



Department of Space and Climate Physics Newsletter

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Covers events between 1st September 2005 and 30th November 2005

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General

The Centre for Polar Observation & Modelling (CPOM), and its associated staff, moved from Dept. of Space & Climate Physics to Dept. of Earth Sciences on 1 Nov 2005.

Promotions

Prof. Duncan Wingham - Head of Department of Earth Sciences, UCL – 1 Nov.

John Rose – Head of Mechanical Workshop - 1 Dec.

New Staff Members

Claire Foullon - Space Plasmas Group as a Research Fellow from 7 Nov. 2005.

Paul Kuin - Solar and Stellar Physics Group.

Sue Prosser – Kitchen.

Visitors

Zsofia Bebesi from KFKI, Budapest visited to work on Cassini data at Titan (funded by EuroPlanet - 7-11 Nov.)

Pascal Demoulin from Paris Observatory (France) and Bernhard Kliem from the Astrophysical Institute, Potsdam (Germany) visited the solar group - 24-28 Oct.

Matthias Foerster from MPE Garching, (Germany) visited the Space Plasmas Group for discussions on Cluster PEACE data studies.

Lucinda Lane (6th former) worked with Hourri for 3 months.

30 UCL undergraduates visited on MSSL 30 Nov.

Prizes and Awards

Andrew Fazakerley was honoured with a special award for his contribution as Cluster PEACE PI on the occasion of the 5th Anniversary of Cluster in Space.

Members of Space Plasmas Group - A.N. Fazakerley, C.J. Owen, I.V. Alexeev, Y.V. Bogdanova, R.C. Fear, P.D. Henderson, H. Khan, A.D. Lahiff, B. Mihaljic, S. Szita, G. Watson, R.J. Wilson - received awards from the European Space Agency (ESA) in recognition of the outstanding contributions they made to Cluster's exploration of Geospace.

Members of MSSL received Group Achievement Awards from the National Aeronautics and Space Administration (NASA) in recognition of their contribution to the success of Cluster exploration of Geospace.

Grants and Contracts Awarded

MSSL has been awarded contracts from ESA for a further 2 years to continue provision of in-flight maintenance of XMM Newton OM and RGS instruments (100k Euro).

PPARC has approved the Solar-B EIS Post-launch support grant to MSSL (£1,100k - Lousie Harra – PI).

Climate Physics - £40k from September 2005 to March 2006 to further develop EuroTempest, a new on-line weather service to provide real-time damage forecasts for winter storms affecting the UK and six other European countries. Sponsored by GE Insurance Solutions, Benfield and and Royal & SunAlliance (Mark Saunders - PI).

PPARC's small award grant £2,686.75 for the 'Sky is no limit!' 2006 - science week festival (Lucie Green).

The Smart X-ray Optics consortia was awarded a Basic Technology Grant from Research Councils UK. MSSL has responsibility for the production of test support equipment and overall management of the project (£210k to MSSL).

EuroPlanet awards - Hazel McAndrews (to MPS, Lindau), Gethyn Lewis (to IRF Uppsala, Sweden)

Telescope/Satellite Time Awards/Proposals

Space-based telescope time awards:

Roberto Soria was awarded a Chandra grant for a successful time application in Cycle 7.

Mission Status and Developments

Aurora/ExoMars - Andrew Griffiths (in collaboration with our German, Austrian and Swiss partners) has completed the first part of the PanCam instrument information package. Along with the IIPs for the other Pasteur instruments, it will be used to define the interface requirements during the current ExoMars rover phase B1 industrial study. Hot news – ExoMars approved by ESA ministerial meeting on 6 December. We're going back to Mars!

Cassini-Huygens - Several flybys including Titan, Tethys, Hyperion, Dione, Rhea in this period – good data from all and summary plots distributed to the CAPS team. Titan seminar meeting at Imperial College - 16-17 Nov. Many MSSL-led and collaborative studies underway. Hazel visited MPS Lindau to instigate collaborative studies.

