

# SPACE

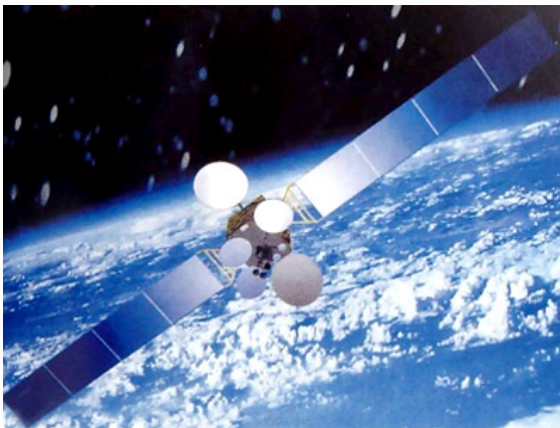
## Intelligence News

### DECEMBER 2006

#### SINOSAT 2 IS A 'TOTAL LOSS' AFTER SOLAR ARRAY DEPLOYMENT FAILURE

The Chinese SINOSAT 2 (XINNUO 2) communications satellite has reportedly been lost in orbit after a failure to deploy its solar arrays and communications antennas shortly after launch. It is thought that this was due to deployment mechanism failure. It is reported unofficially by industry sources that the satellite had a Central Processor Failure which affected the deployment.

However, Sinosatcom (Sino Satellite Communications Co Ltd) who own the satellite have stated that while there was a major fault no failure of the electronic equipment on board or software took place. The satellite is now believed to be 'dead in orbit' after all its power was drained from its batteries. The date of the failure is officially put at 8<sup>th</sup> November.



*Artist's impression of what should have been the final configuration of SINOSAT 2 with its solar arrays fully deployed – Image: via [www.esa.int](http://www.esa.int)*

**Comment:** CAST would have known of this fault within days of the launch as they attempted to deploy the arrays (some reports indicate that this was to occur on 7<sup>th</sup> November).

As can be seen below, according to figures from Ascend Space Review – Risk Analysis, in common with maiden flights of launch vehicles, maiden flights of satellite types are susceptible to failure with a serious anomaly rate of 37.4% and a corrected total loss burn rate of 28.6%.

For full details on how to subscribe to Space Review – Risk Analysis, contact us via [space@ascendworldwide.com](mailto:space@ascendworldwide.com) or call +44 208 564 6700.

## SERIOUS ANOMALY/FAILURE RATES FOR NEW COMMERCIAL SATELLITE TYPES

Source Ascend SpaceTrak and Space Review – Risk Analysis

Satellite Type	Maiden Launch Date	<sup>st</sup> 1 Flight Result
A2100	08/09/1996	OK
AMOS	16/05/1996	OK
BSS 376	15/11/1980	OK
BSS 601	13/08/1992	OK
BSS 702	22/12/1999	F(49,1-2)
DHF-4	28/10/2006	F (100,0-1)
Eurostar 1000	30/10/1990	OK
Eurostar 2000	16/12/1991	OK
Eurostar 3000S	15/03/2004	OK
EXPRESS	13/10/1994	OK
GALS	20/01/1994	OK
INSAT 2	09/07/1992	OK
INSAT 3	21/03/2000	F(18,0-1)
ITALSAT/GEOBUS	15/01/1991	OK
LM-5000	01/03/1991	OK
LM-7000	16/12/1993	F(100,2+)
LS-1300	05/06/1989	F(100,1-2)
Spacebus 2000	30/08/1990	OK
Spacebus 3000A	09/07/1996	F(100,2+)
Spacebus 4000	03/02/2005	OK
Spektrum/Kupon	12/11/1997	F(100,0-1)
Star 1	12/11/1997	F(19,0-1)
Yamal 100M	06/09/1999	F(100,0-1)
Yamal 200	24/11/2003	OK
	<b>Total Anomaly Rate</b>	<b>37.5%</b>
	<b>Corrected Total loss burn rate = Av% loss x Total Anomaly Rate</b>	<b>28.6%</b>

*The figures in brackets represent % loss or estimate and year of lifespan when anomaly occurred.*

## WGS-4 IS FORMALLY ORDERED

The Boeing Company has reportedly received a US\$299.8 million U.S. Air Force contract for the production of the fourth Wideband Gapfiller Satellite (WGS) as part of the WGS Block II contract. WGS-4 is expected to launch in early 2011.

## OPTUS D1 HAS SERIOUS BEAM POLARISATION ISSUE

It has been reported that the OPTUS D1 communications satellite that was launched on 13<sup>th</sup> October has a serious vertical polarisation issue on one of its beams. A ground fix is being attempted. The antenna on the Optus D1 satellite, to be used to broadcast Sky TV and future digital services, was apparently configured at the wrong polarisation when assembled – horizontal instead of vertical. The Star 2 bus satellite was built by Orbital Sciences Corporation. If the problem is not solved then an insurance loss could be incurred.

## DELTA IV WINS USAF LAUNCH DEAL WORTH US\$674 MILLION

The US Air Force has awarded a contract to Boeing worth US\$674 million in return for launches provided by the company's Delta IV launch vehicle. The contract was placed as part of the EELV Buy 3 contract of the EELV - Evolved Expendable Launch Vehicle programme. Boeing and Lockheed Martin are due to merge their rocket programmes into the United Launch Alliance (ULA). The contract could yet spell the end of the line for the ATLAS V rocket that Lockheed Martin produces.

**Comment:** For medium lift – Delta IV and its Atlas V soon-to-be stable mate still represent poor value for spaceflight given that many commercial systems e.g. Ariane 5 or Zenit 3 could do this far more cheaply. But for secrecy and strategic reasons the US Air Force needed an independent launch capability.

So was the EELV programme to develop the Delta IV and Atlas V really worth it? While most now believe that the US Air Force should have left the original EELV contract in its original 'winner takes all' competition format – the answer remains yes. This is partly for strategic reasons but especially for cost control when launching heavy payloads. The heavy version of the Delta IV is about four times cheaper to launch than its TITAN IV predecessor. Thus the US Air Force will probably save US\$300-400 million for each heavy lift flight it makes. It will not take long for the EELV programme to pay for itself in cost savings even with such large launch contracts as the one announced during November.

## COSMOS 2423 SPYSAT DELIBERATELY EXPLODED IN ORBIT

The Russian spy satellite COSMOS 2423 has exploded in orbit. The satellite, that is believed to have been a YANTAR-6K (ORLETS 1/DON 17F12) photo-reconnaissance spacecraft which uses eight

capsules to return photographic film to Earth, was launched on 14<sup>th</sup> September 2006. The craft was destroyed on 17<sup>th</sup> November in a planned explosion at the end of its lifespan. Russian authorities denied media reports that it has been exploded early as the result of a system failure. The long term debris risk is low as the remnants are expected to fall back to Earth as they are slowed by the thin upper atmosphere.

## INSURANCE CLAIM TO BE ATTEMPTED FOR THAIKOM 3

Space News (20<sup>th</sup> November 2006) reports that an insurance claim is to be made for the power loss failure of THAIKOM 3 that occurred on 1<sup>st</sup> October. The satellite is not believed to have been insured at the time but a further claim may be made relating to the initial power loss that the satellite suffered in February 2003. As a result of that incident a US\$32 million\* insurance payout was made. \*Ascend estimate.

## NASA'S MARS GLOBAL ORBITER LOST IN SPACE

NASA's Mars Global Surveyor (MGS) is now believed to be lost in space after apparent communications and power systems problems on 2<sup>nd</sup> - 5<sup>th</sup> November. The craft was last reported to have entered safe mode after apparent problems with a solar panel motor and now all contact is lost.

On 2nd November, one orbit after commands were sent for a routine manoeuvre to move the solar panels, the spacecraft reported that the motor moving one of the arrays had experienced errors. Onboard software responded as programmed, switching the spacecraft to a backup motor controller, then to a backup circuitry connection. Contact was lost but regained on 5th November and then lost again. NASA's Mars Reconnaissance Orbiter may be used to get some external photographs to check the condition of its fellow Mars spacecraft. Mars Global Surveyor, which was launched 7<sup>th</sup> November 1996, was expected to last only four years three months.



