

Time averaging and stratigraphic disorder of molluscan assemblages in the Holocene sediments in the NE Adriatic (Piran)

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Stratigraphic changes in temporal resolution of fossil assemblages and the degree of their stratigraphic mixing in the Holocene deposits are of high importance in paleoecology, conservation paleobiology and paleoclimatology. However, few studies quantified downcore changes in time averaging and in stratigraphic disorder on the basis of dating of multiple shells occurring in individual stratigraphic layers. Here, we investigate downcore changes in frequency distribution of postmortem ages of the infaunal bivalve *Gouldia minima* in two, ~150 cm-thick piston cores (separated by more than 1 km) in the northern Adriatic Sea, close to the Slovenian city Piran at a depth of 24 m. We use radiocarbon-calibrated amino acid racemization to obtain postmortem ages of 564 shells, and quantify age-frequency distributions in 4-5 cm-thick stratigraphic intervals (with 20-30 specimens sampled per interval). Inter-quartile range for individual 4-5 cm-thick layers varies between 850 and 1,700 years, and range encompassing 95% of age data varies between 2,000 and 5,000 years in both cores. The uppermost sediments (20 cm) are age-homogenized and show that median age of shells is ~700-800 years. The interval between 20 and 90 cm shows a gradual increase in median age from ~2,000 to ~5,000 years, with maximum age ranging to ~8,000 years. However, the lowermost parts of both cores show a significant disorder, with median age of 3,100-3,300 years. This temporal disorder implies that many shells were displaced vertically by ~1 m. Absolute and proportional abundance of the bivalve *Gouldia minima* strongly increases towards the top of the both cores. We hypothesize that such increase in abundance, when coupled with depth-declining reworking, can explain stratigraphic disorder because numerically abundant young shells from the top of the core were more likely buried to larger sediment depths than less frequent shells at intermediate sediment depths.