Cluster - ESA organised a Cluster and Double Star Symposium to celebrate the 5th anniversary of Cluster in space - 19-23 Sept. and look forward to several more years of operations. In a prelude to the Cross-Scale mission, this summer saw the first ever multi-scale space plasma measurements; the 4 Cluster spacecraft simultaneously measured the thickness of the magnetotail current sheet, and examined its structure in the plane of the sheet over much longer distances, as the sheet thinned, thickened and reconnection occurred during substorms. The PEACE instruments continue to work well. Work on preparation of ESA's Cluster Active Archive continues. The PEACE team (PI institute MSSL) held a team meeting in Paris - 26-28 Sept. Gill Watson and Andrew Fazakerley attended the Science Operations Working Group meeting in Paris - 17 Nov.

Cross-Scale - Following activity over the summer in which MSSL played a leading role in defining the science requirements, ESA has issued an ITT for 'SYSTEM DESIGN OF THE CROSS-SCALE TECHNOLOGY REFERENCE STUDY'. This multi-spacecraft mission concept is a possible candidate for the ESA Cosmic Visions 2015-2025 Program (MSSL contact: Chris Owen).

eSDO Phase A Review - We presented the results of our Phase A work on the MSSL-led eSDO project to a PPARC peer review panel on 28 November. These were generally well received though a few detailed changes of emphasis in the algorithm set have been recommended. We will also prepare and submit an outline proposal for post-launch operations for the SDO mission in the UK following its planned launch in August 2008.

Double Star - China's first purely scientific space mission. The Double Star spacecraft are both now in their second year of operations and our instruments are working well. A special issue of *Annales Geophysicae* devoted to Double Star First Results was published on 8 November (Vol 23, Issue 8). Ongoing research was

reported at a Science Working Team meeting in Beijing (10 Nov.). Gill Watson and Andrew Fazakerley attended the Interface, IWG and SWT meetings in Beijing (8-10 Nov.).

KuaFu - Plans are being laid for a Chinese space plasma mission to follow Double Star, known as KuaFu. MSSL is participating in the mission design study and developing an instrument concept. KuaFu passed through a competitive selection process and now has China National Space Agency (CNSA) support for further study of the mission concept. Several UK hardware groups have an interest, and the wider UK space plasma science community recently expressed support for the mission at a community meeting.

Gaia-RVS - The Gaia-RVS consolidation programme (ESA contract) in support of both Alcatel and Astrium primes has now come to a successful conclusion and final reports have been submitted to all interested parties. ESA have congratulated MSSL for the quality of work on this programme, which included the management and technical lead of 4 external groups. Thank you to all the team (and partners!) for their considerable efforts and understanding in support of this programme. The successful prime should be announced in early 2006.

Mars Express - ASPERA-3 is operating well at Mars. Yasir's paper on anomalies was accepted by Icarus.

MEMO (Mars Escape and Magnetic Orbiter) – AJC attended a team meeting for this cosmic visions candidate - 20 Nov.

Moses - Due to scheduling problems at the range, the Moses launch has now been put on hold until 27 January 2006 at the earliest.

Solar-B EIS - successfully passed the spacecraft level vibration tests in October. The next major activity is the spacecraft thermal vacuum test in March 2006.

Venus Express - Successful launch on 9 Nov. ASPERA-4 commissioning tests 9-11 Dec.

News from the Groups

Catherine Brocksopp reports from the Astrophysics Group:

Swift has many talents, only one of which is detecting gamma-ray bursts. Another of its strengths is the detection and follow-up of black hole X-ray transients in outburst.

X-ray transients are binary systems in which a star and a black hole orbit each other. Material passes from the star to the black hole, spiralling through an "accretion disc" before reaching the black hole itself. This process is not smooth and constant; instead we see long periods of quiescence and occasional moments of high accretion, when the disc becomes very bright in both optical and X-ray light - these "outbursts" have been well-documented for the past ~40 years. More recently it has been discovered that radio-emitting jets are ejected from the centre of the disc at certain phases during the outburst, depending on the spectral behaviour of the accretion disc.

Between the ~40-50 black hole systems we know of in our Galaxy, we might typically detect 1 or 2 outbursts each year. Some systems enter multiple outburst phases; others have only ever been seen once.

