

In Brief



New Director of Strategy and External Relations Appointed

Jean-Pol Poncelet has been appointed to the post of ESA Director of Strategy and External Relations (D/SER) for a period of four years. He will take up duty on 15 August.

Mr Poncelet, of Belgian nationality, studied engineering and physics at the University of Louvain. On graduating, he worked on a number of science programmes at the same university, moving on to a research position with the Luxembourg University Foundation. He later had an advisory role with the Ministries of Economic Affairs and Scientific Policy, and was advisor to the State Secretary for Environment on matters of nuclear security.

He began his political career in 1991 as a Member of the Belgian House of Representatives and, from 1995 to 1999, was Vice-Prime Minister, Minister of Defence and Minister of Energy. He is currently a Member of the Belgian House of Representatives and President of the Social Christian parliamentary group.

Jean-Pol Poncelet has always been active in the fields of science, technology and education and has, during his political career, been closely involved in space and technology matters. 

of 590 km, an apogee of 17 487 km and an inclination of 2.94°, compared to the intended values of 858 km, 35 853 km and 2°, respectively. Otherwise, since its injection into orbit, the spacecraft's behaviour has been nominal.

ESA rapidly designed a recovery strategy that will take the satellite to its nominal geostationary operating altitude of about 36 000 km, whilst at the same time maximising the mission's remaining lifetime. This recovery strategy consists of four steps, the first two of which have now been successfully completed. In Step 1 (18 to 20 July), the satellite's apogee boost motor (chemical propulsion) was fired during five perigee passes (i.e. when Artemis was closest to Earth) to increase the orbit's apogee (maximum distance from Earth) to about 31 000 km without significantly changing the perigee. In Step 2 (22 to 24 July), the elliptical orbit was made circular by three consecutive apogee motor burns. The satellite is therefore now in a circular parking orbit at approximately 31 000 km altitude, with an orbit duration of about 20 hours and an inclination of 0.8°. On completion of this step, the solar arrays and two antenna reflectors were fully deployed.

Artemis is now operating in quasi-nominal mode, under the control of the ESA/Alenia Spazio-Telespazio team, pointing at the Earth and with its solar panels tracking the Sun, but not yet in geostationary orbit. In the current Step 3 with the satellite in parking orbit, new control modes for orbit-raising using Artemis' ion engines for propulsion will have to be patched in (by software uploads to the satellite) and commissioned. The ion engines themselves will then be initialised and checked out.

In Step 4, which is expected to start in late-September and last several months, the satellite will be 'spiralled' from its parking to nominal geostationary orbit using its novel electrical ion-propulsion system. The latter was originally included on Artemis to demonstrate this novel technology for maintaining satellites in their geostationary orbits, but it is now being used in earnest to help rescue the mission.

The next progress update will be released with the start of Step 4 operations, in late September. 

Artemis Recovery Well Under Way

ESA's Artemis satellite successfully reached a circular parking orbit, at an altitude of 31 000 km, on 24 July. The necessary manoeuvres were carried out

from the ground control station in Fucino, Italy, by the operations team and system engineers from the Altel (Alenia Spazio-Telespazio) consortium, supported by ESA specialists.

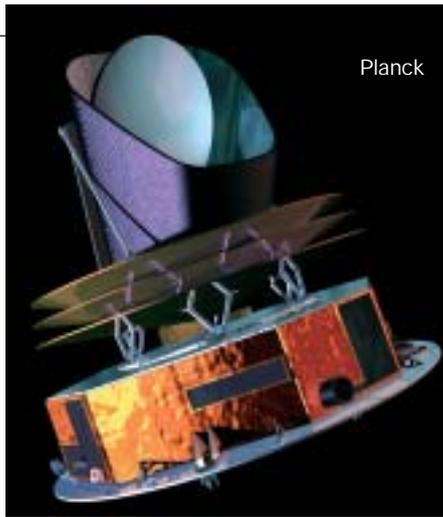
The satellite, launched from Kourou by an Ariane-5 on 12 July, had been put into the wrong orbit due to a failure in the launcher's upper stage. The erroneous injection orbit had a perigee



Largest Ever Space Astronomy Contract Goes to Alcatel Space

The largest contract ever in the history of European space astronomy has been awarded to Alcatel Space Industries (France) as Prime Contractor, with Astrium GmbH (Germany) and Alenia Spazio (Italy) as main contractors. Worth a total of 369 million Euros, the contract is for the building of two ESA astronomy satellites, the Herschel Space Observatory and Planck. The companies will design, develop, manufacture, test and launch the two satellites, and commission them once in orbit.

