DISCUSSIONS

Illamurta Diapiric Complex and Its Position on an Important Central Australian Structural Zone: Discussion

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In a recent article Cook (1971) discussed an ancient northerly trending structural zone, tentatively named the Goyder structural zone, which cuts across the more obvious east-west trending folds of the Amadeus basin and which apparently links up with a similar zone in South Australia. This zone is noted for diapirism, facies changes, and structural complexities. In essence I agree with the concepts expressed in the article. The existence of the Goyder structural zone is supported in a general way by Rod (1966) and seismically by Cleary and Simpson (1971). Further support for this trend is perhaps provided by the circular feature, roughly the size of Gosses Bluff, near Mt. Ormerod in the Seymour Range just north of the area shown in Figure 8 (Cook, 1971).

I have some questions, however, about the northern end of the Goyder structural zone. The northern anchor of the Goyder structural zone is Goyder Pass, believed to be a diapiric feature. Goyder Pass, however, is not an isolated structure. Froelich and Krieg (1969, p. 1996) showed it to be part of the Deering uplift, a folded thrust complex with aspects of diapirism, 80 mi (127 km) long, trending approximately east-west. At Goyder Pass the Deering uplift was intercepted by the Alice Springs arch, which was uplifted during Devonian-Carboniferous time. The result of this movement was that the Deering uplift structure at Goyder Pass was cut off, rotated, uplifted, and exposed.

Cook (1971) suggested that the Goyder structural zone also runs through Goyder Pass. This concept would make Goyder Pass a meeting place of three trends, somewhat like avenues meeting at a traffic circle: (1) the Deering uplift, trending approximately east-west; (2) the Alice Springs arch, trending locally west-northwest; and (3) the Goyder structural zone, trending north-northwest.

It is possible that three trends meet at one point, but it is coincidental and therefore suspect. The Goyder structural zone usually has been traced by examining the east-west-trending folds and marking areas of unusual complexity. Goyder Pass, however, does not seem to be necessarily the most disturbed part of the Deering uplift. If we examine the four seismic cross sections of Froelich and Krieg (1969, Fig. 16b) and compare them with the cross sections of Goyder Pass (Fig. 16a) and with the palinspastic map of McNaughton et al. (1968, Fig. 9), then it seems to me a stronger case could be made for the Goyder structural zone cutting the Deering uplift west of Goyder Pass— for instance, at seismic line 2-6. There, the main thrust fault splits into several strands, and gross fault displacement is larger than at Goyder Pass. It is also possible that the Goyder structural trend cuts the Deering uplift in an area not covered by seismic work. If, because of these uncertainties, we leave the Deering uplift-Goyder Pass region out of consideration, then the Illamurta and Gardiner Range diapiric complexes line up exactly with Gosses Bluff (Cook, 1971, Fig. 1).

The northeast Gardiner-Gosses Bluff-Tyler uplift is an arch, south of the Deering uplift, and roughly parallel with it. The most complex structure on the arch is undoubtedly Gosses Bluff, but Cook has not drawn the Goyder structural zone through this feature. The reason given is that Gosses Bluff was thought to have an impact origin. This origin has not been universally accepted. In an earlier publication (Ranneft, 1970), I suggested a mud volcano origin (associated with diapirism): Brunnschweiler (see Lasen, 1969, p. 75) had come independently to essentially the same conclusion after having studied both Gosses Bluff and the large mud volcano Naga Ywa on Cheduba Island, Burma (personal communication). Elsewhere, features similar to Gosses Bluff continue to be the subject of controversy (Amstutz, 1964, 1965a, b; Zimmermann and Amstutz, 1965; Seddon, 1970).

Where would the Goyder structural zone have been drawn if the origin of Gosses Bluff had not been taken into consideration? I think there is little doubt it would have been drawn through the...