



The Newsletter - Volume 7, Issue 3

13th January 2010

Covers events between 1st September 2009 and 30th November 2009

List of Contents

Teaching.....	1
New Staff Members.....	1
Visitors.....	2
Prizes and Awards	2
Appointments (e.g. Editorial Boards or Committees).....	2
Proposals Submitted	2
Mission Status and Developments	2
Publications – Refereed	3
Publications - Non-refereed	4
Invited Talks and Conferences.....	5
Media Broadcasts and Features	6
Outreach.....	6
Other News Items/Activities	7
Next Issue	7

Teaching

The first series of Roberto Soria's lectures, "Introduction to black holes", for the MSSL astro and theory groups is available at http://www.mssl.ucl.ac.uk/~rs1/bh_lectures/mssl_lectures09.pdf.

New Staff Members

We welcome back Dr Yulia Bogdanova who has rejoined the Space Plasma Physics Group. Yulia will be working on calibrating and delivering PEACE data from the Cluster spacecraft for the Cluster Active Archive.

Adam Masters joined the Planetary Science Group to work on Cassini; Lucille le Corre will be working with Peter Muller and Phil Williams with Bob Bentley.

~YESTERDAY AT MSSL ~

Roger Duthie joined the Space Plasma Physics Group as a new PhD research student, under the supervision of Andrew Fazakerley. He will be working on Cluster and Double Star data with the aim of deepening understanding about the Earth's magnetospheric plasma environment.

Visitors

A very well attended Open Day for local residents was held on 5 Sept.

UCL Physics and Astronomy undergraduates and Space and Climate Physics MSc students visited the laboratory on 11 Nov.

Dr Denise Gorse (UCL Computer Science) visited on 22 Oct. Denise gave a fascinating seminar on neural networks and discussed the use of these, in a space physics context, with members of the Space Plasma Physics and Planetary Science groups.

Prizes and Awards

MSSL prize-giving was held in November. Chris Arridge won the Robert Boyd Award; Deb Baker won the Alan Johnstone Award; Ian Hepburn won the Elizabeth Puchnarewicz Award and Barry Hancock won the John Raymont Award.

Professor Kenneth Phillips has been awarded the Gold Medal from the University of Wroclaw where he has had a long-standing collaboration with people at the Astronomical Institute. They have been involved in a fast-frame CCD experiment called SECIS that has been used to search for oscillations in optical radiation from the solar corona, which would be a signature of coronal heating mechanisms. Kenneth has also been involved with others, notably Prof. Janusz Sylwester of the nearby Space Research Centre, with solar X-ray spectrometers including RESIK (which MSSL was involved with) and more recently SphinX, which is looking at X-ray levels during the present very deep solar minimum. The ceremony took place in the University's baroque main hall, the Aula Leopoldina.



Very soon after this, Kenneth heard that he has also been awarded the most prestigious Polish Science award: The Nicolaus Copernicus Medal.

Appointments (e.g. Editorial Boards or Committees)

Andrew Coates and Chris Arridge were scientific coordinators for the ISSI workshop on Comparison of the plasma-spheres of Mars, Venus and Titan, Bern, 30 Nov-4 Dec.

Andrew Coates was co-convenor of Europa Lander Workshop (MT4 session) at European Planetary Science Conference, Potsdam, 13-18 Sept (with O. Korabiev, O. Prieto-Ballesteros, L. Prockter, K. Hand).

Roger Duthie was elected the chair of UKSEDS (<http://www.ukseeds.org>) – the national student-run organisation which looks after the affairs of UK students in the space sector.

Proposals Submitted

EJSM continuation funding (STFC).

Mission Status and Developments

Cassini - Cassini is currently in the Equinox (extended) mission until July 2010, and hopefully this will be extended further in the Solstice mission until 2017. CAPS-ELS is working well and producing excellent science. Several scientific publications, meetings and publications were made during the period (see lists). Andrew Coates attended the CAPS meeting in Atlanta; we are hosting the next meeting in May 2010.

EJSM – Instrument workshop in Holland attended by Dhiren Kataria, Barry Hancock, and Andrew Coates. Team meeting planned for January. Grant application for next phase submitted. Penetrator study started with industry.