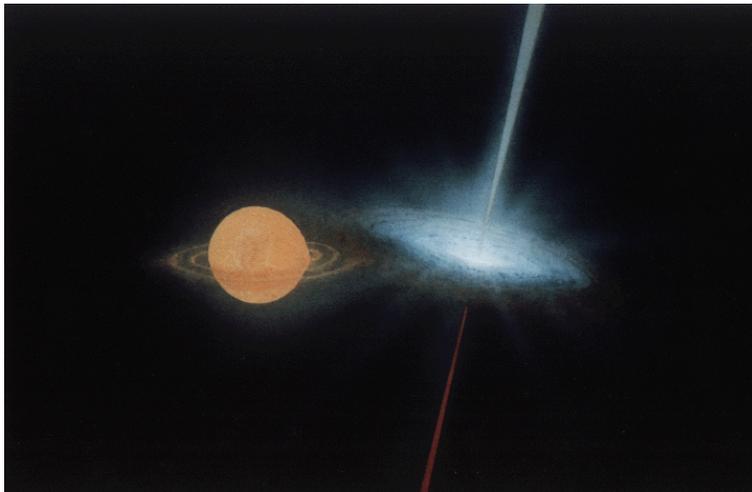
In 2005 one of these outbursts took place in a system known as GRO J1655-40. This is a famous source, most notably for having jets moving with "apparent superluminal

motion" - with a velocity of $0.9c$, special relativistic effects cause the approaching jet to appear much faster. The 2005 event was less energetic than previously but provided a great opportunity for Swift to monitor the outburst at gamma-ray, X-ray, ultraviolet and optical wavelengths - resulting in an unprecedented dataset.

The detailed lightcurves (plots of flux against date) from the three Swift instruments initially appeared to be completely independent, all showing very different behaviour. But by comparing subsections of the data, it soon became clear that the behaviour of the X-ray emitting region was a combination of that of the gamma-ray and optical-emitting regions. This means that the X-ray behaviour depends on whether it is in a jet-producing state or not, and is actually the superposition of emission from two different regions of the system. This has been determined before from study of the X-ray spectra, but this is the first time anyone has been able to deduce the same information from the lightcurves.

Follow-up work now involves analysing some radio observations in conjunction with the Swift data....

...and of course waiting for the next source to go into outburst.



This artist's impression shows the various components of a black hole X-ray transient - material passes from the star to the black hole via the accretion disc. Under certain conditions, which are not yet well-understood, material is ejected away from the disc via long, collimated jets.

Publications - Refereed

S & CP authors are shown in upper case.

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Invited Talks and Lectures (National and International)

A.Coates – Talks at 4th London Space Plasma Seminar series, Imperial College, 16 Nov 2005: (1) A CAPS view of Saturn's magnetosphere near the orbit of Titan, (2) Saturn/Titan interaction from CAPS-ELS.

Talk 'Water loss at Mars: preliminary results from ASPERA-3' at UCL/Birkbeck APEX seminars, 25 October 2005.

Andrew Fazakerley – "Magnetotail Science with Double Star and Cluster" at the Asia Oceania Geosciences Society on 21 June 2005.

A.Griffiths – Talk 'ExoMars payload' at UCL/Birkbeck APEX seminars, 15 Nov. 2005.

Chris Owen – "Cluster Observations of Flux Transfer Events" at the Cluster and Double Star Symposium - 5th anniversary of Cluster in Space, ESTEC, Holland, 20 Sept 2005.

Mark Saunders - Hurricanes Katrina and Ivan: how unusual and well predicted? International Union of Marine Insurance Conference, Amsterdam, The Netherlands, 20 Sept. 2005. (Keynote Address).

North Atlantic hurricane activity and global warming. NOAA/RPI Workshop on Assessing, Modelling and Monitoring the Impacts of Extreme Climate Events, Bermuda, 13-14 Oct. 2005.

Hurricanes and climate change. Benfield GAP Day, London Underwriting Centre, 17 Oct. 2005.

Hurricane activity – what does the future hold? DEFRA (Department for the Environment, Food and Rural Affairs) meeting on Tropical Storms, London, 9 Nov. 2005.

