Processing the Deep-towed Autonomous Continous System (ACS) Data in Joetsu Basin, Niigata Prefecture, Japan

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The deep-towed Autonomous Continuous System (ACS) is a marine seismic reflection data acquisition method developed by JGI, Inc. The ACS utilizes high frequency seismic source (ranging from 700 Hz to 2300 Hz) and multi-channel receivers that both source and receivers can be located close the seafloor. High frequency seismic reflection acquisition is suitable to obtain high-resolution image of shallow geological structures, and this seismic result is commonly used for analyzing submarine geo-hazard potentials, analyzing marine or hydrothermal systems, finding shallow gas reservoirs, and mineral deposits. Since ACS data acquisition can be operated near the seafloor (maximum depth is 2 km from sea-level), the ocean’ s (strong) current makes the position of both receivers and sources irregular (un-stable) and it is hard to measure the absolute depth of both receivers and sources. During data acquisition, the un-stable depth of both sources and receivers not only make the recorded seismic reflection curve (hyperbolic curve) rugged, but also makes the velocity analysis process more difficult because the velocity semblance is not clear. In this research, we processed the ACS seismic data located in Joetsu Basin, Niigata Prefecture, Japan. The Joetsu Basin is known as an area that has gas hydrate potential. Furthermore, we did not only process ACS data using a conventional seismic reflection method, but we also proposed a method to recover the rugged hyperbolic curve, so the velocity semblance became clearer and made the velocity analysis easier. Finally, we delivered the seismic stack section that may indicate the location of gas hydrate in our seismic line.

Keywords: deep-towed seismic acquisition, high resolution exploration, marine seismic reflection, shallow exploration

