

DISCUSSION

IDENTIFICATION OF A PALAEODELTA NEAR THE MOUTH OF PERIYAR RIVER IN CENTRAL KERALA by A.C. Narayana, C.P. Priju and A. Chakrabarti.

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K.R. Subrahmanya and H. Gangadhara Bhat, Department of Marine Geology, Mangalore University, Mangalagangotri - 574 199 comment:

The short communication has drawn our attention since the title mentioned was of a palaeodelta in Kerala. The authors have identified the features marked M in their Fig.1 as palaeodelta and N as a new delta being built up. The deltas, as generally understood, are features associated with major rivers having a large drainage area and carrying huge quantity of sediments. A typical, triangular shaped delta is built up in a wave dominated environment and a birdfoot delta of a river in a current dominated situation. Although tide dominated estuarine delta can be recognized as the third type, it is not in vogue. The feature under discussion is a part of Malabar coast that is known to be emergent. The slow uplift of the coast results in the part of inner continental shelf getting added to the coastal plain. In this process, the shelf sediments get reworked and transported landward, accreting in the form of ridges and swales. It is this reworking of shelf sediments that is responsible for the enrichment of placer minerals in parts of coast in Kerala and Tamil Nadu. The emergent nature is also responsible for enclosing a part of the Lakshadweep sea as a lagoon (Vembanad lake).

Reverting to the feature marked M, the authors, based on the tonal differences, consider that area as palaeodelta. This feature is more likely to be a silted up part of Vembanad lake (lagoon) in which silting is an ongoing process. Likewise, it is very common to see a patch of suspended sediments at the mouths of rivers and estuaries. Further, the plume pattern need not necessarily reflect any bottom topography. It may be a surface pattern as the concentration of suspended sediments reduces the penetration capability of the electromagnetic radiation. IRS band 1 (0.45-0.52 μm) and band 2 (0.52-0.59 μm) are more useful for the study of nearshore processes than FCC. Careful observation of the IRS imagery (Fig.1) indicates that the turbid plume pattern is broader to the north of the Periyar river mouth and tapers to the south in the nearshore zone. It is indicative of the direction of the flow of currents. For these reasons, we feel that there is not sufficient justification to consider the feature N in Fig.1 as a new delta.

The authors have used the term *yazoo* with several suffixes such as *yazoo* drainage zones, *yazoo* belt, *yazoo* zone, *yazoo* system. *Yazoo* by strict definition is a tributary that runs parallel to the main river for some distance. It appears that the term has been used to indicate coast-parallel water bodies. The term *yazoo* itself is rarely used and its loose usage will lead to confusion.

The authors had made use of the facility and faculty of the Department of Marine Geology, Mangalore University for interpretation of satellite data. We feel that the same could have been acknowledged.

A.C. Narayana, C.P. Priju and A. Chakrabarti, Department of Marine Geology and Geophysics, Cochin University of Science and Technology, Lakeside Campus, Fine Arts Avenue, Kochi - 682 016 reply:

We are thankful to K.R. Subrahmanya and H.G. Bhat for evincing keen interest in our short paper. Their objection to the presence of a palaeodelta inferred by us near Munambam is however not acceptable. The term 'delta' has been used by us to imply an accumulation of sediments at a river mouth resulting from the rate of deposition exceeding the rate of removal by waves and currents (Holmes, 1966, p.545). Since the time of Herodotus, i.e., 2500 years ago, the term delta has been modified in various ways, but it is generally applied to the subareal plain formed by a river at its mouth without reference to its precise shape (Coleman, 1968, p.255). Recent studies of deltas have shown that the subaqueous portion of a delta is characterized by a high rate of sedimentation, building up to create new land. In this manner, the shoreline of a delta plain tends to move seaward or prograde with time. Present-day deltas display an enormous variety of size, shape, structure, composition and genesis. These differences exist because, the same kind of event takes place under a wide range of settings. The geomorphology of the entire Kerala coast cannot be generalized in terms of an emergent Malabar coast, as it is possibly characterized by a number of transgressions and regressions. The stretch of the coast extending from Ponnani to Paravur, of which the area under investigation forms the central part, is characterized by distinctive geomorphology

