Poster 29

Seasonal dynamics of the stable isotope ($\delta^{18}O$, $\delta^{13}C$) composition of modern ostracodes in a large tropical lake (Lago Enriquillo, Dominican Republic)

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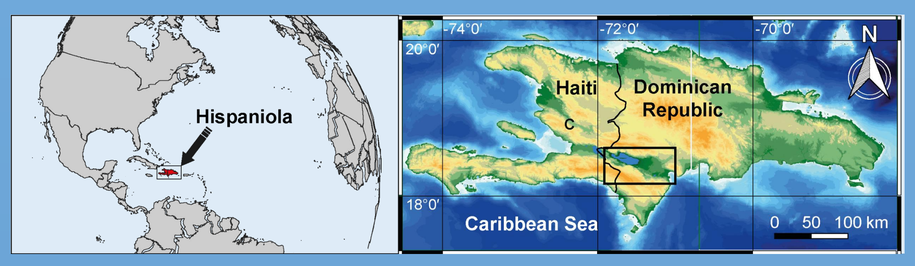
Introduction & Approach



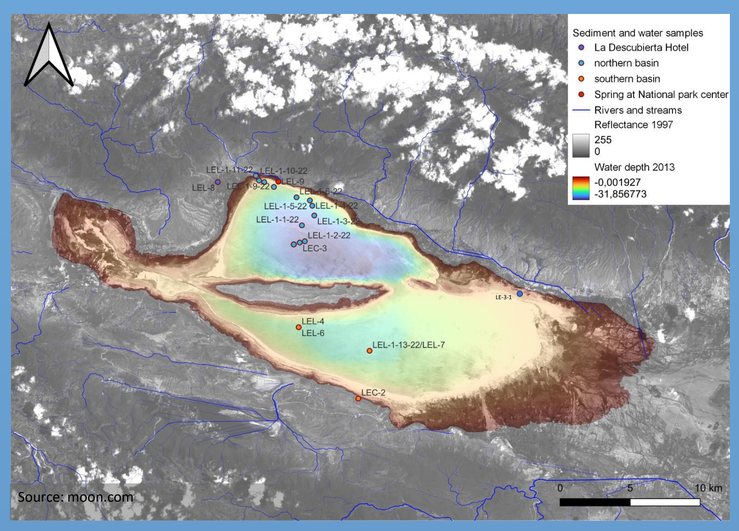
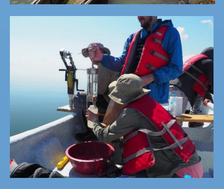


Fig. 1: Overview of the Enriquillo valley and its major water basins.



Stable oxygen (O) and carbon (C) isotope records are widely used for paleoenvironmental reconstructions based multiple ostracode specimens to obtain an average $\delta^{18}O$ value that reflects the mean temperature and $\delta^{18}O$ of lake water over the life spans of the combined single valves. This approach ignores, however, information of seasonal environmental variability that is implied by the short and variable life history of ostracodes. Seasonal weather patterns of tropical areas such as the Caribbean region are broadly divided into dry and rainy seasons with often profound effects on hydrological and ecological conditions. How this hydrological seasonality is archived by ostracode stable isotopes ($\delta^{18}O$, $\delta^{13}C$) is, however, poorly documented.

The approach:

Ostracode life cycle (*Cyprideis* spp.) = timing of calcification

+

Seasonal variation of lake water hydrochemistry and $\delta^{18}O$, $\delta^{13}C$

+

Seasonal variation of valves (i.e., $\delta^{18}O$, $\delta^{13}C$)

=

Understanding of the influence of changes between dry and rainy season on lake water and ostracode valve $\delta^{18}O$ and $\delta^{13}C$

Results & Interpretation

Seasonal variation of physico-chemical parameters of Lago Enriquillo

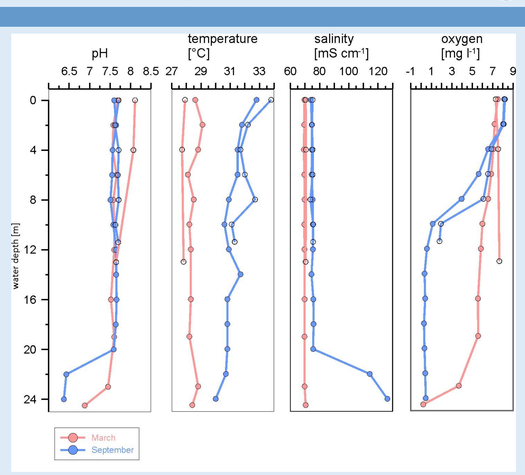


Fig. 2. Variations of pH, temperature, salinity, and oxygen of Lago Enriquillo in March and September 2022.

