HOLOCENE VARIABILITY OF THE NORTH AMERICAN MONSOON: DIATOM-BASED EVIDENCE FROM LAKE SEDIMENTS IN WESTERN MEXICO.

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We present a multi-proxy sediment record from Laguna de Juanacatlán, Jalisco (20°37'N, 104°44'W), in the western fringes of the Trans-Mexican Volcanic Belt. The lake lies in the core of the North American Monsoon region, with more than 80% of precipitation occurring between May and October. Whilst the Pacific Ocean is the dominant influence, moisture originating from the Gulf of Mexico / Atlantic is also important. This unique sedimentary archive provides an opportunity to investigate long term changes in monsoon intensity during the Holocene. High-resolution X-ray fluorescenc (XRF) analysis, magnetic susceptibility and organic geochemistry are combined with diatom species data and oxygen isotope analysis of diatom silica to provide a multi-proxy reconstruction of climate variability.

Laguna de Juanacatlán lies at c. 2000 m a.s.l. and has a maximum depth of c. 28 m. Periodic monitoring has revealed that the lake is consistently thermally and chemically stratified. Its waters are of calcium-magnesium-bicarbonate composition, with a pH of c. 8.5 and electrical conductivity of 105 µS cm^{-1}. Lying in a remote, mountainous area, the lake has experienced minimal human impact, meaning that the climatic signal should not be obscured by anthropogenic disturbance.

A 7.8m composite sequence of finely laminated sediments provides an annually resolved record spanning the last 6000 cal yrs BP. Laminations are composed of alternating minerogenic and organic-rich diatomaceous layers. Downcore diatom assemblages are dominated by *Discostella stelligera*, *Aulacoseira granulata* (+ var. *angustissima*), punctuated by brief periods of dominance by *Nitzschia palea* at 1000 cal yrs BP and 3200 cal yrs BP, reflecting increased nutrient concentrations. *Synedra* spp. become more important after 1000 cal yrs BP, being replaced by *Fragilaria crotonensis* in the most recent sediments. These taxa are also found in significant numbers between 5000 and 6000 cal yrs BP. Diatom species changes are best explained in terms of fluctuations in nutrient and light availability rather than ionic composition or concentration. Diatom-based oxygen isotope values are higher between c. 1600 and 6000 cal yrs BP, oscillating between 29 and 32 ‰, whilst during the last 1600 years, variability increases along with a shift to generally lower values. This is interpreted as a trend towards wetter conditions but with greater variability in monsoon intensity.