Characterization of Atotonilco geothermal area, Veracruz, Mexico

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Session ERE 2.3 Geothermal resources in the framework of climate change and sustainability

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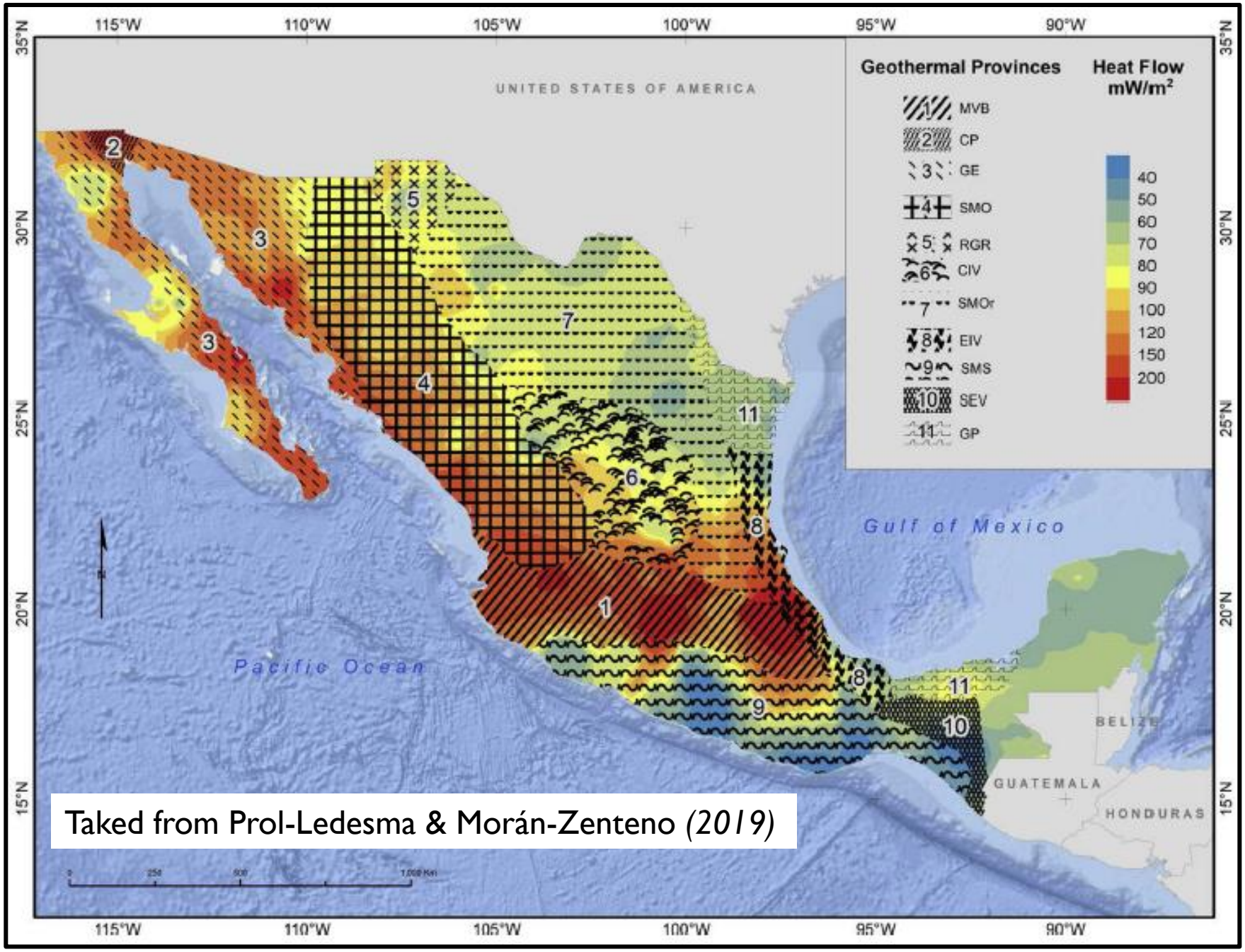
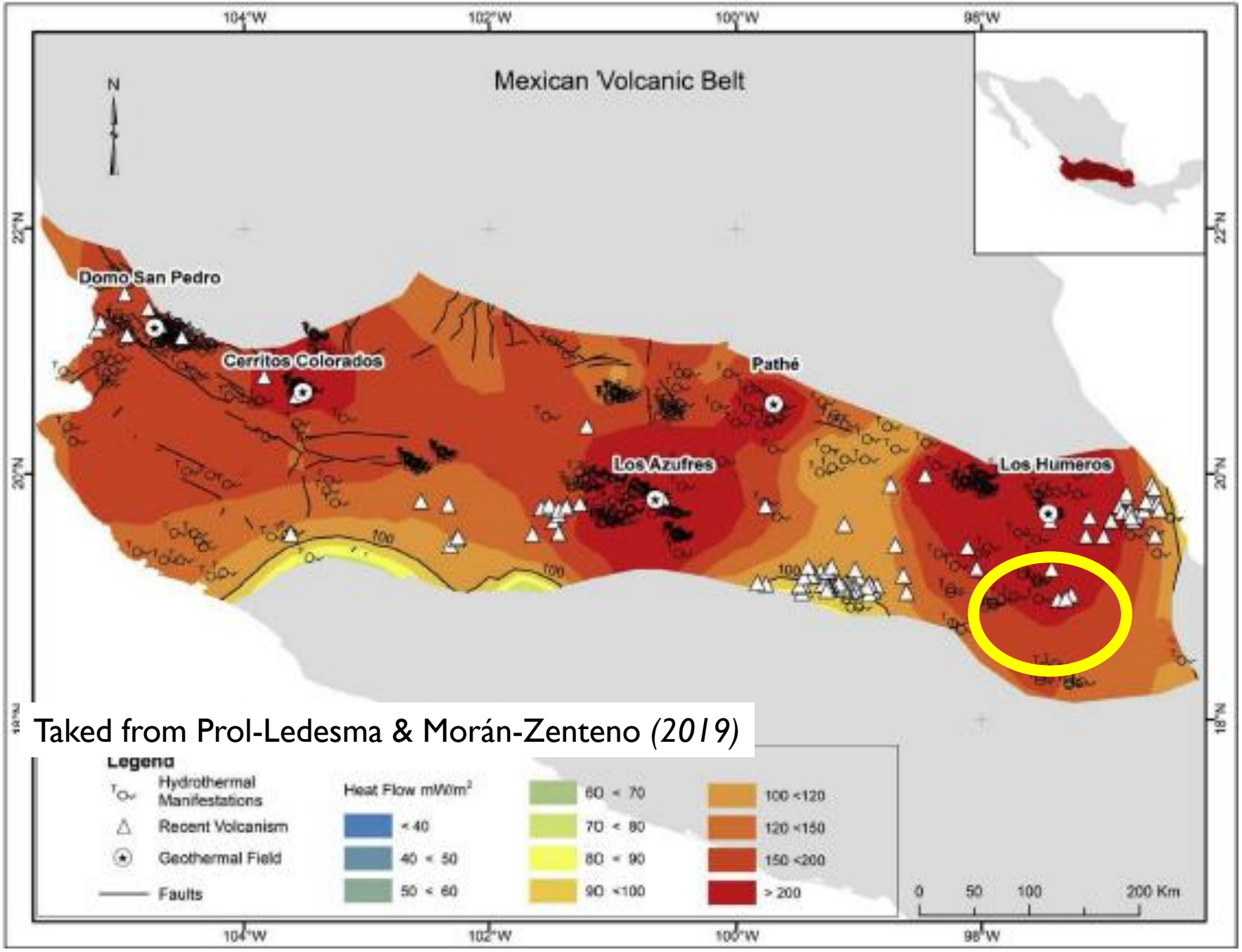


