

# Internal deformation of the Dolomites Indenter, eastern Southern Alps: Orthogonal to oblique basin inversion investigated in crustal scale analogue models

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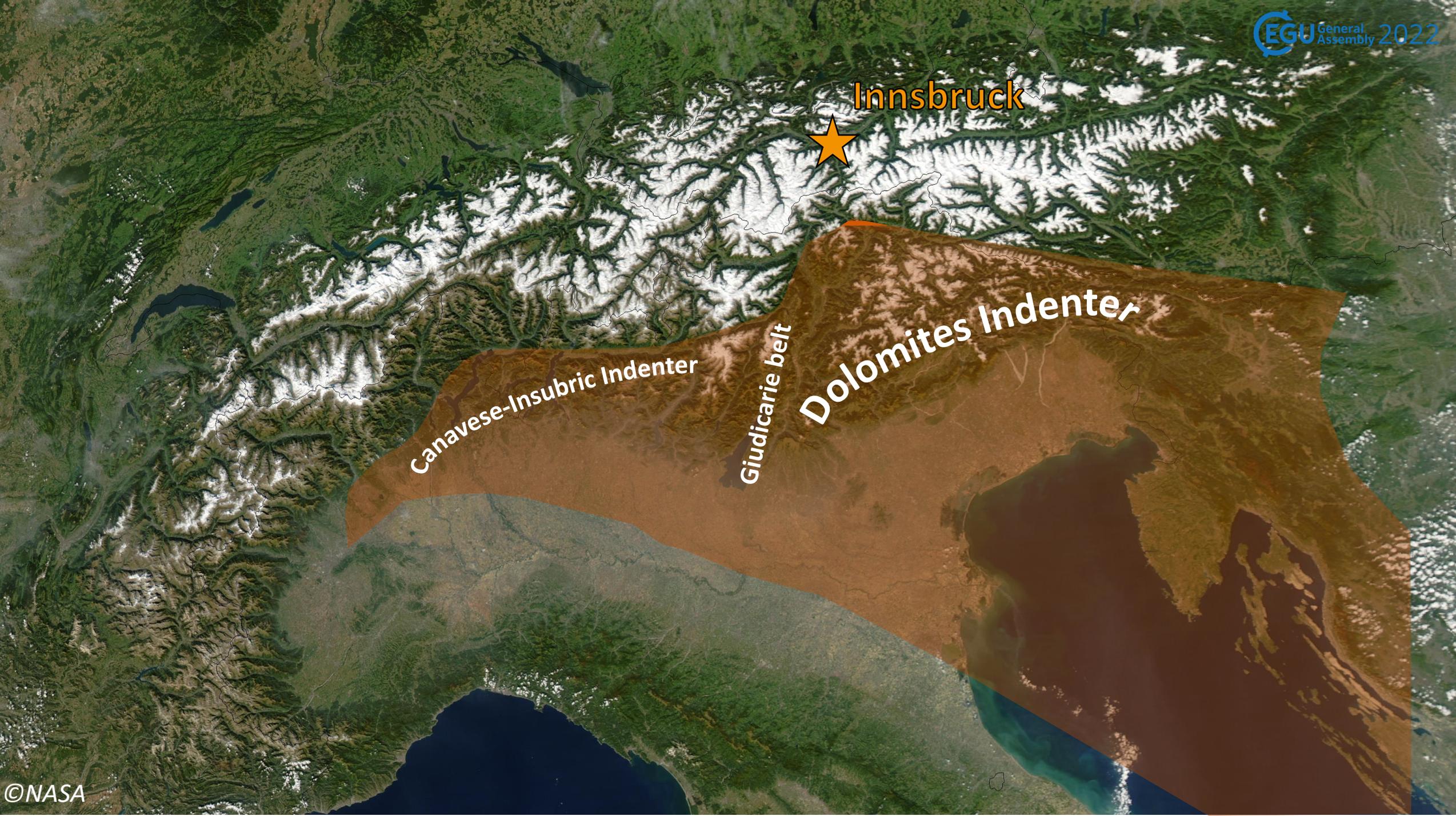
Innsbruck



Canavese-Insubric Indenter

Giudicarie belt

Dolomites Indenter



why?

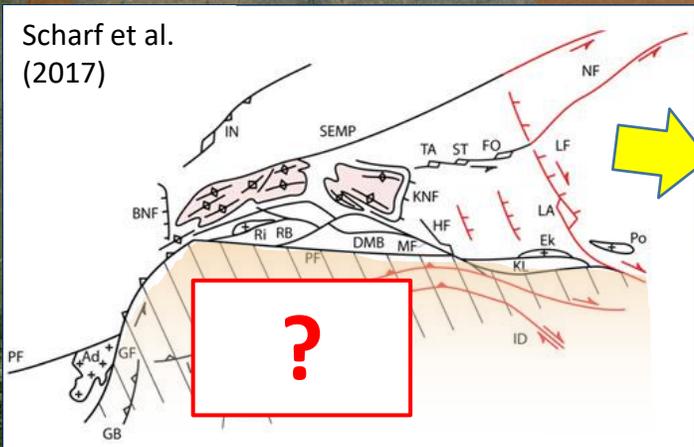
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Canavese-Insubric Indenter

