

The observation and analysis of ACROSS signals at MRI

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Due to the fulfillment of the GPS network in addition to the strainmeter and tiltmeter, the deformation of the earth's surface came almost to become clear in realtime. The slow slip which has been observed since summer in 2000 around Hamana lake by the GPS network. This kind of slow event that could not be detected before because the dominant period is just between the crustal movement observation range and seismometry observation range, can be detected in recent years. This is very important step for earthquake prediction because the phenomena having large variety of time scales, which is important to understand the plate motion, can be clarified. Trial for using them to the numerical simulation of the earthquake cycle have been made recently.

But the only earth's surface deformation can be observed by the GPS network. The process of stress concentration before earthquake occurred in deep in the ground near the plate boundary, and these phenomena cannot be detected on the earth's surface until it becomes a big change because the influence attenuates as the distance increases. So it is ACROSS that it was designed as underground radar. It tries to detect the slight change of travel time and reflection coefficient by broadcasting the highly controlled signal precisely.

Next we try to consider what kind of information can we take from ACROSS signals to know the variation of physical properties around plate boundary. Fujie et al. (2002) pointed out that, there exists a variation of reflective amplitude at the plate boundary in the Japan trench region from the analysis of seismic refraction and reflection experiments. They found a good relation between seismicity and reflection intensities, and concluded that the variation of reflection intensities might be due to that of water content that is related to plate coupling. This suggests monitoring the reflection intensities enables us to estimate plate coupling. In Tokai region where is our targeted area, the seismic experiments using control sources were conducted and found the strong reflection along subducting Philippine Sea plate (Iidaka et al., 2003). Above facts suggests using ACROSS source, we can monitor temporal variation of seismic wave properties along the subducting plate.

Special research has been done with a plan for 5 years with a title of 'Improvement in prediction accuracy for the Tokai earthquake and research of the preparation process of the Tonankai and Nankai earthquakes' in MRI from 2004. In this research project, we plan to deploy ACROSS source in Tokai area to monitor the seismic wave properties such as seismic velocity this year and observe at Hi-net and JMA network seismic stations. In this project, we will deploy ACROSS source in Shizuoka prefecture and continuously monitor seismic properties such as seismic velocity. We have been already developing analyzing method using of Tono ACROSS source and have gotten following results. P and S phases can be identified at the stations with the epicentral distance less than 100km. The wide variation of shape of transfer function can be seen partly because the range of transmitted frequency is very high (higher than 10Hz) and scattering effect is very large. Temporal variation greater than the noise level can be seen about 1 year long data analysis. The future plan is the monitoring the seismic properties around the boundary between Philippine Sea plate and overriding plate.