Publications: Papers, books & book chapters

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Geris, J., Tetzlaff, D., McDonnell, J.J., Anderson, J., Paton, G.I. & **Soulsby, C.** 2015. Ecohydrological separation in a wet, low energy boreal environment: use of different soil water extraction techniques to test the “two water worlds” hypothesis. *Hydrological Processes.* DOI: 10.1002/hyp.10603.

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Henrik Vosgerau, Simon R. Passey, Kristian Svennevig, Max N. Strunck & **David W. Jolley**. 2016. Reservoir architectures of interlava systems: a 3d photogrammetrical study of Eocene cliff sections, Faroe Islands. In: Bowman, M., Smyth, H. R., Good, T. R., Passey, S. R., Hirst, J. P. P. & Jordan, C. J. (eds) The Value of Outcrop Studies in Reducing Subsurface Uncertainty and Risk in Hydrocarbon Exploration and Production. *Geological Society, London, Special Publications*, 436, http://doi.org/10.1144/SP436.7.

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Bentivenga, M., **Palladino, G.**, Prosser, G., Guglielmi, P., Geremia, F. & Laviano A. 2016. A Geological Itinerary Through the Southern Apennine Thrust Belt (Basilicata—Southern Italy). *Geoheritage*, DOI 10.1007/s12371-015-0168-6.

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Marc Sosson, **Randell Stephenson**, Yevgeniya Sheremet, Yann Rolland, Shota Adamia, Rafael Melkonian, Talat Kangarli, Tamara Yegorova, Ara Avagyan, Ghazar Galoyan, Taniel Danelian, Marc Hässig, Maud Meijers, Carla Müller, Lilit Sahakyan, Nino Sadradze, Victor Alania, Onice Enukidze & Jon Mosar. 2015. The eastern Black Sea-Caucasus region during the Cretaceous: new evidence to constrain its tectonic evolution. *C. R. Geoscience*, doi: 10.1016/j.crte.2015.11.002

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Funding

J-C Comte was awarded funding by the Newton Fund/British Council for contributing to the International Workshop on 'Resilience of Groundwater Systems to Climate Change and Human Development', February 8-11, 2016, Bangkok, co-organised by the King Mongkut's Institute of Technology Ladkrabang and the University College London to encourage research collaboration between UK and Thailand.

J-C Comte was also awarded a small pilot grant by the Geoscience Research Ireland/Irish Geological Survey to explore 'the use of Nuclear Magnetic Resonance Tomography for assessing aquifer parameters in fractured bedrock' as co-applicant in collaboration with Queen's University Belfast, University College Dublin and University Joseph Fourier Grenoble (€25k total).

Dave Healy is an International Partner on a new Australian Research Council grant with Adelaide (AU$230k over 3 years), on the Structural Permeability of Australian Basins. Lead PI is Dr. Ros King, Co-Is Dr. Simon Holford and Prof. Richard Hillis.

John Howell reports that BP have joined the SAFARI Project, increasing net income by £140k.

John Howell has also won a £5000 grant from the Teaching and Learning fund for a project to create synthetic seismic from outcrop data for the Utah and other field trips. Jose Puig from the University of Barcelona will join us as a RA on the project.

Dave Kemp has won a grant from the Sasakawa Foundation of Great Britain (£1600) to conduct fieldwork in Japan and hold a collaboration meeting with colleagues from the National Institute for Environmental Studies in Tsukuba, Japan.

Roberto Rizzo won awards from the TSG (Tectonics Studies Group) Travel Bursary to support his attendance at the 2015 AGU Fall Meeting in San Francisco (£500); and from the Principal's Excellence Fund (University of Aberdeen) to support his attendance at the TSG Annual Meeting (6-8 January) at UCL, London (£170).

Luca De Siena received a COST award under the European TIDES scheme to visit the University of Naples and University of Salerno (Italy) for cooperation projects on the state of Unrest of Campi Flegrei caldera. He visited these two universities between the 9th and the 22nd of December.

Luca De Siena received a Japan Society for the Promotion of Science Short-Term Fellowship and will move to Japan in 2016 for 1 month in order to establish research links with Tohoku University. The frame is the study of active volcanoes by using seismic tomography and interferometry.