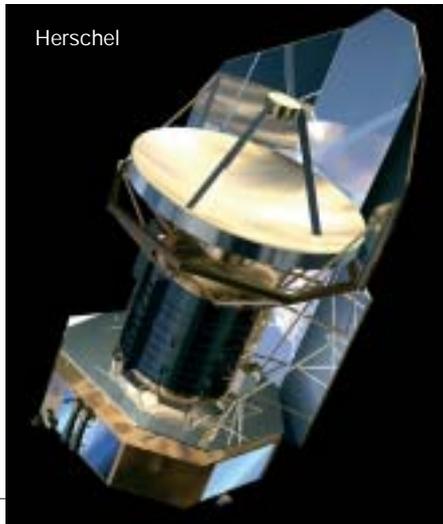
The decision to combine the two missions under one contract was taken due to the significant cost savings that could be achieved, and in view of certain technical similarities between the two satellites. For instance, their final orbits are such as to allow both spacecraft to be launched together on the same rocket. Their launch is scheduled for early 2007 from Kourou.



Planck

Once in operation, however, Herschel and Planck will work as completely independent satellites, with different scientific goals and different orbits. In fact, this will be the first time that two satellites aimed at solving different astronomy problems will be launched together and subsequently injected into different orbits.

Alcatel Space will mainly take care of the Planck Payload Module's development and the assembly and testing of Planck. Astrium will have the same responsibilities for the Herschel Payload Module, as well as the assembly and testing of the spacecraft, while Alenia Spazio will be responsible for the Service Modules for both spacecraft.



Herschel

The list of European companies taking part in this large industrial undertaking does not stop there. The subcontractors involved in this contract will come from all 15 of the Agency's Member States including Portugal, which is participating for the first time in an ESA scientific project.



ESA and China Joining Forces for 'Double Star'

ESA and China are going to work together on the 'Double Star' project, in which European instruments will be flown on Chinese satellites for the first time. The historic agreement between the European Space Agency and the Chinese National Space Administration (CNSA) was signed in Paris on 9 July by ESA's Director General Antonio Rodotà, and Luan Enjie, Administrator of CNSA.

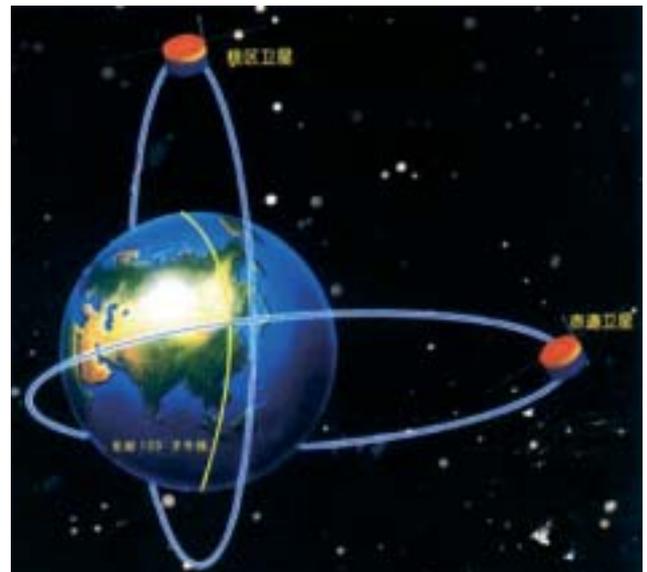
Double Star, two satellites developed, launched and operated by China, and flying in complementary orbits around the Earth, will study the effects of the Sun on the Earth's environment. They will carry 10 instruments that are identical to those currently flying on the four Cluster spacecraft, with another eight instruments from Chinese institutes. Conducting joint missions with Cluster and Double Star should increase the overall scientific returns from both missions, for example in terms of the exploration of the magnetotail.

