

## **ELECTRICAL RESISTIVITY IMAGING OF TRAVERTINE-CAPPED SINKHOLES: DEEP LAKES WITH LIDS**

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Sistema Zacatón, a karst area in northeastern Mexico known for deep phreatic shafts and hydrothermal water, also displays a unique travertine morphology. Some of the sinkholes are dry or contain shallow lakes with flat travertine floors; other deeper water-filled sinkholes have flat floors without the cone of collapse material commonly observed in these types of shafts. We hypothesized that these floors may have large water-filled voids beneath them. A geophysical expedition in June 2006 at Sistema Zacatón tested the application of electrical resistivity imaging (ERI) to image the hypothesized voids. Three separate travertine caps were imaged using ERI; 1) around the cenote La Pilita, which is open, exposing the structure of the cap over a deep water-filled shaft; 2) the dry sinkhole Poza Seca; and 3) the 240-meter diameter sinkhole Tule, which contains a very shallow lake. ERI at La Pilita tested the morphology of travertine surrounding this 110+ meter deep cenote. The existence of some water-filled void spaces interpreted from ERI data are verified by SCUBA diving exploration and new voids are inferred. Two ERI lines at Poza Seca demonstrated a thin (<2 to 4+ meter) layer interpreted as the travertine cap with a conductive region (consistent with the resistivity of water) under the layer extending to at least 25 meters depth beneath the cap. No lower boundary of the void is evident in the ERI data. A survey line at Tule was conducted that also produced geophysical evidence of a large water-filled void beneath a thin (<2 to 4+ meter) cap. A deep, higher resistivity layer indicates a flat lower boundary 45 meters deep that may be a second cap, similar to one that exists at another open cenote, Verde. These findings support the hypothesis and may have implications for paleo-climate models of the late Pleistocene. The capped voids may provide habitats for anoxic bacteria to evolve for a significant period of time in isolated thermal environments.

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