



Fidelity of life and death molluscan assemblages from carbonate tidal flats in the Persian (Arabian) Gulf

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Live-dead (LD) studies aim to help understand how faithfully fossil assemblages can be used to quantitatively infer the structure of the original living communities that generated them. To this purpose, LD comparisons have been conducted in different terrestrial and aquatic environments to assess how environment-specific differences in quality and intensity of taphonomic factors affect LD fidelity. In sub-tropical and tropical settings, most LD studies have focused on hard substrates or seagrass bottoms. Here we present results on molluscan assemblages from soft carbonate sediments in tidal flats of the Persian (Arabian) Gulf (Indo-West Pacific biogeographic province). We analyzed a total of 7193 mollusks collected from six sites comprising time-averaged death assemblages (DAs) and snapshot living assemblages (LAs). All analyses were performed at site and at habitat scales after correcting for sample-size differences. We found a good match in proportional abundance and a notable mismatch in species composition. In fact, species richness in DAs is 6 times larger than in LAs at site scale, and 4 times at habitat scale. Additionally, we found a good fidelity of evenness, and rank abundance of feeding guilds. Other studies have shown that molluscan DAs from subtidal carbonate environments can display lower time-averaging than those from siliciclastic environments due to high rates of shell loss to bioerosion and dissolution. For our case study of tidal flat carbonate settings, we interpret that despite temporal autocorrelation (good fidelity of proportional abundance), substantial differences in species richness and composition can be explained by early cementation, lateral mixing, intense bioturbation and moderate sedimentation rates. Our results suggest that tidal flat carbonate environments can potentially lead to a wider window of time-averaging in comparison with subtidal carbonate settings.