BOSUMTWI IMPACT STRUCTURE: EVIDENCE FOR FLUIDIZED EMPLACEMENT OF THE EJECTA.

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Introduction: The about 10.5 km diameter Bosumtwi impact crater is one of the youngest large impact structures on Earth. The crater rim is readily noticed on topographic maps or in satellite imagery [1,2]. It defines a circular basin filled by water (Lake Bosumtwi) and lacustrine sediments. The morphology of this impact structure is also characterized by a circular plateau extending beyond the rim and up to 9–10 km from the center of the crater (about 2 crater radii). This feature comprises a shallow ring depression, also described as an annular moat, and a subdued circular ridge at its outer edge. The origin of this outermost feature has remained debated and could either correspond to the limit of an ejecta deposit, or to a ring fault [2].

Objective: In order to determine the origin of the topographic features observed outside of the rim, we combine the analysis of the topography and roughness at different scales using SRTM denoised data, with airborne radiometric data (Fig. 1) and field observations made in November 2017 [3].

Results: We report an association between rough topography, surface exposure of fresh rocks, and a K-rich annulus (see Fig. 1). These regions are currently being eroded and expose fresh outcrops of metasediments. In contrast, the K-poor areas within the moat are associated with smooth surfaces and a lateritic cover that likely developed since the time of impact. This provides evidence that the moat and outer ring are features inherited from the impact event and represent the partially eroded ejecta layer of the Bosumtwi impact structure. The presence of an outer ridge indicates that ejecta emplacement was not purely ballistic but, instead, requires ejecta fluidization and surface flow. The setting of Bosumtwi ejecta can therefore be considered as a terrestrial analog for rampart craters, which are common on Mars and Venus, and also found on icy bodies of the outer solar system. Future cosmonuclide studies at Bosumtwi will focus on the confirmation of the age of the lateritic cover observed on the ejecta layer.

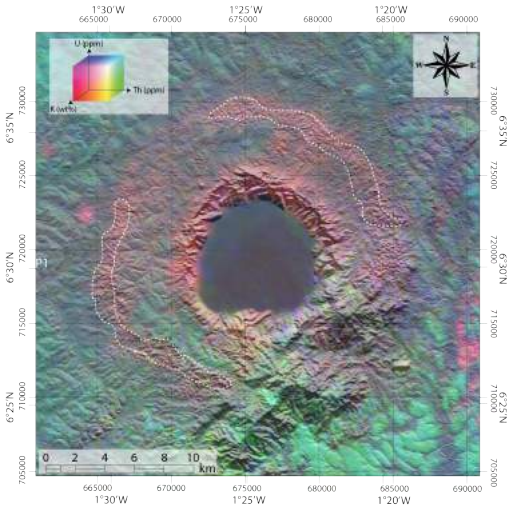

Fig. 1 – RGB map of K (0–2.5 wt%), Th (0–9 ppm), U (0–4 ppm) concentrations superposed onto a shaded relief image of the Bosumtwi impact crater. Dotted lines correspond to the rough areas associated with higher potassium concentrations (> 2wt%).

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