

Monreal – Roque, Eduardo<sup>1,2</sup>; Tajčmanová, Lucie<sup>2</sup>; Weber, Bodo<sup>1</sup>

<sup>1</sup> CICESE, Earth Sciences, Baja California, Mexico (eduardo.monreal@outlook.com)

<sup>2</sup> Universität Heidelberg, Institut für Geowissenschaften, Heidelberg, Germany

## The Sierra de Juárez Complex: The state of art

The Sierra de Juárez Complex (SJC) in southern Mexico (figure 1), is a belt of **deformed igneous and metamorphic rocks** shaped by multi-episodic deformational events.

The origin for its **mylonitic fabric** has been linked to **two** competing **models** (figure 2):

(1) an **Early to Middle Jurassic** shear zone, associated with the **southwards** Yucatán Block's movement and Gulf of Mexico opening. (Alaniz-Álvarez *et al.*, 1994; Espejo-Bautista *et al.*, 2021)

(2) a **Late Jurassic–Early Cretaceous E-W** extensional event related to a post-orogenic collapse between two tectonostratigraphic terrains in southern Mexico. (Graham *et al.*, 2021)

This study integrates **geochronology and structural data** to better understand the SJC's role in southern Mexico's Mesozoic evolution and its connection to western equatorial Pangea.