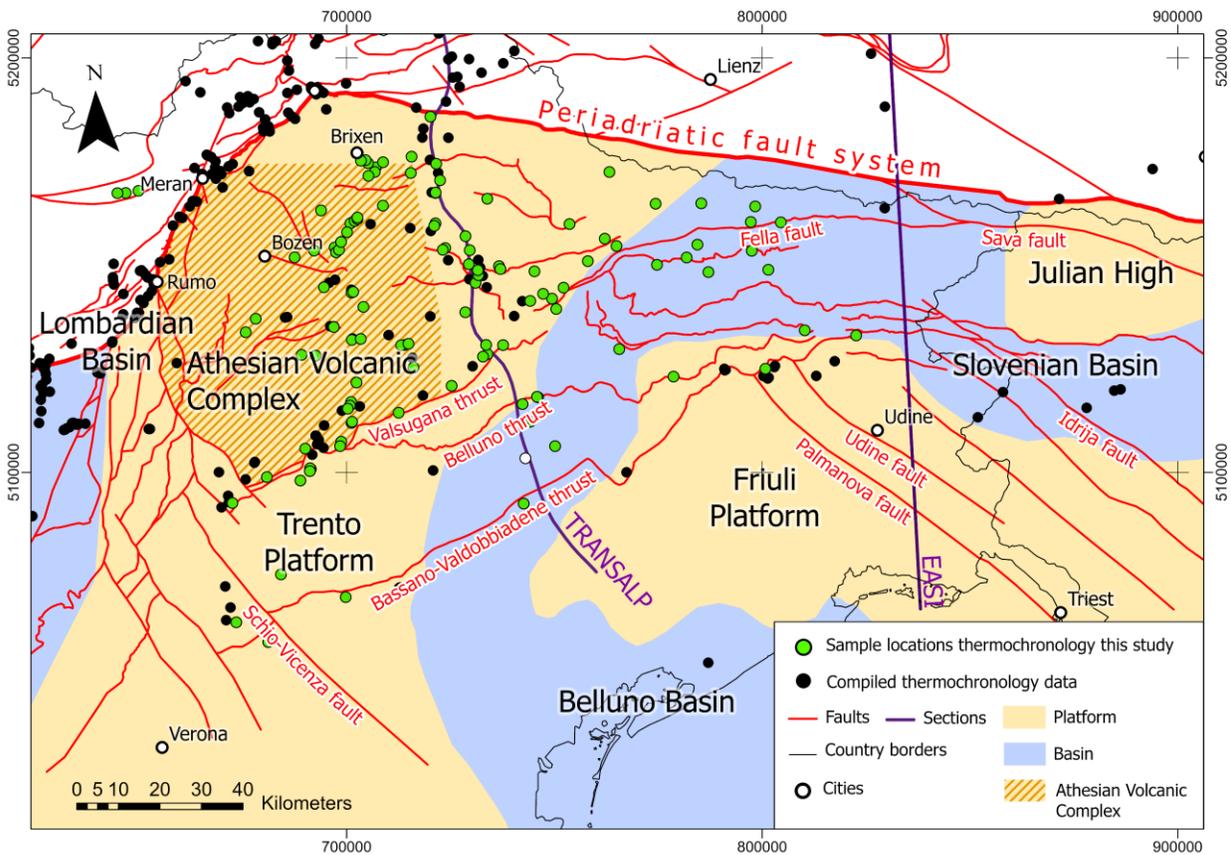
Giudicarie belt

Dolomites Indenter



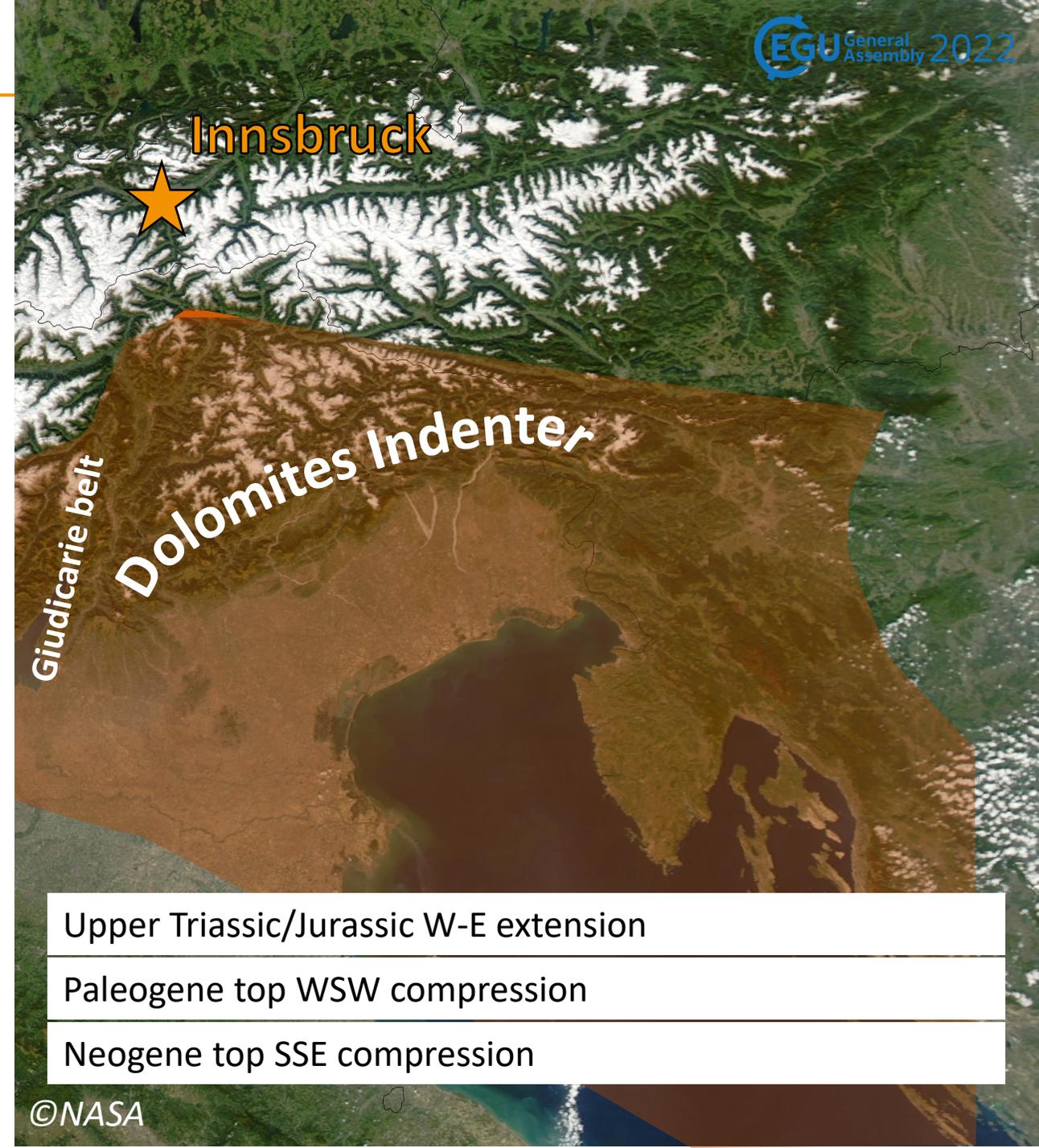
Indenter: "... a relatively rigid, less deformed piece of continental crust, which has been pushed into weaker parts of the orogen." (Reiter et al., 2018)

