



P440

Microseismic Panorama: from Geohazard Surveillance to Fracture Mapping.

Saleh Barakat

Summary

Microseismicity is a pressure induced dynamic effect associated to cracks, fractures and faults. The release of microseismic energy takes place when the failure criterion of any discontinuity in the sub-surface is exceeded. Each microseismic event represents a discrete shear or opening movement at or along such a discontinuity. The gathered data can be interpreted essentially as either fluid migration indicators or as indicators of reservoir active elements, such as mobile faults and spreading fractures.

The monitoring of a reservoir using the passive microseismic approach is a technique which makes it possible to obtain reliable information to manage performance and mitigate risks associated with injection/production phases. However, the so called "microseismic technique" is not a single technique. It addresses different scales and problematics. It refers to geomechanics, earthquake seismology and reflection seismic. It covers different type of monitoring designs and processing methods. In any given situation, the microseismic technique must be adapted to spatial and/or time factors, depending on the problems to be solved.

Spatially, it is possible to work on the scale of one well, several wells (injection and assisted retrieval) or on the scale of an entire field (large structural accidents, depletion).

Temporally, it is possible to work from one day to a whole week (hydraulic fracturing), from one week to one month (observation of phenomena between wells) and over several months or several years for observations relative to the whole field (Life of the Field monitoring).

With a special focus on unconventional reservoir concerns, this presentation will consider both the surveillance approach (microseismicity is an unexpected consequence of manmade activity) and the monitoring approach (microseismicity is a by product providing a non direct way to assess how a model could be distinguished from other, competing models).

Based on our experience, this presentation will review the available monitoring techniques and their applicability for both surveillance and monitoring objectives.