Chris Soulsby is a Co-PI on the consortium that successfully won £2 million funding from NERC and the Chinese National Science Foundation (CNSF) as part of the jointly funded Critical Zone Observatory initiative. The project is titled "The Transmissive Critical Zone: Understanding the Karst Hydrology-biogeochemical interface for Sustainable Management" and will be based at the Puding Observatory in Guizhou Province. Our UK project partners are the Universities of Glasgow and Stirling and SUERC. Partners in China are Hohai University and the Chinese National Academy of Sciences, with Aberdeen's funding at £331K. Dr Zhaicai Zang will soon join us as a post-doc in hydrological modelling,

(Funding, continued…)

As part of the same NERC/CNSF initiative **Josie Geris** secured funding as a Co-I on a project (led by Paul Hallett in SBS) on 'Red Soil CZ: From natural to anthropogenic evolution of Red Soil and its impact on ecosystem function in the Critical Zone.', 2016-2019,with UK funding of £800k, which is also in collaboration with York. The project will be carried out in collaboration with the Institute of Soil Science, Chinese Academy of Sciences. We are currently in the process of recruitment for a hydrology postdoc position based at the School of Geosciences.

Conferences, Presentations

Presentations at the British Sedimentological Research Group (BSRG) AGM in Keele (December 2015):

- **Howell J.**, Eide C.H. & **Hartley A.J.** No evidence for sea level fall in the Cretaceous strata of the Book Cliffs of Eastern Utah.
- **Pierce C.**, **Howell J.**, Reike H., **Fyfe L-J.** & **Healy D.** A virtual-outcrop based study of the Jurassic Page Sandstone Formation. An approach to multiscale geomodeling of aeolian reservoir analogues.
- Rahman M.M., **Macdonald D.I.M.** & **Howell J.A.** Towards a classification and quantification scheme for overbank sandstones in a delta top setting.
- **Mullins J.R.**, **Howell J.A.**, Buckley S.J. & Kehl C. Improved reservoir models from outcrops using Virtual Outcrops and Multiple Point Statistics.
- **Rob Butler**. The Annot … down-system: chasing confined turbidites in mountain belts.
- **Rob Butler**, Joris Eggenhuisen, Peter Haughton & Bill McCaffrey. Interpreting syn-depositional sediment remobilisation and deformation beneath submarine gravity flows – a kinematic boundary layer approach.
- **Owen, A.**, **Hartley, A.J.**, Weissmann, G.S. & Nichols, G.J. Understanding system scale connectivity in fluvial systems.

Presentations at the Tectonic Studies Group (TSG) AGM at UCL (January 2016):

- **Alcalde, J.**, **Bond, C.E.**, Johnson. G., Ellis, J. F. & **Butler, R. W. H.** Two Hundred and Fifty Five Shades of Grey: Impact of seismic image quality on interpretation uncertainty.
- **C. E. Bond**, Shackleton J.R., **Wild, T.** & Binti Zain, Z. Utilizing Drones, Virtual Outcrop and Digital Data Analysis to Input into Fracture Models.
- **C. E. Bond** , G. Johnson, N. Hicks, Y. Kremer, S. Gilfillan, D. Jones, R. Lister, T. Maupa, P. Munyangane, K. Robey, I. Saunders, Z. Shipton, Jonathan Pearce & Stuart Haszeldine. The Structural Geology of the Bongwana Natural CO_2 Release: an analogue for fracture controlled CO_2 migration.
- **Rob Butler**. Basement-cover tectonics, structural inheritance and deformation migration in the outer parts of orogenic belts: A view from the western Alps.
- **Rob Butler**, Joris Eggenhuisen, Peter Haughton & Bill McCaffrey. Interpreting deformation structures formed beneath submarine gravity flows– a kinematic boundary layer approach.
- **A.J. Cawood**, **C.E. Bond** & **Y. Totake**. A workflow for the structural analysis of virtual outcrop models.
- **Farrell, N.** & **Healy, D.** Effects of Porosity on Geomechanical Risk.

Conference presentations (continued…)

