

^{36}Cl exposure dating of post-glacial
deposits along the Mt Vettore Fault
(Central Apennines, Italy)
**constraining fault slip rate and
local deglaciation stages.**

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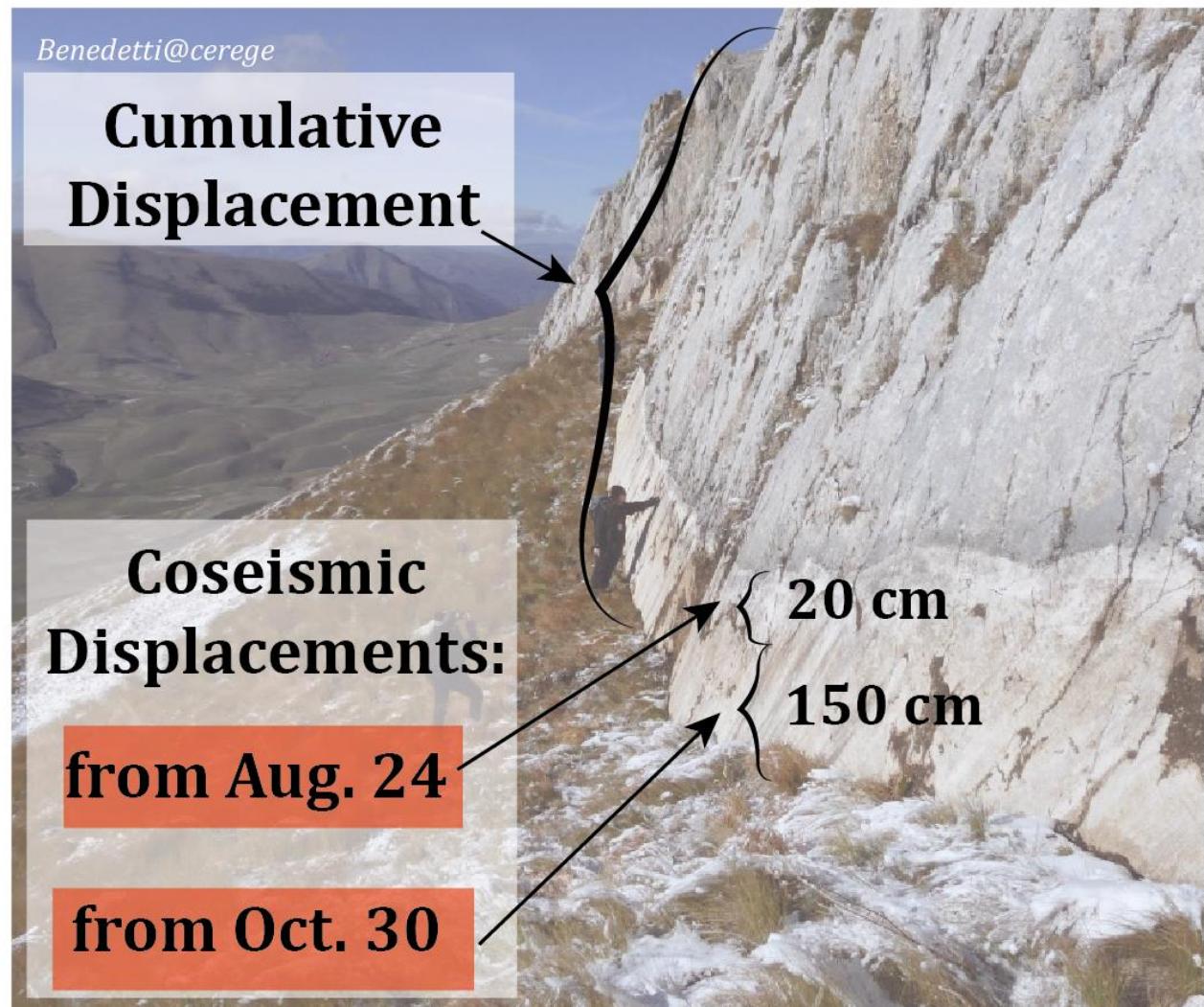
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³ University "G. d'Annunzio", Chieti-Pescara, Italy

Fault slip rates:

- SR are used in seismic hazard models.
- What do the cumulative displacements look like?
- How do we “date” the deformation?

Mt Vettore Fault scarp :

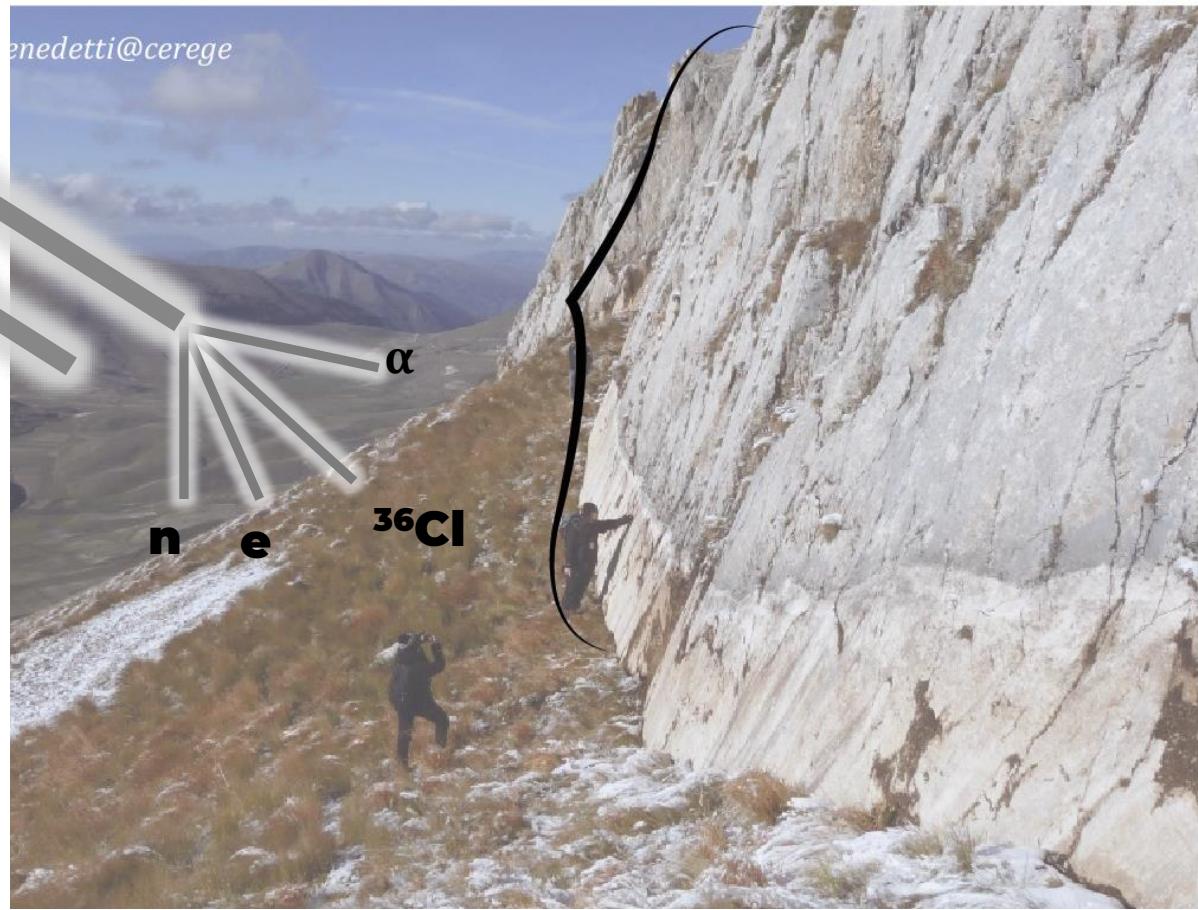


Fault slip rates:

Mt Vettore Fault scarp :

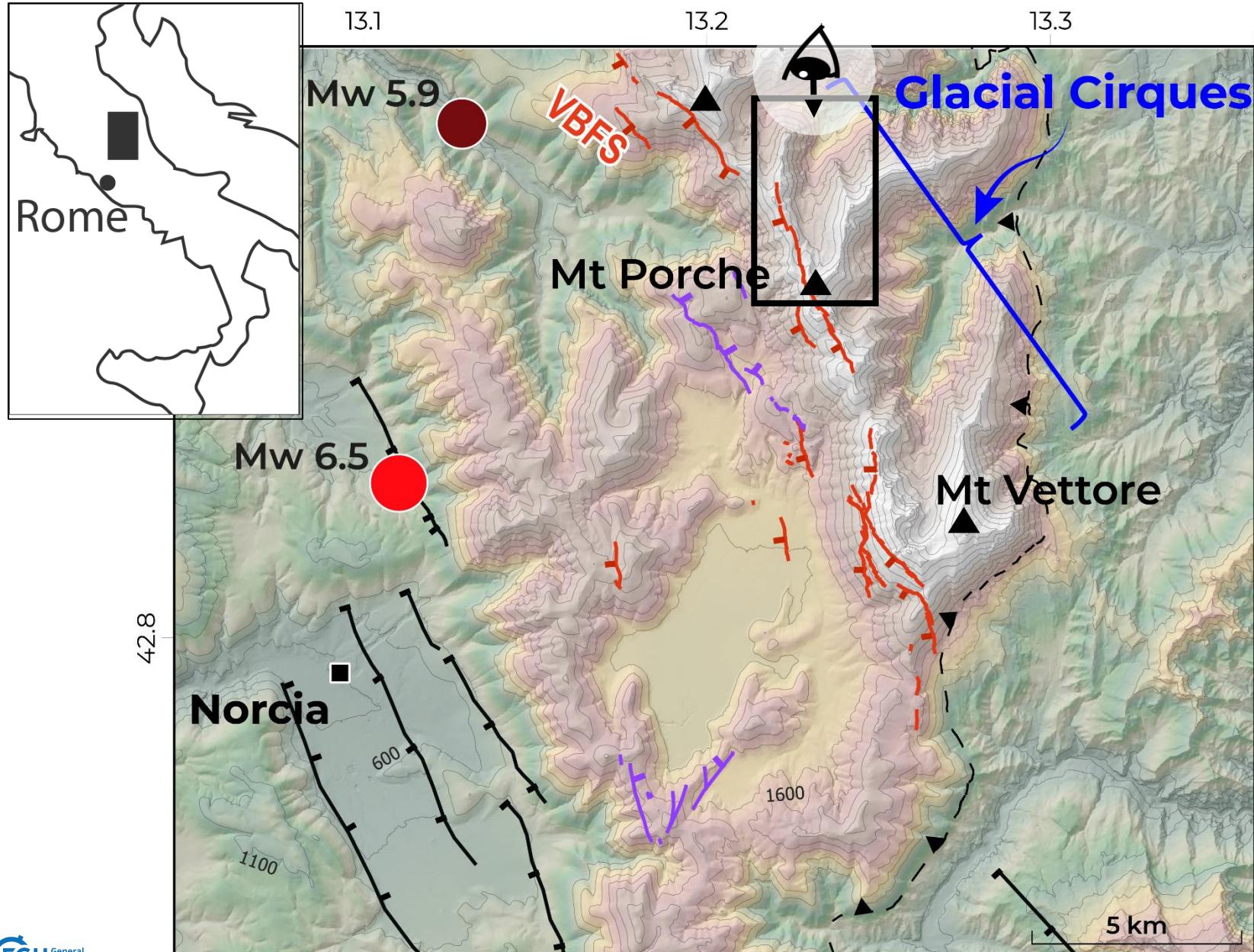
cosmic rays

^{36}Cl : Cosmogenic nuclide
Half-life = **301000** yr



$$[\text{Cl}^{36}]_{\text{rock}} \approx \text{Production rate } \text{Cl}^{36} (z) \times \text{Exposure time}$$

