

HYDROGEOLOGY OF THE MT ANNE KARST, TASMANIA

Martin Scott

Abstract

Cave passages and streams in Annakananda, Potatoes, Deep Thought and Kellar Cellar indicate that underground drainage in the Annakananda area of the Mt Anne karst flows to the north and northwest. This is in the opposite direction to previous inferences that underground drainage flowed directly southeast towards Lake Timk and Snake River. A sequence of conglomerate, sandstone and siltstone outcropping 150m southeast of Annakananda forms an insoluble barrier to underground drainage flowing to the southeast. Water tracing and further cave exploration and geological mapping are needed to understand the hydrology of the Mt Anne karst.

Introduction

Northeast of Mt Anne is a ridge of spectacular karst surrounded by deep glacially eroded valleys. The top of the ridge is a plateau 900-1080m asl (Davis 1988) composed of dolomite which strikes northwest to Sandfly Creek at an altitude of 400m, and southeast to Lake Timk at an altitude of 490m and beneath Lots Wife Ridge to the Snake River catchment below 400m (Calver 1991, Kiernan 1990a,b). The topographic relief of the Mt Anne karst is in excess of 600m, making it highly prospective for the discovery of deep caves in Australia.

Considerable cave exploration by numerous caving groups occurred at Mt Anne during the 1970's and 1980's. The most significant cave found is 3000m+ long Annakananda, which for some time was the deepest cave in Australia at 373m deep. Other caves over 100m deep in the karst include Kellar Cellar, Col-in-Cavern, Potatoes and Deep Thought. The largely vertical nature of the caves at Mt Anne, the lack of significant underground streamways, and no complete published plan map for Annakananda has made determining the hydrology of the karst difficult.

Recently Kiernan(1990a) has inferred that underground drainage from the Annakananda and Col-in-Cavern areas of the karst flow along strike southeastwards to the Lake Timk area and then further southeast to springs in the catchment of Snake River.

Cave maps published in the speleological literature, and cave and geological mapping conducted during the SUSS Mt Anne Expedition suggest the karst drainage is not as simple as inferred by Kiernan(1990a).

Cave Drainage

The hydrology of the karst can be investigated by following streamways within the caves. Maps of caves from the Annakananda area show drainage and passage development to the north and northwest, towards Sandfly Creek.

There is no complete plan map of Annakananda available, but maps of parts of the cave have been published. Early in the exploration of Annakananda, Eberhard(1982) published a map of the

entrance passages showing drainage trending northwest from the doline. Maps of the Desiccator Series in Annakananda are shown in Webb(1985) and Carter(1985). Cave development trends and drains NNE from the Organ Grinder down the Dessicator Series to a depth of 345m below the top of the doline. The developed long section of Annakananda by Bunton & Eberhard(1984) is presumably drawn north-south, and shows the Heartbeat and Priority Paid Series heading further north of the Dessicator Series. The King Rat Series is also shown draining beneath the entrance doline. These maps and sections show Annakananda draining to the north towards Sandfly Creek.

Potatoes, Deep Thought and Kellar Cellar are another drainage system in the Annakananda area. Numerous streams in these caves drain north to northwest, approximately parallel to Annakananda, towards Sandfly Creek.

The karst to the east of the Annakananda area contains numerous caves although Col-in-Cavern is only significant cave with streams. Two small streams in Col-in-Cavern flows south following the general trend of the major passage (Anderson 1971). The streams and passage orientation suggest the drainage from the Col-in-Cavern area heads towards Lake Timk.

Geological Investigations

Rocks of the Weld River Group outcrop on the northeastern ridge of Mt Anne (Turner et al 1985, Calver 1989, 1991). The basal unit of the Weld River Group is the Annakananda Formation, a 30 thick sequence of thin-bedded sandstone and massive conglomerate. Karst is developed in the conformably overlying massive Gomorrah Dolomite and bedded oolitic Devils Eye Dolomite. The Weld River Group is overturned and dips moderately to the southwest.

