Additional file

The following figures are examples of the methodology described in Section 3.1 of the main manuscript.

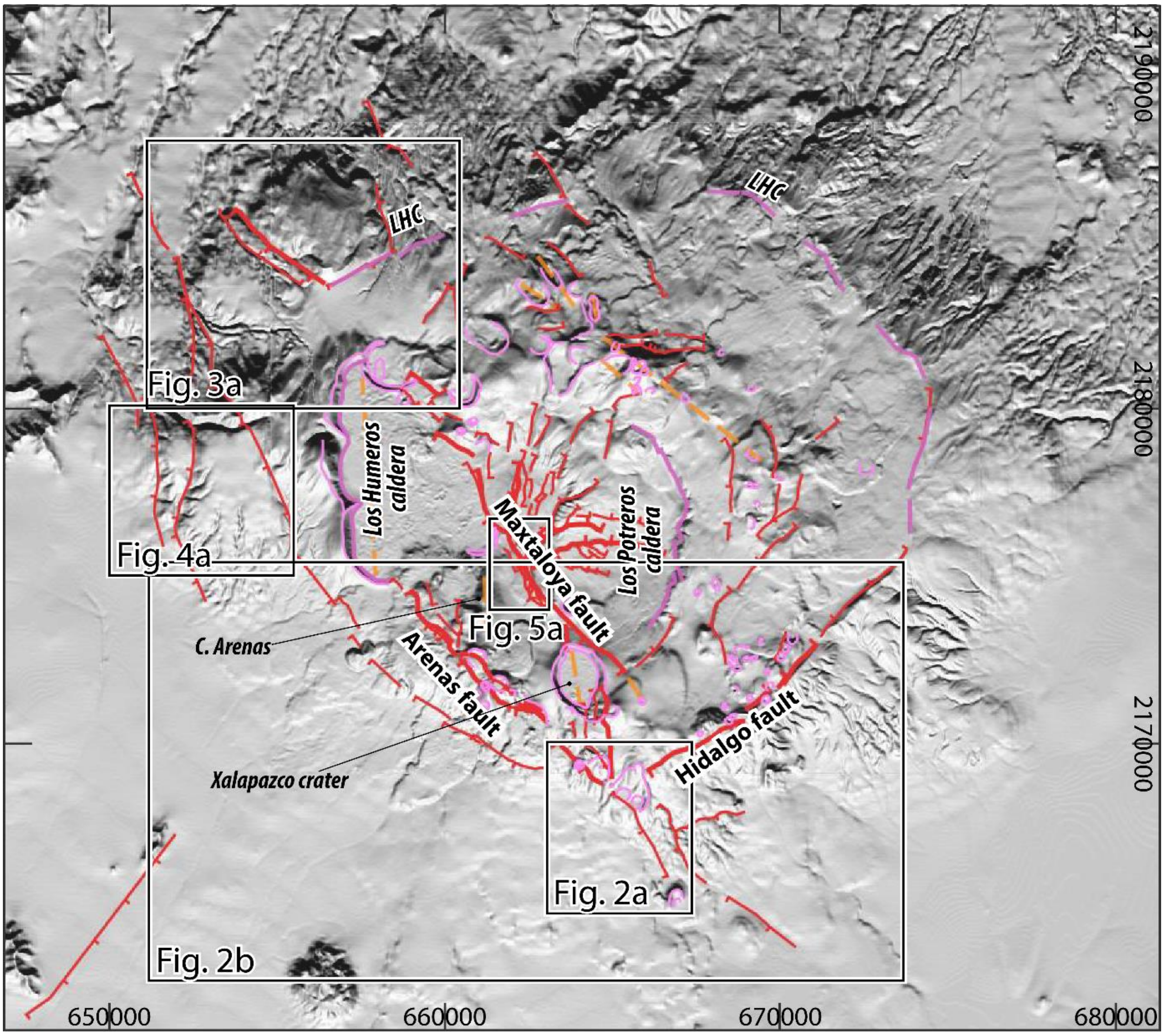

Figure S1. Los Humeros volcano, with location of figures discussed in this supplementary material. Red lines: faults. Purple lines: craters and crater rims. Dashed orange lines: buried volcano-tectonic features. DEM (15 m) is from Servicio Geológico Mexicano, https://www.sgm.gob.mx/GeoInfoMexGobMx/).

