A (relatively) fast technique for finding impact ejecta horizons in the stratigraphic record

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Impact ejecta deposits have the potential for being ideal stratigraphic markers. Identifying impact horizons, however, is done by the identification of shock-metamorphic minerals [1]. Such work is time consuming, often requiring searching through hundreds of grains, and is therefore not feasible when searching through extensive stratigraphic sections. Alternatively, impact horizons are frequently identified by the presence of Ir anomalies. This is typically done through either Ni Fire Assay and column chemistry or by INAA [2]. Both of which are time consuming and/or require specialized training.

Here we present results of our new technique for measuring Ir without Fire Assay or INAA. ~90 mg of sample is dissolved in HF + Nitric followed by a mixture of HCl and Nitric. Analyses are conducted on a quadrupole mass spectrometer, using Indium to correct for instrumental drift and standard addition to avoid matrix complication. We have tested this technique with a mix of both Cody Shale doped with known amounts of Ir and with naturally Ir-rich samples.

This technique is capable of identifying anomalies as low as ~1 ppb. While other geochemical techniques can provide more precise concentrations, particularly at lower concentration, the ease of this technique is well suited as a first-pass screening tool for identifying impact horizons in large stratigraphic sections.

[1] French B. M. 1998. Traces of catastrophe: A handbook of shock-metamorphic effects in terrestrial meteorite impact craters. LPI Contribution 954. Houston, Texas: Lunar and Planetary Institute. [2] French B. M. and Koeberl C. 2010. The convincing identification of terrestrial meteorite impact structures: What works, what doesn't, and why. Earth-Science Reviews 98:123–170.