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Subsidence and strike-slip tectonism of the upper continental slope off Manzanillo, Mexico

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Abstract

The direction of convergence between the Rivera and North American plates becomes progressively more oblique (in a counter-clockwise sense as measured relative to the trench-normal direction) northwestward along the Jalisco subduction zone. By analogy to other subduction zones, the forces resulting from this distribution of convergence directions are expected to produce a NW moving, fore-arc sliver and a NW–SE stretching of the fore-arc area. Also, a series of roughly arc parallel strike-slip faults may form in the fore-arc area, both onshore and offshore, as is observed in the Aleutian arc.

In the Jalisco subduction zone, the Jalisco block has been proposed to represent such a fore-arc sliver. However, this proposal has encountered one major problem. Namely, right-lateral strike-slip faulting within the fore-arc sliver, and between the fore-arc sliver and the North American plate, should be observed. However, evidence for the expected right-lateral strike-slip faulting is sparse. Some evidence for right-lateral strike-slip faulting along the Jalisco block–North American plate boundary (the Tepic–Zacoalco rift system) has been reported, although some disagreement exists. Right-lateral strike-slip

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faulting has also been reported within the interior of the Jalisco block and in the southern Colima rift, which forms the SE boundary of the Jalisco block.

Threefold, multi-channel seismic reflection data were collected in the offshore area of the Jalisco subduction zone off Manzanillo in April 2002 during the FAMEX campaign of the N/O L'Atalante. These data provide additional evidence for recent strike-slip motion within the fore-arc region of the Jalisco subduction zone. This faulting offsets right-laterally a prominent horst block within the southern Colima rift, from which we conclude that the sense of motion along the faulting is dextral. These data also provide additional evidence for recent subsidence within the area offshore of Manzanillo, as has been proposed.

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Keywords: Tectonics; Fore-arc; Mexico; Seismic reflection; Oblique convergence; Arc parallel stretching

1. Introduction

The northern end of the Middle America Trench (Fig. 1), where the Rivera plate subducts beneath the

North American plate, is commonly termed the Jalisco subduction zone (e.g., Bandy et al., 1999). Plate motion studies (e.g., Bandy, 1992; Lonsdale, 1995; Kostoglodov and Bandy, 1995; DeMets and Wilson,

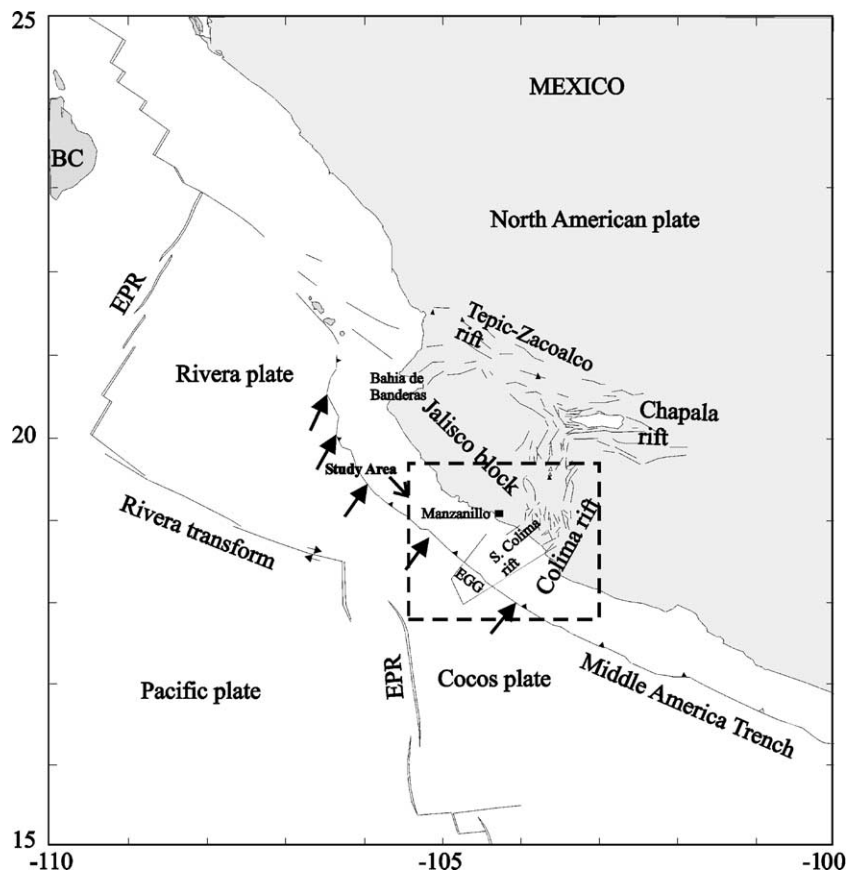


Fig. 1. Study area location map. Bold arrows along the Middle America Trench indicate convergence directions of the Rivera plate with respect to the North American plate (Bandy et al., 1997) and the Cocos plate with respect to the North American plate (DeMets and Wilson, 1997). Abbreviations: EPR=East Pacific rise; EGG=El Gordo graben; BC=Baja California.

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