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Relationship between two Solomon Islands earthquakes in 2007 (M8.1) & 2010 (M7.2) and a seismic gap, revealed by PALSAR

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Solomon Islands are situated in the southwest part of the Pacific Ocean. The Australian, Woodlark, and Solomon Sea plates subduct toward the northeast beneath the Pacific plate. In consequence, these four plates cause complicated tectonics around the Solomon Islands, and have caused so many interplate earthquakes in the subduction zone [e.g. Lay & Kanamori, 1980]. On April 1, 2007 (UTC), a M8.1 interplate earthquake occurred in the subduction zone between the Pacific Plate and the Australian Plate [see the USGS web site for time of occurrence, type, magnitude, and location of the earthquake]. This earthquake was accompanied by a large tsunami and caused considerable damage in the area. The Japan Aerospace Exploration Agency (JAXA) performed emergency observation using the Phased Array type L-band Synthetic Aperture Radar (PALSAR) installed on Advanced Land Observing Satellite (ALOS), and detected more than 2m of maximum displacement using differential interferometric SAR (DInSAR) technique. Miyagi et al. [2009] estimated a slip distribution of the seismic fault from the PALSAR/DInSAR data and the field investigation data of Tomita et al. [2008], jointly. Their results 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 southeastern region of Tetepare Island.

On January 3, 2010, an M7.2 earthquake occurred in west of Tetepare Island. It seems that this earthquake and aftershocks located in the southeast were filled the remnant seismic gap mentioned in Miyagi et al. [2009]. JAXA carried out ALOS/PALSAR observation on January 22, and crustal deformation on Rendova Island located in north of the epicenter was detected using DInSAR technique.

In this presentation, we estimate fault model associated with the 2010 earthquake. Then we discuss about the relationship between this earthquake and the 2007 event, and the seismic gap of this region.

Keywords: Solomon Islands, SAR, DInSAR, crustal deformation, earthquake, seismic gap