- Bubeck, A., Walker, R., **Healy, D.**, Dobbs, M. & Holwell, D.A. Void geometry as a control on rock strength anisotropy.
- **Healy, D.** Polymodal faulting: Implications for connectivity & permeability.
- Walker, R., **Healy, D.**, Wright, K.A., England, R.W. & McCaffrey, K.J.W. Igneous sills as a record of horizontal shortening.
- Stephens, T., Walker, R., **Healy, D.**, England, R.W. & McCaffrey, K.J.W. Sill emplacement controlled by stress state rather than host layering.
- Timms, N.E. & **Healy, D.** The effects of anisotropic elastic properties on shock deformation microstructures in zircon and quartz.
- **R. Rizzo**, **D. Healy** & **L. De Siena**. The Benefits of Maximum Likelihood Estimators in Predicting Bulk Permeability and Upscaling Fracture Networks.
- **R. Rizzo**, **D. Healy**, **L. De Siena**, & A. Awdal. Get the 'Maximum' out of it: Maximum Likelihood Estimators for Fracture Attributes.
- **Y. Totake**, **R. Butler**, & **C. Bond**. Uncertainty in seismic depth conversion and structural validation.
- **Hannah Watkins**, **Clare Bond**, **Rob Butler** & **Dave Healy**. Discrete Fracture Network (DFN) modelling of a folded tight sandstone reservoir analogue.
- **Weihmann, S**. & **Healy, D.** Predicting Hydraulically Conductive Fractures: Why Common Methods Must Be Revisited.

Presentations at the Fall AGU meeting in San Francisco (December 2015):

- **Healy, D.**, **Rizzo, R.** & Jupp, P. Polymodal faulting: Implications for connectivity & permeability.
- **N. Rawlinson** gave two talks (one invited), a poster, and chaired an oral session on the Moho.
- **R. Rizzo**, **D. Healy** & **L. De Siena**. Predicting bulk permeability using outcrop fracture attributes: The benefits of a Maximum Likelihood Estimator.
- **Weihmann, S**. & **Healy, D.** Predicting fluid flow in stressed fractures: A quantitative evaluation of methods
- **Doerthe Tetzlaff, Chris Soulsby** (Invited). Hydroecological Interfaces between Landscapes and Riverscapes.
- Christian Birkel, **Chris Soulsby, Doerthe Tetzlaff**. Tracer-aided modelling using long-term and high resolution data to assess non-stationarity in stream water age.
- **Maria Blumstock**, **Doerthe Tetzlaff,** Gunnar Nuetzmann, Iain Malcolm, **Chris Soulsby**. Spatial Organisation of Groundwater Dynamics and Runoff Responses in Montane Catchments: Integrating Field Data in a Modelling Framework.
- **Bas Buddendorf, Josie Geris**, Iain Malcolm, Mark Wilkinson, **Chris Soulsby**. Identifying Impacts of Hydropower Regulation on Salmonid Habitats to Guide River Restoration for Existing Schemes and Mitigate Adverse Effects of Future Developments.
- **Jonathan Dick**, **Doerthe Tetzlaff**, John Bradford, **Chris Soulsby**. Integrating hydrogeophysics and hydrological tracers to characterise the spatial structure of groundwater storage in the critical zone of montane environments.

Conference presentations (continued…)

- **Luca Fabris**, Iain Malcolm, Karen Millidine, **Bas Buddendorf, Doerthe Tetzlaff, Chris Soulsby**. Modelling the Influence of Long-Term Hydraulic Conditions on Juvenile Salmon Habitats in an Upland Scottish River.
- **Josie Geris, Chris Soulsby,** Christian Birkel, **Doerthe Tetzlaff .** New Approaches to Assessing and Predicting the Hydrologic Impacts of Urban Disturbance Using Isotopes and Transit Time Analysis.
- **Marjolein van Huijgevoort, Doerthe Tetzlaff, Chris Soulsby.** Using tracers to constrain storage, fluxes and water ages in a spatially distributed model.
- **Chris Soulsby,** Christian Birkel, **Josie Geris, Doerthe Tetzlaff**. Storage Dynamics and Non-Linear Connectivity between Landscape Units Control Runoff Generation and Stream Water Age Distributions.
- **Matthias Sprenger**, Martin Erhardt, Monika Riedel, Markus Weiler. Historical Tracking of Nitrate in Contrasting Vineyard Using Water Isotopes and Nitrate Depth Profiles.
- **Doerthe Tetzlaff**, James Buttle, Sean Carey, Hjalmar Laudon, Jeffrey McDonnell, James McNamara, **Marjolein Van Huijgevoort**, Christopher Spence, **Chris Soulsby**. VeWa: Assessing Vegetation Effects on Water Flows and Mixing in Northern Mountain Environments using Stable Isotopes and Conceptual Runoff Models.
- **Claire Tunaley, Doerthe Tetzlaff, Jason Lessels, Chris Soulsby**. Linking High Frequency Variations in Stream Water DOC to Ages of Water Sources in Peat-Dominated Montane Watersheds.
- **Hailong Wang, Doerthe Tetzlaff**, James Buttle, Sean Carey, Hjalmar Laudon, James McNamara, Christopher Spence, **Chris Soulsby**. Relationships between vegetation dynamics and hydroclimatic drivers in the northern high-latitude uplands.