Study case: Italy

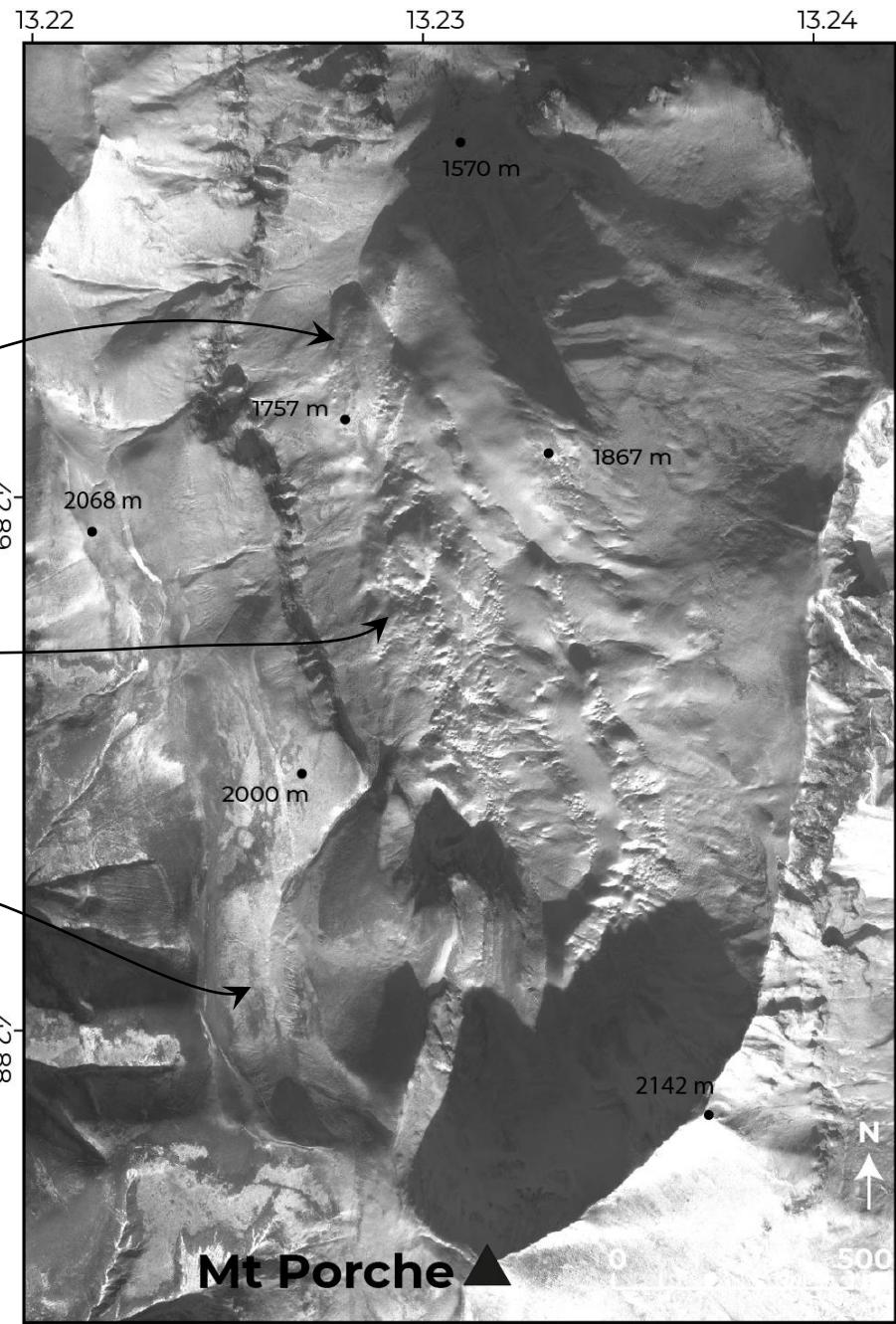


Glacial valley

Frontal moraine

Till

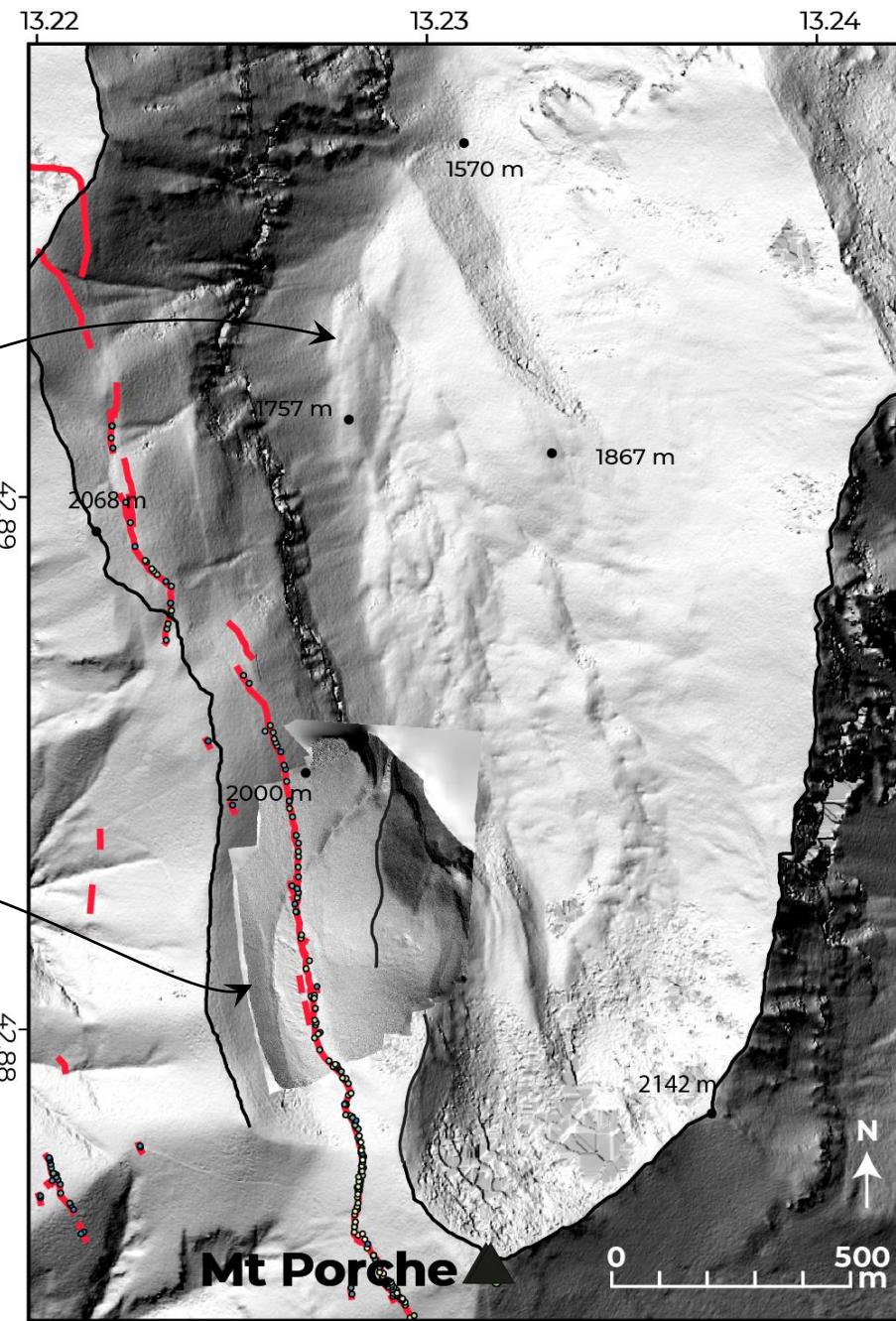
Perched valley



Glacial valley

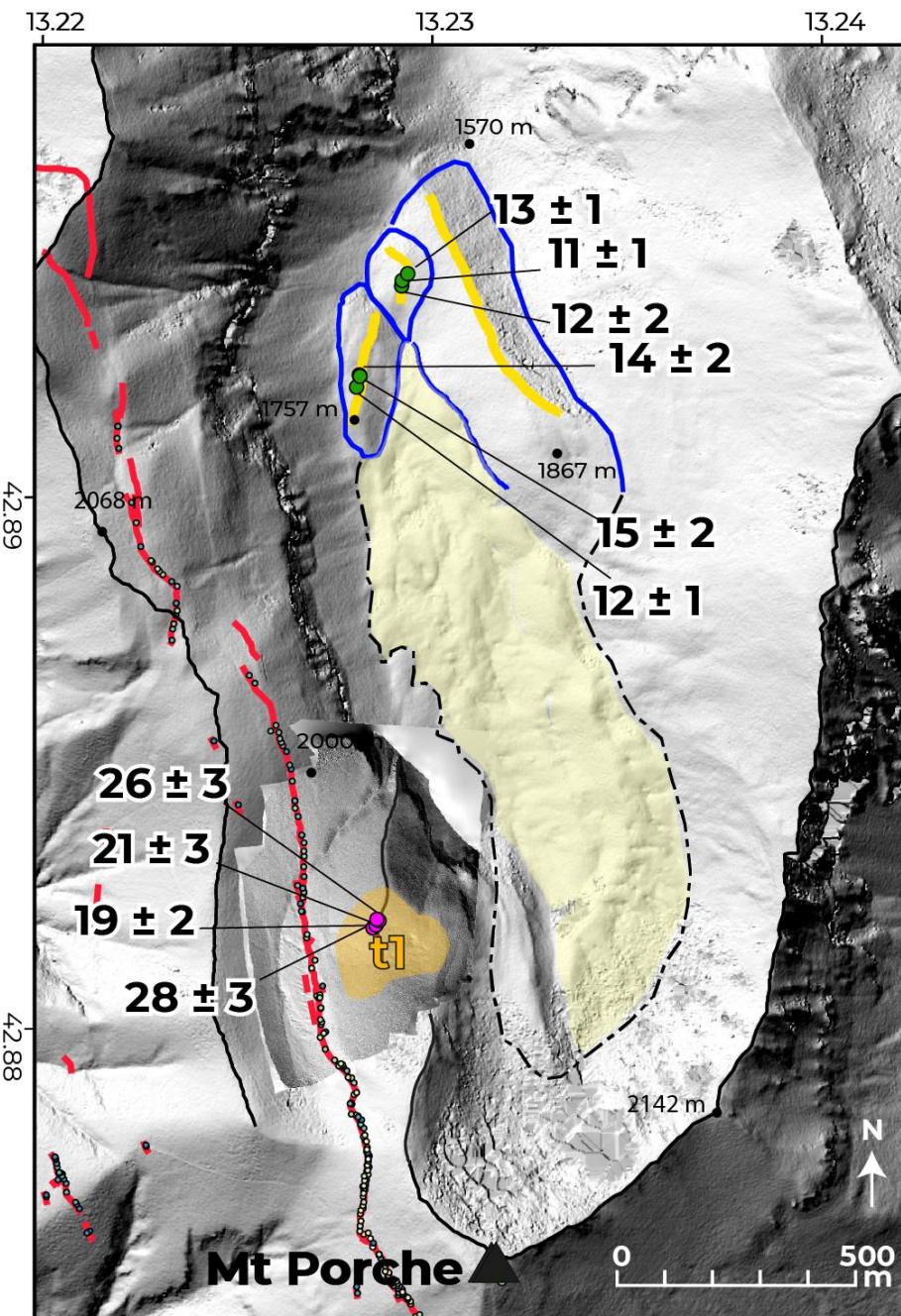
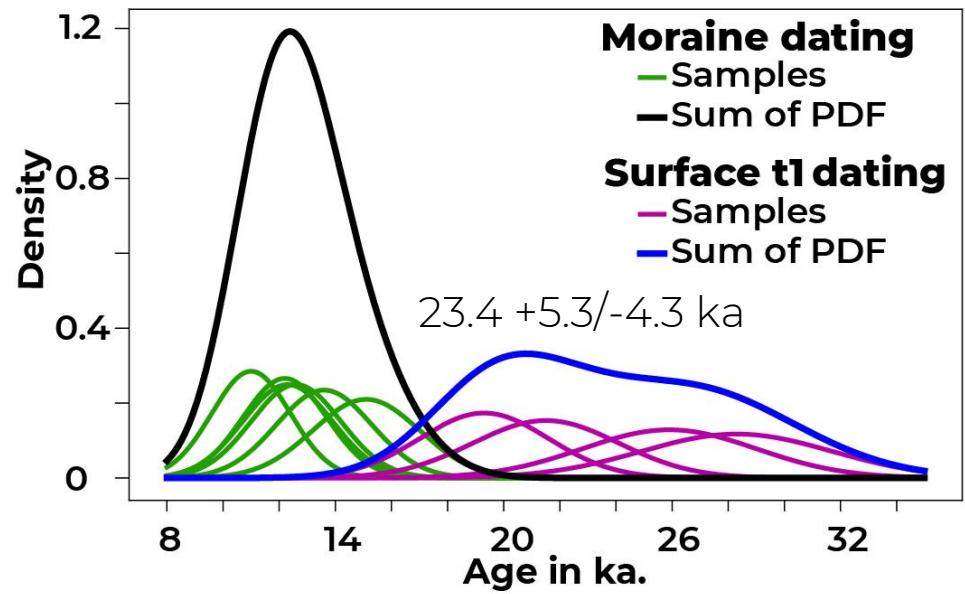
