[EE] Evening Poster | S (Solid Earth Sciences) | S-SS Seismology

[S-SS03]Induced and triggered seismicity: case-studies, monitoring and modeling techniques

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Wed. May 23, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)
Induced and triggered seismicity occurs in conjunction with human activities such as reservoir impoundments, mining operations, conventional and non-conventional hydrocarbon production, geothermal energy exploitation, wastewater disposal, CO2 sequestration and gas storage operations as well as volcanic and hydrogeological processes. The stability of faults is affected by external solicitations such as pore-pressure diffusion, relaxation effects and stress field perturbations related to mass and/or volume changes, dike intrusions and earthquake-earthquake interactions. A better understanding of the physical processes governing induced and triggered seismicity is thus important for assessing the risk of current and future industrial activities, including the geological disposal of nuclear waste.

The study of induced and triggered seismicity is inherently an interdisciplinary problem, which requires the combination of seismological, hydrogeological and geodetic data as well as a wide range of modeling approaches. This session covers the analysis and modeling of induced and triggered seismicity at different spatial scales and in different environments. We welcome contributions from earthquake and volcano seismology and geomechanics.

Relevant topics to be presented include - but are not limited to - new methods for microseismicity characterization (both natural and anthropogenic), spatio-temporal variations of physical parameters (including stress, pressure and temperature changes), spatio-temporal patterns of seismicity, modeling strategies and case-studies.

The goal of the session is to cover both observational, theoretical and experimental aspects on the topics summarized above.

[SSS03-P03]Doublet earthquake triggering for the April 2014 events in the Solomon Islands

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The mechanism of earthquake doublet occurrence remains an enigma that is not fully understood in seismology. The Solomon Islands subduction zone is known for large earthquakes that commonly occur as pairs with small separations in time and space (Lay and Kanamori, 1980; Schwartz et al., 1989; Xu and Schwartz, 1993). Understanding the triggering process in this region, would provide new explanations for the mechanisms of the doublet occurrence and provide useful information for evaluating the seismic hazards for the region where multiple earthquakes often occur.
Two earthquakes occurred in 2014 at 20:14 (UTC) on April 12th and 12:36 on April 13th, with magnitudes of Mw7.6 and Mw 7.4, respectively near the island of Makira (San Cristobal), the depths of the events were approximately 23 km and 39 km, respectively. This sequence offers the opportunity to further study the role

of stress transfer and mechanisms involved for earthquake triggering in a region known for occurrence of large (Mw>7) earthquake doublets, To evaluate the doublet source process of the events and recover the distribution of slip on each of the faults, we use an iterative inversion method by Kikuchi and Kanamori (1991) for the teleseismic P waveforms recorded from 20 stations of the Global Seismographic Network in a distance range of 30° to 90°. For the inversion procedure, a fault plane with fixed strike and dip is placed in the region of the earthquake hypocenter and divided into subfaults, and a constant the rupture velocity is assumed. Synthetic waveforms are calculated at the teleseismic stations for dislocations at each subfault. Using these synthetic Green functions, the observed seismograms are inverted to determine the fault plane and obtain the distribution of slips for the two events. The relative locations, fault sizes, slip distributions and static stresses for the two events will be used to understand the rupture process and explore scenarios which favor the triggering process