

Mollusk shells and carbon and oxygen stable isotope as indicators of environmental changes in the Patos Lagoon, RS, Brazil



Carla Ennes de Barros*, Ricardo Baitelli*, Pedro Costabile de Souza*, Beatriz Appel Dehnhardt* & Cristiane Bahi dos Santos*

*Universidade do Federal do Rio Grande do Sul

The study addresses the sediment analysis of the core Pt-06 (3.3 m), obtained in the Patos Lagoon interior (31°16' 45"S, 51°26' 36"W). About of 0.25 g unconsolidated sediments were collected from intervals of 10 cm along the core. The biogenic fraction is represented by *Heleobia australis*, *Heleobia* sp., *Erodona mactroides*, *Caryocorbula caribaea*, *Caryocorbula* sp., *Tawera gayi*, *Acteocina bidentata*, *Mytella* sp., *Brachidonte* sp.; associated with shell fragments. On these shells, carbon ($\delta^{13}\text{C}$) and oxygen ($\delta^{18}\text{O}$) stable isotope analysis were made. The bottom core (3.3-2.4 m depth) does not have preserved mollusk shells, only fragmented ones were recorded at 3.3 m and 2.5 m. At 3.3 m, the $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ values are 1.61 and 0.68, respectively, and the estimated temperature is about 14°C (3.3 m) and 21°C (2.5 m). At the interval of 2.3-1.3 m, marine species of *T. gayi*, *A. bidentata*, *Caryocorbula* sp. and *Brachidonte* sp., and marine/mixohaline species of *H. australis* and mixohaline *E. mactroides*. The $\delta^{13}\text{C}$ values varying from -1.15 to 0.87 and the $\delta^{18}\text{O}$ values varying from -1.39 to 0.40 are recorded. The estimated mean temperature calculated for the interval is about 18°C. At the interval of 0.5-1.2 m, mollusk shells were not recorded, however, shell fragments occur at 0.8 m depth. The $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ values are -1.12 and 0.42 m, respectively, and the estimated temperature calculated is 15°C. Mixohaline species of *E. mactroides* and marine/mixohaline species of

H. australis occurs in the upper core (0.3-0.5 m). The $\delta^{13}\text{C}$ isotope analysis varying from 0.27 to -0.91 and the $\delta^{18}\text{O}$ varying from -1.00 to 0.61, and the mean temperature estimated is 21°C. The interval of 3.3-2.4 m corresponds to a non-fossiliferous transitional zone. Shell fragments occur at the base associated with positive values of $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$, and the estimated temperature is about 14°C, which may be related to a marine zone. The shell fragments recorded at 2.5 m show negative values of $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ and a relative elevated temperature of 21°C, showing a mixohaline environment. From 2.4 to 1.3 m, a predominance of shallow marine fossils, however at depths of 2.1 and 1.3 m mixohaline fossils occur, showing the proximity of a fluvial drainage or fluvial influence, that is clear on these periods. The middle/upper core (0.5-1.2 m) show a zone with no mollusk fossils. Only shell fragments occur at a depth of 0.8 m, with $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ values characteristic of a marine environment, and estimated temperature of 15°C. The shallow marine environment is overlain by a mixohaline environment at the interval of 0.5-0.3 m. Marine and mixohaline fossils occur altogether, showing a new sub-environment. A mix of marine and mixohaline shells helps us to understand the fingerprints of sea-level variations on its coast, and also the evolution of lagoon-barriers along the southern Brazilian coast.

