

## Sequence stratigraphic anatomy of diversity patterns: Late Quaternary benthic mollusks of the Po Plain, Italy

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### ABSTRACT

The influence of sequence stratigraphic (base-level driven) processes on patterns derived from the fossil record is receiving increasing attention. This study explores the stratigraphic anatomy of diversity patterns across two late Quaternary fourth-order sequences deposited on the Po Plain (Italy) over the last 150 ky (i.e., the two most recent glacial-interglacial cycles). The rich mollusk fauna, dominated by extant forms, preserved as a part of well-understood eustatic cycles, offers a testing ground for exploring how climate-driven sea-level changes influence sample diversity, diversity turnover, and higher-order diversity patterns within and across systems tracts and sequences. These two fourth-order depositional sequences were densely sampled from three cores. The data (152 species and 22777 specimens from 29 Holocene and 19 Pleistocene samples) were analyzed using single-sample and multisample rarefaction techniques. In all three cores and for both cycles, sample-level diversity decreased upward within sequences: the late transgressive systems tract samples displayed the highest equitability and richness, and the highstand systems tract samples displayed the lowest diversity (the trend primarily reflects the increase in the dominance of most common species in highstand systems tract samples). This pattern is likely due to a combination of ecological, environmental, and taphonomic processes. Multisample rarefaction indicates that species turnover is more limited in transgressive phases of both depositional cycles. This trend may reflect increasing environmental heterogeneity of marginal habitats averaged within shallowing-upward successions or decreasing time averaging associated with increasing sedimentation rates during highstand systems tract phases of the cycles. The sequence and multisequence diversity levels are lower than those observed within individual late transgressive systems tracts, indicating that species turnover was minimal both within as well as across the last two glacial-interglacial cycles. This study shows that species richness and equitability patterns of the most common mollusk species track closely the sequence stratigraphic architecture of late Quaternary successions of the Po Plain.