

A word from the Director General



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September/October 2005

A spirit of optimism and progress

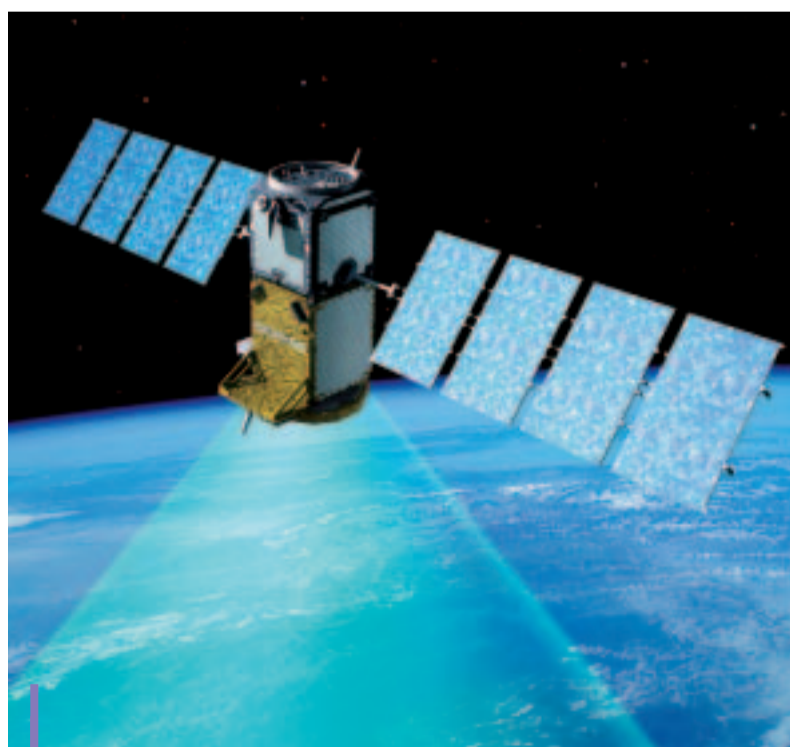
Up until now 2005 has been a very eventful year and the next few months will be no exception with several missions to be launched. I attach enormous importance to these forthcoming missions, which all have symbolic value. CryoSat is the first of the Earth Explorer missions and marks the start of a new era in Earth sciences. It will study polar ice changes, as this is essential in understanding our environment and climate. The Venus Express mission will expand our presence in the solar system. When giving speeches, I always point out that ESA is the only space agency in the world engaged in missions throughout the solar system. We are orbiting the Moon and Mars, we have landed on Titan, we are chasing comets and will soon be orbiting Venus and journeying to Mercury with BepiColombo. We are pushing forward the frontiers of discovery!

The launch of the GalileoSat satellite is also a first. Once this first satellite is in orbit, Galileo will go from project stage to reality. It is the first major programme to be developed with the European Commission (EC) and represents a new way of working with the European Union (EU). Regarding MSG-2, our relationship with Eumetsat demonstrates that ESA is able to fully develop operational systems driven by demand. To all this should be added microgravity experiments and preparation for Thomas Reiter's flight. Human spaceflight is by definition the most human aspect of our activities and the astronauts play the role of space ambassadors vis-à-vis the general public.

This has already been a remarkable year; 2005 has seen the arrival of Huygens on Titan and the return to flight of Ariane 5 ECA, with Ariane 5 GS launching the largest ever telecommunications satellite in August. Ariane 5, it should be pointed out, is the only launcher in the world able to place such large payloads in orbit. In 2005 too, the MARSIS radar was deployed and fascinating data are being received from Mars. On the human spaceflight side, Roberto Vittori's mission was also a great success.

All these successful endeavours are a demonstration of ESA's capabilities and of the benefits that the Member States gain from working together. These missions were, of course, achieved thanks to ESA staff, but first and foremost thanks to the Member States. I would also like to say that thanks to these successes, ESA's global reputation has considerably improved. I have recently discerned on the part of my NASA, Russian and Japanese space agency counterparts a certain admiration for what ESA is doing and I must say that I am very proud to represent ESA vis-à-vis other agencies.

The achievements of 2005 to date open up the way to the Ministerial Council meeting in December, but we do, nevertheless, have a certain number of issues to resolve in the meantime. The Galileo/IOV (In-Orbit Validation) development contract has still to be signed. ESA has done all the work we had to do and could do. We are now waiting for the Member States to collectively give the starting signal. Our colleagues responsible for Galileo have worked incredibly hard all summer. We are ready to continue, but need about €200m of additional contributions from Member States and €200m from the EC. That amount has been pledged by it. As for the Member States, they need to confirm their contributions, but have decided to postpone doing so until the matter of setting up the concessionaire has been dealt with. This situation has led to the creation of a link between the IOV part for which we are responsible, and the second part, that is, the deployment and operation of the constellation, which will come under the concessionaire's responsibility. >>> 2



*GalileoSat satellite
Artist's view of the GalileoSat satellite, the first major programme to be managed with the European Commission (EC).*





A Ministerial Council looking resolutely to the future

The Ministerial Council meeting in December will be extremely important. Delegations will be taking decisions affecting about three years of ESA budgets, over the period 2006-2008 which represents €8 to €10 billion. A Ministerial is always a very difficult exercise and this one is unlikely to be any different. ESA, especially its larger contributors, is experiencing very tough budget constraints. The context of the EU is also difficult and its Financial Perspectives have not yet been decided. These political and budgetary problems inevitably have repercussions for ESA. To these uncertainties can be added those concerning the International Space Station. The next US Space Shuttle flight is scheduled for March 2006 at the earliest. We are unlikely to have, by December, a definite date for the Columbus launch and will therefore have to work on the basis of assumption.

In my meetings with European ministers responsible for space, I emphasise the fact that Europe's space sector has to look to the future. In spite of budget constraints, it is vital that we start up new activities and develop new technologies. Today's achievements are the outcome of technology decisions taken 10 years ago. Moreover, the space powers we are working with include not only Russia but also China and India. These countries are operating under very different economic conditions to ours and have become major space powers. As Europe cannot compete with them on cost, it has to be technically better. It cannot confine itself to managing the programmes of the past, but must look resolutely to the future. For the forthcoming Ministerial, I wish to place particular emphasis on enhancing knowledge and competitiveness.

The Director General's proposal to Delegations is entitled "Plan for discovery and competitiveness." I have set out five priorities for new activities supporting this plan: enhancing the science programme; starting up a major exploration programme with

particular focus in the short term on ExoMars, a robotic mission; boosting telecommunications demonstration missions including Alphasat which will use the Alphabus platform; moving forward on GMES so as to meet the highest expectations of European citizens concerning the environment and security; and starting up a major technology programme, covering formation flight in particular. We will do our utmost to start these new activities in order to shape the future of the European space sector.

ESA/EU cooperation

Cooperation between ESA and the EU is progressing on the basis of the Framework Agreement in force since May 2004. The third Space Council meeting will take place on 29 November. It will be centred on the GMES programme that we are developing together. We have common objectives and common interests. These should help us overcome the difficulties arising from the fact that European institutions are currently experiencing political and budgetary problems.

Reorganisation of ESA

I have tasked Jörg Feustel-Büechl with helping me move our Agency towards ONE ESA by adapting relationships between directorates. The Agency has inevitably aged, and administrative layers have formed over the years and walls built up between directorates, creating a lack of communication and lack of mutual trust. Improvements will come from some reforms and from cultural changes. As for the reforms, they have also to take into account ESA's increasing work with external customers, such as the EU and later, I hope, with the defence sector. We owe it to ourselves to operate at European standards. We can no longer get by with a strictly ESA financial system – we should have a system that can be understood by all European organisations. Our industrial policy also needs to be adapted to the industrial situation, which is changing almost daily. A great deal has already been done, and the outcome of the June Council meeting was striking with regard to financial systems and industrial policy. However, the reforms yet to be effected include some that concern relations between directorates. Examples are the funding of support directorates by programme directorates and aspects of planning at corporate level.

If I had given responsibility for these reforms to a particular director, this would have made for a biased situation, as each director has his own interests in relationships with other directorates. Certain cross-directorate reforms can only be carried out by the Director General, but being myself heavily involved in strategic affairs, I have entrusted the task to Jörg Feustel-Büechl, who knows the Agency extremely well and has no specific directorate interests concerning these reforms.

As for cultural changes, they concern relationships among staff. The bureaucracy which affects us all – and in the first instance the DG – has been created by all of us. We shall reduce the bureaucracy but will only have succeeded fully when everyone is able to trust his/her fellow-workers. Individual accountability must also be strengthened which means that all ESA staff members should always be fully accountable for their own actions, thereby avoiding the cascade of signatures, ending much too often in a signature by the DG.

Another essential area of reform is project planning and in-year reporting. Sometimes, in reforming one form of bureaucracy, we create another. Project planning is an essential tool for working together more effectively. Moreover, the in-year reporting by the directors provides me each month with an extremely useful means of monitoring progress in the Agency's activities.

These reforms that I am calling for will not change the great pleasure that I feel working with my colleagues and I can only thank you for being the people and professionals you are and for succeeding in what you are doing. But once again, it is my fervent wish that we work together in greater harmony and in a spirit of greater trust. We have done remarkable things together, but moving and shaping the future requires more than the mere addition of our individual skills. Let's break down the remaining walls and build a real team! ■



 Ariane 5 launch

Successful liftoff for Flight 166, an Ariane 5G, 11 August 2005.

Building ESA's future programmes

Interview with Volker Liebig

Volker Liebig took up duties as Director of Earth Observation Programmes (D/EOP) and Head of ESRIN in October 2004. He talks to ESA Today about the challenges he faces in this double role, the current priorities of his directorate and his experiences at ESA.

ESA Today: *In addition to being Director of Earth Observation Programmes (D/EOP), you are also Head of ESRIN. What challenges do you face in this double role?*

Volker Liebig: The two tasks are very distinct and I would like to say that I take both roles very seriously. As Head of ESRIN I have to deal with safety, security and general management of the Establishment and ensure that everything functions effectively. I am also the ESA representative in Italy vis-a-vis the Italian authorities. As director, my current focus is on preparation for the Berlin Ministerial Council Meeting in December 2005. When I took up my new duties in October 2004, I was delighted to find I could rely on excellent teams. This has helped make the transition easier. My role as D/EOP is to try to initiate new Earth Observation programmes that contribute to forming the foundations of ESA. As the date for the Ministerial Council Meeting draws nearer I'm required to devote more and more time to this, which means compromising on my Head of Establishment function. This is a constant challenge but as we need space programmes for the future it is logical that this be my main priority. It must also be remembered that these programmes service ESRIN and the other establishments and are, therefore, for everyone's benefit.

There are over 350 staff and contractors working in D/EOP which are spread over three establishments: ESRIN, ESTEC and HQ. How do you structure your work, manage your time and your teams?

VL: This is a real challenge for every director at ESA but I believe even more so when you are head of establishment and programme director. This double role can only be carried out by being highly disciplined and by good forward-planning. I consider self-management as an important quality. I also rely on modern communication technology which means, for example, that every second week I can hold a meeting with my department heads using videoconference systems between the sites.



^ *Earth and Space Expo, Brussels, 11 February 2005*
Volker Liebig, Director of Earth Observation Programmes, and Günther Verheugen, European Commission Vice-President in charge of Enterprise and Industry, officially open the exhibition during "Earth and Space Week 2005."

Currently I am on mission almost four days a week. In addition to the weekly DG/Directors' Committee meeting in HQ, I have the Programme Boards, the Council Working Group and Council meetings. I also travel to the capital cities of the Member States and to Brussels to talk to the authorities in order to prepare for meetings and future decisions. When we have the Ministerial Council behind us, I hope to find time to make more project-related missions. But for the moment, ESA's future programmes are the absolute priority.



^ *Volker Liebig, Director of Earth Observation Programmes (D/EOP) and Head of ESRIN*

Working with 17 different nationalities has added a new dimension to my professional life. It can complicate certain aspects but, for the most part, is highly stimulating. One finds a broad spectrum of resources and skills and putting these to work in the best way possible is a real challenge. Communication is key in a national organisation, but in an international organisation you have to work even harder at this to make sure there are no misunderstandings. You need to take into account that individuals are very different. Sometimes there is also a certain national character that has to be considered when forming teams.

What is the current status of ESA's Earth Observation Programmes you are responsible for?

VL: First of all, there are the flagship missions like ERS-2 and Envisat that continue to operate, delivering abundant data about the Earth, its climate and changing environment to thousands of users. We had a very successful science meeting last year in Salzburg where more than a thousand scientists gathered to discuss Envisat results. We are now looking forward to results from the first Earth Explorer mission, Cryosat, whose objective is to test the thickness of the polar ice. This family of missions, a component of ESA's Living Planet Programme, are designed to address critical Earth science issues whilst demonstrating breakthrough techniques. Following the launch of Cryosat this year, new science missions will be launched, namely GOCE (Gravity and Ocean Circulation Explorer) in 2006, SMOS (Soil Moisture and Ocean Salinity) in 2007, ADM-Aeolus (Doppler Wind Lidar) in 2008, Swarm (Earth's Magnetic Field and Environment Explorer) in 2009; EarthCARE (Clouds, Aerosols and Radiation Explorer) in 2012. These missions are smaller and very different to Envisat, which carries a vast number of instruments on what is the biggest satellite ever built in Europe. These Explorer missions concentrate usually on one science field each.

We will now harvest what we seeded years ago when we decided to work on the Earth Observation Envelope Programme, a programme offering scientists from the Earth Observation (EO) communities in the Member States and Canada the possibility to propose ideas for future Earth Explorer missions. The scientists and the Earth Observation Programme Board (PB-EO) decide on the missions and within this envelope, can work freely. I was a Delegate to the PB-EO eleven years ago – so in a way, I was one of the founding fathers of this programme. >>>



building esa's future programmes

September/October 2005



Dragon symposium held in Santorini, Greece from 27 June to 1 July 2005

About 60 Chinese scientists and high-ranking members of the Chinese space community attended a workshop hosted by new ESA Member State Greece

Looking to the future, we are preparing the third part of the EO Envelope Programme for the Ministerial Council. We have had positive feedback from the Member States in support of ESA's Earth Science programme.

Postponed for the second time, the launch of the Meteosat Second Generation (MSG-2) satellite is now due to take place in November. This joint project between ESA and the European Organisation for the Exploitation of Meteorological Satellites (Eumetsat) is a continuation and enhancement of the previous Meteosat missions. Its purpose is to provide continuous imagery of weather situations over Europe and Africa.

The Global Monitoring for Environment and Security (GMES) initiative will be a key priority at the ESA Ministerial Council meeting in December 2005. How is the programme proposal progressing?

VL: GMES is one of the initiatives of our Director General. The European Commission (EC) has agreed that this is the new flagship after Galileo. It involves cooperation between ESA and the European Union (EU) and we are currently working on this programme with the Commission for the next Ministerial Council Meeting. We are preparing a first phase of the programme that will cover the next six years until budgetary decisions in the EC have been taken. At the end of 2007 we plan to take a decision on the full GMES programme. At the Council meeting in ESOC at the end of June, we received unanimous approval of the enabling resolution for GMES, a legal step which authorises our Director General Jean-Jacques Dordain to bring this programme to the Ministerial Council.

In a recent PB-EO we reached consensus with the Member States that in 2007, after honouring the EC budgets, there will be a decision point also for the first phase. But many other details have still to be negotiated.

