

RESEARCH NOTE

CONTROL OF DEPOSITIONAL ENVIRONMENTS ON TEXTURE OF CLASTIC DEPOSITS OF CRETACEOUS BASINS, WESTERN INDIA

The Nimar Sandstone of the Narmada rift basin, 30m to 150m thick, comprises mainly sandstones, shales and locally developed conglomerates. The sequence has been generally considered as fluvial (Pascoe, 1959; Robinson, 1967) especially in the inner or eastern part of the basin. In the Western part, deltaic/marine influence is suggested (Biswas and Deshpande, 1983). A recent study indicates, during the later Turonian marine transgression, deposition in a macrotidal estuarine complex environment comprising shallow channels and mud flats (Ahmad and Akhtar, 1990).

The Wadhwan Sandstone of the Saurashtra basin is about 50m thick and consists of sandstones, with lenticular shales and limestones. The Wadhwan Formation represents localized deposition in estuaries and embayments as part of continuing marine transgression (Casshyap and Aslam, 1992).

The textural attributes of Cretaceous sandstones (Nimar and Wadhwan Formations), such as size, roundness, sphericity and textural maturity were studied in relation to their depositional environments. Interrelationship of various textural attributes of Cretaceous sandstones were studied with the help of bivariate plots.

The Nimar sandstones of Himatnagar-Naswadi area are mostly medium grained (63%) and fine grained (36%) and occasionally coarse grained (1%). Most of them are moderately well sorted (48%), well sorted (29%) and moderately sorted (24%) and few are poorly sorted (3%). 46% samples are near symmetrical, 27% fine-skewed, 16% coarse skewed, 7% strongly fine skewed and 4% strongly coarse skewed. 49% samples are mesokurtic, 41% leptokurtic, 7% platykurtic and 3% very leptokurtic. In Rajpipla-Jobat area 50% samples are fine sand followed by 36% medium sand and 10% coarse sand. Majority of samples are moderately well sorted (47%) and moderately sorted (31%); some are well sorted (18%) and few poorly sorted (3%). 34% are fine skewed, 32% near symmetrical, 19% strongly fine skewed and 13% coarse skewed. Mesokurtic samples are 36% followed by platykurtic 26%, very leptokurtic 6% and very platykurtic, 5%.

In comparison to the sandstones of the Narmada basin, the Wadhwan sandstones are mostly medium sand (78%) and some are fine sand (19%). 61% are moderately sorted, 33% poorly sorted and 6% moderately well sorted. 50% are fine skewed, 30% are near symmetrical and 14% strongly fine skewed. 50% are mesokurtic, 22% platykurtic and 28% leptokurtic.

The samples from both the Narmada and Saurashtra basins show low sphericity. About 75% grains are of low sphericity and 25% grains are of high sphericity.

According to their textural maturity, the percentage of sandstones of Himatnagar-Naswadi area are: immature 33%, submature 54%, mature 11% and supermature 2%. In Rajpipla-Jobat area 46% are submature, 38% immature and 16% mature. But 80% of the Wadhwan sandstones are submature, 17% are mature and 3% immature.

The sandstones of both the basins show almost similar textural characteristics. They are generally medium to fine grained, moderately sorted to moderately well sorted, near symmetri-

cal to fine skewed and mesokurtic to leptokurtic. The sandstones are mainly texturally submature to immature and comprise subrounded grains of low sphericity.

The textural attributes suggest that the sandstones were mainly locally derived and were not subjected to long transport or reworking. Earlier petrographic study of the Nimar Sandstone suggested that the Nimar sands were shed from fault bounded uplifts of continental basement rocks and accumulated, without much transport, in the nearby incipient Narmada rift (Akhtar and Ahmad, 1991). The highly quartzose nature of the Nimar Sandstone was mainly attributed to the humid and tropical climate prevailing at the time of deposition.

The texturally immature sandstones were deposited in rather protected environments of estuaries and embayments. The waves and currents could winnow away the mud, but were not strong enough to bring about sorting and rounding of the detrital grains.

Bivariate plots of various textural parameters, such as mean size versus roundness, mean size versus sphericity, mean size versus sorting and sorting versus roundness, show generally weak relationship in both Nimar and Wadhwan sandstones.

In conclusion, textural characteristics of sandstones from these basins of western India were mainly determined by the climate and depositional environments.

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