



## Seismic Hazard Analysis Considering the Effect of the Shape, Size and EQ Distribution of Seismic Sources for Different Locations in Sikkim, NE India

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### Abstract

For a seismically active region, ensuring the safety of the structures against future Earthquakes (EQs) is very important. This seismic safety is mainly ensured by designing the structures to withstand the probable EQ hazard that may occur in the future. This future probable EQ hazard level can be estimated by performing seismic hazard analysis (SHA) for the region. The two types of SHA, deterministic (DSHA) and probabilistic (PSHA), strongly depend on the presence of seismic sources near the region, its past EQ history, and the site condition of the region. In the present work, DSHA and PSHA are used to obtain the seismic hazard level (SHL) of different locations in Sikkim, NE India. This is to be noted here that some faults near Sikkim are not linear, and different segments of some faults show different seismic activity rates. The effect of these types of shapes is considered for the present SHA. As SHA depends on the type of seismic sources, two types of seismic sources (linear and areal), with multiple source models (SMs) are considered. These SMs are based on geotectonics and EQ distribution. For DSHA, highest SHL is obtained when SM with large areal sources is considered. However, for PSHA, hybrid SM, which contains both linear and areal sources, gives the highest SHL. In DSHA and PSHA, significantly lower SHL is obtained when linear SM is considered. Thus, SHL obtained from more than one SM should be examined before reaching a judgement about SHL of a specific region.

**Keywords:** Seismic hazard, Seismicity parameters, GMPE, NE India