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A Palaeoproterozoic dolomite showing Phanerozoic-type dolomitization

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From Neoproterozoic to Neoproterozoic carbonate platforms were a distinctive feature and in many cases the dolomite content of these ancient platforms is high in comparison with those of the Mesozoic and Cenozoic. The Precambrian sedimentary record to about 3.5 Ga includes dolomites and limestones that likely precipitated as primary aragonite and calcite. Palaeoproterozoic carbonate sedimentation was marked by less spectacular occurrences of massively-precipitated aragonite and calcite. Precambrian dolomites may have also formed by precipitation directly from seawater or by dolomitization during very early diagenesis from fluids comparable with seawater. Precambrian dolomites are generally characterised by very well-preserved fabrics of the original carbonate grains and early cements, leading to arguments over primary versus replacement dolomite.

In India, the Palaeoproterozoic Vempalle Formation located in the Cuddapah Basin is characterised by the presence of a ~1.9 km-thick stromatolitic dolomite. A thorough geochemical examination of samples from a 1000 m long exposure in a freshly-cut canal section showed that 10–15 % of precursor limestone is still preserved in the Vempalle Formation in the form of remnant patches of calcimicrite and ooids with calcite spar cement. The ooids,