and, therefore, should have a distinctive stamp of evolution as will be evident from the geological map of the region. We believe that this stretch of the Kerala coast must have evolved in several stages culminating in a final scenario in which the Vembanad lake is, perhaps, the most prominent feature. Even if the Vembanad lake is relict of Lakshadweep sea, as a lagoon it does not rule out the possibility of deltas having been built by rivers along the existing paleoshoreline, withdrawal from which westwards lead to the formation of Vembanad lake. In this context, the interpretation of what we have termed as palaeodelta "as a silted up part of Vembanad lake (lagoon)" seems simplistic. The sudden ending of the geomorphic features against a line (the old river bank in our view) is indicative of riverine action rather than filling up of a lagoon. Filling up of a lagoon will have a different morphologic expression. Similar pattern has been noted in the palaeo-Subarnarekha delta, in the East coast of India. In this case, the slow uplift of the coast has blocked the growth of the delta. In fact, we anticipate that ^{14}C dating of the sediment sequence in this part of the coast would bring out the time relationship. We feel that it is important to identify several stages of the temporal evolution in this stretch. The suggestion of a palaeodelta has been made as a first step in this direction based on the geomorphic features already mentioned. Broad generalizations regarding the evolution of the Malabar coast, we feel, will not help in delineating several stages of its evolution.

Regarding the second paragraph, while we agree that use of IRS bands 1 and 2 may be more useful for nearshore processes, it is not clear how inferences from a FCC are unattainable. Plume pattern is normally associated with initial growth of delta mouth bar. In fact, the LISS I FCC of the Hoogly river mouth clearly brings out the underwater

sandbanks, giving a good reflection pattern. These patches with suspended sediments are the basic nuclei for delta-building processes. The feature N was not described by us as a new delta, but as a delta in the making (*see* caption of Fig.1). The importance in pointing out this feature is to emphasize that along the present coast we have riverine deposition overtaking removal by currents, however small the resulting deposition may be at present.

The term *yazoo* has been mainly used to emphasize the lack of energy in the river system to cut across a narrow barrier built between the river and its final destination. Instead, the streams run parallel to the coast for long distances to reach the final destination. The system therefore is dynamically similar to the general definition of *yazoo*. The extended use of the term *yazoo* may be debatable, but the long linear stream courses may not be merely "coast parallel water bodies" as indicated by Subrahmanya and Bhat. They may have a submerged riverine antecedence.

We would like to categorically acknowledge the collaborative support from the faculty of Mangalore University in our research endeavours, which has been a source of considerable encouragement. Our collaboration with H.S. Bhat has been with regard to landuse/land cover characterization and any publication made on this subject would be with his co-authorship.

References

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LATE CRETACEOUS-TERTIARY SEDIMENTS AND ASSOCIATED FAULTS IN SOUTHERN MEGHALAYA PLATEAU OF INDIA VIS-A-VIS SOUTH TIBET: THEIR RELATIONSHIPS AND REGIONAL IMPLICATIONS by S. Nag, R.K. Gaur and Tapan Pal, Jour. Geol. Soc. India, v.57(4), 2001, pp.327-338.

S.N. Chaturvedi, S. Balasubramani and H.S. Rajaraman, Atomic Minerals Directorate for Exploration and Research (AMD), North Eastern Region, Nongmynsong, Shillong - 793 011 comment:

We congratulate the authors for describing various lithofacies and associated faults of southern Meghalaya

plateau and its linkage with Tibetan plateau. But the disposition of the Jadukata Formation as described in this paper between Saitbakan and Nongshyrngen is not correct, as these conglomerates and sandstones are of Tertiary age.

1. The area from Siatbakan to Nongshyrngen located south of Pynursla lies between latitudes $25^{\circ}15'27''$ and