

Space-time variation of the b value in the Philippine Sea slab along the Nankai Trough

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A dense seismic and geodetic observation network has been established along the Pacific coast of southwestern Japan where the Philippine Sea Plate subducts beneath the Eurasian plate and a huge interplate earthquake is anticipated to occur in the near future. Since characteristics of the interplate coupling as well as associated phenomena along the Nankai Trough differ from those along the Japan Trench where the Pacific Plate subducts beneath the North American Plate, we cannot expect “precursory phenomena” observed before the 2011 Tohoku-Oki earthquake will be observed similarly before the supposed Nankai Trough earthquake. However, it has been reported that a notable seismic quiescence did appear in a wide region along the Nankai Trough before the 1944 Tonankai and the 1946 Nankai earthquakes (Kimura and Okano, 1995; Aoki and Yoshida, 2001), so that it is highly expected that seismic quiescence will also appear before the next Nankai Trough earthquake. Then, how about the remarkable decrease of the b value observed in the focal region of the 2011 Tohoku-Oki earthquake? Because it is known that the b value was low in the focal region of the 2004 Sumatra earthquake, it is very probable that decrease of the b value will be observed as well before the next Nankai Trough earthquake. A problem is that the seismicity in the sea region along the Nankai Trough is apparently low compared to that off the Pacific coast of Tohoku region. Therefore, it is uncertain if we can trace change in the b value in detail as has been done for the 2011 Tohoku-Oki earthquake. Here we report preliminary results of the space-time variation of the b value in the region along the Nankai Trough. We found that the b value is low in the Kumano-nada and beneath Shikoku where a large slip deficit rate has been elucidated (Yokota et al., 2016) and the b value in the sea off Shiono-misaki is high. Intriguing temporal variations that might have been related to the change in the stress in the slab are also found in some regions. The seismic activity in the crust in southwestern Japan is comparatively high, so that we think that it is meaningful to monitor change in the b value at various areas. It may be possible to observe increase in b value related to decrease of the stress in the crust due to weakening of the interplate coupling.

Keywords: seismicity, b value of the Gutenberg-Richter law, Nankai Trough