Geophysical Research Abstracts
Vol. 19, EGU2017-6279, 2017
EGU General Assembly 2017

Fluid-driven normal faulting earthquake sequences in the Taiwan orogen

Ling-hua Wang, Ruey-Juin Rau, and En-Jui Lee
Department of Earth Sciences, National Cheng Kung University, Tainan,Taiwan (bellring9889@gmail.com)

Seismicity in the Central Range of Taiwan shows normal faulting mechanisms with T-axes directing NE, subparallel to the strike of the mountain belt. We analyze earthquake sequences occurred within 2012-2015 in the Nanshan area of northern Taiwan which indicating swarm behavior and migration characteristics. We select events larger than 2.0 from Central Weather Bureau catalog and use the double-difference relocation program hypoDD with waveform cross-correlation in the Nanshan area. We obtained a final count of 1406 (95%) relocated earthquakes. Moreover, we compute focal mechanisms using USGS program HASH by P-wave first motion and S/P ratio picking and 114 fault plane solutions with M 3.0-5.87 were determined. To test for fluid diffusion, we model seismicity using the equation of Shapiro et al. (1997) by fitting earthquake diffusing rate D during the migration period. According to the relocation result, seismicity in the Taiwan orogenic belt present mostly N25E orientation parallel to the mountain belt with the same direction of the tension axis. In addition, another seismic fracture depicted by seismicity rotated 35 degree counterclockwise to the NW direction. Nearly all focal mechanisms are normal fault type. In the Nanshan area, events show N10W distribution with a focal depth range from 5-12 km and illustrate fault plane dipping about 45-60 degree to SW. Three months before the M 5.87 mainshock which occurred in March, 2013, there were some foreshock events occurred in the shallow part of the fault plane of the mainshock. Half a year following the mainshock, earthquakes migrated to the north and south, respectively with processes matched the diffusion model at a rate of 0.2-0.6 m2/s. This migration pattern and diffusion rate offer an evidence of ‘fluid-driven’ process in the fault zone. We also find the upward migration of earthquakes in the mainshock source region. These phenomena are likely caused by the opening of the permeable conduit due to the M 5.87 earthquake and the rise of the high pressure fluid.