Mexico only have seven Geothermal fields in exploitation, but the high heat flow in the country allow to increase the number of fields

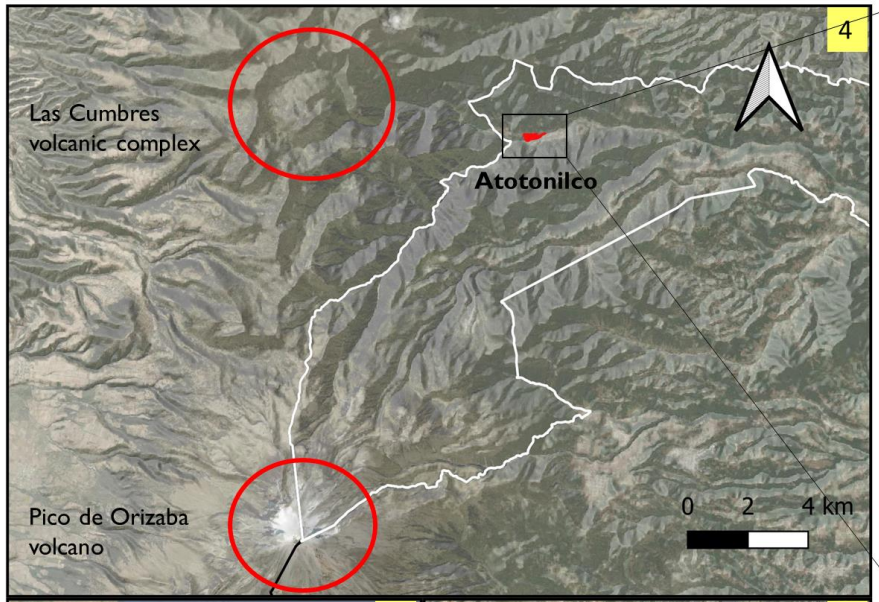


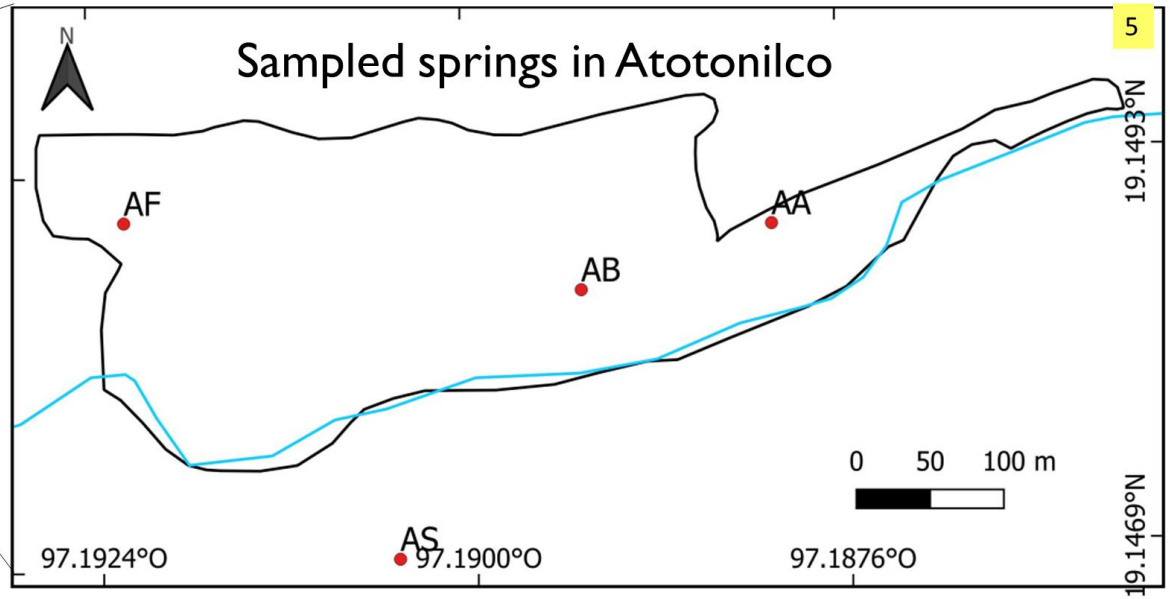
Five of seven geothermal fields are located on the Mexican Volcanic Belt. Heat Flow in the zone becomes higher than 200 mW/m², whilst the world average it's 64.7 mW/m²

