

Folding in the Rocks of Upper Rewa Group Vindhyan Super Group, Near Galla Mandi District Saugor, Southern Bundelkhand Region, M.P. India

Arun K Shandilya*, Anktia Shrivastava and Shivam Tiwari

Department of Applied Geology, Dr. Harisingh Gour University, Sagar, Madhya Pradesh, India

*Corresponding Author: Arun K Shandilya, Department of Applied Geology, Dr. Harisingh Gour University, Sagar, Madhya Pradesh, India.

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Abstract

First time in the geological history of Indian geology some of the minor folds have been recorded in the rocks of Upper Rewa Sandstone of the Vindhyan Super Group in the near Galla mandi in the District Saugor, lying in the southern part of the Bundelkhand region of M.P. in Saugor Commissioner. M.P. A typical isoclinal to recumbent type folds have been observed in the Upper white sandstone, pink sandstone layer of the Upper Rewa group rocks at the escarpment exposed at 540 to 580m height from MSL on the old Vindhyan escarpment. These folds are within the upper most layer which shows the current bedding, asymmetrical ripples, and coarse sandstone shows the graded bedding as primary sedimentary which must have been formed under shallow water condition. In the escarpment about 1 - 2m thick sandstone bed is showing the folding. The amplitude of the fold is very low, but it is varying in nature from isoclinal to recumbent type, the size of the fold is about 50 cm to 1.0m in size, with numerous folding in the layer. The axial plane, axis and limb are inclined in the isoclinal fold and axial plane, axis, and limbs are very low angle to nearly horizontal in the recumbent fold. It seems that these fold must have been developed in 1 to 2 m thick deformed layer by the penecontemporaneous deformation (PCD) in the later phase of Upper Rewa sandstone upliftment and deformation in the Vindhyan basin. In near future attempt will made to make the studies of such type of penecontemporaneous layer in the other part of the Upper Rewa rocks in the adjoining district in Bhopal, Vidisha, Damoh, Satna, Panna, and type locality of Rewa sandstone.

Keywords: Rocks; Rewa Group Vindhyan Super Group

Introduction

Present studies has been carried out during the M.Tech Ist year II semester Geological mapping training held in the early March month 2013 at RATONA village in the District Saugor lying in the southern edge of Bundelkhand region in Saugor commissioner. In this training programme students have under gone the various geological, lithological, structural, stratigraphic, geomorphological, and soil mapping training to budding young geologists, under the supervision of the both authors. The rocks of the whole of the Vindhyan Super group were considered as a low dipping strata varying in dip from 5 to 10 degree. No one has attempted to see the folding in these rocks all-over the Vindhyan basin in M.P., U.P. and in Rajasthan state.

Geology

The area is covered by the rocks of the Upper Rewa Group of the Vindhyan Super Group exposed in the north of the Ratona village area. The stratigraphy of the Ratona area is as follows.

The rocks exposed in the north of Ratona Village are as follows:

Structure

The rocks of the Upper Rewa group are characterized by the low dipping/gently dipping strata, which have formed the Synclinal hill with a steep escarpment on the both slope of hill top at the height varying from 540m to 620m from MSL. Along these escarpment till recent time on one attempted from Geological Survey of India and researcher from the Universities have tried to make the structural studies in these rocks, not only in Saugor but also in Vidisha, Bhopal, Damoh, Rewa and Satna area.

As mentioned earlier that the gently dipping synclinal hill and anticlinal valleys are very wide are developed in the throughout the Vindhyan terrain. In the Ratona village the Upper Rewa sandstone strata are exposed as Inlier within the Ratona Volcanics (= Deccan Trap Basalt) of the Upper Cretaceous age.

Age	Formation
Recent- Subrecent/ Quaternaries	Alluvium soil, Black soil
Upper Cretaceous	Deccan Trap Basalt (with Intertrappean limestone)
Lower Cretaceous	Lameta Formation
Late Proterozoic Vindhyan Super Group	Bhander (Containing the Petroleum gas and Helium gas) Rewa Kaimur Semri
Middle Proterozoic Bijawar Super Group	Phosphatic Dolomite Dolomite. Ferruginous Shale Ferruginous Sandstone Iron Formation/BHQ Quartzite Conglomerate bed.
Early Proterozoic Bundelkhand Granitic Complex	Quartz reef intrusion Pegmatitic intrusion Ultramafic intrusive Granite Intrusive rocks. Granite Gneiss Biotite Schist.
Archean Mehroni Super Group	Intrusive body Dolomitic Marble Slate Ferruginous Formation Quartzite Schist

Table 1: The stratigraphic succession in Sagar district, M. P. [1].

