Programmes in Progress
### In Orbit

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ISO

The ISO Data Centre Active Archive Phase activities have continued to run smoothly. The Archive remains busy and, on average, each month in 2003 has seen 60 users downloading some 13% of the content, i.e. the equivalent of the full scientific content is being retrieved every eight months by the community.

Requirements have been consolidated for a new version of the ISO Data Archive (V.6), planned for release in July, which upgrades the functionality associated with, and visibility of, the Expert Reduced Data (i.e. data reduced systematically ‘by hand’). Projects focusing on reducing data from selected observing modes are underway and a campaign for soliciting reduced data from the community is about to start.

A new approach to data-quality assessment has been laid down, upgrading from a small set of ‘technical quality flags’ to a well-structured quality report, which often includes a ‘scientific assessment’. Implementation of this approach, which is the same as that foreseen for the XMM-Newton Science Archive, is planned for version 7 of the ISO archive, due for release end-2003.

ISO continues to have a significant presence in the refereed literature, with about 1000 articles drawing upon ISO data having appeared since late-1996, 143 of them in 2002, with a similar number expected this year. These ISO-based papers cover almost all areas of astronomy.

Data processing and data shipment is proceeding according to plan: over 2500 observation sequences have been executed, and the data for 2400 of these have been shipped. Version 2.0 of the XMM-Newton Science Archive (XSA), including the first release of the Survey Science Centre (SSC) generated source catalogue, was successfully released on 7 April for use by the whole astronomical community.

The programme-completion status is as follows:
- Guaranteed time : 96.9 %
- AO-1 programme : 93.5 %
- AO-2 programme : 39.4 %

The third call for observing proposals (AO-3) was released on 17 March, with a deadline of 30 April, and is open to all astronomers worldwide.

On 27 February, a Gamma-Ray Burst (GRB) alert was received from ESA’s Integral satellite and XMM-Newton was used to follow up this event. GRB030227 was discovered at 08:42 UT on 27 February in the field of view of Integral’s IBIS telescope. Notification was received by Vilspa (E) at 10:00 UT and an observation was immediately approved by the XMM-Newton Project Scientist for execution at the beginning of orbit 590, which was starting at 11:09 UT the same day. The observation began at 16:39:39 UT and lasted for a total of 49 ksec. Already after the first 1000 sec of exposure, two sources were clearly present in the MOS field of view. Initial results can be found at:

The above sequence of events clearly demonstrates XMM-Newton’s ability to rapidly (< 6 h) follow up external triggers, and illustrates the powerful and unique capabilities offered by operating the Integral and XMM-Newton observatories in combination.

By the end of March, some 280 papers based on XMM-Newton data had been published in, or submitted to, the refereed literature.

Integral

Following its successful commissioning and performance-verification phases, Integral has entered routine operation, conducting observations on behalf of the astronomical community and guaranteed-observing-time holders. Operations are proceeding smoothly with no major concerns.

In February, the observing programme was interrupted to allow observations of the Crab Nebula ‘standard candle’ source. These observations will allow the sensitivities and responses of Integral’s high-energy instruments to be accurately derived and provided to observers. Unfortunately, the Crab Nebula was not visible earlier in the mission due to solar-aspect-angle constraints.

As part of the guaranteed-time programme, Integral regularly scans the Galactic Plane looking for unusual activity and new gamma-ray sources. The first such new source, named IGR J16318-4848, was recently found in this way and prompted follow-on Target of Opportunity observations with ESA’s other high-energy mission XMM-Newton.
revealed a compact high-energy source deeply embedded in dense surrounding material. This material blocks many of the emitted X-rays, while allowing the gamma-rays through much more easily. This results in a relatively faint X-ray source as viewed by XMM-Newton, but a bright gamma-ray source for Integral. Since then, Integral has discovered two more similar sources, hinting that such sources may be much more common than astronomers previously believed.

The detailed Integral observing programme is planned about one month in advance and can be found on the web site of the Integral Science Operations Centre (http://astro.estec.esa.nl/Integral). The first public data are now available on the web site of the Integral Science Data Centre (http://isdc.unige.ch/) located near Geneva (CH), and the first shipments of data and processed science products to observers are expected to start shortly.

