STOP PRESS - Euclid Adopted

Mark Cropper and Richard Cole report that at its SPC meeting on 19-20 June 2012, ESA adopted Euclid as the second medium mission in its Cosmic Vision programme. Euclid was selected last October, and in the interim period the international agreements between the different countries involved in Euclid have been formalised. The adoption now authorises ESA to go ahead with the selection of a Prime Contractor, and moves the programme from the initial study phases to the implementation phase.

Euclid will investigate the nature of dark energy and dark matter, the little understood entities which appear to make up more than 95% of the Universe. Alternatively, it may be that the theory of gravity is incorrect on cosmological scales. In any case the science that Euclid will do will be profoundly important.
MSSL is responsible for one of the two instruments in Euclid, the visible imager, a 576 Mpix high spatial-resolution camera, which will be the 2nd largest camera in space after the Gaia one. We lead a team including institutes in France, Italy and Switzerland. Euclid launch is early 2020.

Euclid: An expanded view of the focal plane array for the visible imager: this instrument also has a shutter, calibration unit and digital processing and instrument control electronics.

There were a number of press releases to mark this event, for example

http://www.esa.int/esaSC/SEMZS3BXH3H_index_0.html

Two new staff have already joined the Euclid team at MSSL: Dr Sami Niemi is the VIS instrument scientist, and Jamie Denniston is the VIS System Engineer. A project manager, Dr Sabrina Pottinger, will start next month, initially assisting Richard Cole.

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Contents
New Staff Member .................................................................................................................................3
Prizes and Awards .................................................................................................................................3
Appointments .........................................................................................................................................3
Visitors .................................................................................................................................................3
Grants and Contracts ............................................................................................................................3
Proposals ...............................................................................................................................................3
Mission Status and Developments .......................................................................................................3
Publications – Refereed ..........................................................................................................................4
Outreach ...............................................................................................................................................9
Other News Items/Activities ................................................................................................................9
Press Releases.......................................................................................................................................9
Media Broadcasts and Features ...........................................................................................................9
Next Issue............................................................................................................................................10
New Staff Member
Anne Wellbrock has started as a Research Assistant in the Planetary Science Group.

Prizes and Awards
Andrew Fazakerley was formally awarded the Chapman medal at NAM 2012.
Congratulations to Chris Arridge who was awarded a Royal Society University Research Fellowship from October 2012, and a newly-created academic post in the Planetary Science Group following this.

Appointments
Lucie Green has become a member of the Science Museum Advisory Board.
Colin Forsyth stood down from MIST Council having served a 3-year term.

Visitors
Licia Ray from UCL and Lewis Dartnell from Leicester University both gave seminars when they visited the Planetary Science Group.
The Space Plasma Group were visited by Kyle Murphy of the University of Alberta for two weeks in April. Kyle was a guest of Andrew Walsh, who had visited Alberta in 2008. They were partially funded by an RAS grant to aid international collaboration.

Grants and Contracts
Lunar Pancam: We have been awarded an ESA contract to study the adaptations required to use the ExoMars Pancam for the proposed lunar lander (instrument to be called L-CAM). This 6-month study will examine the differences in the radiation and thermal environments. We have been responding to ESA queries relating to their recent call for Declarations of Interest for L-CAM, and are working towards providing the required information by the due date in early June.

Chris Arridge has been awarded an RAS undergraduate bursary to support Tim Culwick (U. Oxford) for a four-week placement during this summer. He will work on retrieving atmospheric water vapour content and profiles using ExoMars PanCam.

Proposals
Lunar PanCam study, ESA – submitted.
Andrew Fazakerley supported work on the NITRO proposal for an ESA S-Class mission, and also set out to lead the AUREX proposal, but terminated that activity due to lack of UK funding for S-missions and for lack of time due to an unexpectedly early new baby.

Mission Status and Developments
Cassini – The CAPS instrument was successfully turned on again in mid-March and worked successfully until the end of the reporting period, gathering excellent data from three Enceladus encounters and a Titan encounter. The Planetary Science group hosted the 43rd CAPS team meeting on 31 May-1 June with over 35 international attendees. MSSL-led science talks were given by Coates (2), Wellbrock, Arridge (for Jones), Arridge, Jasinski, Walsh, Coates (for Jones), and operations talks by Gilbert, Lewis and Arridge. Unfortunately another on-board anomaly involving CAPS occurred on 2 June and the instrument has been off since. The scientific output from CAPS at MSSL continues to be excellent (see publications and presentation lists).

