

# Investigation of juxtaposed high- and low-pressure metamorphic field gradients rocks and its tectonic implications, a case study of Turvo-Cajati Formation, Ribeira Belt, Brazil

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## Introduction

In Ribeira Belt, Curitiba Terrain, SE Brazil, metapelites from Turvo-Cajati Formation (TCF) crop out in distinct metamorphic degrees (Low-TCF, Medium-TCF and High-TCF). Low-TCF is composed by phyllites in biotite/garnet zone. Medium-TCF is composed by schists in staurolite and sillimanite zones. High-TCF is composed by paragneiss with evidence of partial melting and kyanite-K-feldspar association. Previous studies in High-TCF indicate 670-810 °C and 9.5-12 kbar peak metamorphic conditions occurred in 589±12 Ma and 584±4 Ma (monazite and zircon, respectively; Faleiros et al., 2011, 2016) with partial melting and sillimanite occurring as retrograde phase. This study presents results from Low and Medium-TCF, units never studied in detail, and compare them with High-TCF to propose a tectonic model to TCF evolution and for all Curitiba Terrane.

## Isograd Map and samples location

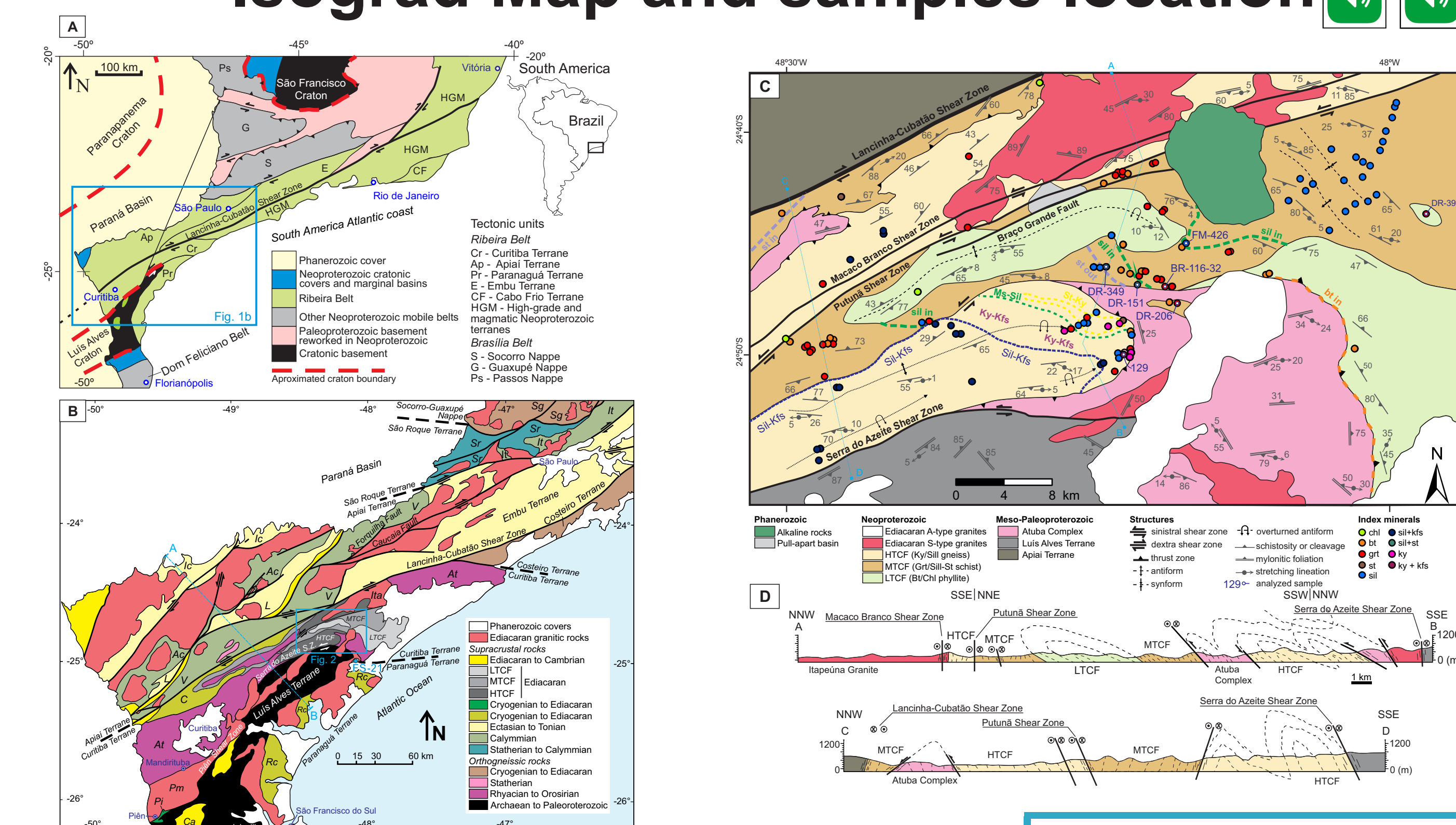
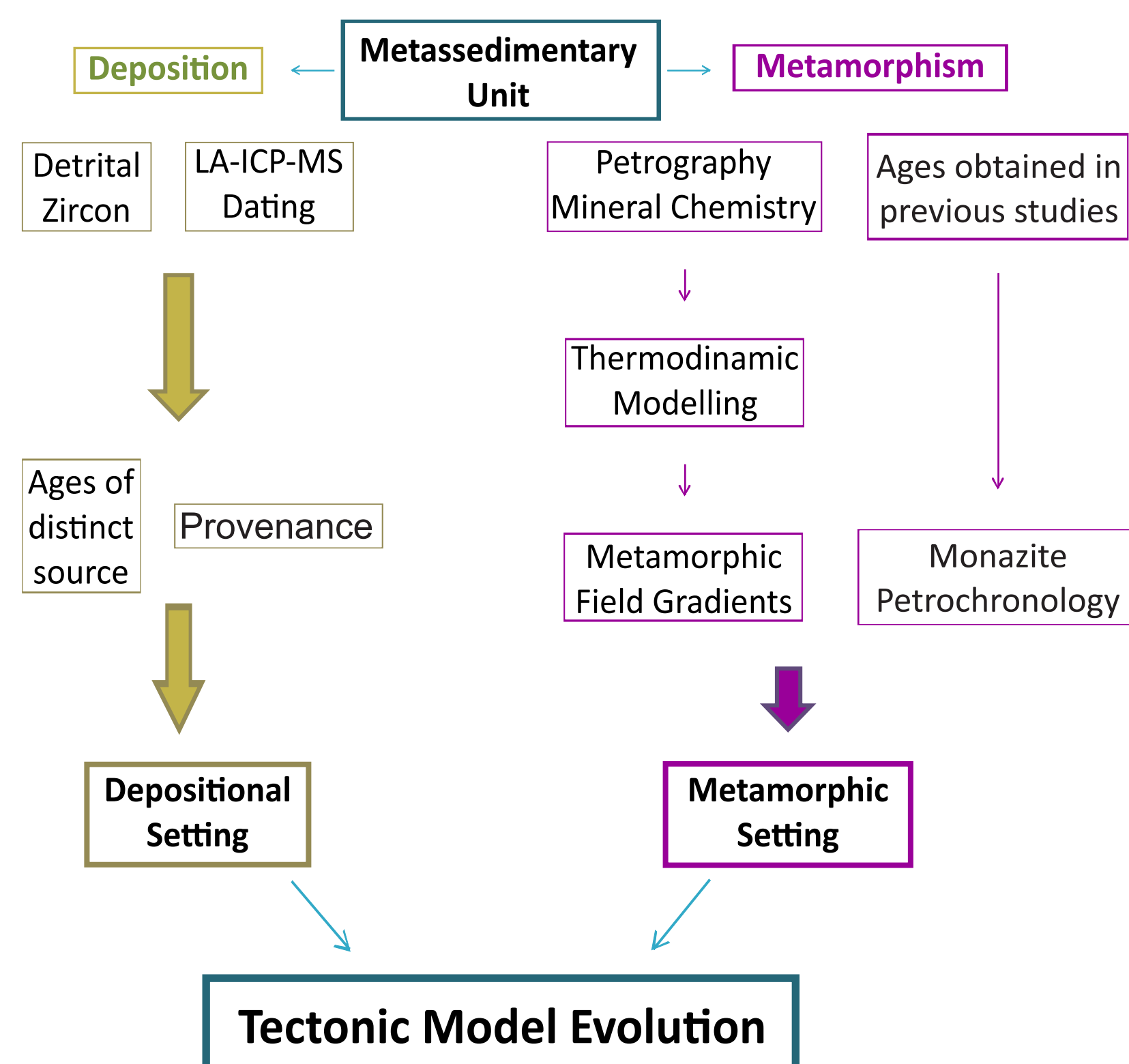


Fig 1: (A-B) Geological context where TCF is located. (C) Detailed study area map with samples locations and proposed isograds for TCF. (D) Cross-sections on the studied area.

