EGU2020-17636
https://doi.org/10.5194/egusphere-egu2020-17636
EGU General Assembly 2020

Response of benthic species to post-glacial sea-level rise on the northern Adriatic shelf revealed by stratigraphic unmixing of fossil assemblages

Rafał Nawrot[1], Daniele Scarponi[2], Adam Tomašových[3], and Michał Kowalewski[4]
[1]Department of Palaeontology, University of Vienna, Althanstrasse 14, Vienna 1090, Austria (rafal.nawrot@univie.ac.at)
[2]Dipartimento di Scienze Biologiche, Geologiche e Ambientali, University of Bologna, Via Zamboni 67, 40126 Bologna, Italy
[3]Earth Science Institute, Slovak Academy of Sciences, Dúbravská cesta 9, Bratislava, 84005, Slovakia
[4]Florida Museum of Natural History, University of Florida, 1659 Museum Road, Gainesville, FL 32611, USA

Late Quaternary fossil record offers a window into ecosystem dynamics during episodes of abrupt climate warming and sea-level rise following the Last Glacial Maximum, but in marine settings ecological inferences might be hindered by high time-averaging affecting transgressive deposits. However, the signature of temporal shifts in local skeletal production rates may be preserved in the age-frequency distributions (AFDs) of death assemblages. We use carbonate-target radiocarbon ages of 191 shells to examined variation in AFDs among four bivalves species collected from a 2.3-meter-long core recording the post-glacial transgression on the northern Adriatic shelf over the last the last ~14,500 yr.

The scale of time-averaging within species (interquartile age range) varied from 200 to 7,400 yrs, while the between-species age offsets (differences between the median ages of species) ranged from ~2 to 6,400 yrs within 5-cm-thick core intervals. Although the median ages of *Varicorbula*, *Timoclea* and *Parvicardium* increased with increasing burial depth, shells of *Lentidium* appeared age-homogeneous throughout the core. Age unmixing revealed a single massive peaks in the abundance of this opportunistic, shoreface species around 14 cal ka BP, coincident with the initial marine flooding of this shelf area during the melt-water pulse 1A. Moreover, a prominent gap in the AFDs between 11 and 12.5 cal ka BP corresponds to a minor sea-level fall associated with the Younger Dryas cold spell. Importantly, the reconstructed onsets and durations of shell production pulses across the four species are consistent with independently-derived relative sea-level history at the site. The species gradually replaced each other through time as the dominant component of the assemblage in accordance with their bathymetric preferences estimated from surveys of the modern Adriatic benthic fauna.

The diachronous production histories of four bivalve species coupled with subsequent exhumation of old shells and burial of younger shells through bioturbation and sediment reworking resulted in the ecologically mixed fossil assemblages. These assemblages are thus characterized by multi-modal age distribution and millennial-scale age offsets between species co-occurring in the same stratigraphic increments. Although this stratigraphic homogenization and

disorder greatly limits the resolution of the raw stratigraphic record, our results demonstrate the power of AFDs to capture shifts in abundance of benthic species during recent episodes of rapid sea-level rise. Fossil assemblages from transgressive deposits preserved on continental shelves represent a rich and underutilized source of data on long-term biotic responses to global climate change and associated shifts in sea level.