



Deep Structures of the Forearc Region at the Western End of the Ryukyu Subduction-Collision Zone Offshore Eastern Taiwan

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The Ryukyu forearc region offshore eastern Taiwan is the area where the Ryukyu subduction zone terminates against the Taiwan Island. The Hopping Basin is a small forearc basin located just east of the Taiwan Island. Due to the northwestward convergence between the Philippine Sea and the Eurasia plates, there are complex seafloor topography and large crust deformation in the Hopping Basin area. This study focuses on a deformed strata, called the Suao Strata, in the Hopping Basin and the western end of the Ryukyu forearc area. From the analyses of deep seismic reflection profiles of the 1995 TAICRUST and 2009 TAIGER cruises, together with other multichannel seismic reflection profiles of the R/V OR1 cruises, we have mapped the distribution and deformation of the Suao strata in detail. The Suao Strata deformed as the results of complicated subduction-collision processes in this region, and the structures observed could shed lights on how the subducted Philippine Sea slab collides with the Taiwan Island.

By compiling the reflection seismic images, we characterize the Suao Strata deformation by two factors. The first one is submarine sedimentary processes and accretionary processes, as seismic images reveal truncated surfaces and channel cut and fill features in the Suao Strata. This strata also shows upturned basin flank on the side against the accretionary wedge. The second factor is the deep subduction-collision processes. We observe a 3000m drop of the dipping Suao Strata lying over the Ryukyu Arc slope, and complicated folds and fault systems developed in the Suao Strata on the top of the Hopping Basement Rise. The thickest strata is located beneath the Hopping Canyon and adjacent to Hsincheng Ridge.

We hypothesize that the flat lying Suao Strata began to deform when the subducted Philippine Sea slab collided with the Taiwan Island, and infer that the accreted Yaeyama Ridge, the Taiwan block, and the subducted Luzon Arc (the coastal Range) all contributed to the Suao Strata deformation. Very low gravity anomalies (< -300 mGal) and very thick (> 5 km) low crustal velocity values in the Hopping Basin area further strengthen the idea that the 3000m subsidence of the Suao Strata was caused by the sinking of the Philippine Sea plate at its western edge and tearing of the Eurasia plate here.