SHORTER COMMUNICATIONS

SUPERPOSED FOLDS AROUND TAMRA, SUNDARGARH DISTRICT, ORISSA

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Introduction: During the course of geological mapping of an area of 350 sq km in the western part of T. S. 73 C/13 between latitudes 21°45′ and 22°00′ and longitudes 84°45′ and 84°53′, the author has recognised the presence of a set of superposed folds around a village called Tamra in Sundargarh, district, Orissa (21°59′ : 84°47′). The aim of this paper is to describe the geometry of the superposed folds in brief.

Geological setting: Prasad Rao *et al* (1964) have described three sequences of rock formations of Precambrian age which they have designated as Sequence I, V and VI. The area discussed in the paper forms a part of the sedimentaries grouped under Sequence VI. The author also could distinguish three groups of sedimentaries in Groups I, II and III in the relative order of younging, being equivalent to Sequence I, V and VI of Prasad Rao *et al* respectively. The Group III rocks are found to extend further north and include the 'Iron-Ore Series' and 'Gangpur Series' of Krishnan (1937). The Group II rocks are characterised by an arenaceous 'facies', comprising conglomerates, quartzites, quartz schists and greywackes with intrusive and extrusive members. The area of present study forms a part of the arenaceous cum argillaceous 'facies' of Group III. The rocks consist of greyish and whitish quartzites, carbonaceous quartzites, carbon phyllites, shales, phyllites, dolomitic marbles and siliceous limestones. Both the Group II and Group III rocks have been folded into a northerly plunging syncline (with NE–SW axial plane), which is shown on a macroscopic scale by the quartzites and the associated intrusive and extrusive members of the Group II rocks. The Group III rocks form a basin structure around Tamra, with the bedding strike showing much variation from the east to the west due to the superposition of a younger system of ENE–WSW trending folds on the original synclinal fold (Fig. 1).

Structural analysis: For studying the effects of superposed folding around Tamra, the area was divided into four structural domains as follows:

	Latitude	*Longitude*
Domain I	21°57′00″ to 22°00′00″	85°50′00″ to 84°53′00″
Domain II	21°58′00″ to 21°59′20″	84°47′35″ to 84°50′00″
Domain III	21°59′20″ to 22°00′00″	84°47′35″ to 84°50′00″
Domain IV	21°58′00″ to 22°00′00″	84°45′00″ to 84°47′35″

Analysis of a total number of 845 bedding poles in the above four domains has yielded the following fold axes (β) for the various domains, as seen in Fig. 2-A.

		β
Domain I	. . . .	40° toward N60°W
Domain II	. . . . .	40° toward N20°E
Domain III	. . . . .	40° toward N10°W
Domain IV	. . . . .	15° toward east

It is seen that in domain I the fold axis is down the dip of the axial plane of the folding, thus indicating the nature of the fold to be reclined. The above WNW plunging fold is manifest in the outcrop pattern of the carbonaceous quartzite, which changes from ENE–WSW strike to NW–SE northwest of Kulijhari (21°59′ : 84°49′). But the dip of the beds in both cases is northerly. Thus the northern limb of the fold appears to be overturned to south. Domains II and III occur in the core region of the first synclinal fold and show nearly northerly plunging fold axes. In domain IV, the quartzite band shows a westerly closure, which has yielded a low plunging fold axis due east.