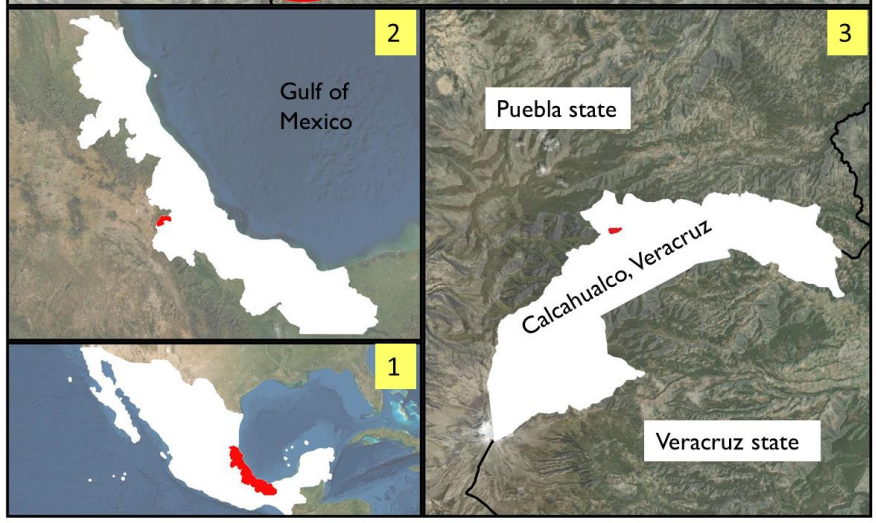
Here the Eastern sector is the least studied

Therefore, all geothermal exploration Works are welcome!

- There are hydrothermal manifestations in Atotonilco, and we need more information from this geothermal area
- Geothermal projects can contribute to clean energies transition.
- Shallow geochemical exploration techniques to characterizate this thermal area





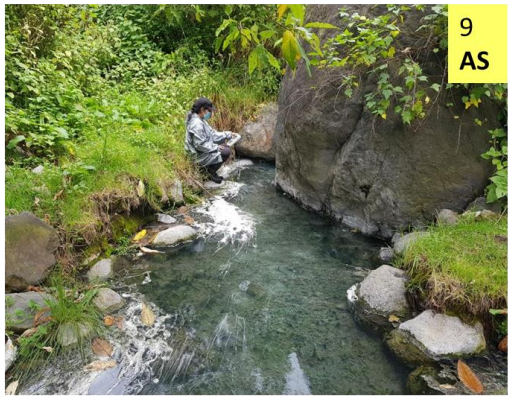


Atotonilco geothermal area

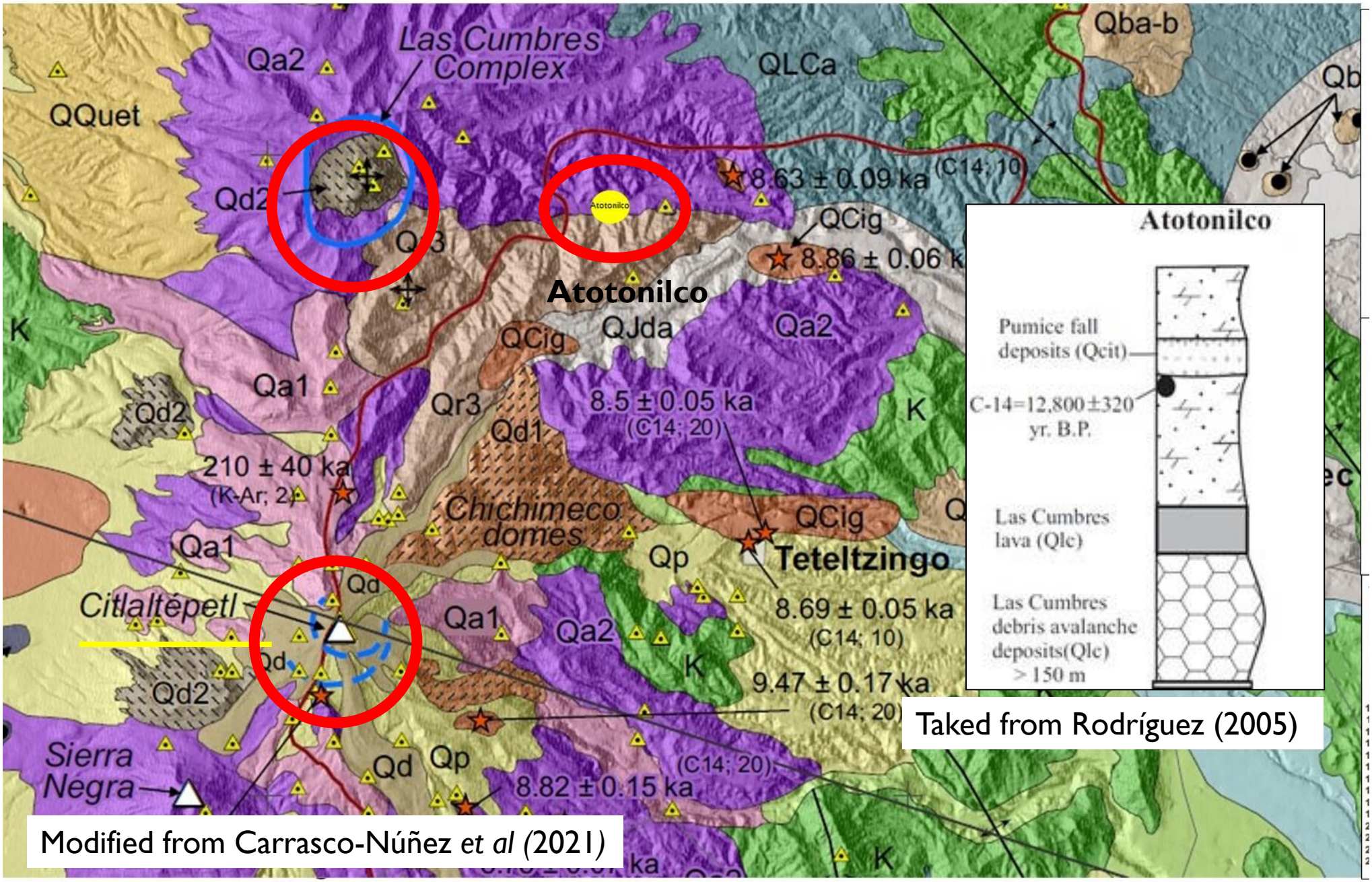
- Rural location in Calcahualco, Veracruz, Mexico
- There is a low-income population
- Temperate wet climate, at 2000 masml

