What is going on around a Potentially Seismogenic Zone in the Tokai Region, Japan ?

Shozo Matsumura[1]

[1] NIED

An anomalous change in seismicity of microearthquakes has been detected around the Tokai region since the latter half of 1990's, where it is feared that a major earthquake of disastrous proportions is in preparation. At first, the change commenced as a quiescence of the activity in the crust since 1996, and another quiescence started in the subducted slab since 1999. The degree of these quiescences was rather less than those of typical precursors previously reported, however they looked statistically significant because the activities for comparison in the regular period were quite constant. During the continuation of unusual seismic activities, another phenomenon has happened in GPS observation, which commenced probably in the latter half of 2000. A back-slip analysis revealed that a slow slipping progresses on the plate interface at 30km depth beneath Lake Hamana, that is located just the western edge of the inferred locked zone. Both evidences tell us existence of an unusual movement violating ordinary coupling state on the plate interface. For the present, the slow slipping looks to fringe the deeper edge of the inferred locked zone. That should result in a stress concentration around the neighboring area within the locked zone. Under such situation, the problem we are concerned is whether any change in the meaning of the mechanical coupling state between both plates progresses or not. Analyzing the spatial pattern of the seismicity, we have found spatially inhomogeneous distribution of the activity change such that a quiescent area appears to surround a non-quiescent or an activated spot. It is considered that a pattern of seismicity change corresponds to a pattern of stress redistribution. In the present case, there is a possibility that we are looking on a progress of stress redistribution possibly caused by change of coupling state, that is, a partial relaxation of locking is going. By now (January, 2003), this trend still goes on, and does not indicate to cease. It is feared that if there happens an unexpected growth of the trend, it tends to an entire failure of the locked zone, that is the next Tokai earthquake.