Geophysical Research Abstracts,
Vol. 10, EGU2008-A-09627, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-09627
EGU General Assembly 2008

Three-dimensional geometry of the Southeastern Caribbean: Results from multi-band seismic studies from BOLIVAR/GEODINOS

A. Levander(1), M.S. Miller(1), F. Niu(1), C.A. Zelt(1), M. Bezada(1), M.B. Magnani(2), S.A. Clark(3), M. Sobiesiak(4), G.L. Pavlis(5), M.A. Growdon(5)

(1) Rice University, Houston, TX, USA, (2) University of Memphis, Memphis, TN, USA, (3) University of Oslo, Oslo, Norway, (4) GFZ-Potsdam, Potsdam, Germany, (5) Indiana University, Bloomington, IN, USA (alan@rice.edu, Fax: 001-713-348-5214 / Phone: 001-713-348-6064)

The southeastern corner of the Caribbean is a complex tectonic regime, forming an odd junction where three lithospheres of different origins, the Caribbean plate and oceanic and continental portions of Atlantic-South American plate, join without forming a triple junction in the normal sense. Govers and Wortel (2005) characterize this plate boundary as a Subduction Transform Edge Propagator (STEP) fault system. There are three plate boundary structures: 1) The El Pilar – San Sebastian right lateral strike slip fault system, which is the surface expression of the boundary between the Caribbean plate and the continental South American plate, 2) The southern edge of the active Antilles island arc and subduction zone, where the Atlantic oceanic plate is subducting beneath the Caribbean plate, and 3) The juncture of the South American continental lithosphere and the Atlantic oceanic lithosphere. East of the strike-slip system South America and the Atlantic are a continuous plate, at the juncture the plate must tear as the oceanic plate subducts. Complementary studies from the BOLIVAR/GEODINOS experiment image different aspects of this system; these studies include a series of active-source profiles, relocated local seismicity, surface wave tomography, SKS shear wave splitting calculations, and P-to-S receiver functions.

The various seismic datasets, in combination, illustrate the complex, three-

dimensional geometry of the southeastern Caribbean region and provide evidence for an active lithospheric tear that is progressively detaching the oceanic Atlantic lithosphere from continental South America as the Antilles subduction zone rolls back along the northern edge of the South American continent. The tear is identified as a subcrustal cluster of seismicity slightly north of the Paria Peninsula. As the tear propagates eastward, forming the right lateral strike slip boundary above it, the South American continental lithosphere is depressed by $\sim$15km and subsequently rebounds, controlling the development of mountains and basins along the northeastern margin of South America.