

## Trial of the Earthquake precursor detection by Geoelectric Potential Observation using Extremely Short Electrode Span

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### 1. Overview

The author have been observing Geoelectric Potential (called GP herein after) since January 2005 by embedding four electrodes at 10m each extremely short span of north, south, east and west in the house yard into the underground.

After April 2005 when the electrodes probably got used with the ground, 4 times of anomalies were observed by the end of January 2006, and earthquakes have occurred at near place from the observing post respectively. The outline is reported about this correlation in this paper.

### 2. Observation system

Both electrodes of east and west or north and south are connected to a preamplifier, and a 12-bit analog / digital converter, it takes into an observation server, and the electric potential difference between both electrodes is measured in a sampling rate of 20 seconds.

A preamplifier is consisting of Instrumentation Amplifier, Low Pass Filter (LPF), etc. LPF is furnished in order to eliminate 50Hz commercial power noise from a trains and/or factories, etc.

### 3. Pattern of GP anomalous phenomenon

So far, the patterns considered to be anomalous are a rectangle-like waveform which continues for about several hours, a waveform of electrical charge - discharge curve continued several minutes or more, and a pulse-like waveform for 1 or less minute. Those waveforms of east-west and north-south are sometimes synchronized or asynchronous.

I think that a prolonged rectangle-like waveform may be the influence of geomagnetism or an artificial noise. It is considered that the unsynchronized north-south and east-west is also the influence of an artificial noise. I think that other anomalies may be high possibility of being seismic.

### 4. Hypothesis considered as seismic anomalies

The following hypotheses were drawn from the law learned by experience for about one year.

(1) Charge-discharge-like or pulse-like waveform which appears almost simultaneously at East-west / north-south

(2) The S/N ratio of an anomalous value should be more than 10dB

(3) Detection area from an observation may be within about 200km

(4) Presumption method of earthquake occurrence

-The magnitude of the earthquake may be proportional to the S/N ratio of anomaly value.

(5) Preceding time of small-scale earthquake may be for about one week, and also presumed as 2 weeks for the middle scale EQ and 3 weeks for the large scale.

(6) Presumption method of EQ occurrence place

- The arrival direction can be found by taking Arc tan of the ratio of North-South and East-West potential difference

- Pinpointing of a place is possible if anomalous signal is simultaneously observed at more than 3 posts.

### 5. Verification of EQs which may be correspond to GP anomalies

(1)'05.07.31, Anomalies with about 21dB and 16dB -'05.08.07 Chiba NW M= 4.7 D=73Km, about 69Km from Observation Post(OP)

(2)'05.10.01, Anomalies with about 31dB -'05.10.19 Ibaragi off, M= 6.2, D= 40km ,about 174km from OP

(3)'05.12.19, Anomalies with about 24dB -'05.12.26 Tokyo Bay, M=3.6, D=70km , about 60km from OP

### 6. Awaiting Solutions

(1) To lead distance between EQ occurrence place and observation post and Magnitude from S/N Ratio by Cooperating with Multi

-Point Observation posts.

(2) To try reducing artificial noise by changing Cutoff Frequency of LPF which is contained in the Preamplifiers as low as possible

### 7. Conclusions

By GP observation trial during this year, it could be recognized that an earthquake precursor may be caught by this extremely short span Geoelectric Potential observation method. Furthermore, it can be thought that this method could contribute to future massive earthquake occurrence prediction greatly by carrying out simultaneous parallel observation at multi-point observation. Also other methods are essential in addition.

References; - Feb.1985, Toshio Mori, 1989, Hiromi Takayama