

ABSTRACT
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Speleogenesis in Cenozoic Limestones, Southeastern Australia

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Southeastern Australia has extensive areas of Cenozoic limestones. These include both Oligo-Miocene marine calcarenites and calcilutites and Pleistocene dune calcarenites. This paper will illustrate the factors involved in speleogenesis in these limestones and outline the relationships between speleogenesis, hydrogeology and lithology in relatively young limestones.

These limestones, whilst more extensive in area than the Palaeozoic impounded karsts of eastern Australia, are less well known especially for cave exploration. However they have both extensive and intensive cave systems including the flooded cenotes of the Mount Gambier area, the large caves of the semi arid Nullarbor Plain and maze-like systems in the Pleistocene dune ridges.

Speleogenesis in these lithologies is an interplay between the groundwater conditions and the lithification and diagenesis of the calcareous sediments. As such sediments are highly variable in their calcareous content, the solution/precipitation balance also varies from site to site. This variability is combined with both high primary porosity and permeability resulting in diverse surface and underground karst features.

The caves are dependent on the ability of the calcarenites to develop sufficient structural strength in the form of an indurated layer. This "caprock" is necessary for the development of many karst forms, especially caves, as it gives the relatively unconsolidated calcarenite structural strength. The caprock develops in both limestone sequences where conditions are favourable but somewhat better in the Pleistocene dunes.

The development of cave systems is also directly related to the groundwater conditions. Evidence of fluctuating groundwater conditions over time can be seen in the caves, especially the drowned cenotes of the Lower Southeast of South Australia. The inter-relationship of groundwater conditions and relatively horizontal lithologies, combined with the development of an indurated layer are the keys to understanding speleogenesis in these limestones.