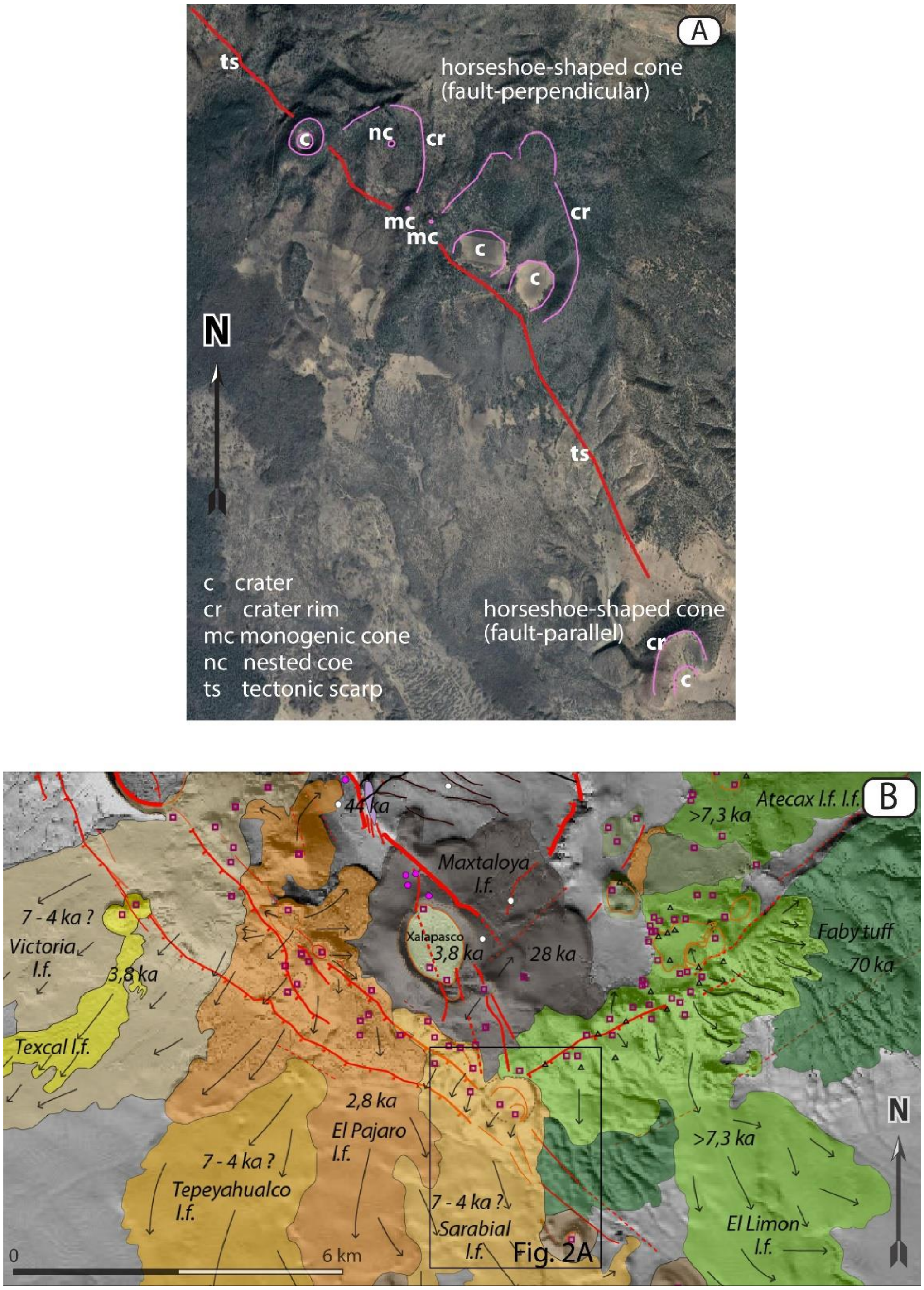

Figure S2. **a)** Arenas fault. The coexistence of several morpho-structures (tectonic escarpments, alignment of craters and monogenic cones, breaching of crater rims) identify the lineament shown in figure as a normal fault, dipping to the southwest, acting as conduit for volcanic eruptions. **b)** Directions of lava flows (redrawn from Carrasco-Nunez et al., 2017, with further data from this work) document the fissural eruptions of lavas from the NE oriented Arenas fault and of the NW oriented Hidalgo fault, from at least 7.3 ka (El Limon lava flow) and as recent as 2.8 ka B.P. (El Pajaro lava flow).

