



The Newsletter - Volume 8, Issue 3
17th January 2011

Covers events between 1st September 2010 and 30th November 2010

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General

Congratulations to Santiago and Laura Vargas on the arrival of Baby Jimena on 27 November.

MSSL Open Day

The MSSL annual open day took place on 4 September. The aims this year were for more of a community event, and although guided by a team from MSSL lead by Sheila Kanani, it was shaped by local residents and businesses. Practical demonstrations were held, such as comet making and the MSSL's Got Talent event with MSSLIans competing for audience votes. There were talks

and an "Astronomer's Question Time" which allowed people to quiz MSSL's scientists about outer space.

Astronomy items on show included a 3D model of the Sun, a working model of a Mars rover vehicle and its Lego counterpart, the Magic Planet and GeoWall, which allowed the surface of Mars to be explored in 3D. The Herschel roadshow was again a big hit with the public, particularly the IR camera.

There was a Treasure Planet Hunt, paint a planet, build a space tower and a competition for junior journalists to have their account of the day on a newspaper website. Entrepid space explorers could feel what it was like to walk on the Moon, or

another place with less gravity on the bouncy castle. Guildford Astronomical Society provided tours of their telescope and views of the Sun through a solar telescope, Cranleigh Lions had a fairground style stall and we had help on the day from London and Surrey STEM ambassadors. (These are volunteers who actively encourage young people to enjoy Science, Technology, Engineering and Mathematics (STEM) subjects, and inform them about the unique career opportunities that are available to them).

The day-time event was attended by over 450 people and ended with a bang when a rocket was launched by a member of the audience who won the chance to push the button. The fun didn't end there! Nearly 100 people enjoyed a wonderful evening event, "Space Rocks!" comprising space comedy, a BBQ, a barn dance and "smoking" welcome drinks!

Movie footage was taken throughout the day and played on the UCL Youtube channel and three newspaper articles about the Open Day appeared.

Sheila Kanani would like to thank everyone who contributed to the day's great success.

Visitors

The Space Plasma Physics group hosted a meeting of the Alfvén-MICE proposal team on 9/10 Nov.

Prizes and Awards

Lucie Green was named one of the top 10 UK scientists under 40 in Eureka, The Times' monthly science magazine. The Eureka 100 list celebrates the publication's first anniversary and is a guide to the most influential contemporary scientific figures in Britain. The list was compiled by a specialist panel, including academics and science journalists.

On November 19 the MSSL prize-giving ceremony was held. The winners were:

- Santiago Vargas Domínguez - Robert Boyd Award for outstanding scientific achievement;
- Sheila Kanani - Elizabeth Puchnarewicz Award for outstanding contribution to outreach;
- Samantha Oates – Alan Johnstone Award for outstanding achievement by a research student;
- Berend Winter – the John Raymont Award for outstanding commitment to MSSL's technology programme.

Louise Harra was awarded a Leverhulme International Network award. This will be used to run a series of workshops whose aim is to link what

happens below the Sun's surface to what is happening above.

Geraint Jones and Anne Wellbrock were awarded travel and subsistence funds by the conference organizers of the 5th Alfvén Conference on Plasma Interaction with Non-magnetized Planets/Moons and its Influence on Planetary Evolution.

Sheila Kanani was awarded an all expenses paid trip to the NASA Astrobiology winter school taking place in Hawaii in January 2011.

Appointments

Chris Brockley-Blatt has been appointed to the Equality and Diversity Steering Group of the Institution of Mechanical Engineers to advise on the Institution's policy on Equality and Diversity within engineering. She has also been asked to serve as the IMechE's liaison officer with the Institution of Engineering and Technology (IET) on their Space and Satellite Systems Network Committee.

Andrew Coates is UK national adherent to SCOSTEP (Scientific Committee on Solar-Terrestrial Physics (SCOSTEP) from Sept 2010.

Proposals Submitted

PLUMB (PLasma interaction with UnMagnetized Bodies), submitted to EU FP7 Space Call, Andrew Coates coordinator.

