SOME FACTORS RESPONSIBLE FOR THE DEVASTATION IN NAGAPATTINAM REGION DUE TO TSUNAMI OF 26th DECEMBER, 2004

On 26th Dec 2004 great earthquake of magnitude (M~9.3 revised recently) had struck the active subduction corridor along the eastern margin of the Indian lithosphere. Its epicenter 3.7N, 95°E lies close to NW boundary of Sumatra, where the trench appear to (a) bend a little and (b) be intersected by nearly N-S running oceanic features (like Investigator ridge/fracture, 90°E ridge etc). Such features on entering subductions way act as barrier (aspirites) to cause large stresses to build which are eventually released in form of major earthquakes. As a consequence of great energy release and associated land movement in the marine region, tsunamis were produced in the eastern part of the Indian Ocean and spread with speed of ~700-900 km/hr. On its eastern path successively these reached Andaman, east coast of Sri Lanka and Tamil Nadu and then further north along the east coast up to Orissa. On reaching shallow waters along the coastline, the large energy of the deep sea waves gets transformed into very forceful tidal waves of great height causing vast devastation evidenced there. The extent of the resulting damage may depend on various factors and its model need to take into account finer details of different significant parameters. However the Nagapattinam region (NG-R) appears to have borne the greatest brunt of this catastrophe. Some first order factors that may be responsible for maximizing the devastation around Nagapattinam are: (1) the distance (d) from the tsunami/ earthquake source region (*see* Fig.1). As the force (a energy content) of these waves will depend upon the distance (d),

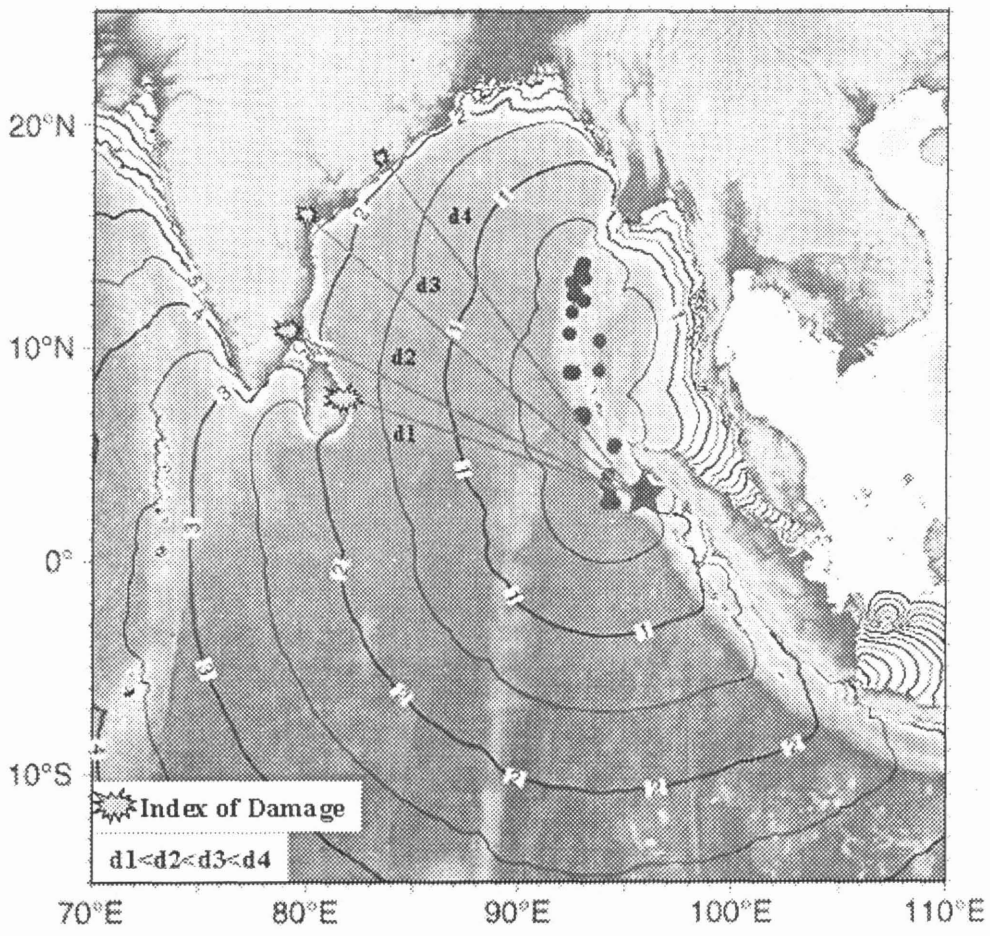

Fig.1. Shows that after the Sri Lankan east coast, the NG-R was probably closest to the source region (star). Approximate variation of the damage with distance is also depicted.

