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Study of two intermediate earthquakes in the Guerrero seismic gap, Mexico.

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The Guerrero seismic gap is located along the Mexican subduction zone. It extends from 99.2 W to 101.2 W (about 200 km in length). According with some authors, the Guerrero seismic gap could generate an earthquake of magnitude 8.0, if the gap were rupture in a single earthquake. There have not been large subduction thrust earthquakes in the NW part of the gap since 1911. The region SE of Acapulco, up to 99.2W, has experienced only relatively small (Mw < 7.1) earthquakes since 1957. We analyze two intermediate earthquakes close to the Guerrero seismic gap and its tectonic implications in the seismic cycle in this region. The first event is a Mw = 6.7 shallow subduction thrust earthquake occurred on 18 April 2002 close to the trench. The second earthquake is normal inslab earthquake (Mw = 6.5) occurred on 11 December 2011 inland at depth of 58 km. The 2011 Guerrero earthquake was strongly felt in several states in the coast and in Central Mexico and it resulted in three fatalities. We determined source parameters such as fault dimensions, rupture velocity, stress drop, focal mechanisms and slip distributions; and we model accelerograph records in Central Mexico. We used teleseimic data and the deconvolution method of Kikuchi and Kanamori to determine the focal mechanism and the slip distribution of these two events. The Guerrero seismic gap region represents a source of seismic hazard for the cities of Acapulco (State of Guerrero), and Mexico City, one of the cities more densely populated in the world (approximately 22 million inhabitants).