ExoMars - Regular ExoMars PanCam team telecons were resumed. Our Swiss colleagues have applied for funding via the Swiss space office

for the Wide Angle Camera sensors. PRoVisG (3D imaging) meeting was held at MSSL 12-16 Oct. Clare Cousins' trip to the Arctic in support of PanCam was featured in Space:UK (BNSC) and in an article for UCL Science.

Solar Orbiter – It has been a busy period for the project. In addition to work needed to finalise the Assessment Study Report (the 'yellow-book') for the ESA Cosmic Vision Competition, the SWA team led by MSSL has had a

number of meetings in addition to regular teleconferences. In particular, a full team meeting was held at IFSI in Frascati, Italy (21-23 Sept.), which was followed by the ESA 'Instrument Design Status Review' of the consortium, held at MSSL (16/17 Nov.).

Mars Express and Venus Express - Both missions are in extended mission and ASPERA is working well.

Publications – Refereed

- Arridge, C.S., H.J. McAndrews, C.M. Jackman, C. Forsyth, A.P. Walsh, E.C. Sittler, L.K. Gilbert, G.R. Lewis, C.T. Russell, A.J. Coates, M.K. Dougherty, G.A. Collinson, A. Wellbrock D.T. Young, Plasma electrons in Saturn's magnetotail: structure, distribution and energisation, *Planetary and Space Science*, Volume 57, Issues 14-15, December 2009, Pages 2032-2047, doi:10.1016/j.pss.2009.09.007, online Sep print Dec 2009.
- Coates, A.J., A. Wellbrock, G.R. Lewis, G.H. Jones, D.T. Young, F.J. Crary, J.H. Waite Jr., Heavy negative ions in Titan's ionosphere: altitude and latitude dependence, *Planet. Space Sci.*, 57, Issues 14-15, 1866-1871, doi:10.1016/j.pss.2009.05.009, (online May, print Dec) 2009.
- Foullon, C., C. J. Farrugia, A. N. Fazakerley, C. J. Owen, F. T. Gratton, and R. B. Torbert, Reply to comment by H. Hasegawa on "Evolution of Kelvin-Helmholtz activity on the dusk flank magnetopause", *J. Geophys. Res.*, 114, A10201, doi:10.1029/2009JA014444, 2009.
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- Guainazzi, M., Risaliti, G., Nucita, A., Wang, J., Bianchi, S., Soria, R., Zezas, A., "AGN/starburst connection in action: the half million second RGS spectrum of NGC 1365", *Astronomy & Astrophysics*, 505, 589, Oct 2009.
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- McAndrews, H.J., M. F. Thomsen, C. S. Arridge, C. M. Jackman, R. J. Wilson, M. G. Henderson, R. L. Tokar, K.K. Khurana E. C. Sittler, A. J. Coates, M. K. Dougherty, Plasma in Saturn's nightside magnetosphere and the implications for global circulation, *Planet. Space Sci.*, Volume 57, Issues 14-15, 1714-1722, doi:10.1016/j.pss.2009.03.003, online March, print Dec 2009.
- Robertson, I.P., T. E. Cravens, J. H. Waite, Jr., R. V. Yelle, V. Vuitton, A. J. Coates, J. E. Wahlund, K. Agren, K. Mandt, B. Magee, M. S. Richard and E.Fattig, Structure of Titan's ionosphere: model comparisons with Cassini data, *Planetary and Space Science*, Volume 57, Issues 14-15, 1834-1846, doi:10.1016/j.pss.2009.07.011, online Aug, print Dec 2009.
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- Vuitton, V., P. Lavvas, R.V. Yelle, M. Galand, A. Wellbrock, G.R. Lewis, A.J. Coates and J.-E. Wahlund, Negative ion chemistry in Titan's upper atmosphere, *Planetary and Space Science*, Volume 57, Issue 13, 1558-1572, doi:10.1016/j.pss.2009.04.004, online Apr published Nov 2009.
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- In press**
- Achilleos, N., P. Guio, and C.S. Arridge, A model of force balance in Saturn's magnetodisc, *MNRAS*, in press November 2009, doi:10.1111/j.1365-2966.2009.15865.x.
- Coates, A.J., Bow shocks at comets, AIP refereed conference proceedings of AIAC8 on Shock Waves in Space and Astrophysical Environments, Hawaii, 2009.
- Coates, A.J., G.H. Jones, G.R. Lewis, A. Wellbrock, D.T. Young, F.J. Crary, R.E. Johnson, T.A. Cassidy, T.W. Hill, Negative Ions in the Enceladus Plume, *Icarus*, in press, *Icarus* (2009), doi:10.1016/j.icarus.2009.07.013, in press, 2009.
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- Sittler, E., R. E. Hartle, Cesar Bertucci, Andrew Coates, Thomas Cravens, Iannis Dandouras, and Don Shemansky, Energy deposition processes in Titan's upper atmosphere and its induced magnetosphere, Chapter 18 in *Titan after Cassini-Huygens* book, 2009.
- Storrie-Lombardi, M.C., Jan-Peter Muller, Martin R. Fisk, Claire Cousins, Birgit Sattler, Andrew D. Griffiths, Andrew J. Coates, Laser Induced Fluorescence Emission (L.I.F.E.): Searching for Mars Organics with a UV-Enhanced PanCam, *Astrobiology*, in press, 2009.
- Wei, H.Y., C.T. Russell, A. Wellbrock, M.K. Dougherty and A.J. Coates, The plasma environment at Titan's orbit with Titan present and absent, *Geophys. Res. Lett.*, in press, doi:10.1029/2009GL041048, Oct 2009.