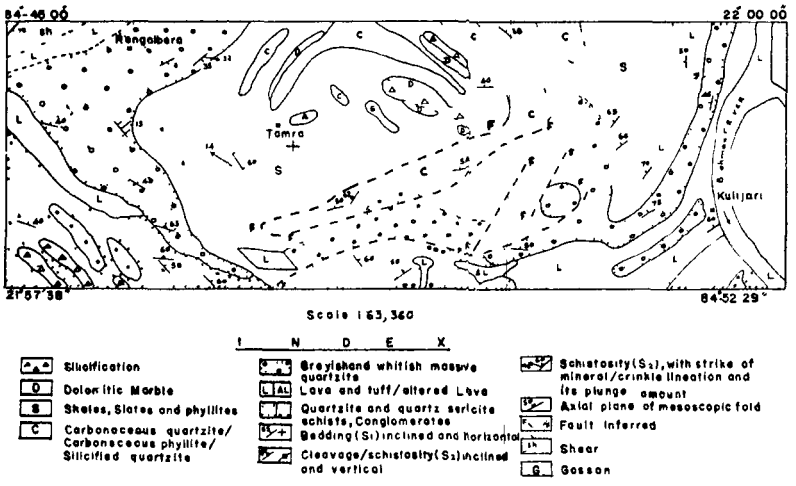
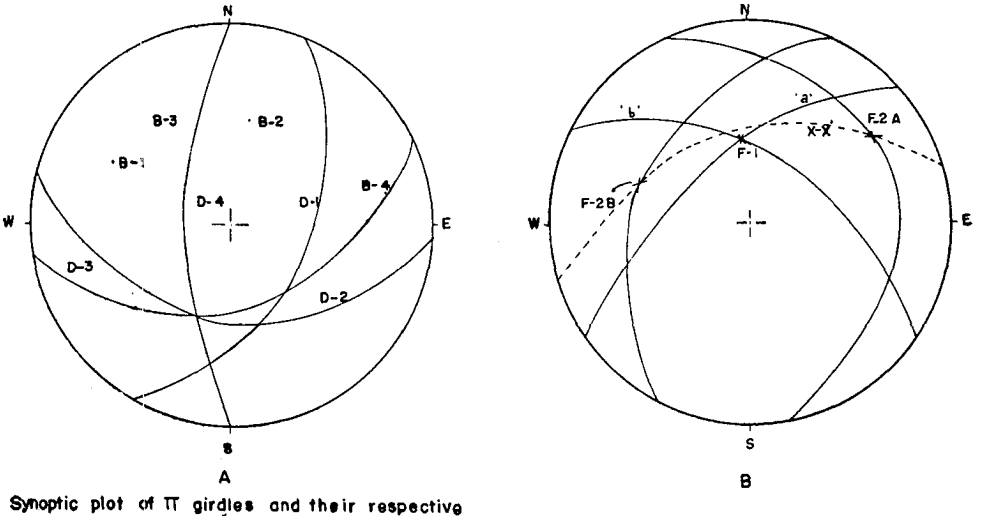


Figure 1. Geological map of the area around Tamra.

Discussion: The difference in the orientation of the folds from domain to domain, as described earlier, is governed by the principles of superposed folding, whose geometry depends on the original attitude of the bedding plane. This is illustrated in Fig. 2-B. The first synclinal fold (F_1) is defined by the intersection of the two 'S' planes (bedding planes) 'a' and 'b'. The axial plane of the later fold $\times - \times'$ is superposed on these. Depending on the original attitude of the bedding plane, superposed folds of two different axes F_2A and F_2B are obtained. Where the axial plane $\times - \times'$ intersects the steep northwesterly dipping easterly limb of the first north plunging syncline, the result is a WNW-plunging reclined fold, as seen in Domain I. Where the axial plane $\times - \times'$ intersects the low northeast dipping western limb of the F_1 fold, the new fold has a low easterly plunge, as seen in Domain IV.

The superposed folds have produced crinkles and mesoscopic folds in the incompetent shales and carbon phyllites, whose axes show a distinct concentration in the WNW direction in domain I and a prominent concentration in the ENE to easterly direction in domain IV, thereby indicating that superposed folds with axes paralleling the above trends are present in this area.



Synoptic plot of π girdles and their respective B's in the rocks around Tamra.

Figure 2.

Though the superposed folding movements could not cause any folds in the competent quartzitic members of Group II, their effects are manifest by several ENE–WSW trending shears and faults around Tamra.

References

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