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Analyzing the paleoseismic history of the La Rouvière Fault (LRF) unexpected source of the 11-11-19, Mw4.9 Le Teil surface rupturing earthquake (Cévennes FS, France)

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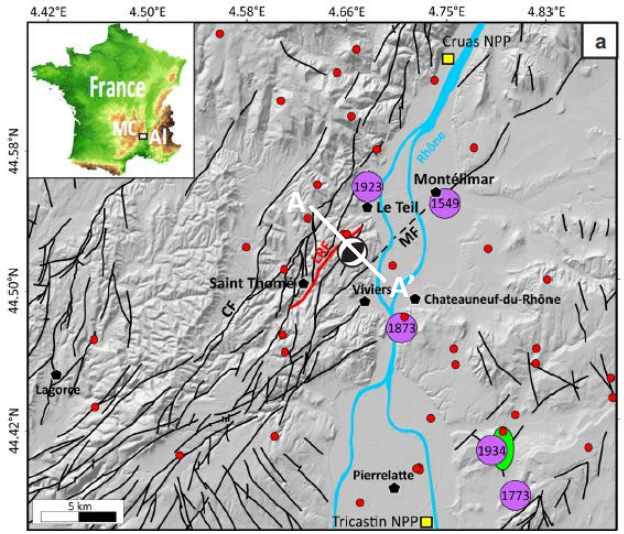
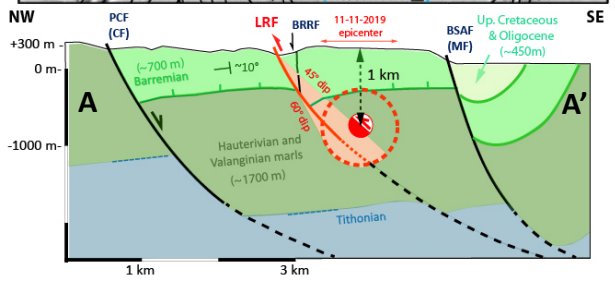
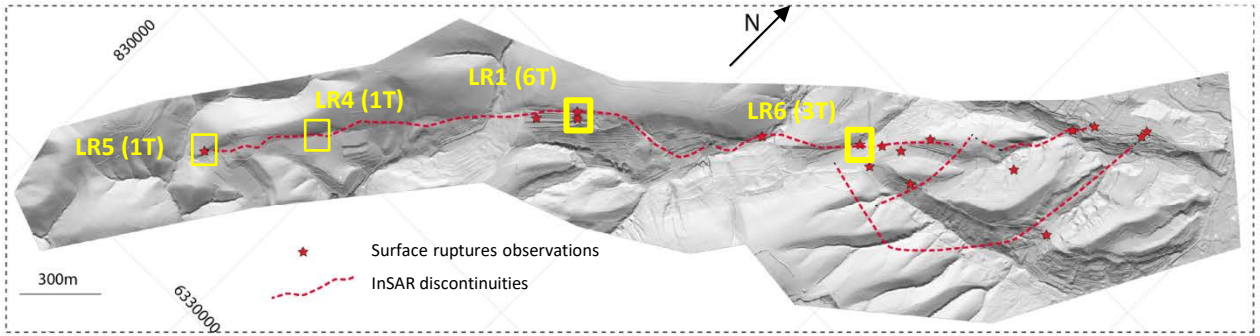
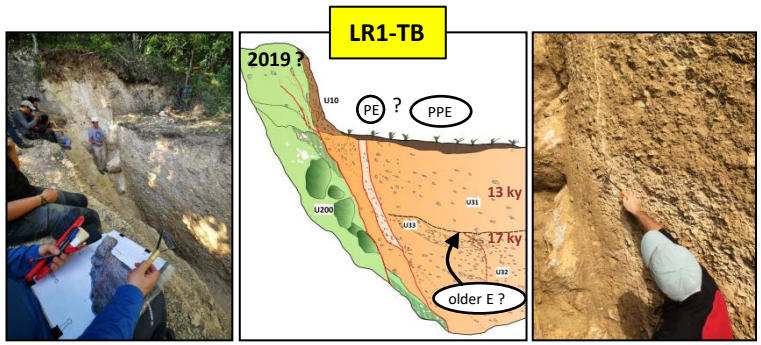
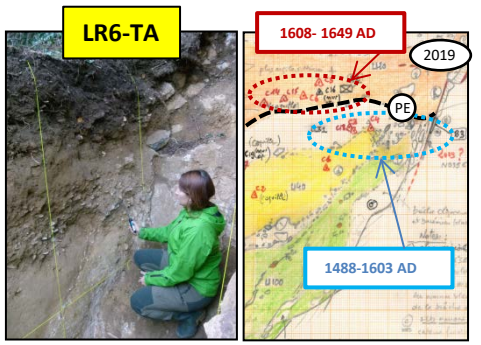






The 11-11-2019 Le Teil earthquake (Mw4.9), located in the Rhône river valley (France) occurred along the La Rouvière fault (LRF) within the NE termination of the Cévennes faults system (CFS). This very shallow (~1km) moderate magnitude and reverse-faulting event inverted an Oligocene normal fault which was not assessed to be potentially active, causing surface rupture and strong ground shaking (Ritz et al., Commsenv 2020; Causse et al., Commsenv 2021). We launched paleoseismic investigations along the LRF to analyze, whether the fault was reactivated for the first time since the Oligocene, or if it had broken the surface before, during the Quaternary.





11 trenches were dug along the section that broke in 2019. Five trenches yielded favorable Quaternary deposits (slope colluvium and eolian deposits) to document past-coseismic deformations. The radiocarbon and OSL dates within 2 trenches (LR1 and LR4) suggest that at least one event prior 2019, and maybe, more occurred in the past 17 Ka. The radiocarbon dates within trench LR6 suggests that the penultimate event occurred between the end of the 15th century and the beginning of the 17th century with kinematic characteristics (sense of movement, amount of displacement) similar to the 2019 event. The fact that these events are not preserved in the morphology is explained by the small amount of displacement and a long return period, consistent with the low strain rate (0.5–1.0 x 10^{-9} yrs^{-1}) measured by GPS in this region (i.e. Masson et al., Solid Earth 2019).

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