

Source locations of earth-origin electromagnetic pulses detected before and after an earthquake

Minoru Tsutsui[1]; Takeshi Maenishi[2]; Toshiyasu Nagao[3]

[1] Info. Commu. Sci., Kyoto Sangyo Univ.; [2] none; [3] Earthquake Prediction Res. Center, Tokai Univ.

At 14:49 JST of January 6, we had an earthquake with M 5.2 at 34.2 N, 137.7 E, 40 km in depth. At that time, the monitor system in Kyoto Sangyo University displayed an arrival direction of intense EM pulse. The displayed arrival direction was just from the epicenter of the earthquake. The propagation distance of the pulse was obtained from its frequency dispersion characteristic curve. As the result, the source location of the EM pulse was just in the earthquake epicenter. Since the pulse duration was very short about a few milliseconds, we concluded that the EM pulse was excited by Piezo-electric effect generated due to deformations of earth crust in the earthquake epicenter. From this point of view, we can expect that EM pulses would be excited even in weak deformations of earth crust which could not cause any earthquakes.

In the present study, therefore, we examined EM pulses detected before and after the earthquake. EM pulses began to appear about two days before the earthquake, and the detection lasted about one and a half days after the earthquake. Numbers of EM pulses during the periods were 68 before the earthquake and 314 after the earthquake, respectively. Among these EM pulses, we picked up several EM pulses whose dispersion curves could provide propagation distances clearly. As the result, we finally obtained four EM pulses as the data before the earthquake and nine ones as those after the earthquake. We separately plotted source locations of these EM pulses on two maps as events before and after the earthquake, respectively. From these results, we can clearly see that the source locations of the EM pulses before the earthquake concentrated near the earthquake epicenter and those after the earthquake were going away from the epicenter region.

These results have further shown that the earth-origin EM pulses would be a good monitoring system of deformation region of earth crust.