Reconnaissance geological mapping conducted on the SUSS Mt Anne Expedition has recognised a reddish-coloured siliciclastic sequence of conglomerate (containing boulders of dolomite) and thinly interbedded sandstone and siltstone outcropping 150m southeast of the Annakananda doline. The siliciclastics strike NE and dip NW, and form a sequence at least 20m thick. The complete thickness and lateral extent of the sequence is unknown. Conglomerate, sandstone and siltstone of the siliciclastic sequence all abut the dolomite along an irregular NE striking contact. The geological nature of the contact is uncertain. The siliciclastic sequence is tentatively correlated with the Annakananda Formation on the basis of similar lithologies.

The siliciclastic sequence southeast of the Annakananda area has formed an insoluble barrier to underground drainage. The NW dip and NE strike of the siliciclastics has directed underground drainage in Annakananda and Potatoes, Deep Thought and Kellar Cellar to the north and northwest. A small resurgence emerging above the siliciclastics indicate these lithologies act as a base level controlling minor southeast-flowing drainage in dolomite bluffs immediately above the contact.

Discussion and Conclusions

A siliciclastic sequence outcropping southeast of the Annakananda area has prevented underground drainage from flowing directly southeast to the Lake Timk area as inferred by Kiernan(1990a). Drainage in the caves Annakananda, Potatoes, Deep Thought and Kellar Cellar is directed north and northwest towards Sandfly Creek. Although drainage in these caves is to the north and northwest, the eventual efflux for their drainage is uncertain. Drainage from the Annakananda area may flow north to springs in the upper tributaries of Sandfly Creek (S. Eberhard pers. comm. 1987) or resurge in swampy alluvium along Sandfly Creek. Otherwise the streams in these caves may eventually flow eastwards to the Col-in-Cavern area and southeast to Lake Timk and the springs in the Snake River catchment.

Water tracing and further exploration for springs and caves should give a better understanding of the hydrology of the Mt Anne karst. Cave exploration to date gives only an uppermost glimpse into the karst hydrology, as the main streamways are still to be discovered. More detailed geological mapping of the area is also needed to further understand the hydrology.

Acknowledgements

The findings of this paper owe much to the documentations of numerous cave explorers at Mt Anne. Members of the SUSS Mt Anne Expedition are particularly indebted for their assistance. The Expedition was supported by members of the Tasmanian Caverneering Club, Dick Smith & Australian Geographic, University of Sydney Union, Aquasea Products Pty. Ltd., Wildsports and Australian Airlines.

References

- Anderson T. 1971. Mt Anne S.W. Tasmania. *Spar* 5, 2-6.
- Bunton S. & Eberhard R. 1984. Vertical Caves of Tasmania. Adventure Presentations, 81pp.
- Calver C.R. 1989. The Weld River Group: a major Upper Precambrian dolomite sequence in southern Tasmania. *Pap. Proc. R. Soc. Tas.* 123, 43-53.
- Calver C.R. 1991. Geological background to karst in the Weld River Area. *T.C.K.R.G. J.* 5, 21-25.
- Carter B. 1985. Anne-A-Kananda II. *Nargun* 18(4), 24-31.
- Davis B. 1988. Large scale mapping of the Mt Anne region in S.W. Tasmania. *T.C.K.R.G. J.* 3, 67-70.
- Eberhard S. 1982. Ann-A-Kananda map. In: Hume N. 1982. Mount Anne. *Speleo Spiel.* 181, 3-4.
- Kiernan K. 1990a. Bathymetry and origin of Lake Timk, South-West Tasmania. *Helictite* 28(1), 18-21.

Kiernan K. 1990b. The alpine geomorphology of the Mt Anne massif, south-western Tasmania. *Aust. Geogr.* 21(2), 113-125.

Turner N.J., Calver C.R., McClenaghan M.P., McClenaghan J., Brown A.V., Lennox P.G., Boulter C.A. & Godfrey N.H.H. 1985. Pedder 1:50 000 Geological Sheet. Tas. Dept. Mines.

Webb J. 1985. Geological observations on Anne-A-Kananda. *Nargun* 18(4), 27-31.

Address for correspondence - 4 Bowen Ave, Turrumurra NSW 2074.