Mars Global Surveyor artist's impression – Image courtesy NASA/JPL



## DELTA IV DEBRIS REDUCTION PLAN GOES CATASTROPHICALLY WRONG

After the successful launch and deployment of the DMSP 17 meteorological satellite by a Delta IV launch vehicle on 4th November, the vehicle's second stage still contained a large amount of fuel and oxidiser. In order to minimise the chance of the stage exploding and hence creating a space debris hazard, it was decided to make a propellant depletion burn that, at the same time, would de-orbit the stage over the Pacific Ocean. It was hoped that the majority of the second stage would burn up on re-entry with any debris landing in the Pacific.

This plan apparently went catastrophically wrong as the US Strategic Command's Space Track website subsequently showed that at least 59 pieces of debris had suddenly appeared in orbit (and probably lots more smaller pieces that cannot be tracked). This implies that the upper stage actually exploded and caused even more space debris orbiting the planet. Renowned amateur satellite tracker, Jonathan McDowell, notes that there was probably a 'high energy event' around the time of the de-orbit burn.

**Comment:** This debris reducing measure apparently had precisely the opposite effect.

## PROTOSTAR BUYS GROUNDED CHINASAT 8

It has been reported that ProtoStar Ltd., a Bermuda corporation with principal U.S. operations in San Francisco is about to make a US\$210 million purchase of Chinasat 8. The satellite has been renamed PROTOSTAR 1 and is to be used to offer a direct to home (DTH) broadcasting service. The satellite, which was originally built for Chinasat, has been grounded for over seven years by ITAR restrictions that prevent unlicensed U.S. space technology being exported abroad. The LS-1300 satellite was built by Space Systems Loral

## ASTRA 3B ORDERED FROM ASTRIUM

SES ASTRA, an SES GLOBAL company, has announced that it has awarded the contract for the construction of its new satellite, ASTRA 3B, to the European satellite manufacturer Astrium. As prime contractor for ASTRA 3B, Astrium will design and build the satellite. ASTRA 3B will be a state-of-the-art Ku and Ka-band spacecraft designed for the distribution of both direct-to-home (DTH) broadcast services and two-way broadband services across Europe.

After ASTRA 2B and ASTRA 1M, ASTRA 3B is the third ASTRA satellite to be built by Astrium. The satellite will have 52 transponders, 20 of which are to replace existing in-orbit capacity, while 32 which will create new capacity, thereby strengthening 23.5E as the third orbital hotspot for European DTH services. ASTRA 3B is expected to be launched at the end of

2009. The satellite is to use a Eurostar E3000 platform – the latest version of the series.

## ORBITAL SCIENCES WINS NSS-9 ORDER FROM SES-NEW SKIES

Orbital Sciences has been awarded the construction contract for NSS-9 from SES-NEW SKIES. The satellite is to use the STAR 2 platform and is expected to be launched in 2008. The spacecraft is to be located at 183E. SES-New Skies is a quasi-independent subsidiary of major satellite operator SES Global.

## ALCATEL ALENIA GETS EXPRESS SATELLITES' COMMS ORDER

The Russian communications satellites, EXPRESS-MD1 and EXPRESS-MD2, that are due to be launched at the end of 2007 and 2008 respectively are to use a communications payload manufactured by Alcatel Alenia after an order was placed by the Russian Satellite Communications Company (RSCC). The satellites themselves are to be built by the Russian Khrunichev State Research and Production Space Center firm. The communications payloads are to have eight C-band transponders and one L-band transponder aboard.

## X-37 WINGED SPACECRAFT REVIVED BY US AIR FORCE

As NASA turns itself away from winged spaceflight with the planned retirement of the Space Shuttle, the U.S. Air Force has announced that it is developing an Orbital Test Vehicle, based on the design of a cancelled NASA X-37 technology demonstrator. The vehicle will become an unmanned rocket launched space plane. The vehicle is seen by analysts as a precursor to a reusable reconnaissance space plane.



Artist's impression of the X-37 during re-entry - Image courtesy of NASA via [www.msfc.nasa.gov](http://www.msfc.nasa.gov)

The Air Force Rapid Capabilities Office will lead the initiative with continued participation of NASA and the Air Force Research Laboratory. Boeing is the prime contractor for the OTV program. The first orbital test flight of the OTV is planned for 2008, with a launch from Cape Canaveral Air Force Station on an Atlas V launch vehicle. Key objectives of the first flight include demonstration and validation of

guidance, navigation and control systems to include fault tolerant autonomous re-entry and landing as well as lightweight high temperature structures and landing gear. Either Vandenberg Air Force Base or Edwards AFB will conduct re-entry and recovery activities.

## UK MINISTER FOR SPACE RESIGNS FOR 'PERSONAL REASONS'

After eight years in the post, the United Kingdom's Minister for Science and Technology who has Space as part of his brief, Lord Sainsbury, has resigned from the Government. While officially, he is to retire from the government for personal reasons, Lord Sainsbury has been said to be angry over reports linking him to the 'loans for honours' corruption scandal that is currently embroiling Britain's political establishment, including the office of the Prime Minister, who is also expected shortly to be 'helping the police with their enquiries.'

The scandal involves the allegation that party loans had been made to the incumbent Labour Party in return for the giver receiving honours including peerages. It has also been alleged that the loans, which do not have to be publicly declared, were really donations, which do. It is not just the Labour party that is affected. The opposition parties are also alleged to have received loans in this way to keep their donors secret. Lord Sainsbury himself had been interviewed as a witness in the Police investigation.



Lord David Sainsbury – Photo via [www.news.bbc.co.uk](http://www.news.bbc.co.uk)

Lord Sainsbury is head of the Sainsbury supermarket family that controls the third largest grocery chain in the country. He had previously been cleared of breaching the ministerial code over giving a £2 million loan to the Labour Party without disclosing it to Parliament.

**Comment:** Overall Lord Sainsbury was well regarded by both space and scientific communities. He was liked because he had interest in the job, and while unable to do all that he wanted, given budget limitations especially for space research, he did manage to get significant budget increases to help the science and engineering communities. Malcolm Wicks M.P., former Minister for Energy, has now been appointed Minister for Science and Technology.

## NASA REBUTS CLAIMS THAT ARES 1 ROCKET IS 'NOT POWERFUL ENOUGH'

NASA has rebutted reported concerns that their planned ARES 1 launch vehicle is not powerful enough to launch the manned Orion CEV capsule into its required orbit. The ARES 1 rocket has its first stage designed around technology derived from the Shuttle's SRB (Solid Rocket Booster). NASA has stated that the rocket is still within its performance limits and any shortfall would be addressed during the system engineering design process. It was reported by some websites that NASA was considering the need to add some solid rocket boosters, improve the performance of the liquid fuel upper stage, or develop an alternative design in order to improve the performance of the rocket.



Artist concept of ARES 1 launch vehicle – courtesy NASA

## SES AND EUTELSAT COOPERATE ON EUROPEAN MOBILE PHONE TV

The EUTELSAT W2A communications satellite is being modified to carry an S-band payload and antenna on behalf of EUTELSAT and SES GLOBAL to provide TV services to mobile/cell phones. The Eu130 million cost is being divided between the two firms. The satellite is due to be launched at the beginning of 2009. Booster transmitters, known as Ancillary Terrestrial Components, will be positioned in cities to cope with the signal attenuation that tends to occur in built up areas.

## PRINCESS BEATRICE BOOKED ON VIRGIN GALACTIC?

Following the rumour that His Royal Highness Prince Harry had booked a flight on the planned Virgin Galactic suborbital tourist trips into space, it has been reported that his cousin, Princess Beatrice is also to fly on a flight after being booked aboard by her boyfriend David Clark, who works for Virgin. Press reports have indicated that she will fly on the first commercial flight.

## EVERYONE WANTS A PIECE OF K-1 AS ALLIANT TECHSYSTEMS JOINS TEAM

Alliant Techsystems announced Wednesday that it has signed an agreement with Rocketplane Kistler to help develop the K-1 reusable two stage launch vehicle. Under the agreement ATK will become the lead contractor for the K-1, responsible for vehicle development, assembly, integration, and testing. ATK will also provide composite structures and subsystems for the K-1's payload module.

