

# NEWSLETTER

## INSTITUTE OF EARTH & PLANETARY SCIENCES

Edited by Andy Carter & Leisa Clemente

No1: February 2014

(December to February)

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## FOREWORD

Welcome to the first issue of the IEPS Newsletter that aims to keep staff informed of research activities within the UCL and Birkbeck components of the Institute of Earth and Planetary Sciences. Current plans are for the Newsletter to be circulated four times a year. As the content largely depends on your goodwill please find time to respond to requests for items so that the Newsletter captures the full spectrum of research achievements and activities.

## RESEARCH NEWS

**PhD Studentships:** The London NERC Doctoral Training Partnership (DTP) website remains open to listing new PhD projects. Although the deadline for student applications is Monday 17<sup>th</sup> February (interviews on 3<sup>rd</sup> and 4<sup>th</sup> March), the nature of the training programme is such that accepted students will not formally select their PhD project until the start of Term 2 (Year 1), *i.e.* it is possible that your project could win one of the studentships even if it was submitted after the

application deadline. See; <http://london-nerc-dtp.org/>.

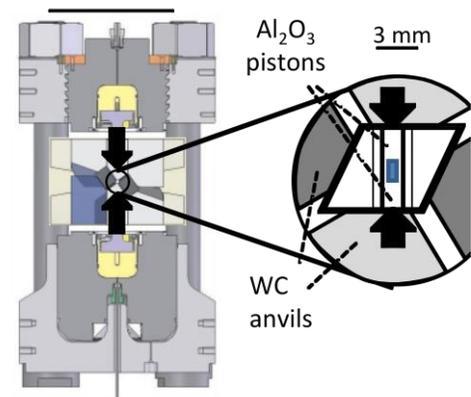
**Decoding the volcano:** *The Aon Benfield UCL Hazard Centre has launched Project CITYVOLC, a three-year programme on the threat of volcanic unrest to major urban centres:* One person in fifty lives in a city within range of an active volcano. The cities include major hubs for international trade. Volcanic unrest is thus a direct threat not only to urban populations, but also to the stable flow of international business. Co-financed by Aon Benfield and UCL, Project CITYVOLC will develop decision-making strategies for evaluating the impact of volcanic unrest on livelihoods and business activity in vulnerable cities. It will focus first on the Neapolitan district of southern Italy, which is sandwiched between the active volcanoes of Vesuvius and Campi Flegrei. Campi Flegrei, in particular, is again showing signs of unrest after four centuries without incident. Led by Christopher Kilburn and Stephen Edwards, project members include Rosa Sobradelo and Danielle Johnson from UCL, together with collaborators from Aon Benfield, the Vesuvius Observatory and Italy's Department of Civil Protection.

**London Ion Probe Consortium (LIPC):** A working group was formed in late 2013 between a group of like-minded scientists from London institutions\* to determine the best way of securing a new ion probe-based facility for the London region. The accurate spatial resolution for trace element and isotopic analyses enables the ion probe to operate at a range of scales linking conventional microscopic methods with a growing array of nano-scale techniques. To explore the potential demand for such a new facility, the LIPC will hold a half-day symposium on the 2<sup>nd</sup> June 2014, 1130-1630 at the Geological Society, Burlington House. London and the surrounding SE region represent the highest concentration of both academic and industry-related researchers in the UK, with outstanding European and international connections. Business and academic sectors likely to benefit from this facility include those engaged in materials, engineering, Earth, planetary, natural and biomedical research. The facility will also provide a new focus for the training of multidisciplinary sciences to young researchers, with enduring potential for public and media interest. Contact Adrian Jones if interested.

\*The group currently comprises UCL, IC, BBK, RH, NHM with scope for long-term industrial partnerships and is managed by Adrian Jones at UCL

## AWARDS AND APPOINTMENTS

**David Dobson and Simon Hunt** won a NERC standard grant (£497k) to investigate the strength of the lower mantle. They will be performing laboratory studies into the strength of rocks and minerals in the transition zone and uppermost lower-mantle, particularly looking at how the phase changes in this region affect the strength of the mantle. This is only recently possible due to a new deformation multi-anvil press, which David designed as part of his Royal Society URF and Simon developed during his NERC fellowship. David and Simon are currently deforming samples at 18 GPa and their new press is one of only two devices in the world capable of this.



**Ian Crawford** has been appointed to ESA's Human Spaceflight and Exploration Science Advisory Committee (HESAC). This is the senior ESA advisory body on all matters concerning the scientific exploitation of ESA's human spaceflight and exploration programmes, including scientific utilisation of the International Space Station, microgravity research, and plans for the future human exploration of the Moon and Mars.

