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# Source rupture process of the 12 January 2010 Port-au-Prince (Haiti, Mw7.0) earthquake

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The Haiti earthquake occurred on tuesday, January 12, 2010 at 21:53:10 UTC. Its epicenter was at 18.46 degrees North, 72.53 degrees West, about 25 km WSW of Haiti's capital, Port-au-Prince. The earthquake was relatively shallow (H=13 km, U.S. Geological Survey) and thus had greater intensity and destructiveness. The earthquake occurred along the tectonic boundary between Caribbean and North America plate. This plate boundary is dominated by left-lateral strike slip motion and compression with 2 cm/year of slip velocity eastward with respect to the North America plate.

The moment magnitude was measured to be 7.0 (U.S. Geological Survey) and 7.1 (Harvard Centroid-Moment-Tensor (CMT). More than 10 aftershocks ranging from 5.0 to 5.9 in magnitude (none of magnitude larger than 6.0) struck the area in hours following the main shock. Most of these aftershocks have occurred to the West of the mainshock in the Mirogoane Lakes region and its distribution suggests that the length of the rupture was around 70 km.

The Harvard Centroid Moment Tensor (CMT) mechanism solution indicates lefth-lateral strike slip movement with a fault plane trending toward (strike = $251^o$ ; dip = $70^o$; rake = $28^o$). In order to obtain the spatiotemporal slip distribution of a finite rupture model we have used teleseismic body wave and the Kikuchi and Kanamori's method [1]. Rupture velocity was constrained by using the directivity effect determined from a set of waveforms well recorded at regional and teleseismic distances [2]. Finally, we compared a map of aftershocks with the Coulomb stress changes caused by the event in the region [3].

[1]- Kikuchi, M., and Kanamori, H., 1982, Inversion of complex body waves: Bull. Seismol. Soc. Am., v. 72, p. 491-506.

[2] Caldeira B., Bezzeghoud M, Borges JF, 2009; DIRDOP: a directivity approach to determining the seismic rupture velocity vector. J Seismology, DOI 10.1007/s10950-009-9183-x (http://www.springerlink.com/content/xp524g2225628773/)

[3] -King, G. C. P., Stein, R. S. y Lin, J, 1994, Static stress changes and the triggering of earthquakes. Bull. Seismol. Soc. Am. 84,935-953.