

## In Brief


### 50 Science Mission Proposals

A wealth of new mission concepts was submitted by the European scientific community by 29 June, following the ESA Call for Proposals in March. The proposals cover a wide variety of scientific objectives, from the search for extrasolar planets, the study of Jupiter and its icy satellite Europa, to testing the laws of gravity.


The missions' objectives fit well with the four major themes of ESA's Cosmic Vision 2015–2025 plan: the conditions for life and planetary formation; the origin and formation of the Solar System; the fundamental laws of the cosmos; the origin, structure and evolution of the Universe.

Out of these 50 concepts, three medium missions (with cost to ESA within EUR300 million) and three large missions (costs to ESA within EUR650 million) will be selected for assessment starting in October this year.

The evaluation process will treat the scientific value and novelty of the proposal as the main criteria, together with the technological maturity and estimated cost.

At the end of the full assessment cycle in 2011, one medium and one large mission will be adopted for implementation by ESA's Science Programme Committee. Their launches are expected in 2017 and 2018, respectively. 

characterising transmission performance in the Q–V band in preparation for possible commercial exploitation of these frequencies.

The intention is to begin the programme in the third quarter of 2007, with launch in 2011. 

### ATV On Its Way

*Jules Verne*, ESA's first Automated Transfer Vehicle, arrived at the Kourou launch site in French Guiana in late July to prepare for the final leg of its journey to the International Space Station. Launch is planned for January 2008.

Only 10 days after completing its final integration and space environment tests, it left ESTEC in Noordwijk (NL) on 13 July. The 20 t ATV is the largest and most complex spacecraft ever built in Europe. The unmanned ferry will deliver cargo to the Station and help to raise its orbit.

A specialised team spent 10 weeks preparing 400 t of equipment for shipment across the Atlantic. Each item was individually documented and carefully packed into around 50 containers. "One of the major issues has been getting the

### Alphasat First Mission

ESA and Inmarsat moved closer in June to Alphasat, the first satellite based on Alphasat, the new European multi-purpose platform for the high-power communications satellite market.

Alphasat will use the Alphasat proto-flight platform, providing in-orbit validation of the platform through a commercial operator. ESA and Inmarsat have signed a Memorandum of Understanding as the first step towards confirming Inmarsat as the platform's first customer.

Inmarsat intends to fly an extended L-band payload in support of its global mobile services. The satellite will be positioned at 25°E to cover Africa, Europe, the Middle-East and parts of Asia.

This 'Geo-mobile' application requires a 90° change to the flight orientation to accommodate the large deployed reflector and its feed. In addition, Alphasat will carry three ESA technology payloads: an advanced startracker using active pixel technology, an optical laser terminal for geostationary to low-Earth orbit communication at high rates, and a dedicated payload for





*Left: ATV is prepared for its departure from Europe. The spacecraft was shipped in three major sections*

*Right: the 5.5 kg, 40 cm-diameter YES2 capsule will be the first space payload to use a tether to begin its return to Earth*



*verification campaign, involving vibration testing, thermal-vacuum and electromagnetic testing. The team has achieved a great deal to get this far, and the students have benefited tremendously from this practical experience with a real space project."*

Following the final tests, YES2 was removed and shipped to Baikonur Cosmodrome in early July, where it met its host spacecraft again at the end of the month.

Almost 500 students from most ESA Member States, plus the United States, Japan, Canada and Australia, have worked on YES2. Although these were mainly involved in the preliminary design, some 60 students developed and built hardware and software.



*customs paperwork in order," explains Stefan Brosze, ATV Transportation Manager. "There are members of our team who know exactly where to find everything, right down to the very smallest items."*

ATV was taken by lorry and canal barge to Rotterdam harbour and loaded aboard the *MN Toucan*, a vessel normally used by Ariespace to transport Ariane rocket components on the same route across the Atlantic. 

