



## **Sedimentary and Shallow Velocity Structure Characteristics in the Southern Okinawa Trough off Northeastern Taiwan**

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The Southern Okinawa Trough as a back-arc extensional basin along the Ryukyu subduction system is located in the 24.5 oN to 25.75 oN area off Northeastern Taiwan. Because of active tectonics, high uplifting rate of island (5 mm/yr averagely), frequent typhoons, heavy precipitation (locally greater than 5.5 m/yr), high relief (mountain elevations over 4,000 m), and steep slopes, the island of Taiwan is generally recognized as having particularly high sediment production rates. About 10 million tons of sediment annually is discharged from the Langyang drainage in the northeastern Taiwan through a narrow shelf area eastward to the Southwestern Okinawa Trough. In addition, a large amount of sediments from the Eurasia continent have also been transported southeastward to the Okinawa Trough through the broad East China Sea Shelf. Three main submarine canyons emanated from the shelf break are main conduits for sediment dispersal. These sedimentary processes play important roles for the shallow structure patterns in the Southern Okinawa Trough. However, a general long term sedimentary distribution pattern and what roles do the tectonic activities of the Ryukyu backarc system in the area play are rarely discussed. This study uses bathymetry, chirp sonar and seismic reflection data to investigate the characteristics of sedimentary and shallow velocity structures in the Southern Okinawa Trough. Those data were collected from 1995 to 2009, including eight large-offset seismic profiles crossing the whole Southern Okinawa Trough and its adjoining area offshore northeastern Taiwan. Using migration velocity analysis and velocity spectrum methods, the P-wave velocities in the shallow strata (0-200 m depth below sea floor) in the Southern Okinawa Trough are between 1,490 to 2,100 m/s. Some local relatively high velocity anomaly features in the shallow strata could be related to the local erosive or mound deposit features which have been observed in the chirp sonar images and coring data. For the strata at a depth range of 200 to 1,000 m below sea floor, most velocities are between 1,900 – 3,000 m/s. The velocity analysis result shows seaward decreasing characteristic in this depth range group in the adjoining shelf and slope area. Velocity values of the deep strata (deeper than 1,000 m below sea floor) in most study area are affected by tectonic and geological structures, especially where volcanic activities are present. The result of migration velocity analysis also reveals many local velocity variations in the Southern Okinawa Trough. Based on seismic facies analyses, submarine landslides and turbidity currents are important means for sediment deposition in the study area, especially in the places near the outfalls of the Keelung Valley, Mienhua Submarine Canyon and North Mienhua Submarine Canyon systems on the East China Sea shelf break and the conjunction area of the Ilan Shelf. Local tectonic activities like volcanisms and earthquakes also affected the sediment deposition pattern, and could trigger mass wasting processes in the Southern Okinawa Trough.