ESA has already spent about 100 million euros on GMES, in particular in developing services based on available data sources. With the EC, we have developed about 12 service portfolios for 220 operational European user organisations. Now we have to create an infrastructure which fills all gaps in the satellite infrastructure and on the ground to be able to deliver the data for the GMES services. At the moment GMES is partly operational based on data sources available in the Member States and from ESA satellites. Envisat and ERS are both operational scientific satellites but their lifetime is limited. ESA proposes to close the gaps in operational remote sensing capabilities using the Sentinel satellites, which will be based on requirements coming from the services. Sentinel is the "brand name" for the operational satellites to be developed by ESA in the context of the GMES initiative.

How are relations with the European Commission?

VL: We have been working with the EC for many years. I think the history of cooperation in Earth Observation is even longer

than in the overall space programme because we had our first European Earth Observation strategy with EUMETSAT, the EC and ESA about ten years ago.

Overall I think cooperation between ESA and the EC is developing very well. We had a new beginning on 1 January 2005 when the new Commission came in and the units handling space matters were moved from the Directorate General for Research (DG-RTD) to the Directorate General for Enterprise and Industry (DG-ENTR). There are still some hurdles. Funding will be a challenge, as money is short in all Member States, but I am optimistic. Finding the optimum model to govern the GMES operational system is also a challenge. With Eumetsat, Europe has one operational entity in Europe. The distribution of roles between an operator and a developing and implementing agency has been successful in meteorology. We try to use this experience also for GMES. To find the optimal composition we need to pursue discussions with the Member States, the Commission and the other protagonists on this matter.

The GMES satellites will be managed in ESTEC, the ground segment in ESRIN and ESOC will play a role in the operations. In Brussels there will be a management team on the Commission side and our ESA Office. We have a framework agreement with the Commission stating that ESA is the implementing agency for GMES. There will be a lot of people involved in the Member States because GMES is not building on new satellites but on data from national missions. We will build a ground segment which will unify access to the different missions we have in Europe.



^ *Western Turkey on 30 October 2002*

The rugged coastline of Western Turkey is shown spectacularly in this Medium Resolution Imaging Spectrometer (MERIS) image. The Greek Dodecanese islands, in particular Lesbos, Chios, Kos and Rhodes in the south of the Bosphorus, contrast perfectly against the blue of the Aegean Sea. On the Turkish mainland to the north of the image, the city of Istanbul can be seen partially covered in cloud, with the Bosphorus separating the Black Sea from the Sea of Marmara and then the Aegean. On the west coast is the city of Izmir, and on the south coast is Antalya.



Users are not interested in the various standards, interfaces and data formats. What they want is services and this is our task. I think that only ESA could handle that as the European Space Agency. We hope that the first Sentinel satellite will be launched in 2011. This would be the first operational satellite and hopefully the first of many, just as with the launch of the first Meteosat satellite in the 1970s.

Could you talk a little about the international projects your directorate is working on such as Dragon, Tiger and Bear?

VL: International cooperation on Earth Observation is high on the agenda. By definition, satellite Earth Observation is a global issue. We have developed three main programmes in which we cooperate with other countries. One of these programmes is Dragon, a collection of projects with China on which work began in 2003. At the moment we have about 15 projects running, covering areas such as agriculture monitoring and, in particular, rice production in China. Several projects look into floods, forests, landslides and water resources. The Chinese authorities are giving high priority to these activities. A workshop hosted by new ESA Member State Greece took place in Santorini from 27 June to 1 July 2005 with the participants of the Dragon initiative. About 60 Chinese scientists and high-ranking members of the Chinese space community attended.

Work began on the Tiger initiative when ESA participated in the World Summit on Sustainable Development in Johannesburg in August 2002. The United Nations Secretary General Kofi Annan pointed out at that time that over a billion people lack access to clean, safe water, mainly in Africa, and that nearly 2 billion people do not have hygienic sanitation. The use of EO data was specifically mentioned in the Johannesburg Plan of Implementation

Russia and the pipelines leak from time to time. EO can help protect them. I think all these projects are well received and can be seen as a kind of constructive outreach of our work into other countries.

In view of the above-mentioned activities, do you plan to make changes in your directorate?

VL: I have already made changes in my directorate. Just after my arrival I set up the GMES Programme Office (GPO), an entity that brings together approximately 15 part-time staff in charge of the programmatic coordination of the two organisations, the EC and ESA. The other change I implemented involved restructuring of the Ground Segment Department. This process, which was already under way when I arrived, was then formalised. I would like to wait until after the Ministerial Council Meeting for decisions on the new programmes and then, in relation to these decisions, I will make further changes. In general, I took over a directorate that was working well. However, if we are to set up a new GMES programme worth €1 or 2 billion we have to reflect this somehow in the organisation. I have also found certain areas where I would like to see improvement.

What about team spirit in D/EOP?

VL: We work in an area where our enthusiasm stems from the content. I feel that the team is highly motivated and the general calibre of staff at ESA is very high. I personally feel this is absolutely mandatory for the survival of the Agency. As we offer a service to all the Member States, we have no choice but to be the best.

Although team spirit is high, occasionally we have to remind ourselves not only to think in terms of our own team but also in terms of the Agency as a whole and to interface with other parts of ESA. In principle, I have been very pleasantly surprised by the level of commitment and also the performance and effort my staff put into their jobs.

What is your opinion of communication within the Agency?

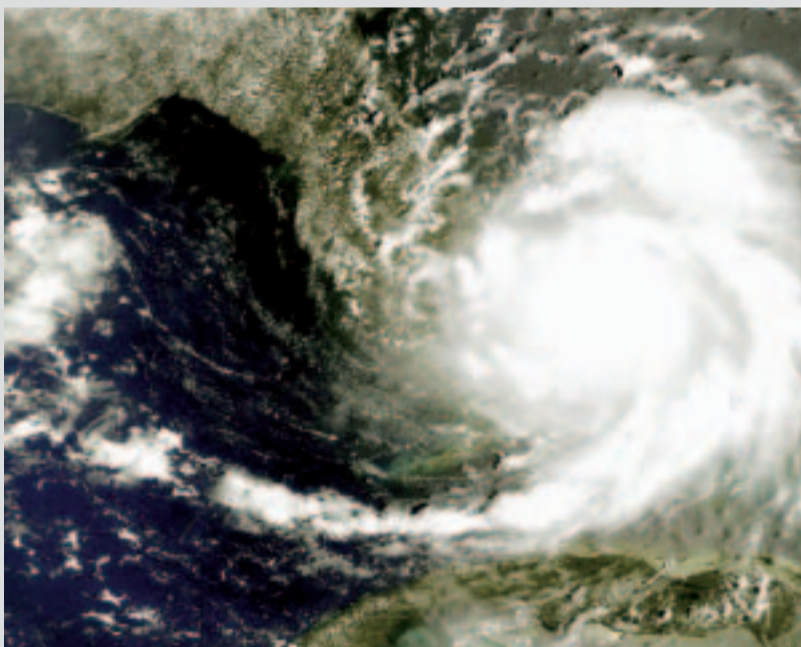
VL: Improving communication at ESA is a key element on the agenda of our Director General and we have already gone part of the way. The DG/Directors' Committee meetings that take place every Monday have been instrumental in this process. I believe we are now acting more as a whole but there is more work to be done not only at management level but at all levels. We have to constantly work on internal communication and transparency.

I think we are well on our way to achieving this. In the DG/Directors' Committee meetings we have adopted a working culture based on a certain sympathy and respect for each other which I feel is very good. We exchange all our experiences. I very much appreciated the support I received when I arrived at the Agency and I try to offer similar support to my colleagues.

You spent most of your career in the German Delegation. How has your perspective changed since you joined ESA?

VL: This is not altogether true. I was a Delegate for 11 years on different ESA programme boards, spending six years on the Earth Observation Programme Board and five years as Council Delegate. I started my career in polar research and I worked for some time in industry which was when I was introduced to the world of space. Only after that did I start to work for the German Space Agency. In my current position, I draw on my previous experiences.

Being part of the German Delegation before joining ESA has been a distinct advantage. It meant that I knew about procedures and the way the Agency works. Having worked for a space agency with 2,500 people in 11 different locations also helped. Upon arrival in ESA, I found many similarities between DLR and the Agency – complex machines which by virtue of their size create bureaucracy. Bureaucracy has no sense in itself but is a tool to achieve what we have to do. The machinery serves only one purpose, to provide the optimum environment for producing our directorate main products: satellites and the operation of these satellites. This is one of ESA's missions and we constantly have to remind ourselves of that. We are, and have to be, the best European tool for building and developing innovative satellites and the European Space programme. ■



▲ Katrina off southern Florida on 25 August 2005
Hurricane Katrina as seen by MERIS in Reduced Resolution mode, when it was still Category One on the Saffir-Simpson scale measuring hurricane intensity. The storm caused great damage after landfall, mostly due to heavy rainfall.

as a possible response to these problems. The Tiger initiative is also a collection of projects which look into the water issue, to find and estimate water resources, to look for safe water and to support hydrology programmes. The World Water Assessment Programme also covers this area. At the moment we have 50 ongoing projects with excellent participation from African water authorities and environmental organisations. Tiger is a highly successful and visible programme for ESA.

The third initiative is Bear. With all these animal names, it sounds as if we are running a zoo! Bear is a cooperation agreement between Europe, Russia and Ukraine, which aims at promoting scientific cooperation in the field of remote sensing applications. We have six ongoing projects and they correspond to the GMES Programme and cover areas like detection of forest logging in Siberia. One should also be aware that the biomass in boreal forests as found in Siberia for instance is comparable to, if not bigger, than the biomass found in tropical forests. So it is a real contribution to the carbon cycle. One of the EO projects is to look into the forests in Siberia and their inputs to the CO₂ flux models. We have another interesting project to monitor oil spills from pipelines in the Black Sea. The oil industry is important for

Happy 30th an



On 31 May 2005, ESA celebrated its 30th anniversary, marking a historical milestone for Europe in space and signalling the start of official festivities to be held in ESA's main Establishments throughout the year. Chancellor Gerhard Schröder launched these celebrations when he visited ESOC in June. *ESA Today* reports on the event.

On 1 June 2005 ESA Director General Jean-Jacques Dordain welcomed the Head of the German Government Gerhard Schröder to ESOC together with Gaele Winters, Director of Operations and Infrastructure (D/OPS), and DLR Chairman of the Executive Board Sigmar Wittig. This visit, the first ever by a Head of Government to ESOC, was acclaimed by Jean-Jacques Dordain as one of the best gifts that ESA could receive on its anniversary.

In his address to ESA staff, representatives from Member States and industry and the media, the Chancellor paid tribute to ESOC, hailing it as "an important centre of leading

technology and innovation" in Germany and in Europe, and said that ESA staff had every reason to be proud of their achievements.

Speaking only three days after the rejection of the European Constitution in France, Chancellor Schröder stated that although Europe had made great progress over the last thirty years, improvement was still necessary. ESA is a very good example of successful European cooperation, joining European forces to secure the huge investment required for space programmes. He underlined the significance of long-term investment not only for the advancement of science but also for daily space applications. A large part of his speech

was given over to his commitment to Galileo and to Earth Observation systems.

ESOC staff presented highlights of key ESA missions – Mars Express, Envisat and Huygens – to the Chancellor before inviting him to enter the Main Control Room to participate in a deployment simulation exercise involving the MARSIS instrument on board Mars Express. A rare privilege was extended to the Chancellor when Michael McKay, Exploration Missions Ground Segment Manager (OPS-OSC), asked him to send a command to Mars Express during the simulation. Werner Frank, Head of Operations (OPS-O), gave detailed explanations of pictures taken by the High Resolution Stereo Camera (HRSC) on board Mars Express and also commented on Envisat images demonstrating the applications of the highly successful Earth Observation satellite.

niversary ESA!



To celebrate the official ESA anniversary at ESTEC, a summer date was chosen coinciding with the formal inauguration 15 years ago on 29 June by Queen Beatrix of the Netherlands of the Large European Acoustic Facility (LEAF) at ESTEC and the Space Expo Visitors' Centre, Europe's first space museum.

This time around Queen Beatrix did not attend but celebrations went ahead hosted by Director General Jean-Jacques Dordain. The main guest speaker at ESTEC's 30th anniversary event was Deputy Prime Minister and Minister of Economic Affairs Laurens Jan Brinkhorst, nominated as the next Chairman of the Ministerial Council meeting on 5-6 December 2005 in Berlin.

In his address to guests, including ambassadors and representatives from embassies and the Dutch space community, Minister Brinkhorst spoke about the future and Europe's need for investment in technology to ensure that future generations can also look back with pride on ESA's successes in the way we can now.

"Some people believe that they are too far removed from space activities. I have to dispute this point of view. We all come into contact with space in our daily lives - through communication, navigation and the environment.

But also through exploration and the numerous technological spin-offs. The success today lies in the wisdom and vision of leaders 30 years ago. Now another important point has been reached. And right now Europe needs to be inspired," Minister Brinkhorst explained.

For Jean-Jacques Dordain it was a day for reflection on the past and for looking to the future: "Sixty satellites have been built here at ESTEC - all of them successful. ESA has also developed five different Ariane rockets. Together these have been used for 160 launches and more than fifty percent of the commercial market. We have landed on Titan, we are in orbit around Mars and the Moon, we are on our way to a comet and in October we will leave for Venus."

According to Jean-Jacques Dordain, continued success in the future requires the Dutch government and the European Union alike to be visionaries. The world of space and European citizens can be brought together through new

projects in the fields of safety, environmental research and navigation. In this way everyone stands to gain from space.

As a mark of the Dutch government's continuing support for space, Minister Brinkhorst presented Michel Courtois, Head of ESTEC and Director of Technical and Quality Management (D/TEC), with a high-tech foundation stone symbolic of new buildings to be constructed on the 4.5 hectares of land made available to ESTEC by the Dutch government.

With the formalities completed, festivities could get under way in the newly refurbished exhibition area of Space Expo where Holland's own David Copperfield, the well-known magician Hans Klok performed his miracles - see photo!

ESA astronaut André Kuipers and former ESA astronaut Wubbo Ockels were once again able to float in space and, this time, on the same mission which regrettably only lasted a few minutes. After a brief tour of the Visitors' Centre, guests were invited to a special anniversary lunch and further magical acts.

These memorable celebrations will undoubtedly go down in the annals of ESA! ■





Artist's view of ESA's CryoSat satellite

CryoSat, ESA's mission to the poles

ESA satellite will observe state of polar ice

by **Guy Ratier**, CryoSat Project Manager (EOP-PY), Directorate of Earth Observation Programmes, ESTEC

CryoSat is the first Earth Explorer Opportunity Mission within the framework of ESA's Living Planet Programme. The satellite will circle the poles at a distance of 700 km above the Earth and provide vital information to assess and predict the world's greatest environmental threat – climate change. Guy Ratier writes on mission objectives and teamwork.

Since ice plays such a crucial role in regulating climate and sea levels, the prospect of diminishing polar ice cover and subsequent elevation of sea levels due to global warming is one of the biggest environmental issues the world currently faces. From an altitude of 700 km and reaching latitudes of 88°, CryoSat's main objective is to measure changes in the thickness of the polar ice caps with unprecedented accuracy. These observations will detail the evolution of polar ice cover over a three-year period and provide crucial data sets that we urgently need to improve computer models of climate change, used to predict its future impact.

Current computer models of climate change effects neither include the year-to-year variation of Arctic sea ice, nor the decadal growth and decline of the great ice sheets covering Antarctica and Greenland. It is essential to gain an understanding of the natural variation in ice thickness and extent so that any human contribution to diminishing polar ice may be determined. CryoSat aims to do just this: to provide a detailed record of the variability in the thickness of floating sea ice and continental ice sheets so that any trend towards shrinking ice cover can be ascertained.

