Geophysical Research Abstracts
Vol. 12, EGU2010-11862, 2010
EGU General Assembly 2010

Source Study of the September 29, 2009 (Mw=8.1) Samoa Earthquake

Mohammad Raeesi (1) and Kuvvet Atakan (2)

(1) Earth Science Institute, Bergen Univ., Bergen, Norway (raeesi@geo.uib.no), (2) Earth Science Institute, Bergen Univ., Bergen, Norway (Kuvvet.Atakan@geo.uib.no)

There are few instrumentally-recorded great outer-rise earthquakes, all exclusively with tensile mechanisms. The latest such an event is the 2009/09/29 (Mw=8.1) Samoa earthquake which jointly with the 2007/01/13 (Mw=8.1) Kurile earthquake take the third rank after the 1933/03/02 (Mw=8.4) Sanriku and the 1977/08/19 (Mw=8.3) Sumba outer-rise earthquakes. Only the 2007/01/13 event followed the rupture of its corresponding interplate earthquake of 2006/11/15 (Mw=8.3). These normal earthquakes are mainly due to exertion of strong slab-pull forces.

We analyzed the source processes of the 2007/01/13 (Mw=8.1) Kurile and the 2009/09/29 (Mw=8.1) Samoa earthquakes using teleseismic body-waveform modeling and also by using the new measure of "trench parallel Bouguer anomaly, TPBA." The source process of the Samoa earthquake is somehow different than the source processes of the other mentioned earthquakes due to the sharp bending of its rupture area. Naturally this kind of bending geometries generate barriers. We show how the multiple sub-events and their sequence facilitated the rupture process of the 2009 event. The asperities derived from teleseismic body-waveform analysis are compared with the asperities derived from the TPBA measure. The very good correlation between these two different measures further demonstrates the applicability of the TPBA on determining asperities of great outer-rise earthquakes. Such great tensile outer-rise earthquakes leave substantial gravitational imprints that are simply detectable by the TPBA measure. We discuss the aftershocks of the 2009 earthquake and the coupling mode of its corresponding forearc area. We also discuss the similarities and differences of the source processes of the 2007/01/13 (Mw=8.1) Kurile and 2009/09/29 (Mw=8.1) Samoa earthquakes.