Blackpool earth tremors during 'fracking' induced on ancient fault

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New research has demonstrated that the 2011 Blackpool earth tremors during 'fracking' were induced on an ancient pre-existing fault.

Professor Peter Styles, Professor of Applied and Environmental Geophysics in the Applied & Environmental Geophysics Research Group in the School of Physical and Geographical Sciences at Keele University, with collaborators from Cuadrilla Resources and the Czech Academy of Sciences, have demonstrated the existence of the ancient pre-existing fault, some 300 metres away from the tip of the well, which slipped by only a few centimeters over a distance of only 200 metres.

In April and May 2011 a series of small seismic tremors were felt in the Blackpool area, the largest of which at Magnitude 2.3, was detected clearly on the Keele University seismometer some 100 kilometres away.

Exploration for shale gas had just commenced at a site near Preese Hall and the second of a series of hydraulic stimulations ('fracks') had just taken place. Felt seismicity associated with 'fracking is extremely rare - this being only one of four instances out of many hundreds of thousands of hydraulic stimulations which have taken place (including 200+ over the last 40 years in the UK for geothermal energy, as well as hydrocarbon extraction).

The Applied and Environmental Geophysics Group together with the British Geological Survey installed seismometers which showed that the minor tremors were located close to the shale gas well position.

Results from the study have been published in *Geophysical Research Letters* and the work was selected by *Nature* (4 December 2014, vol 516 , p11) as a Research Highlight.

Professor Styles said: "While these events were very small and, in fact, smaller than events we have detected all over the UK caused by collapses in old mine workings, this demonstrates the importance of using geophysical investigations to delineate the presence of unknown faults before shale gas drilling begins and also that seismic monitoring must be in place before, during and after the operations.

"Together with Dr Rachel Westwood, a member of our group, we are now carrying out further research funded by the REFINE Research Collaboration (hosted at the University of Durham) to ascertain the 'respect distance', which should be maintained from known faults during stimulation activities."

A 2012 report to UK Government, of which Professor Styles was a co-author, with Dr Chris Green, of GEOFRAC, A Fracture Monitoring System, and Dr Brian Baptie, of The British Geological Survey, has already made recommendations to government to establish a seismic traffic light system which will monitor and control fracking operations and this is now DECC policy.

More information: "Felt Seismicity Associated with Shale Gas Hydraulic Fracturing: The First Documented Example in Europe." DOI: 10.1002/2014GL062047

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