**what?** Test the effect of Mesozoic extension on Neogene shortening using crustal scale analogue models



Platform/basin configuration modified from Busetti et al. (2010), Masetti et al. (2012), Picotti & Cobianchi (2017), Martinelli et al. (2017).

For more infos on thermochronology data check out [Klotz et al.](#), session GD8.4



Upper Triassic/Jurassic W-E extension

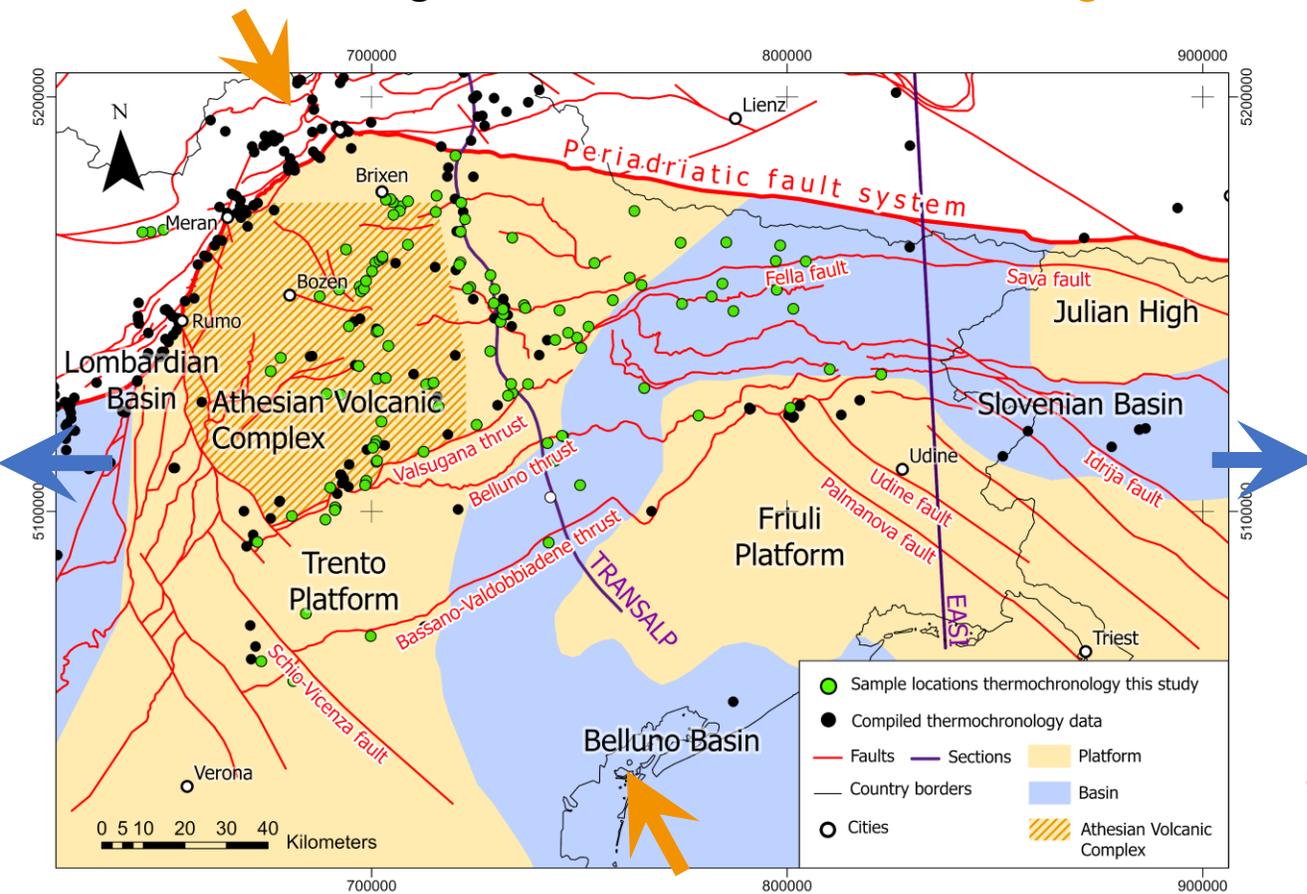
Paleogene top WSW compression

Neogene top SSE compression

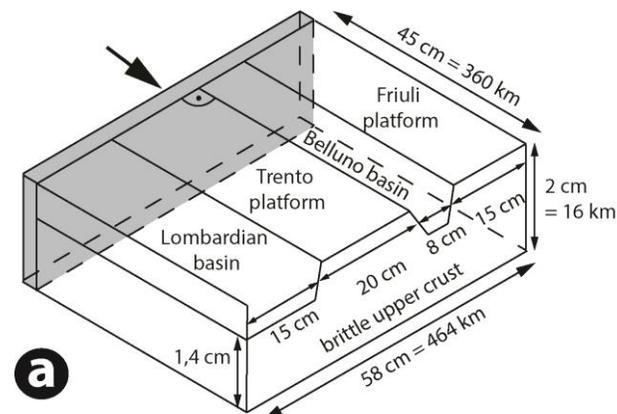


how?