The company is the third to make agreement with Rocketplane Kistler following the withdrawal of

Orbital Sciences from the project following a disagreement over strategy. Andrews Space and MacDonald Dettwiler and Associates have become part of the construction team. Rocketplane Kistler won a US\$207-million flight demonstration contract as part of the Commercial Orbital Transportation Services (COTS) programme for the International Space Station.

## TERRESTAR LAUNCH ORDER GOES TO ARIANESPACE

Arianespace and TerreStar Networks Inc., a subsidiary of Motient Corporation (MNCP) and an emerging North American mobile communications operator, signed a "Launch on Demand" contract for TERRESTAR 1 which will be the largest commercial communications satellite ever launched into geostationary orbit. Three launches are covered by the agreement with the first likely to be exercised for TERRESTAR 1 in late 2007.

## COMPENSATION TO BE PAID FOR DNEPR ROCKET CRASH DAMAGE

Russia has agreed to pay US\$1.1 million (€860,000) in compensation for the damage caused by the crash of a Russian rocket on 26<sup>th</sup> July that spilled highly toxic fuel over Kazakhstan.

The estimate includes US\$741,000 (€580,000) for the environmental damage, the rest is compensation for running a government commission.

## JAPANESE/KOREAN FREQUENCY CLASH BEING NEGOTIATED

A frequency clash between the Korean communications satellite KOREASAT 5 and Japan's N-SAT-110 has been reported. Efforts are being made to find a joint solution to the problem.

## TELENOR BOUGHT BY APAX PARTNERS

Telenor Satellite Services has been acquired by private equity financiers Apax Partners. The deal, which was valued at US\$400 million, adds to the acquisition of France Telecom's mobile satellite division that Apax acquired in July 2006.

## XM-5 TO FLY ON SEA LAUNCH

XM Satellite Radio's XM-5 satellite will be launched aboard a Sea Launch Zenit 3SL rocket under a previously signed launch option that XM has now converted. The launch is expected to take place next year.

## SURREY SATELLITE SELECTED TO BUILD NIGERIASAT 2

Nigeria has ordered the construction of NIGERIASAT 2 from Surrey Satellite Technology Limited (SSTL).

The earth observation satellite will be launched into low orbit in 2009.

## SPACE ELEVATORS NO GOOD FOR MANNED SPACE TRIPS

Following on from last month's report about Space Elevators (SIN Nov 2006) scientists from Los Alamos National Laboratory, New Mexico, USA, have pointed out space tourists are unlikely to ever be able to use space elevators due to the danger of space radiation. While rockets carrying manned spacecraft and satellites regularly transfer through the 'Van Allen' belts of charged particles that are held in Earth's magnetic field, the rocket's speed is such that their total exposure is very small and not hazardous. However, a slow moving elevator carrying passengers or high value electronic payloads would be much more susceptible to damage from ionizing radiation.

## ORBITAL SPACE TOURIST TICKET RISES A MILLION BUCKS

The price of a commercial flight to the International Space Station has risen from US\$20 million to US\$21 million according to Nikolai Sevastyanov, the head of the Energia rocket and space corporation. He declared that the price rise set by Roskosmos (Russia's space agency) was necessary due to the growth in the cost of materials and components used in the Soyuz spacecraft.

## LORAL GETS TWO PAY OFFS

According to *Space News*, major launch provider ILS (International Launch Services) has paid satellite manufacturer Space Systems/Loral US\$18 million in settlement of a dispute over cancelled launches. Boeing has also made a payment to Loral's space satellite operator of US\$14.9 million in compensation following the cancellation of its long term lease of transponder capacity in preparation for the withdrawal of Connexion services.

## DEVELOPMENT AND DELAY WOES FOR JAPAN'S GX ROCKET

The Japanese attempt to build a new liquid fuel rocket has turned into a financial and technical disaster for Japan as the rocket is now to incur a delay of five years. The GX rocket, which uses an RD-180 Russian design for its first stage, has had the most trouble with its indigenously produced second stage. A complete redesign has now been recommended.

The first flight of the rocket had already been delayed by two years from its planned 2006 launch date because cracks were discovered in its fuel tank. Worse was that the LE-5B second stage engine, which is to burn a natural gas/liquid oxygen mix, has had combustion pressure fluctuation issues that are currently being worked on. The development cost of this rocket engine is believed to have tripled to



US\$292 million. This redesign has now pushed out the first launch until at least 2011.

The troublesome fuel tank has been modified, but in doing so it added weight to the design - significantly reducing its performance. The rocket is now planned to carry 1,500kg to a 500km orbit instead of 2000kg to 800km.

**Comment:** This is yet another disaster for JAXA and the Japanese space programme that in recent years has been characterised by overspend and technical failure in both its launch vehicle and spacecraft programmes. Officially the GX rocket is to be offered commercially but there is no real market for this very expensive rocket given its very limited performance. It is expected that this programme will be scrapped by Japanese Space Activities Commission who will elect to spend its money on something more worthwhile.

## **GLOBALSTAR HAS SUCCESSFUL IPO BUT ORBCOMM'S IS NOT SO GOOD**

Two low Earth orbit (LEO) satellite constellation operators held IPOs (Initial Public Offerings) of their stock. Globalstar Inc., the mobile satellite phone operator, sold 7.5 million shares in its initial public offering 2<sup>nd</sup> November at US\$17 a share. The shares rose slightly after the sale on the NASDAQ. While the brilliant prospects of everyone having a world phone diminished after normal cell phones became more and more internationally capable (the debt ridden

Globalstar fell into Chapter 11 bankruptcy as a result of this miscalculation), the re-emerging company has found a niche use for emergency services in time of disaster. For example, Hurricane Katrina two years ago destroyed most land lines and cell phone infrastructure to the point that emergency services had to use satellite phone systems. The funds raised by the IPO are to be used to launch eight replacements into the current satellite constellation and to design a new constellation.

Meantime ORBCOMM Inc., a low Earth orbit constellation that concentrates on messaging and tracking applications had a major share price fall of more than 20% following its IPO. The IPO raised US\$101.5 million as 9.2 million shares were sold for US\$11 per share. However, the 'overvalued' share price then promptly fell to US\$7.75 causing an immediate loss to new investors. The reason for this is not entirely clear but it could be indicative of doubts about satellite tracking. At one time satellite tracking of assets and goods looked to have a rosy future. However, the increased use of simple (and cheap) scanned RFID chip systems has meant that delivery companies are now moving away from satellite tracking for goods delivery. That said, it is believed that there is still a viable market for asset tracking (trucks, aircraft, trailers etc).

## **INTERNATIONAL SPACE STATION ORBIT WAS NOT RAISED PROPERLY**

An attempt to raise the orbit of the International Space Station by firing the engines of the attached PROGRESS-M58 at 2305 GMT on 29<sup>th</sup> November was cut short after on-board detectors commanded a shut down. It is suspected that this was due to a configuration change-related shift in the overall centre of gravity of the station after a new solar array was fitted. The resulting moment arm of the displaced engine thrust (relative to the C of G) causing rotational movement which was detected by sensors which then shut down the engine.

## **GOLFING COSMONAUT 'SHANKS' OFF INTERNATIONAL SPACE STATION**

During a spacewalk from the International Space Station, Flight engineer Mikhail Tyurin stood on a ladder by the docking port and hit a light-weight ball, sponsored by Century21, using a gold-plated six-iron club as part of an advertising stunt. The ball was to be fired backwards (retrograde) so that its velocity will be slightly less than the ISS and hence will fall into a slightly lower orbit to mitigate the chance of any debris collision. However, Cosmonaut Tyurin did 'shank' the ball so that it flew right (In golfing terms a shank is a severe miss-hit). The ball contains a transmitter that allows it to be tracked as it orbits the Earth. Experts disagree how long the ball will take to re-enter.

