[EE] Evening Poster | S (Solid Earth Sciences) | S-CG Complex & General

[S-CG56]Asian Earthquakes, Volcanoes and Tectonics

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The geological structures and tectonics are complex in the Asian region. Many orogenic belts and active faults exist within the Asian continent, and active subductions occur in its surrounding regions. In the east, the Pacific and Philippine Sea plates are subducting beneath East Asia, causing the development of trench-arc-backarc systems. In the southwest, the Indian plate is subducting beneath the Eurasian plate, forming major topographic features, such as the Himalayan mountain chain and the Tibetan Plateau. Due to the intense interactions among the four tectonic plates, large earthquakes take place frequently, such as the 2008 Wenchuan earthquake (M 8.0), the 2011 Tohoku-oki earthquake (M 9.0), the 2015 Nepal earthquake (M 7.9), and the 2016 Kumamoto earthquake (M 7.3). In addition to many arc volcanoes caused by plate subductions, some active intraplate volcanoes exist in Asia, but their origin and relationship with the intraplate tectonics are still not very clear. In this session, we welcome original or review presentations from fields of geology, geophysics, petrology and geochemistry addressing issues of geological structures, seismotectonics, volcanism and geodynamics of the Asia region.

[SCG56-P05]Coseismic gouge graphitization and its signatures in the active fault zone of the Longmenshan fault, China

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Faults accommodate deformation by aseismic (slip rates <<0.1 mm/s) and seismic (average slip rate ~1 m/s) slip. The frictional dissipation during seismic slip, especially for moderate to large in magnitude (M >6) earthquakes, should result in bulk temperature increase of the fault slipping zone. One moderate to large magnitude earthquake (M>6) nucleates in the Earth's crust every three days, but the geological record of ancient fault slip at m/s seismic velocities (as opposed to sub-seismic slow-slip creep) remains debated because of the lack of established fault-zone evidence of seismic slip. Here we sheared carbonaceous-bearing fault rocks from the Wenchuan earthquake Fault Scientific Drilling project-1 (WFSD-1) in the laboratory and compared to natural active slipping-zone materials. By means of in-situ synchrotron X-ray diffraction, micro-Raman spectroscopy and focused-ion beam transmission electron microscopy, we found graphitization process likely occurred during the 2009 Wenchuan (Mw 7.9) earthquake, and detected graphite grains similar to those found in the active principal slip zone only in experiments conducted at seismic velocities. The experimental evidence presented here suggests that high temperatures pulses associated to seismic slip induce graphitization of carbonaceous material. Importantly, the occurrence of graphitized carbonaceous fault-zone materials of WFSD-1 shows us the signatures of multiple coseismic events.