## Methodology



## Sample Characterization and Metamorphism

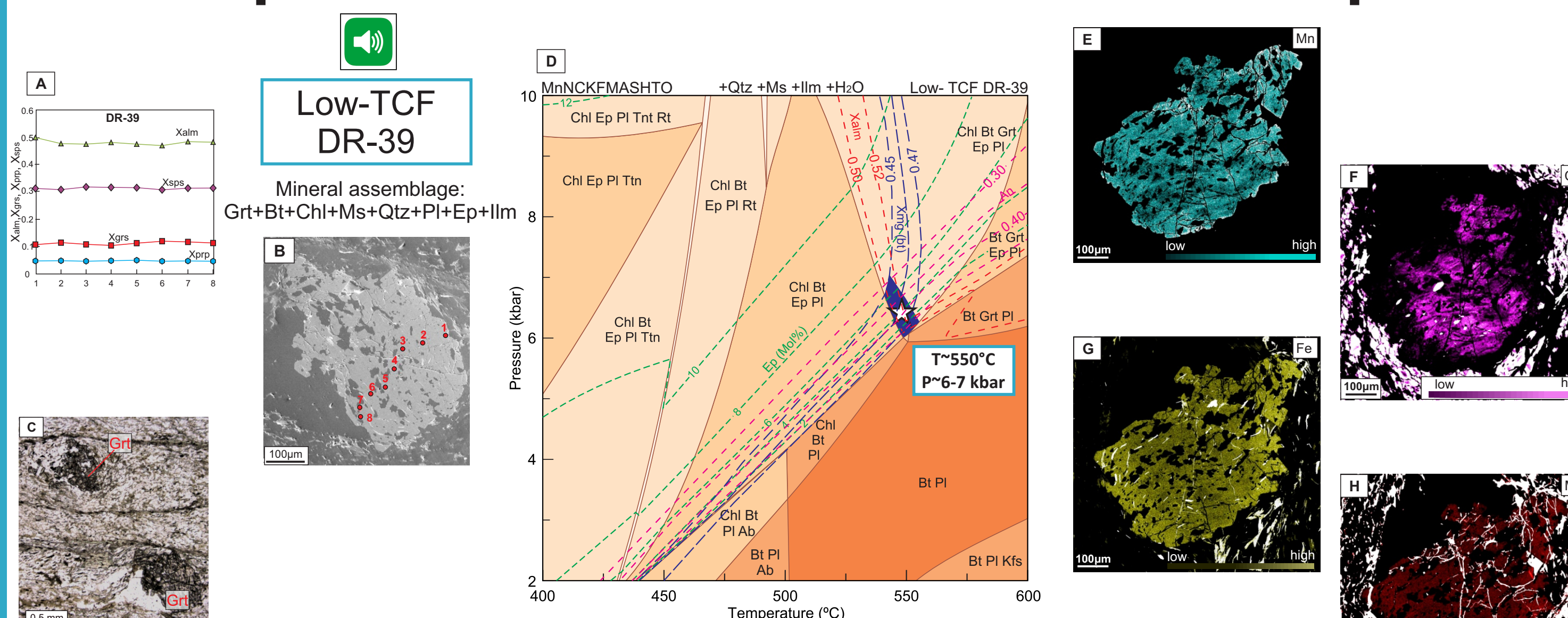


Fig. 2: Characterization and metamorphism of sample DR-39. (A-B) Chemical profiles in garnet for distinct end-members and its location presented in BS image. (C) Photomicrography. (D) Pseudosection modeled with P-T peak conditions estimated presented in white chart. (E-H) Compositional maps in garnet for different elements.