**Rosetta**

Various new mission scenarios were presented to the Agency’s Science Programme Committee (SPC) in February. The outcome was an SPC recommendation to study in detail a mission to comet Churyumov-Gerasimenko, which could be launched on an Ariane-5 G+ in February 2004. A ground observation programme has started to further characterise the new target comet, and a Lander Working Group has been set up to consider in detail the difficulties of landing on this particular comet nucleus, which is larger than Wirtanen.

An alternative is a mission to the original target comet Wirtanen, to be launched in January 2004 but using a more powerful launch vehicle, e.g. Proton. A back-up to these missions is also available to comet Churyumov-Gerasimenko with a launch on an Ariane-5 ECA or a Proton in February 2005. The final decision will be made by the SPC in May 2003.

The Rosetta flight-model spacecraft remains at the launch site in Kourou (Fr. Guiana), where preparations for off-loading the fuel are underway. It will now remain there and will be used for testing any software updates before the new launch campaign starts later in the year.

The engineering-model spacecraft has been transported to ESOC, where it will remain throughout the mission. It will also be used to test any new software updates, to train for the flight operations, and eventually as a facility for studying any anomalies when the spacecraft is in orbit.

**Mars Express**

After the spacecraft had successfully completed all relevant tests, the Beagle-2 landing craft was mounted on it for the first time in early March. The spacecraft, Beagle-2 and all necessary support equipment have since been transported by two Antonov-124 cargo planes to Baikonur, on 19 and 21 March, respectively.

Concern about the proper functioning of a power distribution box on the spacecraft necessitated the removal and repair of this unit. Its re-installation on the spacecraft in Baikonur required extra work, inducing a slip in the launch date from 23 May to early June. The launch campaign is progressing well, with activities being executed ahead of the planned dates.

The Ground Segment Readiness Review was successfully completed in early February, and the Flight Acceptance Review for the spacecraft was held in mid-March.

See page 107 for latest news
**SMART-1**

After completion of the environmental tests, the SMART-1 flight model successfully passed the second System Functional and Performance Test (SFPT-2). The Flight Acceptance Review (FAR) Board, meeting on 20 February, confirmed SMART-1’s readiness to fly, provided that the actions assigned – mainly a documentation update and some extra verification tests – were satisfactorily closed out. Arianespace has identified a launch opportunity for SMART-1 between end-July and end-August. The spacecraft activities will be resumed with the final functional test and system verification test with ESOC, and the integration of the solar arrays, before transportation to the launch site. In the meantime, the FAR actions are being completed.

Preparation of the Mission Control System (MCS) at ESOC (D) and the Science and Technology Operation Co-ordination (STOC) at ESTEC (NL) is going according to plan. The Ground Segment Readiness Review for the MCS has already been held, while a delta review for the STOC will take place at the end of May.

Due to the launch-configuration uncertainties, Arianespace has still to perform the final mission analysis for the SMART-1 launch. The associated review is now expected to take place in June, and its success is a pre-condition for the mission Flight Acceptance Review, expected to be held in early July.

**Herschel/Planck/Eddington**

Following the successful completion of the Spacecraft Preliminary Design Review (PDR) at the end of 2002, the project turned its efforts towards the detailed activities. Lower level PDRs took place for many units and subsystems (including some major ones such as the Attitude Control Subsystem), further contributing to the technical definition of the spacecraft at every level.

The Mission PDR – encompassing not only the spacecraft, but also the ground segment and the science operations – took place successfully in February and cleared the way for the programme to progress towards the next major milestone, the Critical Design Review (CDR).

There has also been progress in the definition of the later spacecraft testing activities. A facility specifically designed for vibration testing the Herschel instruments at cryogenic temperatures (-260°C) has been finalised at CSL in Belgium, and so the Project can now simulate on the ground the conditions that the experiments will encounter during launch.
Testing of the first qualification models of the Herschel payloads in this cryogenic vibration facility is scheduled for May.

The scientific instruments themselves are also advancing in their development, and the first full hardware models are being built and will be tested throughout the rest of this year.

Another area where major milestones are being achieved is in the manufacturing of the Herschel Telescope. The 12 petals that, when put together, will make up the full 3.5 m primary mirror have already been manufactured and will be joined together (by brazing) in the coming weeks. Thereafter, the complete mirror has still to undergo a number of other lengthy processes, including polishing, coating, and cryogenic optical testing.

