Temporal Variation and Statistical Assessment of b value off the Pacific Coast of Tokachi, Hokkaido, Japan

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The Gutenberg-Richter Law describes frequency-magnitude distribution of earthquakes. A number of studies have shown that the slope (b value) of the relationship between frequency and magnitude decreased before large earthquakes. In this paper, we investigate the temporal variation of the b value off the Pacific coast of Tokachi, Hokkaido, Japan, during 1990-2014. The magnitude of completeness (Mc) in the catalog is evaluated by combining the maximum curvature (MAXC) technique and the bootstrap approach. Then, the b value and its uncertainty is computed by using the maximum likelihood estimation. The Akaike Information Criterion (AIC) with the bootstrap approach is introduced to statistically assess the temporal variation of b values and quantify the significance level. The results show decrease trends of the b value prior to 2 major large earthquakes (September 26, 2003 (M8.0) and September 11, 2008 (M7.1)) in the analyzed area. In addition, the decrease of b values shows certain statistical significance 3 months before the 2003 off the Pacific coast of Tokachi Earthquake (M8.0). It is concluded that the b value with statistical assessment may contain potential information for future large earthquake preparation off the Pacific coast of Tokachi, Hokkaido, Japan.