MSSL staff led or were contributors in the submission of several ESA M3 proposals:

The Planetary Science Group led:

- Caroline (main belt comet mission led by Geraint Jones),
- Uranus Pathfinder (led by Chris Arridge).

and contributed to AXIOM (magnetosphere imaging led by Graziella Branduardi-Raymont), LunarNet (led by Alan Smith), EVE (Venus balloon), MarcoPolo-R (asteroid sample return).

The Space Plasma Physics group led:

- Alfvén-MICE (led by Prof. Andrew Fazakerley and Dr. Matthieu Berthomier [LPP, France])
- IMPALAS (led by Prof. Chris Owen).

and is involved in the AXIOM (Planet-X), Uranus Pathfinder and Ravens proposals. Chris Owen, Lucie Green and Geraint Jones represented MSSL at the ESTEC briefing meeting on 29 Sept.

The Solar Group led:

- SPARK (Solar Particle Acceleration, Radiation and Kinetics): (Lead: Sarah Matthews);

and contributed to SolmeX (Solar Magnetism Explorer): Sarah Matthews (Lead: Hardi Peter, MPS-Lindau); SAGE: Stellar and Galactic Environment Survey: Sarah Matthews (Lead: Martin Barstow, Leicester); HiRISE (High Resolution Imaging and Spectroscopy Explorer): Colin Forsyth, Lucie Green, Louise Harra, Sarah Matthews, David Williams & Sergei Zharkov, Lead: Luc Dame; Solar-C/LEMUR (Large European Module for Solar Ultraviolet Research): Len Culhane, George Doschek, Lucie Green, Louise Harra, Bernhard Kliem, (Lead: Luca Teriaca, MPS-Lindau)

Within the European Commission 7th Framework Programme (FP7) a proposal was submitted answering "Space Call 4" FP7-SPACE-2011-1. The proposed collaborative network eHEROES (Environment for Human Exploration and Robotic Experimentation in Space) is led by Giovanni Lapenta (KU Leuven, Belgium). MSSL participants: Lidia van Driel-Gesztelyi (Workpackage lead), Louise Harra (MSSL lead), Sarah Matthews, Lucie Green, Chris Owen, Andrew Fazakerley, Chuan Li.

Telescope/Satellite Time Awards/Proposals

Nick Seymour and Mat Page were awarded 27 and 5 hours respectively on ESA's Herschel Space Observatory to obtain far-infrared observations of distant, powerful supermassive black holes.

Mission Status and Developments

Cassini - ELS working well. A spacecraft safing event due to a bit flip meant that data were missed for a few days in November: all fine now. ESA SPC approved funding for UK Cassini operations until 2014, review 2012. Many papers and presentations at scientific meetings (see lists). Andrew Coates and Lin Gilbert attended the CAPS meeting in Annapolis, MD, Nov 17-19. LKG presented on ELS operations, AJC presented 5 science talks (1 AJC, 2 GHJ, 2 AM).

Cluster – In November, ESA agreed to continue funding operations of the PEACE instruments on Cluster, extending the mission to 2014 with a mid-term review in 2012. Cluster continues to take exciting new data and the PEACE instruments are in good health.

EJSM – Instrument development and preparations.

EGSM – Instrument development and preparations for instrument proposals, are continuing. Proposal meeting via Webex, meeting of funded UK teams with UK space agency on 26 Nov on status of activities (attended by Andrew Coates, Dhiren Kataria, Rob Gowen).

ExoMars - EXOC meeting attended by Craig Leff and Barry Hancock, 28 Oct. Hardware meeting at DLR, 23/24 Nov attended by several people from MSSL.

Solar Orbiter - Chris Owen, Chris Brockley-Blatt and Barry Hancock represented the SWA PI group at the NASA Science Requirements Review and Systems Definition Review at NASA/GSFC during the week of Sept 13. The team passed the review without problem.