**Phillip Pogge Von Strandmann** has been awarded US\$16k by Petrobras to do a pilot study on lithium isotopes in oil-bearing carbonates, to understand the oceanic environment during deposition.

**Stephen Edwards** of the Aon Benfield UCL Hazard Centre (<http://www.ucl.ac.uk/abuhc>) from NERC to support his pioneering work with businesses and humanitarian and development agencies to enhance the ways in which disaster risk reduction is undertaken by applying scientific methods and knowledge. His project, funded through the NERC Probability, Uncertainty and Risk in the Environment programme on Risk Visualisation and Quantification for Enhanced Disaster Risk Reduction, is with the Catholic Agency for Overseas Development and Aon Benfield, and is examining risk from natural hazards in Cambodia.

aims to grow the training he already offers to the re/insurance sector and expand it to the humanitarian and development sector. The training will improve natural and environmental science knowledge in these sectors specifically for improving their capacities to assess and manage the risk from natural hazards.

**Tim Atkinson** and John Catt (UCL Geography) awarded £15,420 for analyses by the NERC Cosmogenic Isotope Analysis Facility for a project entitled Late Neogene uplift of southeast England –  $^{26}\text{Al}/^{10}\text{Be}$  'burial' dating of marine deposits at 160 m altitude.

**Peter Grindrod** has secured a UK Space Agency Grant for £240,000 for 'Identification and Analysis of Mars Landing Sites: ExoMars' with partners at Imperial College, the University of Leicester, the Open University and the Natural History Museum. This project will identify and characterise a variety of potential landing sites for the ExoMars 2018 Rover through geological studies of existing satellite imagery.



**Gerald Roberts** has been appointed a Core Member of Panel A on the NERC Peer Review College

**Tom Mitchell** has obtained funding support from the Chilean National Commission for scientific and technological research through collaboration with researchers at the Pontificia Universidad Católica de Chile to study the structural geology of the central Andes.

**Karen Hudson-Edwards, and Patricia Acero**, Marie Curie Postdoctoral Fellow have secured a NERC grant for £21,000 for access to the Facility for Environmental Nanoparticle Analysis and Characterisation (FENAC) at the University of Birmingham. The FENAC access is for the project '*Characterisation of Nanometre-Sized Aluminium Sulphates: Implications for Mobility of Aluminium from Mine Wastes*'. This grant contributes to the ongoing EU-funded Marie Curie intra-European project '*Reactivity of Aluminium Sulphate Minerals in Minewastes*' ([RASMIM](#)) in the Department of Earth and Planetary Sciences, whose aim is to shed light on the reactivity of aluminium sulphates for contributing to new mine development and environmental and human health protection.

## NEW MEMBERS

IEPS welcomes the following research associates;



**Dr Carlos Pinilla** (formerly at IMPMC, Université Pierre et Marie Curie) working with Lars Stixrude. Started 01/01/2014

**Dr Lewis Schardong** (formerly at Earthquake Research Institute, University of Tokyo) working with Ana Ferreira on the origin of seismic heterogeneity and attenuation in the Earth's upper mantle and transition zone. Started 01/02/2014

**Dr Fabio Cramer** (formerly at ETH Zurich) working with Carolina Lithgow-Bertelloni investigating how slab structure controls dynamic topography. Started 01/01/14

**Dr David Santamaria-Perez** (formerly at University of Valencia) working with David Dobson. Started 01/12/13

**Dr Nachiketa Rai** (formerly Free University of Amsterdam) working with Hilary Downes investigating how meteorites can be used to study the formation of terrestrial planets. Started 9/12/13

**Dr Richard Wall** working with Stephen Edwards. Started 01/12/13

## TALKS AND LECTURES

IEPS were well represented at the **December AGU Fall meeting** held in San Francisco. In addition to poster presentations staff and students (\*) gave 10 oral presentations:

### 9<sup>th</sup> December

**Vincent Tong:** Rifting and intraplate axial volcanic zone: Near-surface crustal model of the Tengchong volcanic area in China

### 10<sup>th</sup> December

**\*Mike Chandler:** Fracture Anisotropy and Toughness in the Mancos Shale: Implications for crack-growth geometry

### 11<sup>th</sup> December

**Kevin Pickering:** Provenance of Miocene submarine fans in the Shikoku Basin: Results from NanTroSEIZE and implications for stratigraphic correlation of subduction inputs

**Andy Carter:** Location of South Georgia and potential impact on early Pacific-Atlantic through flow

### 12<sup>th</sup> December

**Phil Meredith:** Strength recovery and vein growth during self-sealing of experimentally-induced faults in Westerly granite.

