At least five major paleo-canyons have been identified in sediment sequences along the western flank of the Tampico-Misantla Basin in eastern Mexico. These were formed during the late Paleocene (~56 Ma) and cut into thick unconsolidated Paleocene bathyal sediments. Sediments within two of these canyons have been studied in more detail. The Acatepec paleo-canyon was filled with more than 150 m of slumps, pebbly mudstones, channel, and channel-levee sediments. The upper part of the sequence contains four paleo-karst intervals that may indicate relative sea-level fluctuations. The San Lorenzo paleo-canyon contains a mass transport complex above its erosional base. At all locations, canyon-fill sediments are deepwater sequences. These are not easy to date because they contain very few lower
Eocene biomarkers, but ubiquitous, reworked material, especially including upper Paleocene foraminifera and nannofossils. Dating through detrital zircons and palynology provides a more accurate depositional age, which is lower Eocene. The Paleocene Eocene Thermal Maximum (PETM) has not been identified in the outcrops, although *Apectodinium* spp. dominates palynology samples just above canyon bases. Bitumen beds formed from paleo-oil seeps at ~56 Ma are found along paleo-canyon margins. The paleo-canyons are spectacular in spatial dimensions. While we cannot exclude a submarine origin, we suggest they were formed by a major drop in Gulf of Mexico sea-level, perhaps by thousands of meters. A subsequent rapid rise provided the accommodation-space for the deposition of hundreds of meters of coarse-grained, conglomeratic, and mud-rich canyon-fill sediments. Pressure decrease caused by the lowering of relative sea-level and erosion could be responsible for seal failure of hydrocarbon traps, creating subaerial oil seeps which fill in desiccation cracks and flow along a major unconformity.

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