Figure 1. Location map

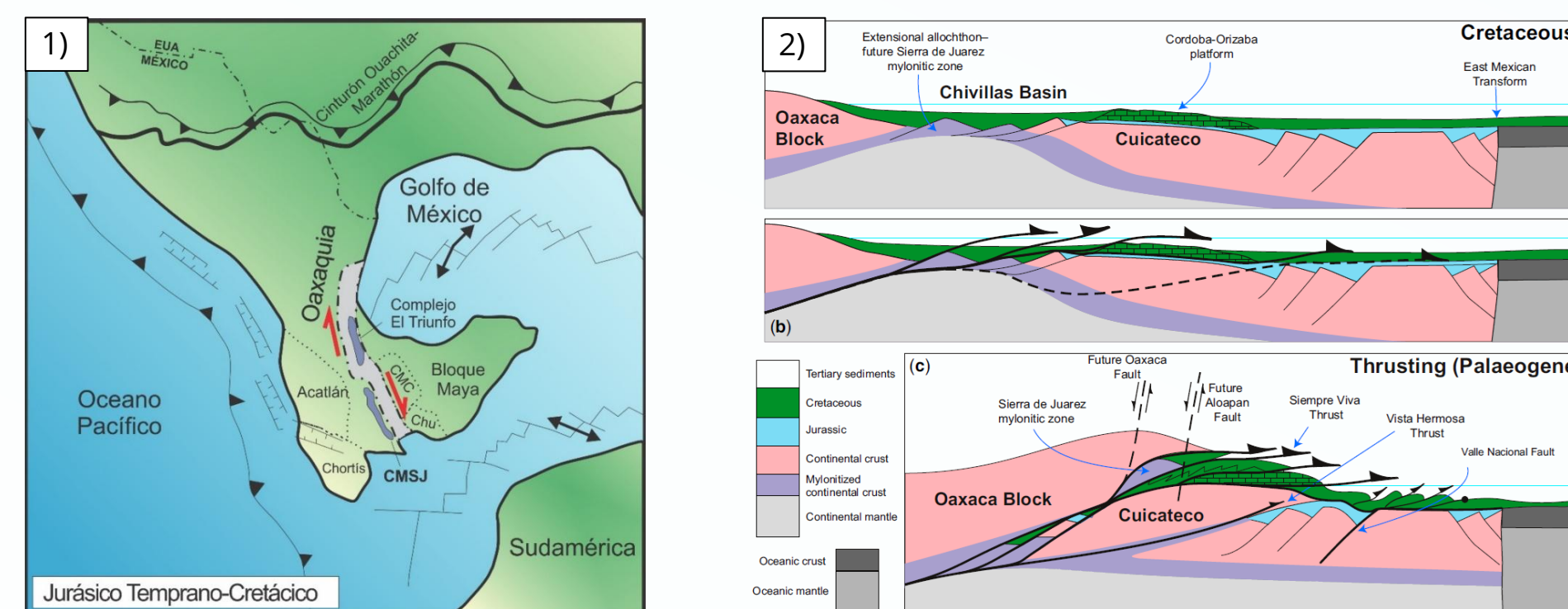
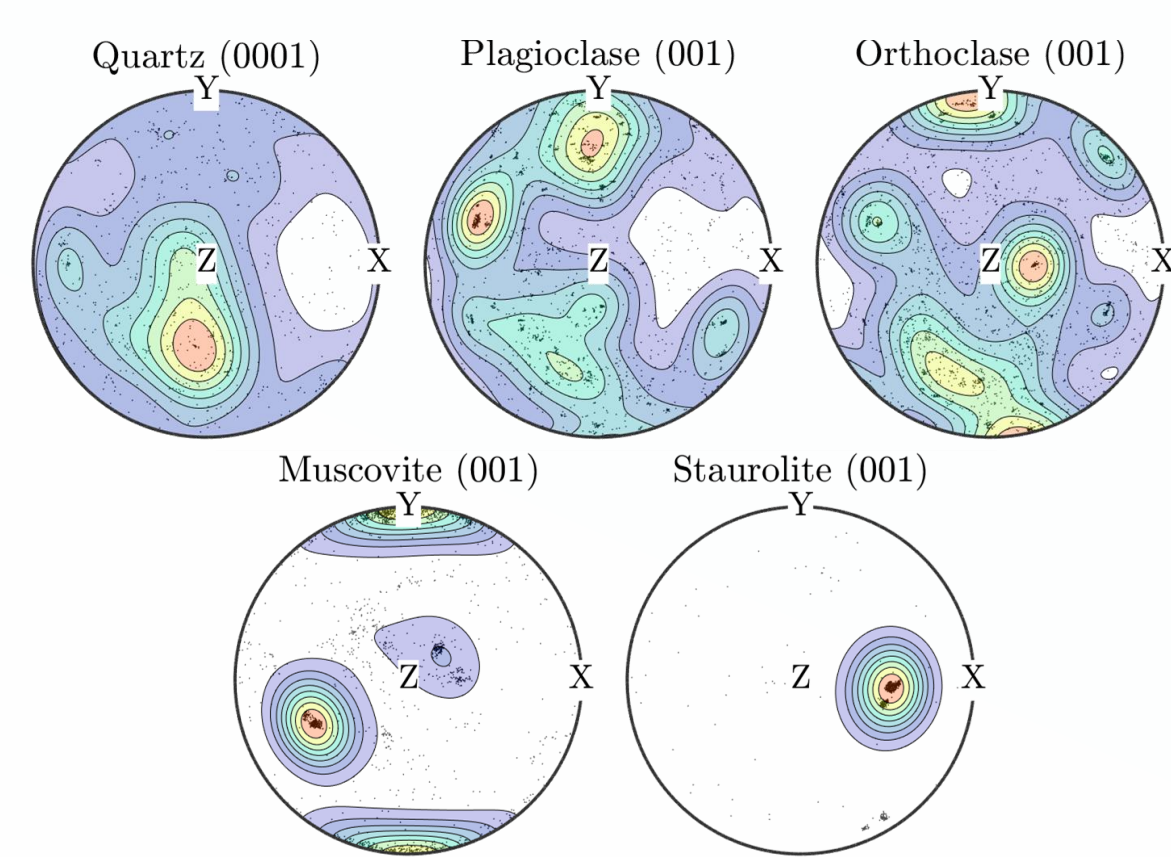


Figure 2. Existing models for origin of the SJC (Espejo – Bautista *et al.*, 2021; Graham *et al.*, 2021)