- South-east limit of Eastern sector Trans Mexican Volcanic Belt
- Near Pico de Orizaba and Las Cumbres volcanoes

Satelite images from ESRI (ArcGIS/World_Imagery) and Gaia (INEGI)

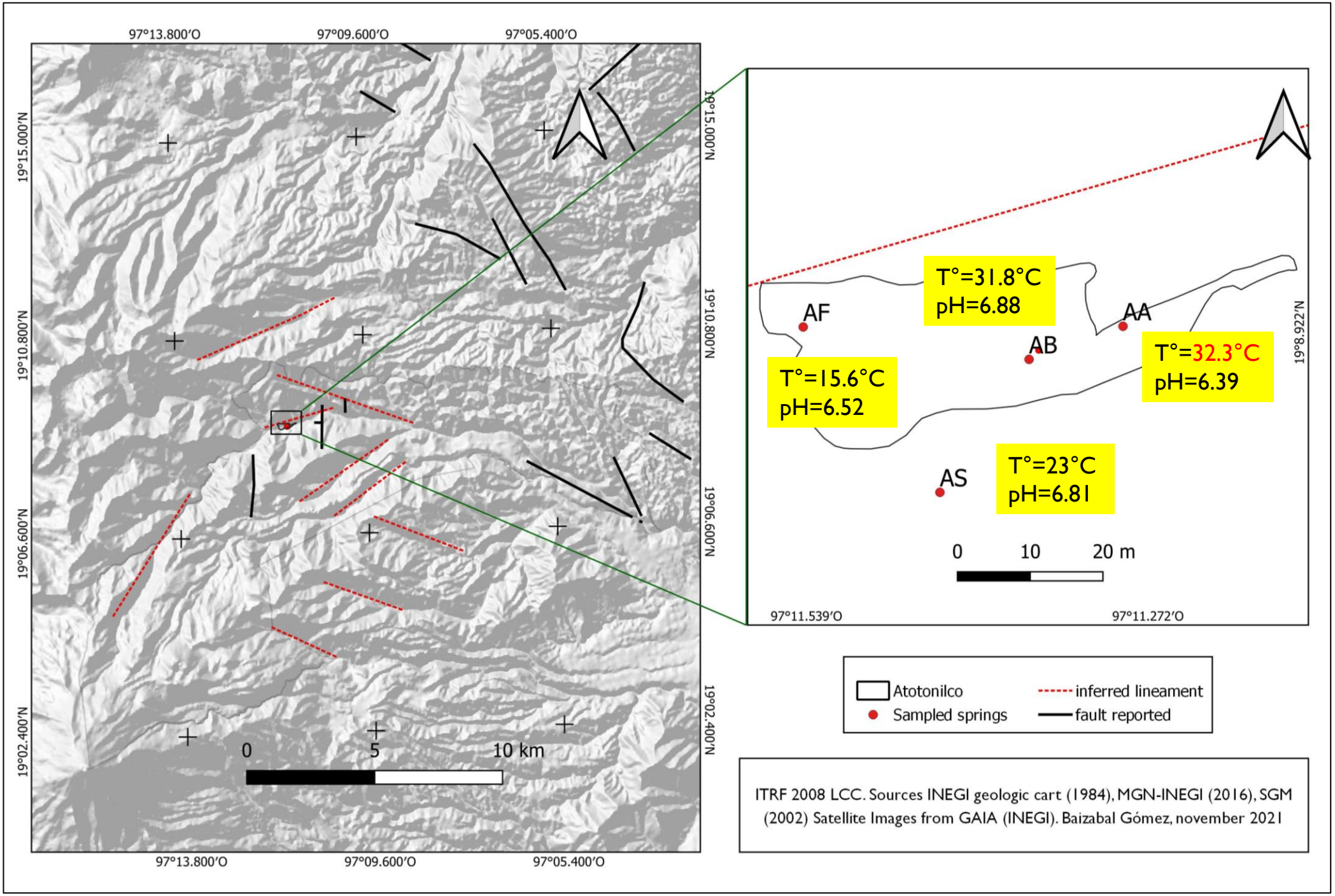


1 Mexico, **2** Veracruz state, **3** Calcahualco municipality, **4** Atotonilco área, **5** Sampled points, **6 - 9** sampled water springs. Photographs by Espinasa-Pereña (2021), during field work.

