

MAMMOTH DISCOVERY: PALEONTOLOGICAL AND GEOPHYSICAL EVIDENCE FOR TIMING AND SEQUENCE OF KARSTIFICATION AT SISTEMA ZACATÓN, MEXICO

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Defining the timing of karstification in a specific geologic setting is often a challenging task. Isotopy, sediment deposition, paleontology, geologic super-position and geomorphology are among the tools used to provide clues when understanding when a particular karst system formed. The cenotes of Sistema Zacatón are perhaps the deepest underwater shafts. The period of their formation had been constrained to only within the last 1.5 million years, when volcanic activity dominated the nearby landscape. The sinkholes are hypogenic - formed by volcanic gasses. Following the opening of many sinkholes in Sistema Zacatón, a secondary phase of travertine deposition sealed expansive water-filled voids beneath a 2-5 meter thick crust of rock as demonstrated by electrical resistivity data and cave diving. In June 2006 while conducting geophysical surveys of some of the sealed cenotes, vertebrate fossils were found in travertine, previously mapped as Cretaceous limestones, adjacent to the sinkhole Poza Seca. These fossils have been identified as belonging to the genus, *Mammuthus*, as identified by the molar and tusks that were located. The significance of this discovery relates to the lithology of rocks that pre-date sinkhole development to the surface and subsequent collapse. The fossils are lithified in dense travertine deposited by hydrothermal springs and the sinkholes and dry caves in the system have formed within this travertine, thus major dissolution and collapse episodes at Sistema Zacatón must have occurred coincidentally or following this travertine formation. *Mammuthus* distribution in Mexico is predominant in the late-Pleistocene, as recent as 10,000 years b.p. The identification of these fossils may provide accurate timing of the formation of this impressive karst system.