Quaternaries/ Recent	Soil/Alluvium Weathered rocks
Ratona Volcanics (03 flows) (= Deccan trap Basalt.) Upper Cretaceous	Unconformity Flow 3 Intertrappean limestone Flow 2 Intertrappean limestone Flow 1 Unconformity Palaeosoil Unconformity
Rocks of Upper Rewa Group	White Sandstone, pink sand stone and Red Sand stone
Upp. Vindhyan Super Group	Base not exposed

The typical primary sedimentary primary structure are exposed all along the Vindhyan escarpment. But in these escarpment at the height 540 to 600m from MSL in the north of the village Ratona, have 2 - 3m thick layer comprises of the primary sedimentary structure rich, including- current bed, asymmetrical ripple marks, and in the coarse grained sandstone showing the graded bedding etc.

The asymmetrical to symmetrical isoclinal to recumbent plunging fold as very well exposed with varying the plunge from 10 to 20 degree towards N and south direction. The regional trend of the Upper Rewa Sandstone rocks are ENE- WSW trend with a small amount of dip varying from 8 to 12 degree, dipping towards either north or south in the limb of the syncline.

The area is predominantly characterized by the synclinal hill and anticlinal valley. Along the anticline valley and low lying area had been occupy by the lava flow of the Ratona Volcanics (= Deccan Trap) are spread over in the area. These Upper Rewa Sandstone rocks are exposed as the inlier within the Ratona Volcanics.

Nature of folding

The earlier in the history of the Vindhyan rocks it was considered that these rocks of the Upper Rewa Group and as whole of the Vidhyan Super Group rocks, were not folded, they were merely low dipping/gently dipping strata.

Our present studies in the red sandstone, pink and cream coloured sandstone of Upper Rewa group on the north of the Ratona village, comprises of the synclinal hill and anticlinal valley, with a steep escarpment on the synclinal hill ridges. Among these escarpment, no one has attempted to make any structural studies in detail.

It is first time during the M.Tech 1st year II semester geological mapping training a detailed investigation has been carried out on the highly elevated escarpment of these geosynclinal ridges, with in these escarpment at the height of 540 - 560m from MSL, a 2 - 3m thick layer with the diagnostic primary sedimentary structure i.e. current bedding, cross bedding, asymmetrical ripple marks, and graded benning has been recorded along the 2 - 3m thick penecontemporaneous deformed layer, in which the asymmetrical isoclinal to recumbent has been observed in the northern slope of the Ratona village and near Galla mandi in the northern slope on the Sagar - Bina road section. Along the Sagar- Bina road section at about 5.00 km point on the right hand side on the escarpment of the another synclinal hill an Eye shape superimposed fold has also been, which is doubly plunging fold.

Superimposed folding

In the thin layer within the cream coloured sandstone of Upp. Rewa group in the escarpment we have observed 2 - 3m thick layer of penecontemporaneous deformation (PCD) layer overlain by the primary sedimentary structural horizon in the cream coloured sandstone. This PCD layer showing the wide isoclinal to recumbent type of folding, domal structure in also observed.

Ratona volcanics

The volcanic rocks of the Ratona area is equivalent and extension of the Deccan Trap basaltic flows (= Malwa Trap) of the Sagar area. The flow I is directly overlain the Vindhyan Palaeosol and some places on the Red sandstone. The Flow I is overlain by the Inter trappean limestone, followed by another Flow 2 and Inter trappean limestone and then again overlain by the Flow 3. The average thickness of the volcanics lava flow is 20 to 30m. The Ratona Volcanics rocks have occupied the low lying horizon of the anticlinal valleys. The Vindhyan outcrop are exposed as the inlier within the Ratona Volcanics (= Deccan Trap Basalt) [2-11].

Figure 1: Photo exhibiting the recumbent fold.

Figure 2: Photo exhibiting the Recumbent fold.

Figure 3: Double Plunging Fold in vindhyan rocks.

Figure 4: Recumbent fold in vindhyans rocks.

Conclusion

The penecontemporaneous deformation with the in the 3 - 5 meter thick formation was responsible for the development of the isoclinal to Recumbent type folding. These rocks were overlain by the Deccan trap Basaltic lava during the Upp. Cretaceous period, whereas these Isoclinal to Recumbent folding were developed during the fold in Vindhyan rocks around Sagar Gall Mandi, much earlier period sometime in early 600 m.y. ago.

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