Gulf hurricane activity: what does the future hold? Benfield Corporate Risk 2005 Hurricane Symposium, Houston, USA, 16 Nov. 2005. (Keynote Address).

Hurricane activity and climate change. Hedge Funds World Conference, Zurich, Switzerland, 21 Nov. 2005.

Using hurricane forecasts to adjust peril model loss probabilities. Lighthill Risk Group Seminar, London Underwriting Centre, 28 Nov. 2005.

Roberto Soria - Marshall Space Flight Center, on the search for multiwavelength counterparts to ultra-luminous X-ray sources.

Conference and Workshop Presentations (National and International)

Members of the Astrophysics Group gave presentations at:

- Escorial meeting (Spain, 26-30 Sept.)
- Six Years of Chandra, workshop in Cambridge, MA

Members of the Planetary and Plasma Physics groups gave presentations at:

- 37th annual meeting of Division of Planetary Sciences of the American Astronomical Society, Cambridge, UK, 4-9 Sept. 2005.
- Cluster and Double Star Symposium, ESTEC, 19-23 Sept. 2005.
- PEACE team meeting in CETP, St Maur, Paris, 26-28 Sept. 2005.

- SPENVIS & GEANT-4 workshop, Brussels, 3-7 Oct. 2005.
- 5th European workshop on astrobiology, Budapest, 10-12 Oct. 2005.
- RAS Meeting on the 'Sun-Earth Connections' on 14 Oct. 2005.
- Double Star SWT, China, 9-11 Nov. 2005.
- MIST, London, UK, 25 Nov. 2005.
- ISSI working group on Response of the Martian ionosphere/thermosphere to the solar radiation, solar wind and crustal magnetic fields, 2005.

Members of the Climate Physics group gave presentations at:

- Royal Meteorological Society 2005 Conference, Exeter, 12-16 Sept. 2005.

Press Releases

- 2 Aug. 2005 - Scientists weather a space storm to find its origin: MSSL scientists studied a huge eruption from its birth on the Sun to when it reaches Earth.
- 4 Oct. 2005 - Surrey Scientists observe rare celestial event: The MSSL Cluster and Double Star PEACE instruments detect gamma rays from an exploding magnetar. This reported a study, based on Cluster and Double Star PEACE data, which was also two ESA news stories: <http://clusterlaunch.esa.int/science-e/www/object/index.cfm?fobjectid=37944>
http://www.esa.int/esaSC/SEMERY7X9DE_index_0.html
- 4 Oct. 2005 - Surrey Scientists observe rare celestial event.
- 17 Oct 2005 - Venus Express launch (PPARC, UCL, MSSL); PPARC press conference presentation.
- 19 Oct. 2005 - To Venus with Love.
- 09 Nov. 2005 - On our way to Venus!
- 16 Nov. 2005 - UVIT Kick-off Meeting at MSSL.
- 29 Nov. 2005 - MSSL Instrument sees 10 years in space.
- 26 Oct. 2005 - Hurricane modelling methodology breakthrough paves way for better informed risk and reinsurance buying strategies, (Mark Saunders).(<http://tsr.mssl.ucl.ac.uk/docs/ReMetricsTSR26Oct2005.pdf>)

Media Broadcasts and Features

Andrew Coates

- Deep Impact: BBC1 1 O'Clock News, 7 Sept. 2005.
- Solar activity and effects: BBC News 24 13 Sept. 2005.
- Venus Express: Sunday Times 9 October 2005, BBC 4 Sky at Night, BBC Breakfast, BBC World Service ('Science in Action'), BFBS radio, Sky News, Independent, Metro, Mirror, BBC News online (x2), BBC R4 Leading Edge, Canadian (CBC) radio 'Quirks and Quarks', BBC 3 Counties radio (x2), BBC Southern Counties radio (x2), Radio Mercury, BBC News 24 (x2), Surrey

Advertiser, ITV News Channel (x2), ITV 10.30 news, CBC radio 'As it happens', BBC R5.

