

## **Compelling Evidence from Eastern Mexico for a Late Paleocene/Early Eocene Isolation, Drawdown and Refill of the Gulf of Mexico**

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### **Abstract**

Outcrops of the Paleocene/Eocene Chicontepec Formation in eastern Mexico have provided a unique opportunity to study exposed time equivalent sections of the deepwater Gulf of Mexico's Wilcox Formation. A 2012 study established a stratigraphic framework in the Tampico-Misantla Basin (TMB) and identified sequence boundaries that could not be correlated globally. Fieldwork in 2008 had also established a network of paleo-canyons in the basin associated with a particular "54 Ma" sequence boundary. At that time, a Paleocene turbidite basin fed from the northwest was incised by a collection of NE-facing erosional canyons that coalesced laterally into the main SE-trending Chicontepec paleo-canyon; this canyon network was filled in the Early Eocene. Using the 2012 study chronostratigraphic scheme, recent micropaleontological studies were performed on a unique outcrop containing a bitumen bed within one of these paleo-canyons. The results suggest that the basin's water level fell rapidly by at least 200 m, starting after 55.8 Ma and leading to subaerial exposure of the bathyal beds for a maximum of 850,000 years prior to canyon refill. Evidence of rooting (limonite tubes) occurs in the bathyal turbidites below the bitumen bed. At this time, the paleo-canyons in the TMB were eroded by fluvial systems feeding directly into the central Gulf basin, probably a land-locked sea. The interpreted large and rapid fall and rise of water level between 55.8 – 54.95 Ma supports the "Gulf of Mexico drawdown hypothesis", i.e., that the GOM may have been isolated from the world's oceans due to the closure of the Florida Straits as the Cuban arc collided with the Bahamas and northeast Yucatán. The timing of the interpreted drawdown coincides with the Paleocene-Eocene Thermal Maximum (PETM), hinting that the PETM may have been caused or assisted by the release of methane from hydrates in the GOM margins and abyssal plain.