# FLANK MARGIN CAVE DEVELOPMENT AND TECTONIC UPLIFT, CAPE RANGE, AUSTRALIA

This extended abstract is a summary of a recent complete paper (Mylroie et al., in press); as the 17th International Congress of Speleology is being held in Australia, the Congress participants are alerted by this abstract to the paper's existence. Cape Range, Australia, on the northwest coast of the continent at 21° S, 113° E (Fig 1), is a NNE striking anticlinal ridge 315 m high, 100 km long, and 20 km wide extending into the sea, consisting of Miocene carbonate rocks with a series of coastal terraces of Pliocene and Quaternary carbonates and siliciclastic dunes. Inland escarpments, representing former sea cliffs, and deep valleys cutting the limbs of the anticlinal ridge host many cave entrances at a variety of elevations (Fig 2). The lowest unit, the Mandu Formation, a chalky and marly limestone, contains many tafoni (pseudokarst) caves with simple, single chamber plans and widths up to 15 m or more, and heights up to 10 m (Fig 2a). The higher, purer Miocene limestones, and the younger Pliocene and Pleistocene coastal terrace limestones, host numerous flank margin caves from 300 m elevation in the Miocene rocks (Fig 2b-d) to sea level in the Quaternary rocks. Classic epigene stream caves are also found. The flank margin caves have entrances up to 30 m wide and heights of 6 m, with single chamber caves being common but complex chamber caves also present. Some flank margin caves are entered by small entrances that lead to large phreatic chambers, which eliminates both sea caves and tafoni as possible explanations (Fig 2c). The close association of these caves with sea cliffs and incised valleys argues against a deep hypogene origin, which would leave a cave pattern unrelated to the surface configuration. Miocene uplift tapered off in the Pliocene but was still active in a subdued manner in the Quaternary. The flank margin caves in the paleo sea cliffs and incised valleys represent the outcome of the interplay of that tectonic activity and glacioeustasy over a 300 m vertical range, with lowstands causing valley incision; highstands raised the fresh-water lens and allowed cave development in the valley walls. Cave development began with the first tectonic-driven subaerial exposure in the Miocene and continued through to the last Pleistocene interglacial.

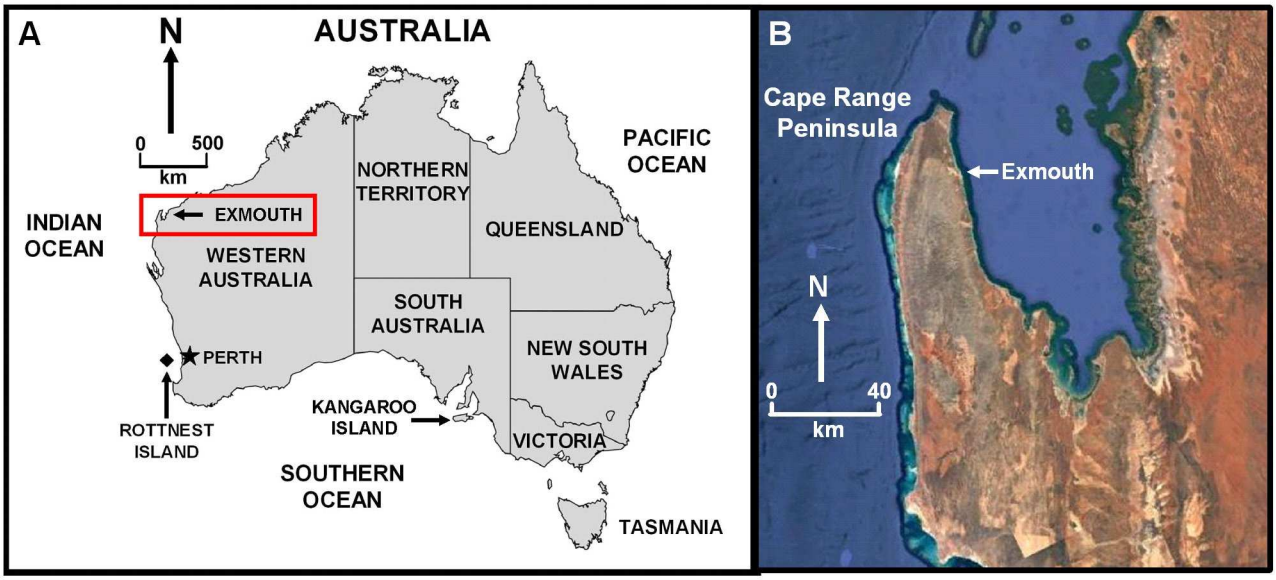


Figure 1: A) Location of Cape Range and the town of Exmouth in Australia. B) Google Earth image of the Cape Range Peninsula; the anticlinal axis runs approximately north-south along the middle of the peninsula.

