

Geochemistry of a Precambrian impactite: The Stac Fada Member, NW Scotland

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The Stac Fada Member (SFM) is an impactite in NW Scotland [1] formed by a large meteorite impact approx. 1.2 Ga [2]. The SFM is remarkably well-preserved, given its age, with clear impact-related features that include shocked quartz, fluid escape structures, melt fragments, bombs, accretionary lapilli and directional flow indicators. We have determined that the impactor's geochemical signal remains in the rock, and has not been substantially mobilized or modified. The distribution patterns of the Pt-group elements, their inter-element ratios and other trace element ratios preserve a meteoritic signature in the SFM.

Vertical exposures of the SFM record a bimodal geochemical enrichment pattern and distribution of shocked quartz. This suggests a fluidised two-layer ejecta flow producing geometry analogous to observed Martian ejecta blankets [e.g. 3]. The SFM is therefore an accessible and well-preserved alternative to studying impacts beyond remote sensing of other planets.

The meteoritic signature can be used to discern the class of the impacting meteorite [e.g. 4]. We conclude the impactor is most likely to be an L class ordinary chondrite.

[1] Amor, K. et al (2008). *Geology*, **36**(4), 303. [2] Parnell, J et al (2011). *J Geol Soc*, **168**(2), 349–358. [3] Mouginiis-Mark, P.J. & Garbeil, H. 2007. *Met&PlanSci*, **42**(9), 1615–1625. [4] Tagle, R, & Hecht, L. (2006). *Met&PlanSci*, **41**(11), 1721–1735.