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

[S-SS06]CSEP, earthquake forecast testing, and the role of SSE in earthquake occurrence.

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The Collaboratory for the Study of Earthquake Predictability (CSEP) has expanded over the years to many different testing areas hosted at multiple testing centers. One of which is the Japan testing center at the University of Tokyo, operated in collaboration with GFZ Potsdam. Hundreds of earthquake forecast models have been submitted to CSEP and are being tested. New testing metrics were developed and implemented and a lot of progress was made to establish CSEP as an institution that cannot be ignored when issuing earthquake forecasts. Its rigor and independence became the standard in evaluating earthquake forecasts and in reporting on the results.

Although the tests CSEP has conducted have been successful and well-received, they have also shown the limitations of the CSEP approach. What is a sufficient testing period for models? Are time-invarying models really describing the long-term seismic activity? Are long-term models testable at all? Do short-term models provide significant information for the forecasting problem or do they only model aftershock sequences? What other signals should be included in forecasting models to improve them? Do improvements in forecasting models translate into improvements of hazard models? Many aspects of seismic hazard or earthquake forecasting remain inherently untestable if only the model forecasts are tested and not the model ingredients. We propose to create new areas of activity for CSEP, namely targeted experiments that cannot be conducted with the current CSEP software system.

We solicit contributions addressing forecasting models, forecast testing problems, new ideas for CSEP experiments, possibilities of further CSEP developments, ways of expanding CSEP into the hazard and risk domain, and more general views on the forecasting problem. This is aimed at fostering the discussion in the community about further goals of earthquake forecasting experiments.

[SSS06-P02]Development of a high-frequency earthquake rupture imaging method at the regional scale; application to the 2016 Kumamoto earthquakes

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Rupture physics control spatial and temporal distribution of energy radiation of earthquakes and is responsible of strong groung motion. Originally used at teleseismic distances [e.g., Xu et al. 2009; Satriano et al. 2014], we apply back projection method at regional scale to image the rupture process. Our concern is to obtain high quality images of high frequencies (4-8 Hz) generation areas by dealing with network aperture and site effects. To develop our methodology, we take as example the April 2016 Kumamoto, Japan, earthquakes (Mw 6.1 event on 14, 21:26, Mw 6.0 event on 15 00:03 and Mw 7.1 event on 16, 01:25, JST) and several moderate-size earthquakes (Mw 4-5) within the source area. We select,

from K-Net and KiK-net networks, surface records within 100 km from hypocenter and convert them into energy records (square of horizontal components of velocity).

We investigate a volume containing the rupture area and localize in space and time extended zones with relatively large energy release in the studied frequency band. Those extended zones are the high frequency generation areas and they are compared to the location in space and time of asperities derived from strong-motion waveforms inversion [Asano et al. 2016; Kubo et al. 2016; Kobayashi et al. 2017]. We establish a first link between the size of the generation areas and the amount of released energy by studying, as simple cases, point source-like earthquakes. Furthermore, an iterative back projection method [Yao et al. 2012] is applied to remove step by step from the records the pulses associated with the main strong groung motion area in order to be able to identify secondary generation areas.