# Movement of Earth Crust and Excitation of Electric Pulses

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Using an electric field sensor inserted into a bore-hole of 10 cm in diameter and 100 m in depth, which was constructed in the campus of Kyoto Sangyo University, we have been observing ELF electric field in the deep earth. This system can make it possible to detect electric noises in the earth separately from those above the ground. We have been continuing its observation since September in 1999. In the second half of 2000, we detected intense electric pulse swarms in both regions, in the earth and above the ground. We identified them as the earth-origin ones, because the intensity of the pulse swarms detected above the ground is 15 dB weaker than those in the earth, in which features of time-variation of spectral form detected in the both regions were same to each other during the period more than few hours [1]. Surveying similar events from the data observed in 2000, we found that intense electric pulse swarms lasting for more than few hours began to appear from June and decayed at mid-September in 2000. About one month later, we had the Tottori-Seibu Earthquake (M 7.1) on October 6. At that time, we could not know the cause of the excitation of the intensive pulse swarms and any relation between them and dynamical movement of the earth crust. However, one year later, the National Geophysical Institute in Japan reported an observational result that west-Japan on the Amur-plate had been moving about 1 cm toward east during the period from July to October in 2000. It is very interesting for us that the period of the movement of the Amur-plate coincided with the period of the detections of the intense electric pulse swarms.

From this view point, we began to re-analyze the electric pulse data detected during that period in order to examine the relation of time between the detection of the electric pulse swarms and the movement of the plate. In the analysis, we have been getting macroscopic views of dynamic spectra of the observed electric noises in the earth during four months from June to September in 2000. The preliminary result of the analysis shows that the background noise intensity began to increase quietly a little, but several intense pulse-swarms can be seen clearly, and their intensity began to decay after mid-September in 2000. If these intense pulse swarms are related to the piezo-electric phenomena occurred in the earth crust, we can imagine that strong dynamical stress was imposed onto a localized earth crust, and that the movement of the Amur-plate was not smooth but intermittent during the four months. As the present detection system of electric noises in the earth is quite sensitive to the movement of earth crust, it would be helpful for the study on causality between them.

[1] M. Tsutsui, Detection of earth-origin electric pulses, GRL, Vol.29, No.8 35/1-4, 2002.