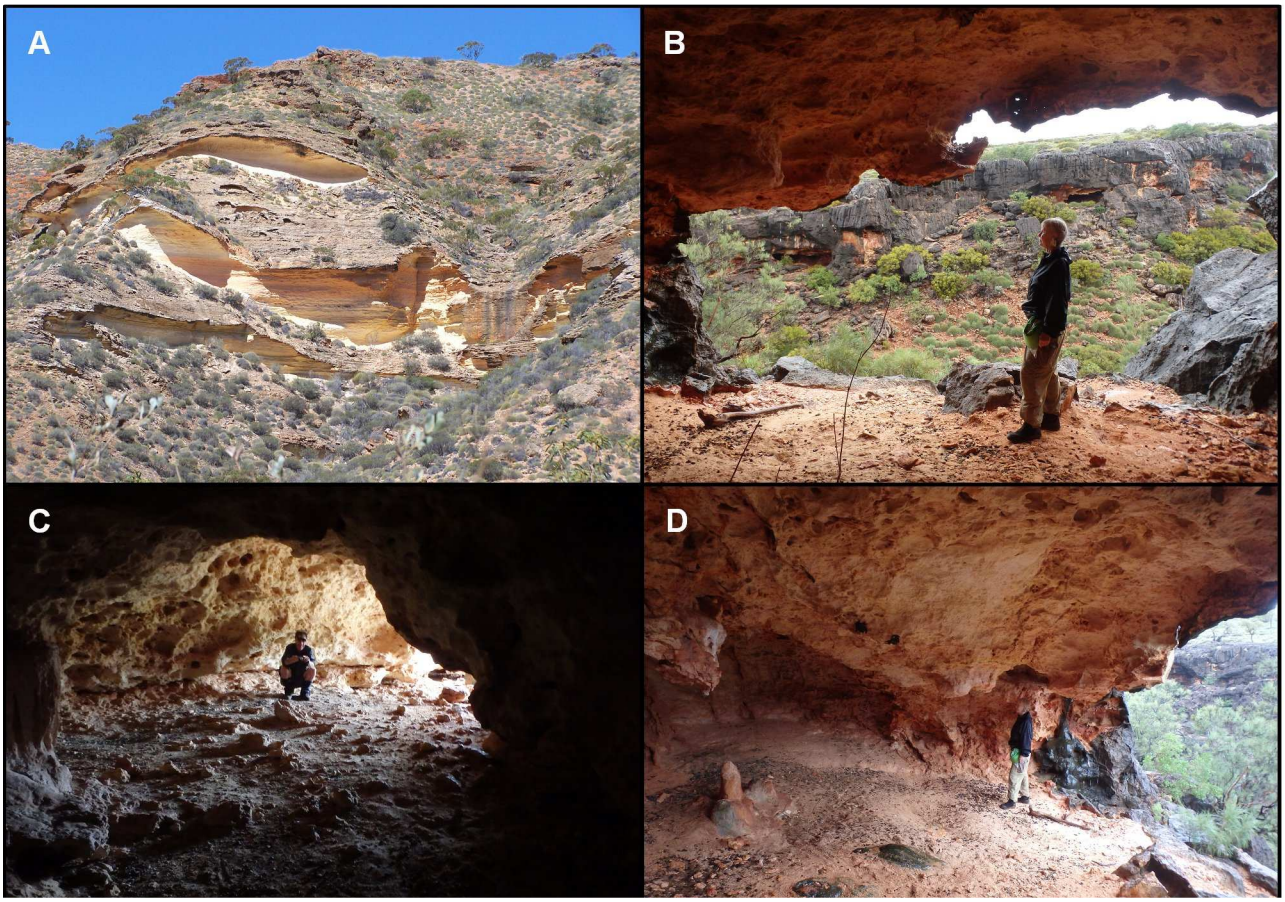


Figure 2: Caves in Cape Range. A) Tafoni in the Mandu Formation. B ) A flank margin cave entrance at ~ 300 m elevation, on the wall on an incised stream channel; entrances to flank margin caves can be seen on the far wall of the valley. C) Large flank margin cave chamber entered from a small entrance, indicating it is a dissolutional cave and not a tafoni or sea cave. D) another view of the cave in (B), showing speleothems and a ceiling with dissolutional pocketing.

References

Mylroie, J.E., Mylroie, J.R., Humphreys, W., Brooks, D. and Middleton, G., in press, Flank Margin Cave Development and Tectonic Uplift, Cape Range, Australia: Journal of Cave and Karst Studies.