

GEOTECHNICAL CHARACTERIZATION AND MAPPING OF TWO EARTH FISSIONS APPEARED IN THE GUADALENTIN VALLEY AFTER THE SEPTEMBER 28TH, 2012 FLOODING



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BACKGROUND

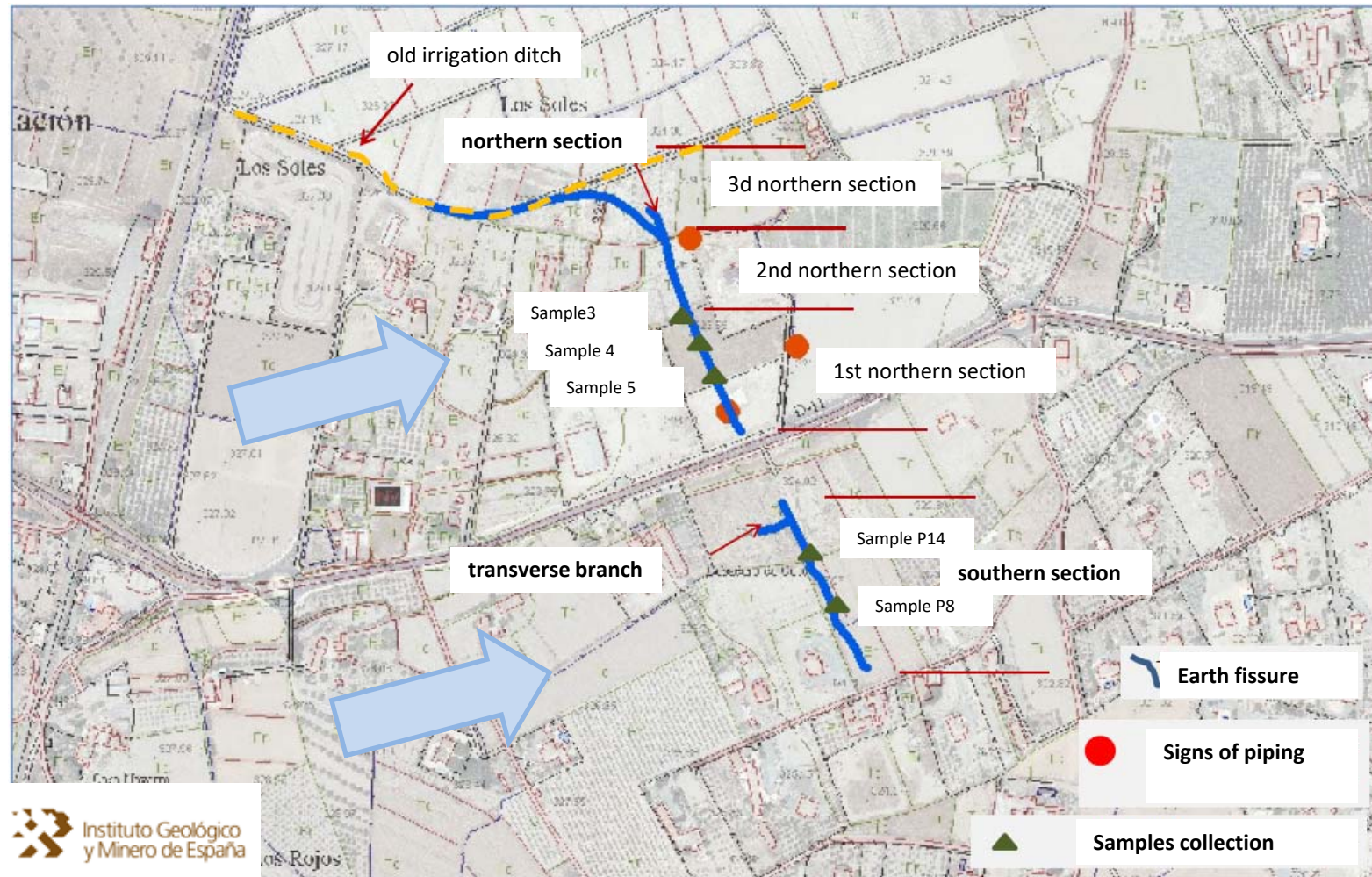
28/09/2012: A flooding devastated Guadalentín Basin (SE Spain) - 212 l/m²:

