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Understanding the Structure and Tectonic Configuration of Bengal Basin for Earthquake Magnitude Prediction

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Abstract

The Bengal Basin is a living model of an active and complex geological entity consisting of dynamic deltaic depositional complex, heterogenous and multidimensional tectonic deformational settings from three tectonic plates. The earthquake risk of the basin is not rationally anticipated due to the absence of adequate seismic and geodetic data, subsurface geological maps, insufficient representative, and instrumental data acquisition system. For a geo-metrical array and vector mapping of tectonic deformation, intensive data search is done from published sources. An investigation on crustal configuration using available seismic data; velocity images, travel time tomography along number of profiles is done. Based on these studies, the basin is classified into five geotechnical domains. An attempt is made to understand the scenario of sediment input, tectonic and gravitational stress distribution, and their pattern of deformation vectors for earthquake magnitude prediction. The crustal study indicates that the basin is severely fragmented, and topography of the sedimentary sequences are shaped and stressed by various sizes of graben and horsts. The basin received enormous volume of sediments, which resulted in deposition of very thick clastic sediments. A seismic zoning map is prepared using the five major geotechnical domains with maximum possible magnitude of earthquakes to be occurred. The 1918 Srimangal event of $M_w \approx 7.5$ is the largest recorded earthquake and no seismogenic structure has been found to cause great earthquakes in Bangladesh.

Keywords: Bengal Basin, Tectonics, Seismicity, Earthquake