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

[S-CG53]Science of slow earthquakes: Toward unified understandings of whole earthquake process

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Accumulating observational studies on various types of slow deformation events, such as tectonic tremors, very low frequency events, and slow slip events, portrays some universal characteristics in generally complex behavior, including interaction among events and influence by various outer loadings. Some of these phenomena seem to have causal relation with the occurrence of very large earthquakes. A unified understanding of these slow and fast earthquake processes requires an approach integrating geophysics, seismology, geodesy, geology, and non-equilibrium statistical physics. We welcome presentations based on, but not limited to, geophysical observation, data analysis, analytical theory, numerical simulation, field study, and laboratory experiments.

[SCG53-P26]Fast and slow slip events emerge due to fault geometrical complexity

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Faults are always acting in network, and the geometry of faults themselves is extremely complex at all scale. However so far very few models of the seismic cycle have tried to incorporate the true geometry of faults. This is mainly due to computational reasons that make non-planar geometries out of reach because of computational time. To overcome this issue, we develop a new quasi dynamic model of earthquakes, with rate and state friction law, that is accelerated through the use of Hierarchical matrices. We show, through many examples, that the geometry alone brings a lot of natural complexities that is actually seen in the seismic cycle. It changes the recurrence time of earthquakes making it more chaotic, it enhances slow earthquakes. An other big challenge of seismic cycles models would be to catch scaling laws such as Omori or Gutenberg. We show that interaction of faults may resolve some of these scaling law issues.