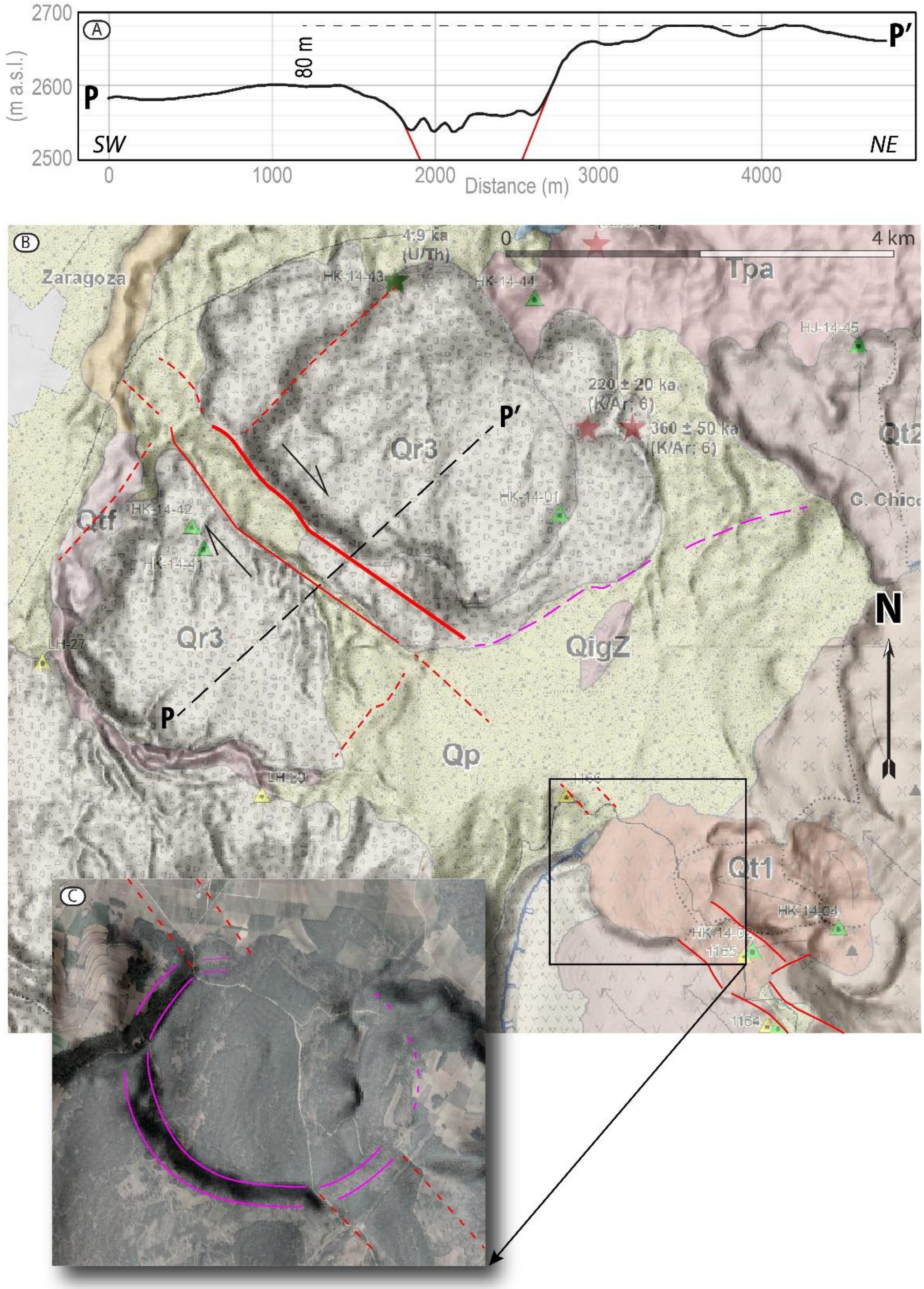

Figure S3. **a)** Geological map (Carrasco-Nunez et al., 2017) and DEM (15 m) is from Servicio Geológico Mexicano, https://www.sgm.gob.mx/GeoInfoMexGobMx/) of NW sector of Los Humeros. Parallel and laterally continuous geomorphological scarps are evident, cutting through the Rhyolitic domes Middle Pleistocene paleosurface (Qr3 – here dated 220-360 ka B.P.). A component of right lateral displacement of the Rhyolitic domes is also visible. **b)** Topographic profile along the Qr3 paleosurface, orthogonal to the morpho-structure interpreted as fault (vertical slip rate across the fault system is about 0.27 mm/a). **c)** Detail of a relevant holocenic volcanic crater (3.9-2.8 ka B.P., emplaced on the olivine basaltic lavas, Qb1 – 3.9 ka, and filled by El Pajaro trachytes, Qt1 – 2.8 ka), clearly faulted by action of the NW-SE oriented prosecution of Maxtaloya fault system to the north; this fault results aligned with the above discussed tectonic structure (red lines). Purple lines indicate the crater rim and the bottom of the relative scarp.