Apart from the stunt, the main reason for the spacewalk was to examine why a Kurs antenna failed to retract properly on the PROGRESS M-58 unmanned cargo craft as it docked. It is thought that the jammed antenna may have to be cut away during a further spacewalk to allow the craft to safely undock from the station. DT & PH

## **INDIA I: CHANDRAYAAN-1 PROBE MAY PROVE ICE ON MOON OR NOT**

Despite recent radar return evidence from ground based radio telescopes (including that at Arecibo) that craters at the lunar poles are filled with fractured rock rather than ice, ice is still not being ruled out by all scientists. While lunar experts argue this out, the Indian Chandrayaan space probe, set to be launched in 2008, could prove to be decisive. It is carrying a special SAR – Synthetic Aperture Radar designed to specifically look for water ice. It was originally suggested from Lunar Prospector and Clementine readings that hydrogen atoms could be present at the Moon's poles.

## **INDIA II: IT IS NOW A FOUR HORSE MOON RACE AS INDIA DECLARES GAGANAUT PLANS**

The Indian Space Research Organisation ISRO is to declare its plans to land a man on the Moon in 2020 as part of its ambitious manned lunar programme. The first manned spaceflight for India is to take place in 2014. Already China has declared its intention to

land a man on the Moon with technical help from Russia. Russia itself is known to have plans to have lunar orbital missions and is thought to have plans to mount a landing. Meanwhile, most publicly, NASA already has advanced plans for a manned return to the body before 2020. Only Japan and Europe have yet to declare their hands. It is suggested that, just as Chinese astronauts are nicknamed 'taikonauts', Indian astronauts will similarly be called 'gaganauts' – this being the Sanskrit equivalent of Astronauts or Cosmonauts.

## **INDIA III: INDIA SIGNS UP WITH RUSSIA FOR GLONASS FOLLOW ON**

During the cold war, India was always described as a 'non-aligned' country – that is one that favoured neither the West nor the Soviet Union/Warsaw pact countries. Nevertheless, the country was happy to trade with both. And it continues that tradition as it announced a cooperation deal with Russia to jointly build the Glonass new generation of navigation satellites.

The Indo-Russian space cooperation agreement has been signed into a federal law by Russian President Vladimir Putin that allows the transfer of sensitive space technology to India for the peaceful use of outer space. The original pact was signed in New Delhi during Putin's visit in December 2004.

The Russian Defence Minister has stated that all security restrictions on its Glonass satellite navigation system will be lifted from 1<sup>st</sup> January 2007. The Global Navigational Satellite System (GLONASS) has to date offered an alternative to the GPS system though its coverage was patchy due to an incomplete constellation in Medium Earth Orbit. The complete constellation is to have 24 satellites. However, the gaps are being filled as replacement Glonass M satellites are being launched. India's GSLV launch vehicle is expected to take part in this process. The two countries are also to jointly develop and market Glonass receivers for commercial use.

## **INDIA IV: INDIAN ABM SHOTS DOWN TARGET BALLISTIC MISSILE IN TEST**

India's Ministry of Defence has announced that it has conducted a successful test of an anti-ballistic missile (ABM). The unnamed ABM was fired from Wheeler Island and destroyed a Pithri 2 ballistic missile target over the Bay of Bengal. The Pithri 2 had been fired from a test range near Balasore. India is believed to have developed the ABM in response to Pakistan's nuclear weapon and ballistic missile programme.

## **SURVEILLANCE OF SPACECRAFT I: SUCCESSFUL TRIAL FOR UK SYSTEM**

The Eastbourne based company Space Insight has successfully conducted a trial of a new space surveillance system at a UK MoD base in Cyprus. Space Insight is exploring how their Starbrook sensor can scan vast areas of the sky every few hours to provide a map of the satellites and space objects that

are detected. The trial is being funded by the British National Space Centre (BNSC) which has awarded two contracts to Space Insight. A UK£75,000 contract for the Starbrook space surveillance project and a UK£33,000 contract have been signed for a space debris re-entry prediction project. PH

## **SURVEILLANCE OF SPACECRAFT II: RUSSIA IMPROVES ITS CAPABILITY**

According to an RIA Novosti report, Russian Space Forces are to significantly improve the technical capabilities of their main space surveillance facility in Tajikistan. The Okno (window) space surveillance complex is located at an altitude of 2,200 metres in the mountains near the Tajik city of Nurek. The facility was commissioned in 2004 and is currently capable of tracking space objects at altitudes between 2,000 and 40,000 kilometres, and plans to increase its capability to be able to track objects between altitudes of 120 and 2,000 kilometres. PH

## **JAMES MASER LEAVES SPACE X**

According to *Space News*, James Maser, who previously headed up the Sea Launch operation, and who moved to Space Exploration Technologies (SpaceX) rocket company to be President and Chief Operating Officer of that firm, is now to leave in order to head up the Rocketdyne rocket engine company.

## **NASA INSPECTOR GENERAL STARTS PROBE AS HE FACES ONE HIMSELF**

The Inspector Generals at NASA and at the U.S. Commerce Department have been charged by Congress to investigate whether the Bush administration deliberately tried to silence government scientists from speaking about global warming.

Earlier this year, climate scientists at NASA and at the NOAA, including most notably NASA scientist James Hansen, complained that they were being prevented from talking or writing about their findings on global warming by White House appointees within NASA's public relations office. The Bush Administration has consistently refused to sign the Kyoto treaty on reducing Carbon emissions due to concerns about the effect it would have on the US economy and because rapidly growing polluters such as China and India, while signatories, are excluded from the treaty limits.

Meantime the Inspector General of NASA himself faces a federal investigation into allegations that he cancelled or censored audits. It is also alleged that his relationship with NASA hierarchy was too close to be fair and unbiased.

## **DEMOCRATS TO KEEP SPACE PLAN BUT WANT BUSH TO SIGN KYOTO**

While recent mid-term election loss of control of Congress from the incumbent Republican Party to the Democrats has already lead to the departure of



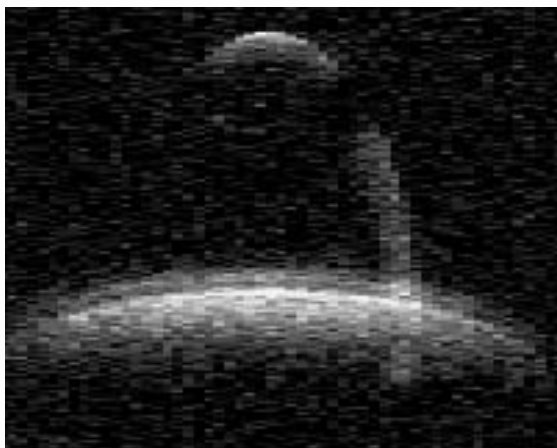
the US Secretary of Defense Donald Rumsfeld, who was a known advocate of the military use of space, it is not expected to significantly affect U.S. space policy. That said, congressional committee scrutiny of the space programme budget and strategy is expected to increase. And the election result is expected to result in increased pressure on the Republican Bush administration to sign the Kyoto treaty on limiting greenhouse gas emissions.

As such, while NASA's core exploration program and strategy will not be affected, it is likely that any spacecraft missions involved with monitoring the environmental condition of planet Earth are much more likely now to be heavily supported by both Congress and the Senate. Funding restrictions had previously caused some scientific missions to be sacrificed in favour of the long term project to restart manned exploration of the Moon and because of the decision to rescue the Hubble Space Telescope – a Shuttle mission that will cost US\$900 million.

## NASA'S 'PROJECT CONSTELLATION' MAY INCLUDE AN ASTEROID LANDING

The Arecibo radio telescope has successfully imaged the KW4 binary (two) asteroid formation that may one day strike the Earth. KW4's trajectory was thought to be a threat to the Earth but any danger of collision has now been ruled out for the next 1000 years at least. Nevertheless, like recent, Science fiction movies Deep Impact and Armageddon, NASA is reportedly exploring the possibility of mounting a manned mission to an asteroid as part of the Constellation manned lunar landing project. Their concern is that one day an as yet untracked asteroid may well threaten the Earth. Such landing techniques could be used in conjunction with an attempt to deflect an on coming asteroid if such collision was imminent. According to NASA there are currently 834 asteroids that could potentially present a hazard to Earth.