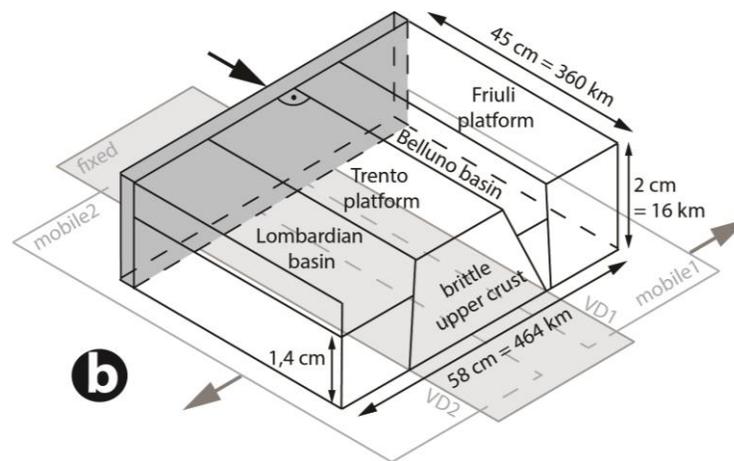
Upper Triassic/Jurassic **E-W extension**  
 Neogene **NNW-SSE directed shortening**



Platform/basin configuration modified from Busetti et al. (2010), Masetti et al. (2012), Picotti & Cobiانchi (2017), Martinelli et al. (2017).



**1 cm model = 8 km nature**

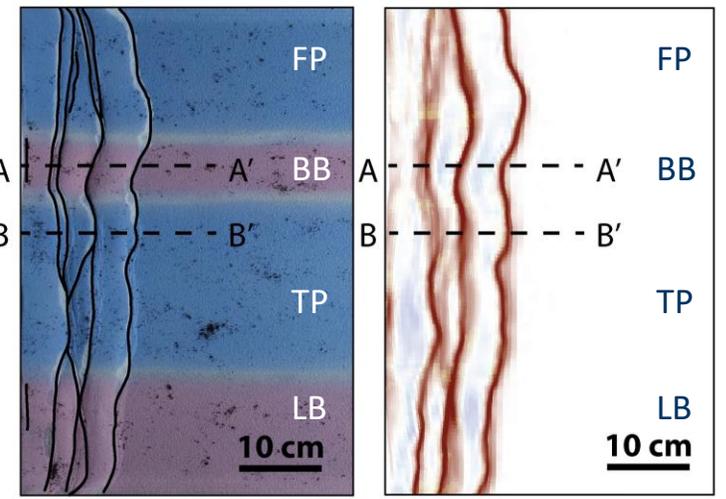


Pre-scribed strength contrast between platforms and basins, followed by one stage of **indentation** (black arrow).

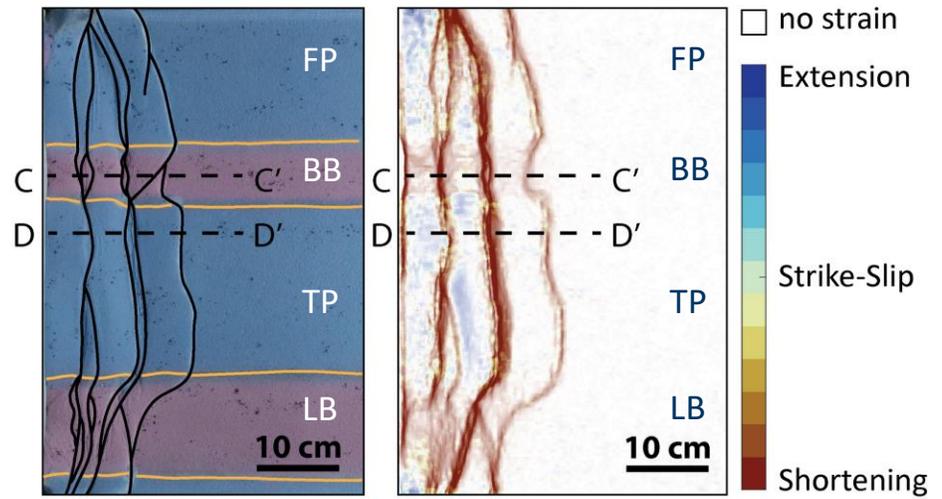
Graben structures were developed through an initial **extensional phase** (grey arrow), followed by **indentation** (black arrow).