Frontal moraine

Perched valley



Glacial valley

$12.7 + 2.2/-1.9$ ka



Glacial valley

Local LGM (Last Glacial Maximum) :



$23.4 +5.3/-4.3$ ka :

Surface T1 exposition



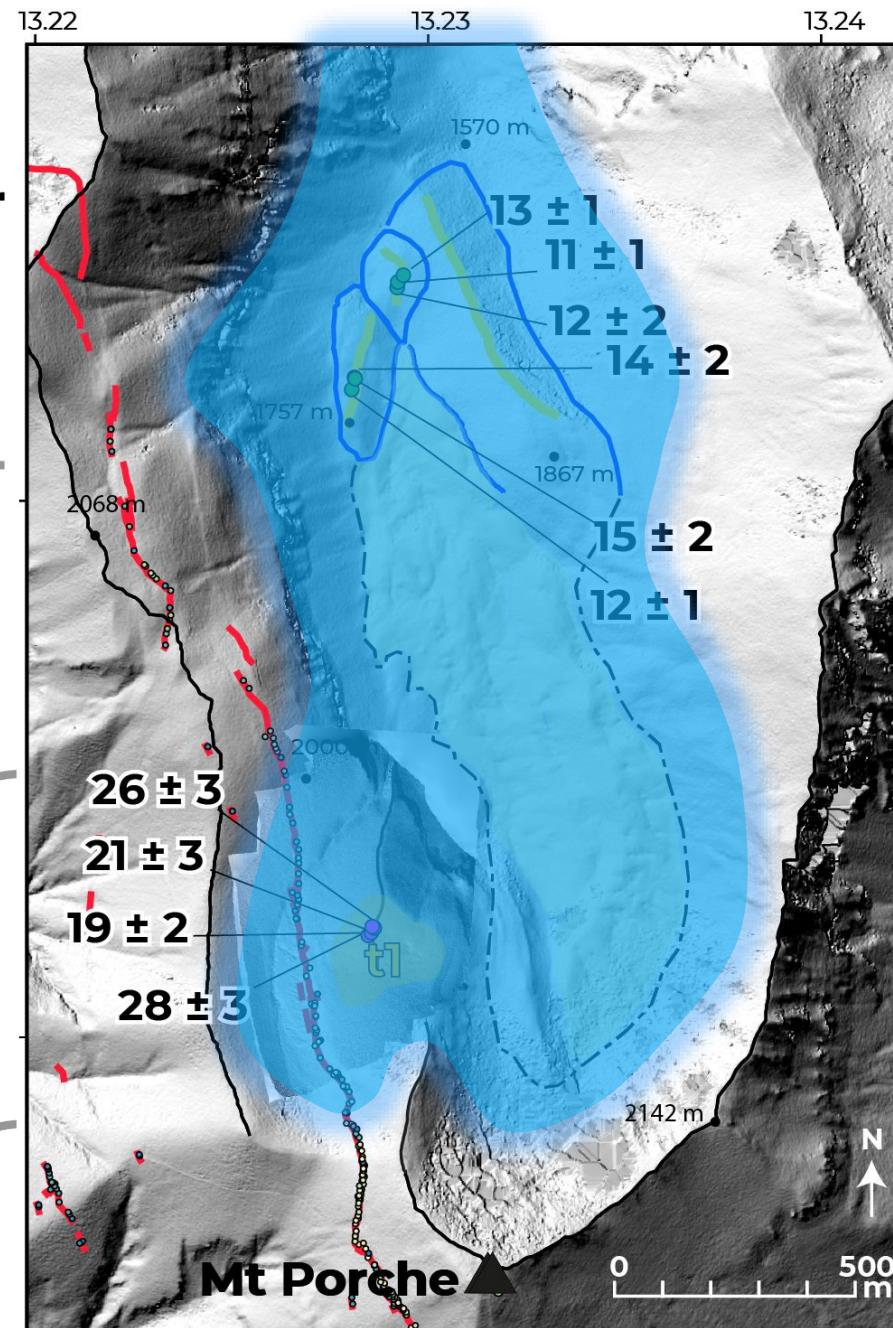
Dryas to $12.7 + 2.2/-1.9$ ka :