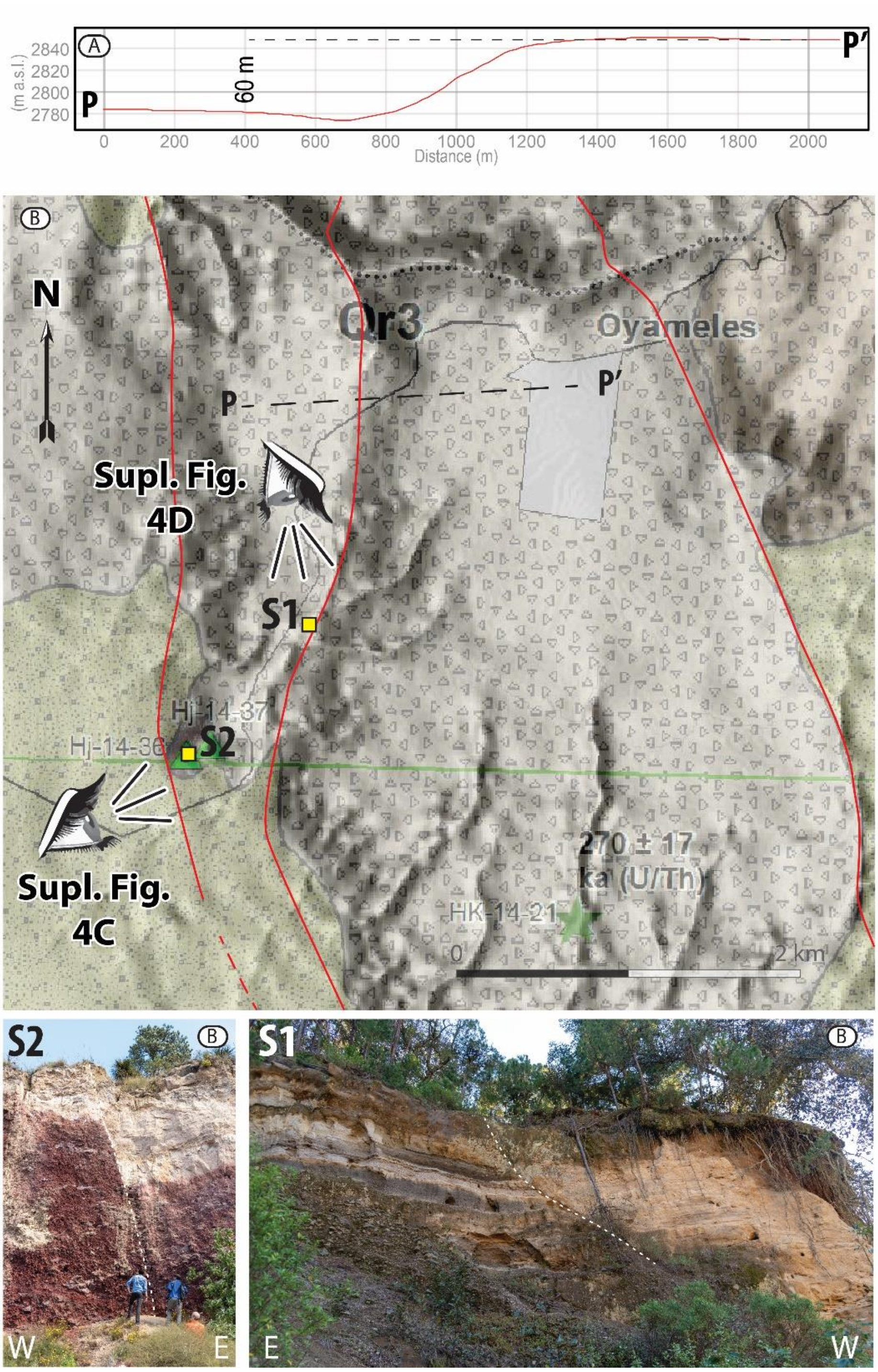

Figure S4. **a)** Geological map and DEM (15 m) of W sector of Los Humeros, at Oyameles. Parallel and laterally continuous geomorphological scarps are evident, cutting through the Rhyolitic domes Middle Pleistocene paleosurface (Qr3 – here dated 270 +/- 17 ka B.P.). **b)** Topographic profile along the Qr3 paleosurface, orthogonal to the morpho-structure interpreted as fault (vertical slip rate is about 0.22 mm/a). **c)** A few minor faults are visible in volcanic deposits (Qr3) in an abandoned quarry. Their dip azimuth varies between N107° and N125°, dipping 70 up to 85° toward the SE (structural data available on https://gemex.d4science.org/group/gemex). These can be interpreted as secondary minor structures associated to the main faults (similar to the secondary structures associated to the Maxtaloya fault,see Figure S5a). **d)** Major fault is visible in the volcanic deposit at station S1. Fault dip azimuth is N280°, dipping 60° toward the west, bedding is N245°/45° (dip azimuth, dip). Photos by L. Piccardi, 2017.