The Eddington mission, to be implemented in the Science Directorate’s new ‘Cosmic Vision’ strategic plan as part of the overall Herschel/Planck/Eddington programme, has also made major progress. The ESA Industrial Policy Committee (IPC) approved the procurement proposal at its January meeting, authorising the release of the Invitation to Tender (ITT) for industry to conduct parallel definition studies, which should be kicked off in May. A contract has been placed for the manufacture and testing of the special CCD detectors needed for the Eddington mission.

### Double Star

Since the birth of the Double Star project with an agreement signed in July 2001 between ESA and the Chinese National Space Administration (CNSA), regular interface and coordination meetings have been held between European and Chinese scientists and engineers. After eighteen months of intense interface definition work, the cooperative activities entered the hardware testing phase last autumn, with a successful compatibility test of European and Chinese equipment being carried out at Imperial College in London (UK).

Assembly of the structural-thermal model (STM) spacecraft was completed in China and it successfully passed its environmental test programme in February. The electrical subsystems for the first of the two flight-model spacecraft are being tested in Beijing and readied for the integration of the European and Chinese payload instruments at CSSAR (Centre of Space Science and Applied Research). In parallel, European scientists are refurbishing and adapting their Cluster flight-spare instruments for delivery to CSSAR by mid-May.

At that time, the European and Chinese-provided instruments will be subjected for the first time to an integrated system test and will undergo a full suite of interface and functional testing. Thereafter, all spacecraft and payload instruments will be mounted to the DSP-E (Equatorial) satellite structure, the first of the two Double Star satellites to be launched from Xichang in southwest China in December.

### Artemis

After a 19-month journey in transfer orbit, the spacecraft finally arrived at its nominal geostationary position on 31 January, an odyssey reported in some detail in an article in the last issue of the ESA Bulletin (February 2003). Since then, the remainder of the platform commissioning tests have been performed and all subsystems were found to be in good order. All specified functions are available (and many non-specified ones as well, which have been discovered only as a result of the very novel way in which we had to operate the spacecraft during the orbit-raising manoeuvres). In parallel, the communication payload characterisation tests were executed by the Artemis team at the Redu station in Belgium. They were also very successful, with all payload functions available and all characteristics compliant with or better than specified values.

Rather spectacular communication tests have also been performed. Optical data links between Artemis and Spot-4 have been established successfully and have confirmed the good results of November 2001. Data-relay services between Artemis and the Envisat satellite have been carried out for the first time. Envisat pointed its high-gain antenna towards Artemis, whose data-relay antenna received the signal, locked onto it and maintained the link for the pre-programmed time. Image data were transferred at 100 Mbit/sec via this link from Envisat directly to the processing centre in Frascati, Italy.

### Venus Express

Implementation of Venus Express has been progressing at a rapid pace. The structural elements are being assembled at Contraves in Zurich (CH). Implementation of the ground segment has been initiated in parallel and its Design Review will be completed by July. The contract for launch-service provision is being negotiated with Starsem and will be completed before the summer.

The Spacecraft Preliminary Design Review has already been successfully completed. The hot thermal environment is a major challenge for the mission design, impacting both the spacecraft’s thermal protection and the design of the solar array. The latter is the one item that requires major changes with respect to the Mars Express re-use philosophy.

On the payload side, the scientific community has set up regular meetings to advise the project, and planning of the scientific observations during the mission has started.
Perhaps even more impressive were the tests performed between Artemis and the Japanese ADEOS-II satellite. High-data-rate link tests similar to those performed with Envisat were conducted, but in addition TTC (telemetry, tracking and command) data were transmitted to and from Artemis. Commands generated in the ADEOS-II control centre in Japan were transmitted via terrestrial lines to Redu. Redu then transmitted the data to Artemis, which forwarded it to ADEOS-II. The commands were executed on ADEOS and the corresponding telemetry data relayed back to Japan via Artemis and Redu.

These tests marked the end of the Artemis Commissioning Phase. The satellite is now operational, with the Land-Mobile payload being used since 1 April to provide an operational service to Telespazio/Eutelsat. By the end of April, the daily data-relay service to Envisat and Spot-4 will begin, and EGNOS will use the Navigation payload from summer onwards.