**Simon Hunt:** The comparative strength of the SiO<sub>2</sub> polymorphs (using the new deformation T-Cup)

**Dominic Fortes:** Dehydration of planetary ices at high pressure; the role of analogue materials (*Invited*)

**Vincent Tong:** Video diaries on social media: Creating online communities for geoscience research and education

**\*Chris Dimech:** Broadening and Enhancing Geophysical Software to Study the Internal Structure of the Sun

### 13<sup>th</sup> December

**Nicolas Brantut:** Earthquake nucleation size in cohesive or healed rocks: Effects of strain hardening and loading profiles

**December 13<sup>th</sup>, Graham Shields** gave a popular science lecture on December 13<sup>th</sup> for the UCL Science Centre on 'Snowball Earth and the beginnings of animal evolution. You can view the podcast here:

<https://lecturecast.ucl.ac.uk:8443/ess/echo/presentation/a3e3c381-b0f2-429a-9df0-424abefd5471>

**December 27<sup>th</sup>, Graham Shields** gave a lecture at Nanjing University on entitled: 'Negative feedbacks: Snowball Earth, the Cambrian explosion and the Industrial Revolution'

**January 14<sup>th</sup>, Graham Shields** gave an invited keynote talk at a Sino-German geology conference in Xi'an on entitled: 'Puzzling aspects of Neoproterozoic oxygenation'

**January 16<sup>th</sup>, Gerald Roberts** gave a seminar at the Open University on "Evidence for Marsquakes from fallen boulder populations"

**January 16<sup>th</sup>, Hilary Downes** gave a talk to the Oxford Geology Group on "How to make and break an asteroid".

## PUBLICATIONS (\* student author)

- Adler, I., **Hudson-Edwards, K.A.** and Campos, L.C. (2013). Evaluation of a silver-ion based purification system for rainwater harvesting at a small-scale community level. *Journal of Water Supply: Research and Technology - AQUA*, 62, pp. 545-551.
- Armitage, T.W.K.**, Wingham, D.J. and Ridout, A.L. (2013). Meteorological Origin of the Static Crossover Pattern Present in Low-Resolution-Mode CryoSat-2 Data over Central Antarctica. *Geoscience and Remote Sensing Letters, IEEE*, vol.PP, no.99, pp.1,5 doi: 10.1109/LGRS.2013.2292821.
- Bell, A.F. and **Kilburn, C.R.J.** (2013). Trends in the aggregated rate of pre-eruptive volcano-tectonic seismicity at Kilauea volcano, Hawaii. *Bulletin of Volcanology*, 75(1), pp. 1-10.
- Carter, A.**, Curtis, M. and Schwanenthal, J. (2014). Cenozoic tectonic history of the South Georgia micro-continent and potential as a barrier to Pacific-Atlantic through flow. *Geology*, doi: 10.1130/G35091.1 (Open Access)
- Clift, P.D., **Carter, A.** and Jonell, T.N. (2014). U-Pb dating of Detrital Zircon Grains in the Paleocene Stumpata Formation, Tethyan Himalaya, Zaskar, India. *Journal of Asian Earth Sciences*, 82, 80-89.
- Furray, F.L., Smith, A.M.L., Navrotsky, A., Wright, K., **Hudson-Edwards, K.A.** and Dubbin, W.E. (2014). Synthesis, characterization and thermochemistry of synthetic Pb-As, Pb-Cu and Pb-Zn jarosites. *Geochimica et Cosmochimica Acta*, 127, pp. 107-119.
- Heard, T.G., **Pickering K.T.** and Clark, J.D. 2014. Ichnofabric characterization of a deep-marine clastic system: A subsurface study of the Middle Eocene Ainsa System, Spanish Pyrenees. *Sedimentology*, doi: 10.1111/sed.12101.
- Herman, F., Seward, D., Valla, P.G., **Carter, A.**, Kohn, B., Willett, S.D. and Ehlers, T.A. (2013). Worldwide acceleration of mountain erosion under a cooling climate. *Nature*, 504 (7480), pp. 423-426.
- Kendrick, J.E., **Smith, R.**, **Sammonds, P.**, **Meredith, P.G.**, Dainty, M. and Pallister, J.S. (2013) The influence of thermal and cyclic stressing on the strength of rocks from Mount St. Helens, Washington. *Bulletin of Volcanology*, 75(7), pp. 1-12.
- Mark, C., Gupta, S., **Carter, A.**, Mark, D.F., Gautheron, C. and Martín, A. (2014). Rift flank uplift at the Gulf of California: No requirement for asthenospheric upwelling. *Geology*, doi:10.1130/G35073.1.
- Michael, N.A., Whittaker, A.C., **Carter, A.** and Allen, P.A. (2014). Volumetric budget and grain-size fractionation of a geological sediment routing system: Eocene Escanilla Formation, south-central Pyrenees. *GSA Bulletin*, doi: 10.1130/B30954.1 (Open Access).
- Piochi, M., **Kilburn, C.R.J.**, Di Vito, M.A., Mormone, A., Tramelli, A., Troise, C. and De Natale, G. (2013). The volcanic and geothermally active Campi Flegrei caldera: an integrated multidisciplinary image of its buried structure. *Int. J. Earth Sci. (Geol. Rundsch.)*, doi: 10.1007/s00531-013-0972-7.
- Phillipson, G., **Sobradelo, R.**, Gottsmann, J. (2013). Global volcanic unrest in the 21st century: An analysis of the first decade. *J. Volcanol. Geotherm. Res.*, 264, 183– 196, doi: 0.1016/j.jvolgeores.2013.08.004.
- Sobradelo, R.**, Bartolini, S. and Marti, J. (2014). HASSET: a probability event tree tool to evaluate future volcanic scenarios using Bayesian inference. *Bull Volcanology*, 76, 770-785; doi: 10.1007/s00445-013-0770-x.
- \***Tarff, R.W.** and **Day, S.J.** (2013). Chilled margin fragmentation as a trigger for transition from Strombolian to phreatomagmatic explosive activity at Cova de Paul Crater, Santo Antao, Cape Verde Islands. *Bulletin of Volcanology*, 75(7), pp. 1-14.
- Weider, S.Z., Joy, K.H., **Crawford, I.A.**, Kellett, B.J., Swinyard, B.M. and Howe, C.J. (2014). Western Oceanus Procellarum as seen by C1XS on Chandrayaan-1. *Icarus*, 229, pp. 254-262.

