INVERTED STRUCTURE OF MELT-RICH IMPACT BRECCIAS AT BOSUMTWI CRATER: IMPLICATIONS TO MIXING AND COOLING HISTORY OF FALLOUT SUEVITES.

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Introduction: The 10.5 km diameter 1.07 Myr old Bosumtwi impact crater in Ghana is one of the world best-preserved large impact structures [1]. Impactite lithologies at Bosumtwi include fallout suevite deposits that are found outside the crater inner rim. According to Boamah & Koeberl [2] the Bosumtwi suevite is found as either large displaced blocks that measure up to several meters or as patches of suevitic material found in the north and southwest of the crater [2].

In this contribution we study mineral and chemical composition of a suevite bed exposed at Sarpong Nkwanta, located north of inner crater rim at 01°23´56.05´´W, 06°33´49.55´´N. The motivation of the study was to characterize the variation of the suevite composition in a nearly 4.5 m thick section with emphasis on devirification/alteration mineralogy.

Results and discussion: Mineralogical analyses reveal gradual changes in lower part of the suevite deposit from a kaolinite-rich composition characteristic to clastic breccia below the suevite bed to a glass-rich suevite material largely devitrified to spinel (hercynite)-plagioclase and secondary cristobalite-smectite mineral phases (Fig. 1). Kaolinite phase in studied samples is detritic, originating from the weathering crust of the target-rock and its content decreases upwards in the outcrop section. In contrast, the content of plagioclase, Mg-hercynite and impact glass alteration products – smectite and cristobalite – increases. Similar trends are in major oxide composition, which show decrease in Al_2O_3 and Fe_2O_3, and contemporary increase in SiO_2 and CaO (Fig. 2).

The partly devitrified glass fragments containing abundant hercynite spinel and plagioclase (Fig. 3) suggest that cooling of the suevite occurred rather slowly to allow mineral crystallization. This also indicates that the initial thickness of the suevite deposit must have been considerably thicker than it appears in present erosional level to allow slow cooling of the suevite.

Compositional trends at the lower boundary of the suevite bed imply to a contact-zone that in our opinion refers to mixing of underlying clastic breccia and overlying suevite deposits due to the horizontal movement of the suevite complex during its formation.

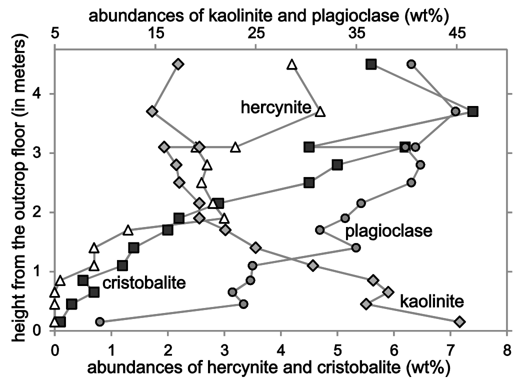

Figure 1. Abundances of hercynite, cristobalite, kaolinite and plagioclase mineral phases in relation to the sample material height in the outcrop.

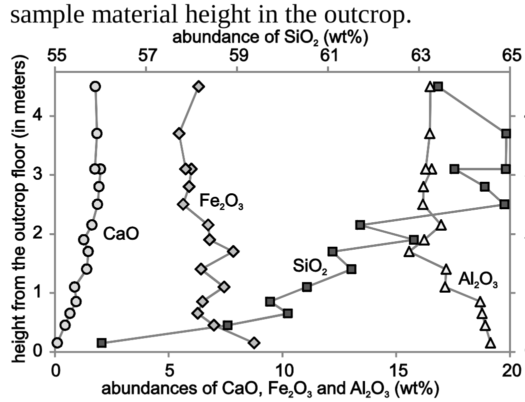

Figure 2. Abundances of SiO_2, CaO, Fe_2O_3 and Al_2O_3 in relation to the sample height from the outcrop floor.

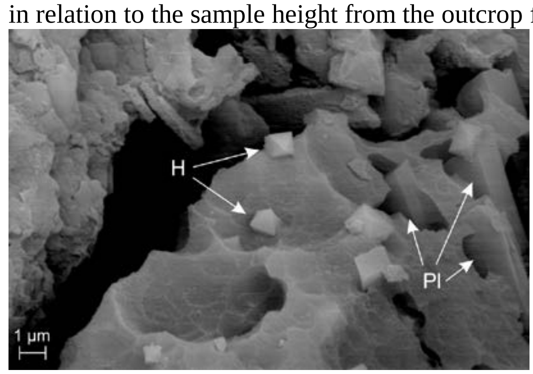

Figure 3. SEM image of a fractured sample from fallout suevite: hercynite (H) octahedrons and plagioclase (Pl) laths in a partly dissolved glass matrix.

References: [1] Koeberl C. et al. (2007) *Meteoritics & Planet. Sci., 42*, 483-511. [2] Boamah D. and Koeberl C. (2006) *Meteoritics & Planet. Sci., 41*, 1761-1774.