The Guayape-Papalutla fault system: A continuous Cretaceous structure from southern Mexico to the Chortís block? Tectonic implications: COMMENT and REPLY

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The use of piercing points in making paleogeographic reconstructions greatly adds to their accuracy beyond that available using other techniques. Thus, Silva-Romo’s (2008) proposal that the Papalutla fault in southern Mexico and the Guayape fault in Honduras provide piercing points to constrain a Late Cretaceous reconstruction (Fig. 1) of the allochthonous Chortís block is a worthwhile objective. However, such a correlation raises more questions than it solves.

QUESTIONS
1. What Euler pole was used? Silva-Romo (2008, p. 75) states that it is a “nonrotational hypothesis” and that the Chortís block was merely moved westwards. This implies that the Euler pole lay 90° away to the south, near the coast of Antarctica. This contradicts the Cenozoic Euler pole for the Caribbean plate derived by both Pindell et al. (1988) and Ross and Scotese (1988), which lies near Santiago (Chile), i.e. ~50° to the SSE of the Cayman Trough. This Euler pole is consistent with the southward concavity of the Cayman Trough transform faults.
2. How is the Chortís block transported through the Gulf of Tehuantepec, which contains an undeformed Late Cretaceous–Holocene sedimentary sequence that straddles the Motagua fault zone, generally considered to be the boundary between the Chortís and Maya blocks (Keppie and Morán-Zenteno, 2005)?
3. Where is the Nicaragua Rise in the Late Cretaceous reconstruction? It is generally considered to be part of the Chortís block (Rogers et al., 2007, and references therein), which poses a geometric problem because it would overlap southern Mexico in Silva-Romo’s (2008) reconstruction.
4. Why does Silva-Romo use a WNW-trending boundary for the northern margin of the Chortís block, when no such feature has been identified? The northern boundary of the Chortís block, which presently lies on the Caribbean plate, is generally located along the ENE-trending Cayman transform faults (Leroy et al., 2000). The latter boundary lies ~20° clockwise of the Guayape Fault, which, if projected northeastwards, would intersect the Cayman Trough at 80°W, not 85°W as shown by Silva-Romo.

PROBLEMATIC STATEMENTS
Silva-Romo makes the following problematic statements:
1. “The Papalutla fault represents the eastern limit of the Guerrero-Morelos Platform” (p.76), which is characterized by Cretaceous shelf carbonates (Centeno-Garcia et al., 2008). Such carbonates represent an overstep sequence that extends from the eastern boundary of the Guerrero terrane (located west of the Papalutla fault) across the Mixteca, Oaxaquia, and Maya terranes (Keppie, 2004). This suggests that the Papalutla fault lies within the Paleozoic Mixteca terrane (comprising the Acatlán Complex) (Centeno-Garcia et al., 2008).
2. “Basement rocks of the Central Chortís terrane are similar to those of the Acatlán Complex” (p. 76). This contradicts Rogers et al. (2007) who state that the Central Chortís terrane represents the core of the Chortís superterrane (including the Northern, Central and Eastern Chortís terranes), which is underlain by ~1 Ga basement.
3. “Northeast of Papalutla town, the Papalutla fault displays left lateral strike slip” (p. 76). At this location, the Papalutla fault deviates from its general NE trend into an E-W trend. This may explain the discrepancy between the kinematics: thrust (Cerca et al., 2007) or sinistral strike-slip (Silva-Romo, 2008).

FUTURE RECONSTRUCTIONS
Any future reconstructions must take into account the following:
1. The Euler pole and displacement across the Cayman Trough since 49 Ma (Leroy et al., 2000).
2. The undeformed, untruncated nature of the latest Cretaceous sediments in the Gulf of Tehuantepec that straddle the Motagua Fault Zone (Keppie and Morán-Zenteno, 2005).
3. Removal of an ~210-km-wide Eocene-Oligocene forearc from the southern coast of Mexico during the Upper Oligocene and Lower Miocene (Keppie et al., 2007).

Figure 1. Late Cretaceous reconstruction of southern Mexico and the location of the Chortís block and the Guayape fault according to Silva-Romo (2008), in contrast to that of Rogers et al. (2007). GF—Guayape Fault; PF—Papalutla Fault.
REFERENCES CITED


Figure 1. A: Papalutla fault as a major northeast trend structure that accommodates deformation on south Mexico during Cretaceous and Cenozoic time. B: Laramidian reconstruction for south Mexico (Keppie, 2004). GMP—Guerrero-Morelos platform. Terranes: J—Juárez; Ma—Maya; Mx—Mixteca; Ox—Oaxaca; SM—Sierra Madre. Overlap volcanic provinces: SMO—Sierra Madre Occidental; TMVB—Transmexican Volcanic Belt.

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Tehuantepec was northward from the fault zone.


Figure 1. A: Papalutla fault as a major northeast trend structure that accommodates deformation on south Mexico during Cretaceous and Cenozoic time. B: Laramidian reconstruction for south Mexico (Keppie, 2004). GMP—Guerrero-Morelos platform. Terranes: J—Juárez; Ma—Maya; Mx—Mixteca; Ox—Oaxaca; SM—Sierra Madre. Overlap volcanic provinces: SMO—Sierra Madre Occidental; TMVB—Transmexican Volcanic Belt.

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