Seismicity induced by pressure diffusion mechanism

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Fluid injections are known to induce micro-earthquakes. However, probing of seismic activity is still challenging owing to weak seismic radiations. Thus, in order to improve the effectiveness of seismic monitoring, new methods to measure seismic activity have been developed. Radiated seismic signals associated with fracturing in the pressurized-area are detected by making use of polarization attributes i.e. eigenvalues resulting from covariance analysis. Polarization attributes can enhance the detection of presence of seismic radiations leading to increase sensitivity of the method to recognize weak signals resulting from fracturing. The recorded seismic signals at the surface have to be back-propagated in order to understand the spatial distribution of rocks experience faulting. To improve the accuracy of seismic event distribution and to reduce computation time, localization method that uses (1) differential travel times between pairs of stations and (2) differential evolution algorithm is used. As indicated by location standard error resulting from bootstrap approach, we conclude that our map of seismic events distribution is reliable. Reliable spatial and temporal variations of seismic events are used to infer a mechanism for seismic events migration. Our results show that the migration of seismic event could be caused by pore-pressure diffusion through the conduit resulting from enhancement of fault permeability. The findings could be useful for mitigating seismic hazards triggered by anthropogenic fluid injections.