

## Analysis of Seismic Waves from Continuous and Controlled Seismic Signal System in Kyushu Area

\*Ryosuke Matsuura<sup>1</sup>, Tatsunori Ikeda<sup>2,3</sup>, Takeshi Tsuji<sup>1,2,3</sup>, Koshun Yamaoka<sup>4</sup>

1. Cooperative Program for Resources Engineering, Kyushu University, 2. Department of Earth Resources Engineering, Kyushu University, 3. International Institute for Carbon-Neutral Energy Research (I2CNER), Kyushu University, 4. Earthquake and Volcano Research Center, Graduate School of Environmental Studies, Nagoya University

One of the methods to continuously monitor the underground is to use Accurately Controlled Routinely Operated Signal System (ACROSS). By mechanically spinning a weight, this apparatus continuously emits artificial seismic waves, which allows us to know the precise seismic velocity change between the ACROSS and seismometers. By monitoring the difference, underground movements such as earthquakes and volcanic activities can be linked to velocity change, which leads to prediction of such disasters. In this research, we focused on observing P-waves and S-waves which arrived the seismometers located around the ACROSS. Using weight stacking, we stacked maximum 119 days of data to distinguish ACROSS signal from random noises, weighing the signal according to the quantity of noise. By taking the motion of certain direction from the transfer function, different types of waves can be separated, making it easier to analyze in detail. We also investigated signal to noise ratio to clarify how far the signal travels. The result indicates that seismic waves from small-sized ACROSS in Kyushu area can be observed 50-100 km far away, and seismic waves becomes clear enough to detect velocity change with 20 days of stacking in stations 10-30 km away. The results of ray tracing demonstrated that observed P-waves can be used to image and monitor the geothermal reservoir and the crustal seismic structure in Kyushu Island.

Keywords: Artificial seismic source, ACROSS, velocity change, SNR