## YES to Launch Site

After 5 years of work, the YES2 second Young Engineers Satellite experiment is ready for launch. The successful Final Acceptance Review on 20 June gave the green light for launch in September attached to the Foton-M3 spacecraft. YES2 will deploy a small recoverable capsule on a 30 km tether – the longest ever used in space – for reentry without rocket propulsion. This first descent via tether will pave the way for the low-cost return-to-Earth for future payloads.

Following 4.5 months of assembly, integration and testing

at ESTEC, the groundbreaking student experiment was shipped on 7 May to TsSKB-Progress, the Foton prime contractor, in Samara, Russia. On 14 June, the payload was installed on the exterior of Foton-M3 to begin weeks of tests.

*"Although there were tight deadlines to meet, the students worked closely in conjunction with ESA and prime contractor Delta-Utec to get it ready to launch," said Roger Walker, Project Manager for YES2, from the ESA Education Office. "It has completed an intensive*

## EGNOS and Other Satnav for Africa

ESA and the Agency for Security of Air Navigation in Africa and Madagascar signed a cooperation agreement on 22 June with the objective of using satellite navigation to improve air traffic safety over the African continent.

The agreement, which covers cooperation between ESA and the African aviation safety agency (Agence pour la Sécurité de la Navigation Aérienne en Afrique – ASECNA), focuses on the next phase of Global Navigation Satellite Systems (GNSS) deployment, which includes the extension and use of the European Geostationary Navigation Overlay Service (EGNOS) as an operational service in Africa.

The agreement envisages ESA and ASECNA providing mutual

assistance, notably with regard to extending EGNOS operational services more widely in Africa, siting European ground installations in ASECNA countries, supporting the project in international standardisation bodies and bringing Galileo services and additional elements to Africa.

ESA and ASECNA have been working together since 2003 and have organised several test campaigns that clearly demonstrated the benefits of EGNOS for Africa, where very few airports are equipped with conventional landing guidance systems.

For these campaigns, ASECNA provided its calibration aircraft and hosted and operated EGNOS stations at several African

airports. This is how the first crossing of Africa at its widest part, from Dakar to Mombasa, was achieved in May 2005, using EGNOS signals.

Composed of a network of around 40 elements distributed across Europe to record, correct and improve data from GPS, EGNOS provides modified signals relayed by geostationary satellites

to users' receivers. It offers an accuracy of better than 2 m, compared with the 15–20 m for GPS signals, with an added guarantee of signal quality.

Since the geostationary satellites that relay EGNOS also cover Africa, an extension of EGNOS may easily be envisaged with the installation of reference stations on African soil.



## Eurobot: Astronauts' Assistant

European engineers are developing increasingly sophisticated machines to work in space. ESA's 'Eurobot' recently completed trials in the giant pool at the European Astronaut Centre.

Eurobot has been under development since 2003, with the intention that the multi-jointed, three-armed assistant will eventually handle some of the more mundane tasks currently undertaken by astronauts on spacewalks. It may also be an indispensable helper on expeditions to the Moon or Mars.

In the hostile conditions of space, the tireless Eurobot will save a great deal of time and effort by taking over routine tasks. For example, the astronauts' flexible friend will be able to find its way to a worksite on the International Space Station (ISS), perform a close-up inspection and carry out preparatory work, such as transferring tools and equipment. Remotely controlled by an operator inside the ISS, Eurobot can multi-task, providing additional hands and eyes for the spacewalkers. Once the astronauts are safely inside the Station, Eurobot will clear away the tools and equipment.

