

SHOCK METAMORPHIC EFFECTS IN ROCKS AND MINERALS FROM THE NEWLY CONFIRMED LUIZI IMPACT STRUCTURE (DEMOCRATIC REPUBLIC OF CONGO).

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Introduction: The Luizi structure, ~17 km in diameter, centered at 10°10'13.5"S and 28°00'27.0"E, on the Kundelungu Plateau of the Katanga province, lies in an underexplored region of the southeastern Democratic Republic of Congo. Luizi exhibits, from the periphery to the center of the structure, a rim elevated up to ~300–350 m above the crater interior, an annular depression, an intermediate ring with a diameter of ~5.2 km, and an ~2-km-wide circular central ring around a central depression [1]. In 1990, Dumont [2] was the first to suggest the structure was of impact origin. Evidence for an impact origin was found recently by Ferrière et al. [1,3].

Here we report on geological field observations and petrographic examination of rock samples collected during our 2010 field campaign at the Luizi structure.

Results and Discussion: The structure formed in tabular massive arkosic sandstone beds, of centimeter to decimeter thickness, with intercalated laminated argillaceous sandstones. Up to 40 cm in size, well-developed shatter cones formed in arkosic sandstone were observed. Shatter cones mostly occur in situ and a few were also found in float samples along rivers. They appear to be restricted only to the inner 3.2 km of the structure.

Monomict lithic impact breccia dikes, up to ~2 m in thickness, and crosscutting sandstone beds, were mapped up to ~3 km from the center of the structure.

Quartz grains with up to five sets of planar deformation features (PDFs) were identified under the universal stage microscope. The dominance of PDF orientations parallel to $\omega\{10\bar{1}3\}$ and the occurrence of a few PDFs parallel to $\pi\{10\bar{1}2\}$ allow us to estimate that the more heavily shocked exposed target rocks have experienced peak shock pressure slightly above 20 GPa. In addition, rare shock deformations in feldspar, notably in perthitic alkali feldspar grains, in which PDFs oblique to the perthite exsolution lamellae were observed. Kink banding in muscovite grains is also common in most investigated samples.

Conclusion: The Luizi structure displays characteristic of complex impact craters, i.e., an elevated structural rim, an annular depression, and a central uplifted zone. For the first time, unique evidence of shock metamorphism, in the form of shatter cones and multiple sets of PDFs in quartz and feldspar grains, is described, confirming the meteorite impact origin of the structure, the first one to be confirmed in Central Africa.

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References: [1] Ferrière L. et al. 2011. *Geology*, doi: 10.1130/G31990.1. [2] Dumont P. 1990. *Bulletin de la Société Belge de Géologie* 99:57–65. [3] Ferrière L. et al. 2011. Abstract #1637. 42nd Lunar & Planetary Science Conference.