BENTHIC BIOGEOCHEMICAL CHANGES ASSOCIATED WITH CALCITE UNDERSATURATION IN LONG ISLAND SOUND SEDIMENTS.

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Numerous indicators were used to examine dissolution of carbonate material in Long Island Sound estuarine sediments during winter-spring, 1992-1993. Calcite saturation states (Ω = IMP/Ksp) over the top 5 cm of sediment changed regularly and rapidly from supersaturated during December (Ω = 1.1), to undersaturated during January-February (Ω = 0.6), to supersaturated following the spring bloom. This resulted in large excesses of Ca^{2+}, Sr^{2+}, and F^- relative to overlying water during periods of undersaturation. Saturation and supersaturation following deposition of the spring bloom is due to rising temperature and anaerobic benthic C-organic remineralization. Ratios of the ΣCO_2 flux out of sediments with the O_2 flux into sediments show a regular pattern of change with lower than a Redfield predicted value of ~0.8 during winter. Analysis of acid volatile sulfides show inventory losses coinciding with this period, suggesting that oxidation of FeS during winter in LIS is at least in part responsible for lowering saturation states. Population dynamics of benthic foraminifera appear to be tightly coupled to pore water saturation states, with the disappearance of foraminifera occurring during periods of greatest pore water undersaturation. The flux of Ca^{2+} due solely to foraminifera dissolution during this period is estimated at ~7.4 mmol Ca^{2+} m^{-2} d^{-1} and is comparable to directly measured Ca^{2+} fluxes in incubated cores. These findings agree well with earlier work on foraminifera population dynamics in LIS.