

Implications of ostracod preservation in Holocene paleoenvironmental reconstruction of Lake La Brava (Argentina)

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The Pampean plain (Argentina) is a flat and low area with an altitude between 80-400 masl extending to the south up to 40°S and sprinkled with several thousand shallow lakes called [i]lagunas[/i]. Two factors make the Pampean plain an important site for reconstructing past environmental changes. First, moisture is mostly controlled by the subtropical low-level jet associated to the South America Monsoonal System (SAMS), and represents the austral border of the subtropics, a very sensitive area to past atmospheric circulation changes. Second, [i]lagunas[/i] represent sedimentary archives of subtropical mid-latitudes of South America where the reconstruction of Holocene environmental variability have been hampered by the paucity of complete and well-dated paleoclimate archives. Hence, the paleoenvironmental analyses of the sedimentary record of the [i]lagunas[/i] allow to reconstruct regional climate variability and past activity of the SAMS. The [i]lagunas[/i] tend to be alkaline lakes that preserve biogenic carbonate, potentially allowing the reconstruction of past changes in moisture balance by analyzing ostracod assemblages recovered from sediment cores. La Brava (37°52'S - 57°58'W; 69 masl) is a bicarbonate-sodium oligohaline laguna (4.5 km²; 4.8 m depth). Ostracod, geochemical and sedimentological analyses were performed in core Br4 (551 cm) in order to reconstruct paleoenvironmental and paleohydrological conditions since the Mid Holocene. Surprisingly, up to one third of the samples lack ostracods. In fertile samples, five species were recorded. [i>Limnocythere[/i] sp. aff. [i>staplini[/i], a highly euritopic species, is by far the most abundant and sometimes the only species recorded, providing more than 90% of shells. As a consequence, ostracods of core Br4 are taxonomically monotonous, and diversity is extremely low, allow inferring at best salinities lower than 4‰ and alkaline waters. Thus, classical paleoecological approach fails in allow a precise reconstruction of the paleohydrological state and evolution of the lake. However, if the pattern of ostracod distribution is considered together with geochemical proxies, the presence/absence of ostracods can be interpreted as a signal of conditions that allow/preclude the preservation of biogenic carbonate, and thus more paleoenvironmental information can be obtained. Abundance of ostracod valves tracks TIC and Ca content. Decomposition of organic matter and a decrease in the pH related to the establishment of eutrophic environments could have promoted the dissolution of ostracod valves. Relations between TOC and TS confirm this hypothesis. We can infer that La Brava experienced significant environmental changes in the last 4700 years. Varying environmental conditions were related to alternating phases of moderate productivity and well oxygenated bottom waters, and phases of high productivity and oxygen depletion, which drive the calcite record promoting dissolution/preservation of calcite and therefore of the ostracod fauna.