A trial for active monitoring of interplate coupling in Tokai area (Overview)

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Generation of a great earthquake in the Tokai area, central Japan, is considered to be high possibility in near future. The seismic refraction study along the N-S line from the Tokai region to the Japan Sea coastal zone showed the presence of high amplitude reflected phase from the subducting Philippine Sea plate in the north of Hamana-lake (Iidaka et al., 2003, Kodaira et al., 2004). It may require the presence of low-density material (e.g., water) along the plate boundary. Almost the same place on the plate boundary is also showing slow slip since June, 2000 (Ozawa et al., 2001). The slow slip can be explained by the weak interplate coupling due to the presence of lubricant material at the plate boundary. Just before the 1944 Tonankai earthquake in the east off Kii Peninsula, a pre-slip was observed near the Hamana-lake at the northeast corner of the source region. This suggests that the initiation of the Tonankai Earthquake was the slip at the plate boundary in the northeast of the Hamana-lake. If we deal with the possibility of the future Tokai-Tonankai Earthquake, it may be important to monitor the temporal change of interplate coupling strength in this region using the seismic reflections. The rapid change of the interplate coupling state may trigger large earthquakes in the Tokai and/or Tonankai region.

In order to make trial of continuous monitoring as stated above, we started a seismic experiment in the Tokai region using the ACROSS (Accurately Controlled and Routinely Operated Signal System) which utilizes an active seismic source adjusting to the GPS clock. We are continuously transmitting the 10-20Hz sweep sinusoidal seismic waves from Toki City, Gifu Prefecture since spring, 2004. The analysis of the data observed by the Horai Hi-net observatory showed a high possibility of the temporal change of seismic signatures over a half year (Yoshida et al., 2004). In order to identify the travel paths for these seismic waves, we installed 22 seismic stations over 40-70km offset distance from Toki City to the northeast of the Hamana-lake since November 2004. Preliminary analysis using 200 hours data obtained by a station at 57km distance showed good quality of P and S arrivals although we are working whether these are the interplate reflection phase or not. We believe that the use of longer data obtained by 22 stations may tell which are the interplate reflected phases and the magnitude of their temporal changes.