FIELD OBSERVATIONS AND GEOCHEMISTRY OF THE STAC FADA MEMBER (TORRIDONIAN SUPERGROUP, SCOTLAND); A MESOPROTEROZOIC PROXIMAL IMPACT EJECTA BLANKET. K. Amor[1], S.P. Hesselbo[1], D. Porcelli[1], S. Thackrey[2] and J. Parnell[2]. [1]Department of Earth Sciences, University of Oxford, Parks Road, Oxford, OX1 3PR.. E-mail: kena@earth.ox.ac.uk. [2] Department of Geology & Petroleum Geology, King's College, Aberdeen, AB24 3UE

Introduction: Proximal ejecta blankets surrounding impact craters are rarely preserved on Earth due to dynamic geological processes; erosion, tectonics etc. We have recently discovered a 1.2 Ga meteorite impact layer in a continuous sedimentary sequence in North West Scotland. The horizon contains abundant devitrified melt clasts, up to 50% at some locations. The presence of shocked quartz with multiple, intersecting, planar deformation features provide unequivocal evidence for an impact origin. Subsequent burial by a sedimentary cover has preserved the ejecta in almost pristine condition and provides an excellent opportunity for studying proximal impactites.

Results: Initial analyses show evidence for an enrichment in the platinum group elements (PGE) in the impact layer (20 ppb iridium), relative to surrounding strata (0.9 – 6 ppb iridium). The increased abundance in PGE is most likely caused by incorporation of a meteoritic component which is highly enriched in these elements compared to crustal rocks.

The country rocks exhibit crustal Ni/Cr values and fall in the range 0.3 – 0.6, whereas in the impact horizon Ni/Cr ratios are elevated (2.9 – 3.9) and comparable with chondritic values.

High precision chromium isotope ratio measurements made using a multiple collector, inductively coupled plasma, mass spectrometer exhibit a positive, anomalous enrichment in ^{53}Cr (ε^{53}Cr ~+0.27) relative to NIST Cr standard SRM979. Such Cr isotope variations are absent in terrestrial rocks but widespread in meteorites and are assumed to be caused by the heterogeneous distribution of ^{53}Mn (which decays to ^{53}Cr t1/2=3.74Ma) in the early solar system [1], [2]. The chromium isotope data confirms the presence of a meteoritic component in the impact layer.

Discussion: The presence of planar deformation features in quartz, an enrichment in PGEs relative to adjacent strata, chondritic Ni/Cr ratios and an ε^{53}Cr isotope anomaly point to an impact origin for the emplacement of this layer. The thickness (up to 22 m) and extent of outcrop (50 km) imply proximal rather than distal ejecta. Field evidence infers that the impact occurred in a terrestrial, continental setting with extensive groundwater in the underlying strata. The sedimentary environment is similar to those ascribed to Mars and this impactite may be an analogue for Martian fluidized crater ejecta.

References: [1] Shukolyukov, A. and Lugmair, G.W. 1998. *Science*, 282:927 – 929. [2] Koeberl, C. et al. 2002. *Geological Society of America Special Paper* 356:607 – 617.