$12.7 + 2.2/-1.9$ ka to today :



Moraine



Glacial valley

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Surface T1 exposition



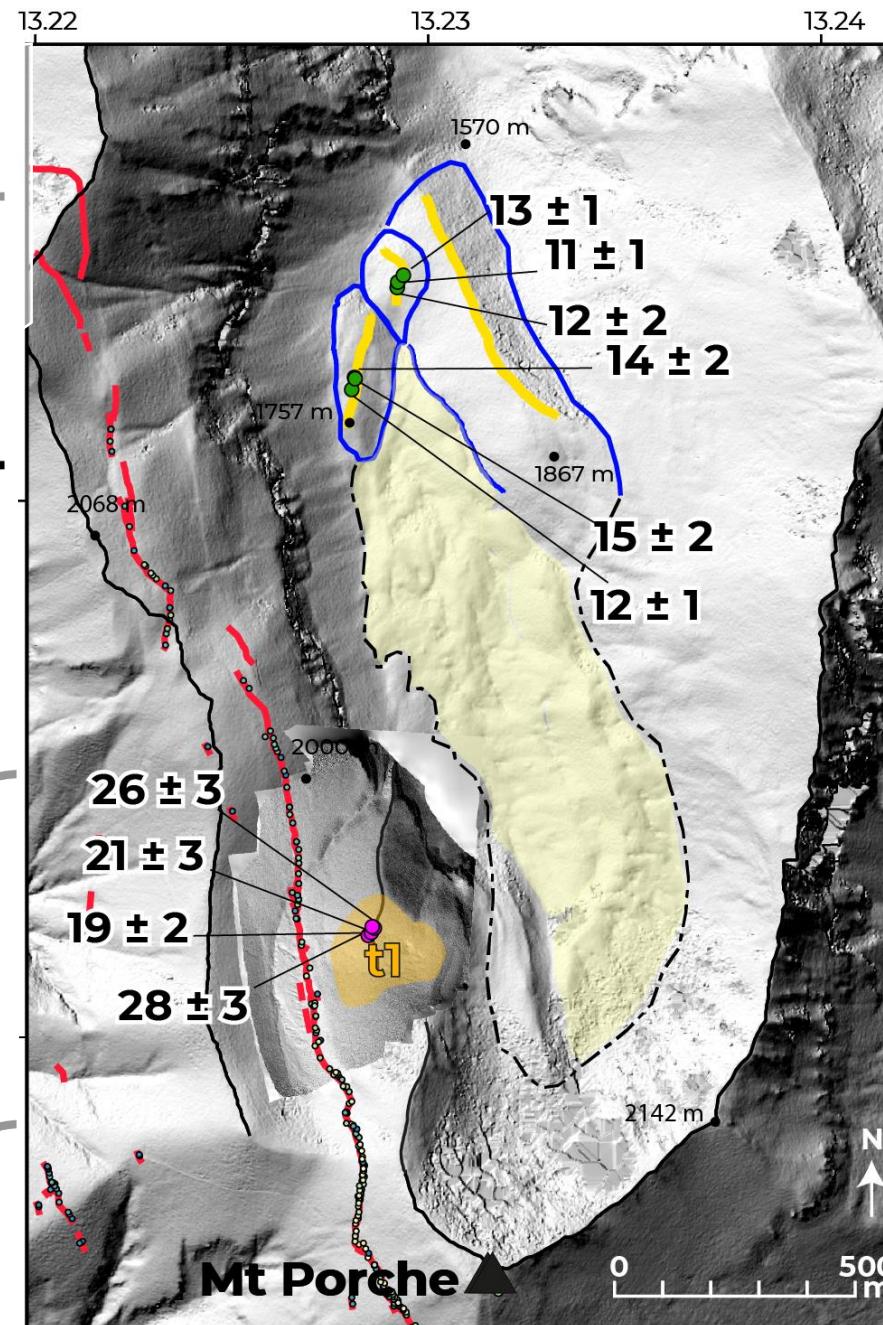