ESA will contribute eight million Euros to the Double Star programme. The money will be used for the refurbishment and pre-integration of the European instruments, the acquisition of data for four hours per day, and the coordination of scientific operations.

"This agreement marks a significant advance for international cooperation in the exploration and peaceful use of outer space," said Mr Rodotà. "It is one of the most important landmarks in scientific collaboration since ESA and the People's Republic of China first agreed to exchange scientific information more than 20 years ago."

"The Double Star programme will be just the first step in substantial cooperation between the Chinese

National Space Administration and ESA," said Mr Luan Enjie. "The signing of today's agreement paves the way not only for reciprocal cooperation between scientists, but for the establishment of comprehensive cooperation between the two agencies".





ESA 2000 at Max-Planck Institute (IPP)

The ESA 2000 Space Science Exhibition has paid a visit to the Max-Planck Institute for Plasma Physics (IPP) in Greifswald, Germany, where it attracted some 1500 visitors. It was opened on 'Sun-Earth Day', on 27 April, by Martin Huber (ESA Science Advisor), Friedrich Wagner (Director of IPP) and high-level representatives from the regional government, the city, and the university of Greifswald.

IPP is one of the largest fusion research centres in Europe, investigating the underlying physical principles of nuclear – and hence also solar – fusion. The location and timing were therefore perfect for the opening of an exhibition that includes the many discoveries made by ESA's solar observatories like SOHO, Cluster and Ulysses. The 90 display panels that make up ESA 2000 now also include the first results from the XMM-Newton mission and describe future missions such as BepiColombo, Solar Orbiter, GAIA, NGST and LISA.

Following the opening ceremony, Frank Jansen from the Space Weather Observatory Greifswald, ESA's consultant for the exhibition, invited the visitors to a tour through the exhibition. There were also lectures open to the public on the ESA Space Science Programme, fusion/plasma physics, radio astronomy and space weather. These activities, together with the models of ESA's Ariane-5 launcher and Cluster-II,

The opening of the ESA 2000 Exhibition in Greifswald

ERS-2, HST, ISO, SOHO, Ulysses and XMM spacecraft on display, as well as interactive CD-ROMs and various publications from ESA and the IPP, the more than 1500 visitors who attended the exhibition in Greifswald were treated to an impressive overview of contemporary space science, fusion research and space-weather phenomena.

About 100 visitors celebrated Sun-Earth Day by attending the opening of the ESA 2000 Exhibition in Greifswald. 

ATV at ESTEC

A new pressurised module for the International Space Station (ISS) arrived at ESTEC in late July. This cargo carrier, built by Alenia Spazio in Turin, will be integrated with the rest of ESA's Automated Transfer Vehicle (ATV) and prepared for structural and thermal tests. Beginning in August 2004, the 20 t ATV will be launched by Ariane-5 to ferry propellants, water, air, equipment and other supplies to the ISS. Up to 10 ATVs are planned for ISS operations by 2012.

The unmanned ATV will dock with the Station automatically. Astronauts will enter the pressurised compartment to unload the provisions and then fill it with rubbish from the ISS. ATV will also be responsible for an important manoeuvre: using its main engines to boost the Station's altitude. This process must be carried out periodically to combat the gradual decay in the orbit caused by atmospheric drag. After up to 6 months attached to the Station, ATV will then be commanded into a destructive atmospheric reentry. 

In front of the 1/4-scale model of SOHO during the opening of the Exhibition: left Prof. F. Wagner (Director of IPP) and Prof. M.C.E. Huber (ESA Science Advisor)



Space Education for ESA Children: The Cannes Space Camp

Between 14 and 28 July this year, nearly 70 children of ESA staff from all Agency Establishments gathered in Cannes, in the South of France, for the annual Space Summer Camp. The Camp was organised by the ESA Children's Camp Club (CCC), under the guidance of the ESA Education Office and in collaboration with the French organisations Provence Sciences Techniques Jeunesse (PSTJ) and PARSEC.

