



Deposition and Distribution of the Orogenic Sediments East of Taiwan

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Over 140 Mt of sediments are transported annually by the rivers on land Taiwan to the ocean offshore eastern Taiwan. The Huatung Basin, located just east of Taiwan, is an almost closed basin surrounded by the Yaeyama Ridge to the north, Gagua Ridge to the east, and Luzon Arc to the south and west. This basin is a natural sink for the orogenic sediments from Taiwan. Swath bathymetry and multichannel seismic reflection data provide insights on the sediment transport processes and the distribution of sediments in the basin. Based on morphological characters, the Huatung Basin can be divided into 4 zones: the steep east-dipping arc slope, the submarine fan belt, the deep sea basin, and the Ryukyu Trench. Numerous submarine canyons run across the arc slope and submarine fan belt in the western half of the Huatung Basin, three of them connect to 3 major rivers on land in eastern part of Taiwan, respectively. These submarine canyons are responsible for carrying sediment derived from the eastern part of Central Range and the Coastal Range to the basin floor and the Ryukyu Trench.

Sediment isopach map has been constructed recently for the Huatung Basin from seismic reflections profiles, and the 2009 TAIGER survey data provide good velocity constraints for time to depth conversion of the sedimentary strata. From this isopach map, the trench has the thickest sediment deposit (over 4.5 km thick), followed by the submarine fan belt located at the foot of the arc slope zone (near 4 km thick). Most of the Huatung Basin sea floor is covered by 0.5 to 2 km thick sediments except on the Gagua Ridge. Besides submarine canyons, mass wasting processes are prevailing in the arc slope zone. Prominent sediment waves which could be formed by gravity sliding processes are widely observed in the submarine fan belt and part of the deep sea basin. Evidence of episodic deposition and submarine erosion can be observed in the Chimei Canyon. At the present time, large amount of orogenic sediment carried by the Hsiu-Ku-Luan Hsi has blanketed the hills and gullies of the Luzon Arc slope, and formed a smooth east-dipping canyon floor that is 8 to 9 km wide. A huge submarine fan was developed at the foot of the arc slope. Topographic and seismic reflection data reveal that the northern half of this fan has been washed away by turbidity currents, so that the Chimei Canyon now runs directly eastward into the Hualien Canyon. Two basin-wide strong reflectors can be identified in the sediment strata, which suggests that the deposition of the Huatung Basin sediment may consist of three phases. The bottom sedimentary layer that fills the lows of the Huatung Basin basement might be deposited before the Taiwan orogen. The middle sedimentary layer that is more evenly distributed across the Basin could be deposited after the initiation of the Taiwan mountain building. The distribution of the top sedimentary layer reflects the paths of the present submarine canyons.