Excursion field book (26 & 30 septembre 2022)

Paleoseismological investigations of the La Rouvière fault, unexpected source of the 11-11-2019, Mw4.9 Le Teil surface rupturing earthquake (Cévennes fault system, France)


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The Rhône River Valley in France, a densely populated area with many industrial facilities including several nuclear power plants, was shaken on November 11th 2019, by the Mw 4.9 Le Teil earthquake. Field, seismological and interferometric synthetic aperture radar observations indicated that the earthquake occurred at a very shallow focal depth on a southeast-dipping reverse-fault. Evidence of surface rupture up to 15 cm uplift of the hanging wall along a northeast-southwest trending discontinuity with a length of about 5 km have documented (Ritz et al., Commsenv (Nature) 2020). Together, these lines of evidence show that the Oligocene La Rouvière fault was reactivated. These observations raise the question of whether displacement from surface rupture represents a hazard in regions with strong tectonic inheritance and very low strain rates. During this field trip, we will observe some of the 2020 rupture evidences associated with the 2019 Le Teil earthquake, and visit paleoseismological trenches that have been opened along the La Rouvière fault after the earthquake.
Surface ruptures observations

InSAR discontinuities

Site 3: Surface rupture (road)
Site LR6: Surface rupture (road)

Profile P2

1.4 cm

Profile P1

4 cm

Ritz et al., Commserv, 2020
Paleoseismological investigations along the LRF

- Alba F.
- Pontet-de-Couloubre F.
- St-Rémèze- F. (BDFA)
- Escoutay River
- La Rouvière F.
- Bayne-Roche-Renard F.
- Marsanne F. (BDFA)
- Rhône River

Le Teil
Indices de rupture de surface
Discontinuité InSAR
Radiocarbon and OSL dating of the colluvium bulk matrix (periglacial screes / heads)
Preliminary interpretation: at least 1 surface rupturing event between 13570 and 3300 years.
**Penultimate event**

2019

**Preliminary interpretation:**

Possible surface-rupturing event (the thick black line corresponds to the ground surface at the time of the earthquake) on the northern part of the central segment of the Rouvière fault between 1474 and 1649 AD.

Could it correspond to the Montélimar 1549 AD historic earthquake?