Cluster – All four Cluster spacecraft and all four PEACE instruments continue to operate well.
A Cluster Science Operations Working Group meeting was held on 15/6 March. Andrew Fazakerley participated.
A Cluster Cross-Calibration Workshop was held at UCL on 17-19 April. It was organized by the PEACE team from MSSL, with excellent support from the MSSL General Office. Presentations were given by Iryna Rozum and Natasha Doss; Andrew Fazakerley also participated.
The Cluster Active Archive Annual Operations Review meeting was held at ESTEC on 30/31 May. Presentations were given by Iryna Rozum and Natasha Doss.

ExoMars – Some positive decisions by ESA during the period to keep the programme going temporarily, and involving the Swiss contribution to PanCam. ExoMars is still awaiting final go-ahead and positive budget decisions with a re-formulated programme involving significant Russian collaboration.

JUICE – The JUICE mission to Jupiter’s moons Europa, Ganymede and Callisto, the first orbiter of an icy satellite (Ganymede), was selected as ESA’s first ‘L’ mission on 2 May by the ESA SPC, following SSAC recommendation. Andrew Coates continued ESA Science Study Team (SST) activity with several inputs during this period culminating the last few years of ESA SST membership, including attending the final Science Study Team meeting on 29 May. Several media appearances
followed the decision on 2 May. The next stage for MSSL activity will begin with the payload AO expected in late June. We intend to propose instrumentation as PI and co-I on the mission.

KuaFu – The ESA KuaFu Science Study Team (which includes Andrew Fazakerley) worked on and delivered the science case for the Yellow Book document during the reporting period. The collaboration included a meeting at ESTEC on 20 April and numerous telecons, as well as lots of writing!

L-Depp – MSSL are part of the L-DEPP (Lunar Dust Environment and Plasma Package) study for the proposed ESA funded Lunar Lander mission, which is nearing completion. ESA have recently released a Call for Declaration of Interest (DOI) for science payloads on the mission and MSSL will potentially propose a combined electron and ion analyser as part of the dust package. The baseline sensor is a modified version of the Solar Orbiter EAS with a single analyser head, modified to be able to make measurements of both electrons and ions. A miniaturised analyser based on the ChaPS sensor built for TechDemoSat is also being considered.

Solar Orbiter - Members of MSSL’s PI team for the Solar Orbiter SWA investigation went to Toulouse to meet with consortium colleagues from France, Italy and the USA at the 10th SWA team meeting (5-7 March). Latest developments of the SWA hardware were reviewed, together with the status of the consortium as it heads towards ESA’s formal “Preliminary Design Review” (see below). Chris Owen (SWA Principal Investigator), Chris Brockley-Blatt (SWA Project manager), Barry Hancock (SWA Systems Engineer) and Dhiren Kataria (SWA Instrument Scientist) represented MSSL at the meeting.

The MSSL SWA PI team hosted Giorgio Bagnasco, the ESA SO payload manager for a meeting to discuss current open issues on 18 April.

Chris Owen attended the signing of the spacecraft prime contract between ESA and Astrium UK, which occurred as part of the ‘50 Years of UK in Space’ conference at the Science Museum on 26 April. The Business Secretary, Vince Cable, was also in attendance.

Chris Owen was interviewed on plans for the Solar Orbiter mission by the Discovery Channel (see Media Coverage below).

The MSSL SWA team hosted the SWA DPU team from AmD in Rome on 30 April, in order to perform the first test of DPU/EAS interface.

The SWA team worked hard in order to deliver successfully the required documentation for the SWA Preliminary Design Review on 8 May. The SWA team gathered in Noordwijk for a pre-“PDR Kick-off” team meeting on 23 May, and presented the status of the investigation to the review panel at the “PDR Kick-off” meeting itself at ESTEC on the following day.

Chris Owen participated in the Remote Sensing Working Group Meeting held at MSSL on 15 May, representing the SWA consortium and the other in-situ instruments.

Venus Express and Mars Express – Operations and scientific output continue (including a paper in Science, see publications list).