- 10 deaths
- 11,000 ha coated by mud/debris
- 200 agricultural exploitations destroyed



THE PUERTO LUMBRERAS EARTH FISSURE

- A 400 m long earth fissured appeared



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- Piping processes observed



THE PUERTO LUMBRERAS EARTH FISSURE

5 soil samples collected

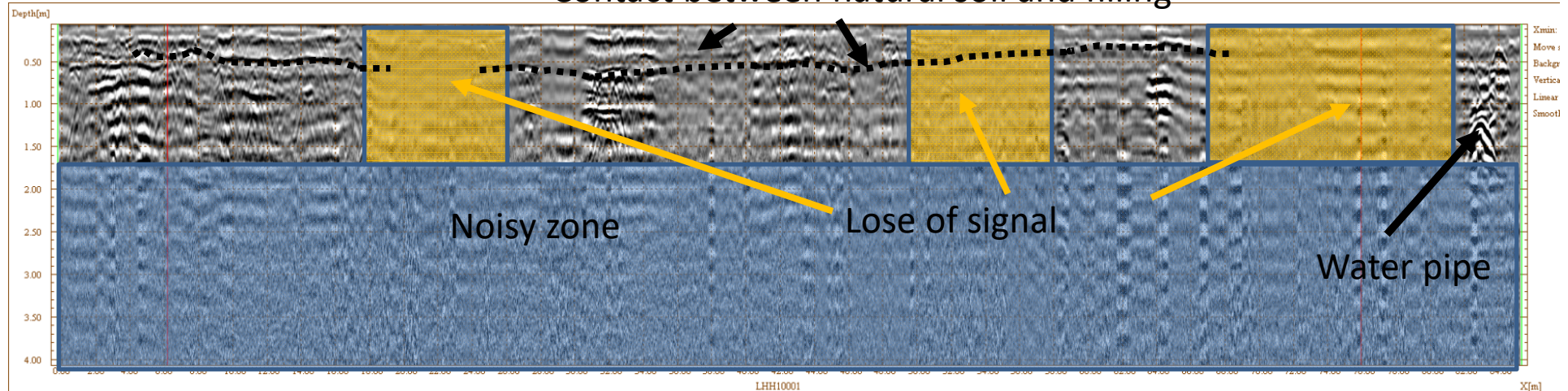
- **Silt (48-68 %), clay (12-30 %), sand (2-40 %)**
- **Plasticity index < 9.2**
- **ML according to USCS**
- **Non expansive**
- **Non collapsible (only one sample medium-high)**
- **pH 7.1-8.7**
- **SO₄⁼ content 0.03-0.20 %**
- **Clay content: mainly illite**
- **Non dispersive (Crumb and Pinhole test)**
- **Sodium Adsorption Ratio (SAR) 0.8-8.8**
- **Exchangeable Sodium Percentage (ESP) 1.9-14.4**

THE PUERTO LUMBRERAS EARTH FISSURE

- **GPR**
(Ground Penetrating Radar)

