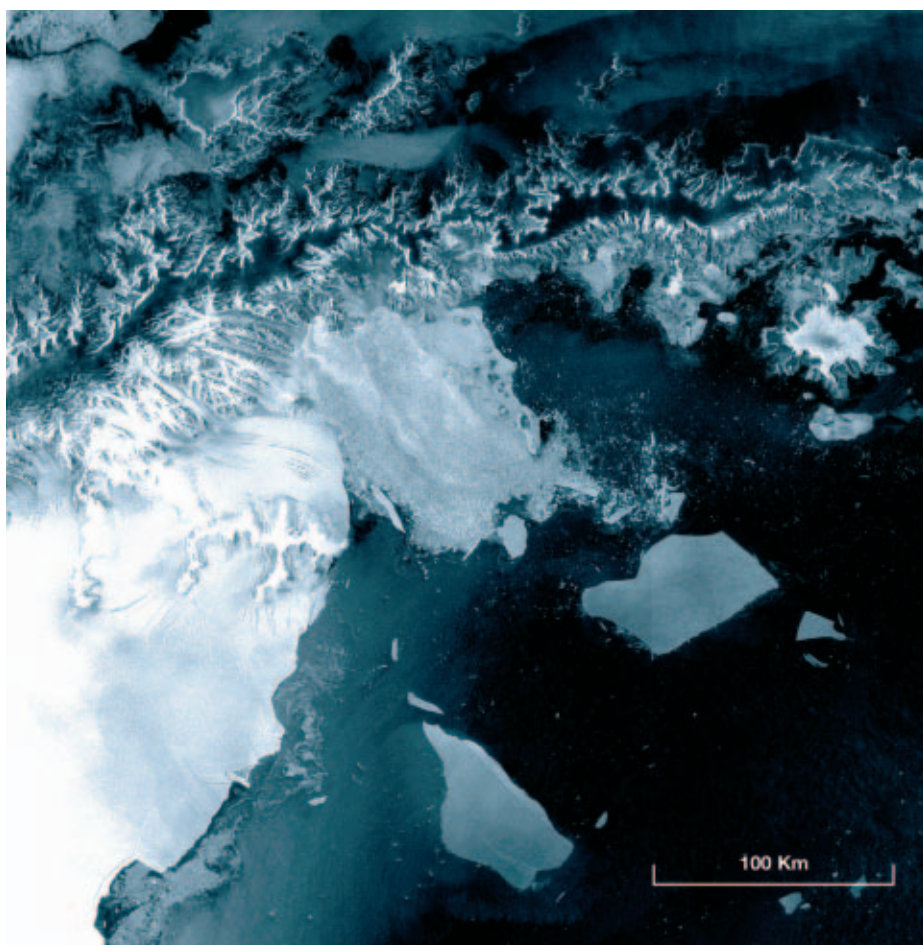
The Launch and Early Orbit Phase (LEOP) was completed on schedule. By 4 March, the ASAR antenna deployment had been completed, and the Artemis Ka-band antenna mast was deployed on 7 March. All Instrument Control Units were switched

The Metop-1, -2 and -3 Payload Modules in the clean room at Astrium in Friedrichshafen (D)

on in the following days and the X-band link, plus on-board recording capabilities, activated.

All instruments were then progressively switched on and data taking activated successfully for all of them. The last two instruments, AATSR and Sciamachy, for which part of the activation process was different to avoid contamination during satellite outgassing, were fully operational by the end of April.

Data acquisitions by the Kiruna (S) and Matera (I) ground stations were performed successfully and the data were delivered via landlines and via the Data Dissemination Satellite System (DDS) to ESTEC, ESRIN and the ESLs (Expert Support Laboratories) participating in this phase. These data transfers, and the processing at the various sites, permitted the timely production of several ASAR and MERIS images for the first Envisat press event, which took place at ESRIN in Frascati (I) on 28 March.



This Envisat ASAR image taken on 18 March 2002 shows the disintegration of the Larsen B ice shelf in Antarctica, in which 3300 sq km of ice was lost. Envisat is making regular all-weather observations of the Antarctic ice shelves, which a key area of interest for global-change research

The Flight Operation Segment (FOS) and the Payload Data Segment (PDS) supported all of the early manually controlled operations very well. The automatic planning by the corresponding mission-planning subsystems has been progressively activated in moving towards the nominal operations scheme for the Envisat mission. While this activation has not hampered the full recovery of the instrument data, it has highlighted several software weaknesses, which are now being corrected to achieve the required operational robustness.

