The chemical diversity of tektites from Ivory Coast : new insight from portable XRF

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Introduction: Various types of rock melts are generated by meteoritic impacts. Their origin is still not understood in detail despite intense geochemical investigations and modeling attempts (Artemieva, 2002). tektite are among these impact-related melts. The present study is aimed at characterizing the geochemistry diversity of Ivory Coast tektite which are related to the Bosumtwi impact structure in Ghana. The scatter of chemical signatures may reflect both diversity of precursor materials around the Bosumtwi impact crater and the processes of formation. The exploration of the chemical diversity in chemical signatures of tektite is limited by number of available samples for traditional-destructive-laboratory analyses process (e .g. ICP-MS). Here we explore the value of using the non-destructive portable XRF (X-ray fluorescence) for this purpose based on a collection of tektite of the SODEMI (Société de Développement des Mines de Côte d'Ivoire). Given the large error bars associated with this technique, it is important to determine rather the chemical diversity may be observed beyond uncertainties.

Samples and analytical techniques: 34 samples of Ivory Coast tektite were analyzed using a portable XRF for 31 major and trace elements. Major elements were measured with the mining mode and Trace elements were analyzed with the soil mode. Measurement last 120 seconds for the mining mode, and 90 seconds for soil mode

Results: Average major and trace element data of Tectites are given in Fig 1.

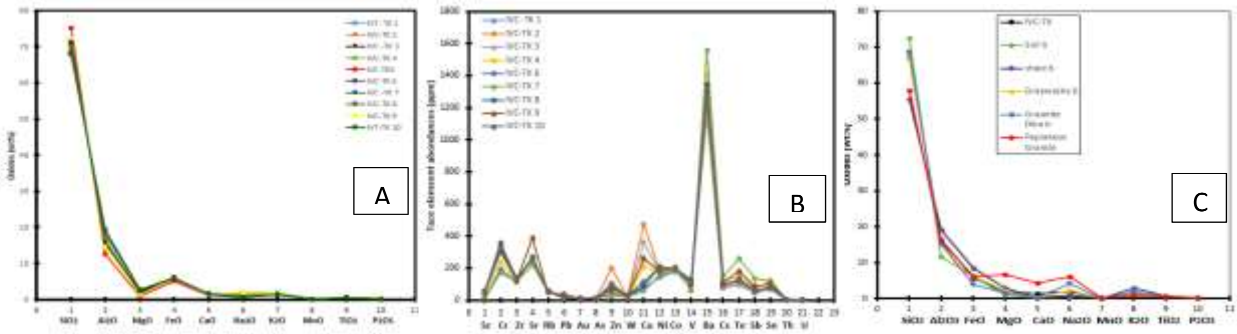

Fig 1 : Average major and trace element signature of Ivory Coast tektites. showing the homogeneity of major elements in of 9 selected tectiktes (A), the variation of some trace elements of 9 selected tectiktes (B), and major element of country rocks from Bosumtwi (C)(data from Bohama et al., 2002) compared to composition of 9 selected tektite from Ivory Coast

Discussion: The major element concentration in Ivory Coast tektite are relatively homogeneous. However, some trace elements (Cr, Sr, Zn, Cu and Te) show notable chemical heterogeneity (Fig. 1B). These chemical signatures are broadly consistent with reported geochemical data (Koeberl et al., 1997) and the observed scatter is well above the limit of detection of the portable XRF. The fact that highly refractory elements show a wide range of concentration indicate that heterogeneity of the source material, rather than impact metamorphism, is responsable for the range of concentrations observed for these elements. For instance, Zn ranges from 66 ppm to 103 ppm in brecciated greywacke and phyllite which dominate the geology around the crater, while Cr ranges from 241 ppm to 540 ppm in small dykes and pods of granitic intrusives. These chemical signatures could readily explain the ranges of variations of Zn and Cr in tektite.

Acknowledgements: The museum of SODEMI is acknowledged for granting access to their collection of tektites.

References

Artemieva, N., 2002. In: *Impacts in Precambrien Shields*, 257-276.
Bohama et al., 2002. *MAPS*, 42
Koeberl et al., 1997. *GCA*, 61
Luetke et al., 2007. *LPS* XXXVIII, Abst.