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**Neoproterozoic marine carbonates and their paleoceanographic significance**

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**Abstract**

The primary mineralogy of marine carbonate precipitates has been a crucial factor in constraining the history of carbonate precipitation in ancient oceans. Secular changes in Phanerozoic marine chemistry, including Mg/Ca, have been well-documented using the original carbonate mineralogy of ooids, marine cements and biominerals. However, the history of Precambrian seawater chemistry is not as well constrained, partially due to the prevalence of dolomitisation in the Precambrian geological record. The Neoproterozoic (~1000Ma to ~541Ma) record of primary carbonate mineralogy is documented here using a combination of literature data and new analysis of marine carbonate precipitates from the Otavi Fold Belt, Namibia, the Death Valley succession, USA and the Adelaide Fold Belt, Australia. These data suggest that the last ~460 million years of the Proterozoic were dominated by aragonite and high-Mg calcite precipitation in shallow marine settings. In contrast, low-Mg calcite has only been recognised in a small number of formations. In addition to aragonite and calcite precipitation, marine dolomite precipitation was widespread in Neoproterozoic

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