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The Current State of Earthquake Hazards is being quantified

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Nepal, which is located in one of the world's most seismically active continental collision orogenic belts, has experienced a series of devastating earthquakes in the past . The Gorkha earthquake (Mw 7.8) in April 2015 was the most recent of these Himalayan thrust events, killing about 9,000 people in Nepal and nearby regions and injuring another 22,000 people. Following the long-term socioeconomic consequences of large earthquakes in the area, it is critical to establish a reliable and transparent system for quantifying the "real" degree of earthquake threat in major cities for the protection and preparedness of millions of people. We solve this issue by using a natural time analysis for earthquake nowcasting in 24 of Nepal's major cities.

The constant collision of the Indian plate with the Eurasian plate, and the resulting underthrusting, has resulted in massive stress accumulation along the major thrust faults in the Himalayan region, including Nepal. According to geodetic studies, the plate convergence rate in the N-NE direction is 35-40 mm/yr. Slip along a major basal detachment, the Main Himalayan Thrust (MHT), absorbs about half of this convergence velocity. The region's earthquakes are shallow to moderate in depth, with thrusting as the dominant mechanism . The general seismotectonic environment of Nepal, as well as the geographical positions of major cities.

In a complex, nonlinear earthquake threshold structure with a spatial network of interacting geological faults and statistically related earthquake events, there is a space-time connection. In some places, there is evidence of earthquake clustering and triggering. far- from-equilibrium earthquake dynamics' macroscopic ergodic behaviour The underlying earthquake mechanism and subsequent seismic hazard assessment in a given area are aided by hierarchical fault-plane geometry and a frequency-magnitude scaling relationship that leads to non-trivial discrete time series of interevent small earthquake counts (natural times) between two large events.

These analytical approaches are more appealing in creating statistical judgments that are also useful in risk assessment, earthquake insurance, and policymaking because of the versatility of earthquake data collection from global public catalogues, the potential to integrate new data points into models, and the illustration of the findings by explicit numerical values.

We use a new data-derived earthquake nowcasting approach that uses ensemble natural time statistics from a wider geographic region to calculate the spatial distribution of current earthquake hazard in 24 major cities across Nepal in this report. Rather than producing an earthquake prediction for future years, the methodology, like financial nowcasting, focuses on the present state of hazard. Since the basic stress variables that characterise the current state of the Earth's crust are essentially unobservable, researchers look for proxy variables that can be used to measure the current state of danger and provide some kind of useful information for social policymaking.

Unlike clock or calendar times, the nowcasting approach uses a natural time domain to explain the evolution of the mechanism, which takes into account accumulated counts of small earthquake events. Furthermore, the use of natural times in hazard assessment alleviates the age-old problem of earthquake clustering and fault segmentation. The fact that a large proportion of the growing urban population lives along active fault zones, such as the Himalayan foothills and the neighbouring Indo-Gangetic Plains, is an inconvenient reality in seismic risk estimation. The presence of multiple initiation processes in such a large network of interconnected faults reveals essential earthquake statistics, such as the spatial-temporal organisation of small and large earthquake events.