Publications - Non-refereed

Published

- Coates, A.J., C. Cousins and A.D. Griffiths, UCL looking for life on Mars, *UCL Science*, Oct 2009.

di Stefano, R., Primini, F. A., Patel, B., Liu, J.-F., Greiner, J., Kong, A., Soria, R.: "Chandra Observations of Soft Sources in Galaxies: New insights into binary evolution, Type Ia progenitors, and intermediate-mass black holes", poster presented at the conference "Chandra's First Decade of Discovery", Boston, 22-25 Sep 2009.

Swartz, D., Tennant, A., Soria, R.: "On Ultraluminous X-ray Source Correlations with Star-Forming Regions", poster presented at the conference "Chandra's First Decade of Discovery", Boston, 22-25 Sept.

Invited Talks and Conferences

Chris Owen attended the second meeting of an ISSI team in Bern, 1-4 Sept. This team consists of observers, modelers and theorists to plan and execute activities aimed at improving understanding of reconnection and magnetic flux transfer events on the dayside terrestrial magnetopause. The team reviewed progress since the first meeting in January and drew up plans for publishing its work.

The Planetary Science Congress in Potsdam (13-18 Sept.) was attended by Andrew Coates, who presented several papers, and Robert Bedington who presented his poster on Miniaturised Plasma Analysers.

- Coates, A.J., D.J. McComas and the JuMMP Team, Jupiter Magnetosphere and Moons Plasma (JuMMP) Investigation.
- Kataria, D.O., A. Smith, P. Brown, T. Horbury, T. Vladimirova, C. Underwood, C. Carr, M. Dougherty, A.J. Coates, and R. Bedington, Development of a CubeSat-based highly integrated science payload package suitable for future planetary missions.
- Arridge, C.S., G.H. Jones, C.T. Russell, Y.-D. Jia, A.J. Coates, S.J. Kanani, and C. Paty, Trajectories of charged nanograins in the plume of Enceladus: Modelling and Cassini/CAPS observations.
- Persoon, A.M., D.A. Gurnett, W.S. Kurth, G.R. Lewis, A.J. Coates, G. Gustafsson, and J.-E. Wahlund, The Effect of Latitudinal Electron Temperature Variations in Saturn's Magnetosphere on the Diffusive Equilibrium Density Model.
- Santos-Costa, D., N. Andre, C.S. Paty, J.A. Redfern, P. Schippers, G.R. Lewis, R.E. Johnson, A.J. Coates, S.J. Bolton, and D.T. Young, Coriolis Drift in Saturn's Inner Magnetosphere.
- The Planetary Science group was represented

- on papers at 41st meeting of the Division for Planetary Sciences of the American Astronomical Society, Puerto Rico, October 4-9.
- Rymer, Abigail; Mitchell, D.; Smith, H.; Coates, A.; Dougherty, M., Evidence For Enceladus Link To Saturn Ionosphere: Does The Plume Have An Auroral Footprint?
- Hagermann, Axel; Smith, A.; Gowen, R. A.; Coates, A. J.; Crawford, I. A.; Sheridan, S.; Barber, S. J.; Pike, T.; Gao, Y.; Church, P.; Wells, N.; Phipps, A.; Sims, M.; Talboys, D., Lunar Science Below the Surface - the MoonLITE Low Cost Penetrator Mission.

