MAGNETIC PROPERTIES AND MICRO RAMAN SPECTROSCOPY OF A CENTRAL AMERICAN TEKTITE FROM BELIZE. V.H. Hoffmann[1,2], M. Funaki[3], J.H. Cornec[4], M. Kaliwoda[5], R. Hochleitner[5]. [1]Faculty of Geosciences, Dept. Geo.-Env. Sciences, Univ. Munich, Germany, [2]Dept. Geosciences, Univ. Tuebingen; [3]NIPR, Tokyo, Japan; [4]1867 S. Marion St., Denver CO 80210; [5]Mineralogical State Collection, Munich, Germany; Email: viktor.hoffmann@alice.de

Introduction

In 1994 first findings of tektite like glasses in Central America have been reported by [1] from archeological sites, Mayan ruins of Tikal, Guatemala. More recently, new findings of apparent tektites have been made in Belize, probably in situ, and the existence of a Central American tektite strewn field was announced [2,3], covering at least parts of Guatemala and Belize. In the 1990-ties two investigated Belize tektites gave an Ar-Ar age of 820 ± 40 ka [2-4], recently a slightly younger age of about 780 ka could be obtained by [5]. Both radiometric age constraints are indistinguishable from the ages of the Australite-Indochinite tektite strewn field (~770 ka). However, additional geochemical studies on Belize tektites reported different signatures as compared to the Australite-Indochinite tektites. The authors suggest a double impact or two timely close but separate impacts [6]. Pantasma structure in Nicaragua was proposed as a possible impact crater [7].

Samples and experiments

One first sample of a Belize tektite was investigated by magnetic means within our pilot study (fig. 1).

Fig. 1: Belize tektite under study.

Amongst many others studied, we focus on the following magnetic parameters in our report: NRM (natural magnetic remanence), IRM (isothermal magnetic remanences, acquired at various fields and field directions), magnetic susceptibility at various fields and frequencies).

The magnetic signature of the Belize tektite are compared with published and new original data obtained on tektites and other natural glasses such as impactites.

Additionally, optical microscopy and micro Raman spectroscopy were performed.

Results and interpretation

The NRM and IRM values (mass specific in 10^{-3} Am^2/kg) obtained on the Belize tektite (NRM: 7.96, IRM 19.9-26.4) were found to be much higher than those of the other tektites investigated or published so far (NRM in the range of 10^{-6} to 10^{-9}; IRM in the range of 10^{-4} to 10^{-7}). Our Belize tektite sample was artificially magnetized (hand magnet?) most likely before it came to our laboratory, so we could not get a real NRM value (NRM is an IRM in this case). Magnetic remanences can be carried only by ferro(i) magnetic phases being present in a sample under study which means that the Belize tektite should contain significant amounts on ferro(i) magnetic material (eg native iron or iron oxides; native iron blebs are known from other tektites). Optical microscopy showed numerous (sub-) micron-sized opaque particles, some of them could be native iron (under investigation). The NRM/IRM properties clearly discriminate our Belize tektite sample from all other known tektites to our best knowledge [own data and 8-10].

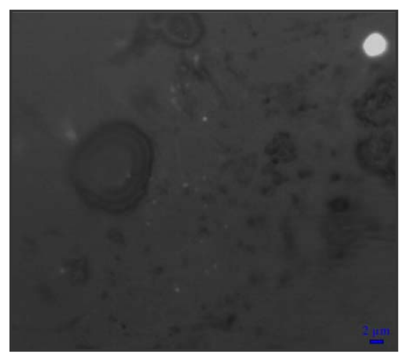

Fig. 2: (Sub-) micron-sized metal/oxide particles in the Belize tektite. Scale 2 µm.

Magnetic susceptibility value (137 10^{-9} m^3/kg, mass specific) of the Belize sample is also higher than that of most of the other investigated tektites and compares well with the values of the Tikal glasses/tektites [own data and 8-11]: Tikal glass mean value 120, range 109-134 [8], range of other tektites 40-117), reflecting the higher content of Fe-bearing phases in our sample (see above).

Summarizing, the magnetic signature of the Belize tektite significantly differs from the magnetic properties of the Australite-Indochinite tektites, details will be shown in our poster.

Preliminary results of micro Raman spectroscopy gave typical spectra of tektite-like glasses, however, we also found several additional features which need to be investigated in more detail.

It is obvious that results of only one tektite sample does not provide substantial data for further interpretations and conclusions, for example in terms of the potential exsistence of a new strewnfield or a link to the Australasian tektite strewnfield. However, as the magnetic signature of tektites within an individual strewnfield seems to be quite homogenous in general, and in combination with the reported differences in the geochemical signature [6], the hypothesis of separate (double?) impacts is supported presently by our results.

References

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