常時微動を用いた米国ネバダ州リノ盆地の速度構造推定

Estimation of the Velocity Structure of Reno Basin, NV, USA in H/V Spectral Ratios of Microtremors

○福岡侑里・松島信一・川瀬　博・John G. ANDERSON

○Yuri FUKUOKA, Shinichi MATSUSHIMA, Hiroshi KAWASE, John G. ANDERSON

1. Introduction

The Reno-Carson City urban corridor is the second most populated region in Nevada, USA and thirteen earthquakes of Magnitude 6 or larger have occurred around Reno-Carson City since 1850 [1]. Fig.1 shows the west coast of USA and Reno is located the west edge of the state of Nevada.

In this study, we observe microtremors at the Reno basin in order to image the basin structure close to the basin edge. We use spectral ratios of microtremors (MHVR) in order to model the location and shape the basin depth for estimating the ground motion.

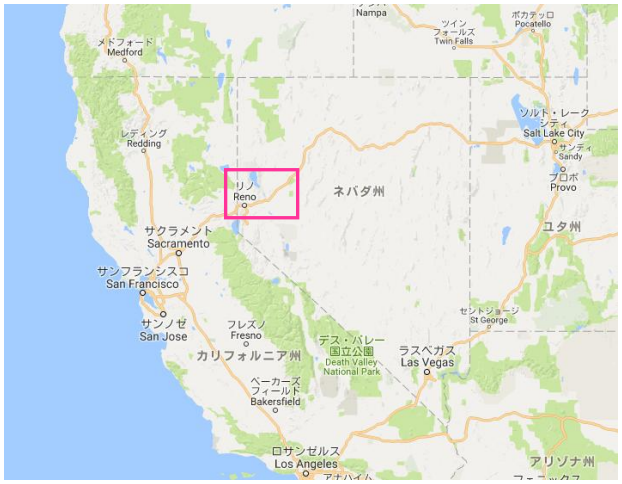

Fig.1 The west coast of the United States

2. Microtremor Observation

In order to confirm the basin depth estimated by Abbott and Louie (2000) [2] (Fig.2) and investigate the velocity structure with the Reno basin, we made array measurements at three sites, namely RN01, RN03 and SRP (pink pins in Fig. 3) and conducted single-station microtremor measurements at points along path1, path2, path3', path3 and path4 in Fig. 3 (site1-1~17, site2-1~9, site3'-1~4, site3-2~17 and site4-1~13) in October 2016. As for the observation lines, the separation of the observation points are about 1 km.

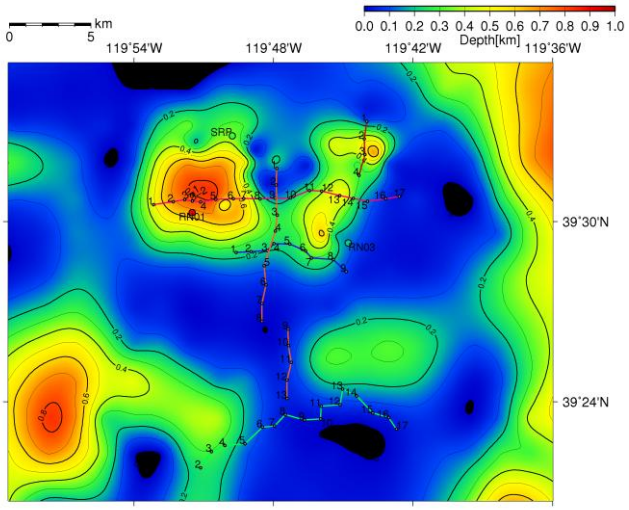

Fig.2 Basin depth model in Abbott and Louie (2000)

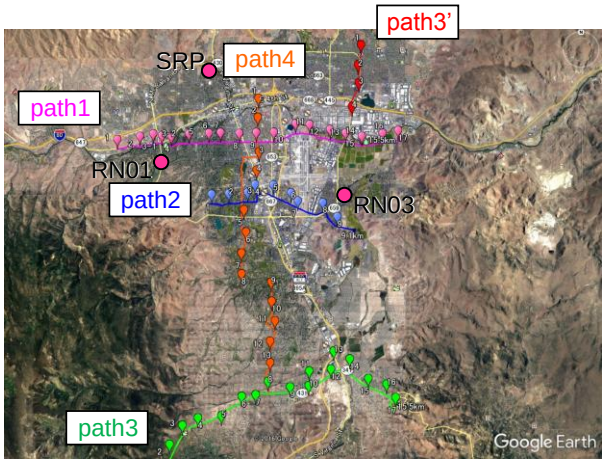

Fig. 3 Observation sites and points in Reno basin
Pink circles are sites for array measurements.
Balloons are points of single-station measurements.

