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Slow strain variations in Taiwan

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Taiwan is located along the boundary between the Philippine Sea plate and the Eurasian plate, one of the most active plate boundaries in the world. The oblique collision between these two plates drives the mountain building and high seismic activity in this area. More than 300 permanent GPS stations are operating, about 1 site per 120 km2. The typical shorting along the plate boundary is about 2$\tilde{4}$ mm/yr over 10 km. Over 20 of borehole strainmeters, both Gladwin tensor strainmeters and Sacks-Evertson dilational borehole strainmeter (one and three components), were installed over the island. Slow earthquakes over one or two days of duration were observed several times during 2004 for a network near the plate boundary, and most of them are identified to be triggered by the typhoons.

For the largest event on December 3rd, 2004, 3 episodes of slip in this event are identified, and model accordingly, looking for solutions with sources on the fault indicated by the seismicity. All changes are very slow so we use static solutions for deformation due to a buried shear dislocation and generate a time series by successive calculations for a model with slow propagation of the rupture. This very simple model gives a remarkably good fit to the data. Importantly, we can find a reasonable and simple model for a slow earthquake that satisfies the data.

Permanent GPS observations over the same area are used to perform the strain time series, and compared with the strainmeter observations. Strainmeter data showed slower strain accumulation than the GPS strain during 2004 while several slow events occurred, and keep similar accumulating rate during 2005-2007.

For a strainmeter network (3 stations) near a reservoir in southern-west Taiwan, the orientations of major strain axis of all 3 sites keep stable during 2004 and 2006.5$\tilde{2}$007.5, but experienced a rotation of 90 degree during 2005$\tilde{2}$006.5. These occurred on all 3 stations, and probably a process of the exchange of major and minor strain axis.