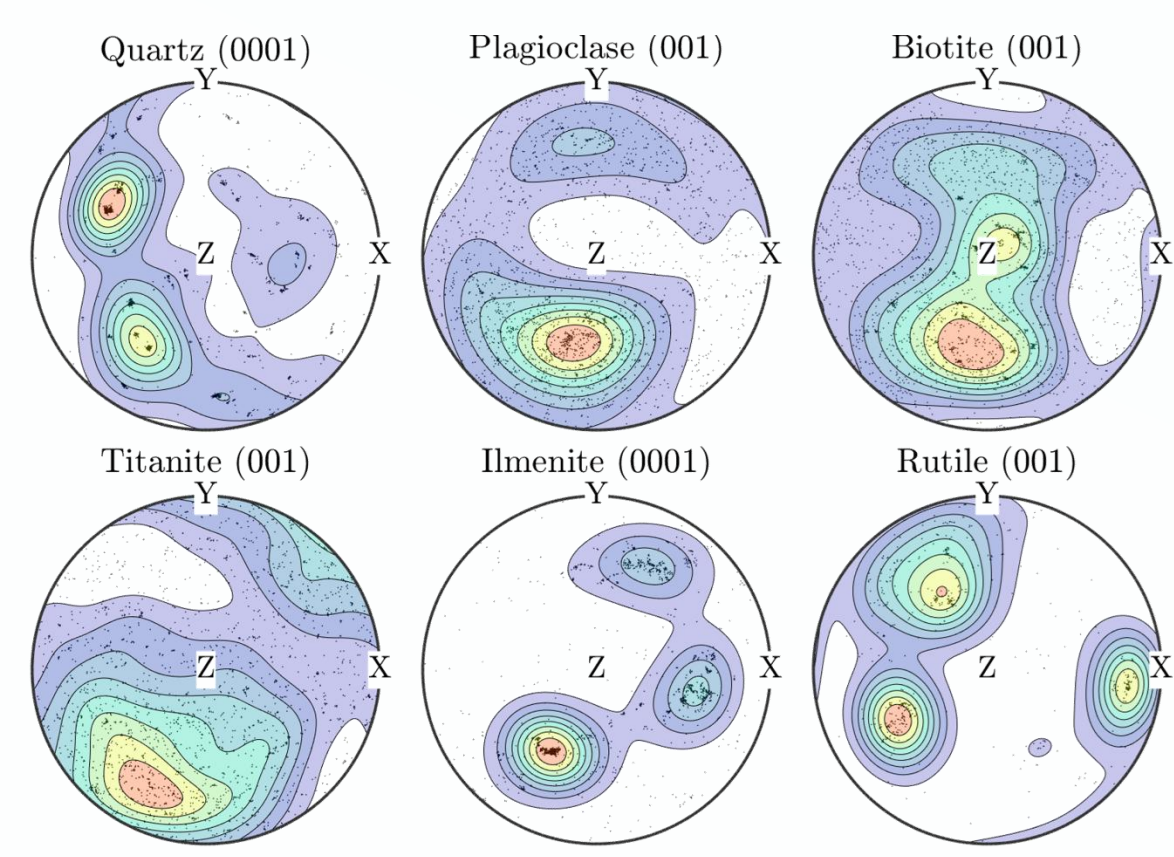
## Are Muscovite/Titanite representative for mylonitic deformation age?

