



## F-TRG newsletter October 2015

### Welcome to the Fold-Thrust Research Group

The Fold-Thrust Research Group (F-TRG) has now started. We'd like to thank you for your support; we hope that this three year programme of research and knowledge exchange will be mutually beneficial and we look forward to working with you all. This is the first of our monthly newsletters, in which we aim to keep you up-to-date with how the F-TRG research is progressing, as well as provide information on key project highlights.

### The University of Aberdeen F-TRG team

**Rob Butler** is Professor of Tectonics in the University of Aberdeen. He's been in Aberdeen since 2008 having moved from the University of Leeds. He has over 30 years research experience on fold and thrust belts. Outside the Fold-Thrust research Group Rob's current research includes using turbidite sequences to deduce the structure of deformed sedimentary basins, especially using examples from the Central Mediterranean and Alps (Numidian and Annot systems). He has long-standing interest in the structural geology of submarine slopes, especially the structure of deep water fold-thrust systems. Rob is director of the Virtual Seismic Atlas – an open access platform for sharing the geological interpretation of seismic data. He is also on the management group of the UK's Collaborative Centre for Doctoral Training in Oil and Gas and has run the core training programme on exploration in challenging environments (using the Alps as a case study for thrust belts and for rifted margin structure).

This (northern hemisphere) summer Rob has been conducting field research in the French Alps and Sicily looking at turbidite systems and their interaction with the inverting rifted continental margin of Tethys.

**Clare Bond** is a Senior Lecturer at the University of Aberdeen. Clare joined the University in 2010, from the structural geology consulting and software company Midland Valley. Clare continues to work closely with them on several projects including the F-TRG. Clare's mix of academic and industry experience provides here with insight into the structural geological challenges faced by operators. Her research interests include structural and fracture modelling, uncertainty analysis and fluid-flow in deformed media. She has two active projects investigating uncertainty in the interpretation of seismic and borehole data in collaboration with industry, and will use knowledge from these projects to inform uncertainties in fold-forelimb structure in the F-TRG. She has spent the last few years developing techniques to use virtual outcrop models, derived from photogrammetry and LiDAR for structural geology research. This has included flying drones (UAV) in the USA and the UK to map fractures and fold structures. Clare has just returned from South Africa (<https://storify.com/ukccsrc/fieldwork-trip-to-south-africa/>) where she was part of a UK delegation to collect data from an 80 km long fault seeping naturally generated CO<sub>2</sub>.



**Hannah Watkins** has recently been appointed to the role of Research Fellow at the University of Aberdeen, and will be working exclusively on the F-TRG project. Hannah gained her PhD, titled 'Characterising and Predicting Fracture Patterns in a Sandstone Fold-and-Thrust Belt', from the University of Aberdeen in July this year. The PhD was examined by John Cosgrove, who has recently written a review paper on the link between folding, fracturing and fluid flow in fold-thrust belts (see publication list). The paper will be published in a Geological Society of London Special Publication on Industrial Structural Geology, of which Clare Bond is an editor. Hannah has presented her research at several UK and international conferences, including the AAPG conference on 'Fractured Reservoirs: Geological, Geophysical and Engineering Tools to Crack Them', held in Catania, Sicily, in April 2015. Since completing her PhD, Hannah has been working on a CGG-sponsored Pathfinder project on Structural Evolution and Damage in Fold and Thrust Belts, specifically focussing on the Vercors region of the French Sub-Alpine chains.

### **Kick-off meeting**

The F-TRG kick-off meeting will be held on Wednesday 2<sup>nd</sup> December, hosted at Oil Search offices, Sydney. Rob and Hannah will participate in the event. We will propose options for F-TRG activities over the coming year and plan our research and knowledge exchange activities for 2016 in collaboration with our project supporters. We will also bring project supporters up to date with our research. Further details regarding the kick-off meeting will be circulated closer to the time.

### **News & events**

Clare visited the Oil Search office in Sydney in August to discuss PNG fold belt geology and exploration. Future challenges, which may be addressed as part of the F-TRG were also discussed.

The AAPG International Conference and Exhibition took place in Melbourne, Australia last month (13-16<sup>th</sup> September). The event hosted several sessions relevant to the F-TRG, including 'Papua New Guinea' and 'Papua New Guinea and South East Asia'. Presentations and posters covered many topics, including the tectonic evolution of Papua New Guinea, the role of basin architecture on structural style, structural uncertainty, kinematic modelling of the fold-thrust structures and smaller-scale compartmentalisation and damage in forelimb regions. Several contributions were presented by F-TRG partners; if anyone has any presentations they are able to share, please send them to us and we will upload them to a secure section of our website, once this has been completed.