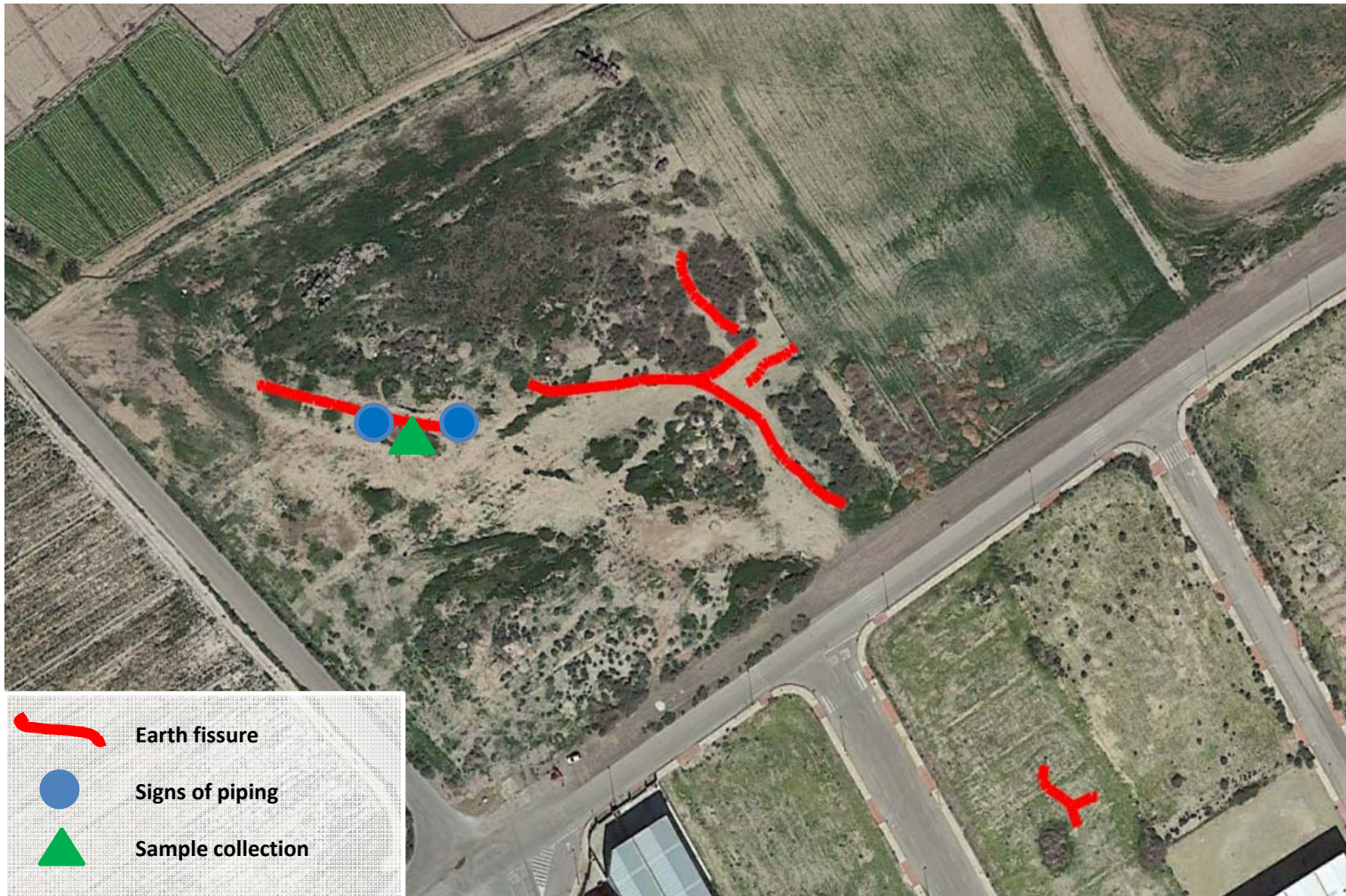


Contact between natural soil and filling

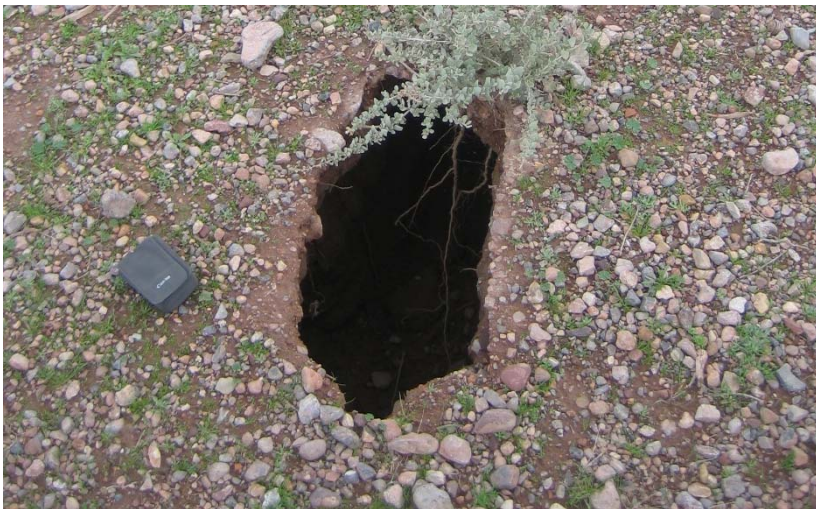


THE TOTANA EARTH FISSURE

- About 200 m long earth fissure appeared



THE TOTANA EARTH FISSURE



