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► To cite this version:

Poher Yoann, Philippe Ponel, Frédéric Guiter, Tachikawa Kazuyo, Frédéric Médail. Impacts of sea-level rise and responses of Mediterranean coastal wetland biodiversity: lessons from fossil insect assemblages. INQUA-PAGES Conference for Early-Career Researchers – Impacts of sea-level rise from past to present, Aug 2018, Utrecht, Netherlands. hal-01910969

HAL Id: hal-01910969

<https://amu.hal.science/hal-01910969v1>

Submitted on 2 Nov 2018

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Impacts of sea-level rise and responses of Mediterranean coastal wetland biodiversity: lessons from fossil insect assemblages

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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. In this presentation, we focus on the multiproxy analyses (palaeoentomology, palynology and geochemistry) 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. 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.

This retrospective approach provides a foreshadowing of potential future insect diversity changes along Mediterranean coastal lagoon ecosystems. We discuss the implications of these findings in terms of resilience and conservation strategies to minimise coastal wetland losses.