New data on the Belize tektites. V.H. Hoffmann[1,2], M. Kaliwoda[3], R. Hochleitner[3], J.H. Cornec[4],. M. Funaki[5]. [1]Faculty of Geosciences, Dept. Geo.-Env. Sciences, Univ. Munich, Germany, [2]Dept. Geosciences, Univ. Tuebingen; [3]Mineralogical State Collection, Munich, Germany ; [4]1867 S. Marion St., Denver CO 80210; [5]NIPR, Tokyo, Japan; Email: viktor.hoffmann@alice.de

Introduction:

New findings of apparent tektites have been made in Belize during the last years, probably in situ, and the existence of a Central American tektite strewn field was reported [1,2]. Two investigated Belize tektites gave an Ar-Ar age of 820 ± 40 ka [3,4], 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 in comparison to the Australite-Indochinite tektites. Pantasma structure in Nicaragua was proposed as a possible impact crater [6].

Methodology

A Belize tektite sample was investigated by magnetic means and LASER Micro Raman Spectroscopy within our pilot study.

A set of magnetic parameters has been studied: NRM (natural magnetic remanence), IRM (isothermal magnetic remanences), magnetic susceptibility (at various fields and frequencies). The magnetic signature of the Belize tektite will be compared with published and new original data obtained on tektites and other natural glasses [7].

A Horiba Xplora Integrated confocal LASER micro-Raman system was used; most of our investigations were performed with the 532 nm LASER. Magnifications were between 100 and 1000x, a long-distance 100x lens was used in general. Acquisition times were 3-5 sec with accumulation numbers of 2-5.

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?). Magnetic remanences can be carried only by ferro(i) magnetic phases being present in a sample. 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].

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).

LASER micro Raman spectroscopy gave the typical spectra of natural silica-rich glasses which are characterized by the following typical features [7], fig. 1: (i) Quite noisy signal showing more or less high background, (ii) high fluorescence background at higher wave numbers (from 1000 1/cm), (iii) two broad bands centred around 450-600 1/cm and 850-1100 1/cm

The high fluorescence background is an indicator of the high degree of amorphization. Additionally, sharp Raman bands are observed in the Belize tektite at higher wave numbers in some cases, similar to the features reported for example in impactites or fulgurites[7 and refs. herein].

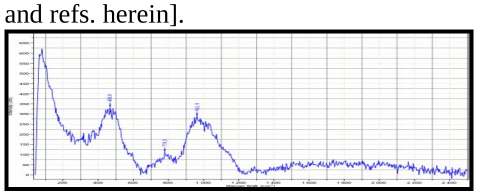

Fig. 1: Typical Raman spectrum found on a Belize tektite.

Currently a number of additional Belize tektites are under investigation within our project. We hope that this will provide a sufficient database to allow further interpretations and conclusions in terms of the potential existence of a new strewn field or a link to the Australasian tektite strewn field.

References

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