Publications – Refereed Published

(Astrophysical Instrumentation and Methods), 10.1007/s10686-011-9251-4


Yershov, V.N., V.V. Orlova, A.A. Raikov, Correlation of supernova redshifts with temperature.
fluctuations of the Cosmic Microwave Background”, Monthly Notices of the Royal Astronomical Society, Vol. 423, p.p. 2147-2152 (2012). In this paper, we found a statistically significant correlation between supernova redshifts and positive temperature fluctuations in the cosmic microwave background as mapped by the 7-year WMAP data. The anomaly with the amplitude $+29.9 +4.4$ micro-Kelvin (for the redshifts $z$ ranging from 0.5 to 1.0) is larger than the theoretical estimates for the distortion of the cosmic microwave background due to the integrated Sachs-Wolfe effect (dark energy).

http://arxiv.org/abs/1205.5139


Invited Talks and Conferences

- The biannual PEACE Team Meeting, organised by PEACE PI Andrew Fazakerley and Branislav Mihaljic of MSSL, was held at the lab in a three day event from 6-8 March. Delegates from UK, Europe and North America took part. Yulia Bogdanova, Natasha Doss, Roger Duthie, Andrew Fazakerley, Colin Forsyth, Branislav Mihaljic, Kirthika Mohan, Iryna Rozum and Andrew Walsh gave presentations.

- **RAS Specialist Discussion** Colin Forsyth and Adam Masters co-convened an RAS Specialist Discussion Meeting with colleagues from the University of Leicester. Entitled “Magnetosphere-Ionosphere coupling and auroral emissions at planets in our solar system and beyond” it was held on 9 March at Burlington House, London. The meeting explored coupling processes throughout the solar system through both observational and modelling studies. The Planetary Science group contributed:


- Royal Astronomical Society, National Astronomy Meeting (NAM), Manchester, 27-30 March:

  - Bernhard Kliem co-organised the session, “Magnetic Reconnection in Space and Astrophysical Plasmas” and gave an invited talk entitled, “Structure and Instability of Active-region Magnetic Fields”.

  - Chris Arridge, Geraint Jones, Yudish Ramanjooloo and Tom Nordheim attended and presented four presentations. The planetary science group contributed to a further two talks:
    - Jones, G.H., H. Osborn, Y. Ramanjooloo, The Sodium Tails of Near-Sun Comets;
    - Ramanjooloo, Y., G.H. Jones, A.J. Coates, M. Owens, The structure of the inner heliosphere as revealed by amateur astronomers’ images of comets;


  - Chris Owen and Andrew Fazakerley also attended NAM, along with Colin Forsyth and Andrew Walsh. All four presented work from the Space Plasma Physics group including new work on auroral physics and the structure of Earth’s magnetotail, as well as the upcoming ESA missions SWARM and Solar Orbiter. Apart from presenting his own work, Colin Forsyth also co-convened the General MIST session.

- Planetary science group contributed to 2 presentations at the 43rd Lunar and Planetary Science Conference, 19-23 March, at The Woodlands, Texas:

  - Li, R.; Li, D.; Lin, L.; Meng, X.; di, K.; Paar, G.; Coates, A.; Muller, J. P.; Griffiths, A.; Oberst,
J.; Barnes, D. P., ExoMars: Pre-Launch PanCam Modeling and Accuracy, LPI Contribution No. 1659, p.2437;

- European Geosciences Union, Vienna, 22-27 April:

Graziella Branduardi-Raymont (Astrophysics Group) gave a talk on the AXIOM concept mission, for global X-ray imaging of the Earth's magnetosphere. The talk also mentioned the ongoing development of an ESA Small Mission proposal, due in June and led by MSSL, for X-ray imaging of the Earth's cusps.

From the Planetary Science Group, Andrew Coates attended and gave a solicited talk:


Garnier, P., J.-E. Wahlund, M. Holmberg, A. Eriksson, S. Grimald, M. Morooka, G. Gustafsson, P. Schippers, D.A. Gurnett, S.M. Krimigis, N. Krupp, A. Coates, and F. Crary, Mapping energetic electrons in the magnetosphere of Saturn with the Cassini RPWS Langmuir Probe;


Jarvinen, R., A.J. Coates, T.L. Zhang, S. Barabash, A. Fedorov, and E. Kallio, Can magnetic connectivity be used to interpret Venus Express photoelectron observations? - A global hybrid modelling study;

Wei, Y., M. Fraenz, E. Dubinin, A. Coates, S. Barabash, and T. Zhang, A comet-like ionosphere at Venus in tenuous solar wind;


From the Plasma Physics Group, Colin Forsyth gave an invited talk on multi-spacecraft observations of auroral acceleration processes in Earth's magnetosphere and Roger Duthie presented his own work on substorm related magnetotail dynamics as a poster.

- Graziella Branduardi-Raymont attended the Europlanet workshop on ‘Aurora of the Giant Planets’ in Santorini, Greece (23-25 May) and gave a talk on the search for X-ray aurorae on Saturn.