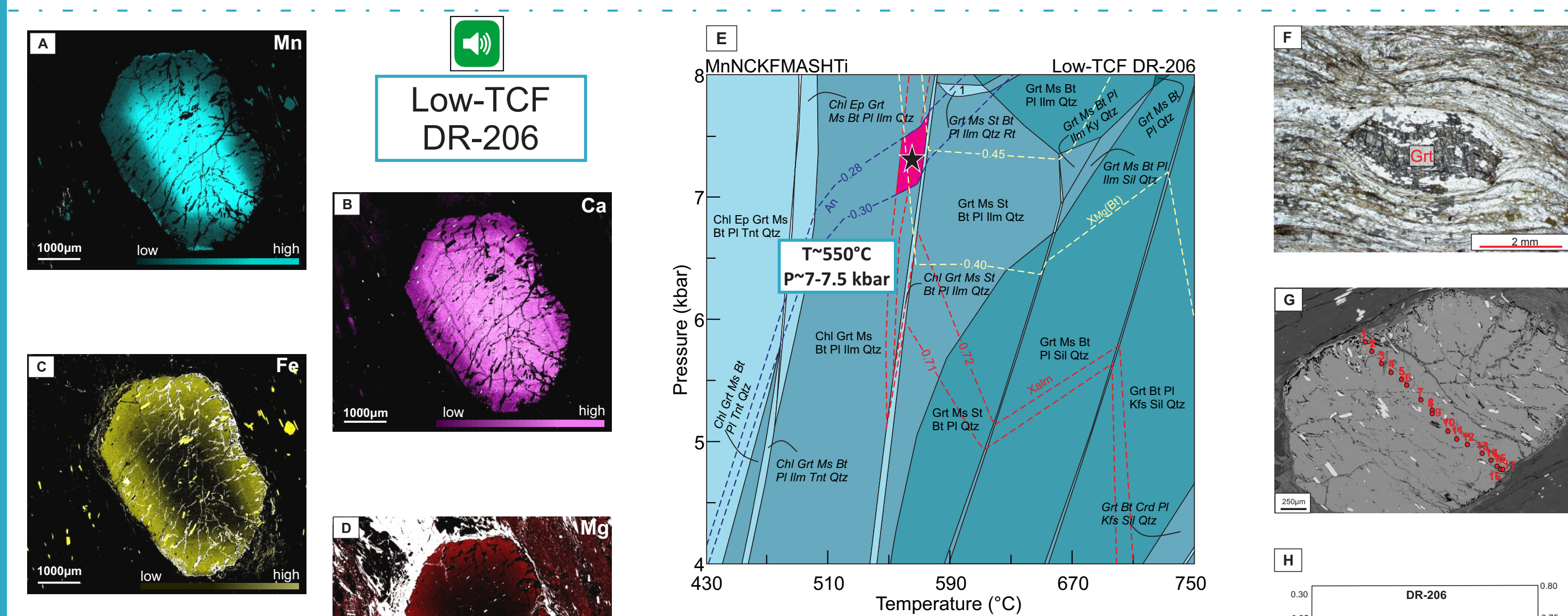


Figure 3: Characterization and metamorphism of sample DR-206 (Low-TCF). (A-D) Compositional maps in garnet for different elements. (E) Pseudosection modeled with P-T peak conditions estimated presented in white chart. (F-G) Chemical profiles in garnet for distinct end-members and its location presented in BS image. (H) Photomicrography.

