# Fault Asociated Cementation and Basinal Fluid Flow, Permian Hopeman Sandstone, Scotland.

By
Oliver F. Quinn
Edinburgh University, Dept. of Geology and Geophysics, Edinburgh, Scotland, United Kingdom (oliver.quinn@glg.ed.ac.uk)

Quartz cement is one of the major culprits of porosity loss in sandstones during deep burial. A major debate is whether quartz cement is sourced solely within the host sandstone unit, or whether mass transfer imports quartz into the sandstone.

The eolian Permian (Hopeman) sandstone is exposed on the coast of the Inner Moray Firth, Scotland where normal faults are visible. Seismic data reveals that these faults are exhumed continuations of deeply buried offshore structures. The exposure is a kilometer-scale horst block representing a structural high at the basin margin. This uplifted horst block is a product of selective fault re-activation during regional Tertiary uplift, analogous to several offshore structures.

A pattern of increasing quartz cement within the footwall, toward these fault planes, exists: quartz cement volumes rise from 5% at 50m to 37% at 2m. The hanging wall of the fault displays quartz cement volumes of less than 15% at 2m from the fault plane and 3% at 30m, an asymmetrical pattern of quartz cement across the fault.

The cement exists as syntaxial overgrowths around detrital quartz grains. Fluid inclusion studies indicate that the quartz cements were precipitated by hot fluids (>80C).

The large volume of authigenic quartz indicates that there may have been mass transfer of silica into the sandstone at shallow depth. A compactional fluid flow laterally out of the basin was focused through this structural high at the basin margin, controlled on the meso-scale by the presence of normal sealed faults acting as barriers to fluid flow.