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Trace element systematics in impact glasses from the Lake Bosumtwi impact crater, Ghana – a LA-ICP-MS study

S. Luetke (1), **A. Deutsch** (1) and F. Langenhorst

(1) Inst. f. Planetologie, WWU Münster, D-48149 Muenster, Germany, (2) Inst. F. Geowissenschaften, FSU Jena, D-07749 Jena, Germany

(luetke.s@uni-muenster.de)

The geochemical analysis of impact glasses by LA-ICP-MS with high spatial resolution is a powerful tool (i) to constrain precursor materials that have been contributed to the melt/vapor, which was quenched to the various impact glasses and, (ii) to bracket processes of melting, vaporization, and ejection by evaluating chemical differences between and inhomogeneities within the different groups. The Lake Bosumtwi impact event is the very rare case of cratering, in which four different types of impact glasses were not only formed but are also preserved as in part exceptional fresh material. This includes glass shards in suevites, fallback glasses (shards or aerodynamically formed particles), the Ivory Coast (IVC) tektites, and microtektites, which were discovered in offshore drill cores in the Atlantic Ocean. In general, the different lithologies show significant differences in Ca, Mg, and alkali contents, and rather uniform REE distribution patterns; the overall elemental patterns reflect that one of the predominant target lithologies, i.e., meta-graywacke and phyllite-slate. Concerning specific trace elements, the concentration of Nb (8 ppm), Ba (900 ppm), Zr (182 ppm), and Th (5 ppm) in tektites exceeds that one in microtektites and fallback particles. Rather high concentrations of Nb (8 to 15 ppm), Zr (96 to 273), Ce (9 to 78 ppm), and Cs (1 to 6 ppm) in the IVC tektites are explained by melting of the thick layer of tropical soil. According to modeling, and Sr-Nd isotope data, such soil was an important precursor lithology for the IVC tektites. In contrast to the tektites, microtektites and fallback par-

ticles represent much more inhomogeneous glass types, probably caused by a larger variation of the precursor lithologies. Our data for the fallback particles show considerable differences to previous data, for example, the Ni (1 to 99 ppm) and Co (7 to 27 ppm) concentrations of quite low in our samples. The reason for the extreme compositional variation between discrete fallback particles is not understood so far.