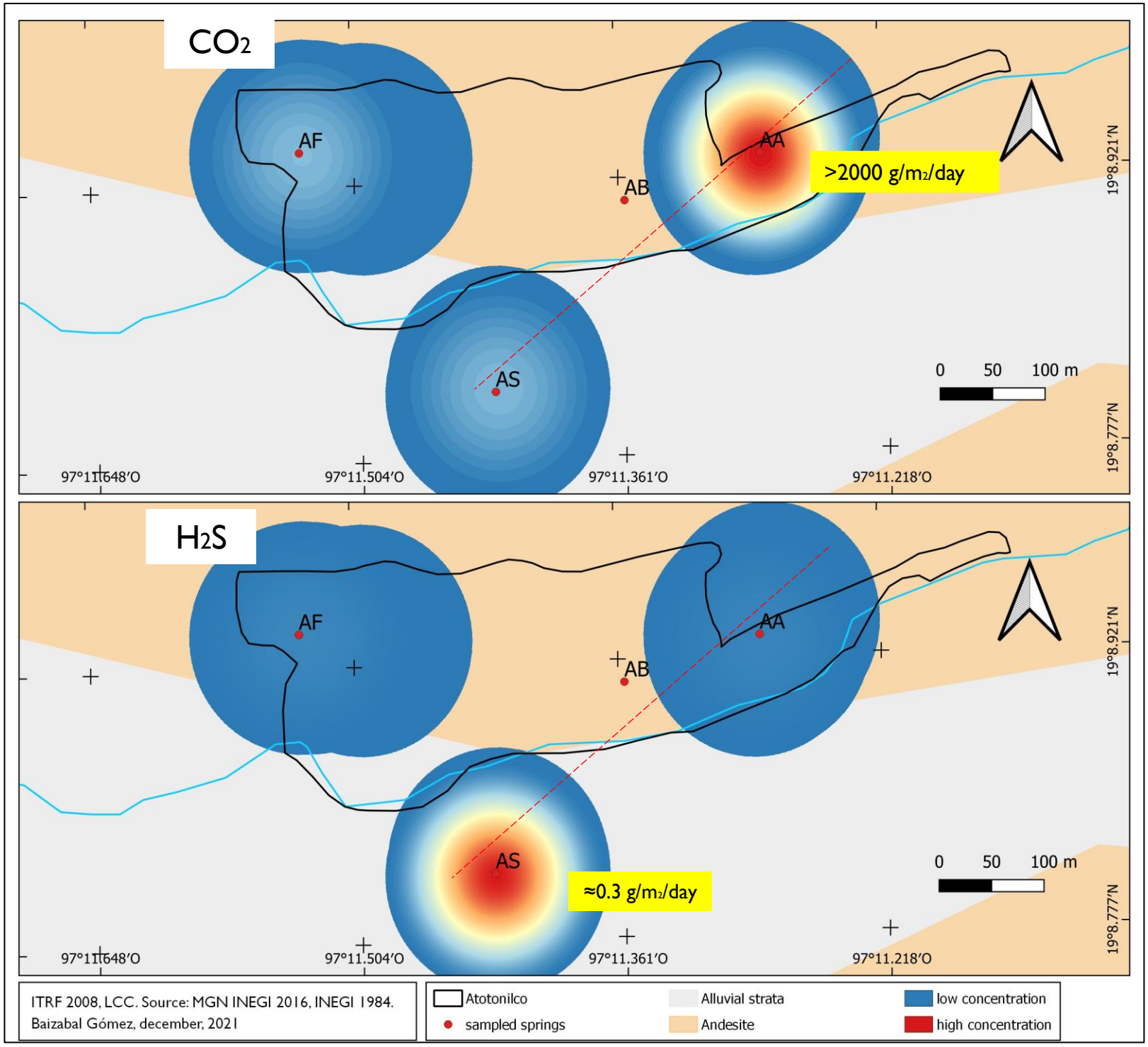


Geology: andesitic and dacites lavas flow, and rhyolitic domes (Carrasco-Núñez *et al*, 2021), and shallow strata are volcanic materials from Pico de Orizaba and Las Cumbres Complex (Rodríguez, 2005).