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*HEFCE is developing a proposal to make Open Access a requirement to the post-2014 REF. The final policy will be announced in the Spring. HEFCE makes it clear that journal articles will have to be available at least on Institutional Repositories.*

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## IMPACT AND MEDIA

16<sup>th</sup> December, **Andy Shephard** interviewed for **BBC NEWS online**, commented on the success of the European Cryosat spacecraft and the recent **data presented at AGU**, that shows a bounce back in summer Antarctic ice volumes:  
<http://www.bbc.co.uk/news/science-environment-25383373>

10<sup>th</sup> January, **Ian Crawford** was interviewed on The **Today programme** (Radio 4) about "Who Owns the Moon".

15<sup>th</sup> January, **Ian Crawford** did a TV interview for **Voice of America** on the same topic on:  
<http://www.voanews.com/content/Chinese-lunar-landing-prompts-debate-about-moon-exploration/1830962.html>

22<sup>nd</sup> January, **Tom Armitage**, **BBC News online**, Antarctic ice line patterns detected by Cryosat spacecraft:  
<http://www.bbc.co.uk/news/science-environment-25832891>

26<sup>th</sup> January, **Ian Crawford** was on **BBC Radio 4, World at One**: "Lunar exploration and keeping order in Outer Space":  
<http://www.bbc.co.uk/programmes/p01qlhpx>

## FORTHCOMING

11<sup>th</sup> March, BBC World will broadcast the episode entitled Sahara: Life-Giving Sands, part of the Power of Nature Series, on which Professor Charlie Bristow was a principal contributor.



## PHD COMPLETIONS

**13<sup>th</sup> December:** **Ian Adler** of the Civil, Environmental and Geomatic Engineering department, co-supervised by Karen Hudson Edwards passed his viva on the. His PhD was entitled '*Rooftop rainwater harvesting as a viable drinking water source for rural areas in developing countries: Application of an innovative model based on filtration and silver ions for rainwater purification in semi-arid communities of Mexico*'. A fine example of cross-disciplinary collaboration;

**6<sup>th</sup> February:** Congratulations to **Rick Wall** who successfully defended his PhD thesis on "Forecasting eruptions at volcanoes in extensional tectonic settings". Rick's supervisors were Phil Meredith and Chris Kilburn.

## FORTHCOMING MEETINGS AND SEMINARS

The Astrobiology and Planetary Exploration (APEX) Meeting Programme is available at:

<http://www.homepages.ucl.ac.uk/~ucfbiac/APEX.htm>



Details on the Paleoclimate seminars, held most Wednesdays between 1 and 2pm, can be found at;

<http://www.geog.ucl.ac.uk/about-the-department/events-seminars/palaeoclimate-seminars>