

## **A global model of earthquake forecasting using spatiotemporal variation of $b$ -value**

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The Gutenberg-Richter frequency-magnitude distribution of earthquakes is well established in seismology. The  $b$  value, the slope of the relation between frequency and magnitude ( $M$ ), has shown a decrease over several years prior to large earthquakes around their hypocenters. Specific examples include the  $M9$ -class 2011 Tohoku and 2004 Sumatra earthquakes (Nanjo et al., 2012). However, it has remained uncertain whether a precursory decrease in the  $b$  value is ubiquitous: it is likely that this might not always precede larger earthquakes, and large earthquakes might occur without  $b$ -value decrease during the leading period. Here we construct and test a model that retrospectively forecasts  $M8+$  earthquakes from 1980 to the present on the worldwide basis, based on decreasing trend in  $b$  values (Nanjo, 2017). Our test result indicates that the decrease in  $b$  values is significant as a precursory phenomenon to large earthquakes, suggesting that the  $b$  value is an important indicator that has great potential in terms of forecasting a future large earthquake.