HAL
open science

Paleoseismological investigations of the La Rouvière fault, unexpected source of the 11-11-2019, Mw 4.9 Le Teil surface rupturing earthquake (Cévennes fault system, France)

Jean-François Ritz, Stéphane Baize, Estelle Hannouz, Magali Riesner, Nicolas Cathelin, Camille Thomasset, Matthieu Ferry, Laurent Bollinger, Christophe Larroque, Laurence Audin, et al.

To cite this version:

Jean-François Ritz, Stéphane Baize, Estelle Hannouz, Magali Riesner, Nicolas Cathelin, et al.. Paleoseismological investigations of the La Rouvière fault, unexpected source of the 11-11-2019, Mw 4.9 Le Teil surface rupturing earthquake (Cévennes fault system, France). Colloque AFEQ - Quaternaire 13, Mar 2022, Strasbourg (67000), France. hal-03609922

HAL Id: hal-03609922

https://hal.science/hal-03609922

Submitted on 16 Mar 2022

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

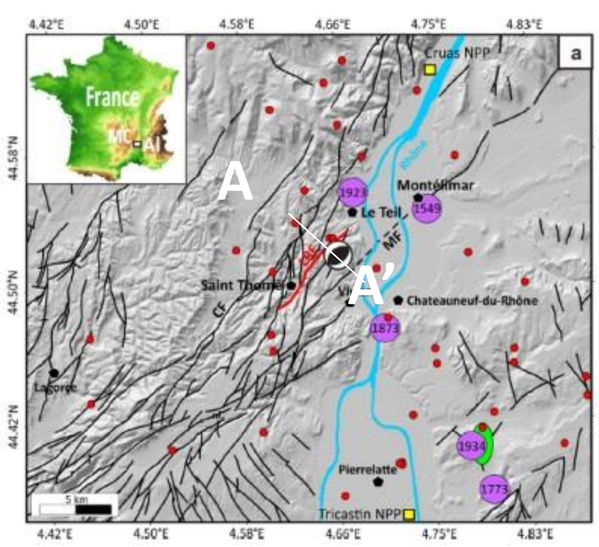
Colloque AFEQ – Quaternaire 13 (Strasbourg, 14-18 Mars 2022)

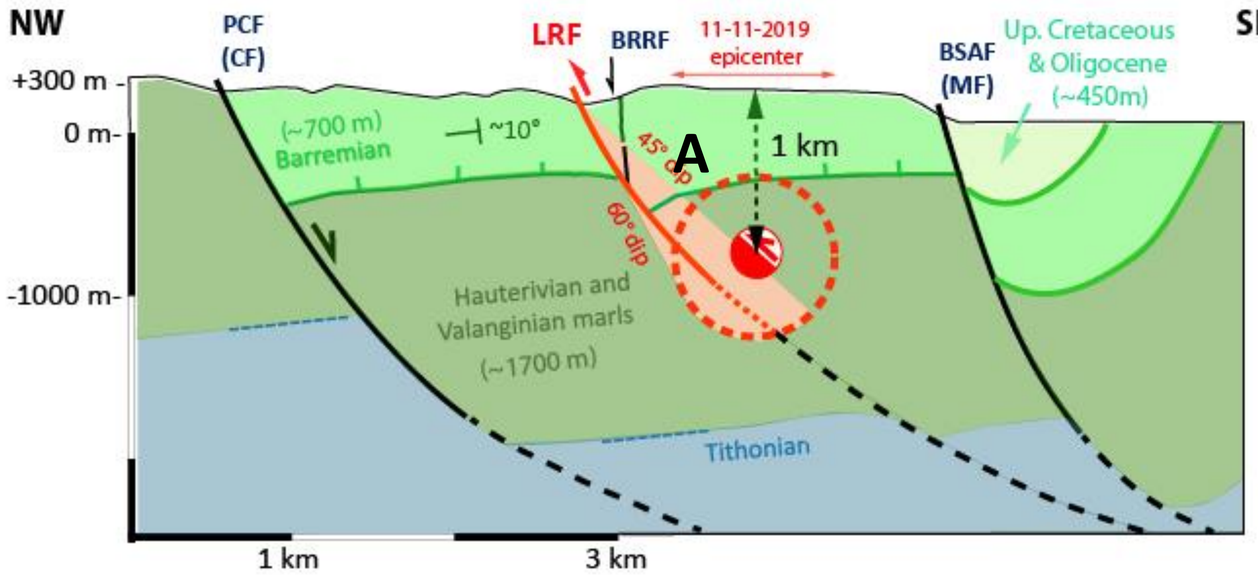
Projet « FREMTEIL » : INSU / Axe de recherche «Failles Actives France» -

