

KGAGODI BASIN, BOTSWANA: ORIGIN BY METEORITE IMPACT CONFIRMED! W. U. Reimold¹, B. K. Paya², H. Holmes², D. Brandt¹, C. Koeberl³, C. Dladla¹ and P. J. Hancox¹, ¹Impact Cratering Research Group, Department of Geology, University of the Witwatersrand, Private Bag 3, P.O. Wits 2050, Johannesburg, South Africa (E-mail 065wur@cosmos.wits.ac.za), ²Department of Geological Survey, Private Bag 14, Lobatse, Botswana, ³Institute of Geochemistry, University of Vienna, Althanstrasse 14, A-1090 Vienna, Austria.

Background: Paya et al. (1999) reported on a possible, 3.5 km diameter, meteorite impact crater located at 22°29'S/27°35'E near Kgagodi Village in southeastern Botswana. This structure was first recognised on aerial and satellite imagery and in the course of water-drilling. Outcrop in this soil and calcrete covered area is extremely sparse. A drillcore obtained ca. 200 m from the edge of the basinal structure was interpreted to comprise some 240 m of sedimentary rocks overlying granitic gneisses of the Limpopo Belt Central Zone. A gravity survey along two perpendicular traverses across the basin indicated a central negative Bouguer anomaly of 10mgals, which was modeled to indicate a basin depth of ca. 900 meters and confirmed the width of the basin at 3–4 km. Several breccia samples from 140–200 m depth did not reveal distinctive shock metamorphic deformation and were interpreted as representing debris flows off the rim.

New results: Since then we have revisited the structure twice, carried out more detailed logging and petrographic analysis of the drill core, and commenced with a geochemical study of selected samples and a thorough magnetic survey across the basin. The drill core can now be divided into 4 zones: 0–158 m: basin fill; 158–165m: suevite; 165–254m: variably brecciated or fractured granitoids with local melt breccia injection (240m); >254m: undeformed granitic and (minor) amphibolitic basement. The suevite breccia is characterised by abundant melt and devitrified glass fragments and abundant quartz and feldspar clasts with multiple sets of PDFs. Granitic material dominates the clast population, besides rare gabbro clasts. All major lithologies have been analysed for major and trace element abundances. Breccias and fractured basement rocks are often impregnated with carbonate, which complicates chemical interpretation. The major element data suggest that suevite was formed from granitoids, but that a mafic component was important (basement amphibolite and, possibly, Karoo dolerite, massive occurrences of which do occur in the environs of the structure). Siderophile element enrichments (e.g., Co., Ni, Ir) in suevite compared to target rocks are indicated from preliminary INAA data, but more sensitive Ir analysis by coincidence spectrometry is still in progress.

The first completed magnetic traverse shows a definite change of anomaly between the area above the structure and the surroundings, where the magnetic signature is much less smooth. Additional traverses are

in progress but are time consuming due to the dense shrub vegetation in this area, which needs to be cleared. The new findings confirm the presence of a meteorite impact crater in Botswana and provide a basis for further detailed analysis of a structure, which appears to be similar to the Brent Crater in Canada. The age of this new discovery is still loosely constrained, with the age of Karoo dolerite dikes only providing a rough maximum age limit of ca. 180 Ma.

Reference: Paya B. K et al. (1999) *62nd Annual Meeting of the Meteoritical Society*.