3. Observation results

Fig. 4 shows the the examples of the phase velocity dispersion curve from array measurement at RN01. When the frequency is 0.5 Hz, the phase velocity is about 0.7 km/s. It corresponds to the phase velocity dispersion curve in Pancha and Pullammanappallil (2012) [3].

Fig. 5 shows the examples of observed MHVRs for sites along path1. There are peaks between frequencies 3Hz to 5 Hz, which can be assumed to be associated with the shallow structure at the east end of path1 (site1-14 to 17) and the difference between NS/UD and EW/UD is limited.

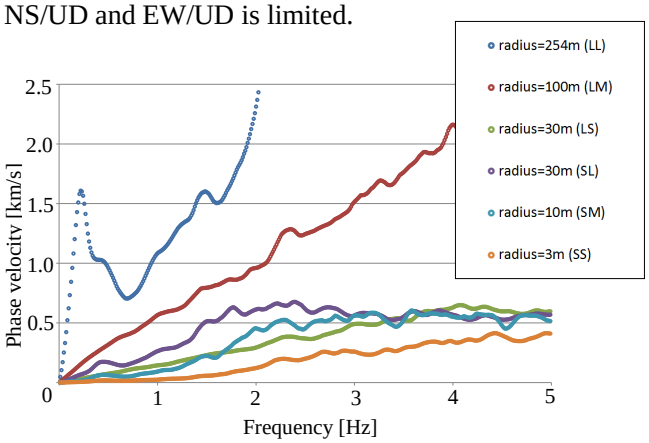

Fig. 4 Phase velocity dispersion curve at RN01

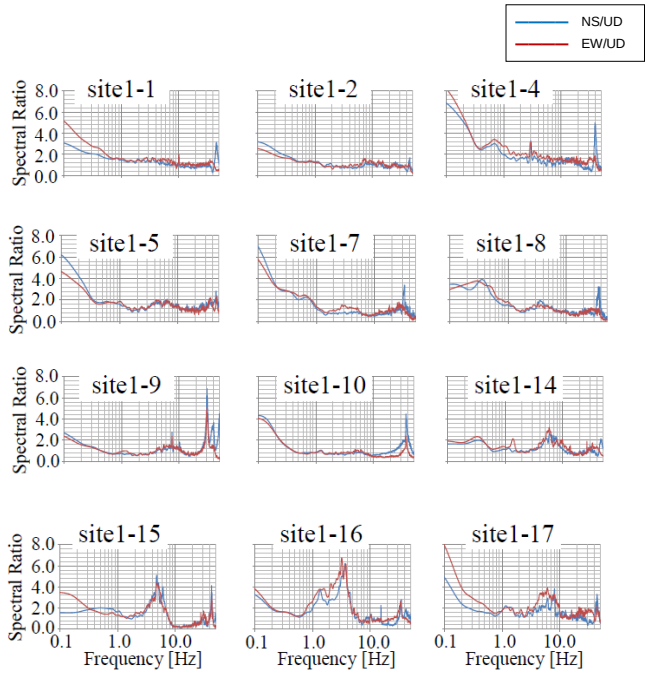

Fig.5 MHVRs for sites along path1

4. Conclusions and Future tasks

The observed MHVRs at Reno shows some peaks that seems to correspond to the basin depth, but most of the observed MHVRs shows that there are small impedance contrast in the area. From the observed MHVRs, it is difficult to derive information to estimate the velocity structure.

Using the results of the phase velocity dispersion curve from array measurement at RN01, we will create the velocity structure model of Reno basin and analyze the behavior of the ground by an earthquake motion.

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References

[1] dePolo CM, Anderson JG, dePolo DM, Price JG (1997): Earthquake Occurrence in Reno-Carson City Urban Corridor. *Seismological Research Letters*, **68**, 401-412.

[2] Abbot RE and Louie JN (2000): Depth to Bedrock Using Gravimetry in the Reno and Carson City, Nevada Area Basins.*Geophysics*, **65**, 340-350

[3] Pancha A and Pullammanappallil S (2012): Determination of 3D-velocity Structure across the Deepest Portion of the Reno Area Basin, *Final Technical Report on External Grant Award Number G12AP20026*, to U.S. Geological Survey NEHRP-IMW Program, available at http://earthquake.usgs.gov/research/external/reports/G12AP20026.pdf (last accessed July 2014).