Fault slip and strain partitioning in Guatemala from InSAR and air photos correlation.

Beatriz Cosenza*†[1,2], Cécile Lasserre*[3], Charles Demets*[1], James Hollingsworth*[3], Enrique Molina*[4,5], Hélène Lyon-Caen*[6], and Pierre Briole*[6]

[1]Department of Geoscience - University of Wisconsin-Madison (UW-Madison) – Lewis G. Weeks Hall for Geological Sciences 1215 West Dayton Street Madison, Wisconsin 53706-1692, USA., États-Unis
[2]Escuela de Ciencias Físicas y Matemáticas - Universidad de San Carlos de Guatemala (ECFM-USAC) – Segundo Nivel Lab 2, Ed T-1 Ciudad Universitaria, Zona 12 01012 Ciudad de Guatemala, Guatemala
[3]Institut des Sciences de la Terre (ISTerre) – Université Joseph Fourier - Grenoble 1, Institut français des sciences et technologies des transports, de l'aménagement et des réseaux, Institut national des sciences de lÚnivers, Institut de recherche pour le développement [IRD] : UR219, PRES Université de Grenoble, Université Savoie Mont Blanc, Centre National de la Recherche Scientifique : UMR5275, Institut national des sciences de lÚnivers, Institut national des sciences de lÚnivers, Institut national des sciences de lÚnivers, Institut national des sciences de lÚnivers, Institut national des sciences de lÚnivers, Institut national des sciences de lÚnivers, Institut national des sciences de lÚnivers – BP 53 - 38041 Grenoble cedex 9, France
[4]Centro de Estudios Superiores de Energía y Minas, Universidad de San Carlos de Guatemala (CESEM-USAC) – Guatemala
[5]Centro de Instrumentación y registro sísmico del instituto de investigaciones de la facultad de ingeniería-Universidad Mariano Galvez (CIRS-UMG) – Guatemala
[6]Ecole Normale Supérieure de Paris (ENS Paris) – École normale supérieure [ENS] - Paris – 45, Rue d'Ulm - 75230 Paris cedex 05, France

Résumé

The zone of interaction between the Cocos, Caribbean and North America plates in Guatemala is defined by the sub-parallel Motagua and Polochic strike-slip faults, a series of north-south-trending extensional grabens immediately south of the Motagua Fault, the Middle America trench, and faults within the Middle America volcanic arc. Historical earthquakes associated with these faults include the destructive 1976 Mw 7.5 earthquake along the Motagua fault and the 2012 Mw 7.5 Champerico subduction-thrust earthquake. The published present-day kinematic models of the region, based on GPS data, show that strain accumulation from the NA/CA relative motion concentrates on the Motagua fault with no resolvable strain accumulation across the active Polochic fault, suggesting that slip varies with time as a result of mechanical interactions within the Motagua-Polochic fault system. As part of the efforts to quantify the present-day kinematics and slip behavior of these faults, we use radar interferometry, to measure the strain rates across faults in Guatemala and constrain slip partitioning among the different faults. We processed radar images in L-band

*Intervenant
†Auteur correspondant: cosenzamural@wisc.edu

acquired by ALOS-1, spanning from 2006 to 2011. We used three adjacent traces acquired in Strip Map mode (with ascendant orbits) covering the Polochic and Motagua faults, the Ipala and Guatemala City grabens, and part of the volcanic arc to the south. We present the preliminary results after applying the NSBAS processing chain. After further refining, we will perform time-series analysis and expect to extract the first InSAR-based maps of interseismic velocity for this region, which will be useful to refine the estimates of the interseismic locking across the Motagua-Polochic fault system, the subduction zone, and other nearby faults. In complement, we also present our first attempts of image correlation to reconstruct the coseismic slip distribution of the 1976 earthquake, based on air photos acquired before and after the earthquake, that will be ultimately compared to the coupling distribution along the Motagua fault.