New Ir data from K-T sections in the Paraiba Basin, NE Brazil

Z. BERNER[1], U. KRAMAR[1], G. KELLER[2] AND D. STÜBEN[1]

[1]Institut für Mineralogie und Geochemie, Universität Karlsruhe, 76131 Karlsruhe, Germany (zsolt.berner@img.uka.de)

[2]Geosciences, Princeton University, Guyot Hall, Princeton, NJ 08544, USA (gkeller@princeton.edu)

New drill cores and outcrops across the K-T transition in the Paraiba Basin (Poty Quarry near Recife) of NE Brazil were collected in order to evaluate the environmental changes and evidence of the Chicxulub impact. Here we report on the sedimentology, stratigraphy and Ir concentrations, with an emphasis on the stratigraphic position of the Ir anomaly, which is of crucial importance in the ongoing Chicxulub impact debate.

The K-T transition is marked by a 40-50 cm thick conglomerate, which is present in the Poty well and outcrops, as well as in another two wells drilled over a distance of 75 km. The origin of this conglomerate is still under debate. It has been variously interpreted as impact-generated tsunami deposit, storm deposit, tectonic breccia or mass flow associated with a sea level lowstand. Our study shows that the conglomerate consists mainly of phosphate and glauconite pebbles, occasionally graded, and floating in a micrite matrix. No impact spherules were detected.

The age of deposition of this conglomerate is still in question. Although previous studies have placed it at or below the K-T boundary, the presence of Danian planktic foraminifera *Parvularugoglobigerina eugubina* indicates an early Danian zone P1a age, as also observed by Koutsoukos (2006).

At the base of the conglomerate and 15 cm above it we detected two Ir anomalies with concentrations of 0.5 and 0.6 µg/kg, respectively. At 5 cm and 15 cm above the conglomerate are two thin dark clay layers interbedded in marls of early Danian zone P1a age. In the upper clay layer, Albertao *et al*. (1994) reported Ir concentrations of 0.6 µg/kg. Our analysis of this layer confirms a small Ir anomaly of 0.33 µg/kg. Thus, our results indicate multiple Ir anomalies, though all appear to be within the early Danian. This can be explained in two ways: 1) the Ir anomalies are derived from reworked ejecta material that was deposited at or prior to the K-T boundary, or 2) The Ir anomalies reflect an early Danian impact with subsequent reworking.

References

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The speciation of metals in natural fluid inclusions at temperatures up to 700˚C

A.J. BERRY[1], A.C. HARRIS[2], V.S. KAMENETSKY[2], M. NEWVILLE[3] AND S.R. SUTTON[3,4]

[1]Department of Earth Science and Engineering, Imperial College London, South Kensington SW7 2AZ, UK (a.berry@imperial.ac.uk)

[2]CODES, University of Tasmania, Hobart, Tasmania 7001, Australia

[3]Consortium for Advanced Radiation Sources (CARS), University of Chicago, Chicago, IL 60637, USA

[4]Department of Geophysical Sciences, University of Chicago, Chicago, IL 60637, USA

The speciation (oxidation state and coordination environment) of metals in fluids is key to understanding their transport in hydrothermal systems. For example, in the formation of porphyry and related epithermal ore deposits the type and stability of metal complexes will control partitioning between melt, brine, and vapour, and the mechanism of ore deposition.

Fluids trapped as inclusions in quartz can be heated, allowing in situ XANES and EXAFS studies of metal speciation. The ideal inclusions are 10s of µm in size, have metal concentrations in excess of 100s of ppm, contain no insoluble phases, and can survive heating to magmatic temperatures.

XAS spectra were recorded at beamline 13-ID-C (GSECARS) of the Advanced Photon Source from individual fluid inclusions in miarolitic quartz from the Omsukchan granite, Russia (Kamenetsky *et al*. 2004). The quartz sections were mounted in a windowless Linkam 1500 heating stage and the temperature of an inclusion determined by a thermocouple on the top surface of the sample. The inclusions are primitive, polyphase, have salinities in excess of 35 wt%, homogenise completely on heating to temperatures up to 700 ˚C, and contain 100s of ppm of Cu and wt% amounts of Fe, Mn, and Zn.

Two generations of magmatic polyphase inclusions with markedly different metal ratios were studied. In both cases Cu was found to occur exclusively as the linear species $[CuCl_2]^-$ from 200 ˚C to at least 700 ˚C. Despite the high salinities there is no evidence for higher order coordination. Preliminary speciation results for Fe, Mn, and Zn at 700 ˚C will also be reported.

References

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