

## Recent progress in EM-ACROSS demanded to realize the practical active monitoring of the Earth's deep crust in Tokai region

# Takahiro Nakajima[1]; Keizo Sayanagi[2]; Naoyuki Fujii[3]; Mineo Kumazawa[3]; Toshiyasu Nagao[4]; Takahiro Kunitomo[1]

[1] Shizuoka Univ.; [2] IORD, Tokai Univ; [3] Geosci., Shizuoka Univ.; [4] Earthquake Prediction Res. Center, Tokai Univ.

We are trying to use Electro Magnetic ACROSS to the active monitoring of the Earth's deep crust in Tokai region where the Philippine Sea plate is subducting beneath, whereas EM-ACROSS has been applied so far only to the change of geological environments down to ~1 km depth during the constriction works of the underground facilities at Tono and Horonobe test sites of JAEA. Apparently the current technology level as well as observation facilities are neither mature nor powerful enough yet, and we have started from the designing and installation of larger and sophisticated observation system.

The essential factor for the observation system is to enable us to the acquire the high S/N transfer function data between the source and the receiving site of electromagnetic diffusion waves, which are reflected back from the depth of ~20 km just above the subducting plate boundary beneath the Tokai region. The observation system demanded is consisted of (a) the accurately controlled signal transmitters with a large dipole moment of the order of  $10^6$  Am, (b) the accurately synchronized and sensitive sensor array, and (c) such a technology system that makes noise reduction at every aspect of data management. The most important targets of (c) are the spatial noise in the shallow layers and its temporal change originated from the environmental disturbances (e.g., rain falls leading to the change in conductivity distribution).

As the first step of our approach towards realization of the actual monitoring the earthquake and volcanic fields in Tokai region, we have installed a large test transmitter (dipole moment= 560m x 20A) in Shizuoka University campus to work on the problems (a,b,c). In the trial observation in the frequency range 0.1-20Hz, the S/N of ~5 for the transfer functions has been reached by one week stacking of the data acquired at the advanced observation system (Sayanagi et al, this JGU meeting) located up to 20 km from the transmitter. Whereas a number of technical innovations were made and are demanded further as will be shown in the presentation, the results were encouraging and appear as a substantial milestone towards the routine methodology for the active monitoring of our targets.