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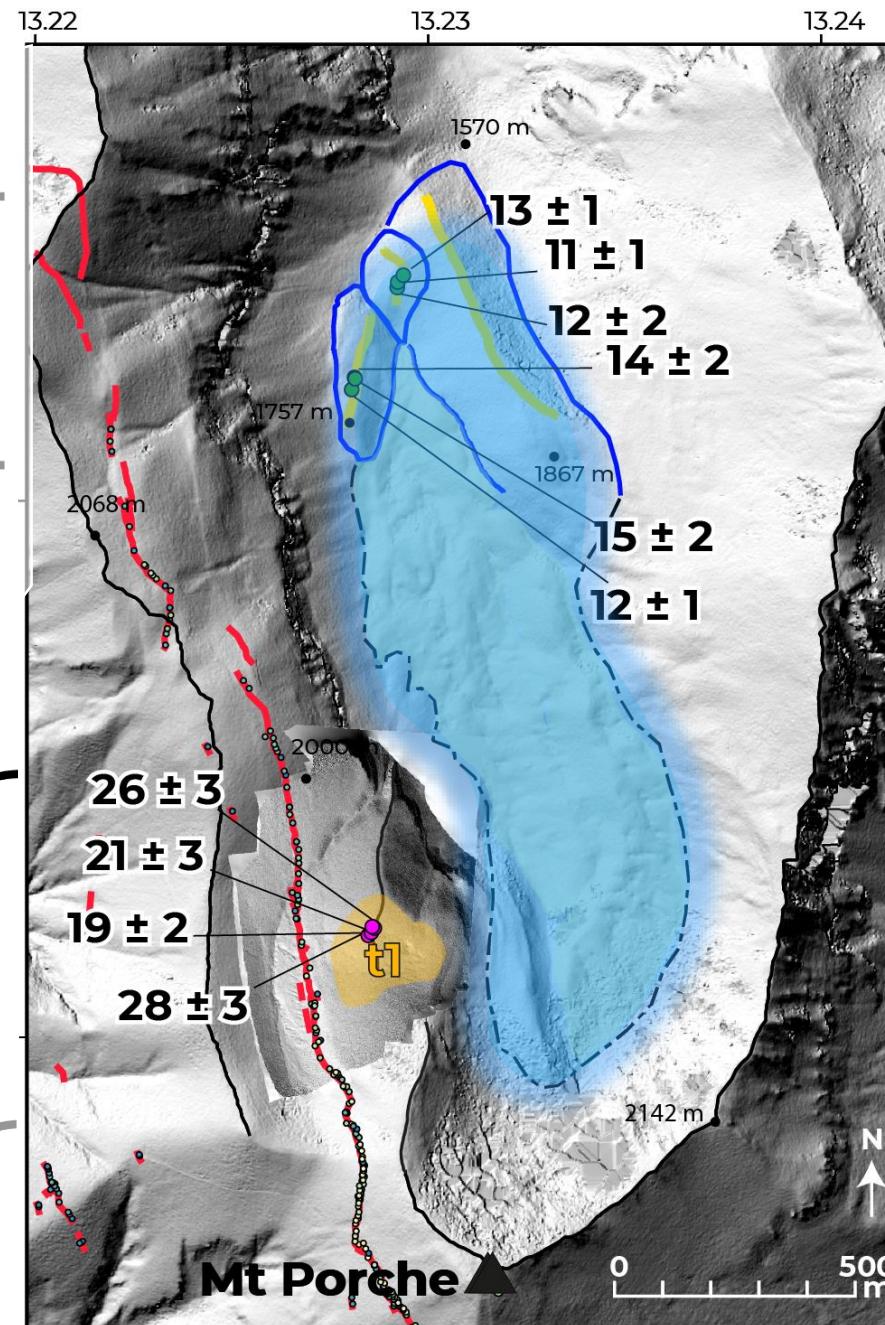
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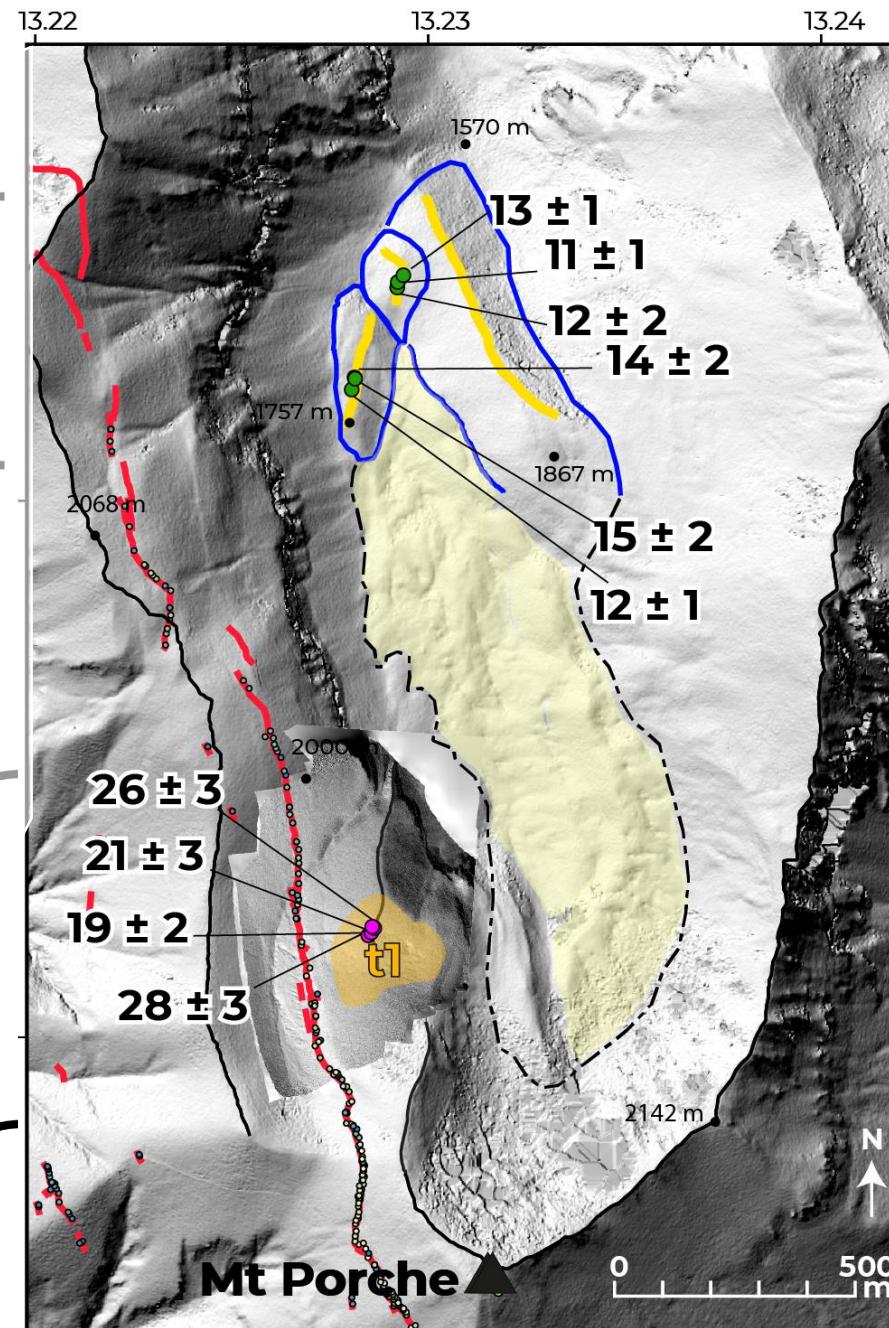
Dryas to $12.7 + 2.2/-1.9$ ka :



