E141-P007 **Room: Poster Session Hall** **Time: May 17**

Detection of precursory seismic electrical pulses by discriminating the pulses from noise

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[Introduction] Since more than fifty years ago, it has been known that radio noise is observed before a great earthquake near the source region. But the earthquake prediction by observing precursory electric fields has not be put practical use, because it is difficult to discriminate the precursory fields (signal) from the artificial or natural noise such as atmospherics (noise). In 2005 the situation has changed, as the method have been developed for discriminating the precursory fields from artificial noise and lightning& #39;s fields which are main natural noise, the pulses have been detected which occur before the earthquake, and the way have been opened for predicting the earthquake a few days before.

[Discrimination method] Concerning continuous and strong noise, we can find the frequencies and locations of the sources, so the noise is avoided by observing the electric fields at different frequencies at remote sites from the source locations.

Concerning the lightning noise (atmospherics), the noise is discriminated by the spectrum. The atmospherics are strong within the band of 100 Hz - 1 MHz. The maximum field intensity is usually within 3 - 10 kHz. The radio waves within 1 - 3 kHz absorb heavy attenuation loss when the waves are propagated through the ionosphere over long distance. These spectrum and propagation loss result that the fields of long distant lightning are maximum at around 12 kHz.

The precursory seismic fields will be inversely proportional to frequency, as usual natural noise is. But the frequencies within 1 - 3 kHz will be optimum to observe the precursory fields, because, at these frequencies, the long distant atmospherics are weak, locating the source is easy, and the harmonics of 50/60 Hz are weak. In the case when the field strength of 1 - 3 kHz is stronger than that of around 12 kHz, then the fields are not regarded as those of distant lightning. Further more, considering that near lightning fields at 1.5 kHz is weaker than those at 3 kHz, when the received fields of around 1.5 kHz are stronger than those of around 3 kHz, the source is not regarded as lightning.

According to our observation over 10 years, at frequencies of 1-13 kHz where the continuous and strong noise is rare, the temporal noise is a pulse, is not so strong except lightning pulses, and is not observed simultaneously at the distance of more than 100 km. So, the temporal artificial noise is discriminated by observing at three sites or more, whose mutual distances are about 100 km. When the pulses are observed at the different sites at time interval of more than 0.4 ms, the sources must be different. So, then the pulses are not regarded as the signal but regarded as artificial noise.

[Observations] Before SE Off Kii Peninsula Eq. (04/09/05, M: 7.3, Depth: 44 km) and Mid Niigata Pref Eq. (04/10/23, M: 6.8, Depth:13 km), at three sites where the source distances are from 180 km to 420 km, and are from 230 km to 290 km, respectively, the above signal pulses are observed. The attached figures show the pulses observed at the central site of the three sites at the time of SE Off Kii Peninsula Eq. The upper one shows the original pulses, central one shows the pulses which contain no lightning pulses, and lower one shows the pulses which contain neither lightning nor artificial pulses, i.e. signal pulses only.

[Concluding Remarks] The memory modules, which we are using, can record not 0.4 ms data but two minutes data only. Even though, it has become clear that the main natural noise and artificial noise are discriminated, and that the pulses before great earthquakes are detected. Farther more, the method makes it possible to locate the source regions, when the time difference between pulses is observed at the accuracy of 0.01 ms. Namely, the method will be able to predict not only the occurrence time of the earthquake but also the source region. So, it is desirable to start trying the earthquake prediction by this method.