**Improving the seismic imaging in the southern Ryukyu subduction system by using multiple attenuation methods**

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**Abstract**

The southern Ryukyu subduction system is located at the boundary where the Philippine sea plate (PSP) subducts northwestward beneath the Eurasian plate (EP) near the eastern offshore of the Taiwan orogen. In previous studies, the geometry of the subducting PSP is not clear due to a lack of high-resolution crustal-scale seismic images. The Ryukyu subduction system is potentially hazardous in terms of tsunami and ground shaking for Taiwan region. Therefore, it is important to understand the crustal structure of this subduction system. The shallow geological structures are Huatung Basin, Yeyama Accretionary Prism, Forearc Basin, and Ryukyu Arc (from south to north), respectively. In previous studies, there are many transform fault zones related to the stress of the Ryukyu subduction system. From 2D Vp tomography, the crustal velocity of PSP is about 5~7 km/s, the Moho velocity is about 7.5 km/s, and the depth of the PSP Moho deep is about 15-20 km under the seabed (Font et al., 2001; Lallemand et al., 2013).

In deep sea, crustal reflections are usually covered by the multiples from sea floor. In order to imaging the plate boundary or even moho reflection, the advanced multiple attenuation methods need to be applied for studying the crustal deformation in the subduction zone. In this study, we applied the multiple attenuation methods to one multi-channel seismic profile (MGL0906\_18N; MGL0906\_15N) in the southern Ryukyu subduction system from TAIGER (Taiwan Integrated Geodynamic Research) in 2009. The field experiment designs are 50 m shot interval, 12.5 m spacing for the hydrophone, 15 s of recording time, and 6.25 m of CDP spacing. In this profile, the top of subducting crust of the Philippine Sea plate is hidden by the multiples. Three steps of multiple attenuation methods are used (1) Gapped Deconvolution, (2) 2D Surface Related Multiple Elimination (SRME), and (3) Slant stack multiple attenuation. These steps will be addressed in the following sections. After these steps, the top of subducting plate below the accretionary prism and the east Nanao basin is clearly imaged. This successful test can be applied to other seismic profiles in the Ryukyu subduction system to better constrain the geometry of the subducting plate in the future.

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