The Educational Office wants the younger generation to feel part of the ESA space family and to develop space awareness, better understanding and exchanges between children of different cultures and nationalities. The Office offered its sponsorship on condition that there would be a strongly space-related programme – no problem for the two French associations that receive groups of children and offer them a wide range of space-related activities on a regular basis throughout the year.

The children were divided into two age groups. PSTJ took care of the youngsters (8 to 13) and introduced them to astronomy, the building and launching of micro-rockets and the conception of experiments for a stratospheric balloon. The teenagers (13 to 18) were under the wing of PARSEC, and their main activities were lectures on space, the building and launching of water rockets, astronomy, the building of satellite mock-ups and an industrial visit to Alcatel Space.

Both groups visited the 'Astrorama' in Nice and the Nice and Calern Observatories. One of the highlights was on the afternoon of 25 July when ESA Astronaut Ulf Merbold visited the Camp. The children built lunar and martian bases with Ulf's help and listened to stories about his space missions.

Cultural programmes were not forgotten, to balance the space content. The space campers visited a perfume factory, the cities of Nice and Monaco, the palaeontology excavation of Lazaret, a



museum for rural life, a grotto, the islands of Lérins, and the medieval city of Eze. Even after all this, there was still time to go to the swimming pool or the beach, have fun and relax in the French sunshine.

During the camp, the children also met renowned astronomers, palaeontologists and engineers and, of course, made lots of new friends from many different countries. Although the activities themselves were in French and partly English, you could hear many other European languages being spoken, including Italian, German, Dutch, Spanish and even Russian.

The ESA Education Office hopes to be able to sponsor this corporate activity with a programme of an equivalent quality again, so see you at the next Space Camp in 2002!**



** ESA and other partners have recently signed an agreement with PARSEC to collaborate in space educational matters. Among the first actions is the contribution ESA has made to help setting up courses for teachers of different European countries so that their schools can benefit from the same type of activities that up to now have only been held at French schools.



Summer School Alpbach 2001 – Satellite-Navigation Systems for Science and Applications

62 students from various ESA Member States (including for the first time two students from Canada) attended the annual Alpbach Summer School from 17 to 26 July. The Summer School is organised by the Austrian Space Agency together with the Austrian Federal Ministry of Transport, Innovation and Technology, ESA and the national space authorities of its Member States. The project for this year's summer students was to define innovative satellite-navigation missions.

As part of the curriculum, about 30 experts taught the students about the international GPS (Global Positioning System) service, signal propagation, reference systems, data processing, signal architecture and signal structure, space-based and terrestrial augmentation systems, precise orbit determination for gravity-field recovery, geodynamics applications, kinematic positioning, location-based services and atmospheric topics.

Throughout the two weeks, the summer students participated in a series of workshops. Divided up into six working groups, they discussed three different workshop themes:

- Sounding the atmosphere with space-borne satellite-navigation receivers
- Telematics applications
- Futuristic applications of satellite navigation and their economic potential.

The students were expected to come up with their own ideas for satellite navigation missions. Their work therefore culminated in the design of the following space missions:

PANIC (Personal Assistant for Navigation, Information and Communication)

This working group's aim was to develop a navigation/information system for pedestrians in urban areas. The functionalities of the system include position determination, route planning/guidance, and information querying. The positioning unit would use GPS and other integrated sensors (stepper, compass, Loran-C). Communication would rely on existing terrestrial networks or/and a satellite communication infrastructure. The basic information (maps, etc.) would be stored in a Processing and Display Unit (PDU), whereas dynamic information (events, news, etc.) would be in a central database accessible via a communications link.

The PDU would consist of a PDA (Personal Digital Assistant), a Webpad or a similar unit. Input would be possible using a touch screen or speech recognition. The output would be on the screen and/or using voice. In the advanced version of the system, Augmented Reality (AR) would be used to provide the information in a more comfortable way.

The target groups would be tourists, drivers and all pedestrians. In addition, it

would be possible to subscribe to various information channels (e.g. news and weather, sports, restaurants, stock quotes, etc.).