To meet the challenges of measuring both relatively thin floating sea ice and surveying the thickness of the vast ice sheets of

Antarctica and Greenland, CryoSat will carry the SAR Interferometric Radar Altimeter (SIRAL). Using one of two antennas, SIRAL will send out radar signals. Both of its antennas will then detect signal echoes from the Earth's surface. By knowing the position of the spacecraft to a very high

degree of accuracy – achieved with an onboard ranging instrument called the Doppler Orbitography and Radiopositioning Integrated by Satellite (DORIS) supplemented by a laser retro-reflector system – the signal return time reveals the surface altitude. Past radar altimeters could deliver



ESA's CryoSat satellite

ESA's CryoSat satellite after completion of acoustic tests at IABG (Industrieanlagen Betriebsgesellschaft mbH) in Ottobrunn, Germany, in July 2005. This 750 kg spacecraft, built by EADS Astrium, features no moving element. The fixed solar arrays (here wearing protective covers) are visible on the top of the satellite.



The CryoSat team during the Flight Acceptance Review (FAR) presentation at ESTEC on 7 June 2005 (from left to right) Fabio Buscaglione, Pierre Viau, Christoph Götz, Cyrille Lusteau, Sean Madden, Malcolm Davidson, Bill Simpson, Lennart Hagstrom, Francesc Coromina, Margaret Basten, Rob Cullen, Reinhold Zobl, Guy Ratier, Duncan Wingham (UCL), Pier Paolo Emanuelli (ESOC), Kurt Büchler, Catherine Bouzinac, Pascal Gilles (ESRIN), Richard Francis, Marc de Bleeker, Karim Bouridah, Nic Mardle (ESOC), Albert Auriol (CNES), Constantin Mavrocordatos and Bernard Weymiens.

data only over the sea and large-scale homogeneous ice surfaces, but SIRAL's new design can also provide detailed views of irregular sloping edges of land ice as well as non-homogenous ocean ice.

Small, low-cost satellites

Although ERS and Envisat are providing us with unprecedented data on the Earth and its environment, their development was time-consuming. Back in the late 1990s, the scientific community had already begun expressing an interest in having tools that were able to provide answers to urgent environmental issues within a short period of time. Earth Explorer Opportunity Missions are designed to fulfil this requirement. These small, low-cost satellites are relatively quick to construct and make operational, thus enabling them to address areas of immediate environmental concern. The idea is to use, as far as possible, technology that already exists, adopting an "off the shelf" philosophy.

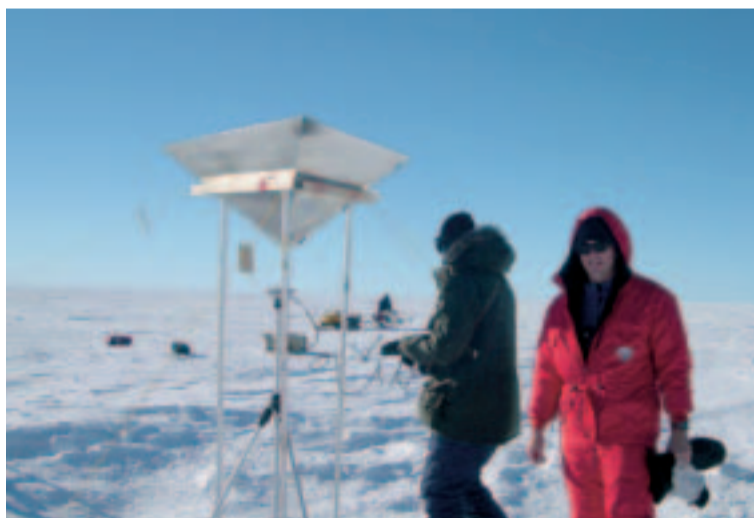
By the time the first Announcement of Opportunity for Earth Explorer Opportunity Missions was released in 1998, it was clear that there was an urgent need for accurate observations of the changes that were occurring in the polar ice masses. The evolution of sea ice and land ice are key parameters needed for improving climate models. This requirement was put forward by a team of scientists led by Professor Duncan Wingham (UCL), UK, and subsequently selected as the first Earth Explorer Opportunity Mission. Following the selection process, the combined Phase A/B started in early 2000 with the industrial teams. It has taken just over five years to go from a proposal on paper to a full-scale mission. The Soil Moisture and Ocean Salinity (SMOS) mission has been selected as the second Opportunity Mission.

Given the nature of this type of mission, the biggest challenges have arguably been associated with time and money. The whole philosophy is that we develop a mission that is based on scientific and technical excellence quickly and cheaply in order to contribute to furthering our understanding of the Earth's system. We

are now on the verge of achieving this. CryoSat is a low-cost mission utilising existing equipment designs and replacing the usual engineering model with software representing a 'virtual satellite'. CryoSat has been rather innovative in this respect, as the development undertaken for it will be reused for further missions. It carries sophisticated instrumentation and has undergone a stringent programme of testing. As with any feat of engineering this testing phase did actually reveal a few technical challenges – all of which have now been resolved.

At ESOC, during the Launch and Early Orbit Phase (LEOP), two teams of about 15 people work for a period of three days. Thereafter, the team is composed of less than ten members for the routine operations phase which lasts about three years. ESRIN will be in charge of the exploitation phase and engineers there have been greatly involved in the design of the CryoSat ground segment. The ESTEC Mission Experts Division is playing a key role not only interfacing with the scientific community, but also in the organising of the extensive ground-based validation campaigns in the Arctic.

Cover reflector >
On the Greenland ice sheet at point T05, one of the main validation sites staffed by UK scientists.



CryoSat teams

In order to comply with the limited budget allocated to the Opportunity Missions, both the ESA team and the industrial team are small with only eight people at ESTEC working full-time on the CryoSat Project.

The advantage of being a relatively small team is that each individual team member has a global overview of the progress of the project. Communication is good within the team and, in spite of the geographical split, excellent working relations with the CryoSat teams at ESOC and at ESRIN have been maintained. The drawback is that the workload has been heavy due to the tight schedule and the amount of activities to be covered by each member of this small team. We have had good support from our colleagues from the Directorate of Technical and Quality Management (D/TEC), and this has been really appreciated.

The CNES team will provide the precise determination of the orbit.

We have been working on this project for over five years now, we all feel very proud of the work we have done but also extremely motivated to continue to make sure that everything goes like clockwork up until we receive the first data on ice thickness. We also have the added responsibility of being the first mission in the series of the Earth Explorer Opportunity Missions to be launched and, of course, we want to set a good precedent. ■

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New windows of disc

A look at fundamental physics in space today and tomorrow

A recent cross-Agency report compiled by Clovis de Matos, General Studies Officer (EUI-P), Sergio Volonte, Coordinator for Astronomy and Fundamental Physics Missions (SCI-CA), Jean-Christophe Grenouilleau, Operational Planning and Integration Engineer (HME-EOI), Olivier Minster, Head of the Physical Science Unit (HME-GAP) together with Professor Orfeu Bertolami from the Instituto Superior Técnico in Lisbon, demonstrates how potential breakthroughs in the domain of Fundamental Physics could advance our understanding of the Universe and maybe even the way in which ESA conducts space exploration.

Every technology-based company undertakes research and development to retain their competitive edge in a fast-moving world. ESA is no different; it is constantly searching for smarter, more efficient ways of conducting space missions which usually take the form of technology development programmes.

But, what if there were totally new approaches beyond mere technology that could make missions better? Perhaps new effects from established theories that have yet to be exploited, or even new physics altogether? Such new laws of nature might make seemingly impossible tasks routine and present totally new windows of discovery on the Universe.

Unlocking this hidden potential is one of the goals of ESA's Fundamental Physics Programme. A recent cross-agency report in collaboration with Professor Orfeu Bertolami, Departamento de Física do Instituto Superior Técnico, Lisbon, has highlighted the vast scope for discovery that exists in this area.

The ESA Fundamental Physics Programme is currently developing an ambitious series of experiments and missions to attempt to measure for the first time several predictions of Einstein's theory of general relativity which have not yet been observed, in particular gravity waves in space. If found, they would provide a whole new insight into the formation of galaxies and the Universe.

According to Einstein's theory, space should be criss-crossed with gravitational waves which ripple its fabric, like a wave moving across an ocean, whenever an object changes shape or motion. When these waves pass other celestial objects, they make them bob up and down, just as small boats bob up and down on Earth's oceans. Some of the Universe's largest gravitational waves are caused by cataclysmic events such as the mergers of black holes in distant galaxies. Even so, the bobbing motion caused is almost too small to be believed: the disturbance is a million millionths the width of a hydrogen atom.

Space, the most accurate laboratory

Detecting such a minuscule variation was unthinkable at the time Einstein proposed general relativity in 1915. Even today with modern equipment on Earth, the task is extraordinarily difficult. There are several laboratories in the world set up to detect

gravitational waves but, in each case, they are plagued by seismic events such as earthquakes or even traffic passing miles away. As yet, no one has convincingly detected gravitational waves.

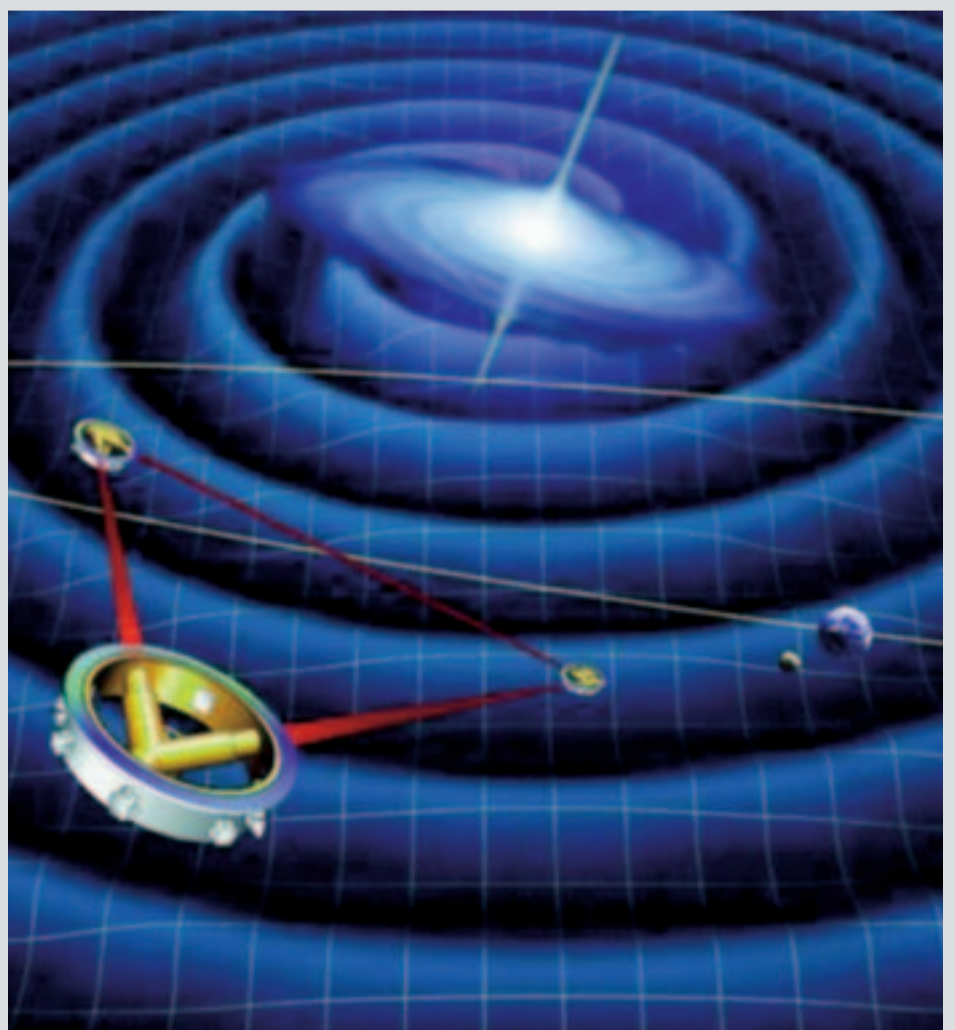
From space, such interference is avoided. ESA is currently working with NASA to prepare the Laser Interferometer Space Antenna (LISA) for launch in 2014. This triplet of spacecraft could provide the world with its first direct detection of gravitational waves. Each spacecraft will sit 5 million kilometres from the other two, forming an enormous equilateral triangle. They will shine laser light between them and tiny changes in the optical paths of this light will allow the spacecraft to detect when one bobs because of the passage of a gravitational wave.

Beyond the mere fascination of detecting gravitational waves and using them to test

Einstein's theory, the LISA mission will provide astronomers with a new window on the cosmos. Gravitational waves are entirely different from visible light and LISA could give astronomers their first glimpse of galaxy formation, in which galaxies collide in the extremely distant Universe, giving out gravitational waves as they do so.

Another phenomenon expected from general relativity but not yet detected is called gravitomagnetism. This effect makes a rotating object generate a slightly different gravitational field from a stationary one. The gravitomagnetic effect around a slowly rotating celestial object such as the Earth is extremely small. However, around a fast-spinning massive body, such as a black hole in the centre of a galaxy, the effect could be enormous. Some astronomers believe it may be the cause of mysterious jets of matter that squirt from the centre of some galaxies.

ESA has been studying the Hyper-precision cold atom interferometry in space (HYPER) mission to orbit the Earth, measuring the tiny gravitomagnetism effect around our planet. Such an experiment could be launched sometime after 2015. It would provide an important complement to NASA's Gravity Probe-B, which is currently performing measurements in space.



^ Artist's impression of the LISA mission concept
This triplet of spacecraft could provide the world with its first direct detection of gravitational waves.

overly on the universe

Quantum gravity and the Holy Grail of physics

A major tenet of the theory of general relativity is that objects are accelerated by gravity in the same way, independent of their mass and chemical composition. This is called the Weak Equivalence Principle. All ground-based experiments so far have confirmed this but a space-based laboratory could test the principle of equivalence with 100 to 10,000 times the sensitivity of ground-based equipment.



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Legendary debate between Niels Bohr and Albert Einstein in 1927 which initiated the quest to harmoniously merge general relativity and quantum mechanics.

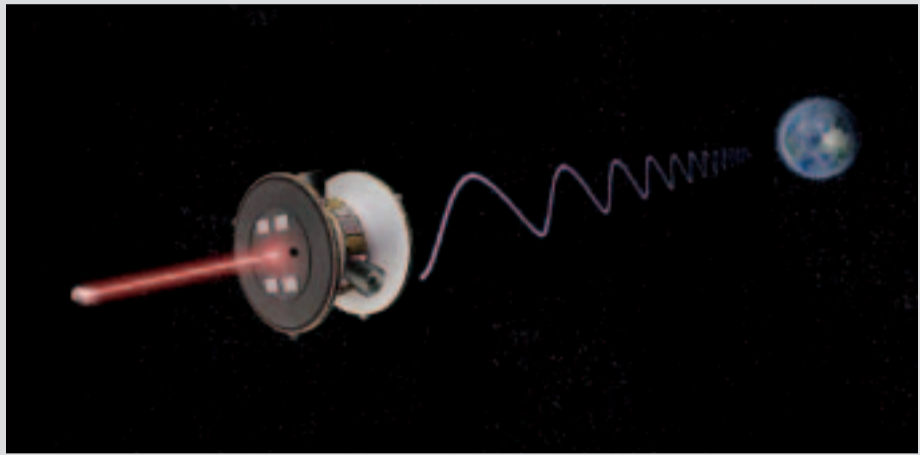
MICROSCOPE (MICROSatellite à traînée Compensée pour l'Observation du Principe d'Equivalence) is a CNES mission in collaboration with ESA due for launch in 2008. Although a more ambitious ESA/NASA plan, the Satellite Test of the Equivalence Principle (STEP) has been abandoned, an experiment based on HYPER technology could also be adapted to study the Weak Equivalence Principle. If MICROSCOPE detects a violation of this principle, it could be the clearest sign yet of a new physical regime of gravity, known as quantum gravity, or gravity on an atomic scale.

