

Doublet earthquake triggering for the April 2014 events in the Solomon Islands

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The mechanism of earthquake doublet occurrence remains an enigma that is not fully understood in seismology. The Solomon Islands subduction zone is known for large earthquakes that commonly occur as pairs with small separations in time and space (Lay and Kanamori, 1980; Schwartz et al., 1989; Xu and Schwartz, 1993). Understanding the triggering process in this region, would provide new explanations for the mechanisms of the doublet occurrence and provide useful information for evaluating the seismic hazards for the region where multiple earthquakes often occur.

Two earthquakes occurred in 2014 at 20:14 (UTC) on April 12th and 12:36 on April 13th, with magnitudes of Mw7.6 and Mw 7.4, respectively near the island of Makira (San Cristobal), the depths of the events were approximately 23 km and 39 km, respectively. This sequence offers the opportunity to further study the role of stress transfer and mechanisms involved for earthquake triggering in a region known for occurrence of large (Mw>7) earthquake doublets, To evaluate the doublet source process of the events and recover the distribution of slip on each of the faults, we use an iterative inversion method by Kikuchi and Kanamori (1991) for the teleseismic P waveforms recorded from 20 stations of the Global Seismographic Network in a distance range of 30° to 90°. For the inversion procedure, a fault plane with fixed strike and dip is placed in the region of the earthquake hypocenter and divided into subfaults, and a constant the rupture velocity is assumed. Synthetic waveforms are calculated at the teleseismic stations for dislocations at each subfault. Using these synthetic Green functions, the observed seismograms are inverted to determine the fault plane and obtain the distribution of slips for the two events. The relative locations, fault sizes, slip distributions and static stresses for the two events will be used to understand the rupture process and explore scenarios which favor the triggering process

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