

Surficial dolomite lithification of Mg-carbonate muds in hypersaline coastal lagoons during periods of increased oceanic upwelling: An example of very early carbonate diagenesis

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Coastal lagoonal environments can serve as natural laboratories to study biogenic and abiogenic processes related with carbonate precipitation. These systems can be influenced by local oceanographic phenomena occurring in the nearby oceans. Two hypersaline coastal lagoons (Lagoa Vermelha and Brejo do Espinho) located in the Região dos Lagos area east of Rio de Janeiro, Brazil are rare examples of modern dolomite precipitation under semi-arid conditions in an otherwise semi-tropical environment. The microclimate in this semi-arid setting is controlled by the regional Western Boundary Coastal Upwelling Current, which results from a major change in the direction of the coastline from north-south to east-west near Cabo Frio. Studies of this lagoonal system during the past 30 years have revealed the importance of microbial processes in the precipitation of carbonate minerals, in particular dolomite.

A recent study on the influence of the climatic and oceanographic conditions controlling the bio-mineralization processes occurring in the coastal lagoons has been undertaken (Nascimento et al., *Limnology & Oceanography*, 2019, in revision). During the annual hydrologic cycle, the Mg-carbonate muds precipitated under aqueous conditions are now undergoing early diagenesis to form ordered dolomite at the exposed surface with the extreme evaporation and desiccation during the current period of increased aridity associated with an intensification of the coastal upwelling system. A similar lithified dolomite layer has been recovered at depth in cores taken from both lagoons. Based on carbon-14 dating of the buried sediments and marine cores retrieved from below the upwelling zone, an earlier period of intensified upwelling with increased aridity occurred at ~2.3 kyr BP and correlates timewise with the earlier dolomite lithification event, demonstrating a link between paleoceanographic phenomena and diagenesis.