Stable isotope studies of post impact hydrothermal deposits within the sub-crater environment of the Rochechouart structure. S. L. Simpson, A. J. Boyce, M. R. Lee and P. Lindgren. School of Geographical and Earth Sciences, University of Glasgow, UK. E-mail: S.Simpson.1@Research.gla.ac.uk.

Introduction: Hypervelocity impacts into hydrous terrestrial targets can initiate hydrothermal circulation [1]. The longevity of these systems is highly variable, and depends on the amount of water available in the target (*i.e. meteoric, hydrous minerals*) and amount of heat generated (*i.e. impact melt, elevated geothermal gradient*) [1]. Approximately one-third of terrestrial impact structures have evidence for impact-hydrothermalism, and this process has recently been confirmed on Mars [1, 2]. These systems are ideal environments to search for life, as they provide an exogenic source of heat to tectonically "dead" planets.

Purpose: We have sought evidence for past life in the sub crater environment of the 201±2 Ma [3], 23km diameter [4], Rochechouart impact structure located in west-central France. The crater has been highly eroded, yet enough material remains to provide a full suite of impactites including the shocked basement directly below the transient crater floor. The target was primarily crystalline, located on the western edge of the Central Massif. Hettangian (199-196 Ma) sedimentary carbonates, crop out 17.5km west of the center of the structure [4]. These deposits may have influenced, possibly covered, Rochechouart during cooling, providing a water source to fuel hydrothermal activity. A strong hydrothermal overprint, primarily K-metasomatism, is a feature of Rochechouart [4, 5]. Of particular interest in this study is the shocked basement directly beneath the transient crater floor, which hosts a network of shock-related fractures, faults and lithic breccias ideal for fluid transport [1, 6].

Methods and Results: Carbonates and sulphides found within autochthonous and parautochthonous impactites were extracted and analyzed for $\delta^{13}C$, $\delta^{18}O$ and $\delta^{34}S$. Pyrite $\delta^{34}S$ values range from -10‰ to -26‰ (VCDT), which is indicative of biological reduction of sulphate, and carbonate values reflect a mixture of organic and inorganic reservoirs, as well cool (< 100°C) depositional conditions [7].

In July 2014, a second field campaign is planned for further collection of impact-hydrothermal sulphides and carbonates from the shocked basement, as well as nearby Hettangian sedimentary deposits for comparative isotope work.

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