The Switch On and Data Acquisition Phase (SODAP) was satisfactorily concluded on 16/17 April and the calibration activities are currently in progress. The product release to the users will take place in a staggered manner, and as soon as the engineering products (Level-1B products) are declared calibrated, the corresponding service will be opened to users.

Altogether, the first two months of the mission have been highly successful: the satellite is healthy and the data analysed so far are showing very promising performances for all instruments and supporting onboard services.

CryoSat

The major event during the first quarter of 2002 was the signature of the contract between ESA and Astrium GmbH for the development and delivery of the CryoSat spacecraft. The project has now entered the main development phase (Phase-C/D) and work is progressing according to plan. A breadboard version of the onboard computer (CDMU) and its associated software has already been delivered to the satellite Prime Contractor for evaluation.

Offers concerning the CryoSat launcher are expected by the end of April 2002 and a decision should be taken before the summer.

The development of the CryoSat ground segment is also progressing according to plan, both at ESOC in terms of the preparation of the flight operations, as well as in industry in terms of the development of the Payload Data Segment.

Within the framework of the Announcement of Opportunity (AO) for the calibration and validation of the SIRAL instrument, proposals have been received from some 13 countries.

GOCE

The GOCE Preliminary Design Review (PDR) presentation by Industry and delivery of the related data package took place on 22 February. The PDR Board is scheduled to meet on 9 April. Successful conclusion of the GOCE PDR will be the milestone marking the end of the project's design phase (Phase-B).

Good progress has been achieved in the competitive selection process for the various equipment suppliers, but the selections in the micro-propulsion and solar-generator areas remain on hold.

The majority of the actions resulting from the Gradiometer PDR have been addressed and an updated data package is now under review. It is expected that this will result in a proper close-out of the review. However, the Gradiometer's development remains the most critical item in terms of the GOCE schedule, as the delay in flight-model delivery can only be partially recovered at system level. There is therefore a resulting delay of about four months in the Final Acceptance Review, leading to a current predicted launch date of mid-February 2006.

Activities have been started with ESOC to prepare for the GOCE Flight Operations Segment (FOS) Requirements Review, currently planned for the third quarter of 2002.

International Space Station

ISS Overall Assembly Sequence

During the first quarter of the year, one logistics Progress flight was launched to the ISS from Baikonur on 21 March.

Columbus Laboratory

Integration work has been finalised, with the exception of rack D1 and some external equipment, and the module has

now been closed on the starboard side. Qualification testing on the electrical test model is continuing.

Columbus Launch Barter Nodes-2 and -3

The Node-2 flight-unit integration has continued, but delivery to NASA's Kennedy Space Center has been delayed by three months, to end-February 2003. Assessments of test/verification activities have been initiated by NASA and the Italian Space Agency (ASI) in order to maintain the launch date of February 2004.

The last Node-3 primary structure weld is in progress and options to Europeanise Node-3 are being studied as part of the overall exercise to find an acceptable ISS 'end state'.

Crew Refrigerator/Freezer (RFR)

NASA has cancelled the Refrigerator/Freezer Racks project. Activities will cease following qualification-model verification and delivery to NASA in April 2003.

Cryogenic Freezer (CRYOS)

Following the kick-off meeting for the Cryo-Freezer early in February, the Contractors have started activities on the specifications set-up. The first progress meeting with Industry is scheduled for mid-April.

Cupola

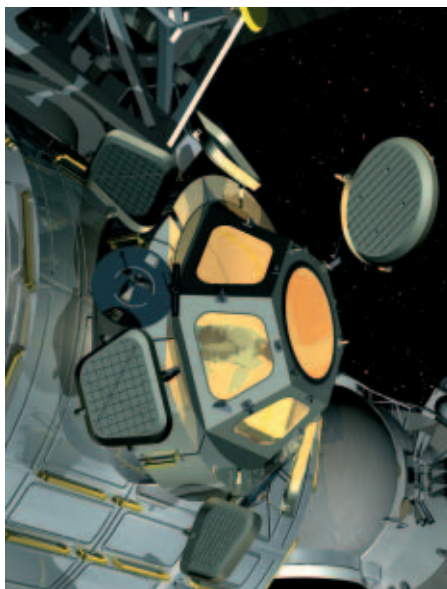
The new flight-unit dome forging has been manufactured and delivered for final machining, and the manufacture of the flight-unit shutters, harness and window frames is in progress. An instrumentation error during vibro-acoustic test preparation has caused a delay in the delivery of the Structural Test Article (STA) to NASA's Johnson Space Center until not earlier than June 2003.

Automated Transfer Vehicle (ATV)

Modal-survey tests on the structural/thermal model (STM) have continued at ESTEC.