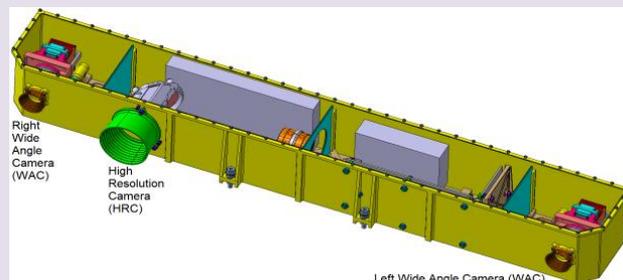
There was a full team meeting of the SWA consortium at the University of Pierre and Marie Curie in Paris, 16-18 Nov, led by the MSSL PI group. Andrew Fazakerley, Dhiren Kataria and Chris Owen also attended a meeting of the Solar Orbiter In Situ Working Group on the 19 Nov.

Venus Express and Mars Express – Instruments working well.

News from the Imaging Group

Mars on Earth

Peter Yuen was awarded Graduate School funding to visit China to conduct experiments with the ExoMars Panoramic Camera (Pancam). These included capturing stereo and high resolution images using two Wide Angle Cameras (WAC) and one High Resolution Camera (HRC).



From Hong Kong, Peter travelled to Xi'an in mainland China. This is the ancient city where for over 2000 years the famous trade route, The Silk Road, ran westwards to destinations in India, Pakistan and even to Rome and where the Terracotta Warriors are buried. An overland trip to Lhasa followed and Peter spent 3 days here acclimatizing to the high altitude at 3,490m before travelling to Everest Base Camp. The test sites, Everest Base Camp at 5,545m (18,192ft) above sea level and the nearby Himalayan regions, were chosen for their similarity to the conditions on Mars with a thin atmosphere, 18% daytime humidity, temperatures between +46°C at noon and -20°C wind chill at night and their extreme daily weather variations.

Peter spent four fully-packed days in the region during which he endured the biting high altitude winds which feel as if they are cutting through to the bone. He did however managed to capture successfully many useful images according to ExoMars Reference Surface Mission which included one WAC 12 geology filters imaging sequence; and 2, 6, 8 & 12 mast positions WAC stereo colour filters images timeline sequences.



This image shows the true "Mars on Earth" - a magnificent landscape which has been carefully preserved by local people whilst the images below show the PanCam Wide Angle Cameras (WAC) and High Resolution

Camera (HRC) stereo and high resolution images of Mount Everest.



Publications – Refereed

Published

- Achilleos, N., P. Guio, C. S. Arridge, N. Sergis, R. J. Wilson, M. F. Thomsen and A. J. Coates, Influence of Hot Plasma Pressure on the Global Structure of Saturn's Magnetodisk, *Geophys Res Lett.*, 37, Issue 20, CitelD L20201, doi: 10.1029/2010GL045159, Oct 2010.
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- Coates, A.J., Ion pickup at comets: comparison with other unmagnetized objects, in *Pickup ions throughout the heliosphere and beyond: proceedings of the 9th International Astrophysics Conference*, eds. J. le Roux, G.P. Zank, A.J. Coates and V. Florinsky, AIP conference proceedings 1302, p213-224, Dec 2010.
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- Green, L.M., Interview with David Willetts MP, *Astronomy and Geophysics*, volume 51, p.12-13.
- Impiombato, D., Zampieri, L., Falomo, R., Grisé, F., and Soria, R., Optical variability of the ultraluminous X-ray source NGC 1313 X-2, *Astronomische Nachrichten*, accepted Nov 2010 (arXiv1011.2043).
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- G.P.Zank, A.J.Coates and V.Florinsky, AIP conference proceedings 1302, p225-230, Dec 2010.
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In press

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- Cousins, C.R., A.D. Griffiths, I.A. Crawford., B.J. Prosser, M.C Storrie-Lombardi, L.E Davis, M. Gunn, A.J Coates, A.P Jones, J.M Ward, Astrobiological considerations for the selection of the geological filters on the ExoMars PanCam instrument, *Astrobiology*, in press, Oct 2010.
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- Harra, L. K., Mandrini, C.H., Dasso, S., Gulisano, A.M., Steed, K., & Imada, S.. The solar source of a magnetic cloud using a velocity difference technique, *Solar Physics*.
- Steed, K., Owen, C.J., Demoulin, P., & Dasso, S., Investigating the observational signatures of magnetic cloud substructure, *J. Geophys. Res.*
- Tao, X., R.M. Thorne, R.B. Horne, S. Girmald, C.S. Arridge, G.B. Hospodarsky and A.J. Coates, Excitation of electron cyclotron harmonic waves in the inner Saturn magnetosphere, *J. Geophys. Res.*, in press, Sep 2010.