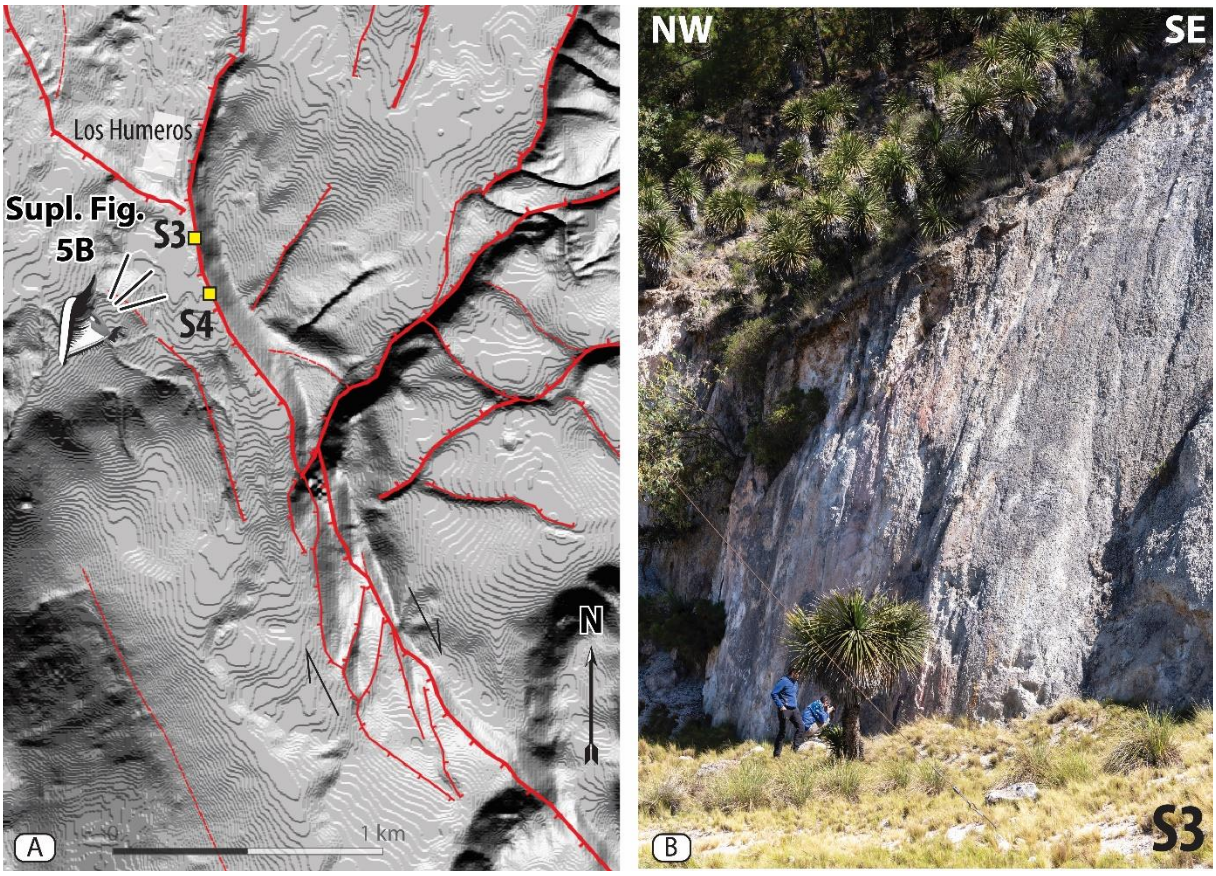

Figure S5. **a)** Central sector of the NW-SE oriented Maxtaloya fault displayed on a 1 m resolution DEM (kindly provided by CeMie-Geo project) . The series of secondary structures, whose dip azimuth range from N90° to N130°, arranged en echelon visible in the southern part of the image along the fault is indicative of a subdued component of dextral horizontal slip on the main fault. Kinematic indicator measured on the main fault plane at Station S4 show normal oblique slip with subdued component of dextral slip (dip azimuth ranging from N230° to N260°, dip from 52° to 88°, pitch from -75 to -88) (structural data available on https://gemex.d4science.org/group/gemex). **b)** Main fault plane of the Maxtaloya fault at Station S3 (in Fig. 5a). The fault plane exhibits clear kinematic indicators such as striae, grooves, mineralized veins and others, showing mostly dip slip (pitch ranging from +70 to -80). Nevertheless, at one place two superimposed generation of striae have been recognized, with N235°, 62, -83 over N233°, 60, +85 (dip azimuth, dip, pitch), with the dextral component of slip resulting the most recent one. Dextral component of slip on the Maxtaloya fault observed here is coherent with the dextral displacement of the Rhyolitic domes depicted in Supplementary figure 3a. Men give scale.