Fig.2. Change in the nature of the rifting from extensional to shear type (southeast of NG-R) (Chand and Sububrahmanyam, 2001) which appears to have taken place close to NG-R.

the damaging power of these waves will reduce as it moves northward i.e. away from source. In this context the NG-R falls it the shortest distance after the Sri Lankan coast, since southernmost part of the east coast has been screened by Sri Lanka. This implies that along the east coast of India NG-R would experience maximum force; (2) Focusing, if any, of the tsunami/tidal waves caused by the shape of the coast line and associated bathymetry such a situation seems to exists in the vicinity of the NG-R as seen from the Fig.3a. It is due to eastward concave shape of the coastline, the reason for which lies in the bending, near the NG-R, of the SSW trending axis of breakup between Greater India and Antarctica (at ~120 Ma) by about ~60° (anticlockwise) such that further south it moves in the SE direction to encompass Sri Lanka (*see* Figs.2 and 3b); (3) Presence of tectonic junction close to this region due to (a) a NW-SE trending major gravity lineament (Sreedhar Murthy, 1999) which has been considered as a deep seated lithospheric feature (Chand et al. 2001; Avasthi, 2002; Raval, 2002; Veeraswamy and Raval, 2003; Haggerty, 2004;), (b) A triple junction has been postulated in this zone (Burke and Dewey, 1973), and (c) eastern end of the Palghat-Cauvery Shear Zone also

