Geophysical Research Abstracts
Vol. 13, EGU2011-7017, 2011
EGU General Assembly 2011

Two Solomon Islands Earthquakes in 2007 (M8.1), 2010 (M7.1), and Seismic Gap along the Subduction Zone, Revealed by ALOS/PALSAR

Yousuke Miyagi (1) and Taku Ozawa (2)

(1) Japan Aerospace Exploration Agency, Tsukuba, Japan (miyagi.yousuke@jaxa.jp), (2) National Research Institute for Earth Science and Disaster Prevention, Tsukuba, Japan

The Solomon Islands are located in the southwest of the Pacific Ocean. The Australian, Woodlark, and Solomon Sea plates subduct toward the northeast beneath the Pacific plate. Interaction among these four plates cause complicated tectonics around the Solomon Islands, and have caused several interplate earthquakes in the subduction zone (e.g. Lay and Kanamori, 1980; Xu and Schwarts, 1993). On April 1, 2007 (UTC), an M8.1 interplate earthquake occurred in the subduction zone between the Pacific Plate and the Australian Plate. This earthquake was accompanied by a large tsunami and caused considerable damage in the area, and at least 52 people were killed and many people lost their homes. Considering a historical distribution of M-7 sized interplate earthquakes in this area, the 2007 epicentral area corresponds to a seismic gap. The Japan Aerospace Exploration Agency (JAXA) carried out emergency observations using the Phased Array type L-band Synthetic Aperture Rader (PALSAR) installed on Advanced Land Observing Satellite (ALOS), and detected extensive crustal deformation using differential interferometric SAR (DInSAR) technique. L-band SAR has the advantage of obtaining better coherence, even in a heavily vegetated region like the Solomon Islands, than C-band SAR. Miyagi et al. (2009) estimated a slip distribution of the seismic fault mainly from the PALSAR/DInSAR data using a dislocation model in homogeneous elastic half-space (Okada, 1985). The resultant fault slip distribution suggested that most of a seismic gap was filled by the 2007 events, but a small seismic gap connecting to an Mw7.0-sized earthquake still remained in the southeast of the 2007 epicentral area. On January 3, 2010, an M7.1 earthquake occurred in the vicinity of the remnant seismic gap. ALOS/PALSAR observed epicentral area both before and after the event, and detected crustal deformation associated with the earthquake. We inferred fault model using the PALSAR/DInSAR data and concluded that the 2010 event was the supposed thrust earthquake filling the remnant seismic gap. A distribution of coulomb failure stress change in the epicentral area after the 2007 event suggested the possibility that the 2010 event was triggered by the 2007 earthquake.