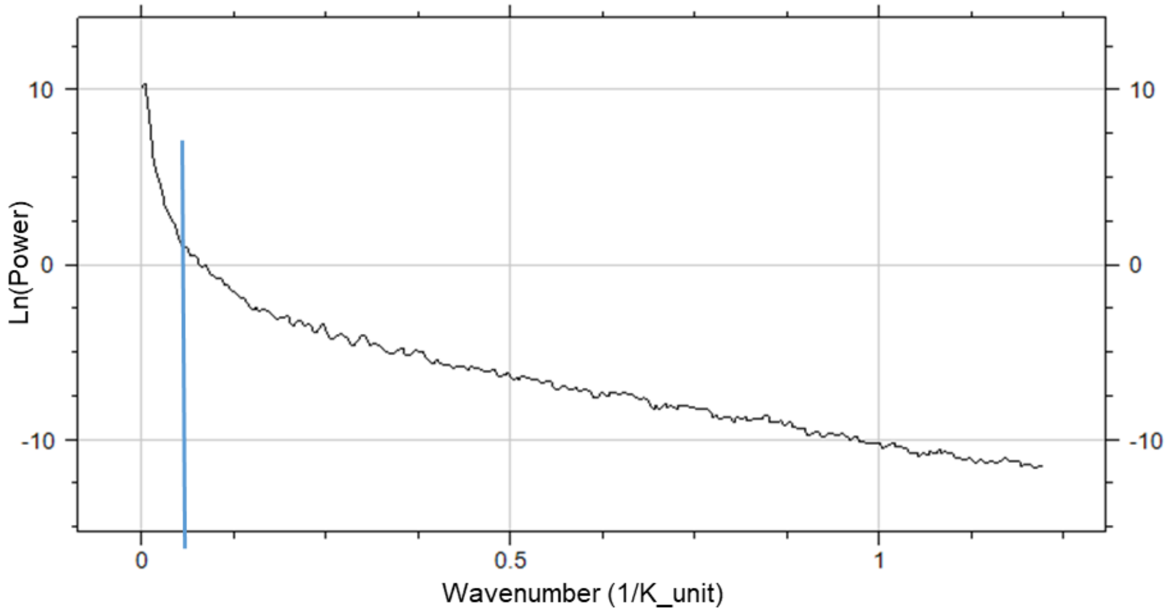

Figure S6. Radially average power spectrum of the Complete Bouguer Anomaly (Figure 5a of the main manuscript). A cutoff wavelength of 20.5 km was selected to separate the lower and higher frequencies, related to regional and local anomalies, respectively. The cutoff wavelength was chosen where the slope of the power spectrum changes, indicating a change in the depth of the anomalous source.