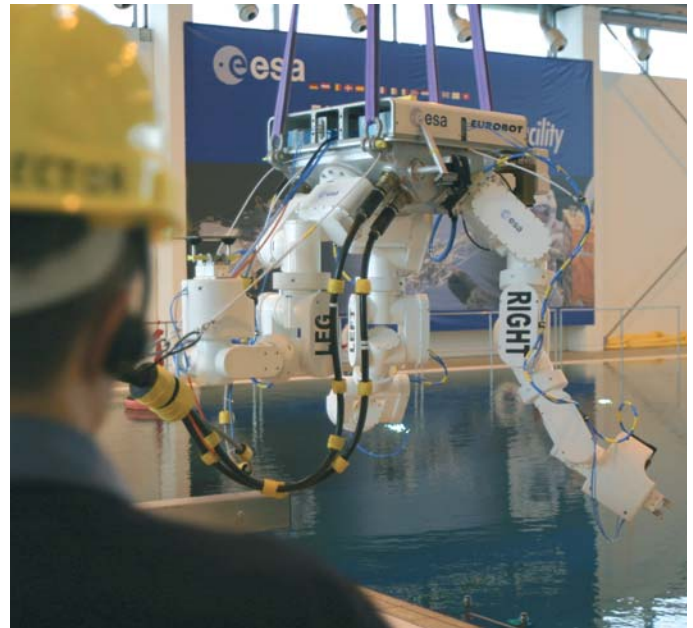
*"It could be a most useful aid,"* said Gianfranco Visentin, head of ESA's Automation and Robotics section. *"There is a shortage of crew time during all missions, so anything that improves the use of astronaut time is very desirable."*

The version of Eurobot used in July's exercises was the Weightless Environmental Test (WET) early prototype, developed for operation in a water tank where the microgravity conditions of space are simulated.

Developed for ESA by a consortium led by Thales Alenia Space, the WET model has a central body with three identical arms, each with seven joints. Although the arms' length and strength are similar to those of a human, they are much more manoeuvrable and versatile.

Each arm carries a camera and an 'end-effector' hand. The WET model has only one type of hand, which is capable of grasping EVA handrails. In contrast, the real Eurobot will have a set of three or four interchangeable hands. A head camera monitors the worksite.

During tests of its ability to move and manipulate objects, the



*Eurobot is lowered into the pool for 'weightless' testing*

project team gained experience of the robot's capabilities, trying out multi-arm control and coordination, along with visual recognition of obscured targets. Eurobot was joined in the pool by ESA astronaut Jean-François Clervoy to demonstrate the interaction between astronaut and robot.

The trials concluded the initial verification phase of the Eurobot WET model programme,

following on from preliminary dry and wet tests in Italy.

*"The tests went very well,"* said Philippe Schoonejans, ESA's Eurobot Project Manager. *"Not only has it been demonstrated that Eurobot can walk around an orbital station autonomously and safely, using no more than the existing EVA handrails, it is also becoming clear that Eurobot can really help the astronauts. And in the next phase we also plan to demonstrate its use on a planetary surface, as part of the Agency's exploration programme."*



## Launcher Contracts

ESA signed two key contracts with NGL Prime S.p.A. of Italy in June: the definition of launcher concepts for the European Next Generation Launcher, and the development of the European Intermediate eXperimental Vehicle (IXV). Both are part of ESA's Future Launchers Preparatory Programme (FLPP), which is aiming to develop and demonstrate the technologies for

a Next Generation Launcher (NGL) for Europe, expected to become operational after 2020. A secondary aim is to increase the reliability and competitiveness of European launchers, including those operational today.

The contracts have a total value of more than EUR20 million and integrate key European competences and expertise in



Two new launcher contracts were signed by ESA's Director of Launcher Programmes, Antonio Fabrizi (left), and Axel Roenneke, CEO of NGL Prime S.p.A.

launcher and reentry systems from 43 industrial and research organisations from 11 ESA member states.

The launcher systems studies will prepare key technical and programme data for the ESA Ministerial Conference in 2008, when strategic decisions about future launcher development will be made. The studies will examine the different options that Europe could adopt for the NGL.

In parallel, the IXV will demonstrate Europe's advanced reentry technologies and integrated system design capabilities. The IXV reference mission calls for launch from Kourou in 2010 aboard a Vega vehicle, followed by a fully automatic reentry, descent and landing in the Pacific Ocean. 

## Estonia Agreement

At a ceremony in Tallinn on 20 June, René Oosterlinck, ESA Director of Legal Affairs and External Relations, and Juhan Parts, Estonian Minister of Economic Affairs and Communications, signed an agreement marking closer cooperation between ESA and Estonia.

