**Soil composition inside the possible crater in Bolivia, Iturralde: Material implying impact event of low density meteorite.** K. Malkova[1], G. Kletetschka[1,2], A. West[3], T. Bunch[4] and J. Wittke[4], [1]Charles University in Prague, Faculty of Science, Prague, Czech Republic, kamila.malkova@gmail.com [2]Institute of Geology, Academy of Science of the Czech Republic, v.v.i., Prague, Czech Republic, kletetschka@gmail.com [3]GeoScience Consulting, Dewey, AZ 86327, USA, [4]Geology Program, School of Earth Science and Environmental Sustainability, Northern Arizona University, Flagstaff, AZ 86011

**Introduction:** The Iturralde structure, also called Araona crater, is located in the NW part of Bolivia in a region near the Beni River, about 200 km east from the Andes Mountains and about 400 km east from Cuzco, Peru. This region is relatively flat with marshes, savannahs and rain forest. The age of the structure is estimated to be between 11,000 and 30,000 calendar years.

**Location:** Iturralde was discovered recently thanks to images from the LANDSAT 7 satellite. Analysis of the satellite images revealed a circular structure, 8 km in diameter, with marginal differences in altitude (rim-center ~ 20 m). Given that the area has a low incidence of earthquakes, the structure has been proposed to have resulted from a meteorite impact, but this is not yet confirmed. In the surroundings, there are high-energy water drainages, whose relationship with the studied structure is unknown. The structure is along the boundary between savannah and rainforest.

**Material and method:** Samples were collected from areas with both vegetation types during an expedition in 2002 (Ice2002 [1]). Specifically, in the area of savannah, a total of 116 usable samples in the depth from 0 to 430 cm was collected. From the area of rainforest, a total of 50 samples from the depth between 0 and 270 cm was collected; the forest profile is ~30 cm deeper than the savannah one. Samples in two profiles were tested for magnetic susceptibility. Magnetic susceptibility ranged from negative 95.57x10-8 SI units (diamagnetic) for samples with high content of silica, and positive 7354.24x10-8 SI units for samples with high ferromagnetic and paramagnetic content. Magnetic susceptibility values from the savannah for depths between 250 cm and 430 cm show a similar range of intermediate values, indicating rather constant sedimentary conditions. Samples from the savannah at depth >300 cm show signs of gleization. The results indicate a correlation between both profiles at depths close to 2.5 m where both show a lowering of susceptibility, indicating a sudden major change in sedimentation. Magnetic grains were extracted from sediment slurry made from each sample (on average 0.23 g/kg) following the standard procedure of [1], using a grade-42 neodymium magnet.

**Results:** Light microscopy revealed tiny clusters composed of many glass beads in peak abundances of up to 90 clusters per 1 kg at depths of 265 and 355 cm. Some glassy fragments contain hundreds to thousands of bead clusters of almost sub-micron sizes, and the total number of such spheres is estimated as millions per kg. About 90% of the beads are rich in oxides of Al-Si-Ca-Fe with up to 4.4% TiO2. The rest are mostly iron-rich beads with small amounts of Al and Ca.

**Discussion:** Measurements and analysis provide initial evidence supporting the hypothesis that the Iturralde structure may have formed during an explosion (airburst) as a result of atmospheric impact by a low density extraterrestrial body [2]. For an airburst to have occurred, the extraterrestrial body must have been small enough and/or possessed low enough density (e.g. porous ice or stone) that made it unable to penetrate the atmosphere and reach the earth's surface to form a classical impact crater. If so, the impactor would have encountered the atmosphere at velocities of approximately 20-50 km/s, and the released energy of the airburst would have been comparable to or greater than any known nuclear explosion. Extreme heat created by such atmospheric disruption would have formed convection cells that lifted the surface unconsolidated material into the fireball, where it melted and subsequently settled to Earth in the form of glass beads. The hypervelocity plume of such an airburst could have reached the ground and created the bowl-like feature visible today from the satellite. Similar bowl-like features have been observed during aerial nuclear explosions, such as the Trinity atomic detonation in 1945 [2].

**Conclusion:** At this point, we cannot completely rule out the possibility that the Iturralde structure formed under other natural circumstances unrelated to an impact. However, in that case, the presence of millions of delicate clusters of beads in the Iturralde sediment suggests that a meteorite impact occurred close to the present structure.

**Acknowledgement:** NASA/GSFC, MUSEO NOEL KEMPFF MERCADO, CONSERVATION INTERNATIONAL, NASA MU-SPIN, CASEWEST

VIRGINIA, BLUE ICE INTERNATIONAL, MSMT grant LK21303

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