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Response of two Mediterranean coastal wetlands (Corsica, France) to Holocene relative sea-level rise and land-use changes revealed by fossil Coleoptera records

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Coastal wetland-based archives have an exceptional scientific potential to observe past biodiversity changes and identify key thresholds for particular ecosystems facing relative sea-level rise (RSLR). In this presentation, we focus on the fossil Coleoptera analysis – supplemented by pollen and geochemical data – of two 14C-dated cores from Corsican back-barrier wetlands: the Grecu pond located on a low-laying island (S. Corsica) and the Cannuta marsh situated on a deltaic floodplain (N. Corsica).

The respectively 7000- and 5900-year sedimentary records from the two sites show contrasted ecosystem trajectories, stemming mainly from their different geomorphological features. Regarding the Grecu pond, by comparing the beetle fauna present on the island today with fossil beetle assemblages, we find that 60% of past wetland beetle fauna became locally extinct because of the increase in salinity caused by marine intrusions. Most of this diversity loss occurred 3700 years ago, when relative sea-level reported in the region was at ~-1.5 meters. These local extinctions have been exacerbated by the aggravation of human pressures over the last decades, with the artificial reduction of the wetland surface area. Regarding the Cannuta marsh, fluctuations of calcium and sulphur (used as tracers of Gypsum), show evolution from a brackish lagoon to a freshwater environment. This transition, marked by a diversification of wetland beetle fauna 1000 years ago, is possibly due to relative sea-level stability and floodplain progradation. It is consistent with evidences of soil erosion (inferred from titanium abundance) and of pastoral practices in the watershed.

We demonstrate the efficacy of fossil beetles for reconstructing the environmental changes in coastal lagoon ecosystems, their resilience, and their response to the Holocene RSLR in the western Mediterranean. This retrospective approach also provides a foreshadowing of potential future insect diversity changes along Mediterranean coastal lagoon ecosystems.