Meanwhile in a separate development, having eschewed manned spaceflight in the past, the Government of the United Kingdom is reported to be wanting to join the US-led Project Constellation manned landing programme. DT & PH



The binary asteroid KW4 as imaged by the radio telescope at Aracebo, Mexico

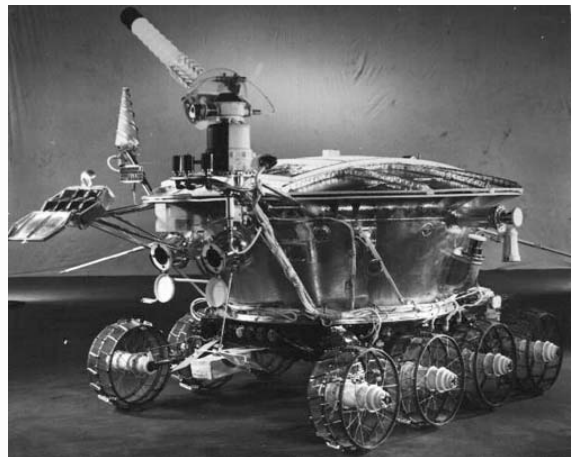
## TRUTH STRANGER THAN FICTION AS SPACECRAFT ISOTOPE KILLS EX-SPY

In an alleged assassination plot that would not have been out of place in a James Bond story, the radioactive isotope Polonium-210 has been used to kill an ex-KGB defector in London. The victim, Alexander Litvinenko, 43, who defected in 2000, was reportedly investigating the assassination of journalist Anna Politkovskaya at the time of the poisoning.

Media reports have suggested that the radioactive isotope Polonium-210 was administered to him over a plate of raw fish in a Sushi restaurant in Piccadilly, London on 1st November. Despite the best efforts of medical staff, Litvinenko died three weeks later after alpha-particle radiation killed cells in his vital organs.

As a bi-product of the incident there was also reported radioactive contamination of the restaurant concerned, some London buildings, and British Airways 767 airliners that had been used on the London-to-Moscow route. British Police are now investigating the murder.

Polonium-210 is an unusual isotope that has to be specially manufactured in nuclear plants. It is rarely used but is a highly radioactive alpha particle emitter and an excellent heat source. As such it has an application in RTG (Radioisotope Thermoelectric Generators) and RHU (Radioisotope Heater Units) used aboard short duration spacecraft and lunar rovers.



The Soviet Lunakhod rover was heated by Polonium-210 - Photo Courtesy: teams.kjpr.org

For example, Polonium-210 powered RTGs were used in early US spy satellites of the TRANSIT series during the 1960s while the unmanned Soviet Lunakhod rovers of the Luna 17 (1970) and Luna 21 (1973) missions used Polonium-210 isotopic heat sources to keep their systems warm during the cold darkness hours on the Moon. While a powerful heat generator, the isotope has a relatively short half-life and nowadays mission designers usually opt for other longer half-life isotopes such as Plutonium 238 for spacecraft RTG and RHU use.

## VESPER IS NOT JUST 007'S LOVE IT IS ALSO NEW NASA VENUS MISSION

The new James Bond film 'Casino Royale' has its principal female character called Vesper Lynd, and who 007 actually falls in love with. Vesper is the Latin name for 'Evening Star' and as this is the colloquial name for Venus it has become the name of a proposed new mission to the planet.

NASA selected three new mission proposals under the NASA Discovery class mission program for concept studies under the program. If approved, the Vesper mission would observe Venus for 486 Earth days but only two Venuses days as it rotates only very slowly (its day is longer than its year). The mission is planned to examine the exceptionally fast upper level winds and cloud vortices at the poles. Vesper will also investigate whether long-term changes in atmospheric sulphur dioxide compounds are evidence of active volcanoes on Venus. The planet's atmosphere is mostly carbon dioxide (CO<sub>2</sub>), which should get broken down by sunlight into carbon monoxide (CO) and oxygen and the mission will investigate why this is not happening on a large scale.

The planet Venus is almost the same size as Earth but is 30 percent closer to the sun It is suspected that Venus and Earth had similar atmospheres after they were formed but that Venus became subject to runaway global warming over millions of years and is now so hot that no life can exist on its waterless surface.

## CHINA'S NEW OPTICAL TELESCOPE IS TO TRACK NEAR EARTH OBJECTS

China has built a new Schmidt telescope, with a one meter diameter lens, to track near-Earth objects that could become a threat to Earth. The telescope is located at the Mount Zijin Observatory (also known as the Purple Mountain Observatory) in China's Jiangsu Province. PH

## .....AS CHINA ALSO PLANS HALF A KILOMETRE FIXED RADIO TELESCOPE

China has started a feasibility study on constructing a 500m (half a kilometre) aperture spherical telescope (FAST) similar to the one at Arecibo, Puerto Rico.. The proposed site for the telescope is a natural 'karst' depression in Pingtang County, Guizhou Province in south-west China. The telescope's main spherical reflector will be composed of 4,600 panels and take up an area the size of 25 football fields. In addition to its work in astronomy the telescope will also be able to be used to monitor satellites and space debris. If all studies are completed on time, the telescope could be operational by 2013. PH

## MEXICO HAS WORLD'S LARGEST STEERABLE RADIO TELESCOPE

Mexico has started two years of testing on the world's largest steerable radio telescope before it is

deemed to be operational in 2008. The German designed Large Millimeter Telescope will be used to study the composition of comets, the atmosphere of planets of other solar systems, and the origins of the universe. The telescope is located on the Sierra Negra volcano, 350 kilometres south-east of Mexico City. PH



*The Large Millimeter Telescope, Sierra Negra Volcano, Mexico. – Picture courtesy of The Large Millimeter Telescope Project*

## CHINA'S ZHUHAI AIRSHOW 2006 – REPORT ON SPACE ELEMENTS

The Airshow China 2006 was held at Zhuhai Airport in Southern China from 31st October to 5th November 2006. This is China's equivalent of the Paris or Farnborough Air Shows where China displays its aerospace programmes to the public.

Space highlights from the show:

The Chinese Academy of Space Technology is researching a new three stage liquid propellant launcher planned to have the ability to launch small satellites into low Earth orbit. The vehicle would have a total length of 29.2 metres with a launch mass of 103.2 tonnes and a capability to place a 500 kilogramme payload into a 700 kilometre sun synchronous orbit. In addition there was also a mock up of an air launch rocket broadly equivalent to the US Pegasus.

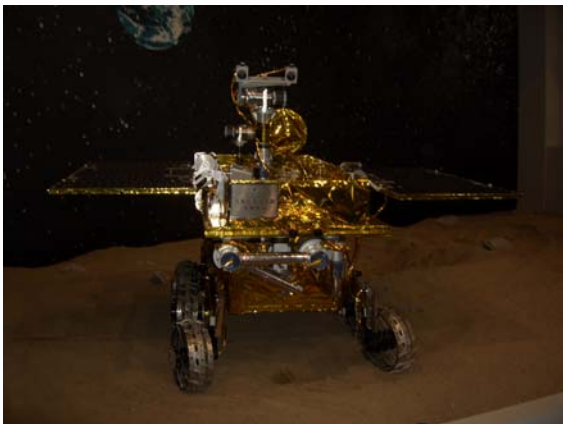
Chinese lunar plans were also on display including a model of the Chinese Lunar Rover which is planned



# ASCEND

A Division of Airclaims

to land on the moon in 2012. The six wheeled vehicle was displayed on an uneven sand surface to give an impression of conditions on the moon.



*China's Lunar Rover – Photo courtesy: Phil Hylands/Ascend*

The Beidou (Compass) satellite navigation constellation will be increased from the current three geostationary satellites to a constellation which is to consist of five satellites in geostationary orbit and thirty satellites in a non-geostationary orbit (presumably medium Earth orbit).

The satellites are to be based upon the DFH 3 satellite bus and are to have a planned eight year lifetime. The navigation system will operate as a continuous real-time system providing passive three dimensional positioning and speed measurement, precision timing and user position reporting. Later reports in the China Daily publication state that the next two satellites for the Beidou constellation are to be launched in early 2007.

