THE LUIZI IMPACT STRUCTURE (DEMOCRATIC REPUBLIC OF CONGO) – BACK TO THE FIELD.

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Introduction: The Luizi impact structure, ~17 km in diameter, centered at 10°10'13.5″S and 28°00'27.0″E, lies in an underexplored region of the southeastern Democratic Republic of Congo. It was recently confirmed as being a complex meteorite impact structure, the first one to be recognized in Central Africa, after the characterization of unambiguous shock deformation features, including shatter cones in sandstones and shocked quartz grains with multiple sets of planar deformation features (PDFs) [1,2]. Because of the challenging field conditions, only a restricted part of the structure was explored by two of us (L.F. & P.K.K.) in 2010; all together only 30 outcrops were studied.

Here we present a brief review of what we know of the Luizi impact structure, our new petrographic investigations (still in progress), and the plans for the next field campaign that will take place in September 2013 (if the security situation is safe).

Review: 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]. The structure formed in tabular massive arkosic sandstone beds (of the Kundelungu Group) of Neoproterozoic age (ca. 570 Ma, [3]) in which the well-developed shatter cones were observed, but restricted only to the inner 3.2 km of the structure. In the laboratory, quartz grains with up to five sets of PDFs were identified under the universal stage (U-stage) microscope, with a dominance of PDF orientations parallel to $\omega\{10\bar{1}3\}$; rare shock deformations in feldspar were also observed [1].

New results and Discussion: Additional U-stage measurements, including samples previously not prepared for petrographic study, were obtained and largely confirm that PDF orientations parallel to $\omega\{10\bar{1}3\}$ dominate. The main objectives for our next field campaign are: (1) to investigate in detail the Eastern part of the crater that is literally cut by a large fault zone, at least 100 km long, as this feature is like a window that will allow us to better understand the three-dimensional aspect of the Luizi; (2) to localize and sample the two kimberlite pipes that should occur within the crater (as mentioned in [4]); and (3) to better map the structure, collecting more data and samples, to perform a detailed characterization of the shock level distribution at the scale of the entire structure, and hopefully to find some melt bearing samples to be able to perform an age determination. So far only a maximum Neoproterozoic age of sedimentation of the target rocks is available.

References: [1] Ferrière L. et al. 2011. *Geology*, 39(9), 851–854. [2] Ferrière L. et al. 2011. Abstract #1637. 42nd Lunar & Planetary Science Conference. [3] Master S. et al. 2005. *J. Afr. Earth Sci.*, 42, 41–60. [4] Grosse E. (1919) *Neues Jahrb. Mineral. Geol. Palaeontol.*, 42, 272–419.