

Sediment Wave and Cyclic Steps as Mechanism for Sediment Transport in Submarine Canyons Thalweg

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Abstract : Seismic analysis of bedforms has proven to be one of the best ways to study deepwater sedimentary features. Canyons are known to be sediment transportation conduit. Sediment wave are large-scale depositional bedforms in various parts of the world's oceans formed predominantly by suspended load transport. These undulating objects usually have tens of meters to a few kilometers in wavelength and a height of several meters. Cyclic steps have long long-wave upstream-migrating bedforms confined by internal hydraulic jumps. They usually occur in regions with high gradients and slope breaks. Cyclic steps and migrating sediment waves are the most common bedform on the seafloor. Cyclic steps and related sediment wave bedforms are significant to the morpho-dynamic evolution of deep-water depositional systems architectural elements, especially those located along tectonically active margins with high gradients and slope breaks that can promote internal hydraulic jumps in turbidity currents. This report examined sedimentary activities and sediment transportation in submarine canyons and provided distinctive insight into factors that created a complex seabed canyon system in the Ceara Fortaleza basin Brazilian Equatorial Margin (BEM). The growing importance of cyclic steps made it imperative to understand the parameters leading to their formation, migration, and architecture as well as their controls on sediment transport in canyon thalweg. We extracted the parameters of the observed bedforms and evaluated the aspect ratio and asymmetry. We developed a relationship between the hydraulic jump magnitude, depth of the hydraulic fall and the length of the cyclic step therein. It was understood that an increase in the height of the cyclic step increases the magnitude of the hydraulic jump and thereby increases the rate of deposition on the preceding stoss side. An increase in the length of the cyclic steps reduces the magnitude of the hydraulic jump and reduces the rate of deposition at the stoss side. Therefore, flat stoss side was noticed at most preceding cyclic step and sediment wave.

Keywords : Ceara Fortaleza, submarine canyons, cyclic steps, sediment wave

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