

The Mw 4.2 (February 8th, 2016) earthquake detected inside of Los Humeros caldera, Puebla-Mexico, by means of DInSAR

Reynaldo Santos-Basurto (1), Olga Sarychikhina (2), Penelope Lopez-Quiroz (1), Gianluca Norini (3), and Gerardo Carrasco-Nuñez (1)

(1) UNAM, CGEO, Geology, Mexico , (2) CICESE, Ensenada, Mexico, (3) Consiglio Nazionale delle Ricerche, Italy

Los Humeros caldera is located in the western part of the Trans-Mexican Volcanic Belt, North-East of Puebla. On February 8th, 2016, a Mw 4.2 earthquake was recorded by the seismic network installed inside the geothermal field. The earthquake made some damages to the Comisión Federal de Electricidad (CFE) power plant infrastructure, which manages the Los Humeros geothermal field. The earthquake also affected the population settlements around the field and several terrain displacements (e.g. landslides) were reported along the Los Humeros fault too.

In this work, we processed four Synthetic Aperture Radar (SAR) images that were acquired by the Sentinel-1A mission from European Space Agency (ESA), by means of the Differential SAR Interferometry (DInSAR) technique. Using two different look angle image pairs (ascending and descending passes), we detected the coseismic displacement of the February 8th, 2016 earthquake whose epicenter was located inside of Los Humeros caldera. Horizontal (East-East) and vertical (Up-Down) components of the surface displacement were derived and the expected values of the deformation due to the coseismic effect were estimated by modeling Los Humeros fault rupture through the USGS Coulomb software.

Finally, the results of the surface displacements were interpreted and validated thanks to the integration of different data such as Magnetotelluric (MT) and seismic processing and modelling.