Bay Area Geophysical Society Seminar Series

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UC Berkeley

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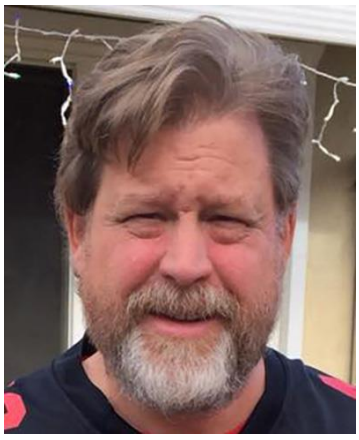
Elevation 66 in El Cerrito

Exotic Seismic Sources: Nuclear explosions, mining events, and volcanic and geothermal seismicity

Abstract: The Berkeley Seismological Laboratory has been routinely computing seismic moment tensors in near-realtime for about two decades using three-component, long-period complete waveforms recorded at local and regional distances. This analysis has contributed to an extensive catalog of moment tensor solutions for the central and northern California region, and the automatic and reviewed moment tensor solutions are used in shared emergency response monitoring with the USGS. In addition, the method has been applied in a number of cases to seismic events in volcanic and geothermal regions, those occurring in glacial ice, those due to the collapse of underground

cavities and for waves generated from large explosions. Events in such environments may be expected to have non-double-couple moment tensor solutions, however non-double-couple components can come from a variety of sources including noise in the data, the approximate nature of velocity models used to compute Green's functions for the inversions, and due to imperfect station coverage. Therefore, it has been necessary to assess the significance of non-double-couple moment tensor solutions through a series of statistical tests and sensitivity analyses. In this talk the development of methods for estimating and characterizing the uncertainty in the non-double-couple signatures of regional distance moment tensor inversions is discussed, and examples from recent DPRK nuclear explosions, underground cavity collapses and geothermal seismicity are presented.

Speaker Bio:



Douglas Dreger is a Professor at the University of California, Berkeley, and has published over 120 peer-reviewed papers on seismic wave propagation, earthquake source parameters, and earthquake source inverse methods. He has been involved in studies of earthquake sources and wave propagation (1D, 2D, and 3D) at regional scales in California, Japan and Taiwan. He has developed near-real-time earthquake source inversion (seismic moment tensor and finite-source), and near-fault strong ground motion estimation procedures that have been implemented at the Berkeley Seismological Laboratory, in Japan (automated moment tensor procedure at NIED), and Italy (finite-source and moment tensor at INGV). He teaches courses on geology, theoretical seismology, and applied geophysics.