### Muscovite sample



EBSD pole figures for each mineral phase

### Titanite sample



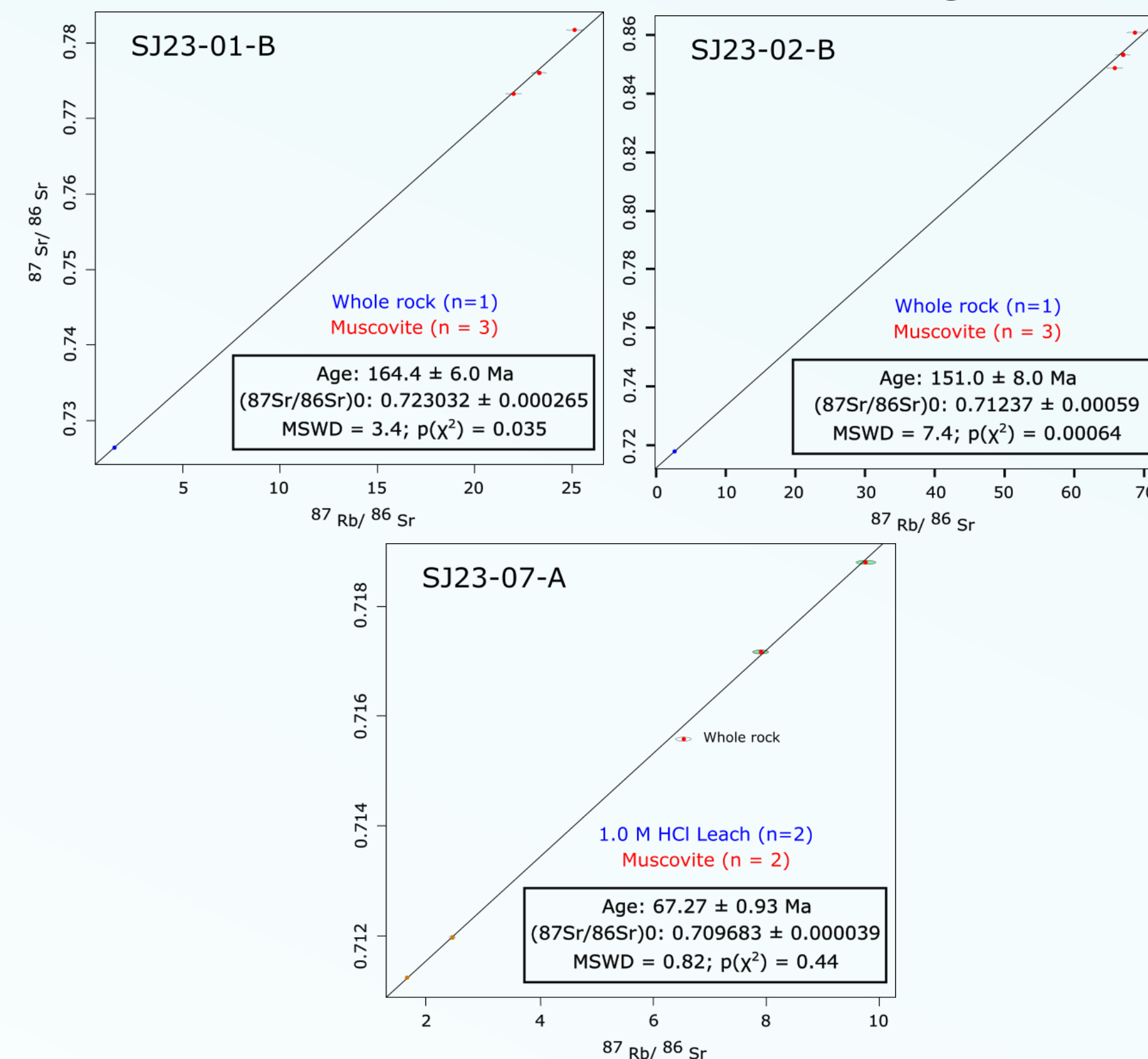
Titanite displays a **CPO** that is **consistent with** that of the **mylonitic matrix**, as defined by the orientation of plagioclase.

Together with the presence of sigma-type porphyroclasts in titanite, aligned with the plagioclase fabric indicate that titanite could be a reliable target for constraining the age of deformation.

## Dating the deformation age

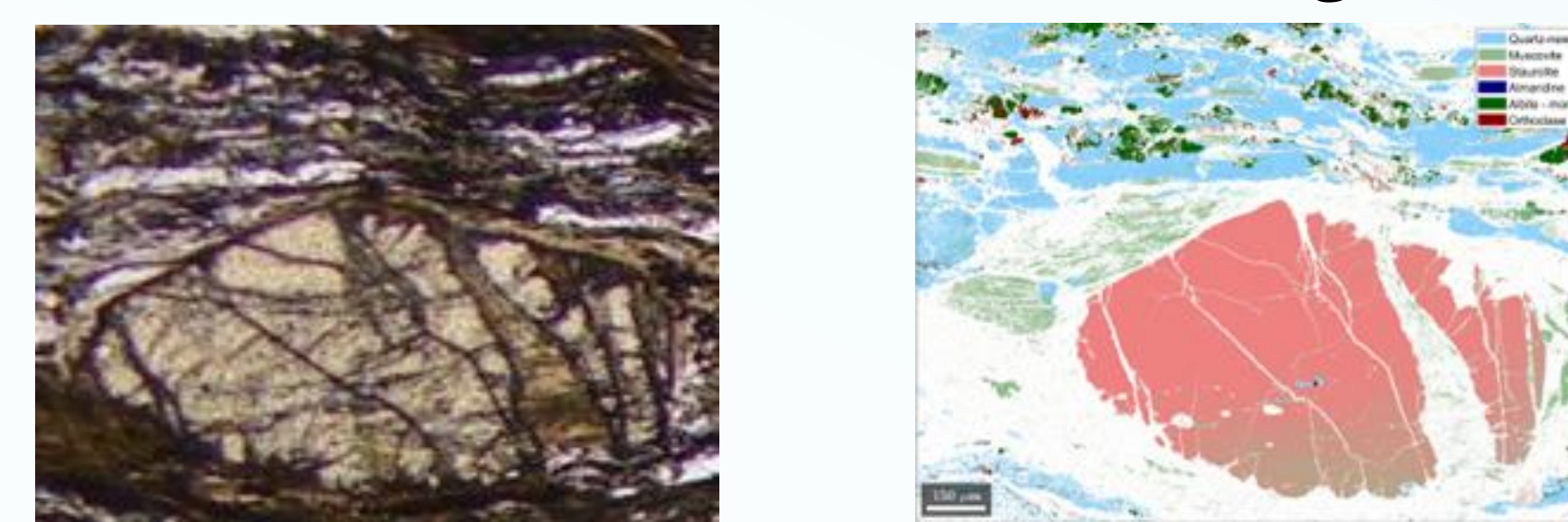
### Existing data:

#### ID-TIMS Rb/Sr Muscovite dating



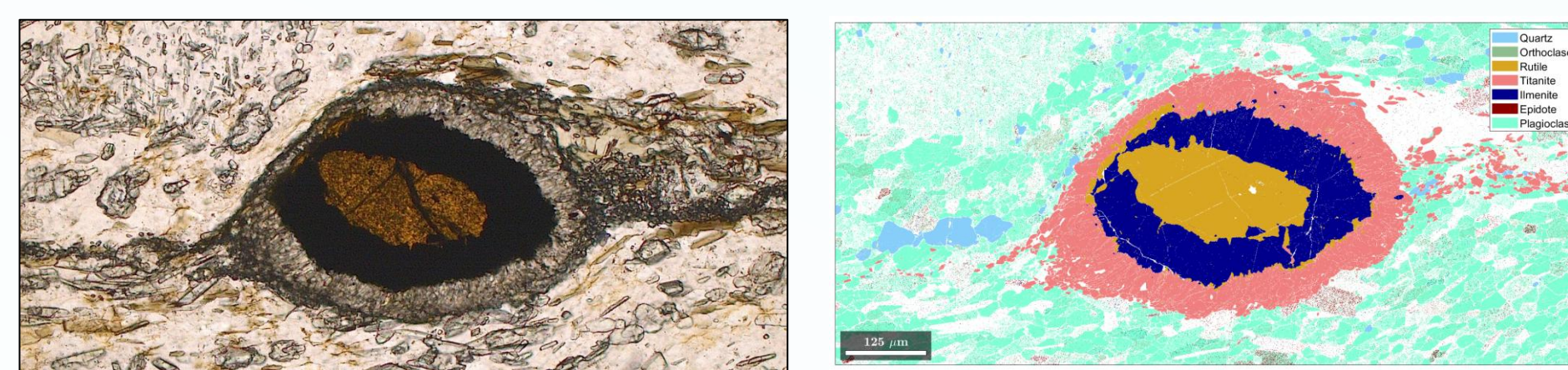
### In progress data:

