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Submarine landslides and related geohazards around Indian Subcontinent and Islands

Sainaba N.K.[1], Remya C.[1]and Unnikrishnan. E[1]

1 - Geological Survey of India, Marine and Coastal Surveys Division, Mangalore, Karnataka, India - 575001.
sainus@gmail.com

Submarine landslides are generally confined to the continental margins and Island flanks. Steep slopes, sediment build up on the shelf edge and various other morpho-tectonic and sedimentological reasons have been suggested for their occurrence [1]. India has a diverse range of continental margin types. Due to such diverse settings, the response of these continental slope and shelf edge sediments to oceanographic, geological, seismic and other catastrophic forces are also different. Accordingly, geohazard potential is also different along different sectors of Indian Coast.

Study of submarine landslides and other marine geohazards is a relatively new area of research in India [2]. The submarine slides and slumps are significant in view of the human exploratory activities in the coastal waters and farther beyond in the recent past consequent to discovery of economic mineral natural gas, gas hydrates and other conventional and non conventional marine resources in the oceans.

The aim of the present study is to examine the continental and island margins of India with regard to their vulnerability for submarine landslides and other geohazards based on various morphological and sedimentological characteristics of the sea bed, and to evaluate their potential for geohazards based on known occurrences, physical settings and other geological parameters. Bathymetric data downloaded from National Geophysical Data Centre (NGDC), United States Department of Commerce (USDCOS), Single and multibeam bathymetric data, sediment distribution maps of sea bed generated by Geological Survey of India (GSI) and other published materials are used to identify and discuss the vulnerable areas and potential slides. Indicators and expression of hazards like slumps, ridges, slope channels, gullies, faults, and pock marks were also identified. Four zones of increasing slope settings are identified and their hazard potential is discussed.

Submarine slumping/sliding and other types of submarine geohazards are not uniformly distributed along the margins, being more extensive in certain areas due to positive interference of various sedimentological and morphotectonic parameters favouring the instability of slopes. Detailed study of three sectors representing three different morphotectonic settings with reference to sediment characteristics and seismicity present along the Indian coast has been carried out to illustrate the occurrence and identification of various geohazards. They are the continental shelf edge of Okha falling in Zone III and IV, submarine delta front of Godavari River at Pudimadaka, Andhra Pradesh, representing

Zone-II, and the island flanks of Andaman Nicobar Islands falling in Zone I. The stability of the slope and incidence of geohazards are different in each of these geomorphic settings.

References:

[1] Locat and Lee (2000); Proceedings of the 8th International Symposium on Landslides, Cardiff, U.K., 1-30.
[2] Unnikrishnan E., (2014); Report: IGCP-585, E-MARSHAL: 15-57.