Paleoseismological investigations of the La Rouvière fault, unexpected source of the 11-11-2019, *Mw* 4.9 Le Teil surface rupturing earthquake (Cévennes fault system, France)

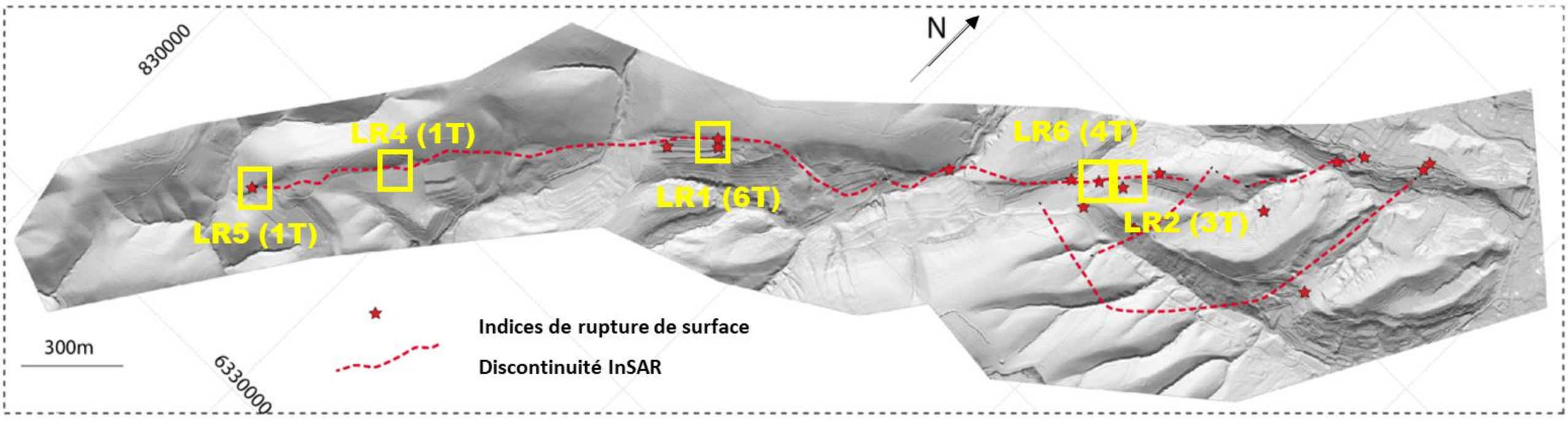
J-F. Ritz [1], S. Baize [2], E. Hannouz [3], M. Riesner [4,7], N. Cathelin [1,2], C. Thomasset [1,6], M. Ferry [1], L. Bollinger [4], C. Larroque [5], L. Audin [3], K. Manchuel [6], M. Rizza [7], H. Jomard [2], C. Sue [3], P. Arroucau [6], R. Le Roux-Mallouf [6]

(1) Géosciences Montpellier (2) IRSN, Fontenay-aux-Roses (3) ISTerre , Grenoble (4) CEA, Bruyères-le-Chatel (5) Géoazur, Nice–Sophia-Antipolis (6) EDF, Aix-en-Provence (7) CEREGE, Aix-en-Provence