This would provide the first tentative link between the physical laws governing behaviour of very large objects in space, as outlined by the general theory of relativity, and those of particles at the atomic level governed by quantum mechanics. Unifying the two theories to produce one set of laws which describes the behaviour of objects on the galactic and atomic scale has been the holy grail of physics for nearly a hundred years since Einstein's relativity theory but so far nobody has managed to do it.

Investigating why space probes drift off course

Besides testing the limits and the validity of Einstein's theories, the cross-agency report refers to the investigation of phenomena that seem to have no explanation within any currently accepted theory.

In particular, the report discusses the so-called Pioneer anomaly. The name refers



▲
*Artist's view of a mission concept to investigate the Pioneer anomaly
More information at <http://xxx.lanl.gov/abs/gr-qc/0506139>*

to the old NASA space probes Pioneer 10, launched in 1972, and Pioneer 11, launched in 1973, which began to slowly and inexplicably drift off course once they were further from the Sun than the planet Saturn. In addition, NASA's Galileo probe and the ESA/NASA Ulysses probe also displayed unexpected trajectory changes.

One reason to take these deviations seriously is that, in the past, the unexplained movement of celestial objects has led astronomers and physicists to extraordinary breakthroughs. Subtle changes in Mercury's orbit perplexed nineteenth century astronomers who believed that they understood all about the way the Universe moved. In fact, it was not until Einstein's theory of general relativity that the small deviations in Mercury's orbit were explained. Could the Pioneer anomaly be the twenty-first century's equivalent?

At present, the anomaly manifests itself as a tiny retarding force that acts in the direction of the Sun. That immediately suggests that it might be some previously unsuspected component of gravity. Another possibility is that it is an undiscovered force of nature that only acts over size ranges similar to the radius of the Solar System. Although a number of scientists believe that the mysterious force is caused by some unknown engineering problem with the spacecraft in question, only a dedicated mission to the outer Solar System, designed to fully investigate the forces acting out there, will resolve this. ESA currently has no plans to further investigate the Pioneer anomaly.

Quantum technology's potential in space

As well as investigating frontier physics, tests of newly recognised quantum mechanical phenomena could result in richly exploitable techniques for future space missions. For example, the growing field of nanotechnology promises ultra-miniaturised components that are clearly of enormous value to mission planners, who need to keep their

spacecraft light enough to launch. Other emerging technologies such as quantum computing and quantum communication require more research to bring them to fruition but, similarly, hold great promise. By performing the science to investigate these phenomena, ESA is preparing to make full use of the resulting technologies.

The future of fundamental physics

The report concludes that ESA's Fundamental Physics Programme should be seen as an indispensable aspect of the Agency's work. This is because space provides an extremely stable environment, free from the distorting events of Earth's gravity and seismic activity, in which to test the very boundaries of physical knowledge.

For all of ESA's existence, it has largely used modern implementations of nineteenth century physics and Isaac Newton's theory of gravity to conduct its missions. Whilst these approaches will remain valid, investigation of the more modern physics of relativity and quantum mechanics will not only advance our understanding of the Universe, it may also provide breakthroughs in how ESA conducts space exploration. ■

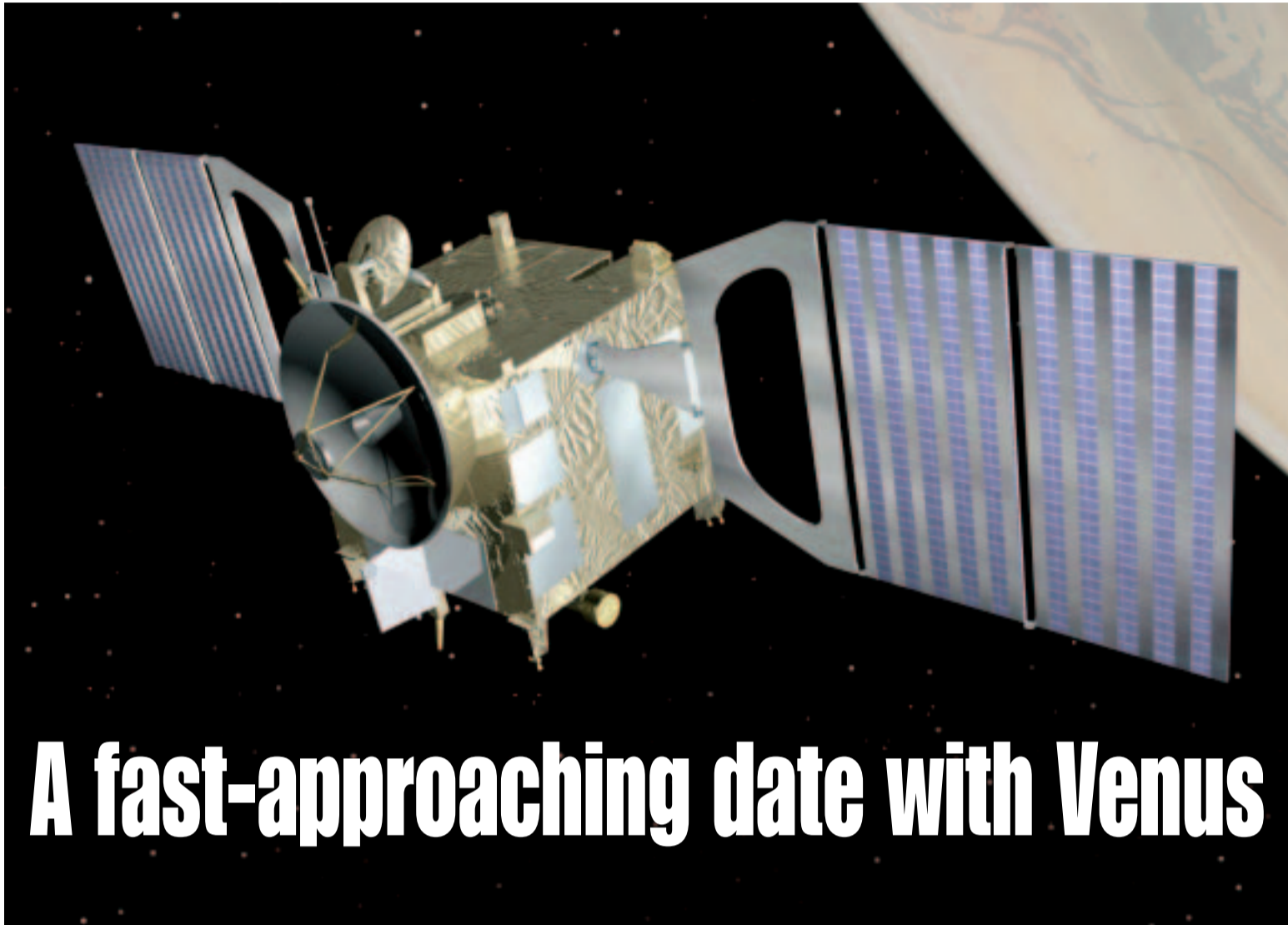
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The full report, entitled *Perspectives in Fundamental Physics in Space*, can be downloaded from: xxx.lanl.gov/abs/gr-qc/0405042



A fast-approaching date with Venus

ESA prepares for the launch of Venus Express

By using a similar design to Mars Express, Venus Express engineers have been able to build Venus Express in just three years. As the currently scheduled launch date of 26 October approaches, Venus Express Project Manager Don McCoy (SCI-PE) reflects on what a challenging journey this has been and shares the team's emotions at various stages along the way.

In these modern times of concern about our climate, and what harm we may be doing to it, understanding how our neighbouring planets have evolved could help us to comprehend what is happening here at home. Venus may be particularly useful in this quest. Although very similar to Earth in terms of size and gravity, there are nevertheless radical differences between the two planets. Surface pressures on Venus are 90 times greater than those on Earth and surface temperatures reach 470°C (about ten times hotter than the hottest temperatures on Earth) although the Sun's energy shining on Venus is only double that on Earth.

Clearly, the greenhouse effect is at work on Venus. Since the greenhouse effect has begun on Earth, the evolution and behaviour of Venus' atmosphere will be of particular interest to us. ESA's mission to Venus, Venus Express, will study this planet using it as a living laboratory to gain a better insight into the lives of planets like our own and perhaps help us predict the future of Earth's environment. The atmosphere and clouds on Venus will be studied in detail and global maps made of the surface temperatures.

Mars Express' cousin

The Venus Express spacecraft uses rebuilds of much of the Mars Express equipment as well as employing the essential structural design elements. This has been made possible by ensuring that the main technical

difference between the two spacecraft – the thermal control – is capable of keeping the internal temperatures of the Venus Express spacecraft in the range of those originally planned for Mars Express. The qualification testing of the Mars Express equipment, which proved it could operate

in the range of approximately -20° C to +45° C, is respected and there are no doubts about its suitability for Venus Express. When looking at the two spacecraft the most obvious difference is the thermal blanketing. In the case of Mars Express, this had to absorb the Sun's energy and gave the



The ESTEC Project Team

(from left to right) Philippe Sivad, Assembly Integration and Verification (AIV) Engineer, Con McCarthy, Power Engineer, Olivier Witasse, Scientist, Frank Geerling, Attitude and Orbit Control Subsystem (AOCS) Expert, Joe Pereira, AIV/Payload Support, Roy Gouka, Project Control Support, Hakan Svedhem, Project Scientist, Michael Witting, AIV/Launch Engineer, Hans Eggel, Payload Engineer, Marco Verna, Payload Manager, Don McCoy, Project Manager, Alistair J. Winton, Electrical Engineer, John Reddy, System Engineer, Thorsten Siwizta, Project Controller, Elisabeth Zondag, Administrative Support, and Philippe Poinas, Thermal Expert, Lothar Gerlach, Solar Array Expert.

Missing from the picture : Ared Schnorhk, Propulsion/Thermal/Structures Engineer.



▲
The ESOC Project Team

(from left to right) Francesca Krüger, Spacecraft Controller, Bruno Sousa, Power Operations, Manfred Warhaut, Ground Segment Manager, Glenn Hurrell, Spacecraft Controller, Norbert Schmitt, Telemetry and Telecommand Subsystem (TT&C) Operations, Mark Sweeney, Power Operations, Wolfgang Hell, Ground Station Network, Andrea Accomazzo, Spacecraft Operations Manager, Christopher Steiger, Attitude and Orbit Control Subsystem (AOCS) Operations, Peter Schmitz, Deputy Spacecraft Operations Manager, Norbert Keil, System Operations, and Ignacio Tanca, System Operations. Missing from the picture: Jean-Baptiste Gratadour, AOCS Operations.

spacecraft a dark appearance while for Venus Express it has to deflect the Sun's energy and so makes the spacecraft shiny in appearance. When one considers that the strength of the Sun at Mars is slightly less than half that on Earth, while on Venus it is twice that on Earth, the reasoning for the different thermal blanketing becomes clear.

Close-up view of Venus

With the unusual group of instruments on board Venus Express we will be able to observe Venus constantly from its surface, through its atmosphere and right out to the limits of the molecular interactions of the atmosphere with the solar wind. We expect to gain an understanding of the strange atmospheric behaviour on Venus with its extreme pressures and temperatures and vastly complex composition.

The suite of instruments on board Venus Express will be able to detect unusual molecules in the atmosphere if they exist. We will also be able to study the daily behaviour of the atmosphere in a variety of sensing bands to understand the winds, the cloud formations and the chemical behaviour as a result of solar interaction: a veritable weather satellite for Venus.

The "Express" team

The Venus Express team has been working for around three years to meet the launch date of 26 October 2005. Over the years, we have managed to maintain this date in the face of many obstacles and now, as the date gets closer, we are feeling quite confident that we will be able to meet our deadline. Venus Express will be launched from the Baikonur Cosmodrome in Kazakhstan where many manned missions are launched to the ISS. We will

be using Soyuz, the same launcher used by manned missions, along with a specialised upper stage called Fregat which has been used by science missions such as Cluster and Mars Express.

There are 13 people working on the ESA project team at ESTEC and another three people from the Directorate of Technical and Quality Management (D/TEC) providing expert assistance. There is also a team of 12 at ESOC preparing for the operations phase of the mission, under the responsibility of Manfred Warhaut, Ground Segment Manager.

To build an interplanetary spacecraft in such a short time it is essential that all people involved work together to solve problems on a daily basis. In order to do so, team members must be committed to the goal, and, regardless of whether they are from industry or from ESA, they must be, first and foremost, a team of Venus Express professionals. I have witnessed exactly this. The ESA team has joined with the French Astrium prime team and the Italian Alenia AIT team to resolve problems together so as to keep Venus Express on track.

Without mutual respect and enduring relationships between people who together enjoy what they are doing, team spirit would only be a textbook management phrase. These are the essential ingredients of team spirit, but there are other aspects too which we try to promote by organising social get-togethers, which I must say are always enjoyable and create lasting memories.

With such a diverse group of people working under constant pressure to meet a plan-

etary rendezvous, one sees some interesting qualities in people. I have recently given a private sort of award for team members only, that I call the Blue Venus award. It is a reward for the unusual and I hope they will remain special for the recipients well after the mission is completed. I am proud to say that this team displays the best spirit there is in the pursuit of a common goal.

Venus Express has been very challenging and I am in no doubt that many more challenging moments lie ahead. A rocket launch should never be underestimated when it comes to the preparation or, for that matter, its capacity to surprise! However, there is a particular period that stands out. This was when the project team was managing the Venus Express development start-up at the same time as completing the Mars Express development, launch and early operations.

In spite of the decision to maintain the project team for both "Express" projects to be more efficient in terms of implementation, it nevertheless required crystal clear discipline on the part of each team member to maintain the level of professionalism needed to carry out the tasks. To have arrived at this juncture with one satellite operating around Mars and another preparing for launch to Venus is a great credit to these people and I salute each and every one of them for their dedication.