**Meteosat Second Generation (MSG)**

The MSG-1 in-orbit commissioning activities have continued since the satellite took its first image on 28 November. In December, they were temporarily interrupted to analyse an observed ‘satellite wobble’. Detailed simulations showed that it had been caused by fuel migration within the thermally regulated fuel lines.

Functional and performance testing of the MSG-1 SEVIRI imaging radiometer are proceeding nominally. The preliminary results are of a very high quality and resulted in a successful Commissioning Results Review by the end of March.

Both the GERB instrument and the Search and Rescue (S&R) transponder have also been successfully commissioned.

MSG-1 commissioning will continue until mid-June, at which time Eumetsat will start the subsequent Commissioning Phase-B with the final Image Processing Facility configuration, with the goal of entering the MSG operational phase by the end of the year.

An Enquiry Board established to investigate the anomalous switch-off of a solid-state power amplifier (SSPA) on 25 October has now concluded, with recommendations on the operation of MSG-1 and on the retrofitting of all SSPAs for MSG-2 and 3.

The MSG-2 satellite-level on-ground test activities are nearing completion. Following the thermal-vacuum testing in December, an optical vacuum test to verify the performance of the SEVIRI imager was conducted in January. Preliminary results show that all performances are nominal. Following a Pre-storage Review (PSR) planned in Cannes (F) for early June, the satellite will be put into storage to await its launch, which is scheduled for January 2005.

For MSG-3, pre-integration activities have started with the mating of the propulsion subsystem and thermal hardware onto the satellite structure. As all of the remaining subsystems have now been delivered, the satellite’s mainAIT (assembly, integration and test) programme will start in May.

**MetOp**

Integration work on the first flight model continues, with preparations for the start of MetOp-1 satellite integration and test activities being well advanced. Work at Payload and Service Module level is thus nearly complete for MetOp-1, and is continuing at full speed for MetOp-2 and -3.

The Satellite Qualification Review is currently being held, which is evaluating the results of the important module-level testing, examining the preparations for satellite-level integration, and checking the qualification status of all design elements. In parallel, Eumetsat is performing its own Critical Design Review of the overall Polar System, with active support from ESA and the MetOp team.

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

The second flight model of the GOME-2
instrument has just been delivered. One performance issue has recently been identified, which points to a degradation in the gratings used in the instruments. The cause is not yet clear, but the solution may require a retrofit.

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

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

Eumetsat and NOAA have recently agreed a ‘Joint Transition Agreement’ which addresses the respective roles of the NPOESS system and EPS/MetOp in the 2010 time frame. The Agreement preserves a strong role for Europe in respect of the infrared atmospheric sounding mission in the morning orbit. Stemming from this Agreement is a possibility to have a rapid relaunch capability for MetOp, in the event of a launch or early-orbit failure. This concept is being evaluated.

ADM-Aeolus

Almost all of the Invitation to Tender (ITT) packages for subsystems and equipment have been approved. Proposals for about 15 of these tender actions have been received, and several have already been evaluated. In particular negotiations are taking place with Galileo Avionica with a view to placing a contract for the laser transmitter assembly.

The Agency has discussed with industry the lifetime-assessment programme run on laser pump diodes in preparation for the Aeolus mission. That programme has shown that an adequate stack lifetime is achievable, and significant elements of the qualification programme for stacks have been agreed. The programme will include extensive screening of stack components and a lot acceptance test on the flight stacks.

It has been decided that definitive launcher selection will not take place until late 2005. This will allow the on-going evolution in the launcher market, and particularly the readiness of Vega for Aeolus, to be taken into account. The structural-model campaign to be started next year will therefore ensure basic compatibility with several launchers.

The ground-segment configuration to support data reception is being studied by ESRIN. It must receive and process the data and forward them to operational meteorological centres within three hours. It will have one European ground station (probably Svalbard, Tromsø or Kiruna) and another in North America. Point Barrow, a NOAA station in Alaska, would be a suitable candidate, but the possibility of a new Canadian station with a 2.4 m antenna is also being discussed.

CryoSat

The satellite development programme passed a major milestone in March 2003 with the delivery of the Cryosat spacecraft structure from Contraves (CH) to Astrium GmbH (D). Work on the test-beds for electrical and functional verification is making good progress. The Critical Design Review process has been started with a presentation at ESTEC and will assess the maturity of the design prior to the integration of the protolight model satellite.

