

An extensive Mesoarchean shallow marine carbonate factory

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Understanding why Earth has an oxygen rich atmosphere, and what processes drove this rise, is essential for illuminating the first chapters in the history of life on Earth and for developing bio-signatures that can be used in the search for life and oxygen on other planets. Recent models suggest that the emergence of continents above sea-level could have driven the rise in atmospheric oxygen. However, we demonstrate that extensive shallow-marine carbonate platforms existed in the Mesoarchean. This conclusion is based on Ca isotopes from 2.8-billion-year-old carbonate rocks, that constrains the Ca isotope value of Mesoarchean seawater to -0.5‰ relative to present day values. This estimate is strikingly similar to pre-Mesozoic values, suggesting that continental freeboard and the area of carbonate platforms was relatively consistent through most of Earth history.