Geophysical Research Abstracts,
Vol. 10, EGU2008-A-09960, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-09960
EGU General Assembly 2008

Neotectonics and river capture effects along the Polochic Fault, Guatemala

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The North American-Caribbean transform plate boundary is marked by the complex EW-trending Polochic-Motagua strike-slip fault system in Guatemala. Our study focuses on the Polochic fault that extends over 350 km from the Pacific coastal plain in the west to the pull-apart basin of Izabal Lake to the east. The Polochic western termination belongs to the complex North American-Carribean-Cocos triple junction but GPS data indicate negligible left-lateral strike-slip rate in this region (Lyon-Caen et al., 2006). Combined field-structural investigations and fault kinematic analyses make it possible to evaluate fault kinematics and explain the westward decrease in present-day slip rate of the Polochic fault. The study reveals that a significant part of the Polochic fault slip is distributed along NE-trending normal faults south of the Polochic fault and along reverse faults in the Altos Cuchumatanes plateau north of the Polochic fault since around 3 Ma. The other part is transferred to the Tonola fault that runs parallel to the Pacific coast. Deformation and slip rates have been determined using offsets of NS-trending pre-capture paleovalleys and a paleosurface of probable Middle Miocene age.

One other purpose of this study is to investigate the potential effects of a river capture on the dynamics of a strike-slip fault. At 7.4 My, the tectonically induced Chixoy (TIC) river capture produced an erosional pulse in the captured basin. This erosional pulse is responsible for removal of material in the fault zone and may favour the local-

ized surface uplift and rock exhumation above the fault. We detect a highly localized uplift of the pre-capture paleovalleys and paleosurface above the Polochic fault zone. Uplift is higher in the regions of high denudation suggesting that irregular phases of erosion and exhumation produced by captures influence the dynamics of the fault zone. Rock exhumation enhanced by the denudation associated with the TIC is currently being tested by numerical modelling. Our ultimate goal is to link lithosphere-scale models with erosion models derived from our field studies in order to describe the feedbacks that link erosion cycles and fault zone dynamics.