Roberto Soria gave talks at:

X-ray Astronomy 2009, Bologna, 7-11 Sept. Title: "ULX bubbles" (contributed).

Black Holes in Binary Systems: Observations versus Theory, Ferrara, 11-12 Sept. Title: "Where is the high/soft state in ULXs?" (invited).

Chandra's First Decade of Discovery, Boston, 22-25 Sept. Title: "Ultraluminous X-ray sources: what have we learned in 10 years?"

PDF version of the talk:

http://cxc.harvard.edu/ChandraDecade/PDFs/Soria_14.pdf. Video available here:

<http://cxc.harvard.edu/ChandraDecade/MP4s/Session14/RobertoSoria.mp4> (contributed).

TIARA Workshop on AGN and Star Formation, Taiwan, 16-20 Nov. Title: "Black hole production in star-forming environments", (invited).

Tsing Hua University, Xinzhu, Taiwan, 27 Nov. Title: "Accretion states of ultraluminous X-ray sources", (invited).

Chris Owen gave a lecture entitled 'The terrestrial Magnetosphere' to the STFC Introductory Summer School on Solar Terrestrial Physics, 15 Sept.

Santiago Vargas Domínguez participated in the II Solar and Heliospheric Physics Spanish Meeting in Palma de Mallorca, Spain (16-18 Sep) presenting a multi-wavelength analysis of bright points in the solar atmosphere.

Iryna Rozum, Branislav Mihaljic and Andrew Walsh attended the Double Star workshop in Qingdao, China in September. Iryna Rozum gave a talk entitled "PEACE data in the DAA", Branislav Mihaljic gave a talk "Double Star PEACE calibration" and Andrew gave a talk entitled "Constraining substorm onset with space and ground based observations".

Andrew Fazakerley gave a talk entitled "Cluster: Highlights and case for extension" at the RAS Discussion meeting in October on the upcoming SWARM mission.

Members of the Space Plasma Physics and Planetary Science Groups attended the Autumn MIST meeting held at the RAS in November. The meeting was organized by Colin Forsyth on behalf of the MIST Council, and Chris Owen convened the "MIST General Science" session. Colin Forsyth and Andrew Walsh presented posters. Andrew also chaired one of the afternoon sessions. Presentations were given by Anne Wellbrock:

- Wellbrock, A., A. J. Coates, G. H. Jones, C. S. Arridge, G. R. Lewis, B. A. Magee, J. H. Waite, E. C. Sittler, F. J. Crary and D. T. Young, Negative ions at Titan – density trends, presented at RAS MIST meeting, 27 Nov 2009.

and Adam Masters:

- Masters, A., N. Achilleos, N. Sergis, M. K. Dougherty, M. G. Kivelson, C. S. Arridge, S. M. Krimigis, H. J. McAndrews, M. F. Thomsen, S. J. Kanani, N. Krupp, A. J. Coates, Cassini observations of a Kelvin-Helmholtz vortex in Saturn's outer magnetosphere.

Bernhard Kliem gave an invited review on The Magnetic Environment and Evolution in Flares at the 3rd SOLAIRE Network Meeting and Flux Emergence 2009 Workshop, Puerto de la Cruz, Tenerife, 2-5 Nov.

Anne Wellbrock, Sheila Kanani and Adam Masters attended UKPF 7th Early Career Scientist's Meeting, Manchester, 6 Nov.

