ODP_LEG207 – A SURPRISINGLY PRISTINE K/T BOUNDARY. II - TRACE ELEMENTS

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Introduction: The ODP Leg 207 recovered apparently totally complete Cretaceous-Paleogene ("K-T") sections in six boreholes at the Demerara Rise, W Atlantic [1]. A ~1.5 ppb Ir peak [1] mark the top of this 2-3 cm thick ejecta deposit, below, "glassy" (now altered) silicate and carbonate spherules, as well as minor shocked minerals in a clayey matrix form a complex spherule layer [2]. Published geochemical data for this boundary section include X ray maps, and two INAA bulk rock analyses for a few major and some trace elements [1]. To better understand the nature of this fall-out deposit, we obtained a high-resolution geochemical profile across the uppermost 5 mm of the spherule layer for (i) major elements using the JEOL JXA 8900 Superprobe (ICEM, Münster; 15kV acceleration voltage, 5nA sample current, 50µm beam diameter; 97 points), and (ii) a set of trace elements using the Element2 LA-ICP-MS (Inst. f. Mineralogie; spot size 235 µm; 5Hz, 8-9J/cm^2; 37 spots) taking NIST 612 as external standard, and BHVO-2G as unknown to monitor accuracy.

Results: *Major elements.* The rather friable sediments have a high porosity, a high content of clay minerals, and are immersed with resin, hence, totals of the EMP analyses range only up to 76 wt.% but may be much lower. Average SiO_2 is 43 ± 3 (1σ) wt.% (not normalized to 100), yet distribution is quite heterogeneous; the SiO_2 data were used as internal standard (^{29}Si) for quantification of the trace element data. Due to the presence of carbonate spherules [2], the CaO concentration also varies considerably.

Rare earth elements: Our results are in good agreement with data by [1] and are typical for the upper continental crust; large variations between neighboring laser spots were observed.

Ni/Cr: In the spherule layer, this elemental ratio straddle around 2.7, clearly less as the average value of 4.05 given by [3] for CM 2 carbonaceous chondrites; which is most likely the projectile type of the Chicxulub impact event [4].

PGEs: Their concentrations (analyzed masses ^{103}Rh, ^{105}Pd, ^{194}Pt, ^{195}Pt) increase sharply, yet discontinuously only in the upper 16 spots of the profile, peak concentrations are reached a few spots prior to the knife-sharp top of the spherule layer, followed by a drop to background values (4 spots), and a small peak in a µm-sized rip-up clast in the lowermost Danian. The respective peaks can be offset by one spot due to the obviously very small size of the PGE particles. The given PGE distribution is best explained by an increase of discrete nuggets as carrier of the "Ir anomaly" towards to top of the spherule layer.

References: [1] MacLeod K.G. et al. 2007. *Geological Society of America Bulletin* 119:101-115. [2] Schulte P. and Deutsch A. 2008 *Meteoritics & Planetary Science* this volume. [3] Tagle R. and Berlin J. 2008. *Meteoritics & Planetary Science* in review. [3] Trinquier A. et al. 2006. *Earth & Planetary Science Letters* 241:780-788.

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