Publications - Non-refereed

Published

- Phillips, K. J. H., Signature of Solar Axions, in *Proceedings of the Axion-WIMP 6th Patras Workshop*, Zurich, Oct. 2010.

In Press

- Young, D.T. and A.J.Coates, Cassini Plasma Spectrometer Explores Saturn’s

Magnetosphere, Space Research Today (COSPAR information bulletin), in press, 2010.

Invited Talks and Conferences

Roberto Soria and Missagh Mehdipour gave talks at "New Results in X-ray Astronomy 2010," Durham, 6 Sept.

The Solar Plasma Spectroscopy Conference was held at the DAMPT, Cambridge, Sept 13-15. Len Culhane gave a talk entitled "The role of XUV and Soft X-ray observations in understanding the solar corona" and Louise Harra contributed with the talk "Using spectroscopy to understand the source of coronal mass ejections". Kenneth Phillips gave a talk entitled "Importance of Iron in solar physics".

Branislav Mihaljcic attended the Spacecraft Charging and Technology Conference, Albuquerque, USA, 20-24 Sept, and presented a poster.

On 23/24 September, scientists gathered at the Royal Irish Academy (RIA) for a specialist discussion meeting on transient phenomena in the universe. Louise Harra gave a talk entitled "Activity from the Sun," in the Solar Transients and the Sun-Earth Connection session.

Andrew Fazakerley, Andrew Walsh, Roger Duthie, Natasha Doss and Iryna Rozum attended the Cluster 10th Anniversary Workshop, Corfu, 27 Sept-1 Oct where 4 posters were presented.

42nd annual meeting of the Division for Planetary Sciences of the American Astronomical Society, Pasadena, Oct 4-8. Paper presented:

- Ma, Y., C.T. Russell, A.F. Nagy, G. Toth, M.K. Dougherty, T.E. Cravens, A. Wellbrock, A.J. Coates, P. Garnier, J. Wahlund, F.J. Crary, Two-fluid Mhd Study On Ion Loss From Titan's Atmosphere.

MSSL solar group participated actively in the Hinode-4 Meeting, "Unsolved problems and recent insights," held in Palermo, Italy, 10-15 Oct. Talks were given by:

- Lucie Green: Multi-wavelength observations of solar eruptions;
- Louise Harra: The role of the boundaries of CH and AR in the initiation of the solar wind;
- Lidia van Driel-Gesztelyi: Connections between corona and heliosphere.

Bernhard Kliem gave a lecture "The Physics and Numerical Modelling of Coronal Mass Ejections," at the International Advanced Space Weather School, ICTP, Trieste, 18-29 Oct.

Natasha Doss attended the 12th Cluster Cross-Calibration workshop in Toulouse, France where she gave three talks on behalf of the PEACE ops team, Oct.

Lucie Green gave a lecture on doing solar outreach at the STFC Advanced Summer School.

Colin Forsyth, Andrew Walsh and Chris Arridge organized an RAS Discussion Meeting on magnetotails with Steve Milan (Leicester). All gave oral presentations along with Adam Masters and Yudish Ramanjooloo. Roger Duthie gave a poster presentation.