Also on display was China's latest development for the satellite communications market, the DFH 4 satellite bus. The first DFH 4 satellite, SINOSAT 2, was conveniently launched on the 28th of October and at the show it was announced that SINOSAT 3, also based on the DFH 4 bus, would be launched as a replacement for SINOSAT 1 in May 2007. Unfortunately for China, it now appears, as reported earlier in this month's Ascend Space Intelligence News, that SINOSAT 2's solar arrays failed to open resulting in the complete loss of the satellite.

Manned space systems were also on display at the show with the SHENZHOU 6 de-orbit capsule being there, protected by a clear screen. Also looking to the future, on display was a model of the future space station.

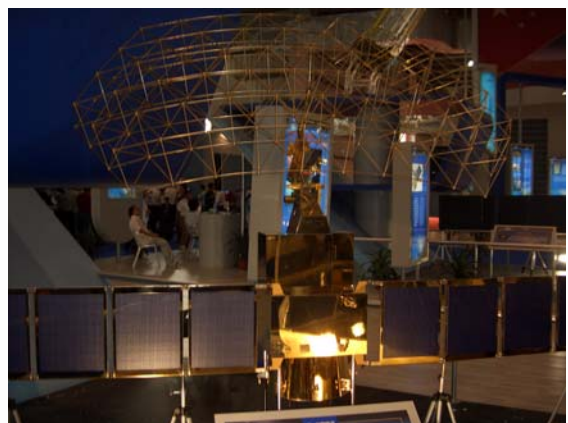


*The SHENZHOU 6 De-orbit Capsule – Photo courtesy: Phil Hylands/Ascend*



*The planned Chinese Space Station configuration with SHENZHOU craft attached – Photo courtesy: Phil Hylands/Ascend*

The Chinese Environment and Disaster Monitoring Constellation is to consist of two electro-optical satellites and a S band synthetic aperture radar satellite. The constellation is due to become operational in 2007.



*Model of the Disaster Monitoring SAR satellite – Photo courtesy: Phil Hylands/Ascend*

Also on display was China's latest development in meteorological satellites, the polar orbiting Feng Yun



# ASCEND

A Division of Airclaims

3 and the geostationary orbiting Feng Yun 4. These satellites are designed to provide multi-spectral and 3-dimensional imagery and to provide weather parameters such as temperature, humidity, cloud cover and radiation data.

According to Ascend's Spacetrak database, the first launch of the Feng Yung 3 series of satellites is to take place during the 4th quarter of 2007 while the launch of the first Feng Yung 4 is uncertain.

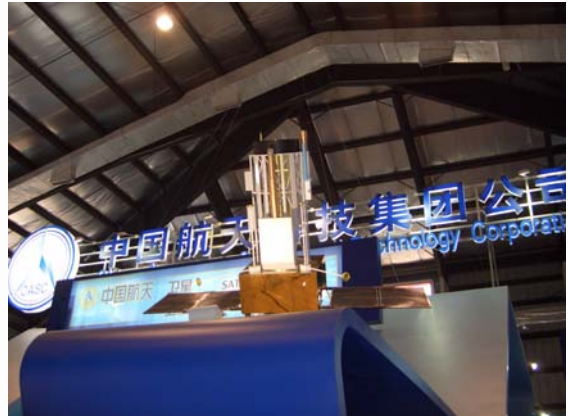
Astronomy was not forgotten with the display of a model of the one metre aperture Space Solar Telescope. This telescope is to be placed in orbit during 2008 by a Long March launch vehicle.



*The Feng Yung 3 Polar Orbiting Meteorological Satellite  
- Photo courtesy: Phil Hylands/Ascend*



*The Feng Yun 4 Geostationary Orbit Meteorological Satellite  
- Photo courtesy: Phil Hylands/Ascend*



*China's Space Solar Telescope - Photo courtesy: Phil Hylands/Ascend*

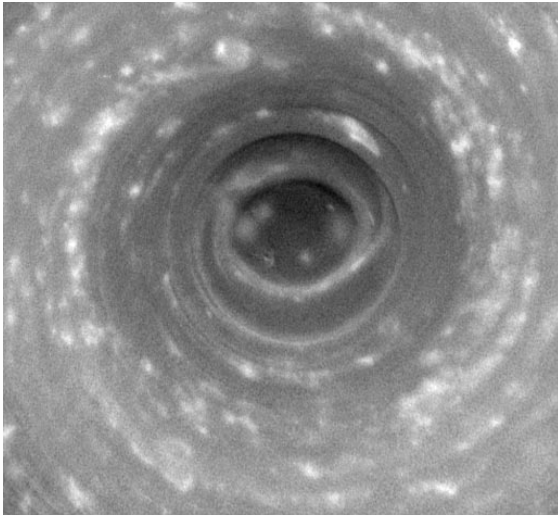


*The Kaitouzhe Family of Solid Propellant Launch Vehicles  
- Photo courtesy: Phil Hylands/Ascend*

Also on display were models of all the Long March family of launch vehicles including the future liquid propellant modular Long March 5 vehicle and the Kaitouzhe family of solid propellant launchers.

Comment: The show was evidence of the extent of China's space plans. China has become a player in spaceflight that the World can no longer ignore.

## IMAGES OF THE MONTH: SATURN'S POLE HOLE AND MERCURY'S TRANSIT



*The slightly obscene looking 'eye of a Hurricane' at the South Pole of Saturn as imaged by NASA's CASSINI spacecraft. The diameter of the storm is around 8,000km. In fact the Great Red Spot storm on Jupiter is larger but it has no 'eye-wall' while Venus has a smaller 'double hole' vortex at its South Pole. Image courtesy: NASA/JPL*



*The Planet Mercury was seen from Earth to cross the Sun on 9th November as a little black spot (right) during one of its rare transits. Image courtesy NASA/JPL*

### ON A LIGHTER NOTE I: FAT GET BLAME FOR GLOBAL WARMING

While environmentalists look for who to blame for the failure to reduce greenhouse gas emissions that also apparently include those that use satellite digital TV and radio receiver technology as it uses more power than the old style analogue systems – a new set of 'villains' is now under fire: the overweight.

Specifically, University of Illinois researchers are suggesting that the carbon footprint of overweight people is much larger than that of those of 'normal' weight. Evidently they require more fuel to get from A to B whether that is by aeroplane or automobile. Others have made the point that fat people also

require bigger (and hence heavier and less efficient) planes and automobiles to fit inside.

This just might, of course, be just another excuse for discrimination and 'body fascism'. Already the overweight, in common with smokers and very old, are being denied operations on the grounds of a treatment 'cost/benefit' analysis. At this rate, soon only the young and healthy will be eligible for healthcare.

Actually, rather than the stouter people of the world, there may be worse 'global warming' culprits. For example: those fit lean people who do lots of exercise who exhale the more carbon dioxide as they exercise and hence will make global warming even worse.

NASA Astronaut Neil Armstrong, the first man to set foot on the Moon, will not be one of the guilty in this instance. His famous quote was: "I believe every human has a finite number of heartbeats. I don't intend to waste any of mine running around doing exercises."

There may be one way round this global warming pitfall for the fit. Past manifestos of the 'Official Monster Raving Looney Party' in the United Kingdom has suggested wiring up generators to all the exercise machines so that the power produced by those on the treadmill could be used to heat old peoples homes.

*Disclaimer: The writer of this piece admits to be being 'built for comfort and not for speed'.*

### ON A LIGHTER NOTE II: SPACE WEBSITE REVIEWS NON-SPACE MOVIE

Space.com, the well known space news website, has this month run a movie review for Casino Royale – the new James Bond film starring Daniel Craig. This was surprising, as unlike some James Bond films, e.g. Dr. No, You Only Live Twice, Moonraker etc, this one had no space content at all. In fact, Casino Royale, which was closely based on the 1953 pre-space age novel of the same name, has a plot involving using gambling to fund terrorism and the perils of love and heartbreak.

While Casino Royale is rated as very good by most film critics, there has been some criticism over its gratuitous use of product placement to the point where even some of the film's dialogue is taken over. Perhaps it is just a well that there is no space content or else we just might have had James Bond telling 'M': "Actually M, I think 'Acme Satellites' are really jolly good."

