

Lacustrine Carbonates

Gierlowski-Kordesch, Elizabeth H.¹ (1) Geological Sciences, Ohio University, Athens, OH.

Lacustrine carbonates accumulate in all climates and in any tectonic situation. Their depositional patterns are assessed through a database involving literature representing over 250 lakes and lake basins worldwide. Carbonates and calcium-rich rocks (i.e. basalt or carbonatite) need to be available for weathering in the watershed and subsurface in order to produce carbonate sediments in lakes in the first place. Tectonics and climate control the distribution of carbonates through (1) the input and output of ions and minerals through surface water, groundwater, rainfall, and wind; (2) the morphometry of the lake; and (3) the temperature ranges and seasonality of the catchment location. Carbonate deposition proceeds through (1) biogenic mediation, including high productivity of micro- and picoplankton, macrofauna shell formation, and encrustations on any substrate, (2) concentration through evaporation, (3) eolian input, and (4) water-borne clastic input.

Five general facies types are recognized for lacustrine carbonates: (1) laminated carbonates, (2) massive carbonates, (3) microbial carbonates, (4) marginal carbonates, and (5) open-water carbonates. Important fauna and flora associated with carbonates include diatoms, charophytes, insects, bivalves, gastropods, and ostracodes. Facies distribution is dependent on the input mode of calcium-rich waters and carbonate clasts in addition to lake circulation patterns and stratification. The use of stable isotopes of oxygen, carbon, and strontium as well as the recognition of diagenetic alternation in lacustrine carbonates aids in the reconstruction of climate, hydrology, and lake evolution.

Dominantly carbonate lakes contain carbonate sediments from the littoral to profundal zone; the source areas for these lakes are composed of a significant percentage of carbonate rocks (more than 60-70% of provenance). Partially carbonate lakes contain carbonate sediments in some areas of the lakes with 40-60% of carbonate-rich provenance. Sparsely carbonate lakes show less significant carbonate accumulation within lakes because of minor carbonate source rocks (<30-40%).