Nguyen, L. C., Mann, P., and Bird, D. E., 2013, **Location of deeply buried, offshore Mesozoic transform fault along the western margin of the Gulf of Mexico inferred from gravity and magnetic data** (abstract): Eos, Transactions, American Geophysical Union, Fall Meeting Supplement, v. 94, T21B-2558.

Several workers have proposed that a Jurassic age, 500-km-long, right-lateral transform fault along the western margin of the Gulf of Mexico, possibly extending southward and onshore for another 500 km onto the isthmus area of southern Mexico, was formed as the ocean basin opened. This proposed transform fault plays a critical role in the most widely accepted tectonic model for the Mesozoic opening of the Gulf of Mexico by a ~40 degree, CCW rotation of the Yucatan block about a pole near southern Florida. Previously proposed names for the fault include the Tamaulipas-Chiapas transform fault and the Western Main transform fault for the offshore fault and the Orizaba transform fault for the southern, onland continuation of the fault into southern Mexico. There are few direct geologic or geophysical observations on the location or characteristics of the proposed offshore transform because it is buried beneath an over 10-km-thick sedimentary wedge along the continental margin of eastern Mexico. To better define this offshore fault, we identify a 500-km-long, 40-km-wide gravity anomaly, concentric with, and located about 60-70 km off the eastern coast of Mexico. Two east-west 200/1200-km-long gravity models constructed to cross the anomaly at right angles are parallel to existing multi-channel seismic lines with age-correlated stratigraphy. Both gravity models reveal an abrupt crustal thickness change beneath the gravity anomaly: from 27 km to 12 km over a distance of 65 km in the southern profile, and from 23 km to 16 km over a distance of 30 km in northern profile. The linearity of the anomaly in map view combined with the abrupt change in thickness inferred from gravity modeling is consistent with the tectonic origin of a right-lateral transform fault separating continental rocks of Mexico from Mesozoic seafloor produced by the opening of the Gulf of Mexico. Magnetic profiles were analyzed using a Werner depth-to-magnetic source technique, coincident with the gravity models, estimate the depth to top of crystalline basement for the northern (9 km) and southern (11 km) transects. Subsidence analysis along both transects shows that sedimentation rates sharply peaked during the Laramide orogeny in the latest Cretaceous-Eocene, but otherwise conform to steady thermal subsidence of oceanic crust in the deep Gulf of Mexico that formed during the Jurassic CCW rotation of the Yucatan block. The more precisely defined offshore fault aligns well with the onland right-lateral Orizaba transform fault of southern Mexico that is thought to have been active in Mesozoic time.