Sonar Underwater Navigation System (SUNS)

SUNS would provide autonomous underwater position determination by means of small buoys that broadcast their position and time references as sonar signals. The positions of the buoys would be accurately derived from GNSS. The potential applications would range from amateur diving to professional companies exploring the seabed.

The SUNS system would use an array of buoys on the sea's surface. These buoys

could be manufactured using existing components, making them not much larger than the Inmarsat-E distress beacons. The challenge would be to develop the model for the propagation of the sonar signals. A prototype could be built within about a year, and the deployment costs for the initial system would be in the order of 20 000 Euros, making it affordable to amateur divers and certainly to professionals.

The SUNS solution would extend GNSS for underwater navigation, making use of the same reference frames. The operations could be largely autonomous, with no restriction on the number of users.

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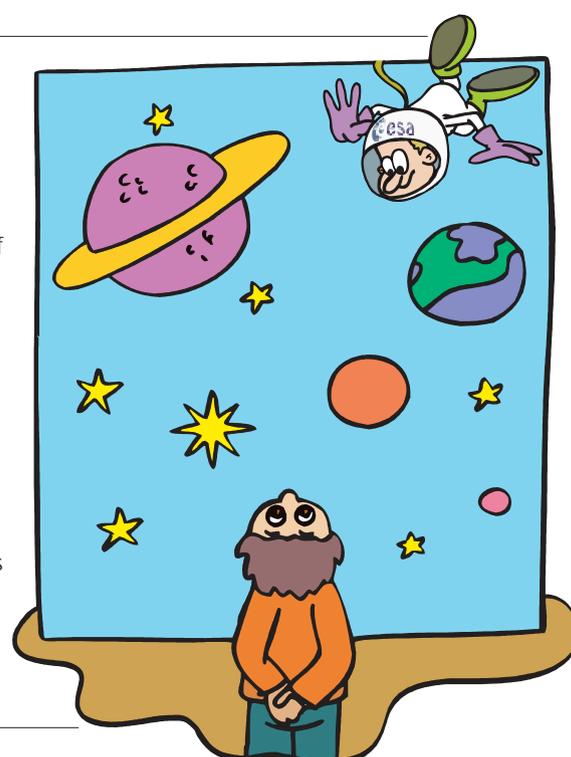
'TEACH SPACE 2001' – A Marketplace for Educational Ideas

"There are two subjects with which you can capture the attention of any child: dinosaurs and space. If you can combine the two - bingo! You will teach them everything they need."

Who should know this better than a someone who teaches 14 to 15 year olds? What do teachers do when the teach about space? And what would they like from ESA?

ESA is organising a special forum for teachers of pupils between 6 and 18

years of age – TEACH SPACE 2001, the first International Space Station Education Conference. From 26 to 28 October, teachers of all disciplines and from all across Europe will be at ESA's European Space Research and Technology Centre (ESTEC) in Noordwijk (NL), to present their ideas on how space can be integrated into the teaching of almost all subjects at school. The participants will not only be meeting colleagues from other countries and talking to ESA's astronauts, but will also be competing with their individual projects for the title *"Most Inspiring Project 2001"*.



Traffic Solutions for the Future

This working group decided to focus on one application that can be realised in the near future and several applications with the potential for later implementation. Underlying assumptions for all selected applications were the global availability of a combined UMTS/GNSS/Galileo network and the availability of GNSS receivers at very low cost. The group proposed:

- a solution for finding parking spaces in inner cities
- a navigation system for pedestrians in cities
- a navigation and guidance system for the visually impaired
- a flexible fleet management system for public transportation
- an intelligent guidance system to avoid congestion of the available infrastructure
- a drive-on-demand system for individual users.

Mission Ionosphere

The mission proposed by this working group would investigate the use of GNSS receivers onboard commercial geostationary satellites for sounding the ionosphere and plasmasphere. GNSS receivers are a cheap and efficient method of determining the positions of geostationary satellites to an accuracy of better than 100 m, which is sufficient

to allow the data collected to be used for ionospheric remote sensing. The project anticipates that in the near future more and more GEO satellites will be equipped with GNSS receivers and that the data would be available for scientific investigations. It is proposed to use the data to resolve exciting and interesting phenomena in the outer atmosphere. The mission would also have important implications for the observation and prediction of space weather.