#### In situ Rb/Sr muscovite dating



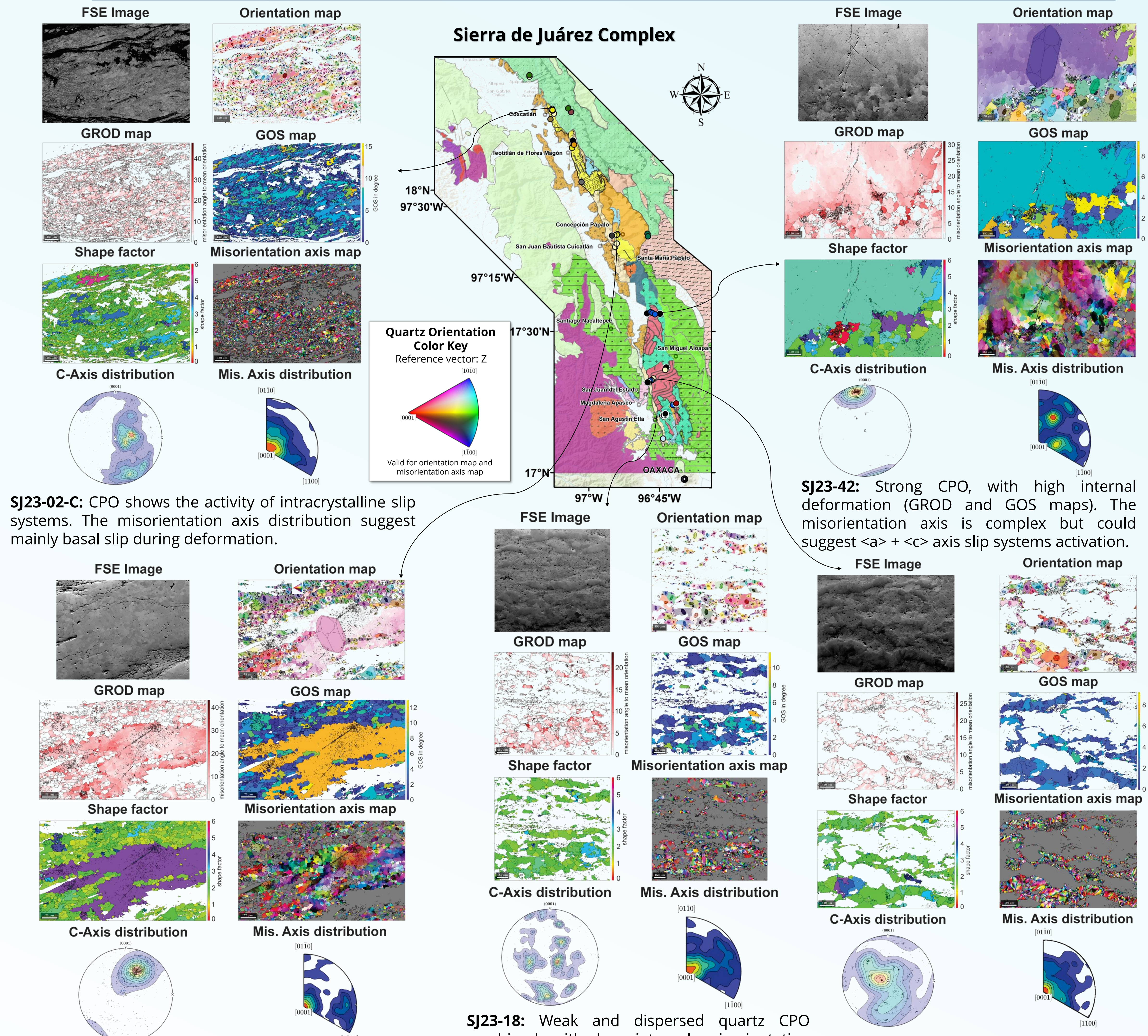
Muscovite, Staurolite and Garnet bearing schist.

#### U/Pb Titanite dating



Rutile, Ilmenite and Titanite bearing anorthosite.

## How does the intensity of quartz deformation differ along the Sierra de Juárez Complex?



**SJ23-02-C:** CPO shows the activity of intracrystalline slip systems. The misorientation axis distribution suggest mainly basal slip during deformation.

**SJ23-42:** Strong CPO, with high internal deformation (GROD and GOS maps). The misorientation axis is complex but could suggest  $\langle a \rangle + \langle c \rangle$  axis slip systems activation.

**SJ23-18:** Weak and dispersed quartz CPO combined with low internal misorientation (GROD and GOS) suggests limited deformation or a recovered fabric. The misorientation axis and shape factor maps support static grain growth or annealing after an earlier deformation event.

**SJ23-15-A:** Moderately developed basal CPO with low internal misorientation (GROD and GOS) suggests weak deformation or a recovered fabric. The misorientation axis and shape factor maps indicate limited dynamic recrystallization.

**SJ23-39:** Strong quartz CPO with a misorientation axis distribution dominated by basal  $\langle a \rangle$  slip, though local activation of additional systems is likely. GROD and GOS maps reveal zones of intense internal deformation, particularly in the central part.

**FSE:** Forescattered Electrons; **GROD:** Grain Reference Orientation Deviation; **GOS:** Grain Orientation Spread

## References

- Alaniz-Álvarez, S. A., Nieto-Samaniego, A. F., & Ortega-Gutiérrez, F. (1994). Structural evolution of the Sierra de Juárez Mylonitic Complex, state of Oaxaca, México. *Revista Mexicana de Ciencias Geológicas*, 11, 147–156
- Espejo-Bautista, G., Ortega-Gutiérrez, F., Solari, L. A., Maldonado, R., & Valencia-Morales, Y. T. (2021). The Sierra de Juárez Complex: A new gondwanan Neoproterozoic–Early Palaeozoic metamorphic terrane in southern Mexico. *International Geology Review*, 64, 631–653.
- Graham, R., Pindell, J., Villagómez, D., Molina-Garza, R., Granath, J., & Sierra-Rojas, M. (2021). Integrated cretaceous–cenozoic plate tectonics and structural geology in southern Mexico. *Geological Society, London, Special Publications*, 504, 285–314