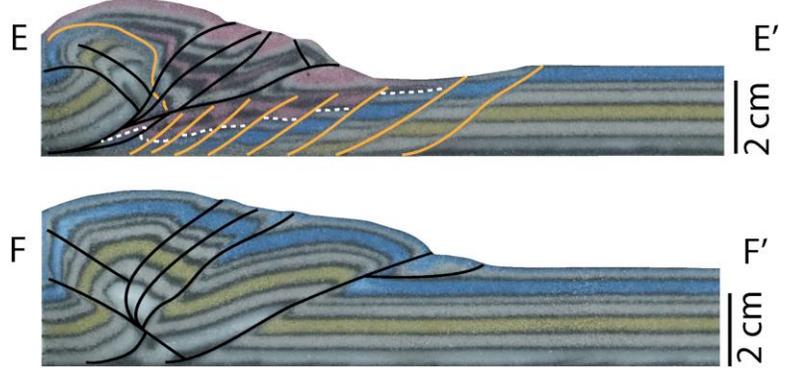
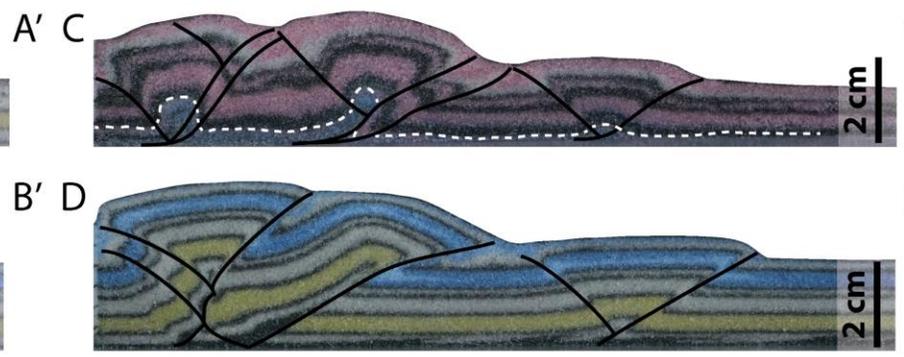
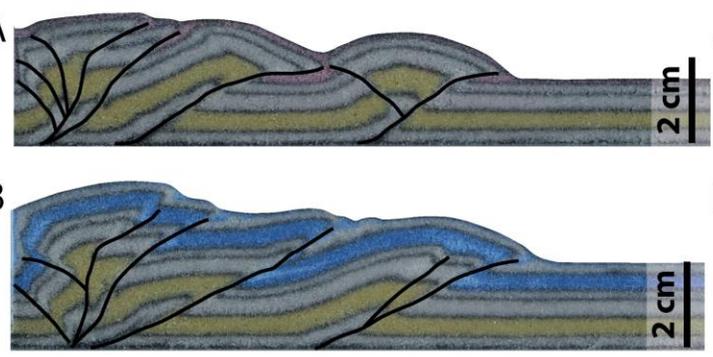
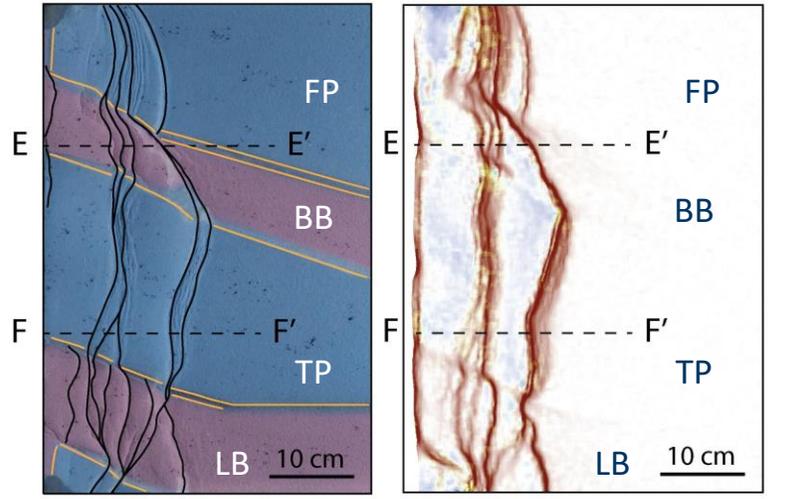
sub-series A



sub-series B



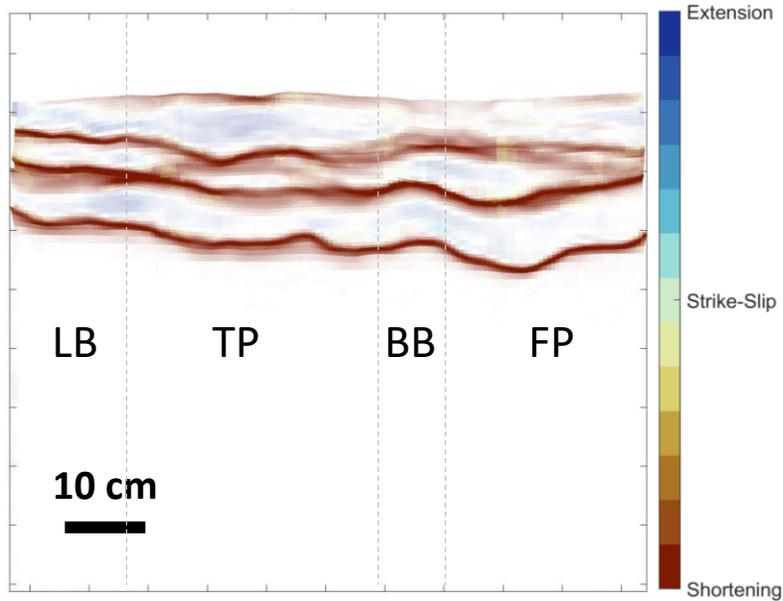
sub-series B



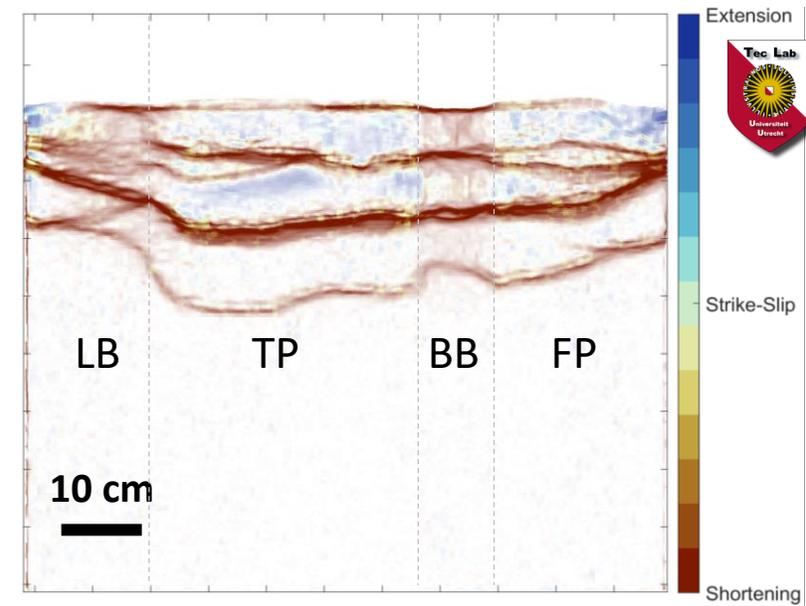
--- section    — thrust fault    — normal fault    - - - - boundary between pre- and synrift sediments

