

**NEW FINDS OF IMPACTITES AT THE LUIZI IMPACT STRUCTURE (DEMOCRATIC REPUBLIC OF CONGO).**

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**Introduction:** The Luizi impact structure, ~17 km in diameter, lies in an underexplored region of the southeastern Democratic Republic of Congo. Its meteorite impact origin was confirmed in 2010 after a challenging field campaign during which shatter cones in sandstones were discovered [1]. The structure formed in a layered sedimentary target rock of tabular massive arkosic sandstone beds with intercalated laminated argillaceous sandstones (of the Kundelungu Group) of Neoproterozoic age.

Here we report on new finds of impactites (and kimberlites) that were documented and sampled during our second expedition to the Luizi structure, in October 2013. Preliminary petrographic and electron microscope observations are also presented.

**Results and Discussion:** A large part of the Luizi structure, not explored during our 2010 campaign, was mapped, resulting in several unique finds. All together more than 50 outcrops were studied, unraveling a wide variety of impactites. In addition, three kimberlite pipes were found and sampled. Even though these pipes are not directly related to the Luizi impact event, their occurrence within the crater is unique in the current impact record and, thus, noteworthy. The occurrence of shatter cones, which were thought to be restricted only to the inner 3.2 km of the structure [1], were mapped up to a distance of more than 3 km from the center, extending their distribution to the inner 6 km of the structure. Impact breccia dikes intruding sandstone beds were found in the inner 1 km of the structure; they consist of rock (and shocked mineral) clasts that are in part or totally melted (with flow texture and irregular shapes) in a fine-grained matrix (locally melted?). Large occurrences of clast-rich impact melt rock were observed in-situ on a hill that seems to be entirely made of this lithology. It consists of a mixture of plastically deformed (showing complex layering) and melted rock (and mineral) clasts in a fine-grained matrix (showing extensive melting and flow texture, as well as vesicles). At the microscopic scale, quartz grains show multiple sets of planar deformation features, some are heavily toasted, and other are partially or totally fused. Other minerals are also shocked/melted, such as feldspar, titanomagnetite, apatite, zircon, monazite-(Ce), and xenotime-(Y) grains (showing a granular texture with microvesicles or, in some cases, being partly decomposed). In addition, an impact melt rock sample was collected in a river close to the center of the structure; it consists of elongated skeletal silica (tridymite?) crystals, hematite, clinopyroxene, and partially digested quartz and feldspar grains in a fine-grained matrix with alkali feldspar composition (a glass?).

These new findings at the Luizi structure show that the crater is not as eroded as previously thought. The sampled rocks will not only permit to better constrain the age of the impact event, but will also allow to improve our understanding of the response of sedimentary rocks to hypervelocity impact.

**References:** [1] Ferrière L. et al. 2011. *Geology*, 39(9), 851–854.