S226-P014 **Room: Poster Session Hall** **Time: May 25**

Seismic velocity change associated with the 2007 mid Oita earthquake swarm detected by Passive Image Interferometry

Takuto Maeda[1]; Yohei Yukutake[1]; Kazushige Obara[1]

[1] NIED

1. Introduction

Auto correlation functions (ACFs) of seismic noise, which can be interpreted as a seismic wavefield or Green's function for the collocated source and receiver, is a powerful tool for searching temporal change of crustal structure. Here we report that the detection of the velocity reduction associated with the earthquake swarm activity.

2. 2007 mid-Oita earthquake swarm

Earthquake swarm activity had started from June, 6, 2007 at mid Oita prefecture, Japan, region. Strong activity lasts about six days. Source is located Beppu Bay to northern portion of Yuhuin fault system, having depth of about 10km. Fine scale relocation by using precise measurement of relative traveltime by waveform cross correlation technique shows that the swarm earthquake activity migrates from NNE to WSW direction with increasing time. Four months later, small-size earthquake activity recurrented on the shallower extended line of the swarm migration at October 31.

3. Data analysis

We calculate ACFs at every one day of noise at OITA2 station that is located very close to the epicenters of earthquake swarm, operated by Japan Meteorological Agency. At first, we divided one-day seismic trace into 24 segments. Then, spike signal and seismic record associated with natural earthquakes have been excluded by using LTA/STA algorithm. Taking ensemble average of ACFs among 24 hours, we generate one-day ACFs. Then, we observe day-by-day change of ACFs from May to December, 2007.

4. Results

Calculated ACF is time-stable. Especially they have very small difference between days for shorter lag time. However, we find that there is prominent phase delay for the lag time of 7 s for the frequency band of 1-3Hz from the mid of June, when earthquake swarm had started. Phase delay increases with increasing lag time. This is the effect what we expect if the velocity reduction have occurred, under the assumption that the ACF could be interpreted that the backscattered seismic wavefield for the collocated source and receiver. Phase delay remains about four months after the termination of the earthquake swarm activities with decreasing phase delay amount. At October 30, sudden phase delay is observed again, associated with the second earthquake swarm activity. Up to end of December, this second phase delay has not yet completely recovered.

5. Discussion

We find that delay and its recovery of phase of ACF with the long-time duration. This observation strongly suggests that there is a velocity change and its recovery associated with the earthquake swarm. ACF could also be changed by seasonal and/or rainfall changes. However, phase delay observed in this case does not match rainy season. Also, change for both of the two earthquake swarm activity support that this change is due to the swarm.

Up to now, we only have notable phase change at one station. Therefore, we cannot discuss about the location where seismic velocity changed. We note that the earthquake swarm does not have strong motion: The maximum magnitude of the activity is 5.0. Therefore, we cannot expect that there is a non-linear effect of elasticity caused by the strong oscillation. A possible scenario is that the water flow induced in the shallow crust by the earthquake swarm activity cause the seismic velocity change. Long duration of recovery of the phase might show that the diffusion process of the water in the crust.

Acknowledgements

We thank to Japan Meteorological Agency for providing their seismic wave data.