LB...Lombardian basin    BB...Belluno basin  
TP...Trento platform    FP...Friuli platform

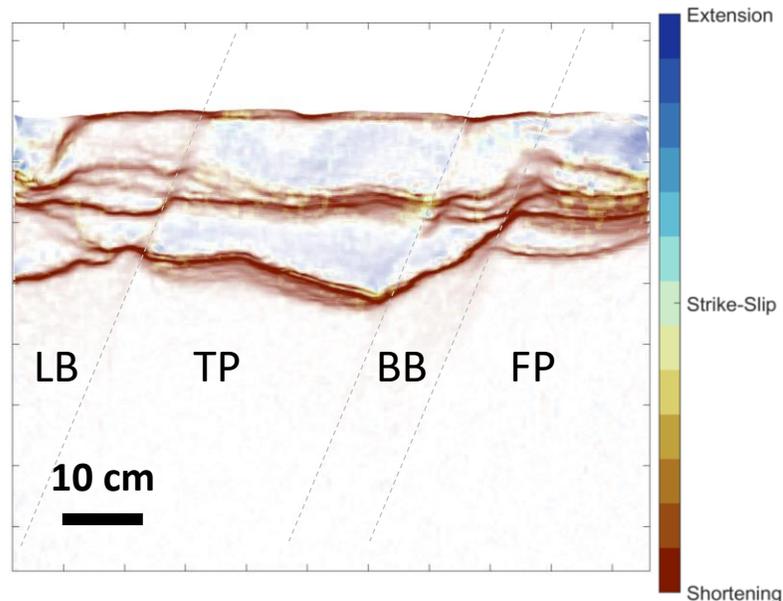
Pre-scribed lateral strength difference, *orthogonal* inversion, quartz sand only



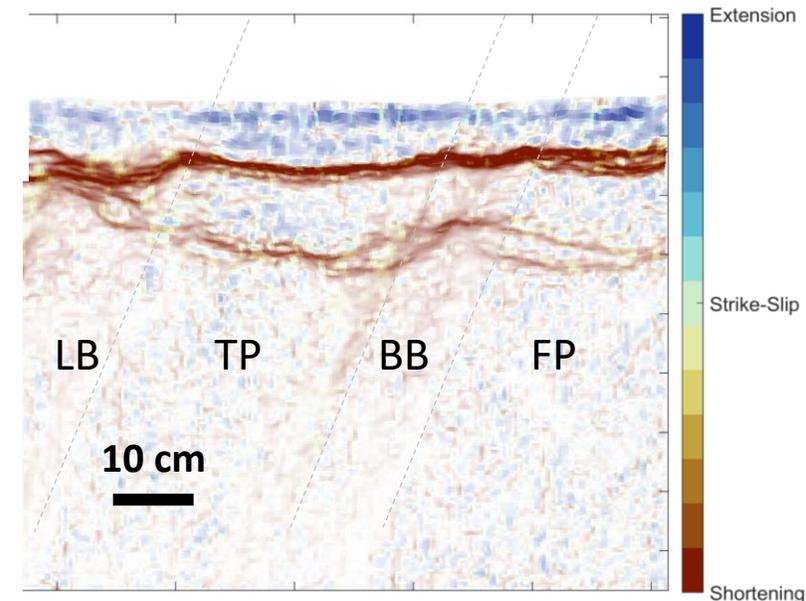
Extension, followed by *orthogonal* inversion, quartz sand only



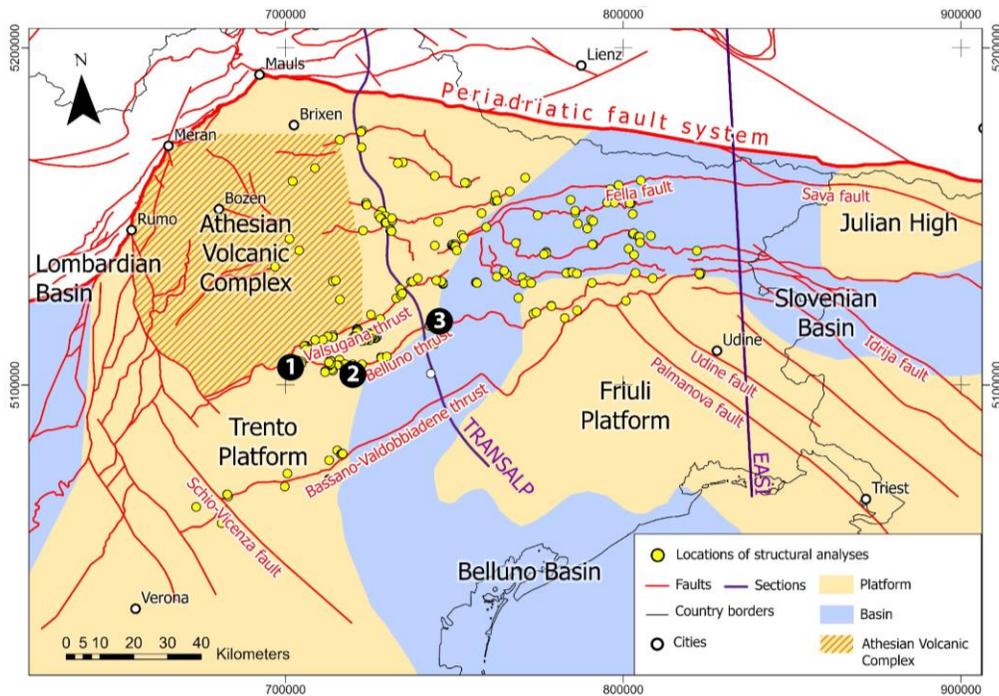
Extension, followed by *oblique* inversion, glass beads at base