Estonia is the first of the countries that have recently joined the European Union to sign a Cooperation Agreement with ESA. Andrus Ansip, Prime Minister of Estonia, welcomed the ESA delegation and confirmed the support his government is ready to give to this new agreement.

A first meeting with an Estonian delegation took place at the beginning of 2006 at ESA's headquarters in Paris. This was followed by an invitation by the Minister of Economic Affairs and Communications to send an ESA delegation to Tallinn in November 2006, to explain in more detail

the different types of cooperation between ESA and non-ESA Member States, and to meet with potential partners.

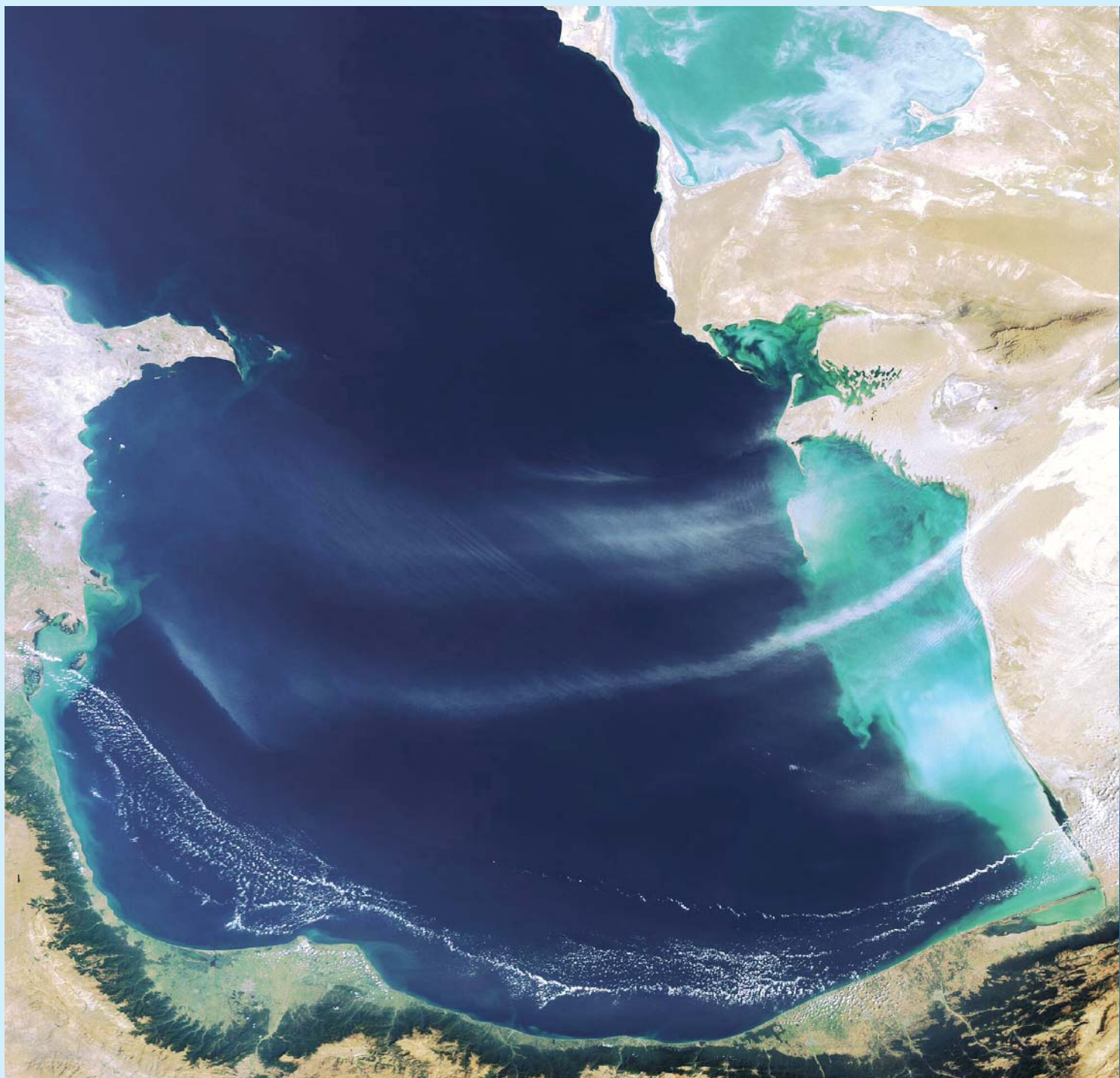
Estonia has long-standing experience in astronomy and space science. The Observatory of Tartu has worked in this field since the 19th century, and is participating in preparations for ESA's Planck and Gaia missions.

