

Temporal changes of Toki ACROSS signal induced by the 2011 off the Pacific coast of Tohoku Earthquake

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Temporal changes of waveform and travel time of Toki ACROSS signal observed by Hi-net induced by the 2011 off the Pacific coast of Tohoku Earthquake (2011 Tohoku Earthquake as follow) are reported. At Toki station, the current specifications of seismic signal being transmitted since Mar. 2007 (ongoing for ~ five years) are as follows: FM signal with a carrier frequency of 13.005 Hz, modulation period 50s in the frequency range 10.245-19.445Hz and ~2700N in spectrum amplitude. The signal and operational mode of rotary transmitter with the vertical rotation axis are optimized for acquiring the accurate tensor transfer function data in frequency domain and Green's function in time domain between the source and receivers located anywhere.

The major results observed at Hi-net Yaotsu (11.3km from Toki station) are as follows:

1) Difference waveforms between daily stacked waveforms and a reference waveform stacked one year data (Apr. 2008 to Mar. 2009) show notable changes of P and S wave later phases after March 11, 2011. These changes are decaying as the month move on, but waveforms do not return to its former state as at December 2011. These changes are thought to be due to groundwater fluctuation induce by the 2011 Tohoku Earthquake.

2) Daily travel time changes of maximum amplitude phases (including direct P wave, direct S wave and these later phases) were calculated using the cross-spectral method. Travel time changes up to 2 msec delay was detected at March 11, 2011. This changes are decaying as the month move on, but travel times do not return to its former state as at December 2011.

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