

Real time selection of crust earthquakes and automatic monitoring of seismic activity

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We have developed a program to select earthquakes in the crust automatically at the time they occur, separating from slab earthquakes and low-frequency earthquakes. We think this program will enable us to monitor change in the crust seismicity in the Japanese Islands at a real-time basis. In the Tokai watching work we have already monitored changes in seismicity for crust and slab earthquakes separately. It was found that characteristics of their seismicities are very different not only in spatial distribution of earthquake densities, but also in temporal changes of their occurrence. Activation or lowering of seismicity is considered to reflect changes of stress in the seismogenic zone. Therefore, it is valuable to monitor changes in seismicity of crust and slab earthquakes separately to find out changes in the state in and around the focal region before large earthquakes. At present, we suppose to monitor significant increase or decrease of seismicity in several months compared to the level in the preceding one year, occurrence of clustered earthquakes, changes in the b-value. In such a monitoring work it is important to evaluate those changes quantitatively, and for that it is preferable to define regions to calculate the indexes. More than ten years ago, we once investigated changes in seismic activity in regions divided by latitudes and longitudes so as not to include subjective views in the analysis. That method seems objective apparently, but we found it was not so much effective for the purpose in many cases. This was because seismic activity is not homogeneous spatially, but density distribution of earthquakes is likely to be related to some specific geological structure. Consequently, it is in general more effective to choose monitoring regions taking into consideration geology and tectonics as eastern Yamanashi, near Wakayama, Tamba, around Lake Hamana, western Nagano and so on. Monitoring areas and criteria to pick up significant changes are, however, not given a priori. We have to learn them in the course of the monitoring work. In that sense real-time separation of crust earthquakes and automatic evaluation of indexes in seismicity should be considered a first step for further more detailed investigation. We present some examples which significant changes were observed in the above indexes before large intraplate earthquakes.