Experimental evidence for linkages between infaunal recruitment, disturbance, and sediment surface chemistry

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ABSTRACT: In prior studies, we have argued that changes in sediment surface chemistry driven by biotic and physical disturbance affect recruitment decisions of infauna. Here, we provide additional data for oxygen concentrations and infaunal recruitment behavior and a time-dependent numerical model of oxygen concentration in disturbed sediments to further support our proposed linkage between disturbance, sediment chemistry, and recruitment decisions. We evaluated the recruitment responses of the polychaete *Arenicola cristata* and the bivalve *Mercenaria mercenaria* to sediments that were undisturbed, disturbed, and allowed to recover for a specified period of time. We also obtained fine-scale measurements of oxygen concentration in surficial sediments and profiles in the upper sediment layer that new recruits explore. Undisturbed sediments were characterized by high oxygen levels and were readily accepted by recruiting organisms. Disturbance caused dramatic changes in surface and subsurface oxygen concentrations and was accompanied by nearly complete rejection of habitats by new recruits. Oxygen concentrations in cores that were disturbed and allowed to recover are consistent with the time scales of recovery as predicted by a transport-reaction numerical model. In addition, organism responses to recovering cores varied with oxygen concentration in the surface and subsurface sediments of these cores. The rapid recovery of cores suggests that diagenetic transport-reaction processes that determine pore-water composition drive the acceptability of sediments to new recruits.