

Continuous GPS measurements in Guadeloupe and Martinique (FWI): Implications for the seismotectonics of the Lesser Antilles

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Volcano and Earthquake Observatories of the French West Indies islands (Guadeloupe and Martinique) are collecting geophysical and geochemical data from several decades to ensure their operational responsibilities: (1) monitoring the two active volcanoes, La Soufrière and la Montagne Pelée, (2) monitoring the regional seismicity and (3) transmission of seismic and sea level data to the international tsunami warning centers.

Continuous GPS (cGPS) measurements start in 2001 to monitor volcanic deformation, and are completed by repeated measurements on denser networks. Since 2003, the networks expand on the Guadeloupe archipelago and Martinique island, to study the crustal deformation associated with subduction processes and earthquake cycle. 6 permanent cGPS stations are currently operated in Guadeloupe and 3 in Martinique.

These data have been processed together with data from Northern Lesser Antilles campaigns (USA) with respect to the Caribbean plate (Turner et al. 2010). Désirade site, the closer to the trench, indicates arc-normal displacement, consistent with interseismic strain accumulation due to locking of the subduction interface. Along the volcanic arc, the data display North to North West translation, consistent with a motion sub-parallel to the arc. These results corroborate the partial slip partitioning along arc-parallel en echelon sinistral/normal fault system proposed by Feuillet et al. (2001, 2002). The shallow seismicity recorded by the FWI observatories is dominated by swarms of activity along this en echelon fault system which experienced two $M > 6$ earthquakes this last decades (1985 Redonda Eq, 2004 Les Saintes Eq). This system seems to be a major structure of the North-Eastern Caribbean plate boundary.

Presently, through a collaborative project with the SRC (Seismic Research Center, University of the West Indies, Trinidad and Tobago), broadband seismic stations equipped with cGPS receivers are deployed in the Lesser Antilles: 4 on Guadeloupe archipelago, 1 on Saint-Barthélemy, 4 on Martinique and 4 on the neighbouring islands of Carriacou, St Lucia, Dominica, and Antigua.