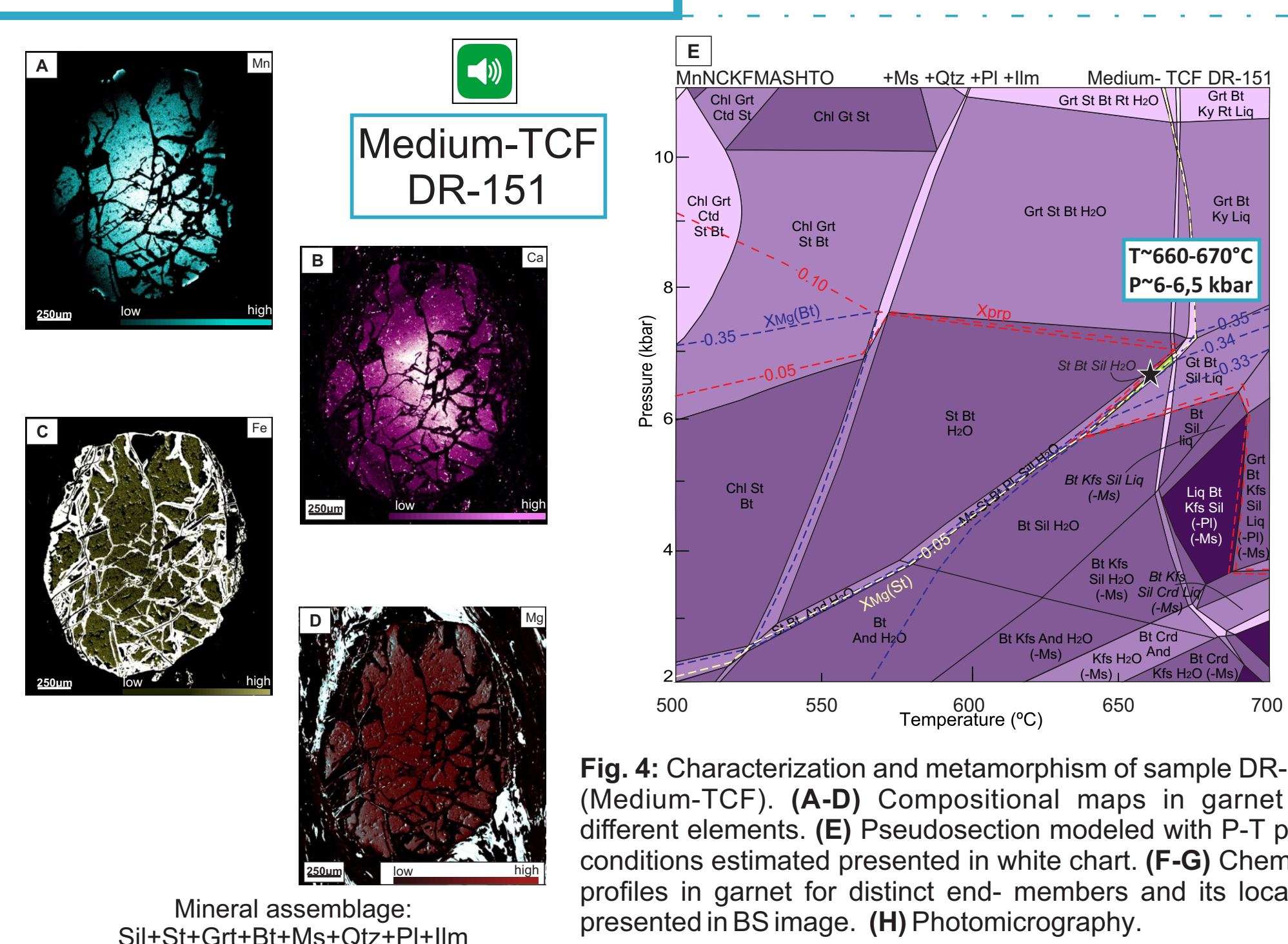


Fig. 4: Characterization and metamorphism of sample DR-151 (Medium-TCF). (A-D) Compositional maps in garnet for different elements. (E) Pseudosection modeled with P-T peak conditions estimated presented in white chart. (F-G) Chemical profiles in garnet for distinct end-members and its location presented in BS image. (H) Photomicrography.

