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# Detection of temporal variations of phase velocity of Rayleigh waves associated with the mid-Niigata earthquake using mi

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Measurements of temporal variations of seismic velocity structure associated with an earthquake are crucial clues for understanding of dynamics of the earthquake. For the estimation of the temporal variations, repeats of seismic tomography by control sources are ideal but it is unrealistic in most cases.
Recently using their random excitation properties, researchers (e.g. Shapiro et al., 2005) measured group velocity anomaly, which is shown by cross-correlation functions (CCFs) of microseismic data between pairs of stations (seismic interferometry).
Seismic interferometry is feasible to estimate temporal variations of seismic velocity structures because microseisms are excited persistently and the estimated temporal variations are localized between the pair of stations. Using this method, Wegler et al. [2009] showed a sudden drop of mean shear
wave velocity of some tenths of a percent at the time of the 2004 mid-Niigata earthquake. In this study we analyzed records at broadband stations for three years.

We used data recorded at 7 broad band stations of Jarray located at a distance of less than 70 km from the epicenter of the 2004 Mw = 6.6 mid-Niigata earthquake, Japan from 2003 to 2005.
We discarded data contaminated by earthquakes, and we calculated the CCFs for each pair of stations. We stacked them every 4 months with an overlap of 2 months. We measured phase differences between the CCFs and a reference CCF. From 0.05 to 0.2 Hz, the maximum drop of phase velocity at the time of the mid-Niigata earthquake is estimated to be 0.5 %. However the estimated value is comparable to apparent temporal variations of phase velocity due to temporal changes of their sources locations. For further study, we will discuss about the apparent temporal variations in detail.

Keywords: micro seismic wave, seismic interferometry, Rayleigh wave propagation velocity