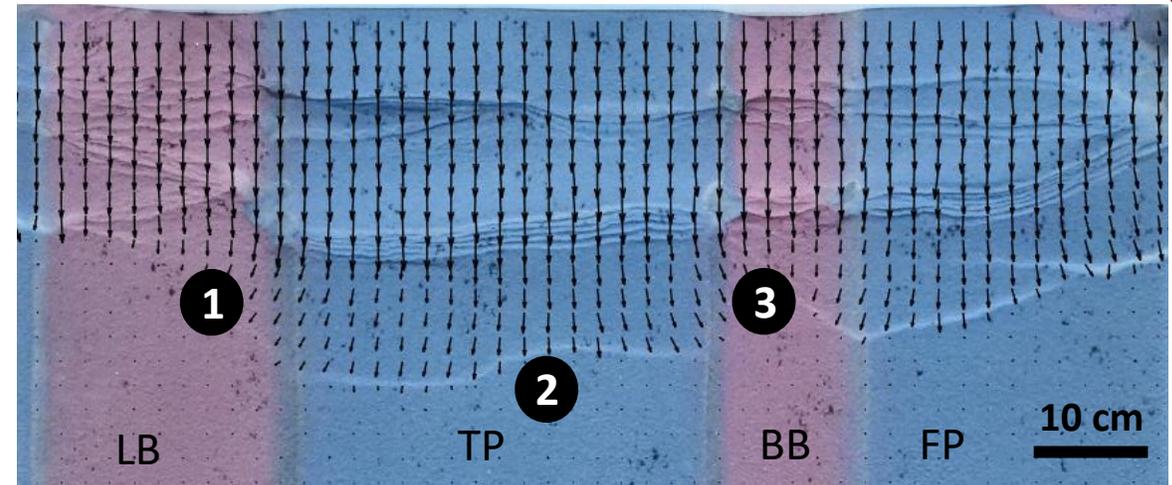
Extension, followed by *oblique* inversion, silicon putty at base



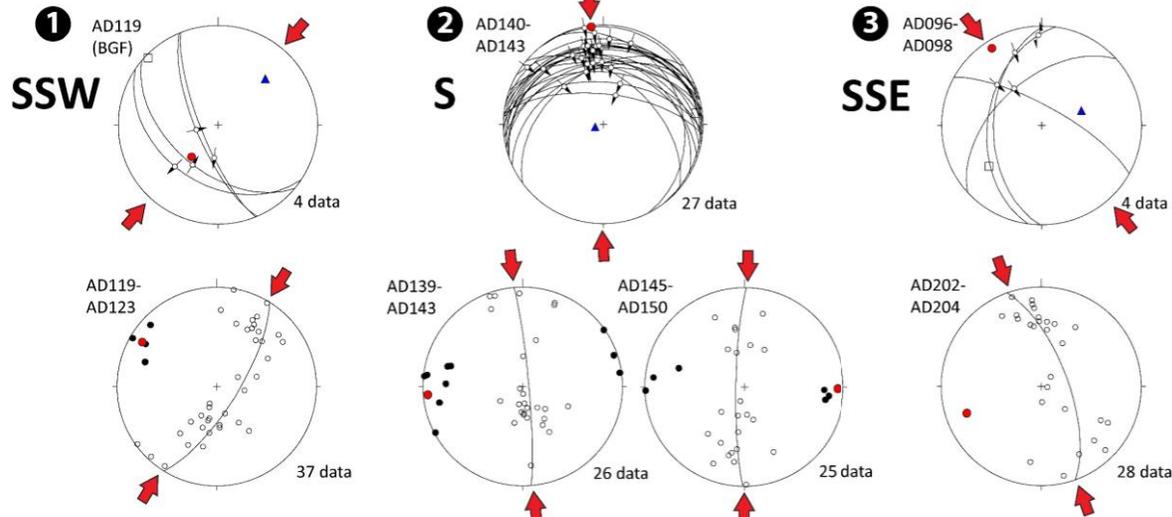
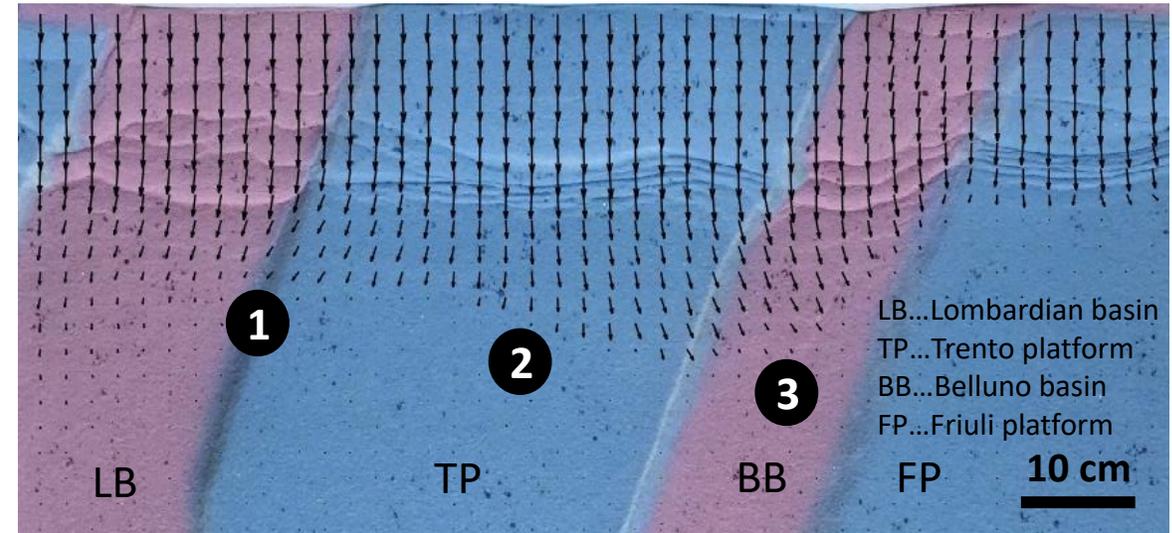
LB...Lombardian basin  
TP...Trento platform  
BB...Belluno basin  
FP...Friuli platform

