RESEARCH NOTES

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A Study on Palaeocurrent in Western Vindhyan Basin

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Abstract

During the Upper Vindhyan times there was a northwesterly flow of current prevailing throughout the Great Vindhyan Basin of Northern India.

The Great Vindhyan Basin of Northern India sweeps around the Bundelkhand Granite Massif covering an area of about 161,000 sq km extending from Uttar Pradesh in the east to Rajasthan in the west. Eastern (Sone Valley and Bundelkhand) and Western (Rajasthan) outcrops of Vindhyan rocks are separated by Deccan Trap flows. The basin is bounded on the north by the Delhi-Aravalli Orogenic belt and on the south by Satpura Orogenic belt.

In the Western Vindhyan Basin in Rajasthan, both the Lower and Upper Vindhyan units are well exposed only in Chitorgarh 24°50′–24°55′N, 74°35′–74°42′E and in Karauli 26°17′–26°23′N, 76°48′–76°59′E State areas. In the eastern part of the Western basin (i.e. Karauli State) the Upper Vindhyan units are better exposed than those in the western part (i.e. Chitorgarh area).

In both the areas the sandstone units contain plenty of cross-stratification and ripple-marks which afford the most important clues for determining the palaeocurrent directions. The most dependable clue to the palaeocurrent is to determine the mean direction or orientation of the foreset of a cross-stratification, which is in the direction of the current producing it. The lee-slope orientation of asymmetric ripples is a means of deducing the direction of palaeocurrents.

In order to avoid any human bias, azimuthal measurements of cross-stratification and ripple marks are generally made according to statistically pre-designed sampling plan. But the highly scattered occurrence of cross-stratifications and ripple marks in the rock units both in Chitorgarh and Karauli areas, made the task difficult for the authors in applying any such pre-designed sampling plan. A summarised account of the data used in the palaeocurrent determination is given in Tables I & II.

Discussion on Palaeocurrent pattern: The palaeocurrent pattern in all outcrops clearly suggests a northwesterly to north-northwesterly direction of sediment transport (except scarp sandstone). It is also clear that the palaeocurrent system varied both vertically and areally in the Western Vindhyan Basin during the deposition of Upper Vindhyan sediments.

In case of the Lower Rewa sandstone and Chitor Fort quartzites the current directions estimated both from cross-stratification and ripple marks are almost same. But in the case of the Upper Rewa sandstone the current direction from cross-stratification differs from that of the ripple marks by about 64°. This difference is most probably due to the variation in depth of basin during formation of cross-stratification

and ripple marks. Using Allen's (1968) regression equation, it is found that the ripple marks are formed in a shallower depth than the cross-stratification.

TABLE I

PALAEOCURRENT DIRECTION DETERMINED FROM CROSS-STRATIFICATION

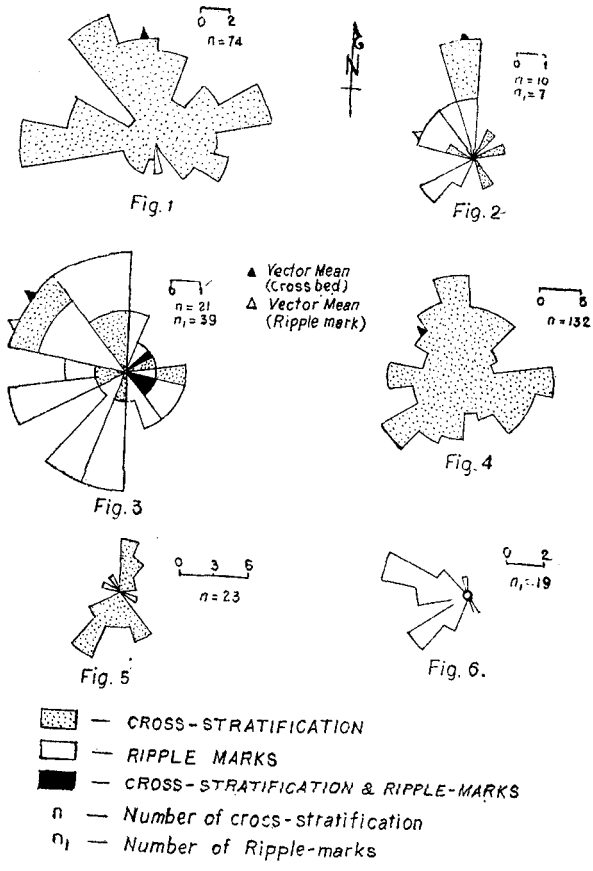
Area of study	Rock units	Type of cross-stratn.	No. of measurements taken	Vector mean direction	Fig. No.
Karauli State	Bhander sandstone	i) Tabular (abundant) ii) Wedge shaped (common)	76	354°36′ (L*=32.27%)	1
,,	Rewa sandstone:				
	Upper	Tabular	10	353°30′ (L=60.2%)	2
	Lower	Tabular	21	306°28′ (L=28.52%)	3
Chitorgarh Kaimur Sandstone	Chitor Fort quartzites	i) Tabular (abundant) ii) Wedge shaped (rare)	132	316° (L=7.42%)	4
	Scarp sandstone	i) Tabular (common) ii) Wedge shaped/ lenticular (rare)	23	171°36′ (L=20.87%)	5

TABLE II

PALAEOCURRENT DIRECTION DETERMINED FROM RIPPLE MARKS

Area of study	rock units	No. of measurements taken	Type of ripple marks	Vector mean	Fig. No.
Karauli State	Upper Rewa sandstone	14	Aqueous ripples; parallel, symmetrical, asymmetrical mainly sinuous, Bifurcating and curved ripples rare	289° (L=70%)	2
,,	Lower Rewa sandstone	68	Same as Upper Rewa sandstone	291° (L=32.82%)	3
Chitorgarh	Chitor Fort quartzites	50	Aqueous ripples; parallel, asymmetrical and slightly curved ripples mainly	311° (L=18.2%)	6

*denotes the 'Consistency Ratio' or 'Vector Strength'.



Figures 1 to 6.

It is observed that the northwesterly to north-northwesterly palaeocurrent direction is almost similar to the regional palaeocurrent of the Eastern Vindhyan Basin (Banerjee and Sengupta, 1963). Thus it can be concluded that during the Upper Vindhyan times there was a northwesterly flow of current prevailing throughout the Great Vindhyan Basin of Northern India.

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References

BANERJEE, I. and SENGUPTA, S., (1963) The Vindhyan Basin—A Regional Reconnaissance of the Eastern Part. *Quart. Jour. Geol. Mtn. Met. Soc. India*, v. 35, pp. 141-149.

CHAKRABARTI, P., (1972) Study of Vindhyan Sedimentation in and around Keladevi, Karauli State, Rajasthan—*Unpublished M.Sc. thesis submitted to University of Calcutta.*

RAY, S., (1966) A study on the Vindhyan Rocks around Chitorgarh, Rajasthan—*Unpublished M.Sc. thesis submitted to University of Calcutta.*

——— (1971) Study of Sedimentary structures & palaeocurrents in the Upper Vindhyan Rocks of Chitorgarh, Rajasthan—*Proc. Ind. Sci. Cong.*, p. 285 (abstract).