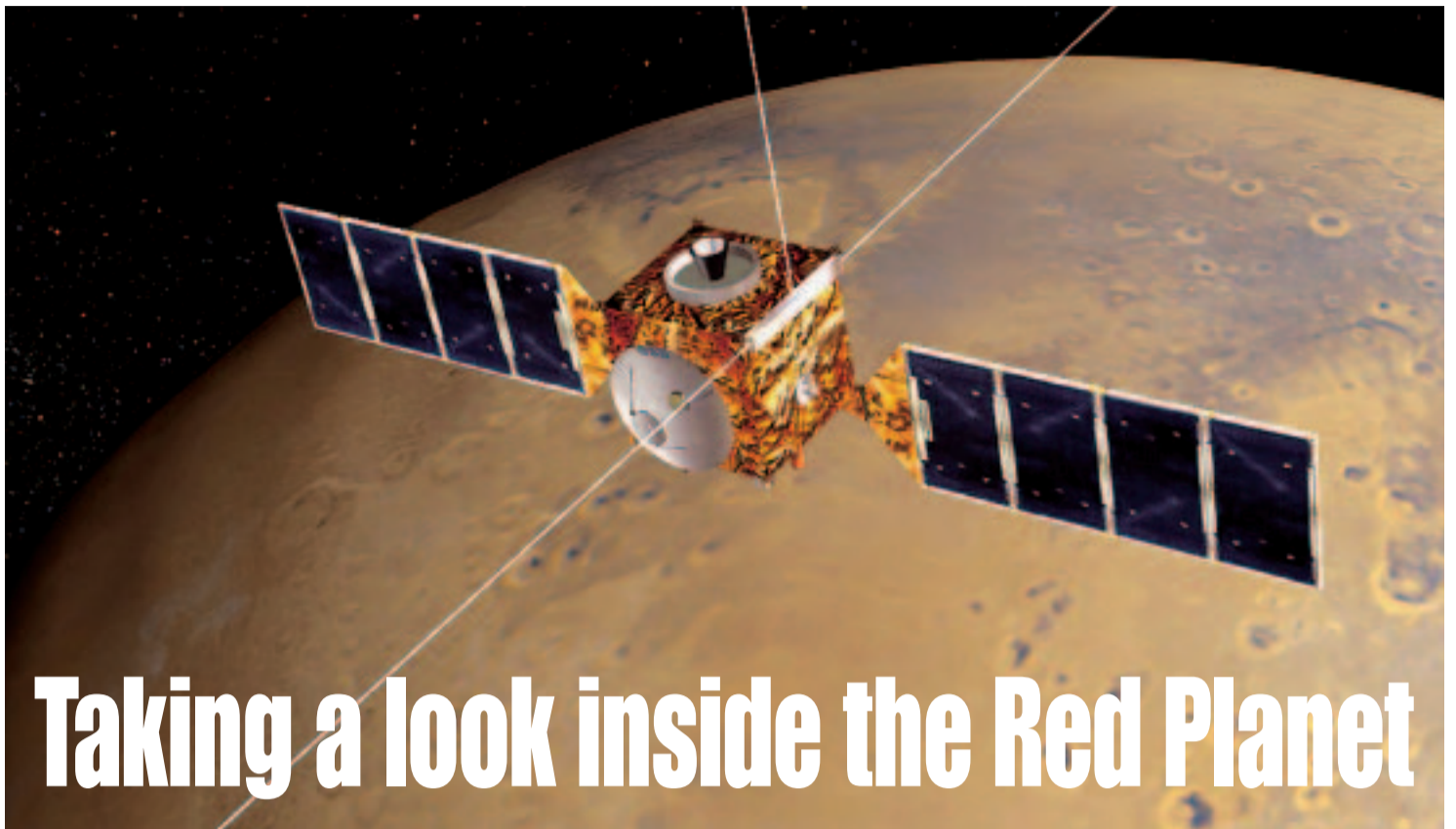
In the few quiet moments that we manage to have between the many meetings and technical discussions, I believe that we are all thinking that we are beginning to see the light at the end of the tunnel. We always knew that we had a date with Venus but it always seemed so far away. I think the team is starting to see the reality of the approaching launch date and with it the excitement of the launch campaign grows.

The completion of the Flight Acceptance Review process in August, where all the work over the last few years is subject to independent peer review to cross-check that everything is ready, has now cleared our path to the launch pad. Since the Antonov 124 cargo plane lifted the spacecraft from Toulouse to Baikonur on 6 August, we are now counting the days to the moment when we will be counting down the seconds! ■



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Taking a look inside the Red Planet

MARSIS at work on Mars

From 4 May to 17 June 2005, ESA flight controllers performed a number of manoeuvres leading to the successful deployment of the Mars Advanced Radar for Subsurface and Ionosphere Sounding (MARSIS) on board the Mars Express orbiter. This meant that the mapping of the Martian subsurface to a depth of a few kilometres could begin. MARSIS began its exploration of Mars in early July. What have scientists discovered? Marcello Coradini, Coordinator of Solar System Missions (SCI-CS) explains.

The MARSIS instrument consists of two 20-metre 'dipole' booms and one 7-metre 'monopole' boom which was deployed perpendicularly to the first two. The unfolding of the booms was an extremely delicate exercise and when an anomaly was found during the deployment of the first boom in early May, thorough verification was required. Consequently, deployment of the second boom was delayed.

By mid-June, however, flight control engineers at ESOC were in a celebratory mood following the deployment of the second and third boom, which went very smoothly. Completion of these delicate operations indicated that MARSIS was in good health and ready to explore the planet's atmosphere, surface and subsurface structure. MARSIS represents the first-ever means of finding out what may lie below the Martian surface.

Where did all the water go?

The radar with its long booms will enable Mars Express to continue its search for the abundant water once suspected on the Red Planet. The primary scientific objective of MARSIS is to map the distribution of water, both liquid and frozen, in the upper portion of the crust of Mars.

By looking deep inside the planet rather than only on its surface, MARSIS should be able

to pinpoint exactly where water is located. By night, the radar will be used to make soundings for water below the surface and during the day it will probe the structure of the ionosphere (the upper atmosphere).

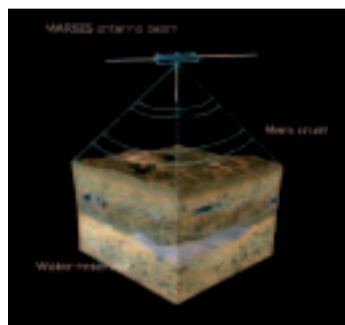
MARSIS and six other experiments on board the Mars Express orbiter: the High Resolution Stereo Camera (HRSC); OMEGA, the Visible and Infrared Mineralogical Mapping Spectrometer; SPICAM, the Ultraviolet and Infrared Atmospheric Spectrometer; the Planetary Fourier Spectrometer (PFS); ASPERA, the Energetic Neutral Atoms Analyser and the Mars Radio Science Experiment (MaRS), constitute the science payload of the mission. This payload has the collective capability of studying the geological evolution of Mars and, in particular, of answering the question "where did all the water go?"

How does it work?

MARSIS is a completely new development and it is the first time that such an instrument has flown on a planetary mission. Due to severe limitations in available mass, a new self-deploying type of antenna was used for the MARSIS dipole and monopole elements. The new type of antenna is a folding fibreglass tube of about 3.8 cm in diameter, which in turn supports wires which form the conductive ele-

ment of the antenna. The combined mass of dipole and monopole elements plus deployment containers is about 7.5 kg.

By night, MARSIS works by sending a coded stream of radio waves towards Mars, and analysing their distinctive echoes. From this, scientists can then make deductions about the surface and subsurface structure to a depth of several kilometres. By day, MARSIS probes the structure of the ionosphere.



Cooperation

The MARSIS instrument was developed by the University of Rome in partnership with NASA's Jet Propulsion Laboratory (JPL) in Pasadena, California, and the University of Iowa. This cooperation, which started in 1998, when the instruments were selected, went smoothly. The booms were provided by the University of Iowa, and the Infocom Department of the University of Rome via Alenia supplied the electronics and the overall concept of the radar.

What do we expect to find?

After the successful deployment of MARSIS, David Southwood, Director of the Science Programme (D/SCI), said: "With MARSIS now at work, whatever we find, we are moving into new territory..."

"This is the first time we have an instrument looking below the surface of Mars," explains Agustin Chicarro, Mars Express Project Scientist. "We expect to find liquid or frozen water down to a depth of several kilometres," he says. "The first results with MARSIS were obtained in June-July 2005 when pericentre passes occurred during the night. For further results we must now wait until December when Mars Express and MARSIS will enter night-time again. Priority will then be given to the radar, which will be able to go deeper under the surface of the Red Planet. During day-time, from August to November, priority has been given to the optical instruments and to ionosphere investigations with MARSIS," concludes Agustin Chicarro. ■

contact

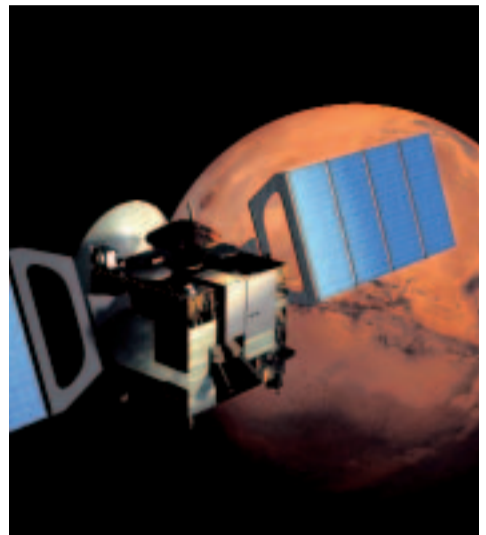
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Awards and tributes

ESA staff are frequently recognised for their outstanding achievements. In this issue of *ESA Today*, we present a number of staff members who have recently received awards for their hard work and dedication.



Prestigious French awards for Huygens Mission Manager and team

In recognition of the contribution of ESA's Huygens Mission Manager and Project Scientist to the success of the mission to Titan earlier this year, Jean-Pierre Lebreton (SCI-SB) received one of France's highest accolades when he was nominated in May to the rank of "Chevalier dans l'Ordre National de la Légion d'Honneur". "This prestigious French award goes right to my heart as it is a tribute to our efforts to stimulate public enthusiasm for the Huygens adventure," said Jean-Pierre Lebreton.



In March the Huygens team had already been awarded the "Prix Icare" by the "Association des Journalistes Professionnels de l'Aéronautique et de l'Espace" which has been conferring this award since 1957 for contributions to the development of the aeronautical and space sector. ■

Architect of Huygens mission receives special award

Former ESA staff member George Scoon, the man responsible for the original Huygens study at ESA, was selected as the winner of the "Inspiration Award" by a panel of judges, representing the space industry, research institutions, universities and space-related organisations, at the inaugural Sir Arthur Clarke Awards in the UK in April. These awards, named after the science fiction writer and futurist probably best known for "2001: A Space Odyssey", are intended to provide recognition for those who have worked for the advancement of space exploration, concentrating mainly on British rather than international achievement.



George Scoon, now retired, began at ESRO in 1965. In 1984 he was appointed Study Manager for future science projects and in this role conducted studies for 15 different space missions including, among others, the Mercury Cornerstone System and Technology study, Mercury Sample Return Assessment study, Venus Sample Return Assessment study, EuroMoon 2000 Pre-Phase A study, Cassini Titan Probe Phase A study, and Vesta Phase A study.

ESA's first real planetary project, Cassini-Huygens, required a change of culture within the Agency but George Scoon showed a special ability to detach himself from the classical engineering schemes and mentality, entering the uncharted waters of designing a deep space atmospheric descent and landing probe. ■

Austrian award for Mars Express

On 4 May 2005 Rudolf Schmidt, currently GAIA Project Manager (SCI-PE), received the prestigious Austrian award "Österreichisches Ehrenkreuz für Wissenschaft und Kunst erster Klasse" for his work as Mars Express and Venus Express Project Manager. The award was presented by the Head of the Government of the Land Steiermark, Waltraud Klasnic, on behalf of the Federal President of Austria.



"I was very proud to receive this award" said Rudolf Schmidt. "In Austria it is quite something!". ■

Extra eyes in the sky

Overview of ESA's Third Party Missions

by **Bianca Hörsch**, Third Party Mission Manager (EOP-GM) and **Günther Kohlhammer**, Head of the Ground Segment Department (EOP-G), Directorate of Earth Observation Programmes (D/EOP), ESRIN

ESA's Earthnet activity has been providing scientists monitoring climate change, oceans, landcover, vegetation and pollution with extra sets of eyes in the sky by distributing data from non-ESA satellites under specific agreements with the satellite operators. *Esa Today* provides an insight into the world of Third Party Missions.

Since 1977 ESA's Earthnet Programme has been responsible for Third Party Missions which support and complement ESA's own Earth Observation operations. The objective of the Third Party Mission element is to provide the European user community with access to Earth Observation data from non-ESA missions. Access to this data helps the continuity of European missions and increases data density in time and geographical coverage. It can be used for cross calibration and validation of satellite instruments and ensures consistency across different data sets. Since the setting up of the Earthnet Programme under the umbrella of the Agency's mandatory activities in 1980, the Third Party Mission element has been a major tool in international and inter-agency cooperation with satellite operators worldwide.

Today, Third Party Missions are handled by the Mission Management and Strategy Office of the Ground Segment Department in the Directorate of Earth Observation Programmes (D/EOP). This office is located at ESRIN. Technically, the Third Party Missions' access is handled through a distributed European multi-mission ground segment, which relies on the infrastructures of ESA and the Member States. Within this decentralised ground segment,

ESA currently manages contracts for the re-use of nine different national facilities for data acquisition, processing, archiving and/or distribution of third party mission data. This cooperative approach and the shared ground segment technology system assure harmonisation within ESA Member States of their national assets in space and on the ground and support a global interoperability concept that will be the backbone for European initiatives like Global Monitoring for Environment and Security (GMES). (<http://www.esa.int/esaLP/LPgmes.html>).

Getting the best view

ESA scientists can benefit from Third Party Mission agreements by switching between satellites with different instruments which show a larger area or a smaller more detailed view. For example, the Medium Resolution Imaging Spectrometer instrument (MERIS) on board Envisat covers large areas with 15 spectral bands at 300m spatial resolution, so that full global coverage is possible every three days. Scientists can use MERIS to measure the colour of the oceans to monitor the carbon cycle and heat exchange in the oceans and to manage fish stocks. If a more detailed view is required, data from a Third Party satellite such as NASA's Landsat TM, which covers comparably

smaller areas with 7 bands but 10 times higher (30m) spatial resolution, can be obtained.

The Landsat satellites operated jointly by NASA, the National Oceanic and Atmospheric Administration (NOAA) and the US Geological Survey (USGS), are one of the oldest Third Party Missions. The Landsat Programme is the longest running enterprise for acquisition of imagery of the Earth from space. The first Landsat satellite was launched in 1972; the most recent, Landsat 7, was launched on 15 April 1999. The instruments on the Landsat satellites have acquired millions of images. The images, archived in the United States and at Landsat receiving stations around the world, are a unique resource for global change research and applications in agriculture, geology, forestry, regional planning, education and national security. Thus, the thirty year record of data acquired by ESA from the Landsat satellites constitutes one of the longest continuous records of the Earth's continental surfaces.

Today also ESA's Proba mission, launched on 21 October 2001, is financed out of the Third Party Mission element. Originally developed as a technology demonstrator with an intended one-year lifetime, the satellite and its lightweight camera known as the Compact High Resolution Imaging Spectrometer (CHRIS), developed by SIRA Technology (UK), turned out to be so successful that last year ESA approved the continuation of Proba among the Third Party Missions. CHRIS takes hyperspectral pictures of an area of some 14 kilometres square to a resolution of 18m with up to 62 spectral bands. Today the demand for CHRIS Proba data by European scientists exceeds by far the daily technical data acquisition capacity of



▲ China National Space Administration (CNSA) Delegation, headed by the CNSA Administrator, Sun Laiyan (middle), visits ESRIN in June 2005. Among the topics of discussion was the inclusion of the Chinese-Brazilian CBERS (China-Brazil Earth Resource Satellite) Mission as an ESA Third Party Mission.

the small satellite.

As a result of the Third Party Mission element of Earthnet, any European scientist can today obtain data from operational missions and from the distributed European long-term archive operated by ESA. This archive currently holds almost half a petabyte, or 500 gigabytes of Third Party Mission data, acquired mainly in Europe over the past few decades.