- Wellbrock, A., A. J. Coates, G. H. Jones, C. S. Arridge, G. R. Lewis, B. A. Magee, J. H. Waite, E. C. Sittler, F. J. Crary and D. T. Young, Negative ions at Titan – density trends.
- Kanani, S.J., C.S. Arridge, G.H. Jones, A.N. Fazakerley, H.J. McAndrews, N. Sergis, S.M. Krimigis, M.K. Dougherty, A.J. Coates, D.T. Young, K.C. Hansen.
- N. Krupp, A new form of Saturn's magnetopause using a dynamic pressure balance model, based on in-situ, multiinstrument Cassini measurements.
- Masters A., N. Achilleos N. Sergis M.K. Dougherty, M.G. Kivelson, C.S. Arridge, S.M. Krimigis H.J. McAndrews, M.F. Thomsen, S.J. Kanani N. Krupp and A.J. Coates, Growth of the Kelvin-Helmholtz instability at Saturn's magnetospheric boundary.

Coates, A.J., G.H. Jones, C.S. Arridge, G.R. Lewis, A. Wellbrock, D.T. Young, F.J. Crary, R.E. Johnson, T.A. Cassidy, T.W. Hill, Sideways through the plume: first results from Cassini's 2009 Enceladus encounters, seminar presented in UCL/Birkbeck APEX series, 12 Nov.

Coates, A.J., The cometary bow shock – and prospects for Rosetta, presented at RPC team meeting, 20 Nov.

ISSI workshop on Comparison of the plasma-spheres of Mars, Venus and Titan, Bern, 30 Nov-4 Dec. The following talks were presented:

- Coates, A.J., S.M.E. Tsang, A. Wellbrock, R.A. Frahm, J.D. Winningham, S. Barabash, R. Lundin, D.T. Young, F. Crary, Comparison of the ionospheres of Venus, Mars, and Titan: ionospheric photoelectrons.
- Wellbrock, A., A. J. Coates, G. H. Jones, C. S. Arridge, G. R. Lewis, B. A. Magee, J. H. Waite, E. C. Sittler, F. J. Crary and D. T. Young, Negative ions at Titan – density trends.
- Arridge, C.S., et al., 'Magnetodisc and solar wind influences on Titan's magnetospheric background'.
- Abigail Rymer, H. Todd Smith, Annie Wellbrock, Andrew Coates and Dave Young, Titan's variable magnetospheric environment – electrons.
- Z. Németh, K. Szegő, G. Erdős, A. Rymer, E. Sittler, A. Coates, A. Wellbrock, Ion distributions of different Kronian plasma regions.

Media Broadcasts and Features

Andrew Coates:

- BBC News Channel interview, on Hubble refurbishment first pictures and NASA future programme (Augustine panel report), 9 Sept.
- UCL news, quoted on ExoMars, appeared 23 Sep.
- BBC World TV, interview on lunar impact by LCROSS mission, 9 Oct.
- BBC1 1 O'clock news, BBC News Channel and BBC World TV, interviews on Rosetta Earth swingby, 13 Nov.
- Chemistry World, quoted on Titan's haze, 16 Nov.
- BBC R5 live Drive, interviews on International Space Station docking and space research, 18 Nov.

Outreach

Robert Bedington organised and ran five 'Kitchen Science' nights for 1st Cranleigh Scout Troop.

Laura Pickard gave schools lectures at Sunbury Manor School, Glebelands School, Reeds School and Bishop Wand School. She has also published an article on gravitational waves and the LISA mission which appeared in Nexus News.

Colin Forsyth talked at the Space Academy Careers Fest at the National Space Centre in Leicester in November. Colin discussed his experiences of being a researcher in space science, working at MSSL and his career path to date.

Andrew Coates gave a talk on 'Saturn, Titan and Enceladus: recent results from Cassini' at Richmond Scientific Society, 25 Nov. and 'Exploring the solar system', for Friendship Club (senior actuaries), Institute of Actuaries, on 2 Nov.

Other News Items/Activities

Congratulations to the Climate Extremes Team (Mark Saunders, Alan Muir and Adam Lee) who won the 2009 MSSL Croquet Tournament with a convincing 2-0 victory to regain their trophies from the Planetary A-Team. Many thanks to everyone who took part but especially to Neville Shane for organizing an excellent tournament; to Sheila Kanani for refereeing the final and to Roy Edgington for maintaining the lawn.



The view from MSSL - 13 January 2010



Many thanks to Craig Theobald for supplying the shots of MSSL in the snow.

Next Issue

The next issue of The Newsletter (Volume 7, Issue 4) will be published in March 2010. This will cover activities from 1 December 2009 to 28 February 2010.