

THE COSTA RICA CONVERGENT PLATE MARGIN: A TEXTBOOK EXAMPLE FOR SUBDUCTION EROSION

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Subduction erosion rather than subduction accretion is proposed to be currently the dominant process at the Costa Rica convergent plate margin. We present a tectonic model of subsidence and extension due to tectonic erosion of the forearc wedge and landward migration of the Nicoya coastline. High seismic velocities in the outermost part of the forearc wedge indicate the seaward continuation of the Nicoya ophiolite complex into the basement of the forearc wedge. The removal of material from the base of the forearc wedge by the process of basal subduction erosion leads to progressive subsidence and thus to landward migration of the coastline, the landward shift of the active volcano chain in the same order of magnitude as the coastline migration, and to the development of tilted blocks by substantial forearc extension. The convergent plate margin off the Osa peninsula in southern Costa Rica is characterized by the indentation of the Cocos ridge 3.5-5 Ma ago. The indentation causes the uplift of the Osa mélange which we interpret to represent an exhumed major channel for the transport of tectonically eroded material down into the subduction zone. We present evidence that subduction erosion rather than accretion has been the dominant process along the plate boundary. The composition of the Osa mélange is dominated by tectonized material of the upper-plate Nicoya ophiolite complex where the rocks partly experienced temperatures 200°C. We thus interpret the Osa mélange as a product of subduction erosion at the base of the outer arc wedge structure.