Impact Spherules: The K/T Boundary and Late Eocene Compared

[1]SMIT, J., [2]MONTANARI, A., [1]VONHOF, H., [3]ROBIN, E. [1]Vrije Universiteit, Amsterdam, Netherlands; [2]Osservatorio Coldigioco, Apiro, Italy; [3]CNRS/CEA Gif-sur Yvette, France.

Impact spherules of the K/T boundary are highly variable in texture and composition. At distal sites the 3mm thick impact layer consists of microkrystites, at a density of ~7000/cm2).

The Late Eocene has two impact layers. The upper layer contains microtektites and can be traced to the Chesapeake crater. The lower contains mostly microkrystites, is enriched in Ir, while the upper is not. The microkrystites could be derived from the Popigai crater.

The microkrystites at the K/T boundary fall into three groups: 1) with Ca-rich clinopyroxene2) Glassy with clusters of cpx, 3) with Ni-rich spinels and olivine crystals. At site 577 the original cpx is preserved, otherwise only the inherited crystal texture. Ni-rich spinel crystals are almost globally preserved, except in strongly reduced environments. Groups 1 and 2 intermix, but group 3 shows little mixing 1and2.

Eocene microkrystites contain Ca-rich cpx and spinels. There are Cr-rich and Cr-poor spinels, and microkrystalline or crystalline endmembers. At Massignano Cr-rich spinel spherules exist next to green (cpx) spherules.

Both Eocene and K/T microkrystite strewnfields are global and associated with an iridium anomaly. Therefore, the impacts should be similar. That could imply a similar impactor type, a carbonaceous chondrite according to Cr isotope systematics, or a similar composition of target rocks of Popigai and Chicxulub. Both are excavated on continental crust, covered with carbonate platformrocks (3000m resp 800m). Vaporisation and mixing of the carbonate cover and basement and subsequent condensation in the hot vapor cloud may explain the origin of these microkrystites.