Significance of bank material at Tilakwada in Lower Narmada Valley

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The alluvial gravels in the Lower Narmada Valley (LNV) at Tilakwada are tectonically controlled and appear to have accumulated in a graben. The three horizons of gravels distinguishable on the basis of their lithofacies point to their formation by the processes of debris and stream flows.

An example of fluvial sedimentation controlled primarily by tectonism is provided by the alluvial gravels in the Lower Narmada Valley (LNV) near the Tilakwada town 60 km south of Baroda. The thick gravel deposits (20 m) are exposed in the cliffs along the river channel (Figure 1a). Chamyal and Merh1 included the lower two horizons of LNV gravels in their Tilakwada Formation. However, at Tilakwada three gravel horizons are distinguishable on the basis of their lithofacies; and are separated by intervening thin horizons of sand or mud.

LNV lies within the Cambay graben structure and the channel as well as its neighbourhood, especially the trap highlands to the south point to the existence of two sets of fractures N-S and E-W, related to the Cambay and Narmada basin tectonics2, 3. Bedi and Vaidyanadhan4 have shown an identical lineament pattern in LNV. The graben at Tilakwada is located quite close to the intersection of the eastern boundary of the Cambay basin and Narmada fault and has provided an appropriate depression in which the gravels got accumulated.

The gravels exposed on the right bank of the Narmada river around Tilakwada form a distinct 40 m high cliff (Figure 1a). Sequence of the gravels as given by Chamyal and Merh1 along Narmada at Maletha is also taken into account (Figure 1b). The lithofacies type of lowermost gravel forms an accumulation of subangular to subrounded boulders, cobbles, pebbles and smaller clasts of volcanics, quartzites and sandstone and is either matrix or clast-supported. The entire thickness is rather unstratified and the mean dip of the longest axes of the gravels is in the upstream direction. Texturally, the lithofacies comprises gravel about 75%, sand 15%, silt 7% and clay 3%. The mean size (phi) and the

Stable isotopic evidence for the pedogenic origin of calcitic rocks of Andaman–Nicobar Islands, Bay of Bengal, India

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Carbon and oxygen isotopes and electron microprobe analyses were carried out in some calcitic outcrops of the Andaman–Nicobar group of islands. Isotopic results in these rocks indicate significant depletion in δ¹³C (−12.0 to −15.02‰ vs PDB) and low δ¹⁸O values (18.42 to 23.32‰ vs SMOW). The presence of chromite, magnetite, quartz and chlorite relics in the microprobe analyses and other geological features suggest that they were formed by the alteration of ultramafic rocks. Brecciation and cementation of the ultramafics under the influence of meteoric water are attributed to the formation of these calcitic lenses.

The Andaman–Nicobar group of islands constitute an island arc connecting the Arakan-Yoma range of western Burma to the festoons of islands south and west of Sumatra. These islands were uplifted during collisional events associated with the subduction of Indian plate under the Eurasian plate. The arc system is composed of an inner volcanic arc and an outer sedimentary arc. The ophiolitic suite of these islands consists of Plutonic igneous rocks, ultrabasics and volcanics. The sedimentary rocks which occur in the south Andaman island are mainly composed of radiolarian cherts, conglomerates and grit, and turbidites. The radiolarian cherts which occur as thin bands consist of radiolarian tests set in the fine-grained clay matrix. Mineralogical studies carried out in these clays showed that they are mainly made up of montmorillonite and chlorite minerals. Conglomerates and grit unit include interbedded calcareous shales and sandstones. Turbidites cover most part of the south Andaman island and comprise alternate greywackes, siltstones and shales. They have well-developed sedimentary structures like graded bedding, flow casts, load casts, convolutes, etc. Geological and geochemical studies of these sediments suggest that they were deposited under different oceanic environments.

The calcitic outcrops of the south Andaman are exposed in small lenses in association with ultramafics and serpentinitic rocks. These lenses which were reported earlier as ‘hard crystalline limestones’ are different from other shell carbonates and limestone boulders of these islands. These islands are extensively covered by forests and receive a very heavy annual rainfall of about 2800 mm.