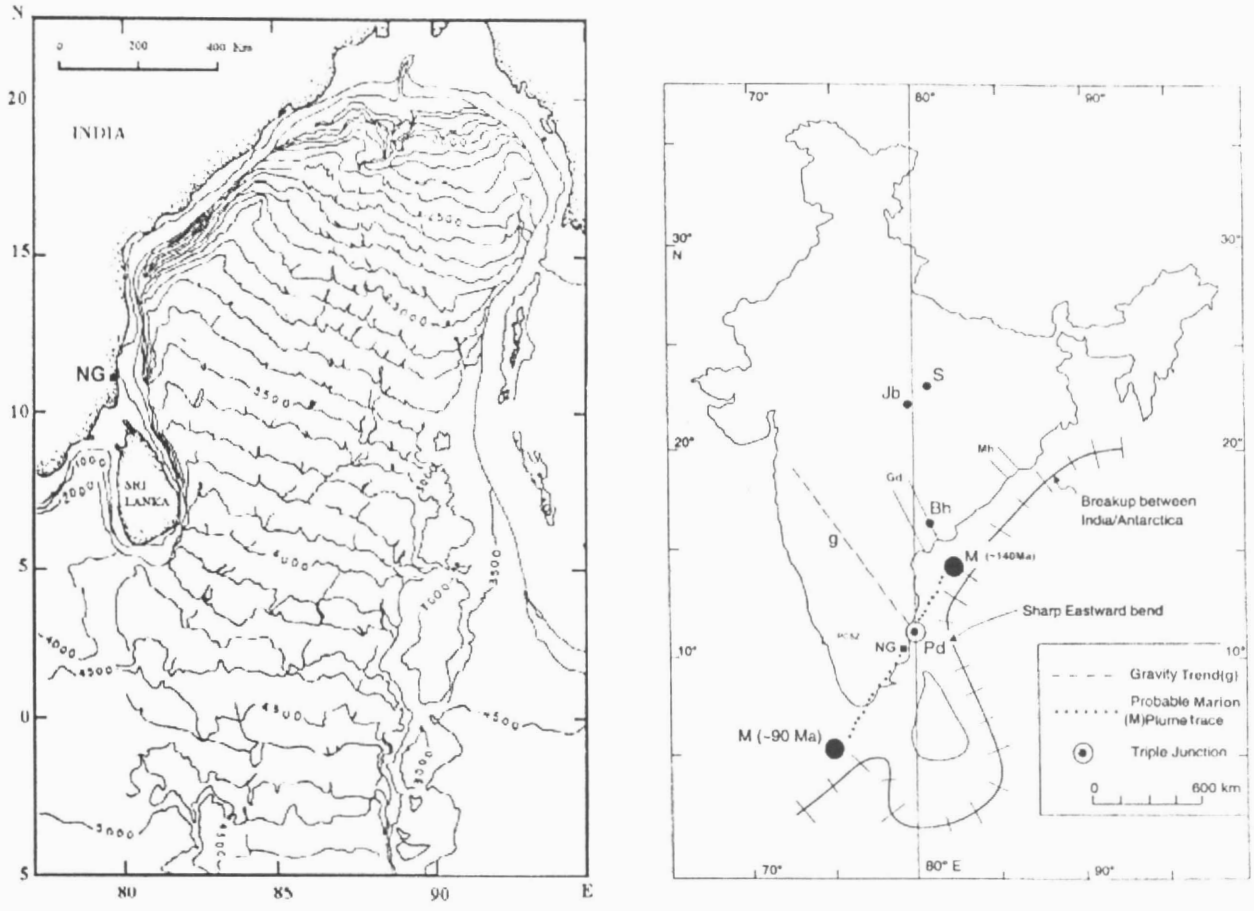

Fig.3. Eastward concave shape of the coastline and bathymetry near NG-R controlled probably by the change in rift axis direction (as shown in Fig. 2 & 4). 3A. Anticlockwise rotation of direction of break up (at ~125 Ma) by ~60° from SSW (north of NG-R) to SE (south of NG-R) the triple junction (Burke and Dewey, 1973) and NW-SE trending gravity axis (Sreedhar Murthy, 1999) are also depicted (Raval, 2002).

lies very close to NG-R (Radhakrishna, 2005), and (4) the NG-R also falls within a narrow corridor across the intriguing 80°E, along which lie a number of significant tectonomagmatic features (eg. Jabalpur, Bhadrachalam, Ongole, Nellore, Pondicherry, Panna, etc.,); it may be noted in this context that in the offshore region adjoining southern most Sri Lanka, major N-S trending fracture zones appear to enter in 80°E corridor and these have been attributed to the traverse of the Indian plate over the Conrad hotspot.

Effect of these first order factors and other finer details need to be considered in modeling the damage along the east coast particularly near the NG-R.

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TRAINING PROGRAMME ON FLUVIAL SYSTEMS

A Training Programme on Fluvial Systems sponsored by Department of Science and Technology (DST), New-Delhi was organized by the Department of Geology, Maharaja Sayajirao University of Baroda, Vadodara from 16th November, 2004 to 25th November, 2004. Twenty participants representing various universities and research Institutions from all over the country and three local participants attended the training programme. The programme was aimed to acquaint young scientists of the country with the multifaceted nature of the fluvial depositional system so that they can take up challenging research along similar lines in the various parts of the country. Earth Science being a field oriented subject, the programme was designed to provide maximum field exposure to the participants. The first two days of the programme were devoted to lectures on various aspects of fluvial systems by eminent resource persons of the country. This was followed by eight days extensive field training in the various river valleys of Gujarat alluvial plains.

The inaugural session of the programme was presided over by Prof. A.V. Ramchandran, Dean, Faculty of Science, M. S. University of Baroda. Prof. L. S. Chamyal, Coordinator of the programme welcomed the resource persons and the participants. Prof. S. K. Tandon stressed on the need for involvement of young geoscientists for taking up challenging research on various fluvial systems of the country. Prof. V. Rajamani in his address highlighted the importance of fluvial systems in the survival of life on earth and role of geoscientists in understanding them. Dr. K.R. Gupta, Adviser, ESS, DST, New-Delhi in his address enlightened the participants about the activities of DST, and highlighted the thrust areas identified for challenging research in earth sciences. He hoped that the participants will be benefited from the course and will take up research on crucial aspects of fluvial systems. Prof. S. K. Tandon in his two lectures emphasized the study of past climates as revealed by fluvial sediments with examples from northern and western India. Dr. S. K. Biswas gave a detailed account of the structure and neotectonics of western India with special reference to fluvial systems, basin evolution and sedimentation. Prof. V. Rajamani in his lectures highlighted the usefulness