Bay Area Geophysical Society Seminar Series

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Microseismicity observation and characterization related to enhanced geothermal system stimulation

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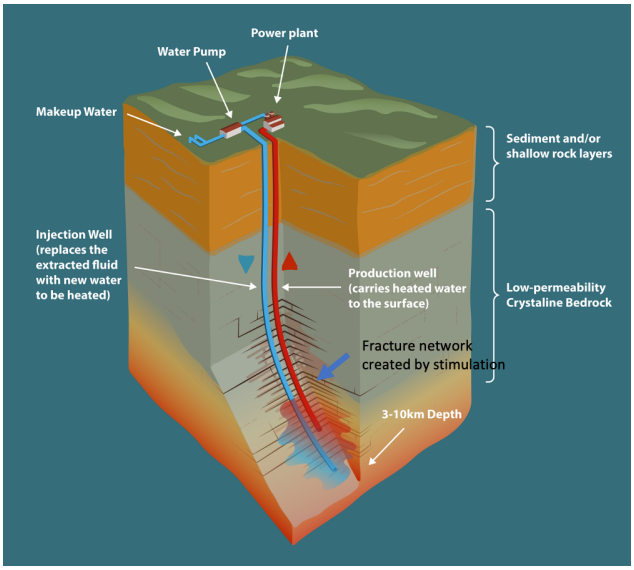
October 3rd, 2024, 5:00 PM PST
UCB campus, McCone Hall, Room 365 on Zoom

Abstract:



Microseismicity monitoring plays a central role in the creation and maintenance of an enhanced geothermal systems (EGS) reservoir by providing information on the locations and properties of mobilized fractures, information on the state of stress, and statistics on micro-seismic activity pre-, during- and post-stimulation. This information feeds directly into reservoir management and risk and hazard mitigation in order to guide public technical outreach plans. It is clear from past EGS experience that an effective seismic monitoring program cannot be described by "one size fits all" and should be tailored to the conditions unique to each EGS site.

To observe the ongoing stimulation and exploration of geothermal resources at geothermal fields, we deploy seismometers, test noise level, refine velocity models,

conduct laboratory and numerical experiments. Shallow boreholes (a few tens of meters) help to improve the signal-to-noise ratio with combined with different types of sensors such as surface nodal sensors. Background seismicity ratio before stimulation with the new seismometers and its changes due to stimulation will be discussed. The velocity model is refined using available active seismic surveys using borehole measurements and full-waveform inversion. The updated velocity model has a better shallow subsurface model, especially in the sedimentary layers, to constrain the location and characterization of microseismic events.

Author:

Dr. Nori Nakata is a Staff Scientist in the Energy Geosciences Division at Lawrence Berkeley National Laboratory. He received his Bachelor of Engineering (2008) and Master of Engineering (2010) degrees from Kyoto University, and his PhD degree at Colorado School of Mines in 2013. He received the Mendenhall prize from the Colorado School of Mines for his PhD and the Early Career Scientist Award from the International Union of Geodesy and Geophysics (IUGG). Nori $B!G (Bs research interests are extensive and include exploration geophysics, volcanism, civil engineering, wave phenomena, machine learning and signal processing, earthquakes and microseismicity, and crustal/global seismology. Before he joined LBL in 2020, he was a postdoc fellow at Stanford University in 2013-2016, an assistant professor at the University of Oklahoma in 2016-2018, and a principal research scientist at MIT since 2018.

Zoom meeting information:

Zoom ID: 813 6307 2598
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