



2010 M=7.0 Haiti Earthquake Calculated to Increase Failure Stress on Adjacent Segments of the Enriquillo Fault and Adjacent Thrust Systems

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We calculate that the Haiti earthquake increased the failure stress on the adjacent segments of the Enriquillo Fault and other thrust faults. Of particular concern is the segment on the Enriquillo Fault immediately to the east of the 12 January rupture. This fault section, which comes within 5 km of Port-au-Prince, is calculated to have been brought about 2-5 bars closer to failure. The inference of stress increase on this eastern section is relatively robust regardless of the specific source models used from available seismic and geodetic inversions. The next most loaded section on the Enriquillo Fault lies to the west of the 12 January rupture, where stress is calculated to have been brought about 1 bar closer to failure. The calculated stress increases on this western section, however, are more sensitive to the source models used in the calculation. Thus far we have tested several teleseismic and InSAR-based models, all of which assume slip occurred on a single north-dipping planar surface. If significant coseismic slip took place on a reverse fault at the western end of the 12 January rupture, these models will need further revision. Previous GPS measurements have shown tectonic loading of 7 ± 2 mm/yr on the Enriquillo Fault, yielding about 1.7 m of accumulated loading since large quakes last struck this region in 1751 and 1770. One or both of these appear to be coupled events separated by days to months, but it is unclear if these struck on the Enriquillo Fault. Thus, there is at least a possibility of future large quakes on these segments of the Enriquillo Fault. We also calculate stress increase of about 0.1-0.5 bars on some surrounding thrust faults, as well as a small increase of 0.05 bars on the Septentrional Fault between Port-de-Paix and Cap-Haitien, which lie 155 km north of the 12 January rupture. Preliminary models are available at <http://pubs.usgs.gov/of/2010/1019/>.