

## **Apatite halogen content measurements by SEM-EDX and LA-Q-ICPMS: a provenance analysis approach**

CLAIRE ANSBERQUE<sup>1\*</sup>, DAVID CHEW<sup>1</sup>, JOHN CAULFIELD<sup>1</sup>,  
AND CHRIS MARK<sup>1</sup>

<sup>1</sup>Department of Geology, Trinity College Dublin, Dublin 2,  
Ireland (\*correspondence: ansberqc@tcd.ie)

The halogen content in apatite varies between different types of granitoids and can be used to discriminate between mantle, crustal or mixed magmatic sources. The provenance of sedimentary rocks derived from the erosion of these magmatic bodies can thereby be tracked by apatite halogen content measurements, and integrated with other provenance information (U-Pb or fission-track ages and trace-element abundances).

We have determined apatite halogen contents from Caledonian (Siluro-Devonian) granitic and sedimentary rock samples collected near the Great Glen Fault, northern Scotland. Halogen contents were measured *in situ* on standard thin sections. F-contents were determined by SEM-EDX on an SEM equipped with large-format EDS detectors, and Cl and Br-contents were determined by LA-Q-ICPMS along with a suite of other trace elements (e.g. REE +Y, Sr, Mn, Ba, V).

This ongoing study will permit (1) distinction of magnetite- and ilmenite-series granitoids, which are characterized by distinct Cl and F-contents [1], and (2) identification of mantle or crustal magma sources. This study will also explore the role of the Great Glen Fault in magmatic source dynamics during the Early Paleozoic. In addition, apatite halogen contents will be analysed in Devonian sedimentary rocks that record the regional unroofing of these plutons, in order to evaluate the utility of apatite halogen contents as a provenance indicator for source areas characterised by abundant plutonism.

[1] Ishihara, S., & Moriyama, T., *Resour Geol* Vol. 66, No. 1: 55–62 (2015)