Andrew Coates, Graziella Branduardi-Raymont, Rob Gowen, Chris Arridge, and Adam Masters attended EPSC, Rome (19-24 Sept). The following papers were presented:

- Branduardi-Raymont, G., D. Kataria, D. M. Walton, A. N. Fazakerley, and A. J. Coates, EXACT: A study of the Earth's aurora using a Cubesat;
- Jackman, C.M., C.S. Arridge, A.J. Steffl, M.K. Dougherty, and A.J. Coates, Field and plasma characteristics of Saturn's magnetotail current sheet and its characteristic motion;
- Galand, M., J. Cui, A.J. Coates, T. Zhang, and I.C.F. Mueller-Wodarg, Photoelectron signature at Venus;
- Galand, M., R. Yelle, J. Cui, J.-E. Wahlund, V. Vuitton, A. Wellbrock, and A.J. Coates, Ionization sources in Titan's deep ionosphere;
- Lavvas, P., M. Galand, R.V. Yelle, A.N. Heays, B.R. Lewis, G.R. Lewis, and A.J. Coates, Energy deposition and primary chemical products in Titan's upper atmosphere;
- Masters, A., N. Achilleos, M. G. Kivelson, N. Sergis, M.K. Dougherty, M. F. Thomsen, C. S. Arridge, S. M. Krimigis, H. J. McAndrews, S. J. Kanani, N. Krupp, and A. J. Coates, Growth of the Kelvin-Helmholtz instability at Saturn's magnetospheric boundary: Charged particle acceleration and potential auroral implications. Invited talk.

Andrew Coates, Geraint Jones and Annie Wellbrock attended the 5th Alfvén Conference on Plasma Interaction with Non-magnetized Planets/Moons and its Influence on Planetary Evolution, Sapporo, Japan, 4-8 Oct. They presented 2 invited talks (AJC), contributed talks (GJ and AW) and contributed to other papers:

- Coates, A.J., The comet-solar wind interaction: lessons for other nonmagnetized Bodies (invited).
- Young, D.T., A.J. Coates and the CAPS Team (invited – presented by A. Coates), Plasma

Interactions with Saturn's Satellites and Rings.
Wellbrock, A., A.J. Coates, G.H. Jones, C. S. Arridge, G. R. Lewis, Electron acceleration regions near Titan's ionospheric pile-up boundary.

Jones, G.H., E. Roussos, and the Cassini CAPS and MIMI Teams Rhea's Interaction with the Saturnian Magnetosphere.

Wahlund, J.-E., K. Ågren, O. Chebanits, N. Edberg, A. I. Eriksson, K. Mandth, J. H. Waite Jr., R. Modolo, A. J. Coates, A. Wellbrock, Substantial amounts of negative ions confirmed in Titan's Ionosphere.

Pérez-de-Tejada, H., R. Lundin, S. Barabash, J. Sauvaud, A. Coates, T. L. Zhang, D. Winningham, M. Reyes-Ruiz, H. Durand-Manterola, Plasma transition at the flanks of the Venus ionosheath: Evidence from the Venus Express data.

Kanani, S.J., G. H. Jones, G. R. Lewis, D. T. Young, C. S. Arridge, A. J. Coates and A. N. Fazakerley, On low energy electron spikes associated with Saturn's moon Enceladus.

Roberto Soria gave talks at the conference on "High Energy View of Accreting Objects: AGN and X-ray Binaries", Crete, 4-10 Oct. and the First GRAVITAS science workshop, Garching, 25-26 Oct.

Chris Owen and Andrew Fazakerley attended an RAS meeting to discuss the future direction of UK Spacecraft operations on 5 November.

Andrew Coates and Neville Shane made presentations at the RAS discussion meeting on "Five years of Venus Express and a look to the future", 12 Nov.

- Coates, A.J., S.M.E. Tsang, R.A. Frahm, J.D. Winningham, S. Barabash, R. Lundin and the ASPERA-3 and 4 teams, A. Wellbrock, F.J.Crary, D.T.Young and the CAPS team, Ionospheric photoelectrons at Venus: ASPERA-4 observations (invited).
- Shane, N. and Coates, A.J., 'VExdisplay: a software package to display ASPERA-4 and IMA data.

Colin Forsyth organised the annual Autumn MIST meeting at the RAS on 26 Nov. Yudish Ramanjooloo and Segheen Beyene gave oral presentations. Chuan Li, Sheila Kanani and Roger Duthie gave poster presentations. Sheila also chaired one of the sessions.

