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BALANCED CROSS SECTIONS OF THE ACTIVE FILA COSTE„A THRUST BELT: CONSTRAINTS ON THE INNER FOREARC RESPONSE TO SHALLOW SUBDUCTION OF THE COCOS RIDGE

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The Fila Coste–a is an active thrust belt within the forearc basin of the Middle America convergent margin in Costa Rica, with a rate of shortening that represents a significant portion of the rapid convergence between the Cocos and Caribbean plates. New geologic mapping of this thrust belt between the Panama border on the east and the TŽrraba gorge on the west depict a duplex with three horses that incorporate Eocene limestones and clastics of the Oligocene - early Miocene TŽrraba Formation. A thrust sheet at the rear of the thrust belt displaces the entire basin sedimentary sequence, including the Pliocene CurrŽ Formation. All the thrust faults are emergent and cut the synorogenic land surface in the mapping area. A cross section was constructed along a NE-SW trending transects across the thrust belt at the near the town of Guaria on the Pan-American Highway, directly inboard of the Cocos Ridge axis. Minimum estimates of fault slip based on cutoffs of Eocene limestones in this section are 4.5 km, 5.5 km, 6.3 km, 8.1 km, and 11.9 km for five thrusts. The Eocene limestones at the base of thrust sheets pinch out to the west due to decreasing slip on faults and/or a lateral ramp in the basal decollement. To the east, the duplex terminates abruptly near the Panama border at the on-land projection of the subducting Panama Fracture Zone, suggesting that shortening is propagating rapidly to the east with the migration of the triple junction and the onset of rapid shallow subduction of thickened Cocos plate. Minimum long-term shortening rates are constrained by the presence of faulted Pliocene marine sediments in the thrust belt. The time since the passage of the Cocos-Nazca-Caribbean triple junction, migrating southeast at 50.8 mm/yr, provides a maximum shortening rate based on the assumption that lateral propagation of the thrust belt is smooth and not episodic. It is estimated by Fisher et al., [2004] that the rates of active thrusting at the front of the Fila Coste–a are between 0.34 mm/yr and 1.5 mm/yr, based upon marine terrace development. These uplift rates, determined from uplifted marine terrace elevations, correspond to the dip on the underlying faults, as exhibited on structural maps. Where the thrust belt extends offshore in the east, there is a regionally extensive marine platform where erosion largely keeps pace with the thrust rate. Comparatively, inboard of the subducting Cocos ridge the thrust front lies inland and the total shortening is greater. The south sides of the prominent ridges within this emergent thrust front are sites of extensive landsliding, with deposits up to 39 sq. km. A minimum of 40 percent of the total Cocos-Caribbean convergence is taken up by shortening of the inner forearc 80 km inland from the active trench. Absence of similar features in the Nicaraguan forearc where the subducting crust is older, subducts more steeply, and lacks incoming ridges and seamounts indicates the demise of the forearc basin in Costa Rica reflects the greater coupling inboard of the Cocos Ridge.