- Mars close approach Radio Mercury, BBC News 24

Lucie Green

- Print: Aurora Masterclass feature in Sky at Night magazine (with Andrew Coates); Masterclass on the Sun in Sky at Night magazine; Article on Deep Impact mission and the UK involvement with the science published in PPARC's Frontier magazine.
- TV: Feature on Venus Express mission and demonstrations of the conditions on VEnus on the Xchange programme on Children's BBC; Feature on the Sky at Night programme on celebrating 10 years of SOHO and discussing the science highlights.
- Radio: Item on Venus Express mission on Radio Jackie.

Hina Khan

- Channel 5 News talking about the Venus Express launch - 9 Nov. 2005.

New Products

Global Drought Monitor for Humanitarian Relief. Launched at the UCL Futures launch event on 22 November 2005 and accessible at <http://drought.mssl.ucl.ac.uk>.

The Global Drought Monitor is a free internet application which monitors the severity of drought worldwide on an ongoing basis. The product will aid humanitarian relief by assisting warnings of potential food, water and health problems. The Global Drought Monitor will also benefit the general public, government and industry by improving awareness of droughts and their impacts. (Created by Benjamin Lloyd-Hughes and Mark Saunders).

Proposals Submitted

CREST proposal submitted on Hyperspectral Camera System to PPARC, Oct. 2005.

Outreach

On 9 November the Lab hosted a "Rocket & Fireworks Night" for over 60 Beavers and Brownies from Horsham and West Byfleet. The evening started with a introduction to rockets, followed by a series of rocket launches, some of which were made by the Beavers and Brownies. The Beavers and Brownies also got the opportunity to look at the Moon, Mars and other interesting Astronomical objects through telescopes set up and manned by Guildford Astronomical Society. The evening finished in style with a large fireworks display. This event was a great success and we received lots of positive feedback from parents and group leaders so "thank you" to everyone who was involved. (Ian Hepburn, Chris Brockley-Blatt & Tracey Poole)

Andrew Coates gave nine talks to university/regional astronomical societies and schools.

Lucie Green was invited to give an opening lecture at Nonsuch High School for Girls which has been made a Science Specialist School. The talk showed how science learnt in the classroom reveals the Sun's true nature. (29 Sept 2005)

Hazel McAndrews gave an assembly at a school in Farnborough. She spoke for 25 minutes on the Cassini-Huygens mission and nearly all of the 14-15 year olds were quiet - not bad for a Friday morning!

Tracey Poole visited several Brownie units in November to run 'Space and Stargazing evenings' which cover the Brownies' Stargazing Badge. Activities include a journey through the Solar System where the Brownies learn about the planets and the phases of the moon; a game based on the Greek mythology of 6 constellations; a craft where Brownies make their own Star Finders, and a chance to use the Star Finders outside if the skies are clear.

Other News

Louise Harra and Chris Owen convened an RAS Meeting on the "Sun-Earth Connections" on 14 Oct 2005. The theme of this meeting was to start to address some of the science that will be possible with the Solar Orbiter Mission. The meeting was well attended by members of both the Space Plasma and Solar communities.

The TSR (Tropical Storm Risk) seasonal forecasts for Atlantic and US landfalling hurricane activity run by the Climate Physics group again outperformed those issued by NOAA and other leading US groups for the active 2005 hurricane season.

The TSR (Tropical Storm Risk) web site received over 670,000 hits between 1 August and 31 October (a 170% rise on the same period in 2004).

Mark Saunders presented a lecture 'Storm tracking and forecasting' to the Halley Society at St Paul's School, Barnes on 23 Sep 2005.

Mark Saunders was one of four hurricane scientists worldwide invited to take part in a Hurricane expert elicitation session on multi-year hurricane activity organised by the company Risk Management Solutions in Bermuda -15 Oct. 2005.

Acknowledgements

Chris Brockley-Blatt and Sue Russell would like to thank everyone who contributed to the Children in Need sale. The total collected was £430.80 - with gift aid, this is worth £538.50.

Next Issue

The next issue of the Department of Space and Climate Physics Newsletter (Volume 3, Issue 4) will be published in March 2006. This will cover activities from 1 December 2005 to 28 Feb 2006.