Media Broadcasts and Features

Andrew Coates:

- Interviews for [The Guardian](#), BBC World Service (The World Today), [BBC news](#), [Daily Mail](#) on Rhea's atmosphere, 25 Nov.

Andrew Fazakerley

- Interview for Material World on Radio 4 about the Cluster on the missions 10th anniversary.

Lucie Green:

- Infinite Monkey Cage on Radio 4 talking about end of the world scenarios including death of the Sun.
- Seeing further into Eclipses in the Metro newspaper as part of a series celebrating the Royal Society's 350th anniversary.

Roberto Soria:

- Feature on the Melbourne Age, 22 Nov 2010, <http://education.theage.com.au/cmspage.php?ntid=142&intversion=79>

Press Releases

Australia Telescope National Facility press release, by R. Soria, M.W. Pakull & J.W. Broderick "Russian doll galaxy reveals black holes' true power". 9 Nov:

<http://www.csiro.au/news/Russian-doll-galaxy-reveals-black-holes-true-power.html>

Geraint Jones and Andrew Coates were featured in UCL and NASA press releases on Rhea's atmosphere, Science Express, 25 Nov.

PhDs awarded

Deborah Baker successfully defended her thesis on "Drivers of Solar Coronal Dynamics".

Outreach

Chris Brockley-Blatt held a Solar Physics Workshop for the GCSE Physics Class at Davisons C of E Girls School, Worthing. After a presentation on the Sun and the solar wind, the girls made magnetometers, carried out some solar observations with the sunspotters and data plotting on sun spots (8 Oct). Chris has been recently made a STEM ambassador and will be working with the school to develop their teaching of space science.

Roger Duthie who is the current chair of UKSEDS - organised a satellite mission skills workshop at the Norman Lockyer Observatory, near Sidmouth, Devon (27 Nov). This was aimed at students and was attended primarily by members of UKSEDS.

Guests included National Instruments (NI), AGI and a member of the London Hackspace; activities included introductory session in NI's LabView and AGI's STK software packages, and an introduction to Arduino-based electronics development.

Louise Harra gave a lecture on "The Sun's Current Activity and How it Affects Us" at the Portsmouth Physical Society. Louise described the solar minimum in the context of historical solar activity, observations now available of the Sun and recent discoveries.

Lucie Green:

- Rocket building workshop with 1st Witley Scouts;
- Lecture at the Radio Society of Great Britain's annual Convention about the Sun, solar activity and its impact on the Earth;
- Talk to the Stratford upon Avon Astronomical Society on the latest in solar research;
- Visit to MSSL by Cranleigh University of the Third Age to hear talks about the lab's research;
- Talks to over 2700 students about MSSL's solar research at the Physics in Action days for A-level students;
- Question and answer session on astronomy after the play Bright Star about female astronomer Beatrice Tinsley.

Andrew Coates:

- Talk "Saturn, Titan and Enceladus: recent results from Cassini," for Guildford U3A science group, 9 Nov.
- Talk "The ExoMars mission – Europe's search for life on Mars," at Horsham Geological Field Club, 10 Nov.

Sheila Kanani coordinated the MSSL Open Day and evening event, Space Rocks, on 4 Sept. For details see page 1.

Colin Forsyth took part in the Space Academy Careers Event at the National Space Centre in Leicester on 8 Nov. The event was designed to show sixth-form students the possibilities of a career in science.

Alison Wallace gave a public outreach talk on 3 Nov for the UCL MAPS Faculty PhD Open Day. Alison described her experiences as a PhD student at MSSL to encourage applications from prospective students.

Other News

Roger Duthie & Dale Potts sat the Radio Society of Great Britain advanced amateur radio exam in the MSSL library (22 Nov). They both passed and now

have full amateur radio licences, which they will be able to use to transmit to satellites in orbit using the amateur radio bands.

Next Issue

The next issue of The Newsletter (Volume 8, Issue 4) will be published in March 2011. This will cover activities from 1 December 2010 to 28 February 2011.