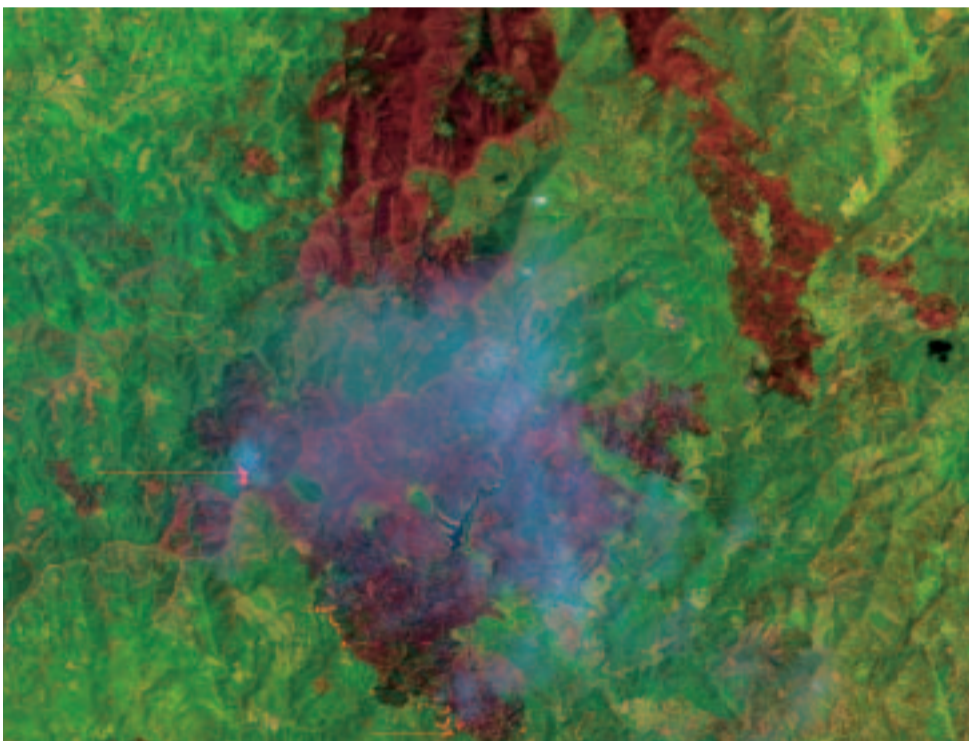
New procedures for Third Party Missions

In order to further improve and streamline the adoption of Third Party Missions in a flexible, user-driven way, an amended mission selection procedure was approved by the Earth Observation Programme Board (PB-EO) in September 2004. Each mission is now evaluated according to a

Land Observing Satellite (ALOS), an Earth Observation satellite developed by the Japanese Aerospace Exploration Agency (JAXA). The objectives call for two optical and one active microwave sensor payload whose high-resolution data may be used for applications such as cartographic mapping, environmental and hazard monitoring. The aim is to provide the user community with data of a high enough resolution to be able to generate 1:25,000 scale maps. Data for Europe and Africa will be acquired by ESA. The data package that will be received from the mission is expected to amount to 170-200 gigabytes daily, almost as much as the 250 gigabytes received per day from the Envisat mission. This data will support the establishment and familiarising of European users with data from the longer

missions. The Earthnet online web pages (<http://earth.esa.int>), and the ESA EO Principal Investigator Portal (<http://eopi.esa.int>) are just two of the many sources of information on ESA and Third Party Missions for the Earth Observation user community. They record on average around 100,000 visitors per month. All data accessible from Third Party Missions can be retrieved homogeneously together with the ESA mission data from the Multi-mission EOLI-catalogue (<http://eoli.esa.int>).

The Earthnet Programme has recently submitted a new Medium Term Plan for the period 2006-2010 which was approved by ESA Council in June 2005. The contents of this proposal were unanimously recommended beforehand by the Earth Obser-



▲ **Landsat image**
Region in Portugal devastated by fire in August 2005



▲ **CHRIS Proba image**
The urban area of Rome, 30 July 2002

pre-defined set of criteria. User benefits must be one of the main reasons for adopting a new mission. This annual evaluation process includes reviews by expert bodies such as the Earth Science Advisory Committee (ESAC).

Once the benefits of a particular mission for the European user community have been recognised, ESA then establishes or extends cooperation or data access agreements with the respective mission owner. Under these agreements, ESA aims to provide European Earth Observation ground segment support and to share existing European infrastructure. In return ESA obtains the distribution right to the European user community of the data acquired. Additionally, ESA exchanges data products or satellite direct downlink time of ESA missions such as ERS or Envisat satellites for the equivalent of Third Party Missions. Over the past few years, these agreements have generated a wealth of data, mainly covering Europe and Northern Africa, which are exploited through a large number of long-term trend monitoring application programmes.

The way ahead

One of the next major Third Party Missions due to begin is the Japanese Advanced

wavelength L-band radar which gives greater information on vegetated surfaces and can "see" below the forest canopy.

Besides the sustainability the wider data access offers to the European Earth Observation data user community, the Earthnet Programme has also been the basis for many successful and strategic partnerships and agreements with Space Agencies and international partners.

In addition to international partnerships, ESA Member States' national missions are also considered for inclusion in the Third Party Mission Programme. Among these are the French SPOT 4 or the British DMC high resolution optical missions, as well as the DLR BIRD microsatellite demonstrator mission which aims to observe fires and hot spots on Earth caused by lightning, volcanism, oil wells or other human activities. Furthermore water clouds can be distinguished from smoke clouds.

A bright future

Despite being a comparatively small programme, the number of users of Third Party Mission data is increasing and on average more than 4,000 products are distributed per quarter, complementing products from ESA's own Earth Observation

Programme Board (PB-EO) and will continue to cover the international agreements on Third Party Mission activities, which require a medium or long-term sustainability and international partnership beyond normal programme funding periods.

Access to data from Third Party Missions is especially important in the light of GMES in order to satisfy all European user data requirements of the services that will make up GMES. The harmonisation of the access to all these different Earth Observation data sources and of the ground segment started in 2003 as part of the O2/Oxygen Initiative. ■

For further information please visit:
<http://earth.esa.int/missions/thirdpartymission/>

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Making learning

Marie-Josée Savoie, Senior Advisor for the Internal University (RES-HU) in the Directorate of Resources Management, HQ, explains the concept behind ESA's recently set up Internal University.

What is meant by "Internal University"?

"Internal University" is the term chosen for ESA amongst many widely used in thousands of organisations around the world today to designate what is generally referred to, in management jargon, as a corporate university. Unlike conventional universities, it is not an architectural structure and does not award degrees to staff. It is not simply a new label for traditional training activities relating to individual job performance, established each year in the context of the Annual Assessment Exercise and under the responsibility of local training coordinators, but a complement to these. Its concern is to transfer critical knowledge and experience, promote lifelong learning and support change in the organisation.

Why is the Internal University concept considered to be relevant to ESA?

As a knowledge-based organisation which faces the challenge of adapting to rapidly changing needs and circumstances, the concept was thought to be particularly relevant. It was envisaged as a means of facilitating the development of new knowledge and expertise – economic, contextual, political – while preserving and further developing the technical and project management knowledge and skills which are the trademark of the Agency. The idea of establishing an Internal University at ESA emerged during the period when Agenda 2007 was being developed. In endorsing the proposal to establish an Internal University, Director General Jean-Jacques Dordain particularly emphasised the need to culti-

needs of the organisation and be attuned to its specificities. With the support of these internal experts, priorities for staff education and development can be set and programme content properly defined. Even when a course is given by an external partner, be it a university, institute or commercial supplier, it is essential that this is overseen by an internal "sponsor". The support of senior managers has proven to be a determining factor in securing the participation of internal experts in the development and delivery of educational programmes, with top quality contributions already having been made by staff from D/TEC, D/OPS, ESA-Brussels, the Legal Department (DG-L) and the Procurement Department (RES-P) for example. Their participation and identification with Internal University activities contribute immensely to the legitimacy and relevance of our programmes. Collaboration, both within ESA and beyond, is intrinsic to the success of the Internal University.

Can you tell us more about other forms of cooperation benefiting the Internal University?

In addition to cooperating with our own ESA experts, we call upon a wide range of external partners: higher education institutions such as the University of Southampton and the College of Europe in Bruges, training providers such as Management Centre Europe and Cegos-Fielden and specialist consulting companies such as the Oxford Group.

We have also become a member of the European Club of Corporate Universities through which we benefit from the experiences and best practices of more than 25 organisations pursuing similar objectives.

I should not omit to mention internal collaboration with our Human Resources Advisors who play an active role in promoting the various Internal University programmes to staff members. I must also mention collaboration with the training coordinators in each ESA Establishment as they are in fact responsible for the registration of participants, local coordination and logistics of the Internal University seminars and programmes given in their respective Establishment.

While the Internal University Project Team itself is very small, made up of Véronique Percheron, Armande Bellone and myself, it depends on the support of numerous players, both within ESA and beyond, to achieve its goal to promote a lifelong learning culture at ESA.

Can you explain the Internal University curriculum?

Yes. The curriculum is divided into six streams:

■ **Citizenship stream**

In line with the Director General's wishes in Agenda 2007, a Citizenship stream has been developed to provide staff members, new staff in particular, with a basic understanding of ESA. It includes a 90-minute web-based application called "Introducing ESA", available since June 2004 and a half-day seminar "ESA – the Institutional Perspective", launched in May 2005 in conjunction with the Legal Department (DG-L) and being deployed across all Establishments. This seminar focuses on ESA's legal institutional framework as well as its decision-making



▲ Participants in the Level 4 Leadership and Management stream pilot group, held in ESTEC in April 2005

vate in staff members a sound basic knowledge of the Agency and a strong sense of its corporate culture as well as to improve staff understanding of the workings of the European Union. He also underlined the importance of management involvement in decisions regarding the means and methods of developing the skills of staff members.

Can you explain the importance of involvement of our senior managers in developing training programmes?

The involvement of ESA managers in the definition and approval process of educational programmes is primordial if these programmes are to satisfy the

a lifelong affair

process. The course "Basics of space systems for administrative staff" is a three-day seminar adapted from a course previously developed for ESA staff at ESTEC and is being made available in all Establishments. Its purpose is to familiarise administrative staff with relevant technical terminology and key issues relating to space systems design to help them better understand the nature of ESA's core business. In addition, programmes on ESA's procurement and financial processes are being developed with the Procurement Department (RES-P) and the Finance and Corporate Controlling Department (RES-F). These should be available to staff in the second half of 2005.

■ Technical / functional stream

Since space systems engineering is a core skill at ESA, particular attention is placed on how related knowledge and skills may be developed through education and training as well as practice. "Space Systems Engineering", a five-day course offered for many years now in collaboration with the University of Southampton is being reassessed and updated to reflect the Agency's current context, constraints and practices. In recognition of the high level of technical expertise already available at ESA, the design and presentation of some key lectures have been entrusted to some of our internal specialists. This improved course will be offered as of November 2005. The development in the second half of 2005 of a related course incorporating the Concurrent Design approach has been agreed with the Directorate of Technical and Quality Management (D/TEC).

Also under way is an initiative to provide technical officers and others involved in initiating contracts with training in the principles and techniques of writing Statements of Work (SOW) to arouse awareness of their impact on the efficiency and effectiveness of the procurement action. A pilot seminar is expected to take place on 24-26 October 2005.

■ Strategic issues awareness stream

In cooperation with the College of Europe, the seminar "Introduction to the Institution and Decision-Making of the European Union" is offered in every Establishment in compliance with the Director General's wishes to raise staff members' awareness about the European Union.

■ Cross-functional stream

Certain skills are essential across the Agency and three are the focus of specific attention at this time: negotiation, project management and interviewing skills.

▶ The three-day seminar "Strategies and Techniques for Successful Negotiations" has been developed in cooperation with Management Centre Europe and the Procurement Department (RES-P) with a view to providing participants with the principles, tools and practice necessary to carry out effective negotiations. This seminar will benefit not only procurement specialists but also those who are involved in any type of business negotiation.

▶ A two-day course entitled "Essential Project Skills" targets administrators and administrative assistants called upon to manage projects in their field of activity. While their needs differ from those managing complex space projects, they do require skills which enable them to plan and manage their project efficiently.

▶ Effective interviewing skills are essential for all involved in recruitment. Such skills are also very useful

in many other professional and personal circumstances. A comprehensive programme is available to develop these skills. "Effective Interviewing Techniques" provides staff members with the necessary knowledge and hands-on practice to become proficient interviewers through a blended learning approach comprising web-based material and exercises, a two-day skills-building workshop, a follow-on test and real interviewing experience.



■ Practitioners Exchanges stream

ESA staff members who organise workshops or events with the aim of sharing experience or information regarding new and emerging theories, technology or practices relevant to ESA can obtain assistance from the Internal University Project to promote their initiatives and make them as widely accessible as possible to colleagues. Examples of such educational events include the "GRID & e-Collaboration for the Space Community Workshop" (see <http://eogrid.esrin.esa.int>) held on 2 February 2005 at ESRIN, presented by Luigi Fusco (EOP-S) and the "Electro active Polymers Smart Materials Technology Lecture" held on 26 April 2005 at ESTEC, presented by Donato Sciacovelli (TEC-MS). A5 ad Personam experts have also been requested to propose relevant activities in this category.

■ Leadership and Management stream

A comprehensive series of integrated programmes has been established to support the development of management and leadership skills. This series comprises six seminars which deal with complex issues facing managers, beginning with basic responsibilities and the fundamental principles of people management for those not yet in a managerial role and graduating to address the complexity of managing change.

How can staff obtain more information on Internal University programmes and enrol?

Information on objectives, key themes, training methods, target groups, location and dates, as well as a contact point for each programme, can be found on Human Space – HR Online under "Learning and Development". To register for all programmes (with the exception of "Introducing ESA" which does not require registration), staff must submit the usual training application form approved by their hierarchy. ■

Who said that chopsticks couldn't be used to improve communication skills? In April at ESTEC a group of managers got together to learn more about this intriguing method.

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New initiatives from the ESTEC Training Service

by **Lucy van der Tas**, Head of the Training Service (RES-HTT), ESTEC

Two recently created training and development initiatives, *the ESA Orientation Programme* and *Lessons Learned*, support the sharing of knowledge among ESA staff members and promote a sense of belonging to a common ESA culture. Although initiated at ESTEC, these programmes are open to all staff (including any staff from other sites on mission at ESTEC, for example). Depending on the success of these programmes, it is intended to run similar sessions in the future in other ESA establishments.

The ESA Orientation Programme

The *ESA Orientation Programme*, which complements the e-application "Introducing ESA" was launched at ESTEC in October 2004 and is co-organised with the D/RES Communications Officer. This programme was initially aimed at newcomers to enhance the services provided to make integration into the Agency rapid and effective. As the programme proved to be such a success it was opened to all staff and there are plans to make it an annual event.

The current programme consists of four half-day sessions lasting approximately three hours each. During each session, representatives from the various directorates present their own directorate's structure and projects. They also explain how they interact with other ESA entities. Michel Courtois, Director of Technical and Quality Management (D/TEC) and Head of ESTEC, opens each series of sessions with a presentation of D/TEC.

Hans Kappler, Director of Resources Management (D/RES), opened the third session in the current series (on 24 May). Most sessions end with a short tour of one of the ESTEC facilities such as the Test Centre, the Concurrent Design Facility (CDF) or the Erasmus User Centre. ■



▲ Hans Kappler, Director of Resources Management (D/RES) opening the third session of the *ESA Orientation Programme* in May 2005

Comments on the *ESA Orientation Programme*

"These presentations should be a must for everybody working at ESTEC."

Fernando Aldea Montero
(TEC-QQS)

"Thanks for this initiative. I think it is very positive for the Agency that we know what our neighbours are doing."

Sonia Toribio Fernandez
(OPS-GDA)

"Please continue with this initiative. Participation will surely help to achieve a better and more unified Agency."

Luciano Di Napoli
(SCI-PTA)

Comments on *Lessons Learned*

"The speaker certainly gave a positive impression that an individual contributes significantly to the Agency's work. I hope that this sort of presentation can help to inspire younger members of staff."

Simon Dinwiddy
(now retired)

"I think all ESA staff would benefit from the "Lessons Learned" initiative and should listen to the recommendations made."

Tina Büchner
(TEC-SYE)

"Good initiative. Again it would be worth gathering the experiences of all retired staff in a continuous way so that their experience is not lost."

