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Developing a Comprehensive Historical Tsunami Database for the Indian Ocean

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Abstract

The Indian Ocean is one of the most active Tsunamigenic zones on the earth. The destructive Tsunami of 26th December, 2004 and 28th September, 2018 are standing testimonies of the tsunami city in the region. The occurrence of two strong Tsunami in consecutive decades is a driving force behind the compilation of a comprehensive historical catalog for the region. Unlike the other tsunamigenic regions of the earth, there exist no historical Tsunami catalog in a concretized form for the Indian Ocean. The importance of this study is that it gives impetus towards developing a probabilistic Tsunami hazard analysis methodology for long-term risk reduction against Tsunami. For this study, the Geographic area between 45°S -27°N and 24°E -120°E has been considered as the extent of the Indian Ocean. All the significant Tsunami events from 416 AD Till 2021 have been collected from various online catalogs globally. A few regional catalogues have also been referred to. All magnitudes of tsunamigenic earthquakes are homogenized into moment magnitude scale (M_w) using global correlation equations. Statistical regression tools like standard linear regression (SLR), Inverse standard linear regression (ISR) and Orthogonal standard regression (OSR) are used to developed correlation between Tsunami magnitude (M_t) and Earthquake magnitude (M_w). The missing data on Tsunami intensity of several events is calculated on the Soloviev scale using already existing relations. An updated catalogue for tsunami events of the Indian Ocean is hence developed which fills several missing values in the already existing catalogue. The catalogue so compiled is presented on a webpage.

Keywords: Tsunami catalog, Magnitude homogenization, Tsunami intensity, Tsunami magnitude