Supporting science studies have investigated the quality of Aeolus wind data based on backscatter information from the US LITE Shuttle experiment. They have shown that data at least as good as that from radiosondes can be obtained over most of the globe. There is a good wind yield in priority areas where few other wind measurements are available.

A separate study has shown that the two different wind directions measured by Aeolus on ascending and descending passes add significant information when integrated into a time-dependent assimilation scheme. The line-of-sight measurements used in this study provided a significant contribution to the analysis of tropical wind patterns.
model has been assembled and the initial electrical tests have started.

Interfaces between the satellite and the Eurockot launcher have been refined and are now under review in Moscow with Eurockot/Krunichev.

The ground segment's development is progressing well, and preliminary activities have started at the Kiruna station. The Cryovex campaign, which forms part of the Cryosat Cal/Val activities, is planned for April.

GOCE

About nine months into Phase-C/D, the space-segment development activities are focused on completion of the detailed satellite design, achieved through breadboard manufacturing and testing and through the execution of equipment-level Preliminary Design Reviews (PDRs). Such PDRs have recently been successfully completed for the S-band transponder and antenna, the Power Control and Distribution Unit (PCDU), the Command and Data Management Unit (CDMU), and the magnetic torquer. In addition, PDRs are in progress for the ion-thruster assembly, the satellite-to-satellite tracking instrument, and the Gradiometer Accelerometer Interface Electronic Unit (GAIEU). The manufacture and testing of the main on-board computer (i.e. CDMU) breadboard has been finalised and it is presently being used to support software development activities.

The GOCE industrial consortium is nearly complete. Negotiations have been concluded successfully with the suppliers selected for the solar generator’s Photovoltaic Assembly (PVA) and substrate, respectively. Moreover, the independent-software-validation and the star-tracker contracts have been kicked-off.

On the Gradiometer side, mechanical testing of an accelerometer sensor head equipped with the selected stop material and coating was performed during the second half of March. On-going inspection of the test specimen is expected to confirm whether the current sensor-head design is able to withstand the vibrations experienced during launch. The accelerometer electronics development is an area of some concern due to the delays encountered so far. The Front-End Electronics Unit (FEEU) breadboard testing activities were recently completed and the results show a satisfactory level of compliance with the gradiometer performance requirements.

Concerning the Ion Propulsion Assembly, breadboard test activities for the xenon feed assembly have been completed and micro-vibration testing is in progress. Manufacture of the pre-verification model of the ion thruster has been completed, and a short 500 h endurance test has been initiated.

Ground-segment activities have focused on finalisation of the documentation relevant to the Invitation to Tender (ITT) for the development of the Payload Data Segment (PDS), responsible for scientific data processing up to Level-1B and for the running archive of data products during the mission. The PDS ITT was released at the beginning of February and contractor selection is expected by the middle of this year.

Finally, the documentation relevant to the launch of an in-depth study of the tasks to be performed by the Calibration and Monitoring Facility (CMF) has been completed. The study itself is expected to start in May.

SMOS

The payload design phase (Phase-B) is progressing well, with successful conclusion of the Payload System Requirements (PSR) Review with the prime contractor, EADS-CASA, on 1 April. The PSR identified a major discrepancy between the payload mass and deployed inertias, and the capabilities of the PROTEUS platform. Immediate work-around solutions were initiated to recover the situation.

The formalisation of ESA-CNES cooperation is proceeding with the finalisation of a draft Memorandum of Understanding (MOU) between the two parties. The System Requirements Document (SRD) has been thoroughly reviewed and updated. System support studies have started on 4 March with CNES/Alicatel in support of payload development, and on 18 March with Rockot for satellite-to-launcher coupled load and trajectory analyses.

The ground-segment definition phase (Phase-A) with GMV, Indra and INSA, is proceeding according to plan, with completion expected by mid-2003.

The MIRAS Demonstrator Pilot Projects 1 and 2 should be concluded by September. Tasks remaining tasks include a measurement campaign with a Noise Injection Radiometer (NIR) at HUT, the final design review for the Digital Correlator (DICOS) at Astrrium, and optical harness (MOHA) breadboarding and testing at Contraves.

