



Passive seismic monitoring of the Los Humeros (Mexico) geothermal field

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ABSTRACT

Extensive passive seismic monitoring was carried out between Sep. 17 and Sep. 18 over the Los Humeros (Mexico) geothermal field. This acquisition operation was conducted in the framework of the European H2020 GEMex project among other geophysical campaigns, but also geochemical and geological surveys. Seismic monitoring provided numerous data, whose processing is still on-going, to better characterize the underground structures and properties of the geothermal field. These results participate to the increase of our understanding of the local geothermal system. They can be utilized to propose new development areas, especially, in the northwestern part of the currently exploited zone, which shows temperature larger than 380°C at ca. 2 km depth.

For one year, a network consisting of 45 short- and long-period seismometers was deployed at the Los Humeros geothermal field. The network layout was chosen to comply with several types of passive seismic processing methods: induced and natural seismicity characterization, travel-time tomography, ambient noise tomography, etc. We present preliminary results associated with the recorded seismicity.

Besides several natural earthquakes detected in the region, local earthquakes were regularly detected at an average close to one event per day. The raw data screening was performed using a recursive STA-LTA algorithm, tuned for local seismicity detection and implemented in the Obspy library (Beyreuther et al., 2010). Manual review of the earthquake candidates was performed as well as the picking of the seismic phase arrivals using the Obspyck freeware (Megies, 2016). Finally, location of the identified local earthquakes was done using NonLinLoc (Lomax, 2018). The local seismic events appear clustered around specific well doublets (Figure 1), at depths between 1 and 3.5 km, consistent with previous results obtained in the area and consistent with the geothermal reservoir interval. However, these locations need to be confirmed after refinement of the velocity model.

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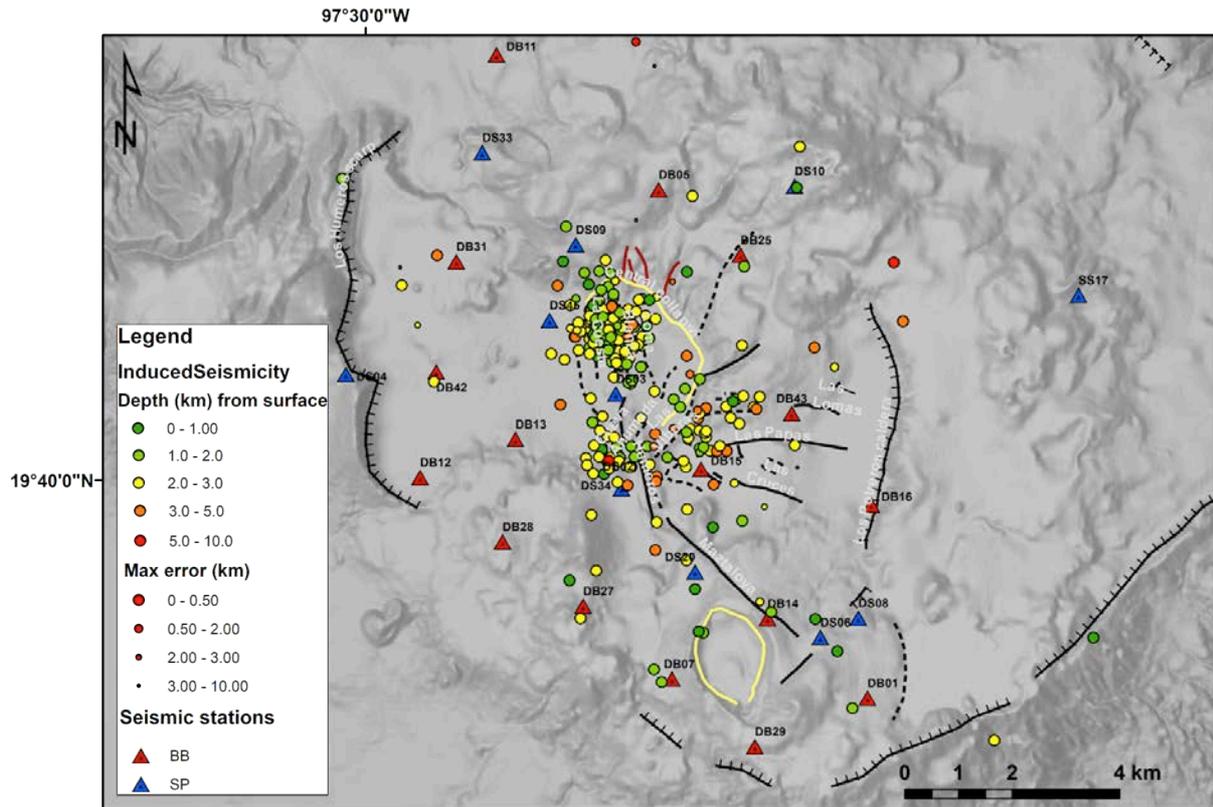


Figure 1: Preliminary location of the seismicity recorded at Los Humeros geothermal field, for the 09/17-03/18 period.