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GEOCHEMICAL STUDY OF TEKTITES AND MICROSPHERES AS INDICATORS OF METEORITE IMPACT AND THEIR COMPARISON WITH OTHER NATURAL GLASSES

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This work present the results of discovered *microspheres*, both of the present time (sediment of the Instituto de Geología, UNAM - IG-UNAM) and at the late Pleistocene period known as *Younger Dryas* (YD) (sediment of the Santiaguillo Basin in Mexico).

Tektites and microspheres, as well as other evidences of impact, have been very important to understand the geological and biological evolution in our planet, for this reason, their study is relevant as it contribute to the understanding of impact craters on Earth. In addition, the extraterrestrial (ET) microspheres can provide information about the conditions of the organic and inorganic material contained there, hence its relevance in prebiotic chemistry.

In this work, the finding of microspheres in sediments of similar age in other sites in Mexico is reported, which is why a methodology is also proposed for the search and study of microspheres in two sediments of different ages to compare these results with those of (Israde et al. 2012).

The main goal of this work was to look for microspheres in two sediments, one extracted from a depth that corresponds to the approximate age of the YD and another recent sediment. Bibliographic study of glasses of terrestrial and ET origin was carried out before to learn their characteristics and morphology and be able to recognize them.

The first sediment (YD) studied was obtained from a succession of sediments located in the Santiaguillo Basin (in northeastern Mexico), which were collected to a depth of 300 cm (Roy et al. 2015).

The other sediment of recent age was obtained from the roof of the IG-UNAM. The collection was done with a neodymium magnet, and manual separation with a optical microscope was done with any target that had the appearance of a micrometeorite.

In Figure 1 we present the microspheres that corresponds to: A) one of those discovered in the sediment of the Santiaguillo Basin, at a depth that can be associated to the YD period, which present a granular morphology; and B) one found in the present sediment built up at the roof of the IG-UNAM. This particle also presents a granular surface very similar to the previous one.

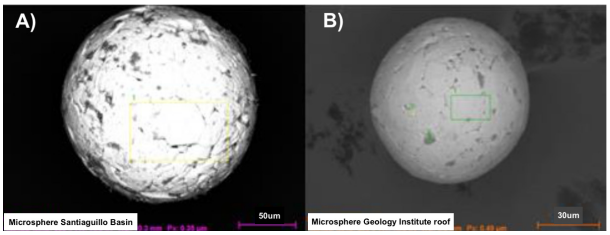

Fig. 1. SEM Images of two microspheres showing granular surface morphology: A) discovered in the sediment of the Santiaguillo Basin, and B) discovered in present sediment on the roof of the IG-UNAM, México.

The chemical composition of both microspheres was obtained using the electron microscope that found presence of nickel oxide (a very rare metal on the earth's surface and which is characteristic of meteorites).

In this work it was possible to separate the microspheres from sediment using the criteria of magnetism and external morphology. With the chemical composition, showing Ni oxides present, it is possible to conclude that they can be of extraterrestrial origin or produced by some meteorite impact. These results support the hypothesis of an impact event in the YD. By contrast, the microspheres found in the recent sediment layer appear to be anthropogenic or volcanic in origin.

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