

Syn depositional Dolomitization of Shallow Marine Deposits, Cangrejo Shoals, Northern Belize

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Dolomite cement comprises an average of ~12% of Holocene, subtidal carbonate sediments in an areally extensive, nearshore mudbank in northern Belize. It is present in sediments along the margins of tidal channels and within the interiors of broad banks between channels, throughout the maximum 7.6-m-thick section of subtidal deposits. Salinity of surface seawater here is 38‰, and that of pore fluids in dolomitic sediments is 38–40‰. Mean dolomite $\delta^{18}\text{O}$ composition is 2.1‰_{PDB}, and is enriched by 0.7‰ relative to that of seawater and pore fluids. There is no change in dolomite $\delta^{18}\text{O}$ composition or of pore fluids with depth or location on the mudbank; therefore, dolomitization may take place in normal-salinity pore fluids. Three subpopulations of dolomite are recognized based on $\delta^{13}\text{C}$ compositions: (a) those with a mean of -1.0‰_{PDB}, which overlaps that of pore fluids and which is depleted relative to that of nondolomitic sediments and surface seawater; (b) those with mean $\delta^{13}\text{C}$ of ~-3.0‰_{PDB}, which is close to that of nondolomitic sediments and unaltered pore fluids; and (c) those with anomalously enriched compositions (up to +11.6‰_{PDB}). There is no correlation of dolomite $\delta^{13}\text{C}$ composition with depth, location, sediment texture, or amount of organic matter in the sediment. Thus it is suggested that dolomitization is facilitated by both microbial sulfate reduction and methanogenesis, and that dolomitization has attended reversible organodiagenetic reactions in the sediment through time.