

C O L L È G E DE FRANCE CNIS

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https://thegateproject.cerege.fr/



#### GATE : Breakthroughs in Quaternary Geochronology to fill in a key gap of knowledge in Active Tectonics.

We propose to develop complementary approaches to accurately date seismic-related late-Quaternary morphological surfaces related to through an exhaustive, detailed and unique direct comparison of TCN and OSL dating methods, which are often in disagreement.





# **OSL** settings

As previous works have shown the difficulties of OSL dating in Taiwan, particular attention has been paid to luminescence characteristics of quartz and potential dosimetry issues.





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# Alluvial terraces in Western Foothills

120.6° E

Topographic profile (next slide)

CS2-S1

Jhushan terrace

▲ alt. 60 m

CHELUNGPU FAULY

r. 440 m

HANGHUA FAUL

23.8°N

0500

CHUSHIANG THRUST

23.8

120.6°

🔺 alt. 1100 m

The Choshuei tableland

Our study case is located in Western Foothills of Central Taiwan, south of the Choushui River.

24°N

There, slip on the Changhua blind thrust fault has caused the eastward tilt of a wide flight of fluvial terraces but slip rates on frontal faults are still debated due to large epistemic uncertainties in dating alluvial surfaces with OSL and TCN methods.



# Alluvial terraces in Western Foothills

Previous geochronological works done in the area



Taking advantage of a natural exposure, we collected 10 samples for <sup>10</sup>Be dating complemented by 14 OSL samples along a 7m-depth profile.



Stratigraphy and sampling strategy





# **TCN** Results and interpretation



The depth distribution of <sup>10</sup>Be concentrations show a complex depositional history with at least two depositional sequences, modelled to be older than ~38.7 ka and ~50 ka.

For more details in TCN modelling see methodology described in Fig. 8 from Rizza et al. (2019) DOI: 10.1029/2018TC005188



### Dose rate determination

In-situ measurements made with a portable gamma spectrometer (not for OSL 1 to 3)



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#### Dose rate determination



Lebrun et al., in prep

Measurements are made in a new OSL lab at CEREGE, Aix-en-Provence, France.





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#### Components study : fast ratio investigations

OSL signal consists of three components: a fast, a medium and a slow one... Our deepest samples present a signal with medium and slow components, characteristics not seen in upper samples.



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# **Results and interpretation**



## **Results and interpretation**

This study shows that it is informative to have an exhaustive, detailed, and direct comparison between dating methods on a single depth profile and allow a more detailed understanding of processes affecting alluvial deposits ... with a more complex history than expected : 4 stratigraphic units and possible changes in the primary sources of the sands.



## Perspectives

1) Dating our other OSL samples (in progress)

2) Overcome OSL signal difficulties of lower unit



Look for high saturating quartz : the super-grain technique



use small sized grain



Investigate De distributions (single-grain)



take advantage of new OSL signals (TT-OSL, VSL)



make use of k-feldspars (IRSL)



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