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

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**ABSTRACT**

**Recent papers have opened the debate over whether the Chortís block was located off the coast of southern Mexico or in a more outboard position, and this led me to explore whether correlations with older structures could be established to determine the evolution of the southwest corner of the North America plate. In this paper I hypothesize that the Papalutla fault of Mexico and the Guayape fault system of Honduras, both considered to be terrane boundaries, were roughly continuous in the Cretaceous, extending from southern Mexico to the Chortís block. They influenced Early Cretaceous clastic sedimentation of the Zicapa Formation on the Guerrero-Morelos Platform (southern Mexico) and the Tepemechin Formation of the Central Chortís terrane (Honduras). The units accumulated in fault-bounded basins associated with left-lateral slip. The basins developed in the Central Chortís terrane and Guerrero-Morelos Platform. Both geological entities appear to represent a continuous Cretaceous geologic province characterized by a trangression that occurred earlier in Honduras than in southern Mexico. This nonrotational hypothesis for the location of the Chortís block adjacent to southern Mexico during the Cretaceous is consistent with northeastward displacement of the Caribbean plate during Cretaceous time and implies 1500 km of Chortís block displacement during the Cenozoic.**

**Keywords:** paleogeography, Cretaceous, Caribbean plate, faults, Honduras, Mexico.

## INTRODUCTION

The continental Chortís block is on the western side of the Caribbean plate (Fig. 1A). Space between the North American and South American plates for the current Chortís block was created during Late Jurassic–Early Cretaceous rifting (Pindell et al., 1988; Pindell and Barrett, 1990). Most models of the tectonic evolution of the Caribbean show Chortís to be allochthonous, but its pre-Cenozoic location has been debated (Pindell et al., 1988; Meschede and Frisch, 1998; Keppie and Morán-Zenteno, 2005; Pindell et al., 2006; Giunta et al., 2006). Three different ideas are that (1) Chortís is nearly autochthonous (James, 2006), or (2) allochthonous, originally adjacent to Mexico (Pindell and Dewey, 1982; Pindell, 1985; Pindell et al., 1988; Meschede and Frisch, 1998), or (3) further outboard in the Pacific (Keppie and Morán-Zenteno, 2005). Although allochthonous models for the Caribbean are not simple (James, 2006), they provide a better explanation for two major Cenozoic tectonic events in southern Mexico: (1) continental truncation (Herrmann et al., 1994; Schaaf et al., 1995; Morán-Zenteno et al., 1996), and (2) Xolapa terrane exhumation (Morán-Zenteno et al., 1996; Ducea et al., 2004).

Earlier workers proposed that stratigraphic correlations between southern Mexico and Honduras indicated a location contiguous to southern Mexico during Mesozoic time (Mills, 1998; Rogers et al., 2007, and other papers therein). I suggest that terrane boundaries in southern Mexico (Sedlock et al., 1993) and Chortís (Rogers et al., 2007) were originally a contiguous Guayape-Papalutla fault system that controlled Early Cretaceous clastic sedimentation (Fig. 1B). The model proposed, as that of James (2007), is not rotational, shows a different Cretaceous structural connection compared to Rogers et al. (2007), and implies a Paleocene Chortís block departure later than the Pindell et al. (2006) model.

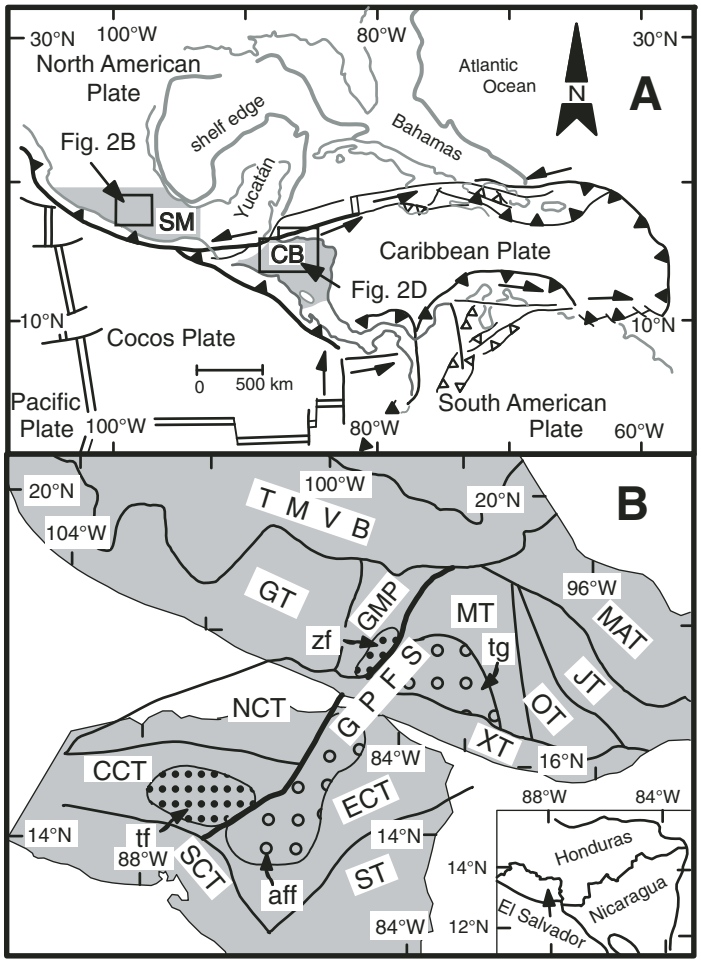


**Figure 1. A: Tectonic location of southern Mexico (SM) and Chortís block (CB), the only continental piece in the Caribbean tectonic puzzle. Modified from Acton et al. (2000). B: Late Cretaceous paleogeographic sketch showing proposed connection between the Zicapa Formation (zf) and Tepemechin Formation (tf), accumulated to the northwest of the Guayape-Papalutla fault system (GPFS). Connection between the Tecocoyunca Group (tg) and Agua Fria Formation (aff), both Middle Jurassic clastic units, appears to the southeast. Southern Mexico (Campa and Coney, 1983): TMVB—Transmexican Volcanic Belt, GMP—Guerrero Morelos Platform; and terranes GT—Guerrero, JT—Juárez, MAT—Maya, MT—Mixteca, OT—Oaxaca, XT—Xolapa. Terranes of Chortís block (Rogers et al., 2007): NCT—North Chortís, CCT—Central Chortís, ECT—Eastern Chortís, SCT—South Chortís, ST—Siuna.**

## STRATIGRAPHIC AND STRUCTURAL CORRELATION BETWEEN SOUTHERN MEXICO AND THE CHORTÍS BLOCK

An assemblage of terranes (Fig. 1B) forms southern Mexico (Campa and Coney, 1983): those of interest for this paper include (1) Oaxaca, which has Grenvillian basement and Paleozoic–Mesozoic cover; (2) Mixteca, characterized by Paleozoic metamorphic basement (Acatlán Complex) overlain by upper Paleozoic–Mesozoic sediments and crossed