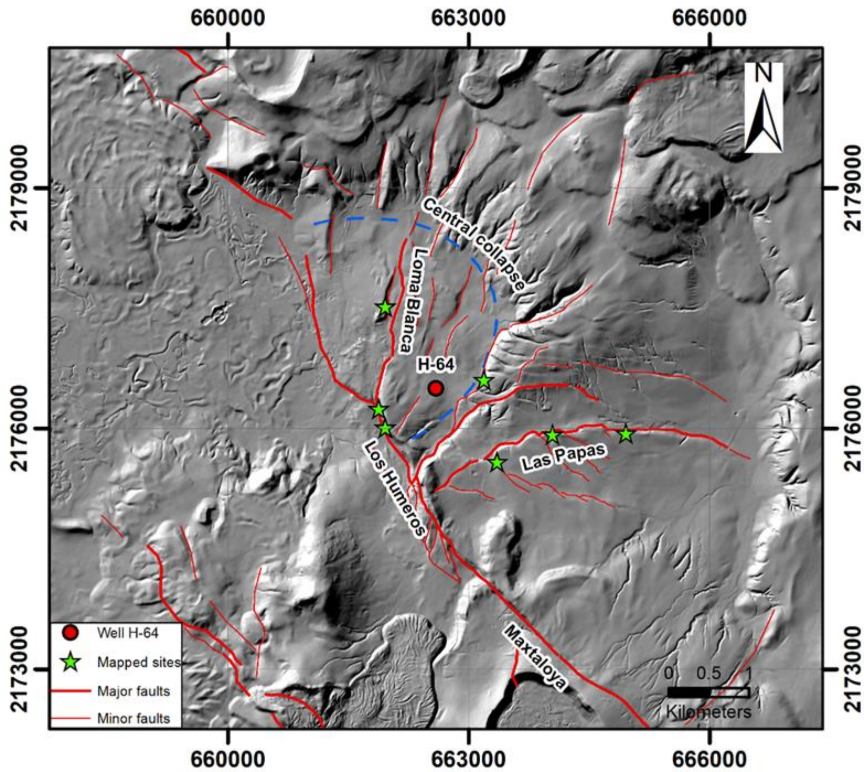

Figure S7. Location of the kinematic indicators collected on the main structures within Los Potreros caldera displayed on a 1 m high-resolution DEM (kindly provided by CeMie-Geo project). See the kinematic indicators associated to these structures in Table S1.

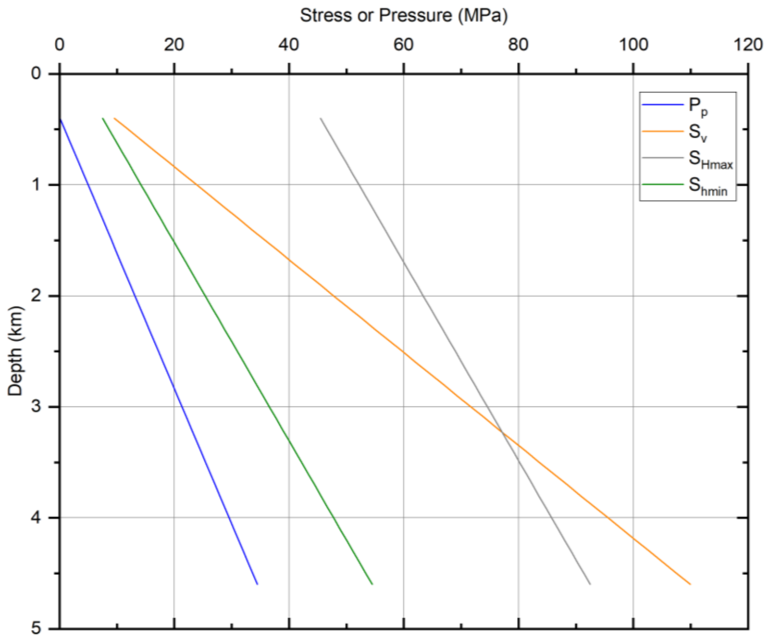

Figure S8. Average total principal stresses and pore pressure with depth in Los Humeros area. A strike-slip to normal faulting regime transition is observed at 3.3 km depth at a P_p of 23.83 MPa.

Table S1. Summarized kinematic indicators collected on dominant normal faulting main structures within the Los Potreros caldera. Average fault dip: 70°.

Locality	**Average azimuth (°)**		**Average dip angle (°)**	
	min.	max.	min.	max.
Los Humeros				
site 1	225	270	55	80
site 2	230	260	52	88
Las Papas				
site 1	35	275	70	78
site 2	225	255	78	78
site 3	5	10	67	70
Central collapse				
site 1	250	270	70	70
Loma Blanca				
site 1	100	125	50	75