- Seasonal differences generally low
- Only the profundal (>20 m) shows large differences in salinity
- Oxygen minimum zone is in September extended up to 10 m

Seasonal variation of ostracode species distribution

- Only three species are currently living in the lake
- Ostracodes (living and valves) are restricted to the upper 10 m of the lake
- *C. similis* occurs the entire year with two generations (i.e., morphotypes)
- Seasonally restricted occurrence: *T.* cf. *sarbui* (dry season) and *P. cribrosa* (wet season)

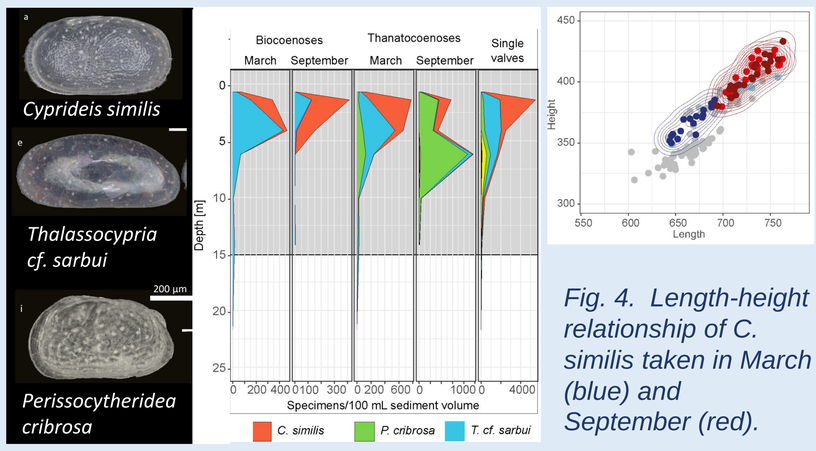


Fig. 3. Variations in the vertical distribution of ostracode species currently living in Lago Enriquillo in March and September 2022.

Fig. 4. Length-height relationship of C. similis taken in March (blue) and September (red).

Stable oxygen and carbon isotope signatures

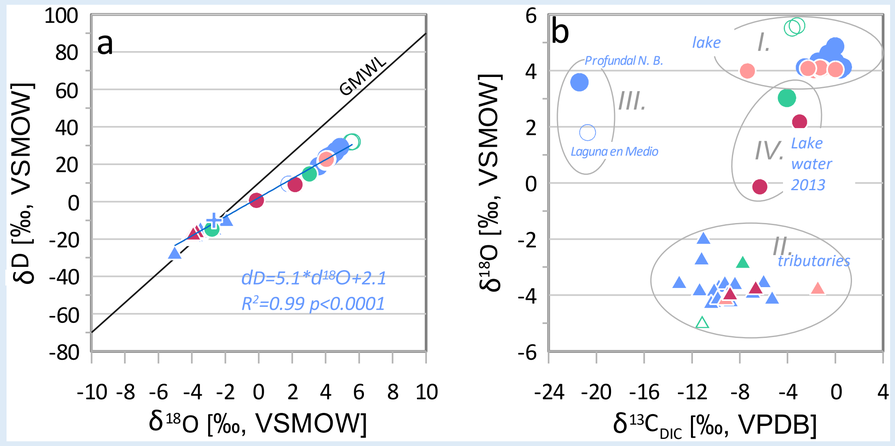


Fig. 5. a) $\delta^{18}O$ vs. δD of lake and input waters of Lago Enriquillo reflecting the local evaporation line. b) $\delta^{18}O$-$\delta^{13}C_{DIC}$ cross plot of water samples showing different groups of isotope signatures.

- Intense evaporation is a major control on $\delta^{18}O$ values of lake water
- Interannual variation is larger than seasonal changes between dry and rainy season

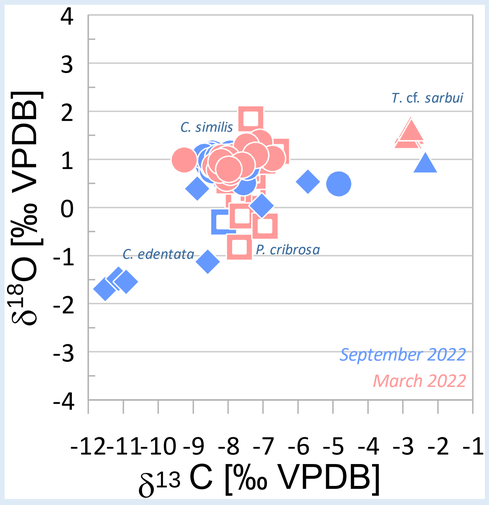


Fig. 6. Oxygen and carbon istope signatures of ostracode valves of the three species C. edentata, C. similis, T. cf. sarbui taken in March and September 2022.

- Species reflect low seasonality
- Strong interspecific differences in $\delta^{13}C$

Conclusion

- Lake Enriquillo shallower water reflects low seasonal changes (i.e., dry and rainy season)
- Ostracode species which are restricted to the upper 10 m calcify at different times, either dry or rainy season
- *C. similis* provides seasonal size morphotypes
- Stable oxygen isotopes vary little seasonally, stronger interannually
- Stable carbon isotopes differ between the species and may reflect spatial variability of $\delta^{13}C_{DIC}$ of the lake water

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