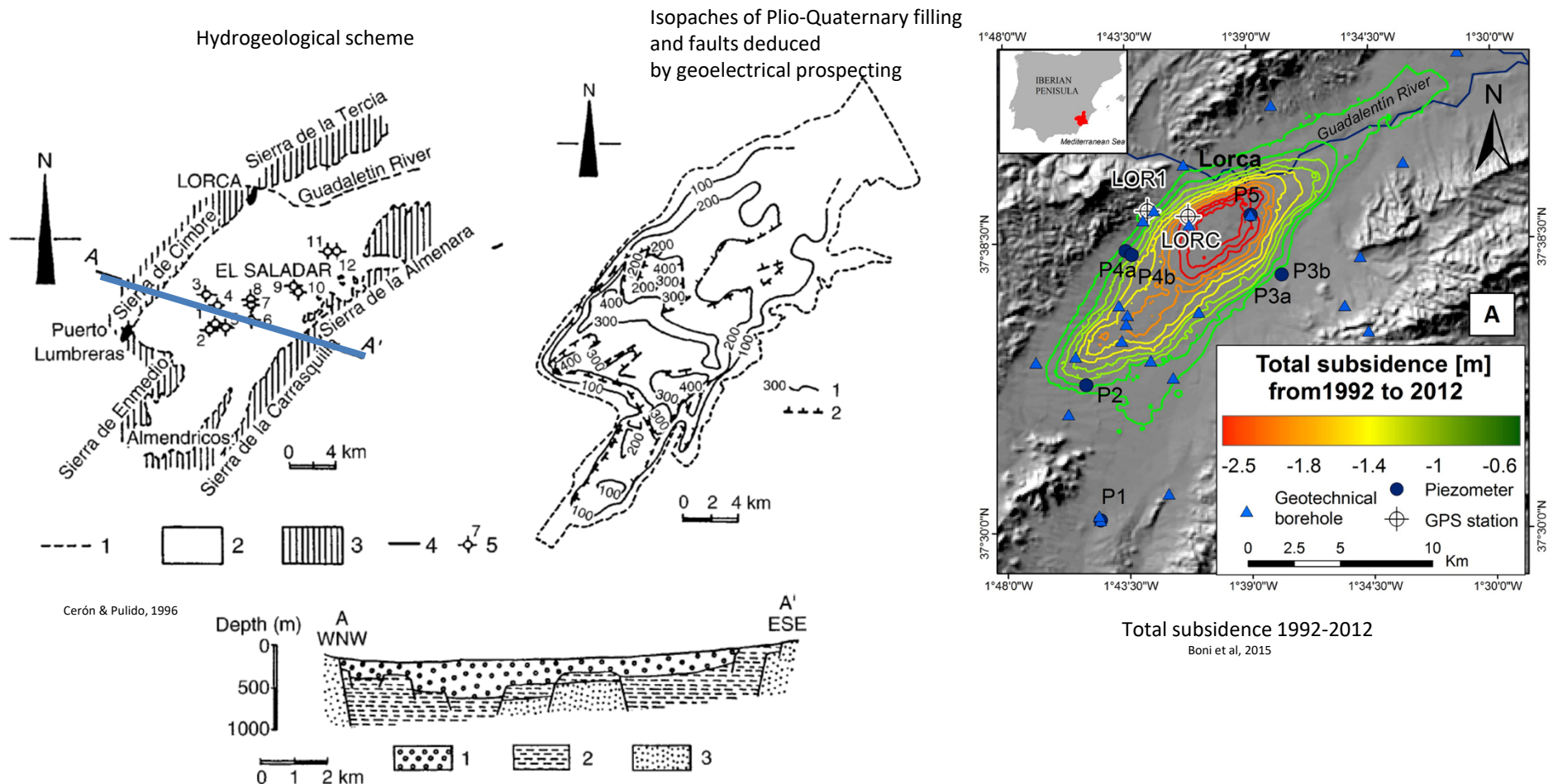
THE TOTANA EARTH FISSURE

- 1 soil sample collected
- Silt 53%, clay 22%, sand 25%)
- $LL = 31.8$ $PI = 8.3$
- ML according to USCS
- Non dispersive (Crumb, D.H. and Pinhole test)