PROBA

The last three months of usage of the PROBA spacecraft has been shared between technological activities and data collection from the spacecraft's space-environment instruments (SREM, MRM and DEBIE) and the Earth-observation instruments (HRC, CHRIS). The first CHRIS-PROBA Workshop has taken place in ESTEC to review the results from the first year in orbit and to prepare the observation plan for the next campaign. The ground support for PROBA has
been slowed down by the Columbia disaster. Following the tragic loss of the Space Shuttle 'Columbia' and its crew on 1 February, the consequences for the ISS have been analysed. The Space Station Control Board (SSCB) evaluated the logistic needs for 2003 and 2004 assuming an absence of the Shuttle, and made several recommendations. As a result, the Multilateral Control Board (MCB) has decided to convert Soyuz flight 6S (April 2003) into a Crew Rotation Flight, and from April onwards a two-person crew will be the ISS baseline until the Shuttle returns to flight (a three-person crew is unsustainable, with the available number of Progress vehicles, beyond end-August 2003). Furthermore, the MCB approved the SSCB 'Option 2' scenario, which has added one extra Progress flight in 2003 and another in 2004, conditional upon funding availability. Unfortunately, to date this funding has not become available.

Specific activities related to the Heads of Agency Programme Action Plan, agreed at their meeting in Tokyo in December, have been slowed down by the Columbia disaster.

However, before that the decision was taken to reinstate Node-3 as a part of the ISS baseline, and to outfit it with the US regenerative Environmental Control and Life-Support System (ECLSS), thereby fulfilling one of the US obligations that were not met in the 'US Core Complete' configuration.

**Space infrastructure development**

As part of the flight-model acceptance testing, the Columbus Laboratory thermal and electromagnetic compatibility (EMC) tests were performed successfully. Hardware/software compatibility testing has started and system functional qualification of the Electrical Test Model continues.

Node-2 flight-unit mechanical integration has been delayed by the unavailability of certain hardware and re-working of that already delivered. The Node-2 Flight Acceptance Review (FAR) has been concluded, but numerous issues remain open.

The Cryosystem design phase (Phase-B) is ongoing and the System Requirements Review (SRR) has been successfully performed.

Flight-unit harness and Meteroid and Debris Protection System (MDPS) deliveries have been made for the Cupola.

Flight-model manufacture and integration of the Automated Transfer Vehicle (ATV) is progressing. Manufacture of the refuelling system has been completed and Integrated Cargo Carrier flight-model integration has started. Electrical integration of the Functional Simulation Facility (FSF) with the Electrical Test Model (ETM) has been completed and electrical testing started. The System Critical Design Review (CDR) has also started. Some technical problems with propulsion-bay equipment are being worked on and flight-software delivery delays have been announced by Industry.

Following the Ariane-5 launch failure last December, the Ariane-5 configuration for ATV-1 will be based on Vulcain-2 and the EPS upper stage. If Vulcain-2 is not qualified in time, it will be launched by an existing qualified Ariane-5 configuration using Vulcain-1 and EPS, with reduced payload capability, but still within the planned up-load mass for the first flight.

Work on Europe's contributions to the X-38 vehicle has been completed.

**Operations and related ground segments**

Proposal negotiations for the Columbus Control Centre have been completed and signature of the contract for the main development phase (Phase-C/D) took place on 31 March.

Following the ATV Control Centre proposal evaluation and negotiation, the technical and financial baseline has been agreed and signature of the contracts for design and development, as well as for ATV operations preparation, is planned for mid-April.

An in-orbit operational problem with the Microgravity Science Glovebox (MSG) has been resolved and operations restarted.

The Data Management System in the Russian Service Module (DMS-R) is continuing to perform without problem.

**Utilisation planning, payload development and preparatory missions**

Nine new Microgravity Application Promotion (MAP) continuation proposals had been received by end-March, and they have been passed to the Expert Panel for evaluation.

The –80 degC Freezer (MELFI Flight Unit 1) has been installed in the Multi-Purpose Logistics Module (MPLM) ready for launch. Delivery of the Hexapod to NASA is planned for May.

The SOLAR Instrument Safety Workshop identified a lack of design maturity in the scientific instruments. Relocation of the EXPOSE facility from the EXPORT assembly (with Coarse Pointing Device) to the EuTef assembly (without CPD) has been implemented.
The payload Phase-C/D for the Atomic Clock Ensemble in Space (ACES) is on hold due to uncertainties about the funding of PHARAO.

