Reconstructing human-environment interactions in the Maya lowlands using lipid biomarkers

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The lowland Maya of Mesoamerica were affected by multiple environmental stresses throughout their history, and in some areas experienced a major demographic and political decline, or collapse, during a period of inferred intense multidecadal drought, approximately 1200- and 1000-years BP. Given regional variation in the timing and character of the collapse, much remains to be discovered about the complex interactions between climate and society in the Maya lowlands. To this end, we combine carbon and hydrogen isotopic analyses of leaf wax n-alkanes with quantification of faecal stanols and polycyclic aromatic hydrocarbons from a lake sediment core from the southwest lowlands to assess whether (1) palaeoecological evidence of land use is related to population change; and (2) whether population and land use are linked to changing precipitation. Our data reveal a transition from generally more intense fire use and C4 plant agriculture during the Preclassic (3500–2000 BP) to dense populations and reduced fire use during the Classic (1600–1000 BP). This is consistent with other evidence for a more urbanised and specialised society in the Classic. We do not find evidence of drought in the hydrogen isotope leafwax record (δ Dlw), implying that local drought was not a primary driver of observed variability in land use or population change in the Classic-period southwestern lowlands. We present preliminary data from lake sediment cores from the northern lowlands.

Keywords: palaeoclimate, biogeochemistry, lipid biomarkers, human-environment, Maya Lowlands, palaeolimnology

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