While Space Intelligence News - SIN will not be reviewing this film given its lack of space content, it has mentioned James Bond films and novels before. For example, SIN has noted You Only Live Twice (1967) several times covering everything from its spacecraft hijacking plot, to how a 'SpaceTrak' is mentioned in the movie, and even how Sean



Connery's hairy chest might be indicative of his relative intelligence.

Earlier this year, SIN also referenced Ian Fleming's original novel *Casino Royale* in our recommendation on what to do about a White House appointed public relations officer who was caught censoring NASA environmental scientists and lying about his academic credentials, while having the effrontery to use the phrase 'low hanging fruit' in his defence. Those that have seen the movie will have got the gist of what we recommended for his.

James Bond has long had his critics. Some have cited 'ridiculous' technologies on display in the films but quite often this is just the shape of things to come. For example, previous Bond movies have had space-based laser beam weapons and even an Aston Martin car that had a cloaking device. SIN has subsequently reported that several of these technologies are now in development by the United States of America. In fact, such is the threat of both in orbit and ground based lasers that the recently launched weather satellite DMSP 17 reportedly carries a laser attack warning sensor.

Some past 'outlandish' James Bond technologies are now already in existence. In *You Only Live Twice*, Bond looks over his shoulder at an oncoming enemy helicopter attacking his small Wallis-built autogyro aircraft and fires his missiles forward. These then proceeded to make a quick U-turn to destroy the enemy chopper behind. For years this impossible air-to-air missile manoeuvre was laughed at by military cognoscenti. This was until the 1980s when, to the shock of NATO, Soviet Air Force jet fighters began carrying the AA-11 ARCHER R-73 air-to-air missile whose exceptional manoeuvrability allowed just such an 'over the shoulder' shot.



*Casino Royale* is rated as good but all the cars in the film are too obviously equipped with highly visible 'product placement' badges. Image courtesy: Eon Productions



James Bond's autogyro in *You Only Live Twice* had no obvious badge but was equipped with machine guns, parachute mines and fantastically manoeuvrable missiles – Images courtesy EON Productions via rotaryaction.com

Other critics of the series of films have wondered if agent 007 was a bit out of date in this post-Cold War era. Given the claims in the press that elements within the Russian secret service, the FSB (formerly known as the KGB) have allegedly been up to their old tricks of assassinating their opponents, either by shooting them or by using exotic poisons, perhaps 007 is still needed.

And of course, if he needs any help, agent double-O-one-and-a-half, writing here, would like to offer his services to Her Majesty's Secret Service. Of course, if, as part of his mission, the FSB/KGB does set up its traditional 'honey trap' involving a beautiful Russian spy – agent double-O-one-and-a-half intends to walk right into it!

## ON A LIGHTER NOTE III: ARS GRATIA ARTIS – BUT IT'S STILL A BUM NAME

Despite our previous advice to the space community to avoid obvious naming 'clangers' for satellites – (e.g. Anna University's Anusat) or for that matter companies, the state-controlled Argentinian company that is taking over the Nahuelsat satellite assets is to apparently be called ArSat.

## ON A LIGHTER NOTE IV: HAL-9000'S LIP READING SKILL IS NOW A REALITY

It is not just James Bond film technology that becomes true. In the film *Space 2001 – A Space Odyssey*, the deranged spacecraft computer HAL-9000 famously reads the astronauts' lips as they plot against him. As a result HAL decides to try and kill his human crewmates during a repair space walk. While originally a work of science fiction - this futuristic lip reading ability has now become a reality.

Scientists have come up with a way of computerised lip reading using the shape of the mouth and a directory of sounds and words. The accuracy is said to be uncanny. The first use of this was to examine old silent footage of one Adolf Hitler to find out what he said in his filmed 'time off' moments. Apart from his attempts at charm, he also makes 'bitchy' comments about his fellow Nazis including Heinrich Himmler and Herman Goering.

No doubt, had the technologies existed at the time, the Nazis would have used it in conjunction with CCTV to further stamp on any internal opposition. Of course, modern day governments might also try this to the point when if you are imaged saying that the Prime Minister (or for that matter the President) is a 'bit of a berk', you might find that the secret police are with you forthwith.

That said, even this lip reading step might not be necessary. Civil liberties groups are reportedly very concerned at reports that London's Metropolitan Police plans to install microphone listening devices into the London CCTV network. Already Holland is trialling this technology.

**Comment:** The growth of the 'Surveillance Society' in its various forms might be good for satellite



companies, but not to oppose it would make us 'Turkeys voting for Christmas'!

## ON A LIGHTER NOTE V: UP YOUR KILT - ASTRONAUT TO ORBIT SCOTS FLAG

British-born NASA Astronaut Nick Patrick is to fly the Scottish Cross of St. Andrews flag into orbit on the Space Shuttle STS-116 mission to the International Space Station in December 2006. The 'saltire' flag to be taken was previously flown over the Scottish Parliament and has been given to Patrick to promote space education in Scotland.



*A Scottish flag (Saltire) is to be carried into orbit Photo courtesy – [www.eastofscotlandgolf.co.uk](http://www.eastofscotlandgolf.co.uk)*



*A Kilt with its Sporan on top may fly in orbit – each tartan design usually represents a clan or family - Photo courtesy [www.Highlandlaird.de](http://www.Highlandlaird.de)*

There may be protests, however, over any preferential treatment if Patrick is allowed to perform this task. Anoushe Ansari, the Iranian born but naturalised American tourist astronaut, was not allowed to display an Iranian flag during her recent space tourism flight to the International Space Station.

It is reported that Mr. Patrick claims Scottish descent via his grandmother who comes from the Isle of Skye. There is speculation that Astronaut Patrick might decide to wear a full clan tartan kilt in orbit. That said, given his limited Scottish bloodline and Irish surname he may not be allowed.

Comment: Perhaps this is just as well as we wonder whether the 'weightless' microgravity conditions experienced in a Shuttle mission would provide a fully supportive and relaxed environment for true Scottish kilt wearers. As in - a wearer might have difficulty keeping his sporan down!

## RECENT AND FUTURE LAUNCHES

November/December 2006 – Source Ascend SpaceTrak

Satellite	Event	Date	Vehicle	Type	Manufacturer	Initial Orbit/Comments (Launch site)
DMSP 17	LAUNCH: Satellite launched successfully	04/11/2006	DELTA IVM	TIROS-N (DMSP BLOCK 5D-3)	LOCKHEED MARTIN SPACE SYSTEM	SUN-SYNCH – US meteorological satellite. (WTR)
ARABSAT 4B (BADR 4)	LAUNCH: Satellite launched successfully	08/11/2006	PROTON M/BREEZE M (8K82KM)	EUROSTAR E2000+	ASTRIUM SATELLITES SAS	G – Commercial communications satellite (TT)
GPS NAVSTAR IIR-M3	LAUNCH: Satellite launched successfully	17/11/2006	DELTA II 7925-9.5	GPS IIR-M LM-4000	LOCKHEED MARTIN SPACE SYSTEM	MEO – US Air Force navigation satellite. (TT)
COSMOS UNK	Future launch	02/12/2006	COSMOS 3M	TSIKADA/PARUS (11F627-TSIKLO)	NPO PRIKLADNOI MEKHANIKI	LEO – Military navigation site. (PL)
AMC-18 (AMERICOM 18)	Future launch	08/12/2006	ARIANE 5 ECA	A2100A	LOCKHEED MARTIN COMMERCIAL SPACE SYSTEMS	G – Commercial communications satellite. (KOUROU)
WILDBLUE 1 (ISKY 1)	Future launch	08/12/2006	ARIANE 5 ECA	LS-1300 Unknown	SPACE SYSTEMS/LORAL	G – Commercial communications satellite. (KOUROU)
ANDE MICROSAT 1	Future launch	08/12/2006	STS DISCOVERY		US NAVAL ACADEMY	LEO – US Naval Academy test satellite (CC)
ANDE MICROSAT 2	Future launch	08/12/2006	STS DISCOVERY		US NAVAL ACADEMY	LEO – US Naval Academy test satellite (CC)
CUBESAT RAFT	Future launch	08/12/2006	STS DISCOVERY		US NAVAL ACADEMY	LEO – Experimental test satellite for testing of RAFT sat detection system. (CC)
MARSCOM	Future launch	08/12/2006	STS DISCOVERY		US NAVAL ACADEMY	LEO – Experimental test satellite for testing of RAFT sat detection (CC)
MEPSI 2A	Future launch	08/12/2006	STS DISCOVERY	CUBESAT	DARPA/ARPA	LEO – Experimental Picosat (CC)
MEPSI 2B	Future launch	08/12/2006	STS DISCOVERY	CUBESAT	DARPA/ARPA	LEO – Experimental Picosat (CC)
STS-116/ISS-12A.1	Future launch	08/12/2006	STS DISCOVERY	STS ORBITER	BOEING REUSABLE LAUNCH SYSTEMS	LEO – Manned space shuttle mission to ISS. (CC)
GENESAT 1A	Future launch	11/12/2006	MINOTAUR	CUBESAT	NASA (NATIONAL AERONAUTICS &	LEO - Genetic and biological experiment satellite. (WI)
GENESAT 1B	Future launch	11/12/2006	MINOTAUR	CUBESAT	NASA (NATIONAL AERONAUTICS &	LEO - Genetic and biological experiment satellite. (WI)
TACSAT-2	Future launch	11/12/2006	MINOTAUR	NGMB (TECHSAT 21)	ITN ENERGY SYSTEMS INC.	LEO – US Navy reconnaissance satellite. (WI)