The recent adoption of the European Space Policy by ESA and the EU confirms the importance of ESA's space activities for EU Member States. New members of the EU are now approaching ESA with a view to participating in ESA's space activities.

This Cooperation Agreement is a first step. As a second step, Estonia intends to become a European Cooperating State in a few years with an increased financial contribution to space activities. 

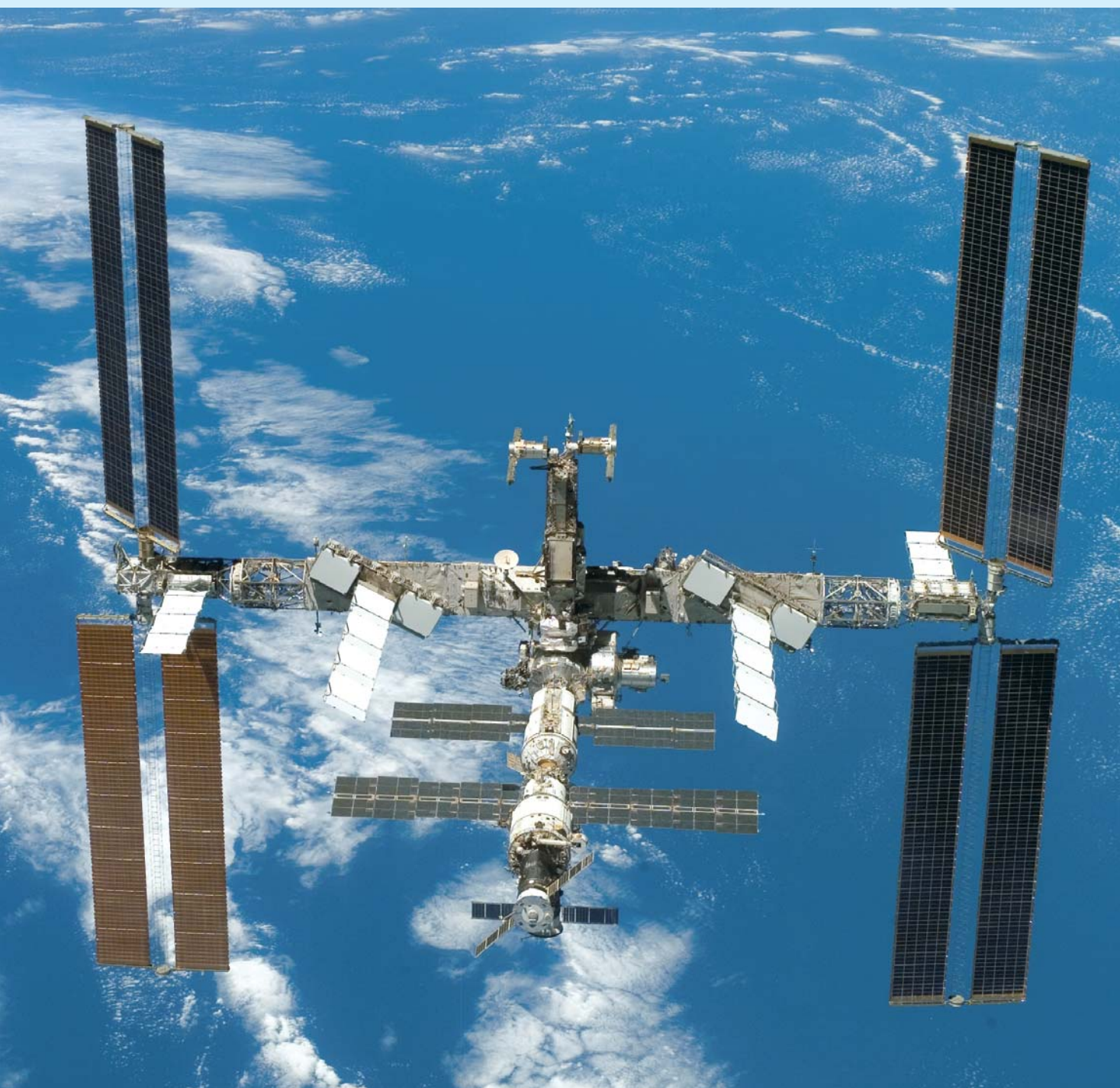


The High Resolution Stereo Camera of Mars Express imaged the Aolis Mensae region (6°S/145°E) of the Red Planet on 26 and 29 March 2007. Deep valleys