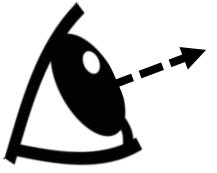
$12.7 + 2.2/-1.9$ ka to today :



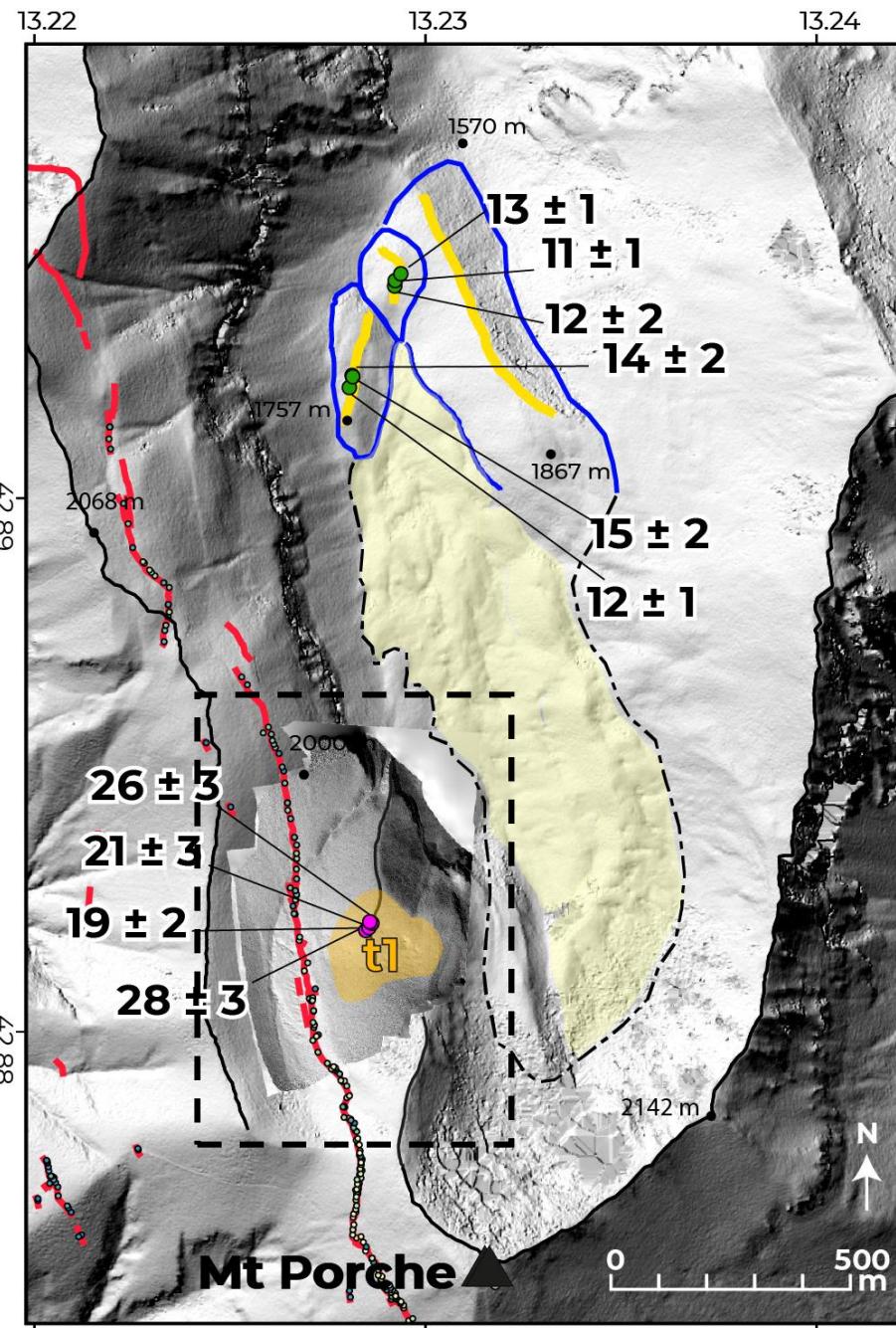
Moraine



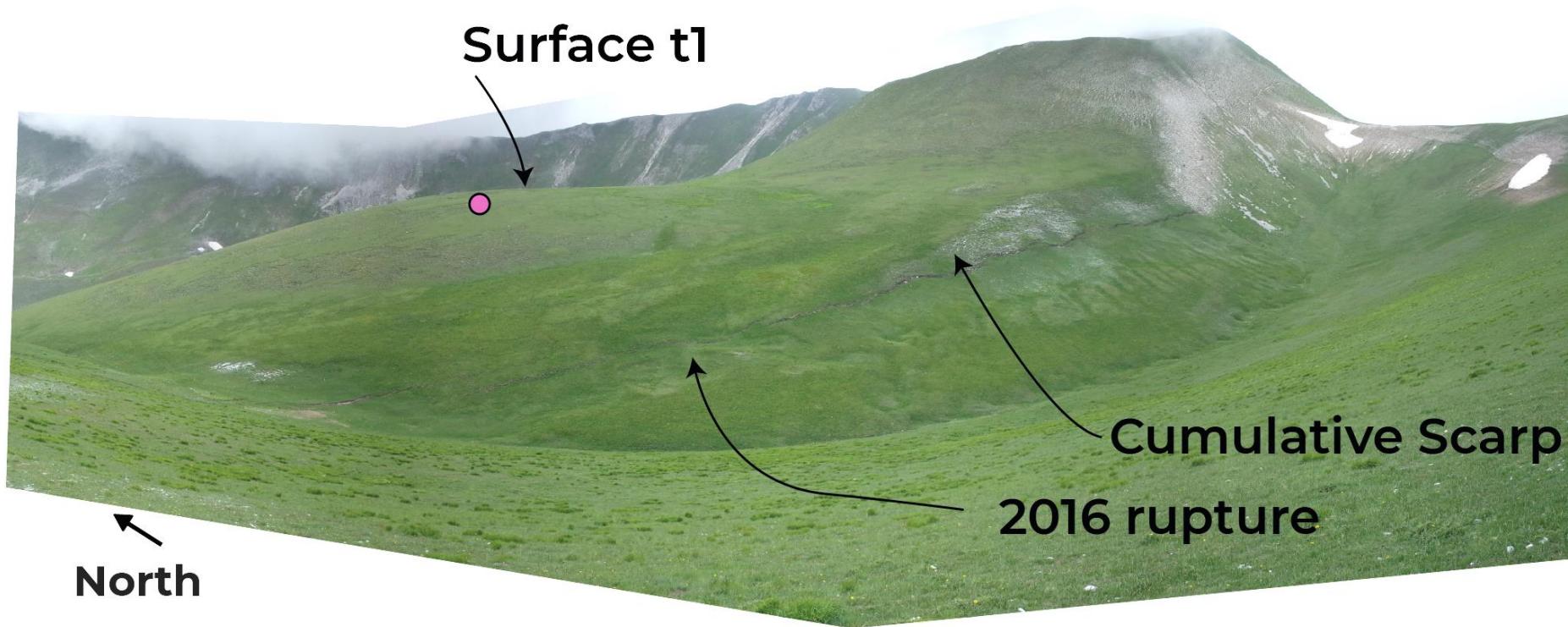
Glacial valley



L. Pousse-B.



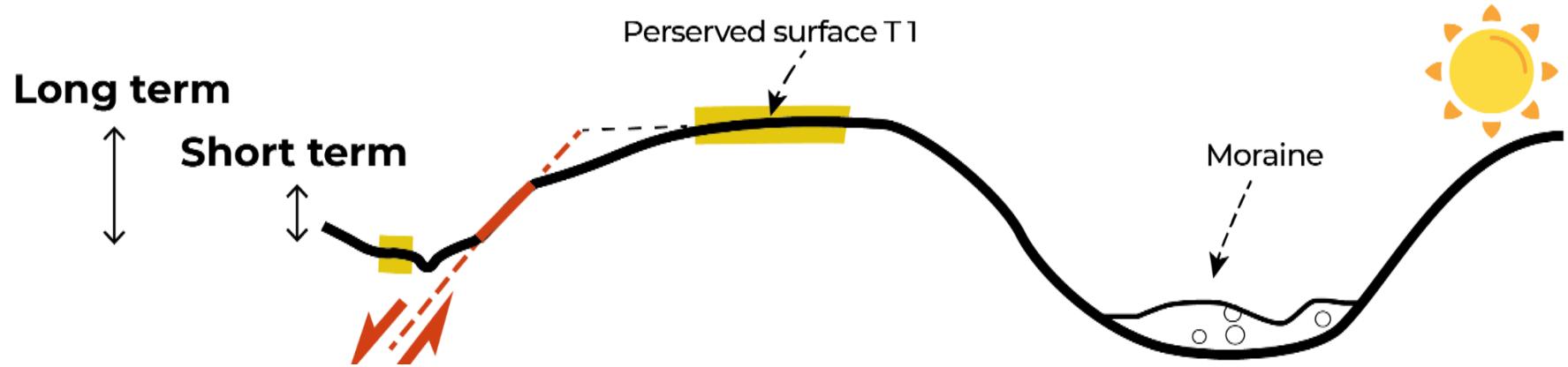
Morphotectonics



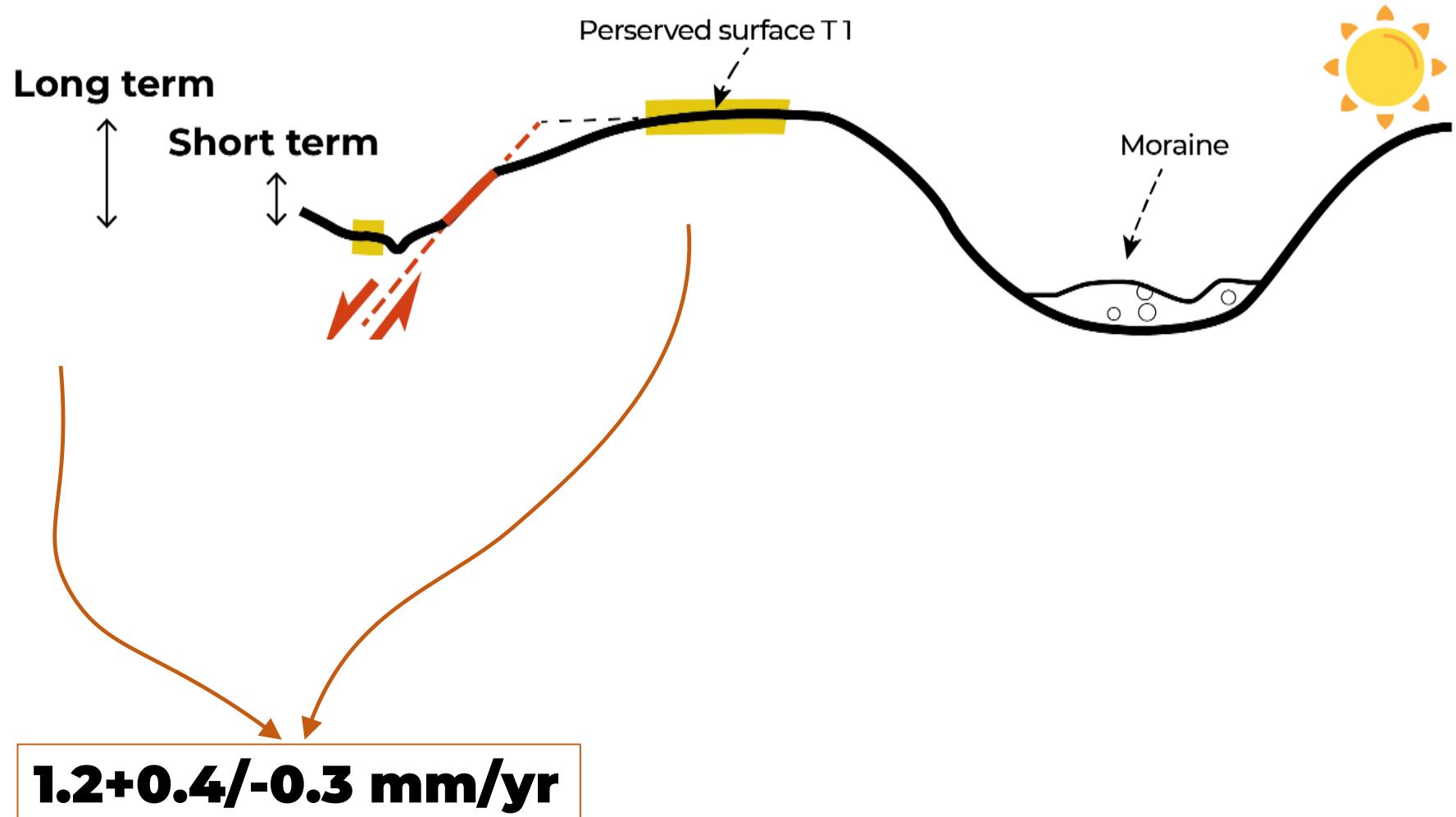
3 stages of deformation recorded:

- Offset of the surface 1 → **32 - 40.5 m**
- Cumulative scarp → **15.5 ± 1.4 m**