MEASAT 3 (A-M SAT)	Future launch	11/12/2006	PROTON M/BREEZE M (8K82KM)	BOEING 601HP (HS-601HP)	BOEING SATELLITE SYSTEMS INC	G – Commercial communications satellite (TT)
FENG YUN 2D	Future launch	Dec 2006	LONG MARCH 3A (CZ-3A)	FY-2 (batch 2)	SHANGHAI INSTITUTE OF SATELLITE ENGINEERING	G – Chinese Meteorological Satellite (XICHANG)
NRO L-21	Future launch	15/12/2006	DELTA II 7920-9.5			SUN-SYNCH – U.S. Believed to be Military Reconnaissance Satellite (WTR)
COSMOS TSELINA 2	Future launch	16/12/2006	ZENIT 2-SLB	TSELINA 2 (11F644)	NPO YUZHNOYE/KB YUZHNOYE	LEO – ELINT - Electronic Intelligence satellite (TT)
ETS 08	Future launch	16/12/2006	H-2A202	DS-2000	mitsubishi electric corp	G – Experimental Communications satellite. (TNS)
SAR-LUPE 1	Future launch	19/12/2006	COSMOS 3M		OHB-SYSTEM GMBH	POLAR – German Radar satellite. (PL)
COROT	Future launch	21/12/2006	SOYUZ 2 - 1B	PROTEUS	ALCATEL ALENIA SPACE	POLAR – French astronomical satellite.
GLONASS M1-4	Future launch	25/12/2006	PROTON K (D-1-e)/BLOK DM-2	GLONASS M (URAGAN M) 11F654M	AKO POLYOT (KB POLYOT)	MEO – Russian navigation satellite (TT)
GLONASS M1-5	Future launch	25/12/2006	PROTON K (D-1-e)/BLOK DM-2	GLONASS M (URAGAN M) 11F654M	AKO POLYOT (KB POLYOT)	MEO – Russian navigation satellite (TT)
GLONASS M1-6	Future launch	25/12/2006	PROTON K (D-1-e)/BLOK DM-2	GLONASS M (URAGAN M) 11F654M	AKO POLYOT (KB POLYOT)	MEO – Russian navigation satellite (TT)
KOMPASS 3	Future launch	25/12/2006	SHTIL 1N	KOMPAS	GRTSKB MAKEYEV	POLAR – Russian Scientific/seismic monitoring satellite (SUB-BARENTS SEA)
COSMOS - MERIDIAN	Future launch	08/12/2006	SOYUZ 2-1A FREGAT	MERIDIAN	NPO PRIKLADNOI MEKHANIKI	MOLNIYA – Communications satellite in Molniya orbit to reach high latitudes. (PL)

## LAUNCH SITE ABBREVIATIONS

ALCT - Alcantara, Brazil.(2.3S, 44.4E),

BARENTS SEA – Between Russia and Norway.

CC - Cape Canaveral, Florida, USA. (28.5N, 81.0W)

DOMBAROVKSIY – Orenburg/Yasnyy, Russia (50.9N, 60E)

EAFB - Edwards Air Force Base, California, USA. (35N, 118W)

EMAMSHAHR – Iran.

ESMC - Cape Canaveral, Florida, USA. (28.5N, 81.0W)

GANDO - Gando, Canary Islands.

JIUQUAN - Jiuquan, China. (40.6N, 99.9E)

KAGOSHIMA – Uchinora/Kagoshima, Japan (31.2N, 131.3E).

KODIAK - Kodiak Island, Alaska



KOUROU - Kourou, French Guiana (5.2N, 52.8W).  
KWAJELEIN - Kwajelein Atoll, Pacific  
KSC - Kennedy Space Centre (manned launches) at Cape Canaveral, USA.  
KY - Kapustin Yar, Russia. (48.4N, 45.8E)  
MUSUDAN-RI, North Korea.  
ODYSSEY-PACIFIC – Pacific launch site on Equator (0N).  
PALMACHIM - Palmachim Air Force Base, Israel. (31.5N, 34.5E)  
PL - Plesetsk, Russia. (62.8N, 40.1E)  
SRIHRIKOTA - Shar Centre, Srihrikota, India (13.9N, 80.4E).  
SVOBDNY- Svobdny, Russia.(51.37N, 128.3E)  
TAIYUAN - Taiyuan, China (37.5N, 112.6E).  
TNS - Tanagashima, Japan.(30.4N, 131.0E)  
TORR - Torrejon, Spain. 40.488N, 3.457E)  
TT - Tyuratam (Baikonur), Kazakhstan. (45.6N, 63.4E)  
WI - Wallops Island, Virginia, USA. (37.8N, 75.5W)  
WOOMERA – Woomera, Australia (31.1S, 136.8E)  
WTR - Western Test Range, Vandenberg, California, USA (34.4N, 120.35W)  
XICHANG - Xichang, China. (28.25N, 102E)

## CHANGES TO THE DATABASE:

On advice from Astrium, the thruster-related anomalies listed in 2001 to the ASTRA 2B and NILESAT 102 satellites have been removed following confirmation that none took place.

The anomaly to ASTRA 1KR earlier reported on the database does not involve a reaction wheel. Instead it involves an antenna issue. Ascend understands that there is a potential for a small insurance loss for this anomaly.

The impact date for the SMART-1 space probe was 3rd September and not 4th September as previously noted.

PROTOSTAR has been removed from the database as PROTOSTAR 1 is the same satellite.

## NEXT MONTH'S ISSUE AND A NOTE TO OUR CLIENTS

We will be publishing a full review of the year and the results of our predictions for 2006. In the following issue we will have the predictions for 2007. It looks as if it is going to be a rough year but 2008 should be better.

In January, we will be sending out a web questionnaire to our SpaceTrak database clients to fill in about what you would like to see in the database. As a bit of encouragement, there is a prize draw for those that complete it!

### **GOOD WISHES TO ALL OF OUR CLIENTS, READERS, CONTACTS, FRIENDS AND FAMILY**

It is that time of year when party celebrations and family get-togethers occur. A special thought should be made for those who will be missing someone this year – either through bereavement, illness, lost love, or through physical separation. Let us hope that they can enjoy this time as best they can.

On a happier note, Ascend, and its parent company Airclaims, officially gives all of their clients their Seasons Greetings.

The space team, David Todd and Phil Hylands, and the space sales team, Derek Goddard and Faisal Majid, would, on a more personal level, like to wish you all:

Have a Very Merry Christmas and have a Happy and Prosperous New Year! God bless us every one!