Presentations at the Geology of Geomechanics, Geological Society of London (October 2015):

- **C. E. Bond**, Shackleton J.R., **Wild, T.** & Binti Zain, Z. Utilizing Drones, Virtual Outcrop and Digital Data Analysis to Input into Fracture Models.
- **Farrell, N.**, **Healy, D.** & Heap, M. Effects of porosity on geomechanical risk.
- Bubeck, A., Walker, R., **Healy, D**., Dobbs, M., Holwell, D.A. & Stephens, T. Como se lava? How representative are "typical" lavas in volcanic stability models?
- Awdal, A., **Healy, D.** & **Alsop, G.I.** Modelling the induced geomechanics of fractured basement: case studies from outcrops in NW Scotland.

Esteem

Clare Bond has been elected Chair of the Tectonic Studies Group of the Geological Society of London.

Clare Bond was selected by NERC to represent the UK at the Joint US-UK Workshop on Improving the Understanding of the Potential Environmental Impact Associated with Unconventional Hydrocarbons, in Washington DC on November 5th-6th 2015.

Clare Bond was an invited speaker at the Shale Gas Environmental Summit in Kensington London, 26th-27th October 2015.

Esteem (continued…)

Rob Butler was an invited speaker at the Geological Society of America: Pardee symposium "Celebrating the Genius of William 'Strata' Smith: Bicentennial Anniversary of Smith's Revolutionary Map" (November 2015), with a talk entitled: "Anchors aweigh: Mapping on the edge of reason" (**Rob Butler**, **Clare Bond**).

Dave Healy convened the 2-day Geology of Geomechanics conference at the Geological Society of London, with Jonathan Turner, Richard Hillis and Michael Welch. The successful conference (over 150 attendees from industry and academia) was followed by a 2.5 day field trip to north Somerset to look at faults and fractures.

Malcolm Hole's recent Geology paper (2015, see Publications) was the Research Focus for *Geology* in April. The associated summary paper is: Rey, P. The geodynamics of mantle melting. *Geology*, 43, 367-368.

John Howell joined the editorial board of Sedimentology.

John Howell made keynote presentations at an internal conference for DEA in Germany (24th November 2015) and another keynote presentation at the NPF Conference in Stavanger (2nd December 2015).

Amanda Owen chaired a fluvial sedimentology session at BSRG in Keele in December.

Nick Rawlinson has been appointed associate editor (Geophysics) of Gondwana Research, the highest-ranking geology journal (according to the SCImago Journal Ranking) with an Impact Factor of 8.2**.**

Randell Stephenson gave invited seminars to the Geological Society of Malaysia in Kuala Lumpur and to the University of Technology Petronas in Batu Gajah, in December. The title was: "Crustal structure and buried paleo-sedimentary basins in the north-eastern Black Sea-Azov Sea area and tectonic implications (DOBRE-2 project)". He also gave an invited seminar to the Structural Geology team of Petronas at the Twin Towers, Kuala Lumpur. The title was: "Canada Basin (Arctic Ocean) compared to the South China Sea: two similar marginal ocean basins with hyperextended continent-ocean transitions".

Sarah Weihmann won an Outstanding Student Poster Award at the Fall AGU in San Francisco, for her poster 'Predicting fluid flow in stressed fractures: A quantitative evaluation of methods'.

Fieldwork & visits

Alex Brasier, **Enrique Gomez-Rivas** and **Dave Healy** visited the Total research centre in Pau at their invitation, to discuss future avenues of research in carbonates, December 2nd-3rd.

Rob Butler and **Hannah Watkins** gave seminars and visited InterOil in Singapore (November 2015) and Oil Search – in Sydney, Australia (December 2015).

Alena Ebinghaus attended an aeolian-fluvial core workshop at BGS in Keyworth, Nottingham (20/12/2015).

John Howell had project meetings for the Safari Project in Stavanger with 13 sponsors, and in Hamburg with DEA for aeolian analogues project.

(Fieldwork & visits, continued…)

John Howell has been busy with field work: laser scanning in Spain with Enrique Gomez-Rivas and Magda Chmielewska; thermal drone mapping of an active volcano (Stromboli); a day at Hopeman with Colm Pierce and L-J Fyfe for a petrophysical study of aeolian deposits; and a half day with Gordon Noble and Oskar Sveinbjarnarson at Dunnicaer, mapping a sea stack and Pictish fort using a UAV.

