Temporal variation of the decay rate of the autocorrelation function of the ambient seismic noise

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Previous studies (e.g. Wegler and Sens-Shoenfelder, 2007) reported that the decay rate of the autocorrelation function (ACF) of the ambient seismic noise has a correlation to the coda Q values of the subsurface considered. If it is the case, the decay of the ACF of seismic noise (ACF-Q) is a potential index of the crustal activity. In this paper, we examined the temporal variation of the ACF-Q in the source region of the 2007 Noto Peninsula earthquake (occurred on March 25, 2007) and central Kinki area.

We computed the ACF of band-pass filtered seismic noise portion recorded with each short-period seismometer at several seismic stations for each one day. Then we assume the envelope of the ACF should obey the typical relation of the coda Q theory to obtain the ACF-Q.

In the source region of the Noto Peninsula earthquake, ACF-Q values during a period of one year including the mainshock at some stations exhibit temporal variations. At one station, ACF-Q gradually decreases since September 2006 and kept lowermost values from mid November 2006 to mid March 2007, and then gradually increased after the mainshock. In the central Kinki area, some stations also exhibit temporal variations in the ACF-Q.

Since we analyzed seismic noise of only one year, it is difficult to conclude that these temporal changes in ACF-Q are related to the crustal activity or just a seasonal change. It is essential to analyze the data in the long time range as well as comparing the ACF-Q with other geophysical observation data.