A Temporal Variation of Auto-correlation Function Calculated from Ocean Bottom Seismometers off Miyagi Prefecture

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Seismic interferometry is one of the most effective techniques for detecting temporal variations in seismic velocity caused by a megathrust earthquake or a slow slip event (SSE). A lot of previous studies reported the temporal variations caused by megathrust earthquakes or SSEs (e.g. Wegler et al., 2009; Zhen and Song, 2009; Rivet et al., 2011; Sawazaki et al., 2016; Nimiya et al., 2017; Ikeda and Tsuji, 2018). We had evaluated temporal variations in seismic velocity with auto-correlation functions (ACFs) calculated from ambient noise recorded by ocean bottom seismometers (OBSs) installed near the Japan trench off Miyagi Prefecture (Uemura et al., 2018). As a result, we had pointed the velocity decrease caused by the 2011 Tohoku-oki earthquake (Mw. 9.0) and possible velocity fluctuation during SSE preceding the 2011 Tohoku-oki earthquake. However, because some of similar velocity fluctuations had been also detected without any megathrust earthquakes and SSEs, it was difficult to conclude that the fluctuation caused by the SSE.
To reveal causes of such temporal variations in ACF calculated during some of periods without any megathrust earthquakes and SSEs, we try to evaluate temporal variations in ACF calculated from 5-year data (from 2008 to 2012) in the same region. The result shows two interesting characteristics of some temporal variations in ACF. One is that ACFs have obviously annual variation which was detected only near the Japan trench. Another is that temporal variations in some specific phases on ACF are commonly detected in the whole study area. We will discuss what causes the annual variation on ACFs and their temporal variations in the specific phases.

Keywords: Seismic Interferometry, Ocean Bottom Seismometer, Auto-correlation Function

