

Geochemical characteristics of Late Pleistocene-Holocene environmental changes: Evidence from Lake Tecocomulco, central Mexico

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Across the basin of Mexico, exists both rainfall (400-800mm/a) and topographic (2450-2240m a.s.l.) gradient from north to south. Across this gradient, a number of relict endorheic lakes are present. Late Pleistocene-Holocene environmental changes documented in a 2.5m sediment core from the margin of lake Tecocomulco (19° 53' N, 98° 23' W) located in north-eastern part of the basin of Mexico (630mm/a) are investigated by integrating the information obtained from lithostratigraphy, multiple element geochemistry, mineralogy, diatom and pollen analysis.

The events of volcanic activity are documented by high K-series, dacitic-rhyolitic air fall tephra that pre date the LGM (ca.31ka ¹⁴C and ca.27.8ka ¹⁴C B.P.). The calcite (CaCO₃) enriched laminas, Sr/Ba peaks, low clastic input and lower chemical weathering in the catchments suggest that the lake desiccated for sometime during ca. 22ka ¹⁴C and ca.16.3ka ¹⁴C B.P. These arid events are correlated with the shallow lake levels at lake Chignahuapan (Lozano-Garcia et al., 2005) and lake Chalco (Caballero and Ortega-Guerrero, 1998) of basin of Mexico and the glacial advances in the Nevado de Toluca (Va'zquez-Selem and Heine, 2004). Between the two arid events, the intercalations of gravelly-sand and thin carbonate laminas suggests that the lake hydrology was fluctuating between desiccation and high energy inflow. Our results suggest a hiatus in sedimentation between ca.16.3ka ¹⁴C B.P. and ca. 3.5ka ¹⁴C B.P. At ca. 4ka ¹⁴C B.P., a marshy shallow water condition (dry event) is reported in the sediment profile of lake Chalco (Lozano-Garcia et al., 1993). Taking into consideration the proximity of lakes Tecocomulco and Chalco and location of our sediment-core at lake margin, we doubt that this regional arid condition might have eroded the stratigraphic record leading to absence of documented paleohydrological information in Tecocomulco. The presence of halloysite, higher abundance of metals and pollens of herbaceous taxa suggests that the present warm and relatively humid condition was established since ca. 3.5ka ¹⁴C B.P.

Key words: Quaternary, Paleo-environment, Tecocomulco Lake, Basin of Mexico, Geochemistry