SAUMEO (Sounding the Atmosphere Using Medium Earth Orbiters)

SAUMEO is intended to improve the observational database for weather forecasting, climate-change monitoring and disaster management. Using Galileo satellites as orbital platforms for GPS receivers to perform radio-occultation measurements of the atmosphere would seem to be a promising possibility. Simulations show that the number of possible occultation events would be at least 1200 within 24 hours. The duration of the occultation measurements would be long (~15 min), making the data suitable for use in numerical weather-forecast models. Because of the long-term stability of the whole experimental setup, the retrieved data would be ideal for evaluating external forcing (e.g.

the greenhouse-gas effect) in climate-change models.

ACRONIM (Advanced Counter-rotating Radio Occultation Neutral Atmosphere and Ionosphere sounding Mission)

This working group proposed a low-cost test mission involving two satellites, which could be operationally extended to include more satellites, with the objectives of:

- measuring the electron density in the plasmasphere
- sounding of the ionosphere
- sounding of the neutral atmosphere.

On the last day of the Summer School, the six missions were presented to a Review Panel which, in selecting SUNS as the winning project, congratulated all of the teams on their achievements during the two weeks. The Panel was suitably impressed by the students' accomplishments and suggested publication of a more extensive report on the results of Alpbach 2001 in a forthcoming issue of the ESA Bulletin.

Additional information and the individual working-group presentations can be found at:

<http://www.asaspace.at> (news section, Summer School Alpbach 2001)



World Space Congress 2002 / 34th COSPAR Scientific Assembly

The Second World Space Congress will be a joint meeting between the Committee on Space Research (COSPAR) and the organisations that meet during the International Astronautical Congress, i.e. the International Astronautical Federation (IAF), the International Academy of Astronautics (IAA), and the International Institute of Space Law (IISL).

The meeting will take place on 10 – 19 October 2002 in Houston, Texas, USA. The local organisation will be in the hands of the American Institute of Aeronautics and Astronautics (AIAA), and under the auspices of the US National Academy of Science (NAS).

COSPAR Topics:

Approximately 80 events covering the fields of COSPAR Scientific Commissions and Panels:

- Commission A: The Earth's Surface, Meteorology and Climate
- Commission B: The Earth-Moon System, Planets, and Small Bodies of the Solar System
- Commission C: The Upper Atmospheres of the Earth and Planets including Reference Atmospheres
- Commission D: Space Plasmas in the Solar System, including Planetary Magnetospheres
- Commission E: Research in Astrophysics from Space
- Commission F: Life Sciences as Related to Space
- Commission G: Materials Sciences in Space
- Commission H: Fundamental Physics in Space
- Panel on Satellite Dynamics (PSD)
- Panel on Scientific Ballooning (PSB)
- Panel on Potentially Environmentally Detrimental Activities in Space (PEDAS)
- Panel on Standard Radiation Belts (PSRB)
- Panel on Space Weather (PSW)
- Panel on Planetary Protection (PPP)
- Panel on Space Research in Developing Countries (PSRDC)
- The Public Understanding of Space Science
- Space Science Education and Outreach.

COSPAR Abstract Deadline: 1 May 2002

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or visit the following Web sites:

<http://www.copernicus.org/COSPAR/COSPAR.html> or www.cosparhq.org

For further information about the IAC technical events programme, please visit: <http://www.lafastro.com/>



New Mission Scenario for Cassini-Huygens

No data will be lost when the Cassini-Huygens mission reaches Saturn and its moon Titan. A joint ESA/NASA Huygens recovery task force, including senior management from the two space agencies and members of the Cassini-Huygens scientific community, have designed a new mission scenario in order to solve the Huygens radio-communications problem and fully recover the scientific return from the Cassini-Huygens mission.

