Late Holocene Paleoclimatology and Paleolimnology inferred from Geochemical characteristics of laminated sediments from the Santa Maria del Oro Lake, Nayarit, western Mexico

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Santa Maria del Oro (21.3° N, 104.5° W, 760 m a.s.l) is an endorheic fresh water crater lake located in the transitional climatic zone between arid northern Mexico and the semi-arid-humid highlands on the Trans Mexican Volcanic Belt (TMVB). Due to its geographical position in a climatically sensitive region, multy-proxy analyses on the laminated lacustrine sediments were performed to resolve the paleo-hydrological cycle and hence climatic fluctuation and latitudinal shifting of the Intertropical Convergence Zone (ITCZ) and subtropical anticyclone belts during the last 2,500 years. Analyzed proxies include multiple element analysis, magnetic susceptibility and stable isotopes ($\delta^{13}C$, $\delta^{18}O$) and trace elements (Sr, Ca and Mg) on ostracod valves.

The geochemical proxies suggest that the Santa Maria de Oro is behaving as an hydrologically closed lake since the last 1,500 calendar years. During the Pre-Classic and the early and middle Classic (600 BC to 600 AD) Santa Maria del Oro received higher inflow. From 600 AD onwards, the climate became gradually drier, reaching the most evaporative stage by 986 AD. This event is characterized by low indices for chemical weathering and higher eolian influx and corresponds to the Terminal Classic Period. During the subsequent stage (until 1250 AD), the lake received higher inflow and less evaporation suggesting a match with the Medieval Warm Period. From 1256 to 1473 AD the fluctuating palehydrology suggests instable climate. The climate was stable and humid at ca. 1470-1650 AD. At the end of this stage, a trend to drier and high evaporation/precipitation conditions is recorded until the present. The findings of tjis work are consistent with other proxy records in Central Mexico (Caballero et al. 2002, 2006; Metcalfe 1995, Metcalfe and Hales 1994, O'Hara et al. 1993), Yucatan Peninsula (Curtis et al. 1995, Hodell et al. 1995, 2001, 2005a,b) and Cariaco Basin (Haug et al. 2001, 2003) and may confirm that these environmental changes can be associated with latitudinal shifts of the ITCZ and the seasonally displacement of the subtropical anticyclone belts, resulting in the strengthening or weakening of the summer monsoon, which is the main moisture source for western Mexico.

Keywords: Holocene, Paleoclimate, Geochemistry, Santa Maria del Oro, Mexico