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Optimized EGS reservoir stimulation using microseismic and numerical methods

Abstract

In this paper, in order to develop robust predictive models for engineering the reservoir and the induced or mobilized fracture network, a fully dynamic 2D Synthetic Rock Mass model is validated to simulate fluid injection in a geothermal reservoir by comparing modeling geometries of hydraulic fractures and induced seismicity with actual results. The numerical results qualitatively agree with field observations and reveal the possible interaction between new fractures and natural fractures indicated by recorded microseimic events. The model enables us to examine in detail the interaction between fluid pressure, rock deformation and slip on existing fractures for the different reservoir conditions. The validated numerical models can help provide insight on the relationship between seismicity, stress/damage and the fluid front in order to optimize the EGS reservoir stimulation for the project in hand or for future projects.

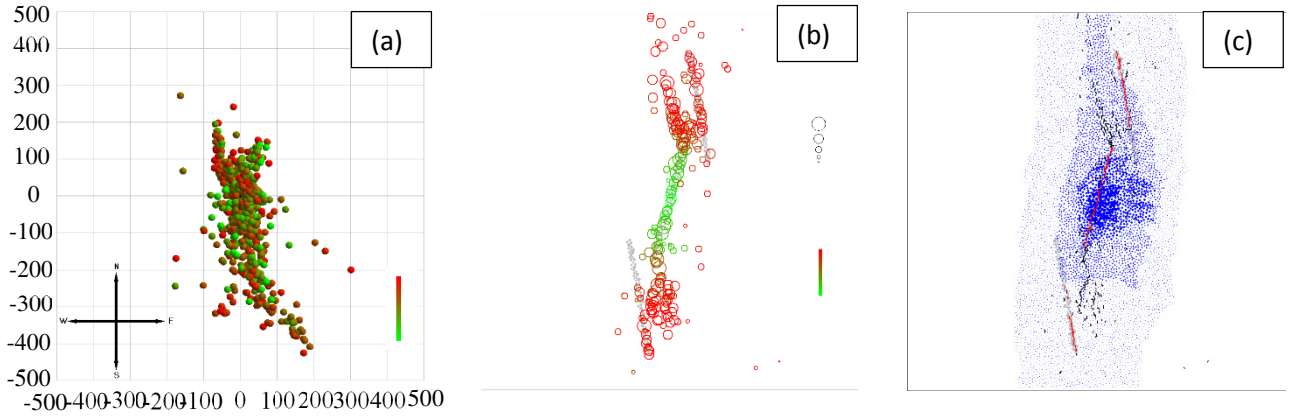

***Figure**: Field recorded MS events (a), synthetic MS (b), fluid flow and induced cracks (c) for the SRM model. The dimension of each subfigure is 1 km ×1 km. (b) Synthetic MS events. The sizes of seismic events are scaled to magnitudes between -0.94 to 0.46 and the color corresponds to the occurring time of seismic events (green/red=early/late). (c) Fluid pressure (blue circles whose sizes are scaled to 50 MPa) and induced cracks (black/red lines correspond to cracks induced outside/inside of smooth joints).*

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Please contact us (info@microseismic.net) for the details of the paper.