Alessandro Atzei
(SCI-AP)

Lightening up >
(from left to right) The organisers: Paolo Donzelli, Head of ESTEC Personnel Division (RES-HT), and Lucy van der Tas, Head of the Training Service (RES-HTT), with Johnny Butu, Head of Project Control Management Support (EOP-FC)



Lessons Learned - Lectures by retired ESA staff

The second initiative entitled "*Lessons Learned - Lectures by Retired ESA Staff*" is a joint effort between the Human Resources Division (RES-HT) at ESTEC and retired staff belonging to the Association of Retired ESA Staff (ARES). This programme was initiated in the spirit of Agenda 2007 and in accordance with the ADMIN note issued on 28 February 2005 in which it is stated that: "It is vital for ESA to record its "Lessons Learned," both positive and negative experiences, and for them to be made available to both current and future ESA staff."

The programme was launched in February 2005 and one two-hour lecture is given once a month. All the lecturers share their valuable experience from their long and varied careers at the Agency, often giving a personal perspective on the Agency's activities in their field of expertise.

The following lectures took place in the first half of 2005: the European Space Sector in Context, Automated Rendez-Vous and Docking, the ESA Test Centre, Product Assurance in Space Projects and Spacecraft Attitude Control.

A list of topics has been drawn up for the second half of the year which includes: From Sounding Rocket to Planetary Exploration, ESA Project Review, Technology at ESA, Human Spaceflight, Space Power Systems, Earth Observation from Space at the service of the Earth's Environment, ESA Patents, Challenges in Astrophysics Projects and Management of International Programmes.

This initiative has been so well received at ESTEC that some staff members are even arranging their work and leave commitments so that they can attend all sessions planned so far. Furthermore, the lectures are being recorded digitally so that they can be archived as part of ESA's corporate memory. ■

Programme Schedule

The schedule of each programme, as well as an overview of all other training activities taking place on the ESTEC site, is published on **HR Online on the local ESTEC training page.**

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A career with a truly international flavour

Chris de Cooker Head of the Organisation, Management Methods and Regulations Department (RES-0)
Directorate of Resources Management, HQ

Chris de Cooker was born in 1949 in the historic city of Breda in the Netherlands. From an early age he felt drawn to the world of international affairs and took a decision to read international law at the University of Amsterdam and Columbia University in the USA. Upon returning from the USA in 1975, he worked first as a lecturer and later as a senior lecturer in the Law faculty at the University of Leiden, specialising in international law, the law of international organisations and international administration until 1984.

During this same period he chaired the Dutch section of the International Commission of Jurists – a well-known worldwide non-governmental human rights organisation. He was also an advisor to the Legal Service of the European Commission. After a short stint at the International Labour Organisation (ILO), a UN specialised agency working on international labour standards, he joined ESA in 1984 as an administrator in charge of staff regulations and relations.

In 1997, Chris de Cooker was appointed Head of the Staff Regulations and Central Support Division. Then, in 2000, he was also made responsible for the Agency's Privileges and Immunities. Part of his work involved the representation of ESA in meetings with the bodies on salaries and pensions of the Coordinated Organisations, where he also held the posts of chairman and vice-chairman.

In his new position to which he was appointed in April 2005, Chris de Cooker is in charge of the coherence of the Agency's structure and regulatory framework, its man-



agement methods and processes. He is also responsible for ESA's information, documentation and knowledge activities, corporate risk management and insurance, as well as privileges and immunities. This department is currently in the process of being set up and, when completed, will comprise a total of 23 staff.

When asked about his objectives for his department, Chris de Cooker says, "This is the first time that a number of important corporate functions have been grouped into one department, and I am sure that ESA staff will benefit from this. The functions are not new but some of our activities definitely are. The system of rules, standards and processes is very cumbersome and currently not very transparent, hence staff often feel they only have a limited

grasp of this whereas it is an important element for their work. We will also make the rules, standards and processes more accessible through an improved ESA Workbench (Intranet) and staff will be in a better position to work with them."

Chris de Cooker is also chairman of the Permanent Working Group on Supranational Administration of the International Institute of Administrative Sciences. His expert advice is regularly sought by other international organisations, such as the International Monetary Fund, the United Nations and the World Health Organisation.

Chris de Cooker is author, editor and co-author of some 30 publications. He has three children and his hobbies include music, hiking and scuba-diving. ■

Patently accomplished

Philippe Pérol Head of the Electrical Engineering Department (TEC-E)
Directorate of Technical and Quality Management, ESTEC



Philippe Pérol was born in Paris in 1954 and began his professional career in 1979 as an engineer at the French company Michelin in Clermont-Ferrand, where he invented new concepts and machines to automate tyre manufacturing.

This followed his graduation from the Ecole Nationale Supérieure de l'Aéronautique et de l'Espace (Supaero) in Toulouse, France, in 1977 and his military service as navigation officer on a navy destroyer.

As his Irish wife did not enjoy the continental climate of the Auvergne region, they moved to the coastal town of Brest where Philippe Pérol worked for Thomson-CSF (now Thales) where he was in charge of developing radar modulators and power supplies for civilian and military applications. He was responsible for a small lab-

oratory that dealt with design and development up to the first commercial model, such as for the first European radar modulator at very high repetition frequency for the surveillance of runways at big airports.

Philippe Pérol joined ESA in 1988 as Power System Engineer on the Columbus team. With the support of the Technical Directorate, one of his significant achievements was the successful negotiation with NASA of the Power and Electro Magnetic Compatibility specification, the system architecture for the definition of Columbus elements and the initiation of development programmes for Columbus elements in the power system discipline. This ended with the review of the Columbus proposal. In 1989, he became Head of the Power

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Conditioning Section in the Power and Energy Conversion Division and, in 2000, was appointed head of this division. In the first post, he was involved in many technical developments of power subsystems especially for SOHO, Spacebus 3000 and 4000, but also XMM, Integral, MSG second generation, Herschel-Planck, and the ATV. The original concept for the energy storage system for SMART-1 was his baby. He was also involved in many high voltage application designs. He explains in his own words, "With power being present on all satellites and payloads, along with my team I oversaw power conditioning work on all ESA projects and a number of commercial industrial developments."

As Head of the Power and Energy Conversion Division, he participated in the Research and Development definition process for ESA's Technology Research

Programme (TRP) and General Support Technology Programme (GSTP), reviewed laboratory operations and investments and completed the harmonisation dossiers and roadmaps for all technologies in his division. He actively supported the development of European high efficiency solar cells and the adoption of Li-Ion batteries on ESA projects. He is keen to highlight the role played by his teams in accomplishing all these projects. Participating in panel reviews was of particular interest to Philippe Pérol, enabling him to broaden his view of all the technical work performed at ESA.

An interesting aspect of Philippe Pérol's career is the number of patents he owns. They come mostly from having been exposed to problems and trying to find solutions. In the course of just a few years he registered no less than eight patents as an inventor and four as a co-inventor. It is fair to say he is a

specialist of converters, sensors, power drives and power system architecture.

When asked about his new responsibilities and his views for his department, Philippe Pérol explains, "The department covers a wide range of technologies and I am sorry to say I will never be able to learn them all as I have done for power electronics. I like to see myself as a leader for others to follow to achieve technical excellence in their domain, motivating and stimulating a spirit of innovation and openness but with rigour and a certain method."

Philippe Pérol, who has three children, is interested in literature, music and history and enjoys going to the cinema or theatre. He considers that his greatest achievement is yet to come: to be able to play his favourite classical pieces proficiently on the piano. ■

Feeling at home in space

Michel Tognini Head of the European Astronaut Centre (EAC)

Directorate of Human Spaceflight, Microgravity and Exploration Programmes (D/HME)

Whether bursting through the Earth's atmosphere on NASA's Space Shuttle Columbia or travelling at one and a half times the speed of sound (about 1,800 km per hour at sea level) in a Mirage jet, the new Head of ESA's European Astronaut Centre, Michel Tognini has always tested the limits of human potential.

Centre, France, initially as a test pilot and subsequently as chief test pilot. During his time there, he helped try out a great deal of French flight hardware including weapon systems for the Mirage 2000-C, Mirage 2000-N, Jaguar ATLAS, and FLIR aircraft. He was also responsible for flight safety for pilots, experimenters and flight engineers.

In 1985, the Air Force pilot was looking for a new challenge. When France opened a recruitment programme to expand its Astronaut Corps, he was one of seven finalists selected.

During his career as an astronaut Michel Tognini spent 19 days in space. On his first space flight on board the Russian Soyuz TM-14 from 27 July to 10 August 1992, together with Anatoly Solovyev and Sergei Avdeiev, he linked up with the Russian space station Mir 1 (ANTARES mission) and joined the crew of Alexander Viktorenko and Alexander Kaleri already on board. They spent 14 days carrying out a programme of joint Russian-French experiments before returning to Earth.

Michel Tognini also flew aboard the Space Shuttle Columbia between 22 and 27 July 1999. During the 5-day mission his primary task was to assist in the deployment of NASA's Chandra X-Ray Observatory which has enabled scientists to study exotic phenomena such as exploding stars, quasars and black holes.

"The most amazing thing about being in space is seeing how fast humans can adapt to a new environment. "You arrive and very quickly you believe you have been there all the time" he explains.

On 1 May 2003, Michel Tognini was appointed Head of the Astronaut Division at the European Astronaut Centre (EAC), Cologne, Germany.

Born in September 1949 in Vincennes, France, Michel Tognini has four children and his hobbies include flying, parachuting, tennis, wind-surfing, water-skiing, skiing, cross-country running, surfing and microcomputers. ■



For Michel Tognini, who took up his new position on 1 March 2005, his most challenging task is to ensure the progression of the operational capability of ESA astronauts. There are currently 12 active astronauts in the Astronaut Corps based in Russia, in the United States and in Europe.

Before becoming an astronaut Michel Tognini had a distinguished career as a fighter pilot and test pilot in the French Air Force, attaining the rank of Brigadier General. In 1983, he began work at the Cazaux Flight Test

Michel Tognini recounts how he was frequently faced with dangerous situations and, in particular, how on one occasion a malfunctioning rocket he fired, turned around and headed directly for his fighter plane requiring radical manoeuvres to avoid being blown up.

During his Air Force days, Michel Tognini logged 4,000 flying hours on 80 types of aircraft (mainly fighter aircraft including MIG 25, TUPOLEV 154, LIGHTNING MK 3 and MK 5, METEOR, and F 104).

Galileo: Europe shows the way

Didier Faivre Head of the Navigation Department (EUI-N)
Directorate of EU and Industrial Programmes, HQ

The development of Europe's new global satellite navigation systems, EGNOS and Galileo, will be the focus of Didier Faivre's work as the new head of ESA's navigation programmes.

Galileo will be the first satellite positioning and navigation system specifically designed for civilian purposes. Developed by ESA and the European Commission (EC) it will offer state-of-the-art services and will be highly efficient in terms of accuracy, continuity and availability. It will be more advanced and more reliable than the current systems – which are under military control – and by 2009-2010 will offer worldwide coverage with guaranteed signals quality. Galileo will be compatible and interoperable with the US Global Positioning System (GPS) and with GLONASS, the Russian Global Navigation Satellite System.

Galileo is more than a space programme managed by ESA. It represents an important strategic objective for Europe, as acknowledged by all the European States. "Galileo is a new kind of programme from many points of view, thus the main challenge for ESA is to make this programme not only a technical success but also a political one," says Didier Faivre. "Galileo is being implemented in a new environment for ESA where the Agency has to rely on a complicated set of new partners, with cooperation mechanisms established at European level and a strong role played by the EC."

Didier Faivre says that one of the main challenges for ESA, beyond its usual role as a technical reference for development, is to create an efficient cooperation framework with the two newly created entities: the Global Navigation Satellite System Supervisory Authority (GSA), the EU Agency in charge of the navigation programmes and the Galileo "concessionaire" which will operate the Galileo system. The success of this process may also



open the way for other European initiatives, with ESA and the EU cooperating on new application space programmes.

Born in 1956, Didier Faivre has worked for more than 20 years on space activities. He graduated from the Ecole Polytechnique in Paris and first joined the Commissariat à l'Énergie Atomique (CEA) where he notably worked on plasma physics and controlled fusion on the ancestor of what is now known as the International Thermonuclear Experimental Reactor (ITER). He then joined CNES in 1983 and went to Kourou, French Guiana where he worked on the future development of investments for Europe's Spaceport and on the preparation of the Ariane 4 operations.

After this experience in the operational heart of European space activities, in 1987 he returned to CNES HQ where he was involved in orbit infrastructure programmes. He started to work closely with ESA as a member of the Columbus Programme Board in the late 1980s before becoming respon-

sible for the European and ESA Division within CNES.

In 1997, he became Deputy Director of the CNES Toulouse Space Centre (CST) before moving back to CNES HQ where he became Deputy Director of Programmes. He was particularly involved in bilateral cooperation and in the management of the applications-related subsidiaries of CNES, becoming a member of the Board of Intespace and Spot Image.

At the end of 2000, Didier Faivre joined ESA as Senior Coordinator and was heavily involved in the preparation of the Council meeting at ministerial level in Edinburgh. He has dedicated the last two years to the preparation of the telecommunication strategy and the initiation of the Alphabus programme, leading to the signature of the contract for the phase C/D of Alphabus last June at the Paris Air Show. Just afterwards he was selected to join the Navigation Department in the Directorate of Application Programmes. ■

Planning for tomorrow's launchers

Thomas Miczaika Head of the Policy and Plans Department (LAU-S)
Directorate of Launchers, HQ

Looking ten years over the planning horizon to the next generation of launchers is the main challenge for Thomas Miczaika in his new position as Head of the Policy and Plans Department (LAU-S) which he took up in October 2004. Priorities include proposing and updating the Agency's launcher strategy, and monitoring and assessing the evolution of the worldwide commercial launcher market and the European space industry.

"We must work to ensure a coherent

European policy for launcher research and technology, in permanent consultation with Member States with which exchanges of information on launcher-related matters must be maintained", he explains.

Thomas Miczaika is both a physicist and an astrophysicist. Born in Heidelberg, Germany, he undertook part of his school studies in Lexington, Massachusetts and in Rome. He graduated in 1973 in physics, mathematics and astronomy from the University of Bonn and then went >>>



on to study economics before obtaining a PhD from the Physics Institute of the same university.

In 1977 Thomas Miczaika started his professional career as a scientific assistant at the University of Bonn. His main achievement in this position was when he was in charge of the project for the planning and construction of a new detector facility for the electron storage accelerator, dealing with large volume, high precision drift chambers. This experience led him to the European Organisation for Nuclear Research (CERN) in Geneva, where in 1985 he had the opportunity to work with the Nobel Laureat Professor Steinberger at the Super Proton Synchrotron (SPS) in collaboration with the Universities of Dortmund, Edinburgh, Mainz, Orsay, Pisa and Siegen.

Thomas Miczaika moved to the German Aerospace Research Establishment (DFVLR) in 1987 where he worked as a systems analyst for the computer configuration of the Spacelab simulator. He designed software for the system and the experiment simulation of Spacelab missions. Later that year he was transferred to the Paris Office of DFVLR where he worked with the Board of Directors and the institutes of DFVLR on cooperation agreements with French partner organisations, CNES and ONERA, and French industry.

In 1991, he returned to Germany to work for the German Space Agency (DARA) where he headed the Industrial Policy Section working with European partners on industrial policy, technological and contractual matters. He was also appointed

Head of the German Delegation to the Industrial Policy Committee (IPC) of the Agency.

In 1998, ESA nominated Thomas Miczaika as National Advisor in the Director General's study group on technology programmes. Then, in 1999, he was appointed Head of ESA Affairs in the DLR Directorate of Space Programmes with overall responsibility for the national preparation of ESA Council meetings, having already prepared the Ministerial Councils in 1997, 1999 and 2001.

