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The Mw = 6.3, November 21, 2004, Les Saintes earthquake (Guadeloupe): Tectonic setting and static stress modeling

Nathalie Feuillet (1), François Beauducel (2), Eric Jacques (1), Paul Tapponnier (1), Sara Bazin (4), Bertrand Delouis (3), Martin Vallée (3), and Geoffrey C. P. King (1)

(1) Dept Tectonics, Institut de Physique du Globe de Paris, France, (2) Dept Seismology, Institut de Physique du Globe de Paris, France, (4) Dept Marine Geosciences, Institut de Physique du Globe de Paris, France, (3) Géosciences Azur, Nice, France

On November 21, 2004, a magnitude 6.3 earthquake occurred offshore, 10-km south of Les Saintes archipelago in Guadeloupe (FWI). The ensuing seismic sequence lasted more than two years, with several tens of earthquakes still recorded monthly today by the Lesser Antilles monitoring network. There were more than $30,000$ aftershocks, most of them at shallow depth near the islands of the archipelago. The main shock and its main aftershock of February 14, 2005 ($M_w = 5.8$) ruptured a normal fault (Roseau fault) mapped and identified as active from high-resolution bathymetric data a few years before. This fault belongs to an arc-parallel en echelon fault system that follows the inner edge of the northern part of the Lesser Antilles arc, accommodating the sinistral component of the oblique convergence between the North American and Caribbean plates. The distribution of aftershocks and damage (destruction and landslides) are consistent with the fault location. The main shock increased the Coulomb stress at the tips of the ruptured plane by more than 4 bar where most of the aftershocks occurred. Following the November 21, 2004 earthquake, however, no increase in volcanic or geothermal activity at Guadeloupe's Soufrière volcano has yet been observed. This is somewhat surprising, since the Boiling Lake in Dominica drained twice probably as a result of the extensional strain induced by the latter earthquake and its main aftershock.