The modifications have been introduced to overcome a design flaw in Huygens' communications system, which means that the Huygens receiver is unable to compensate for the frequency shift between the signal emitted by the Probe and the one received by the Orbiter, due to the Doppler shift. This would have resulted in the loss of much of the unique data that will be gathered by the Probe during its descent through Titan's dense atmosphere.

In order to ensure that as much data as possible is returned from the pioneering Probe, the Huygens Recovery Task Force proposed a new schedule for Cassini's early orbits around Saturn. The agreed scenario involves shortening Cassini's first two orbits around the ringed planet and inserting an additional orbit that provides the new geometry needed for the Huygens mission to Titan.

With the new scenario, the arrival at Saturn on 1 July 2004 remains unchanged, but Cassini's first flyby of Titan will now occur on 26 October, followed by another on 13 December. The Huygens Probe will be released towards Titan on 25 December, for an entry into the moon's atmosphere 22 days later, on 14 January 2005, seven weeks later than originally planned.

In order to reduce the Doppler shift in the signal from Huygens, the Cassini Orbiter will fly over Titan's cloud tops at a much higher altitude than originally planned – 65 000 km instead of 1200 km. This higher orbit has the added advantage that Cassini will be able to maintain its four-year baseline tour through the Saturnian system, by resuming its original orbital plan in mid-February 2005. 

The Solar Eclipse in Africa 21 June: Eyewitness Report

Perhaps it's the sheer experience of an eclipse that causes all of the excitement. As the last direct rays quickly contract into a sliver of light, thousands of surrounding upturned faces cheer in thrilled anticipation. Individually though, you realise that it's really our Moon up there, whose disc is blacking out the Sun's surface in breathtaking cosmic perfection, creating a stunning, bright flower in space ... and darkness on Earth.

The University of Zambia, in Lusaka, has wide-open fields of dry grass and large, square 1970's style buildings. On 21 June, total-eclipse day, there was an African rock group playing in the festival there, a market, buskers, thousands of local people, and an acute shortage of eclipse viewing glasses! The shops in Lusaka had sold out days before. The Physics Department had issued some students with the necessary chromium foil to fashion their own home-made glasses, but for the most part the crowd was desperate, the local papers having warned of the dangers of looking directly at the Sun before and after totality. Surely the visiting scientists and tourists must have brought some glasses with them?

An international organisation, Cosmos Education, had organised a Conference at the University during eclipse week for just under 600 local people, focusing on space science, technology and education. The 20 representatives of Cosmos had brought about 1500 pairs of eclipse glasses with them, something they kept secret until shortly before the eclipse began. They closed the doors of the Conference Hall and urged those inside to remain calm whilst everyone received a pair of glasses. During the proceedings, however, cries and banging were heard from behind the bulging doors. The remaining glasses were therefore quietly smuggled out of the room via a side door, the plan for their further distribution not yet in place!

A little later, hoards of people began to run at top speed towards a point in the festival grounds, for no apparent reason. It was

soon confirmed, however, that a group of Zambian marines attending the festival had agreed to distribute the remaining glasses. Soon thereafter, and fortunately with no reported injuries, the crowd set about enjoying the eclipse's spectacular show.

Before totality, the partially eclipsed Sun shone through the trees and between the throngs of people, covering the ground with an astounding display of miniature Sun-crescent shadows. Then as the Moon and Sun neared totality birds took flight from the trees and swooped about the clear but dimming sky. Just as the Sun was covered, tiny red loops, prominences of hot solar gas, were visible around the edge of the Sun's disc. The Sun's corona streaked blue and yellow into a dark sky, Jupiter bright and glimmering beneath it, a spectacle not easily recorded on film.

Some traditional African legends had been related earlier during eclipse day, re-enacted in stories, poems and drama. They told of fear of the total eclipse, seen as an omen of a journey, an order of the King, or a cause for animals to leave the bush and kill in fear.

Science has since explained the true workings of the eclipse. Nevertheless, those still present after the eclipse that day, huddled in animated groups on the dry grass – now littered with discarded eclipse glasses – reported more than just a scientific phenomenon, they described a true personal 'experience'.

Julia Birch
ESA Education Office



photos: Cosmos Education