2006 Fall Meeting

Cite abstracts as **Author(s) (2006), Title, *Eos Trans. AGU, 87*(52), Fall Meet. Suppl., Abstract xxxxx-xx**

T23C-0518

Constraining Upper Plate Deformation in Nicaragua Through Delineation of the August 3, 2005 Mw 6.3 Strike Slip Earthquake Fault Plane

* **French, S W** *Scott_French@brown.edu*
Department of Geological Sciences, Brown University, Providence, RI 02912 United States
Warren, L M *warren@dtm.ciw.edu*
Department of Terrestrial Magnetism, Carnegie Institution of Washington, 5241 Broad Branch Road NW, Washington, DC, 20015 United States
Fischer, K M *Karen_Fischer@brown.edu*
Department of Geological Sciences, Brown University, Providence, RI 02912 United States
Abers, G A *abers@bu.edu*
Department of Earth Sciences, Boston University, Boston, MA 02215 United States
Strauch, W *wilfried.strauch@gf.ineter.gob.ni*
Geophysics, INETER, Managua, 2110 Nicaragua
Protti, M *jprotti@una.ac.cr*
OVSICORI, Universidad Nacional, Heredia, 86-300 Costa Rica
Gonzalez, V *vgonzale@una.ac.cr*
OVSICORI, Universidad Nacional, Heredia, 86-300 Costa Rica

Deformation in the overriding plate imposes boundary conditions on flow in the mantle wedge and thus is important to understand for models of subduction zone thermal structure and melting processes. In the Nicaragua-Costa Rica subduction zone, the motion of the subducting Cocos plate has a moderate trench- parallel component, and the shear stresses induced by oblique subduction appear to produce ~NW transport of fore-arc material. In Nicaragua, it has been proposed that bookshelf faulting via trench- perpendicular sinistral strike-slip faulting and block rotation, rather than trench-parallel dextral strike-slip faulting, is the primary mechanism of transport [La Femina et al., 2002]. On August 3, 2005, a Mw 6.3 earthquake occurred at 1103 UTC on Ometepe Island in Lake Nicaragua, preceded by a Mw 5.3 event at 0927 UTC and followed by hundreds of smaller events over the following weeks. These earthquakes occurred in conjunction with unusual explosive activity in Concepción, one of the two volcanos comprising Ometepe Island, that began on July 28, 2005. The Harvard Centroid Moment Tensor solution for the Mw 6.3 event indicates strike slip motion with vertical fault planes oriented roughly NNW and ENE. Slip on the ENE plane would provide evidence for the bookshelf faulting model, while motion on the NNW plane would be consistent with simple trench-parallel shearing. To determine the actual fault plane, we have relocated foreshocks and aftershocks of this event and analyzed its source directivity using waveforms from the TUCAN Broadband Seismic Experiment. For the relocation analysis, P arrivals for all INETER catalog events in this area from the last week of July through the end of August were picked using an automatic algorithm; a subset of these picks were verified by hand. Differential travel-times for event pairs were determined by waveform cross-correlation using the automatic picks to window waveforms, and both types of travel-time measurements are being incorporated in double difference relocation using the hypoDD algorithm [Waldhauser and Ellsworth, 2000]. Preliminary results show a clear ENE trending plane of seismicity containing both the Mw 6.3 and Mw 5.3 events. Initial analysis of directivity in the source of the Mw 6.3 earthquake using TUCAN waveforms and teleseismic

data indicates rupture to the ENE. Both the relocation and directivity analyses identify the ENE vertical nodal plane as the fault plane of the Mw 6.3 event, providing evidence in favor of the bookshelf faulting model for upper plate deformation.

7215 Earthquake source observations (1240)

7230 Seismicity and tectonics (1207, 1217, 1240, 1242)

8170 Subduction zone processes (1031, 3060, 3613, 8413)

Tectonophysics [T]

2006 Fall Meeting