A NEW TEKTITE STREWN FIELD DISCOVERED IN URUGUAY.

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Introduction: Tektites are a rare type of impact glass found on Earth in only four distinct strewn fields, namely Australasian, Ivory Coast, Central European, and North American, with ages ranging from 0.8 to 35.5 Ma [e.g., 1]. Central European tektites were first reported in 1788 [2], whereas the last strewn field to be described, the North American one, was discovered in the 1930s (in 1936; see [3]). Tektites resemble obsidian (and can be easily misidentified), but they have distinct petrographic (such as lechatelierite inclusions), chemical, and isotopic characteristics, as well as extremely low H_2O content.

Here we report, for the first time, on the finding of tektites from Uruguay, most of which were discovered by L.F. during fieldwork in December 2016. They are named "uruguaites" after their place of occurrence.

Methods: Macroscopic investigations were conducted on all samples collected in the field and on the very few samples that are in private and institutional collections. Petrographic investigations were completed using an optical microscope and a JEOL JSM-6610 SEM at the Natural History Museum Vienna (NHMV). Major element compositions were measured at the NHMV using a JEOL JXA-8530-F field emission gun electron microprobe. Major and trace element abundances were obtained using a ICP-AES Ultima 2 and an HR-ICP-MS Thermo Element 2 in Plouzané (France) and also by instrumental neutron activation analysis (INAA) at the University of Vienna. Strontium, Nd, and Os isotopic compositions and concentrations (via isotope dilution) were obtained at the University of Vienna by thermal ionization mass spectrometry (TIMS). Iron oxidation states and coordination geometry have been determined by X-ray Absorption Near Edge Spectroscopy (XANES) at the 4-1 beamline of the SSRL storage ring (Stanford, USA). Fourier Transform Infrared Spectroscopy (FTIR) data were collected at the Istituto Nazionale di Fisica Nucleare (Frascati, Italy).

Results and Discussion: The investigated samples are all black in color, with sizes ranging from 1.5 to 11 cm. They are mainly of splash-form with different shapes, including spheroids, ovals, tear-drops, dumbbells, and irregular ones, with pitted and/or flaked surfaces, and in a few cases show a streaky structure. In transmitted light the glass is pale brown in color. Lechatelierite inclusions, commonly oval or egg-shaped, but also irregular in shape (from a few tens of micrometers up to 3.5 mm in size), and rounded vesicles (in general less than 50 μm) can be seen, being rare to more common, depending on the sample. Chemically the investigated samples show no major variations even within one location. A typical sample has in average the following major element contents (in wt%): SiO_2: 69.8, Al_2O_3: 13.9, TiO_2: 0.69, FeO: 5.54, MnO: 0.08, MgO: 3.16, CaO: 1.86, Na_2O: 1.63, and K_2O: 3.05. The uruguaites have clearly distinct composition compared to the other known tektites, allowing to conclude that they are unrelated to them. Uruguaites have low Nd isotopes (εNd -15) [only Ivory Coast show lower values] but high Sr isotopes (εSr 430), forming a separate group, distinct from all other tektites. Based on the Sr-Nd results we can infer that the precursor material of the uruguaites was either a granitoid or sediments with a high Rb/Sr ratio. Os concentrations range from ~0.4 to ~1.4 ppb and $^{187}Os/^{188}Os$ varies between ~0.149 and ~0.396. While Os concentrations are higher compared to UCC by several orders of magnitude, $^{187}Os/^{188}Os$ isotope ratios are significantly less radiogenic compared to UCC, down to near-chondritic values. Thus, it might be reasonable to assume that the obtained Os signature reflects, at least in part, a meteoritic admixture; this agrees with elevated Co, Ni, and Ir contents and corresponding near-chondritic interelement ratios. Water contents obtained for three samples range between 40 to 49 ppm, well within the range for tektites from the other four known strewn fields. Fe redox ratios are also perfectly compatible with published data on tektites [$(Fe^{3+}/(Fe^{2+}+Fe^{3+})$ ratios ranging between 0.06 to 0.09 ± 0.05]. The computed density (using major element composition) of 2.476 g/cm^3 falls within the range of published data for the other tektites. ^{40}Ar-^{39}Ar dating is currently in progress. However, based on the fieldwork, as they were exclusively recovered from Cretaceous rock units, we can already ascertain that they are the oldest known tektites. The extension of the strewn field is not yet defined, but based on field work so far at least 230 km wide.

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