Midland Valley visited the Geology and Petroleum Geology department at the University of Aberdeen this week (5<sup>th</sup>-6<sup>th</sup> October) to deliver a Move software training course. The course covered various aspects including FieldMove, model building, kinematic modelling, and an introduction to Move 2016.

Hannah attended a website training course last month to learn University of Aberdeen web page editing. Over the next few weeks we hope to update the F-TRG website

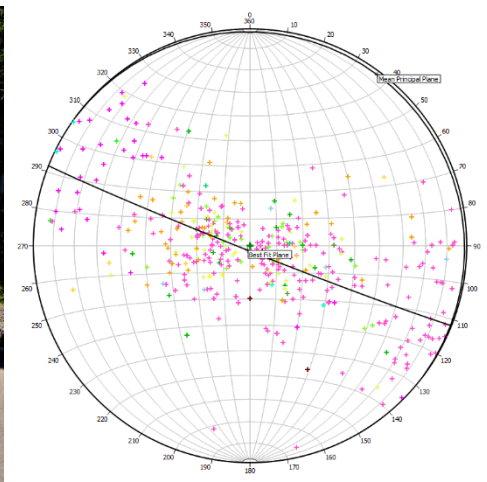
(<http://www.abdn.ac.uk/geosciences/departments/geology/foldthrust-research-group-965.php>).





### Pathfinder project: Vercors fieldwork, French Sub-Alpine chains

In July this year, Hannah spent two weeks undertaking fieldwork in the Vercors, France. The region is part of the French Sub-Alpine chains, and exposes numerous large-scale fold-thrust structures in Jurassic-Cretaceous carbonates. The fieldwork concentrated on the large-scale fold geometries, with specific focus on forelimb damage characterisation. The Vercors region will be one of our outcrop analogues for fold-thrust belts. The research was initially funded by CGG, and we will integrate results with the F-TRG project and share results with sponsors.



*Vercors fieldwork. Top left: hangingwall of Rencurel Thrust at La Balme de Rencurel. Top right: bedding data from the Vercors fold-thrust belt. Bottom: Urganian limestone dip-panels above Villard-de-Lans.*

### Recent/relevant publications

Cosgrove, J. W., 2015. The association of folds and fractures and the link between folding, fracturing and fluid flow during the evolution of a fold-thrust belt: a brief review. In: *Industrial Structural Geology: Principles, Techniques and Integration* (edited by Richards, F. L., Richardson, N. J., Rippington, S. J., Wilson, R. W. & Bond, C. E.), Geological Society, London, Special Publications, 421, <http://dx.doi.org/10.1144/SP421.11>.



Feng, L., Bartholomew, M. J. & Choi, E., 2015. Spatial arrangements of décollements as a control on the development of thrust faults. *Journal of Structural Geology*, 75, 49-59.

Rocha, E. & Cristallini, E. O., 2015. Controls on structural styles along the deformation front of the Subandean zone of southern Bolivia. *Journal of Structural Geology*, 73, 83-96.

Watkins, H., Bond, C. E. & Butler, R. W. H., 2014. Identifying multiple detachment horizons and an evolving thrust history through cross-section restoration and appraisal in the Moine Thrust Belt, NW Scotland. *Journal of Structural Geology*, 66, 1-10.

Watkins, H., Bond, C.E., Healy, D., Butler, R.W.H., 2015. Appraisal of fracture sampling methods and a new workflow to characterise heterogeneous fracture networks at outcrop, *Journal of Structural Geology*, 72, 67-82.

Watkins, H., Butler, R.W.H., Bond, C.E. & Healy, D., 2015. Influence of structural position on fracture networks in the Torridon Group, Achnashellach fold and thrust belt, NW Scotland. *Journal of Structural Geology*, 74, 64-80.

### **Next month.....**

In October we will organise a teleconference with F-TRG project sponsors. We hope to discuss progress of the F-TRG, future research outcomes, and logistics for the kick-off meeting.

The next issue of the F-TRG newsletter will be circulated during the first week of November, and will also be available on our website

(<http://www.abdn.ac.uk/geosciences/departments/geology/foldthrust-research-group-965.php>).