Lineaments and sampled springs

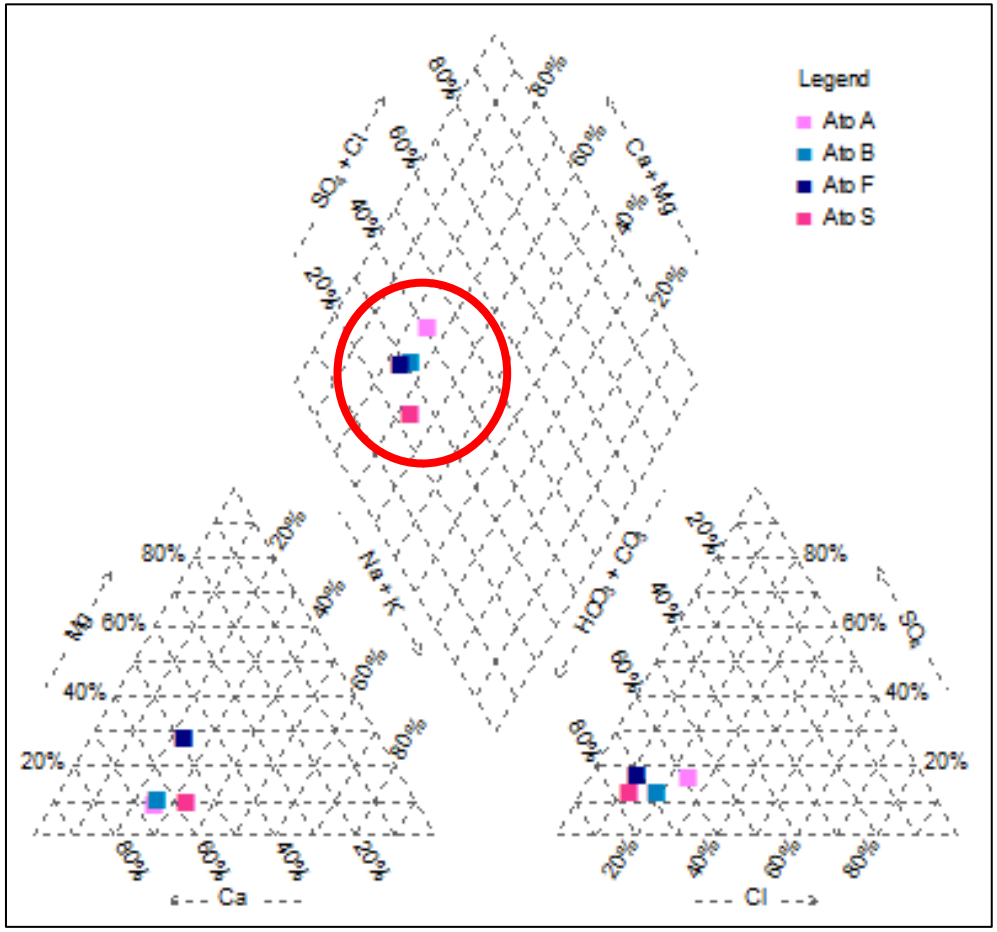


Difusse emissions



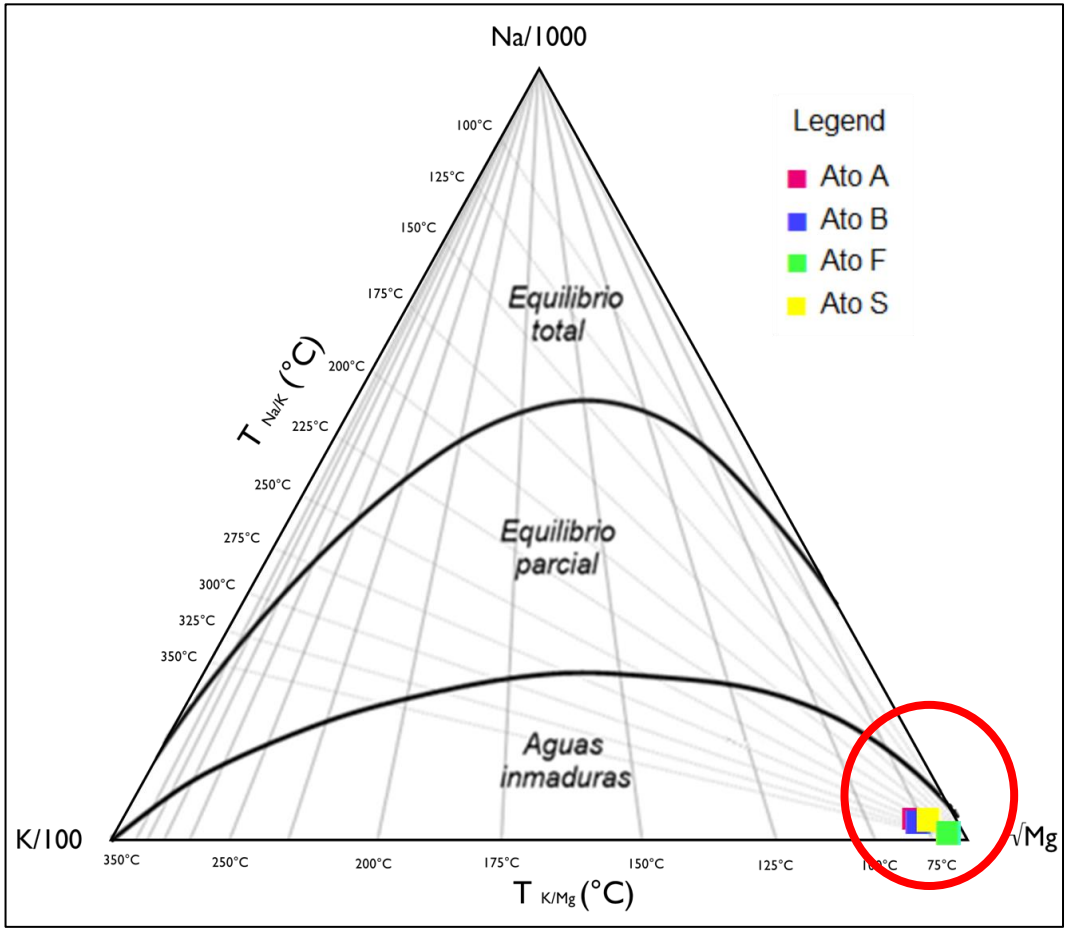
A structural control can facilitate the raising of gases on the northest to southwest lineament, where degassing is higher and the thermic flow associated (principally CO_2), is influencing on thermal springs temperatures

