Paleo-Canyon Formation and Contemporaneous Oil Seepage near the Paleocene/Eocene Boundary, Tampico-Misantla Basin, Eastern Mexico

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ABSTRACT

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

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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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