The floods brought by Storm Frank on 29th/30th December, and its aftermath in early January, have kept the **hydrology researchers** active. The highest recorded flows (i.e. in >90 years) were registered throughout the Dee system. The group's flagship long-term research site, the Girnock Burn near Ballater, was close to the epicentre of extreme flows. Despite various storm damage to much of our field equipment, heroic work by post-docs and PhD students ensured that data capture was good. This has given the group a unique data set to work on and to understand the processes behind the generation of such extreme flood events.

Joyce Neilson presented an overview of ongoing carbonate research to Dr Murray Gray, Provost of the Petroleum Institute, Abu Dhabi during his recent visit to the University.

Shuqing Yao, Magda Chmielewska, John Howell and **Enrique Gomez-Rivas** carried out a 1-week field campaign at the Benicassim area (E Spain) in early October, to acquire LiDAR data for building virtual outcrop models of this dolomitised outcrop analogue.

Outreach, training & media

Juan Alcalde visited Leeds for the UKCCSRC Geophysical Modelling for CO2 storage, monitoring and appraisal. https://ukccsrc.ac.uk/news-events/blog/ecr-ukccsrc-geophysical-modelling-co2-storage-monitoring-and-appraisal-meeting

J-C Comte has sole authored three geological and hydrogeological itineraries in the French Massif Central (Aubrac glacial landforms; granite of Margeride; Causses-Cévennes) for an educational naturalist book, Edited by the Lozère Association for the Study and Protection of the Environment (ALEPE). Itinéraires Naturalistes en Lozère - Découvrir et Comprendre la Nature, ALEPE Editions, 248p., Déc. 2015, ISBN 978-2-9514722-1-1.

Luca De Siena is the only UK-based researcher invited to give lectures at the International Course on Study Techniques in Active Volcanoes, hosted by National University of Río Negro (UNRN) in Caviahue (provincia del Neuquén), from 15 to 22 February:
https://www.abdn.ac.uk/study/international/inmycountry/argentina/events/8560/

John Howell is working on a 2 show TV project with Discovery USA.

Other

Dave Healy, with a massive amount of help from **Colin Taylor**, **Jan Walker** and **Eddie Stephens**, took delivery of the OGIC-funded HP/HT triaxial apparatus in November. A 2-day session saw the 1.4 tonne device installed in Meston 125. The suppliers, Sanchez Technologies, have already commissioned the rig with all systems working, and detailed calibrations are planned over the coming weeks.

Sophie Harland has joined us as a NERC-funded postdoc working on the anisotropy of permeability project with **Dave Healy**. Sophie recently completed her PhD in carbonate pore systems at the University of Edinburgh.

Obeid Saitabau Lemna has started his PhD programme at the University of Aberdeen, with supervisors **Randell Stephenson** and **David Cornwell** funded via a PhD Studentship agreement between Aberdeen and BG Tanzania Limited and the University of Dar es Salaam.

In October Marissa Tremblay (University of California - Berkeley) came to Aberdeen for a short visit and a seminar and then spent a week with **Matteo Spagnolo** and other international colleagues sampling moraines in the Western Alps. The samples are now been processed at Berkeley to quantify their cosmogenic noble gas content and use this to derive information about the palaeoclimate.

Hannah Watkins is now a Member of the Geological Society Library user group.

Hannah Braun at the University of Freiburg, Germany, but who conducted her MSc project under supervision of **Doerthe Tetzlaff** and **Chris Soulsby**, submitted her MSc thesis on the topic “Influence of Vegetation on Precipitation Partitioning and Isotopic Composition in Northern Upland Catchments“. During her MSc Hannah has collected and analysed > 1100 isotope samples.

Gianluca Lazzaro, a PhD student in the Department of Engineering at the University of Padua is based in the School, working closely with **Chris Soulsby** and **Doerthe Tetzlaff**, as part of a collaboration between the Northern Rivers Institute and Professor Gianluca Botter on the hydrological connectivity of salmon habitats.

Yixin Zhao, a Professor of Rock Mechanics at the State Key Lab of Coal Resources and Safe Mining (Beijing) visited **Quan Gan** in January, and met with **Dave Healy** and **Enrique Gomez-Rivas** to discuss future collaborations.

Next copy deadline: March 19th, 2016

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