Temporal b-value variation before and after $M_L \geq 6.0$ Taiwan earthquakes from 2012 to 2019

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Recent studies show that earthquake b values gradually decrease before large earthquakes at the epicenters and then immediately increase after the earthquakes. Temporal b-value variations may result from crustal stress changes associated with a large earthquake. However, the physical process is rarely observed and remains unclear. Taiwan island is a young orogeny leading to frequent earthquakes with magnitudes greater than $M_L 6.0$, which provides an excellent laboratory to examine the physical process. We calculated b-value variation before and after $M_L \geq 6.0$ Taiwan earthquakes at the epicenters from 2012 to 2019. The time period is based on an enhancement of earthquake detection capability from the Central Weather Bureau Seismic Network in Taiwan, which allows the magnitude of completeness ($M_c$) down to 1.5 in the inland region. We used a relocated earthquake catalog to precisely estimate b value and $M_c$ by the maximum likelihood method and maximum curvature method, respectively. We designed three steps in our research. First, we calculated the b value and $M_c$ at the epicenters of the $M_L \geq 6.0$ earthquakes in overall 8 years to know the background seismic activity. Based on this, second, we calculated b values and $M_c$ per half year to test the sensitivity between the radius from epicenters ($r$) and the number of earthquakes with magnitudes greater than $M_c$ ($n$). Finally, we will apply moving window approach with specific criteria to continuously calculate temporal b-value variations. Our results showed that spatial b values in Taiwan in overall 8 years have an average of 1.0. The b values are systematically lower in the epicenters of $M_L \geq 6.0$ earthquakes from 2012 to 2019. We have determined suitable $r$ and $n$ values for each earthquake at the epicenters and some epicenters share similar $r$ and $n$ values. We preliminarily observed temporal b-value decreases before the 2018 $M_w 6.4$ Hualien earthquake. Considering temporal b-value variation by moving windows, we aim to realize whether temporal b-value variation by a large earthquake can be frequently observed in Taiwan.