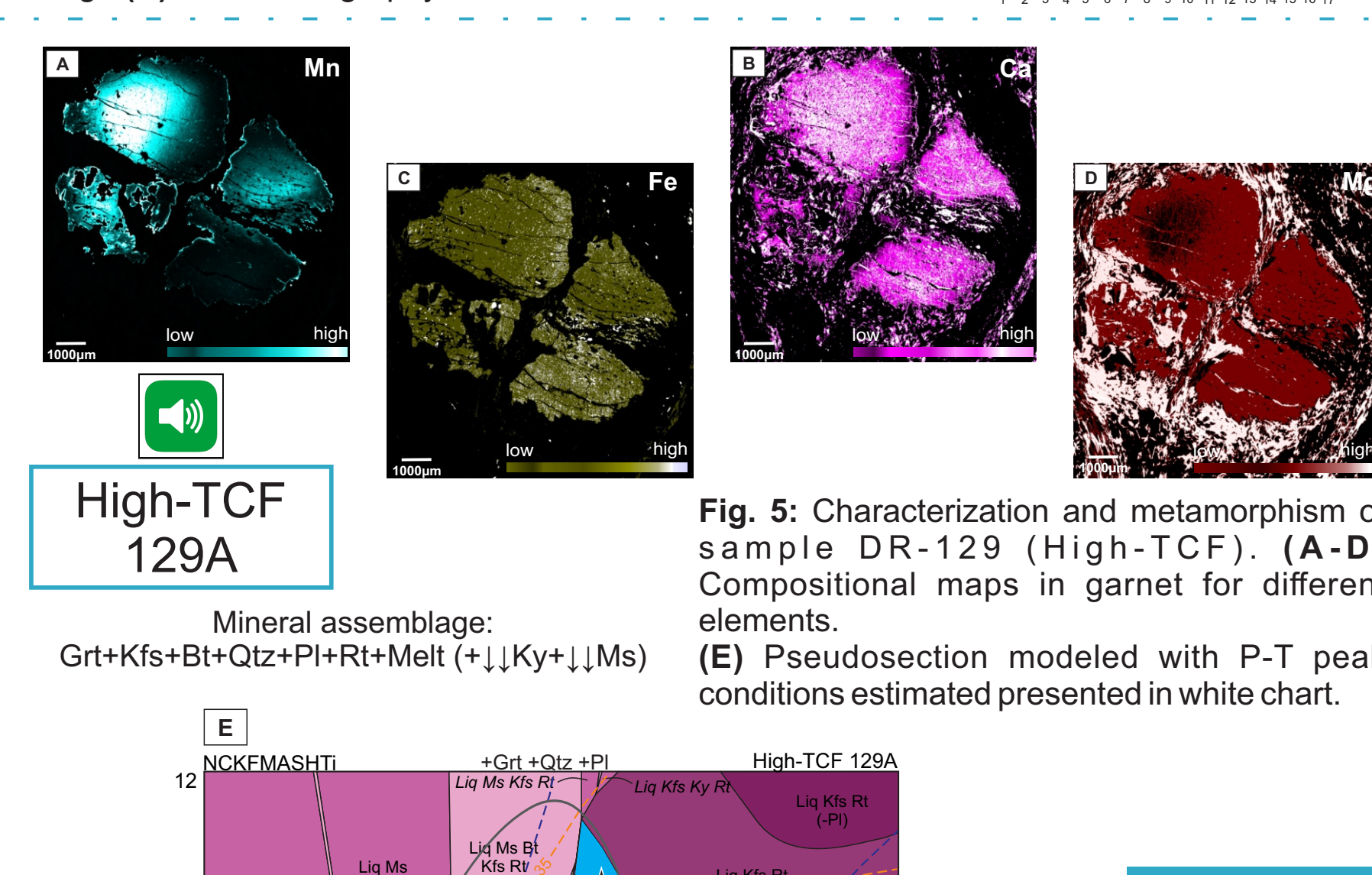


Fig. 5: Characterization and metamorphism of sample DR-129 (High-TCF). (A-D) Compositional maps in garnet for different elements. (E) Pseudosection modeled with P-T peak conditions estimated presented in white chart.