are incised into the highlands with unexplained linear features on some floors. (ESA/DLR/FU Berlin, G. Neukum)



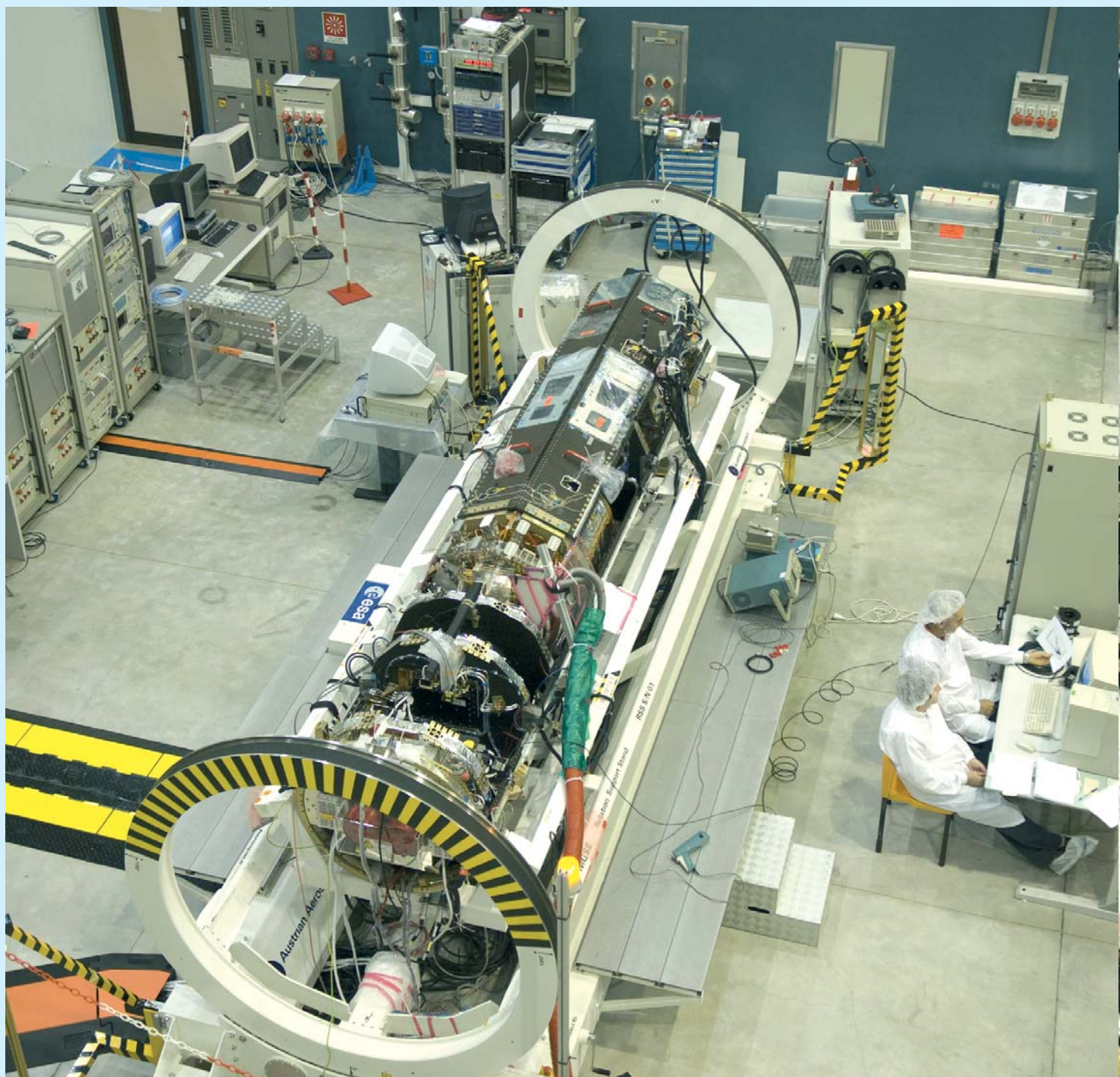
This Envisat/MERIS image of 2 September 2006 shows the southern part of the Caspian Sea, at 371 000 square km the world's largest inland body of water. The oil-rich Caspian stretches 1200 km north to south, bordered by Russia and Kazakhstan to the north, Azerbaijan to the west, Turkmenistan to the east and Iran to the south. Because the Caspian is a closed body of water, it supports a unique biodiversity but is also vulnerable to pollution from agriculture and industry –