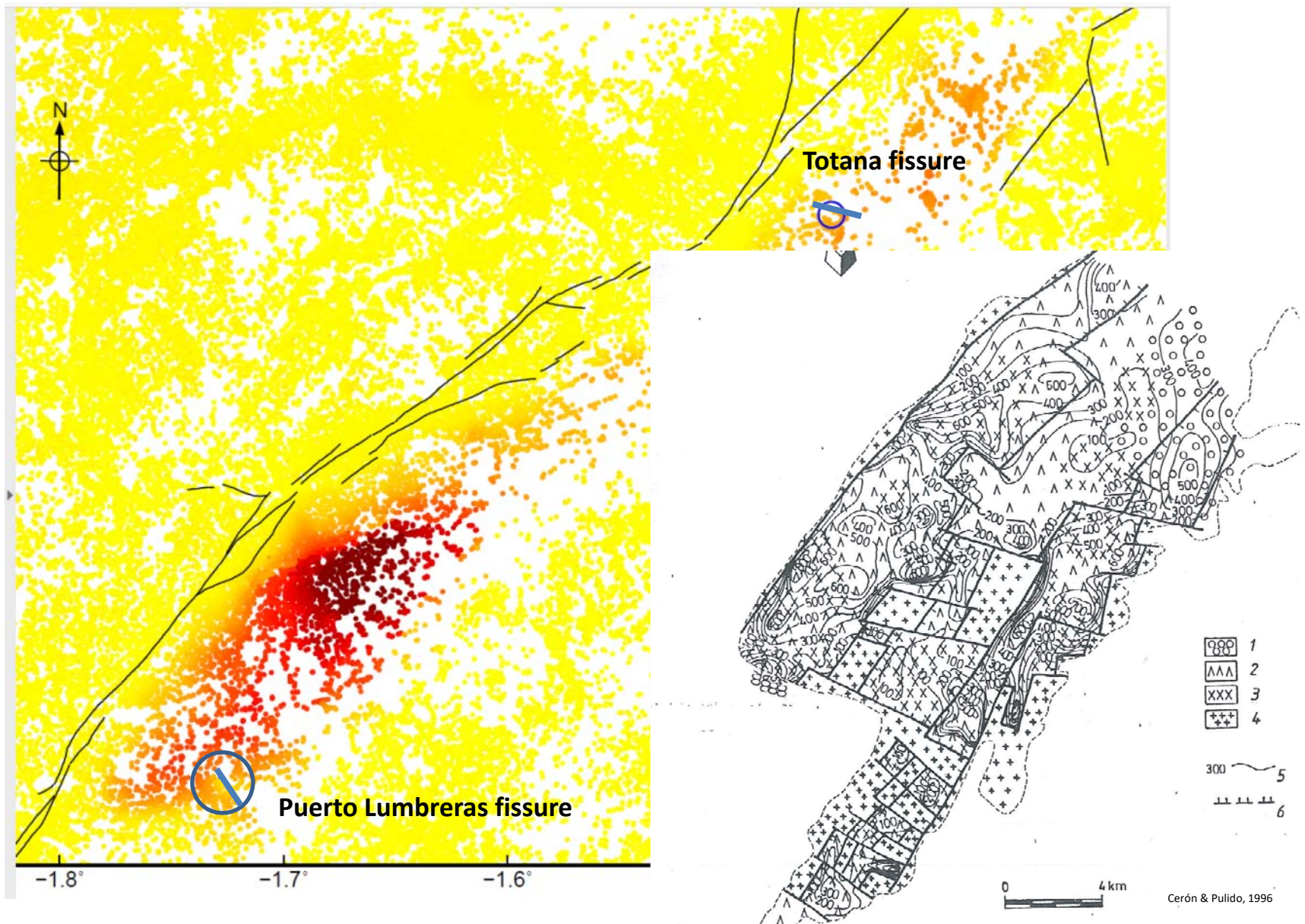


GEOLOGICAL-GEOTECHNICAL SETTING

- Sedimentary basin with Plio-Quaternary sediments up to 400 m depth



GEOLOGICAL-GEOTECHNICAL SETTING



CONCLUSIONS

- First time this phenomenon is studied in Spain
- The fissures appeared after a flooding
- Both fissures were eroded by piping
- Extending research needed (transverse trenches, additional soil sampling and testing, geophysics,...) to understand the origin of the fissures (neotectonic, sedimentary, hydrodynamic, subsidence-induced, anthropogenic or a combination of all/some of them)

CONCLUSIONS

**Any additonal suggestion will be
welcome!**