The proto-flight model (PFM) avionics-bay structure was delivered on schedule and avionic integration and tests on the avionics electrical test model (ETM) have started.

Preparations for propulsion-subsystem qualification testing have restarted.



Artist's impression of the Cupola

X-38/CRV and Applied Re-entry Technology (ART)

Work on the European contributions to the X-38 vehicle has continued. In March, NASA postponed indefinitely the flight date for the X-38 vehicle V201 and further drop tests, but intends to continue integration and system testing at Johnson Space Center until autumn 2003, leaving the possibility for NASA management to reconsider the flight demonstration open. All remaining work on the European contributions to the X-38 vehicle will be completed, but shipment to NASA-JSC will be put on hold pending clarification.

No further CRV activities will be initiated until the vehicle's future is clarified. Current activities will be completed within 2002.

Ground-segment development and operations preparation

The Request for Quotation (RfQ) for the main development phase (Phase-C/D) for the ATV Control Centre (ATV-CC) has been finalised and the pre-TEB (Tender Evaluation Board) held to review and release the RfQ. Individual Columbus Control Centre (COL-CC) subsystem offers have been evaluated and the subsystem contracts incrementally kicked-off.

Utilisation

Preparation

The Space Station User Panel meeting in February was attended by two officials from the European Commission, and focused on increased cooperation between ESA and the EC.

Detailed work on the plans for the

implementation of User Support Operations Centres (USOCs) is in progress.

Of the 44 Microgravity Application Projects (MAP) originally planned, 42 are now ongoing; one has been cancelled due to lack of funds and one is still under negotiation.

Payloads and their integration

Negotiations with industry for the main development phase (Phase-C/D) for the atomic-clock instrument ACES are being finalised. Development of the external payloads Solar/Export and EuTEF is ongoing. The Space Science instruments EUSO and Lobster are in the design phase (Phase-A), and preparations for the Phase-A/B for the RapidEye commercial Earth observation payload are continuing. The Preliminary Design Review (PDR) for the European Drawer Rack (EDR) has been completed. Following the kick-off meeting for the Cryo-Freezer in early-February, activities have started on the specifications set-up. The ESA Microgravity Science Glovebox (MSG) was integrated into the Multi-Purpose Logistics Module (MPLM) on 4 March, ready for flight.

Flight Unit 1 of the -80 degC Freezer (MELFI) was delivered to Kennedy Space Center by the end of March. Launch to the ISS is foreseen for January 2003.

The qualification test campaign for the Hexapod pointing system should be completed in April.

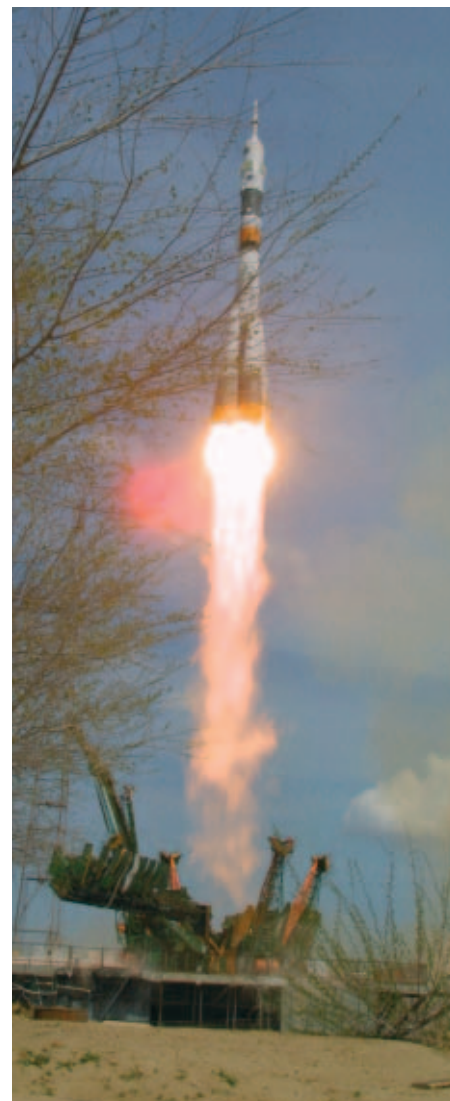
The Global Transmission System (GTS) functional verification testing has revealed a potential failure and further detailed checkout tests are planned prior to activation.