particularly oil. The Caspian Basin is rich in oil deposits; the oil centre of Baku, capital of Azerbaijan, is on the southern side of the Apsheron Peninsula jutting out from the western shore. On the other side of the sea is Turkmenistan, dominated by the Karakum Desert. On the southern shores are Iran's green Gilan-Mazanderan lowlands and the Alborz mountain range, which hinders rain clouds moving south, explaining the contrast with the desert to the south.



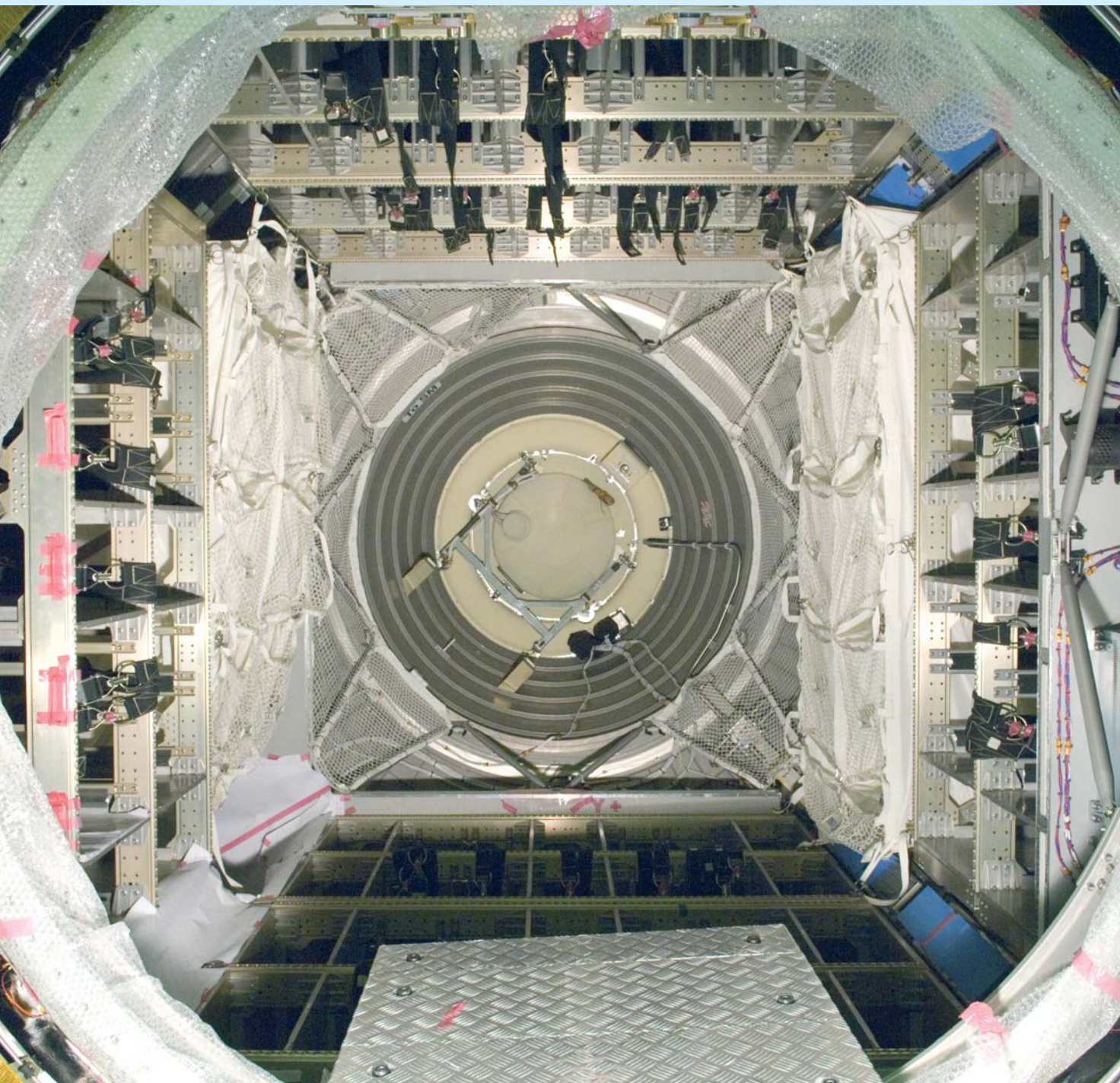
The appearance of the International Space Station as the latest Space Shuttle mission, STS-118, arrived in August. The image was captured on 17 June as STS-117 departed after attaching the S3/4 truss and solar wings at right. STS-118 will add the S5 segment at right to allow the S6 solar wings to be attached on a later mission. It will also help to prepare the way for Europe's Node-2 and Columbus modules to be added in October (STS-120) and December (STS-122) this year,

respectively. STS-120 will also move the P6 solar wings (seen here retracted on top of the Station) to their final position at far left. ESA's first Automated Transfer Vehicle is expected to arrive in January 2008, docking with the aft Zvezda module, seen here with a Russian Progress unmanned ferry attached (closest to camera). Japan's Kibo laboratory module and platform will also be installed in 2008. (NASA)