The Critical Design Review (CDR) for Matrosinka has been successfully completed and thermal testing is now in progress at ESTEC.

Functional qualification testing of the flight model of the European Robotic Arm (ERA) is continuing, but the launch date and scenario for ERA remains undefined.

The seven ESA payloads that were part of the Spacehab mission onboard Space Shuttle ‘Columbia’ were lost in that tragic accident. Telemetry and/or video data are available for ARMS, COMPLEX and FAST, representing approximately 100% of the expected scientific return. For APCF, Biobox, Biopack and ERISTO, however, the scientific outcome was dependent on return of the processed samples, which were destroyed in the accident.

The Science Reference Model for Biolab is undergoing biological testing prior to delivery, the flight-model subsystems delivery is almost complete, and flight-model integration is also approaching completion.

The Fluid Science Laboratory (FSL) system flight-model assembly, integration and testing has been completed. Integration of the Canadian Microgravity Vibration Isolation System (MVIS) will now take place following the completion of FSL flight-model acceptance.

Testing of the NASA Quench Module Insert (QMI) in the engineering model of the Material Science Laboratory (MSL in US Lab) has been successfully completed. Engineering-model delivery to NASA is expected by May, and flight-model assembly has been initiated.

The European Physiology Module (EPM) flight-model system integration is ongoing with harness and thermal subsystems. NASA’s Human Research Facility HRF-2, including the EPM contribution, the Pulmonary Function System, has been integrated into the MPLM and is awaiting launch on ULF-1.

**ISS education**
A review of the pilot version of the ISS Education Kit (for 12 to 15 year olds) by 800 teachers has been completed, with positive results. The final version of the kit will be produced in the last quarter of 2003. On 2/3 March, a workshop for Primary School Teachers was held at ESTEC to prepare for the development of the ISS Education Kit for Primary Schools.

**Commercial activities**
An industrial initiative has been taken to establish a European ISS Business Club, the purpose of which is to contribute to the promotion of ISS commercialisation opportunities throughout Europe’s business communities. It will consist of contractors, subcontractors and suppliers in the area of ISS development, exploitation and utilisation, thus forming a unique industrial network motivated to promote the ISS.

A number of commercial proposals related to the improvement of crew quality-of-life have been received and are being considered for future ESA Taxi-flight missions.

In preparation for the selection of one or more commercial agents, a workshop for potential agents was held at ESTEC in February. It was attended by members of the Cooperation Agreement, the USOCs and the technology-transfer network, and new companies that operate as R&D brokers in Europe.

**Astronaut activities**
André Kuipers and Pedro Duque continued their training in Russia for their Soyuz Taxi-flight missions which, due to the ‘Columbia’ accident, have been postponed by six months. Their training schedules have been revised accordingly.

The training of Christer Fuglesang and his fellow crew members for the STS-116/12A.1 mission was suspended following the ‘Columbia’ accident, but resumed on 18 February. The future Shuttle flight schedule awaits the outcome of the accident investigations.

**Vega and P80**
The two main industrial contracts for the Vega Programme were signed in Colleferro (I) on 25 February. The first, for a firm fixed price of 221 MEuro, is between ESA and ELV, the Vega prime contractor and includes an industrial commitment to future launch pricing. The second, for a firm fixed price of 40.7 MEuro, has been signed by CNES, on behalf of ESA, and Fiat Avio, the prime contractor for the P80 stage demonstrator. Signature of this contract is complemented by a significant industrial investment. These concurrent events have concluded an intense negotiation phase in January and mark the full deployment of the resources needed to achieve the Vega launcher objectives, including a first launch in July 2006.

Current Vega activities include the finalisation of contracts at the lower industrial levels, and preparations for the Avionics Preliminary Design Review and the Level-1 Safety Review. The P80 development effort is also proceeding according to plan.

In the ground-segment area, final discussions have taken place between IPT and CNES/DLA/SDS on the basis of the updated proposal for the ‘Technical Management Engineering and Test Activity of the Ground Segment’. Preparation of the Invitations to Tender (ITTs) for the main ground-segment elements has progressed and the pre-Tender Evaluation Boards for three of them (civil engineering, metal structures and control bench) took place in March.
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