Water composition



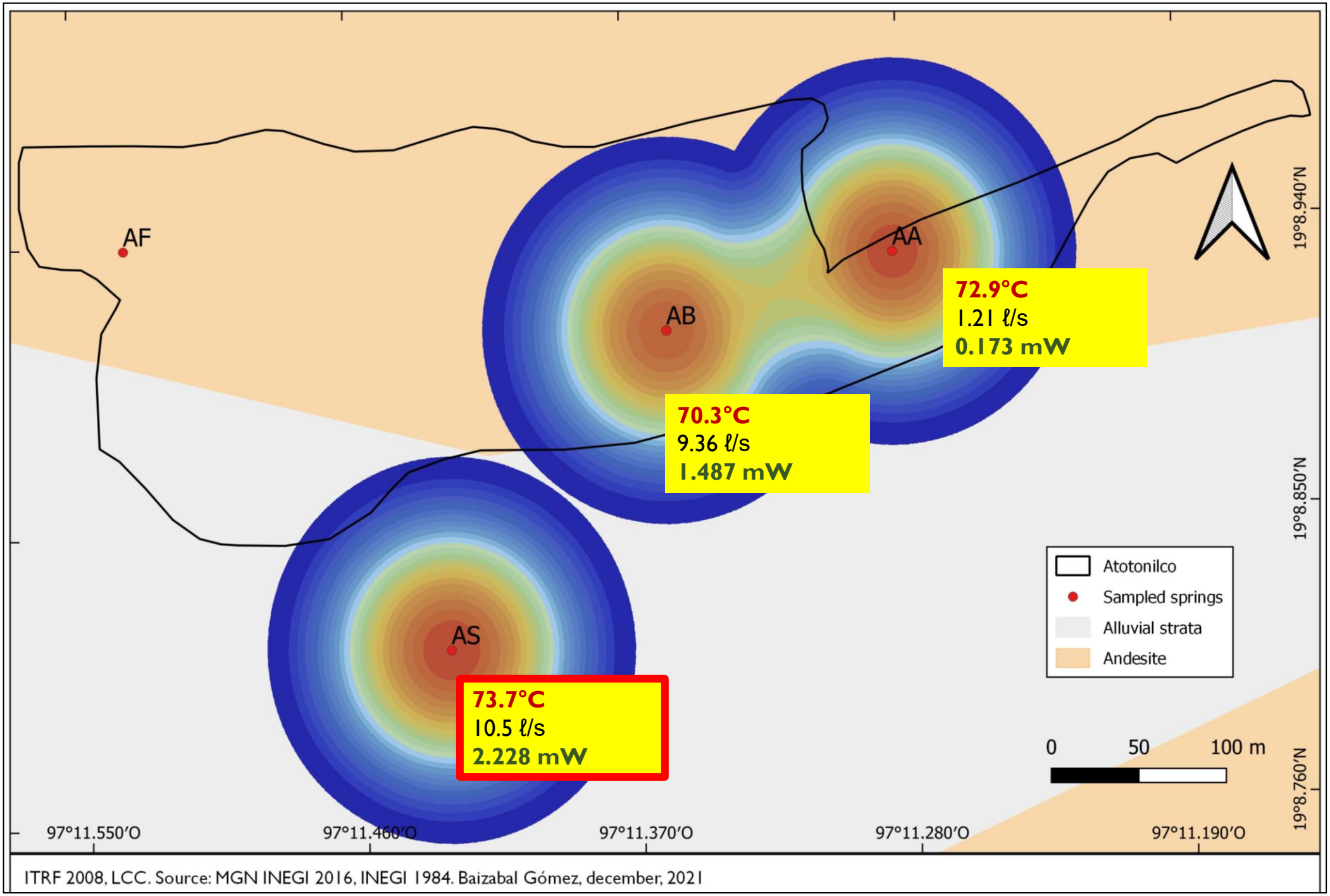
Calcium-carbonate
$Ca(HCO)_3$

Chemical equilibria

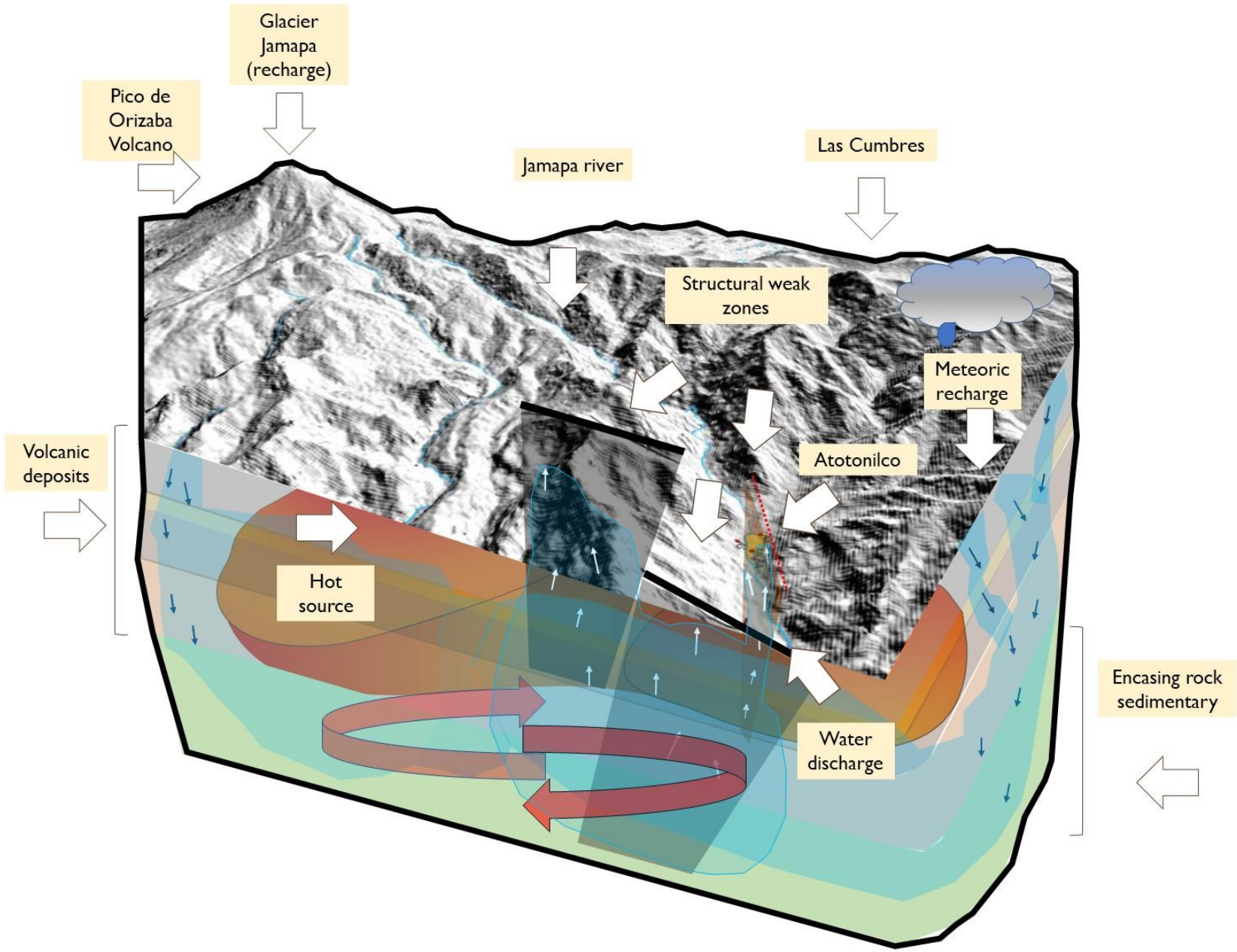


Inmature waters

Geothermometry, flow rates and geothermal potential



Conceptual model



DEM with information from ASF DAAC, 2011

Conclussions

- Calcium-carbonate water thermal springs ($CaHCO_3$)
- Temperature at depth is between 70.3°C and 73.7°C
