

# Preceding phenomena observed by Tree Bio-electric Potential prior to Noto Peninsula Off Earthquake

# Yoshiharu Saito[1]

[1] Japan Society of Ecology and Disaster Prevention (JSEDiP)

<http://www.jsedip.jp/>

## 1. Overview

Since 1977 Tree Bio-electric Potential (TBP) has been measured at Sugunami Tokyo by Dr. TORIYAMA. Prior to EQs of magnitude 5 or above, anomalous potential changes were often observed. This paper reports abstract of the precursor which was observed at Miwa observation post in Aichi prefecture prior to 2007 Noto peninsula off EQ.

## 2. Observation system

A silver electrode is inserted into living tissue of the tree and another copper electrode is buried at a depth of 1m into the ground at a point 1.5m from the tree. The potential difference between 2 electrode is measured at sampling rate of 20 seconds.

Anomaly signal is expressed with dB as an S/N (Signal to Noise) ratio, S is obtained from Peak to peak value of anomalies, and N is obtained from rms (Root mean square) value i.e.,  $N = \text{Noise}(P-P)/2\sqrt{2}$ , then S/N can be obtained from  $20\log S/N$ .

## 3. TBP Anomaly regarded as Precursor prior to Noto Peninsula EQ

35dB anomaly was observed 3 days and 51dB anomaly was observed 1 hour prior to the EQ. Mechanism for Bio-electric Potential is discussed in the referenced paper<sup>1)</sup>.

## 4. Correlation between all past 1 year anomalies and all EQs of Magnitude 6 class

TBP preceding time, Time interval between anomalies and between EQs are shown below.

Anomaly and EQ can be said as synchronized since preceding time is almost several days, each interval is several 10 days. Correlation between TBP anomaly and actual EQ occurrence can be seen.

First Anomaly Related EQ Preceding Time Time Interval between

Date Signal Data Place Mag. Depth Days Anomalies EQs

Strength

2006/2/3 37dB 2006/2/3 Ibaraki Pref. Off M5.9 62km 2 Hours - -  
2006/3/18 31dB 2006/3/28 Tokaido-off M6.0 439km 10 Days 43 Days 53 Days  
2006/4/11 37dB 2006/4/16 Tokaido-off M5.7 454km 6 Days 24 Days 19 Days  
2006/4/20 35dB 2006/5/2 Izu Penins. East off M5.1 15km 13 Days 9 Days 16 Days  
2006/5/8 31dB ? ? ? ? ? - -  
2006/6/9 23dB 2006/6/12 Oita-Mid. M6.2 146km 3 Days 32 Days 41 Days  
2006/7/18 29dB 2006/8/7 Chichijima-near M6.2 24km 20 Days 39 Days 25 Days  
2006/7/22 35dB 16 Days 43 Days  
2006/8/21 37dB 2006/8/22 Kumano-nada M5.5 420km 1 Day 30 Days 15 Days  
2006/10/4 35dB 2006/10/12 Yonagunijima-near M6.2 46km 8 Days 44 Days 51 Days  
2006/10/18 35dB 2006/10/24 Torishima-near M6.8 3km 6 Days 14 Days 12 Days  
2006/11/10 39dB 2006/11/17 Mie Pref. S-E Off M5.5 376km 7 Days 23 Days 24 Days  
2006/11/22 26dB 2006/12/8 Chishima Isl. M6.4 30km 16 Days 12 Days 21 Days  
2007/1/8 19dB 2007/1/13 Chishima Isl. M8.2 30km 5 Days 48 Days 36 Days  
2007/2/6 14dB 2007/2/17 Tokachi-off M6.2 40km 11 Days 29 Days 35 Days  
2007/2/27 20dB 2007/3/8 Torishima-near M6.0 152km 9 Days 21 Days 18 Days  
2007/3/22 35dB 2007/3/25 Noto Penins. Off M6.9 11km 3 Days 23 Days 17 Days  
2007/3/25 51dB 1 Hour 26 Days

## 5. Conclusions

Anomalies observed on 3/22 and 3/25 are regarded as correlated with Noto peninsula off EQ since most of past anomalies were correlated with actual EQs.

Although TBP detects also meteorological and artificial noise, noise elimination is not necessary as those noise level are much lower than seismic one. Especially strong signal which exceeds 20dB can be regarded as seismic.

If TBP and other significant electric and magnetic method are observed at many points, this observation will contribute for future big EQ prediction.

Refer to <http://www.jsedip.jp/>

## References

1)Hideo Toriyama; *The Behavior of the Sensitive Plant in a Typhoon*

[Miwa TBP (Tree Bioelectric Potential)]

PROTOCOL / TORII OETIKEN

