

Estimation of crustal deformation due to the 2011 off the Pacific coast of Tohoku Earthquake

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1. Introduction

The 2011 off the Pacific coast of Tohoku Earthquake was the greatest earthquake in Japan as the magnitude of 9.0. Analysis of GPS network, such as GEONET by Geospatial Information Authority of Japan, has revealed the crustal deformation due to the earthquake. On the other hand, the crustal deformation can be estimated from the displacement waveform calculated by integrating the accelogram observed by strong motion seismometer. This method would be used complementary with GPS analysis. In this study, we calculated the crustal deformation due to the 2011 off the Pacific coast of Tohoku Earthquake from the accelograms recorded on strong motion observation network KiK-net by National Research Institute for Earth Science and Disaster Prevention.

2. Method

All KiK-net observatories have seismometers both on basement and ground surface. Both accelograms were used in order to compare the results from basement accelogram and that from surface accelogram in this study. The displacement waveform was calculated by applying the baseline adjustment and the linear acceleration integral method to the span 0 ? 150 s of the accelogram. For the accelogram seemed to change the baseline during recording, baseline change was corrected before integration.

3. Result and discussion

The crustal deformation at KiK-net observatories in Fukushima, Miyagi and Iwate prefectures calculated by integrating basement accelogram are shown in Fig. 1. This result agrees with the result by GPS network GEONET [1] mostly. By comparison between the result from basement accelogram and surface accelogram, the former provides more stable result. Thus, it is found that the basement accelogram does not contain the amplification effect by surface soil layer so that it reflects the deformation of crust more purely. Displacement waveform at several KiK-net observatories, such as KiK-net Tajiri (MYGH06), agreed with that from high rate GPS analysis [2] mostly as shown as Fig. 2.

4. References

- [1] Geospatial Information Authority of Japan, Crustal deformation due to the 2011 off the Pacific coast of Tohoku Earthquake, http://www.gsi.go.jp/chibankansi/chikakukansi_tohoku.html (2011.4.27).
- [2] Research center for Earthquake Prediction, Disaster Prevention Research Institute, Kyoto University, Coseismic displacement by high rate GPS analysis, http://www.rcep.dpri.kyoto-u.ac.jp/events/110311tohoku/gps_1s/index.html, (2011.4.27).

Acknowledgment

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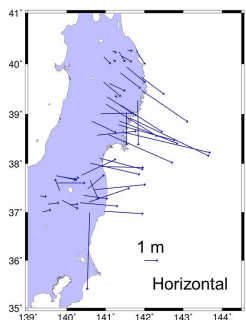


Fig. 1 Crustal deformation calculated from Kik-net accelogram

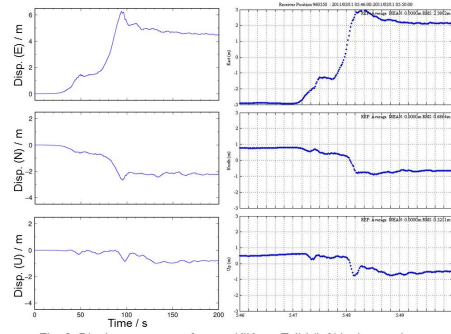


Fig. 2 Displacement waveform at Kik-net Tajiri (left) by integrating accelogram (right) by high rate GPS analysis (ref.[2])

Keywords: the 2011 off the Pacific coast of Tohoku Earthquake, crustal deformation, permanent displacement, strong motion seismogram