Investigation of the pore pressure sensitivity toward ocean loading influence from seismic ambient noise monitoring

*Rezkia Dewi Andajani[1], Takeshi Tsuji[1,2]

1. Department of Earth Resources Engineering, Kyushu University , 2. International Institute for Carbon-Neutral Energy Research, Kyushu University

Spatial mapping of pore pressure sensitivity toward surface perturbations can be useful to characterize crustal dynamic activities. This is due to pore pressure controls the activity of earthquakes and volcanic eruptions. Recent studies have discussed that the status of pore pressure can be evaluated from ambient noise seismic velocity change. Seismic velocity changes are known to exhibit variations induced by surface perturbations such as rainfall, snow, ocean loading, and atmospheric pressure change. Among these perturbations, the mechanism of the ocean loading influencing seismic velocity changes remain unclear. In regards to this, variations in ocean mass are known to cause inland deformation. We aim to investigate the response of the crustal pore pressure toward perturbations from the ocean by seismic velocity monitoring. We used the estimated seismic velocity in the Chugoku-Shikoku region, Japan. In this study, we used a statistical approach to draw a conclusion. To evaluate the influence of the ocean, we calculate the correlation coefficient between seismic velocity changes and sea-level. We assume a linear model between the absolute correlation and the station distance from the coast. The significance of the linear model is evaluated by considering the probability value. Our result suggests that for a specific period band, the absolute correlation between seismic velocity change and sea-level tends to decrease with the increasing distance from the coast. We conclude that ocean perturbations could spatially influence estimated seismic velocity changes, which might infer inland deformation due to ocean loading.

Keywords: seismic velocity change, ocean loading, surface perturbations, pore pressure

