Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)
©2011. Japan Geoscience Union. All Rights Reserved.

SSS027-P12 Room:Convention Hall Time:May 23 16:15-18:45

Detection of seismic velocity changes associated with the 2005 M7.2 Miyagi-Oki Earthquake, NE Japan revealed from seismi

Kota Chujo[1*], Yoshihiro Ito[1], Hisashi Nakahara[1], Ryota Hino[1], Tomoaki Yamada[2], Masanao Shinohara[2], Toshihiko Kanazawa[2]

[1]Tohoku University, [2]The University of Tokyo

Seismic intererometry is a one of techniques used to estimate the detailed properties of the Earth interior using vast number of seismic records; a pair of seismic traces is correlated with one another to estimate a Green's functions as a response of subsurface elastic properties (e.g. Campillo and Paul, 2003). Some previous works for seismic interferimetry of ambient noise showed that auto-correlation functions (ACFs) and cross-correlation functions (CCFs) have temporal changes associated with strong motions due to local large earthquakes (e.g. Wegler et al., 2009). Here, we show changes of ACFs calculated from ocean bottom records accompanied with the occurrence of large earthquake. The five ocean bottom seismometers (OBSs) were deployed off Miyagi Prefecture before the 2005 M7.2 Miyagi-Oki Earthquake. All of the OBSs used in this study are a free-fall/pop-up type with a three-component geophone of natural frequency of 1 Hz. We computed ACFs with time-window length of 120 s. Filtered one-hour traces at the frequency band of 0.5?2 Hz were used to compute correlation by one-bit correlation technique. By taking ensemble average of ACFs among 24 hours, the one-day ACFs were computed from June 2005 to February 2006 including the Miyagi event at each station. Computed ACFs showed some common coherent phases throughout observing period. We assumed that computed ACFs reflected subsurface structure just below OBSs.

The phases between 10 s and 15 s in lag time showed slightly delay of approximately 0.1s after the 2005 Miyagi-Oki Earthquake, which are observed at some OBSs. Interestingly, the delayed phases at 15 s in lag time are restored gradually. The delay time of the 0.1 s corresponds to the rate of seismic velocity decrease of 1% if seismic velocity would be uniformly changed around stations after the 2005 Miyagi-Oki Earthquake. The observed seismic velocity change is comparable with the velocity decrease of 1.5% at inland seismic stations, which was reported by Nakahara et al (2007) after the 2005 West Off Fukuoka Prefecture Earthquake (Mj7.0).

Keywords: seismic interferometry, OBS, ACF, the 2005 M7.2 Miyagi-Oki Earthquake