- Low temperature reservoir

Local applications of geothermal resources

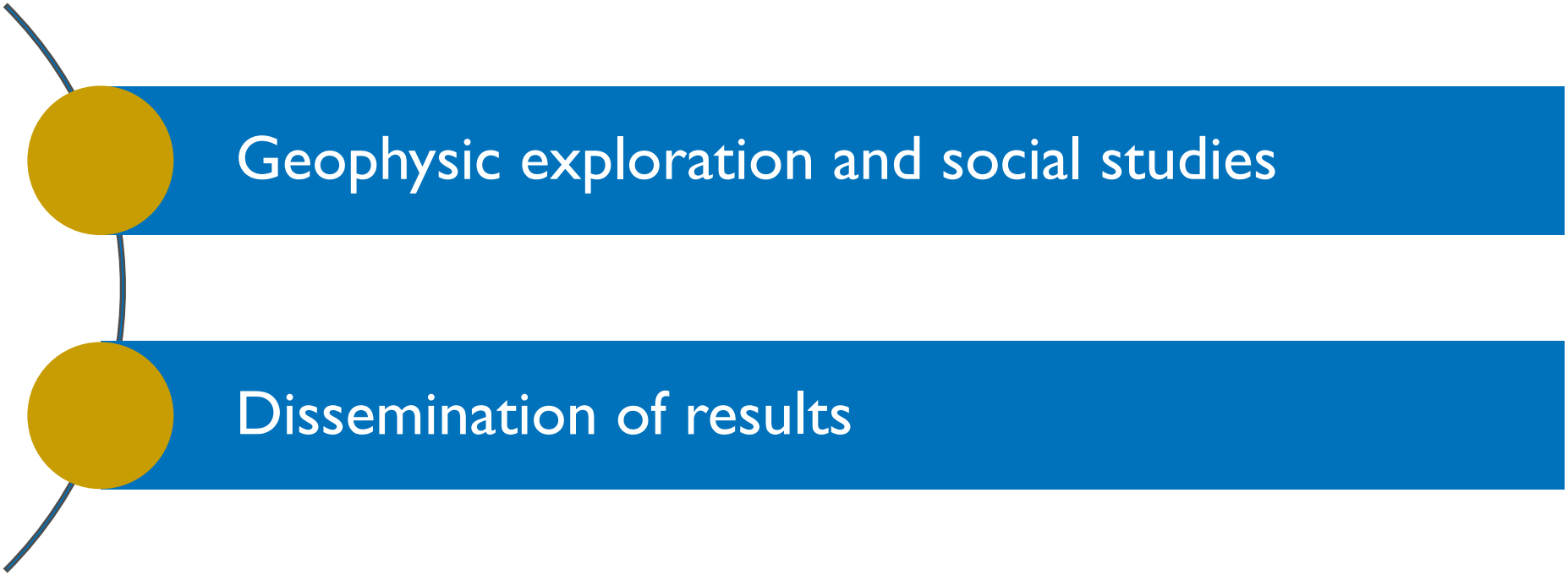
- Urban heating
- Warm water
- Balneology
- Aquaculture
- Dehydrator (corn or peach)

By Espinasa-Pereña (2021)

By Baizabal-Gómez (2021)

Photographs of Atotonilco location

Recomendations



Thank you!

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