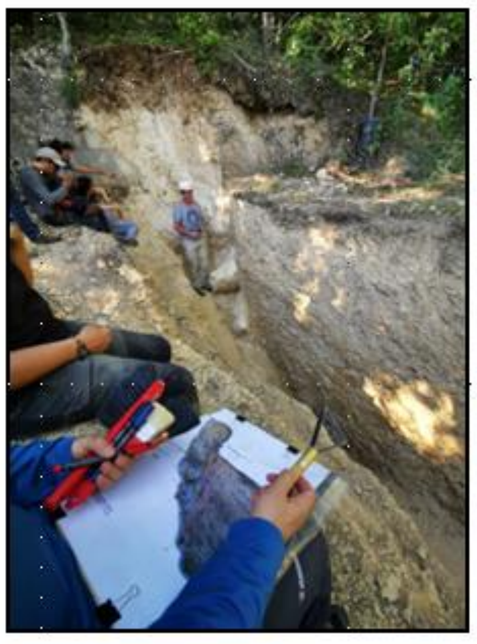


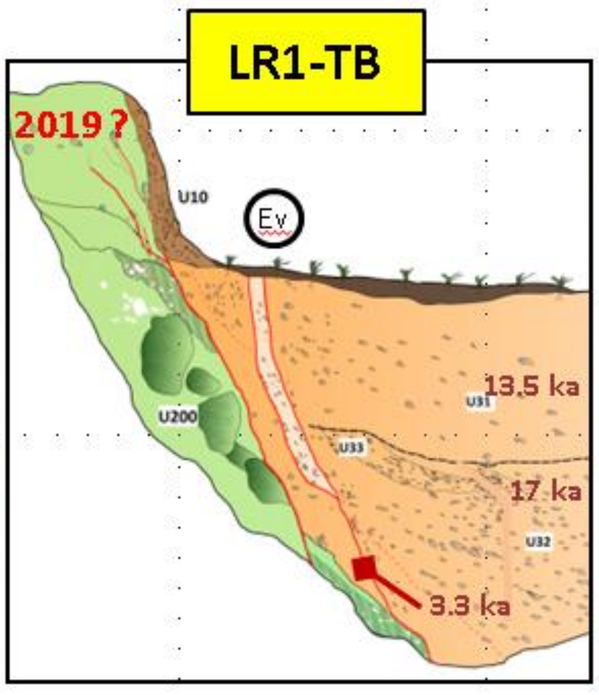


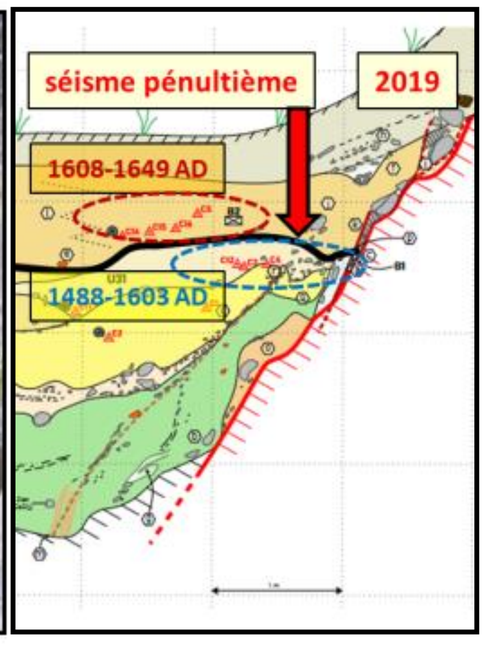
The 11-11-2019 **Le Teil earthquake (Mw4.9)**, located in the Rhône river valley occurred along the **La Rouvière fault (LRF)** within the NE termination of the **Cévennes faults system (CFS)**. This very shallow moderate magnitude and reverse-faulting event inverted an Oligocene normal fault which was not assessed to be potentially active, causing surface rupture and strong ground shaking. Its morphology shows **no evidence of cumulative reverse faulting during the Quaternary**. These observations lead to the question whether the fault was reactivated for the first time since the Oligocene during the Teil earthquake, or if it had broken the surface before, during the Quaternary period, but could not be detected in the morphology.



To answer this question, we carried out **paleoseismic investigations along the LRF to analyze and characterize evidences of paleo-ruptures** in Quaternary deposits. 15 trenches were dug along the section that broke in 2019. Several trenches yielded favorable Quaternary deposits (slope colluvium and eolian deposits) lying against the ancient LRF normal fault mirror carved in the Barremian limestones to document past coseismic deformations. The radiocarbon and OSL dates (from "bulks" collected into colluvium clayey-silty matrices) within 3 trenches located in the central and southern parts of the LRF suggest that **at least one event prior 2019, occurred between 13.5 and 3.3 Ka**. The radiocarbon dates within a trench located in the northern part of the 2019 rupture and dug in younger deposits suggests that a **penultimate event occurred between the end of the 15th century and the beginning of the 17th century** with kinematic characteristics similar to the 2019 event (sense of movement, amount of displacement). This work shows that it is therefore fundamental to carry out more detailed paleoseismological investigations in metropolitan France. Further investigations will now be carried out within the other branches and fault segments of the CFS.







(Acknowledgments: This study was supported by the INSU-CNRS, IRSN, CEA and acad. laboratories. We also thank the landowners (C & V. Ronjon, S. Vierne, W. Théron, Mr Soubayrand and Q Neigre) who authorized us opening trenches)