

Capbreton Canyon: evidence of its formation by differential sedimentation

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The SARGASS cruise (2010), focused on the major turbiditic systems of the Bay of Biscay, had for particular objective a detailed study of the Capbreton Canyon. The “deepest canyon of the world” shows in its upper part a highly contrasted morphology, characterized by a highly sinuous bed, lined by staged terraces. The presence of abandoned meanders, perched valleys and slide scars argues for a compound incision. The multi-beam bathymetric survey revealed similar features on more than more than 300 km. The thalweg deepens very regularly without any slope break despite the marked sinuosity and direction changes. The north flank forms a sharp escarpment (750 to 900 m) cutting the marginal Landes Plateau, which shows a levee-type morphology between 1500 and 3000 m. Inside the canyon, the best defined terraces are located near the axial thalweg, alternatively on the left or right bank depending on the sinuosity. The seismic cross-sections of the canyon highlight the opposition between the deformed series (Oligocene) in the South, and the highly continuous Neogene series forming a southward divergent wedge on the marginal Landes Plateau. In the axis of the canyon, chaotic facies of high amplitude, appear lately in the full-in. They underline migration of the thalweg towards its current position, excluding the hypothesis of a formation of the terraces by erosion. Contrarily, the configuration of the reflectors is in accordance with a construction of channel-levee type with a progressive increase of the offset between the deposits along the canyon and its banks. The tectonic does play a key role only for the canyon initiation in a structural depression. The idea of an erosion dominated canyon is rejected. Contrarily, a sedimentary equilibrium had been attained within de canyon whereas slow aggradation persists on the edges.

Keywords: canyon, turbidite, Bay of Biscay, morphology, seismic