GOCE, ESA's first satellite dedicated to measuring the Earth's gravity field, is seen here at prime contractor Thales Alenia Space in Turin (I) in July before being shipped to ESTEC in August. The 'Gravity field and steady-state Ocean Circulation Explorer' will significantly advance our knowledge of how the Earth works and provide insight into ocean circulation, sea-level change, climate change,

volcanism and earthquakes. At ESTEC, GOCE will undergo final integration and environmental testing to make sure it is ready to withstand the rigours of launch and space operations. It will be launched next spring on a Rockot from the Plesetsk Cosmodrome in north-western Russia. Forty-five companies from 13 European countries have been working on the satellite since 2001. (ESA/S. Corvaja)



The interior of the Automated Transfer Vehicle (ATV) shortly before it was sealed off for the vehicle to be shipped to its Kourou launch site in July. Launch is planned for January 2008 on Ariane-5. ATV will dock with the International Space Station (the docking mechanism is protected by a red cover at the far right in the small photograph) with this pressurised section carrying an array of equipment

and consumables for the crew. Astronauts will enter via the hatch seen closed in the centre of the large image. ATV will remain attached for up to 6 months, periodically raising the Station's orbit to combat atmospheric drag, before departing filled with rubbish to burn up in the atmosphere over the Pacific Ocean. Other ATV photographs can be seen on pages 60 and 65. (ESA)