In his leisure time Thomas Miczaika enjoys skiing, cycling and photography. ■

State-of-the-art space technology

Jack Bosma Head of the Product Assurance & Safety Department (TEC-Q) in the Directorate of Technical and Quality Management, ESTEC



Jack Bosma was born in the Netherlands in 1951 and has been an ESA staff member since March 1975. His early activities involved satellite materials research, and testing facilities. A personal highlight was his participation in the Tiger Team, a special task force, to help solve electrostatic phenomena on telecommunications satellites (OTS, MAROTS, ECS).

From 1982 to 1986 Jack Bosma worked in the Testing Department where he was assigned as Project Engineer in a small team responsible for the procurement and installation of the Large Space Simulator at ESTEC - still one of the world's largest satellite test facilities. Thereafter he worked as integrated Product Assurance and Safety (PA&S) Engineer for microgravity payloads, amongst others on the German sponsored Spacelab D-1 and D-2 missions. In the early 1990s he made a choice to transfer to the Directorate of Earth Observation and Microgravity, now Directorate of Earth Observation Programmes (D/EOP). The strong sense of purpose and team spirit he encountered there inspired his future professional life in project work. He start-

ed as PA & S Engineer and later as integrated PA Manager on the precursors of Envisat: the ERS-1 and ERS-2 remote sensing satellites.

From the late 1990s up to 2002 he was a core member of the team working on the MetOp series of Earth Observation satellites, a joint ESA/EUMETSAT programme also involving NASA, NOAA and CNES as partner agencies. After starting as Assembly, Integration and Verification (AIV) Manager, he went on to become Satellite Engineering Manager and finally Satellite System Manager.

His extensive project experience led to his appointment in August 2002 as Project Manager in the Telecommunications Department responsible for a new generation of very large communication platforms called Alphabus. The next three years were spent paving the way for this very ambitious programme and were successfully concluded with the placing of the main Alphabus development contract in early 2005.

The department Jack Bosma heads today – the Product Assurance and Safety Department (TEC-Q) – employs more than 100 staff and contractors, split over four divisions. It represents the Agency's technical competence in the Product Assurance and Safety disciplines such as quality, reliability, configuration management and safety as well as providing state-of-the-art expertise for components, materials and processes used in space programmes. The department is also responsible for the implementation of ESA's standardisation policy. "Our laboratories are recognised globally and enhance the department's role in creating a network with the European centres of expertise in the component, material and process domains," says Jack Bosma. "Our staff who are working as integrated PA project support are considered an asset by the ESA programmes, helping to maintain the difficult balance between quality, cost and schedule."

"My first priority remains to provide support to the ESA programmes. PA managers are the focal point so as to ensure efficient deployment of the services from the PA mother department as well as to provide the necessary feedback on project risks, problem notifications and alerts," says Jack Bosma. "The continuous replenishment of motivated PA staff on the projects is, in my view, a 'must' for our organisation."

"At ESA corporate level there is a need to speed up the information flow – alerts and problem notifications - between disciplines and projects to help recognise corporate risk and reduce the impact. The core team of the department has the important task of promoting general awareness, in particular amongst those with a need to know outside the expert community," says Jack Bosma. "Another task high on the agenda for my department is the ownership of the European component policy by projects and the satellite manufacturing industry. The European Component Initiative, a joint undertaking with national agencies - presently CNES and DLR - is a first step towards securing access to critical electrical components for European satellite manufacturers."

The coming period will see a shift from the production phase of ECSS (European Cooperation for Space Standardisation) standards to a maintenance period allowing space programmes to provide user feedback. The department will play a key role in gathering user concerns, proposing changes to ECSS and promoting the overall ownership of ESA applicable standards within our programmes.

As a further long-term objective the continuation of the ISO certification exercise will need to be tackled. The department already encompasses the function of quality assurance managers in the successfully certified ESOC and ESRIN Establishments. "All together this represents a full basket of initiatives," says Jack Bosma. ■

From observation to exploration

Bruno Gardini Exploration Programme Manager (HME-ME)
 Directorate of Human Spaceflight, Microgravity and Exploration, ESTEC

Born in 1947 in the tiny rural village of Passatore in the Italian province of Cuneo – well known for its splendid red wines and white truffles – Bruno Gardini graduated in 1971 from *Politecnico di Torino* with a thesis on recursive Kalman filters. He went on to pursue an academic career for a few years as assistant professor teaching Electrical Engineering and Automatic Control Theory.

In 1975, Bruno Gardini received a two year research fellowship from ESTEC, which marked the beginning of an enduring relationship with space. Following the fellowship, his next post was of a more practical nature: he worked on the Ulysses Project in charge of Attitude Control and Propulsion at Dornier System in Friedrichshafen, Germany. At the end of 1981, he returned to ESTEC as a staff member in the Technical Directorate (D/TEC) providing support on several projects. The appeal of project teamwork and his interest in the hardware development and manufacturing phase of a project remained very strong. In 1983 he joined the EURECA Project and then, in 1989, the SOHO Project as Spacecraft Manager.

When Bruno Gardini took on the project management for Envisat in 1993 and later on for Rosetta in 1998, he was confronted with new challenges. He explains: "For Envisat, the sheer size of the project, the challenge of highly-advanced technologies and the changing political climate demanded great dedication and commitment from ESA and the industrial teams.



I am very thankful to everybody for their hard work and unwavering commitment during those years. It certainly showed the value of good team work."

The last few years have brought different and exciting experiences for Bruno Gardini with the start of the Aurora Exploration Programme in 2001; the study of future missions in the ESTEC Concurrent Design Facility (CDF) with a team of young (and not so young) enthusiastic engineers and an assignment of almost 12 months in the Directorate of Launcher Programmes (D/LAU) on the Ariane 5 programme.

"The position of Exploration Programme Manager which I took up on 1 June 2005 is the ideal continuation of the pioneer work carried out in the Aurora Programme," he explains, "which has been enhanced by several worthy initiatives already under way in the directorate covering both robotic and human exploration aspects, and transportation. The challenge will be to harmonise these activities and structure them into a broad vision for the future. I am enjoying working with the new team as we prepare a good case for Exploration at the Ministerial Council Meeting in December," he says.

"I have spent nearly 30 years of my professional career working on space projects. As in all space projects, there has been a fair share of difficult times and challenging moments, but also a great deal of technical interest and excitement. For those involved who have shared these moments, the scientific results and striking images taken of the Sun by SOHO or the views of the Earth taken by Envisat are a great and lasting reward. Hopefully, in a not too distant future we will be able to say the same about new exploration missions," concludes Bruno Gardini.

Married with two daughters, Bruno Gardini has a real passion for the mountains in his native province, where he enjoys skiing in the winter and hiking in the summer. Other hobbies include listening to classical music and travelling to tropical countries. ■

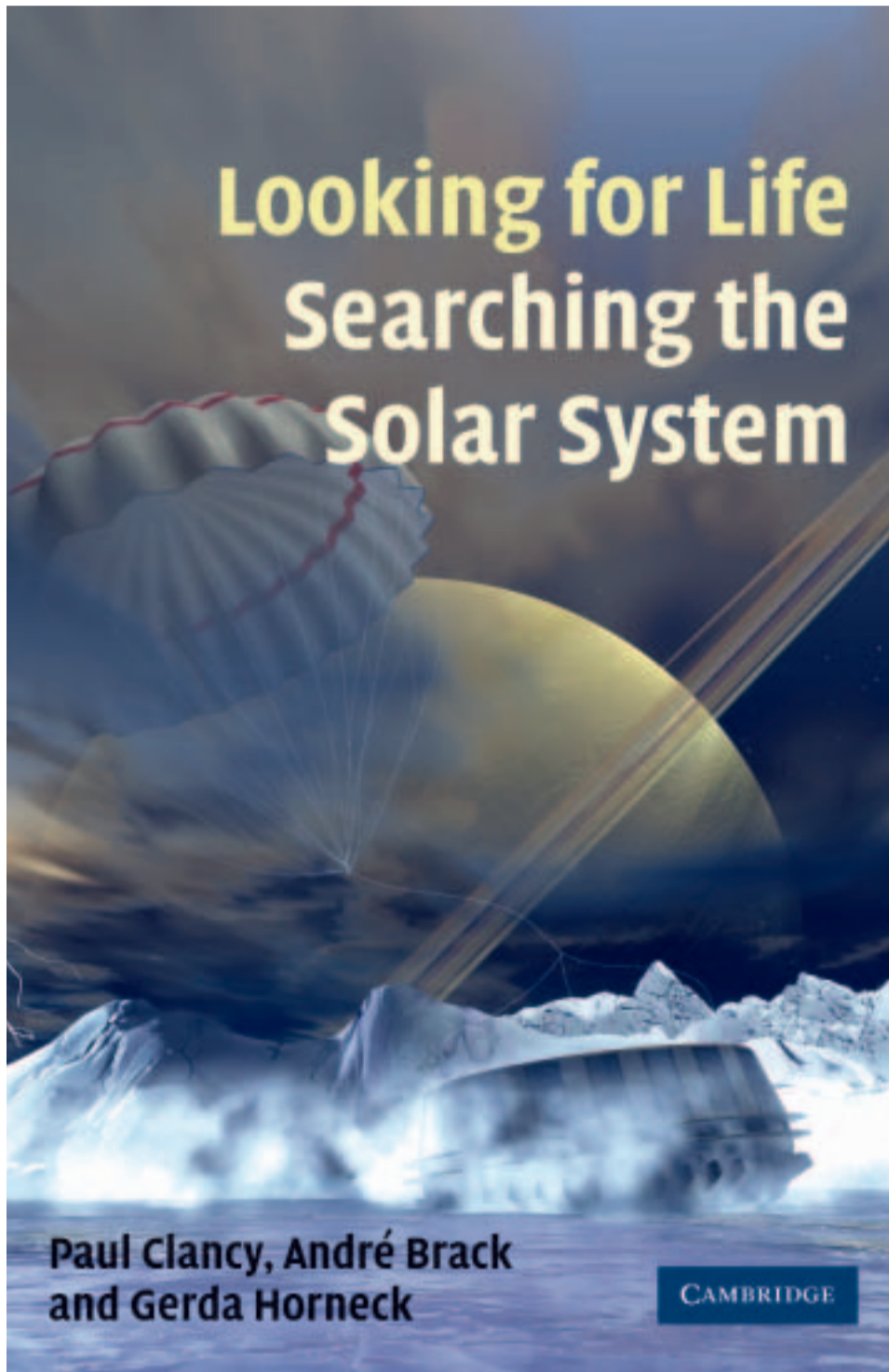
Other moves at ESA...

In the Profile section of *ESA Today*, we feature recent A6 appointments at the Agency. For information on all other staffing changes at ESA, we invite you to read *On the Move*, a special publication produced by Internal Communication (EXR-C) in cooperation with the Department of Human Resources (RES-H) and published three times a year. ■



Looking for Life, Searching the Solar System

September/October 2005



How did life begin on Earth? Is it confined to our planet? Will humans one day be able to travel long distances in space in search of other life forms? These intriguing questions are tackled by three experts in the space arena – Paul Clancy, former Strategic Planning Manager in the Human Spaceflight, Microgravity and Exploration Directorate (D/HME), André Brack, Director of Research Emeritus in the Centre of Molecular Biophysics at the Centre National de la Recherche Scientifique (CNRS), in Orléans, France and Gerda Horneck, Head of the Radiation Biology Section and Deputy Director of the Institute of Aerospace Medicine at DLR in Cologne.

Looking for Life, Searching the Solar System describes the latest plans to search for life in the Solar System, and looks at how these plans are being influenced by new technologies and current thinking about life on Earth. This broad-ranging book is for anyone with an interest in the search for life beyond our planet.

Paul Clancy's recent duties at ESA included planning for exobiological research and the human exploration of Mars, and for European utilisation of the International Space Station (ISS). He conceived the idea for this book *Looking for Life, Searching the Solar System* following the successful first European Exobiology Conference held at ESRI in 2001, of which he was a key organiser. He also drew inspiration from the interest in the studies that led to the ESA scientific publications, 'Exobiology in the Solar System and the Search for Life on Mars' (ESA SP-1231), more familiarly known as the 'Red Book,' and 'HUMEX study on the survivability and adaptation of humans to long-duration exploratory missions' (ESA SP-1264).

Paul Davies at the Australian Centre for Astrobiology at Macquarie University, Sydney, and well-known populariser of science, reviewing the book in *New Scientist* on 25 June 2005 said: "The authors of *Looking for Life, Searching the Solar System* have pooled their expertise to produce an accurate, up-to-date and highly readable survey of the field." ■

Looking for Life, Searching the Solar System
 by Paul Clancy, André Brack and Gerda Horneck
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ESA Today readers discount

Cambridge University Press is delighted to offer *ESA Today* readers an exclusive 20% discount offer on Paul Clancy's book, *Looking for Life, Searching the Solar System*.

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Space Mountain: Mission 2

A launch with a difference

To celebrate its tenth anniversary in April this year Disneyland Resort Paris completely reprogrammed its main attraction Space Mountain to provide visitors with a totally new experience. In Space Mountain: Mission 2, "exploronauts" are now catapulted on a voyage into outer space, speeding well beyond the moon to the far reaches of the universe.



Opening of Space Mountain: Mission 2 on 6 April 2005
(from left to right) André Lacroix, then President of Disneyland Paris, Umberto Guidoni, former ESA astronaut and now Member of the European Parliament, Vin Diesel, film actor, and Jean-François Clervoy, ESA astronaut.

Understanding the Universe
Sophie Bécherel, science correspondent for France Inter Radio, presents the "Understanding the Universe" press conference attended by 100 media representatives from across Europe. 



As it had done ten years earlier, Disneyland Resort Paris called on ESA's Communication Department (EXR-C) to help them launch their most popular attraction: Space Mountain.

ESA brought a touch of reality to the fantasy world of Disney. The ESA communication team collaborated with Disney counterparts to organise a press conference on "Understanding the Universe" which gave an entertaining overview of Europe's interplanetary exploration activities to an unusual mix of science journalists and travel and leisure editors before they climbed aboard Mission 2 for launch on the Disney version of a journey through space. ESA and CNES space science experts and astronauts were on hand for media activities and the opening ceremony. Exhibition material and space imagery, provided by ESA, enhanced the experience. A bonus for ESA's communication team was the unique opportunity to gain a look behind the scenes at the workings of Disney and its large and very successful promotion machine. ■

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The ESTEC Golf Club (EGC)

Teeing off at ESTEC



What better way to unwind than by playing a round of golf? Set up in the 1980s, by enthusiastic golf lovers with a lawnmower, the ESTEC Golf Club (EGC) today has a professionally maintained 9-hole golf course situated on the ESA site at Noordwijk. The club offers a wide range of competitions from social competitions for newcomers to individual and team competitions. In addition, club members can take part in competitions arranged against other clubs and organisations both in The Netherlands and in other countries.

Today, EGC, which comes under the umbrella of the ESTEC Sports Social and Cultural Committee (SSCC), boasts over 300 members. EGC is a member of the Dutch Golf Federation (NGF) which has given the ESTEC golf course

an official "course rating", i.e. has assessed its degree of difficulty. In addition, the handicap system is fully integrated with that of the European Golf Association (EGA) which means that handicaps administered by EGC are recognised all over Europe.

There are a number of practice nets and a putting green at ESTEC and a professional golfer gives weekly lessons at the ESTEC golf course. The club particularly welcomes new golfers and helps them to obtain their "GVB" (the golfing equivalent of a driving licence) by offering courses on the Rules of Golf and opportunities for practical application out on the course. Club members normally provide their own equipment, but for those who are completely new to the game and do not yet have their own clubs, there are some available for short-term loan.

To stay up to date on golf news and competitions, club members receive a regular e-mail newsletter and are invited to consult notices posted in the entrance to ESCAPE and in the "Check Inn" near the first tee. For more detailed information including a club membership application form, visit the website – regularly updated by the club captain, Chris Taylor. After all there's no time like the present to start working on your swing! ■

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