- Andrew Coates presented an invited talk at the 5th Isradynamics conference, Jerusalem, Israel, 29 April-7 May: Coates, A.J., Pickup ions in the solar system. He also gave several invited seminars during the period:

Seminar at Imperial College London (Space and Atmospheric Physics) on ‘The comet-solar wind interaction: prospects for Rosetta’, 20 March;

Lecture on ‘Plasma measurements in planetary magnetospheres’ at Fusion Frontiers and Interfaces Workshop, Fusion Doctoral Training Network, York Plasma Institute, 21 March;

Seminar at Lancaster University ‘Comparative review of ion pickup at various solar system bodies’, 16 April.
Outreach

Chris Arridge gave talks on:
- “The Cassini-Huygens Mission to Saturn” at Cleethorpes and District Astronomical Society on 4 April;
- “Exploring the Solar System with Robots” at the University of Hull for the Yorkshire branch of the Institute of Physics on 19 April;
- “Strangers and Giants” at the University of Surrey for the Southeastern branch of the Institute of Physics on 2 May.

Chris also judged physics projects for the National Science and Engineering Competition at The Big Bang Fair, held at the National Exhibition Centre, Birmingham on 15 March and performed at Bright Club: Evil Genius at the Wilmington Arms on 17 April.

Andrew Coates talked on:
- “Oceans on Other Worlds” at Cody Astronomical Society, 6 March;

Lucie Green:
- gave a talk about the Sun as part of the Arts Catalyst's Kosmica event;
- took part in a Slooh's online broadcast of the annular eclipse, discussing the Sun and current research;
- with Libby Daghorn, Craig Theobald and John Coker ran activities for a group of students who visited from St Teresa's school.

Other News Items/Activities

Congratulations to Alan Brown and Kay Thi on their wedding, Amy and Neville Shane on the birth of their baby, Daisy, and Hannah and Andrew Fazakerley on the birth of their baby, Eleanor.

Jo O'Regan cycled from London to Paris on 9-12 May in aid of Barnardo's Children's Charity, raising £1,550.00 (£1,770.41 with gift aid) in total, with in excess of £1,000 raised from activities and donors at MSSL! Jo would like to thank each and everyone at MSSL again for their support and generosity for this event.

Thanks to all involved (office, kitchen) in much-appreciated arrangements for the successful CAPS meeting 31 May-1 June.

PoleCATS, the MSSL-based, student-led UKSEDS payload for a REXUS/sounding rocket launch successfully passed its preliminary design review. The launch is scheduled for March 2013.

Press Releases

Sergei Zharkov was interviewed by Will Gater for an article on sunquakes and solar eruptions in the July issue of Sky At Night Magazine


Media Broadcasts and Features

Chris Owen was interviewed by:
- the Discovery Channel’s “Daily Planet” program for an item which was broadcast on 4 May. An unofficial version of the interview was captured and can be found on youtube at: http://www.youtube.com/watch?v=v9uo_M7DkuU&list=UU9oplgdixPpMBAK0Shs5LSQ&index=1&feature=plcp
- “The Engineer” magazine for an article which can be found online at: http://www.theengineer.co.uk/sectors/aerospace/in-depth/stellar-line-up-the-solar-orbiter-mission/1012852.article

Andrew Coates and Geraint Jones:
- UCL news article on oxygen at Dione, 1 March, also BBC News, 2 March.

Andrew Coates:
- Info for the Observer on space weather, appeared 18 Mar
- Info for BBC News on Mars, Titan, Europa and Ganymede exploration, appeared 19 Mar
- Interview on BBC radio 5 live Drive, on extrasolar planets and planetary exploration, 28 March;
- Quoted on BBC News website 2 April on JUICE mission;
- Interview on Sky News, 17 April, on Discovery flight to Washington and future space exploration;
- Interview on JUICE selection BBC News, 19 April (for 2 May); used BBC1 6&10pm TV News, BBC radio 4 PM, BBC online, Guardian, FT (19 May);
- Info for Guardian on UK space strengths, 20 April used 27 April;
- Interview on Space X Falcon 9 launch, BBC World TV news, 22 May;
- Interview for Awesome astronomy podcast on JUICE, May.

Lucie Green:
- was one of the presenters of BBC’s Horizon programme on the Venus transit - looking at the history of this rare event and its modern
relevance to studies of our own solar system and beyond.

- took part in the media event related to Solar Orbiter and Astrium signing the contract to lead the build of the satellite.

Next Issue

The next issue of The Newsletter (Volume 10, Issue 2) will be published in September 2012. This will cover activities from 1 June to 31 August 2012.