Astronaut activities

Roberto Vittori has been nominated as Soyuz Board Engineer for the Russian taxi flight 'Marco Polo', sponsored by the Italian Space Agency (ASI), in April. Negotiations with Rosaviakosmos

regarding a Soyuz taxi flight in November 2002, sponsored by the Belgian Office for Scientific, Technical and Cultural Affairs (OSTC), are close to conclusion. The training of Frank De Winne in Star City continues and the experiment training, managed by the European Astronaut Centre (EAC), started on 11 March in Brussels. Christer Fuglesang has been assigned to ISS Assembly Flight number 12A.1, currently planned for May 2003. He will perform three EVAs during the mission (see page 98 for latest news).

The ISS Advanced Training continued with the first training period at NASDA in February 2002, with one week's training for each of the four ESA astronauts (P. Duque, L. Eyharts, P. Nespoli and T. Reiter), each with one NASDA colleague. This Advanced Training class, together with six astronauts from NASDA and one from NASA, will visit the European Astronaut Centre (EAC) for the first Columbus Systems Training in August 2002.



Launch of the Marco Polo Mission with ESA astronaut Roberto Vittorio on board

The Columbus Trainer Mechanical Configuration has been installed at EAC and will be outfitted in the coming months. A second unit has been installed at NASA-JSC as part of the Space Station Training Facility (SSTF). The first training with the Columbus Trainer at EAC will be provided in August 2002 to the ISS Advanced Training class.

A meeting of the European Astronaut Corps took place in Brussels from 4 to 8 March, and was accompanied by high-level public-relations-oriented events, with the participation of Crown Prince Philippe of Belgium.

Early deliveries

Data Management System for the Russian Service Module (DMS-R)

As a result of an ISS computer problem, control of the Station's orientation was lost for several hours on 4 February. Initial indications from the investigation of this problem have identified the application software and/or its interface with the DMS-R operating system as the cause.

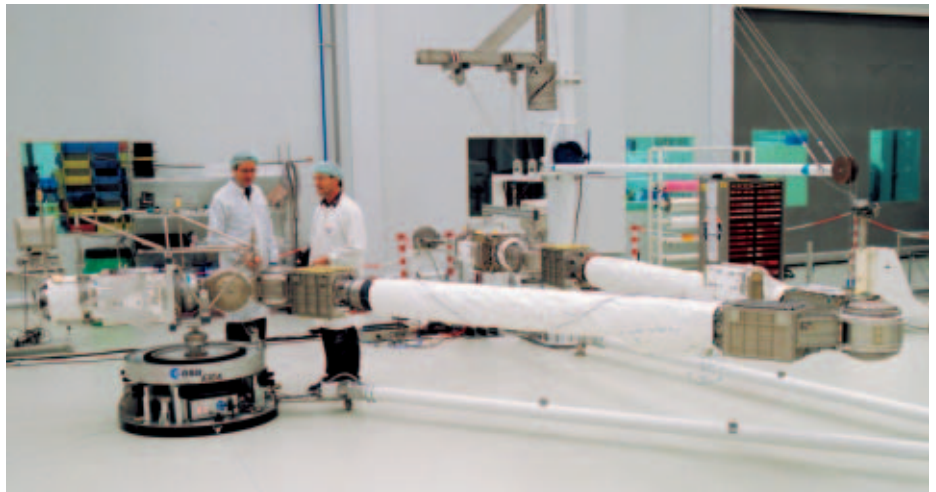
European Robotic Arm (ERA)

The functional qualification testing of the ERA flight model at the Prime Contractor's flat-floor facility is in progress. A delay in the completion of the Mission Preparation and Training Equipment (MPTE) has delayed the ERA system-level qualification and acceptance, which will now take place in October/November 2002.

ISS Exploitation Programme

The Cooperation Agreement for Implementation of Commercial ISS Utilisation Preparation has been signed by all parties permitting an incremental implementation of the cooperation as a function of the ESA financial commitment, which will be matched by the Partners in terms of firm commitments at the same level. All ISS partners have agreed to initiate the ISS global branding programme, and the target date for having the programme in place is end-2002.

In Europe, the Sponsorship Programme has been initiated with the flight opportunity of R. Vittori. Commercial blood-pressure-measurement equipment has been transported to the ISS on the Progress flight in March and an in-orbit demonstration will take place in April-May. Agreement has been reached with Industry on a transitional approach



towards implementing the Industrial Operations end-to-end service contract.

A Rider to the Preliminary Authorisation to Proceed (PATP) has been developed and will be released to Industry in April. The main articles of the contract have been negotiated and the Rider will be finalised in the near future.

Work on the CCN-3 Early ATV Procurements is continuing according to plan. The updated Production Concept Review documentation has been delivered and is being reviewed.

The preparation of the RFQ for ATV production has been started.

