

Petrogenesis of Neoproterozoic Carbonate Cements and Implications on Their Diagenetic History, Flinders Ranges, South Australia

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This study concentrates on the petrogenesis of platformal carbonate cements in the northern Flinders Ranges with the view that they will give insight as to the nature of carbonate geochemistry of seawater during the Neoproterozoic. By using petrology, cathodoluminescence, trace element analyses and stable isotope analyses, we hope to add to the growing field of evidence for a different ocean chemistry during the Precambrian.

Different stages of dolomitisation of the substrate and cements have been preserved in carbonates of the study area indicating that dolomite is a common early diagenetic marine phase during the late Proterozoic. The main types of cements identified in both calcite and dolomite include: fibrous, bladed, sparite and blocky. These may occur with varying degrees of preservation and recrystallisation. However, preservation of cement fabrics is best in dolomite cements rather than the calcareous examples also suggesting early dolomitisation. Preliminary studies also show that there has been significant neomorphic replacement of aragonite to calcite and mimetic replacement of calcite by dolomite. The distribution of the different dolomite cements fabrics indicates variation in precipitation conditions throughout the platform. Cathodoluminescence and trace element studies show differences in oxidation conditions for cements at the same paragenetic position.