

How wide is observation range of the developed stress meter ? - Comparison with STS seismometer -

*Hiroshi Ishii¹, Munemitsu Furumoto¹, Yasuhiro Asai¹

1. Tono Research Institute of Earthquake Science, Association for the Development of Earthquake Prediction

The Tohoku earthquake ($M9.0$) occurred on 11 March 2011. STS seismometers in Japan almost scaled out and could not record larger amplitudes of wave forms. However, stress meters and strain meters developed by Tono Research Institute of Earthquake Science (TRIES) could beautifully record wave forms caused by the earthquake. It is important to record long period seismograms for especially earthquakes occurred in sea because we have to estimate if the earthquake causes large Tsunami or not. Therefore, we compared observation ranges among STS seismometer, stress meter and strain meter. We also investigated how large variations can be observed by stress meter and strain meter. The main results obtained are as follows:

1. Stress meter and strain meter have as 10 times wider observation range than STS observation range.
2. Vertical component of the borehole stress meter of TOS borehole station (depth: 512m) recorded maximum amplitude of about 300kPa for the 2011 Tohoku earthquake. However, the stress meter of high sensitivity can record amplitude of about 5 MPa.
3. The stress meter can observe not only stress but also strain. And observation range of stress meters were about 2×10^{-4} , though maximum amplitudes of observed strain were about 5×10^{-5} .
4. It can be concluded that stress meter developed by us can record whole stress seismogram without scaling out even for gigantic earthquake. Therefore, the stress meter is reliable instrument for estimating Tsunami generation, determining magnitude and research of earthquake mechanism.

Keywords: stress meter, STS seismometer, observation range, Tohoku earthquake ($M9.0$), record of maximum amplitude