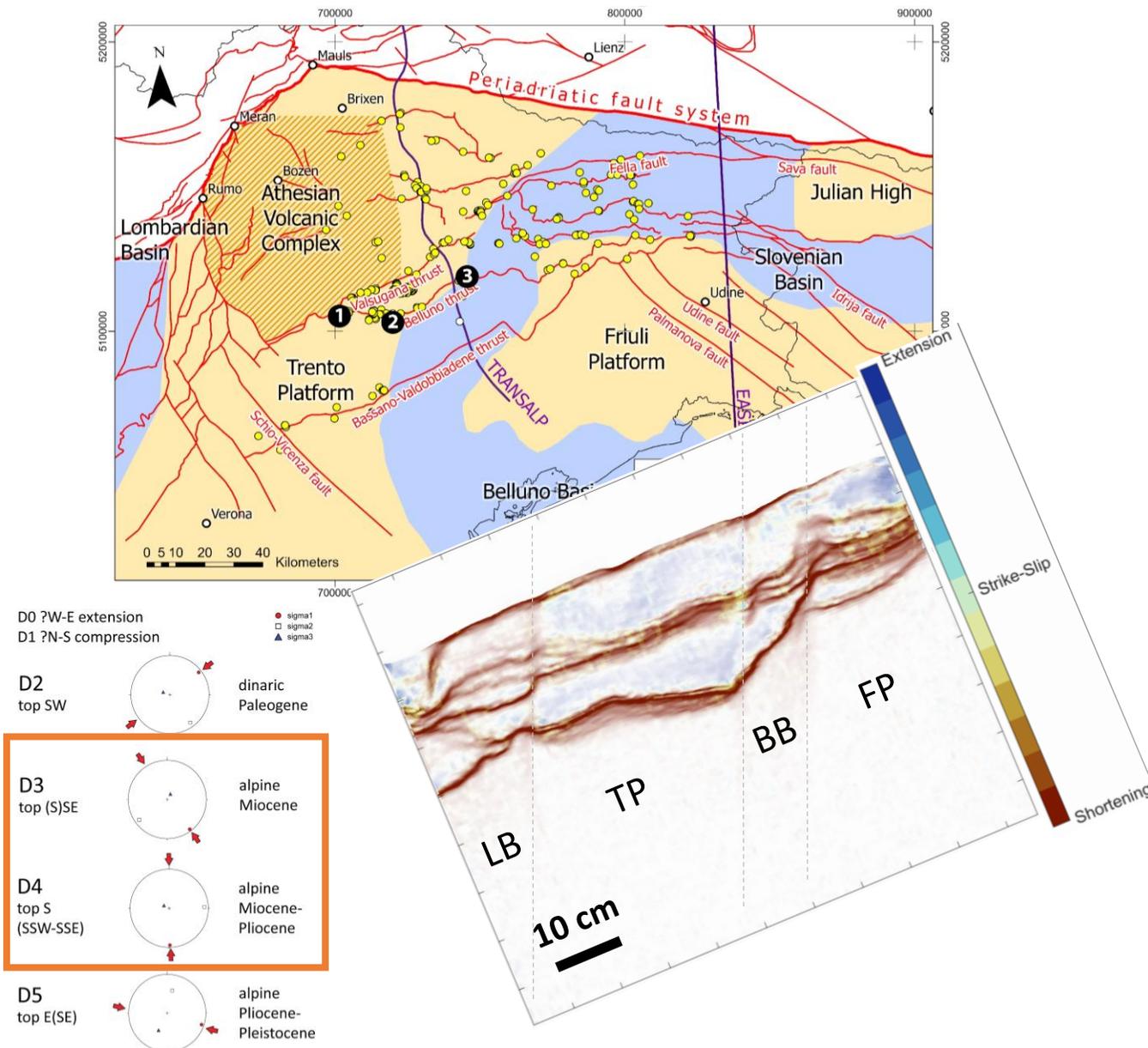


PIV analysis of sub-series B, *orthogonal* inversion, quartz sand only



PIV analysis of sub-series B, *oblique* inversion, glass beads at base





- Modelling results confirm the localisation of deformation in areas of lateral strength contrasts (Brun and Nalpas, 1996), as transitions from platforms to basins represent.
- The overall style of deformation is less dependent on the material of the basal décollement (either quartz sand, glass beads, or silicon putty).
- **The overall style of deformation is ruled by the inherited platform/basin-configuration.**
- Shortening directions of several studied faults change along strike.
- We infer that the **variability of shortening directions** along those thrust faults **depends on inherited geometries;** and may not be the result of various **deformational phases.**

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