

Seismic Activity Change in Tamba Plateau

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The seismic activity in Tamba Plateau has been investigated in detail by the researcher group of the Kyoto University. The recent major events are following two; characteristic seismicity changes before and after the 1995 Hyogo-ken Nambu earthquake (M7.3), and quiescence after early 2003. Katao reviewed it as follows. In Tamba area, the total activity was raised with several swarms including the well-known Inagawa swarm preceding the occurrence of the neighboring big earthquake, once turned quiescent just before it, and finally drastically activated just after it. The activity, maintained in a high level for almost one decade, suddenly turned to quiescence after early 2003. Simultaneously, several anomalous changes were found in crustal movement observations.

Based on these reports, we reexamined the seismic activity changes in Tamba by utilizing the JMA catalogue. The results are followings.

(1) Earthquakes occurred in both of Tamba and Kobe are sampled and compared for the period from 1923 to 2004. In Tamba, earthquakes of M5.0 and greater were never observed in 1923-1978, while 4 occurred in 1979-1995/Jan.. On the other hand, in Kobe, 13 earthquakes of M4.4 and greater occurred in 1923-1965, while never observed in 1966-1994. This means that the sense of the seismicity change is opposite between Tamba and Kobe. The situation is quite similar even for earthquakes of M4.0 and greater.

(2) The spatial pattern of the seismicity change in Tamba was examined by comparing between before and after early 2003. While the general trend looks quiescent, we found some activations at several spots. They are focused near the Kyoto-Nishiyama fault, one of the major faults in Japan. Besides this, we recognize another activated place westwards of Lake Biwa. We consider that these activated parts are those of stress concentrated.

Based on these results, we propose a hypothesis as follows. Tamba and Kobe are both located around the southern end of the Niigata-Kobe strain-concentrated belt, and so belong to a stress-concentrated area. We consider that the distribution of stress accumulation had changed in the 1970's. In the period before 70's, the distribution ratio of stress accumulation was estimated to be 0.67:0.33 for Kobe and Tamba, respectively. Let its fraction of 0.42 transferred from Kobe to Tamba after 70's, then the ratio turned to 0.25:0.75. The before-and-after ratios of the stress accumulation, 0.37 and 2.3 for Kobe and Tamba well agree with each of the seismicity change ratios in the respective region. We interpret this change such that an extremely slow slipping happened to transfer the stress accumulation from Kobe to Tamba in 70's. If this is the case, the Tamba region is still exposed under the condition of high stress accumulation. The historical records give lessons that M6.5 earthquakes happened in Tamba about every 300 years. Under the situation of current quiescence progress, we must take notice of possible happening of earthquakes with such magnitude.