- Coseismic rupture

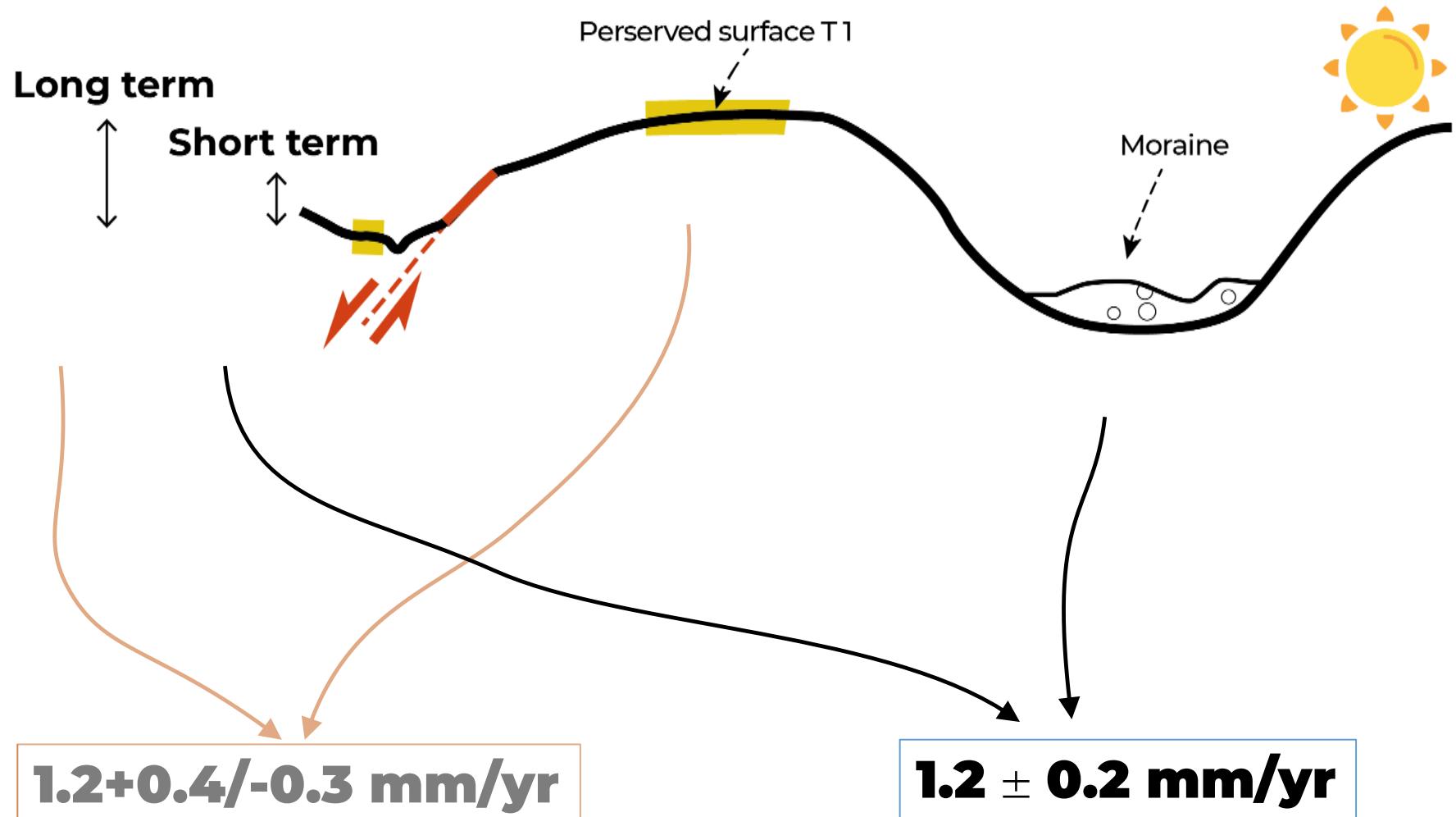
Slip rates



Slip rates



Slip rates



Take home message

In the Central Apennines:

- **First glacial chronology** with absolute and direct dating
 - LGM retreat : $23.4 + 5.3/-4.3$ ka
 - Dryas retreat : $12.7 + 2.2/-1.9$ ka
- **First slip rates** on the main fault
 - $1.2 + 0.4/-0.3$ mm/yr since LGM
 - 1.2 ± 0.2 mm/yr since Dryas