Microgravity

An adapted proposal for the programme contents of the European Life and Physical Sciences (ELIPS) programme, aligned with the subscription level of 171.4 MEuro, was endorsed by the Life and Physical Sciences Advisory Committee (LPSAC) and subsequently approved by the relevant ESA authority.

Preparation of ESA's payloads (APCF, Biobox, ERISTO, FAST, ARMS and Biopack) for their July 2002 flight on STS-107 is ongoing.

The refurbishment of facilities and experiments for the Russian Foton M1 recoverable capsule mission is in progress and the implementation of new experiments is under negotiation.

The Maser-9 sounding-rocket flight on 16 March was only partially successful

ERA Robotic Arm flight model at Fokker Space

due to problems with some of the biology experiments.

The 32nd Parabolic Flight Campaign was conducted between 18 and 21 March.

Various payloads for the ISS are under development, including the European Modular Cultivation System (EMCS) biology facility, due to be launched mid-2004, and the Expose facility for exobiology, for which a launch date has not yet been set by NASA. Delivery to NASA of the HGD/PFD and PEMS physiology instruments is imminent completion, but at present there is no utilisation planning on the NASA side.

Development of the MARES (physiology) and Matroshka (radiation) facilities for the Russian module and of the PCDF (proteins) continues.

Microgravity Facilities for Columbus (MFC)

The flight-model subsystem procurement and manufacturing for Biolab are progressing and have reached 70% completion. The close-out of the Critical Design Review (CDR) for the Fluid Science Laboratory (FSL) has been successfully completed and the engineering-model system test campaign is approaching completion. The engineering-model system test campaign for the Material Science Laboratory (MSL in US Lab) is also in progressing, and the crew review with ESA and NASA astronauts has been successfully completed.

Engineering-model manufacturing of the European Physiology Modules (EPM) is nearing completion, Standard Active Container engineering and flight models have been delivered to the national agencies, and interface compatibility testing with the science modules has been successfully completed.

Ariane-5 Plus

The flight hardware for the first Ariane-5 Plus flight (V517), now scheduled for end-August 2002, will be acceptance tested in early April. All of the V517 EPC flight hardware has been delivered, except for the engine, which will arrive in mid-May. In parallel, the activities concerning the definition of the 'standard 6' oxygen turbo-pump are progressing; the Critical Design Review for this new definition was held successfully in March and the first test model will be available at the end of July, the objective being to equip the third Vulcain-2 engine to this new standard. The qualification reviews for the Vulcain-2 engine subsystems are planned for April. For the solid booster (EAP), qualification reviews have been held for the attachment devices and the solid motor, and similar reviews have started for the front skirt and the stage.

The first simulation of the launch chronology with the filling (MR) model of the ESC-A stage was performed as planned on 25 March in Kourou, French Guiana. The detailed analysis is still in progress and preparations for the next chronology, which will take place in mid-April, are being implemented.

Concerning the dynamic mechanical stage model, the pyrotechnic separation tests for the upper stage and its lower skirt (ISS) have been successfully performed; the last step will be the separation test for the acceleration rockets. The rupture test on the structural model, including the engine thrust frame, a LOX tank dummy and the inter-tank structure, showed that the safety margins are good. The stiffness test on the hydrogen tank showed a higher stiffness than predicted.

The characterisation tests on the Vinci hydrogen turbo-pump are pending, awaiting definition of the speed limitation on the pump's impeller, which has not yet reached final manufacturing standard. The

ESC-B System Concept Review (RCS) may take place early in 2003.

Vega / P80

A proposal for the full Vega small-launcher development contract is expected on the basis of the Request for Quotation (RFQ) sent to industry (ELV) in February. Close-out of the System Preliminary Design Review (SPDR) actions has been completed within the framework of the current contract with ELV for initial development activities.

On the P80 side, the Preliminary Design Review kick-off meeting took place in March, followed by two working meetings during the month. The final report is about to be submitted to the Review Board, which will meet in April.

Ground facilities

Following its first use during the Envisat launch campaign, the new CCU3 payload-preparation facility in Kourou (Fr. Guiana) is undergoing some improvement work in order to achieve full operational status prior to a technical review scheduled for April.

In the Vega ground-segment area, the Procurement Plan and the set of Procurement Proposals have been approved by the ESA Industrial Policy Committee (IPC). A Vega Ground Segment Industry Day, in which around 100 invitees participated, was held at ESRIN on 19 March, in order to present the activities to be performed to potential contractors. On the technical side, activities have concentrated on the actions resulting from the Ground Segment Key Point review held in February, in preparation for the Preliminary Design Review next June.



Artist's impression of Vega