Mangrove leaf species-specific isotopic signatures (*n*-alkane δ^2H and $\delta^{13}C$) along salinity and soil fertility gradients in the Shark River estuary, USA

DING HE[1,*], S. NEMIAH LADD[2], JULIAN P. SACHS[3], RUDOLF JAFFÉ[4], VICTOR H. RIVERA-MONROY[5]

[1] School of Earth Sciences, Zhejiang University, Hangzhou, China
[2] Swiss Federal Institute of Aquatic Science and Technology, Seestrasse, Switzerland
[3] School of Oceanography, University of Washington, Seattle, USA
[4] Department of Oceanography and Coastal Sciences, Louisiana State University, Baton Rouge, USA
[5] Department of Chemistry & Biochemistry, Florida International University, North Miami, USA
[*]Corresponding at dinghe@zju.edu.cn

Mangroves represent distinct monospecific or mix-species assemblages used as classification criteria to evaluate biogeochemical cycles at the local, regional and global scales. However, it is not clear how leaf wax *n*-alkane $\delta^{13}C$ and δ^2H values, vary across and within species when exposed to the interaction between stressors (i.e. salinity) and nutrient (phosphorus-P) availability. Here we present a clear spatial differentiation (with a salinity gradient of 31 parts per thousand) of $\delta^{13}C$ and δ^2H values of green canopy leaves of three Atlantic-East Pacific mangrove species (*Rhizophora mangle*, *Laguncularia recemosa* and *Avicennia germinans*), the dominant species in the Shark River estuary, where a well-defined soil P gradient exists.

Significant variation in δ^2H values was observed among these three mangrove species, with increasing *n*-alkane $^2H/^1H$ fractionation with increasing salinity. Net $^2H/^1H$ fractionation for *n*-C_{31} alkane increased by 0.8, 1.4 and 1.8‰/ppt in *R. mangle*, *A. germinans* and *L. racemosa*, respectively. Meanwhile, although *R. mangle* showed an positive relationship between location and *n*-C_{31} $\delta^{13}C$ values, an negative relationshipi was observed in *L. racemosa*. Significant differences in *n*-alkane $\delta^{13}C$ linear model parameters underscore clear distinctions in eco-physiological adaptations to nutrient availability and salinity gradients between the species.

With the well-defined species spatial distribution of leaf wax *n*-alkane δ^2H and $\delta^{13}C$ values, we propose that these values could serve as a salinity proxy for paleoclimate reconstruction, especially for Rhizophora lipids.