1) Motivation and Aims: Unlocking a tectonic and climatic archive

River strath terraces form as a river switches between aggrading sediments and incision. Unlocking this archive of tectonic and climatic history requires strong age control

Conglomerates pose challenges to dose rate determination and sampling techniques. Experimental pebble and bedrock OSL provide potential insight into terrace formation

2) The Mgoun study catchment

On the southern High Atlas, river like the Mgoun cross an active thrust front (Boulton et al. 2014). A dryland climate next to the Sahara controls river dynamics

Source rocks are predominantly carbonates, with low concentrations of quartz and feldspar in terrace sediments. Coarse conglomerates are typical for fluvial sediments in high relief landscapes

3) Methods

Lab: OSL and IRSL on sand from sand samples and sand from conglomerate samples. OSL/IRSL tests on chips from pebbles/ bedrock sliced cores (profiling)

4) Terraces and Material:

T50

145±46 kya

Sand layer

T50

205±51 kya

Sand lens

T10

163±46 kya

Conglomerate sample

Bedrock OSL

T50

0 m vertical height to modern river

T10

5 m vertical height to modern river

Conglomerate sample

Bedrock depth profile

Surface inside

No significant strath surface bleaching signal

Bedrock profile

127±10 kya

5) Quartz and feldspar signals: saturation limit?

Feldspar

Quartz

Dose rates for sand and conglomerates are 0.7±0.1 and 1.24±0.09 Gy/kyr respectively. Feldspar is needed for the higher terraces.

6) Pebble OSL: which lithology?

7) How/when do terraces form?

Nearby sparse OSL dates suggest incision and aggradation occur on interglacial and glacial timescales. Our dates agree and have the potential to constrain at which stage in a cycle these processes occur and to resolve tectonic waves of incision

6) Conclusions

- 10 - 50 m level terraces span 100-200 ka and supply insight into glacial-interglacial cycles of incision and aggradation
- Red sandstone pebbles can be used for pebble OSL
- Bedrock profiles indicate limited bleaching or subsequent removal of the strath surface