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A Source Model for the January 12, 2010 Haiti Earthquake (Mw=7.2)

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A major earthquake associated with a failure on Enriquillo fault system accumulating 7 mm of deformation per year devastated Haiti killing more than 150 thousand people and leaving far beyond homeless. We retrieve a source model for the January 12, 2010 Haiti earthquake (Mw=7. 2) by inverting the broadband teleseismic body waves to their sources using the finite source and point source inversion technique of Kikuchi and Kanamori (2003). Our rupture model points out unilateral rupture propagation commenced at the eastern side of the fault plane where the seismic moment released on an asperity that is likely left unbroken by the previous historical 1750 and 17 51 large events. The rupture front propagated westward and terminated at a site where the largest aftershocks took place. Our estimates yield a seismic moment of Mo=8.17 x 1019 Nm released on a 60 km-long fault plane with total rupture time of 45 seconds. A patch of 20 x 20 km size at the eastern side of the ruptured fault plane was a site of Mo=5.4x1019Nm moment release which amounts to 5 m of accumulated deformation and approximately a stress drop of 17 MPa. Such an asperity model in the proximity of several cities could be a plausible causative for more th thousands of death toll.

Keywords: Haiti Earthquake, Finite source, Rupture Process, Asperity