## Detrital Zircon

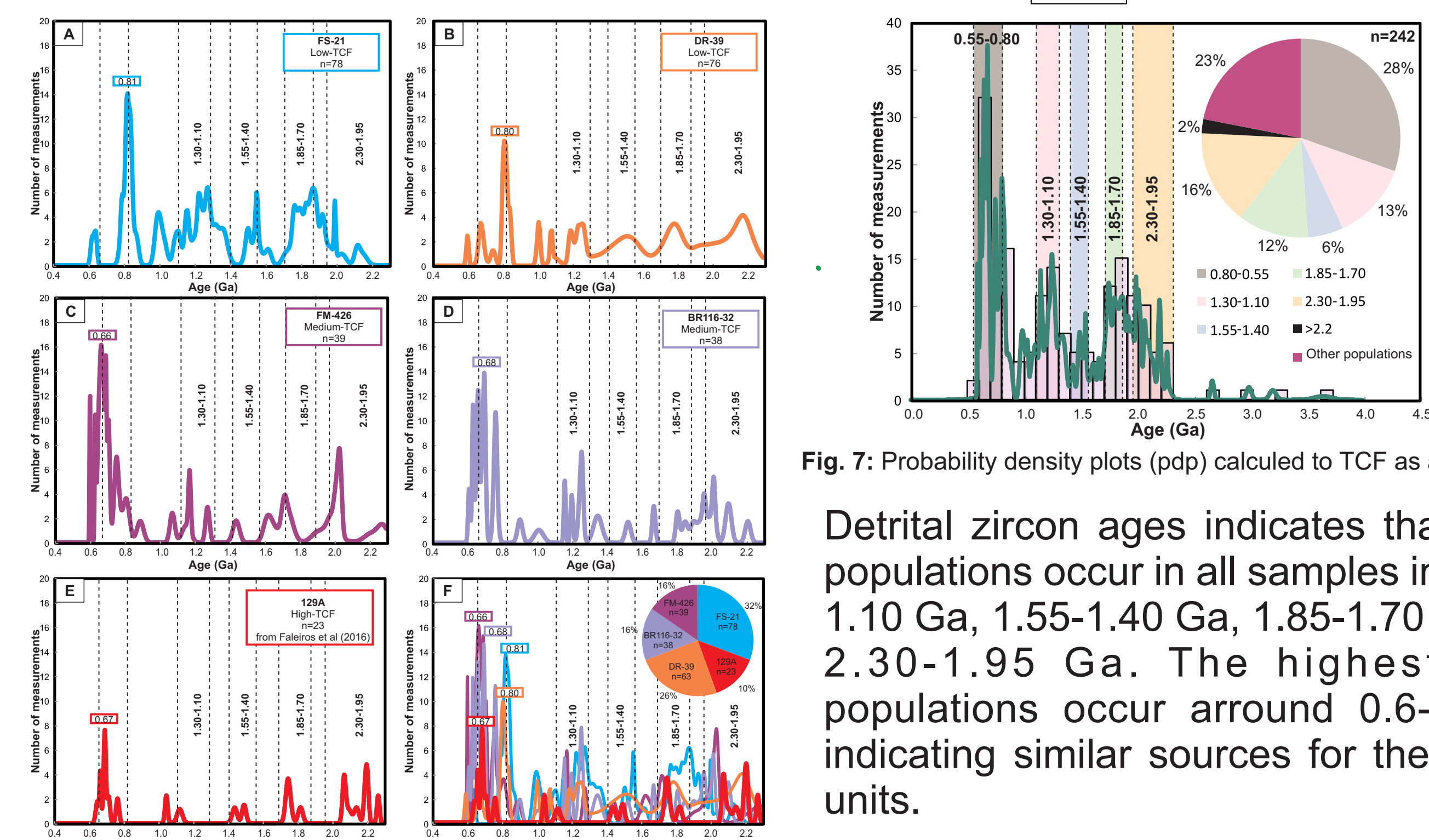


Fig. 7: Probability density plots (pdp) calculated to TCF as a whole unit.

Detrital zircon ages indicates that same populations occur in all samples in ~1.30-1.10 Ga, 1.55-1.40 Ga, 1.85-1.70 Ga and 2.30-1.95 Ga. The highest peak populations occur around 0.6-0.8 Ga indicating similar sources for these sub-units.

Fig 6: Probability density plots (pdp) from samples in all sub-units. (F) is a compilation of all pdp. Pie chart represents the number of analyses of each sample.

## Preliminary conclusions

Previous studies in High-TCF point to peak pressure of 10-12 kbar. This study, in Low and Medium-TCF points to maximum pressure of 7 kbar. This scenario indicates that TCF comprises more than one group of metamorphic rocks from distinct tectonic settings. P-T conditions suggests that that comprises a paired low-P and high-P belt associated with major Ediacaran suture. Detrital zircon indicates that all sub-units received similar detrital grains and the highest peak at ~640 Ma could be associated with a magmatic arc. Detrital zircon U-Pb signatures coupled with metamorphic records suggest that TCF is made up of juxtaposition of an accretionary wedge (High-TCF) and back-arc basin (Medium-TCF, Low-TCF) related to a microplate that includes a Rhyacian basement microcontinent (Atuba Complex).

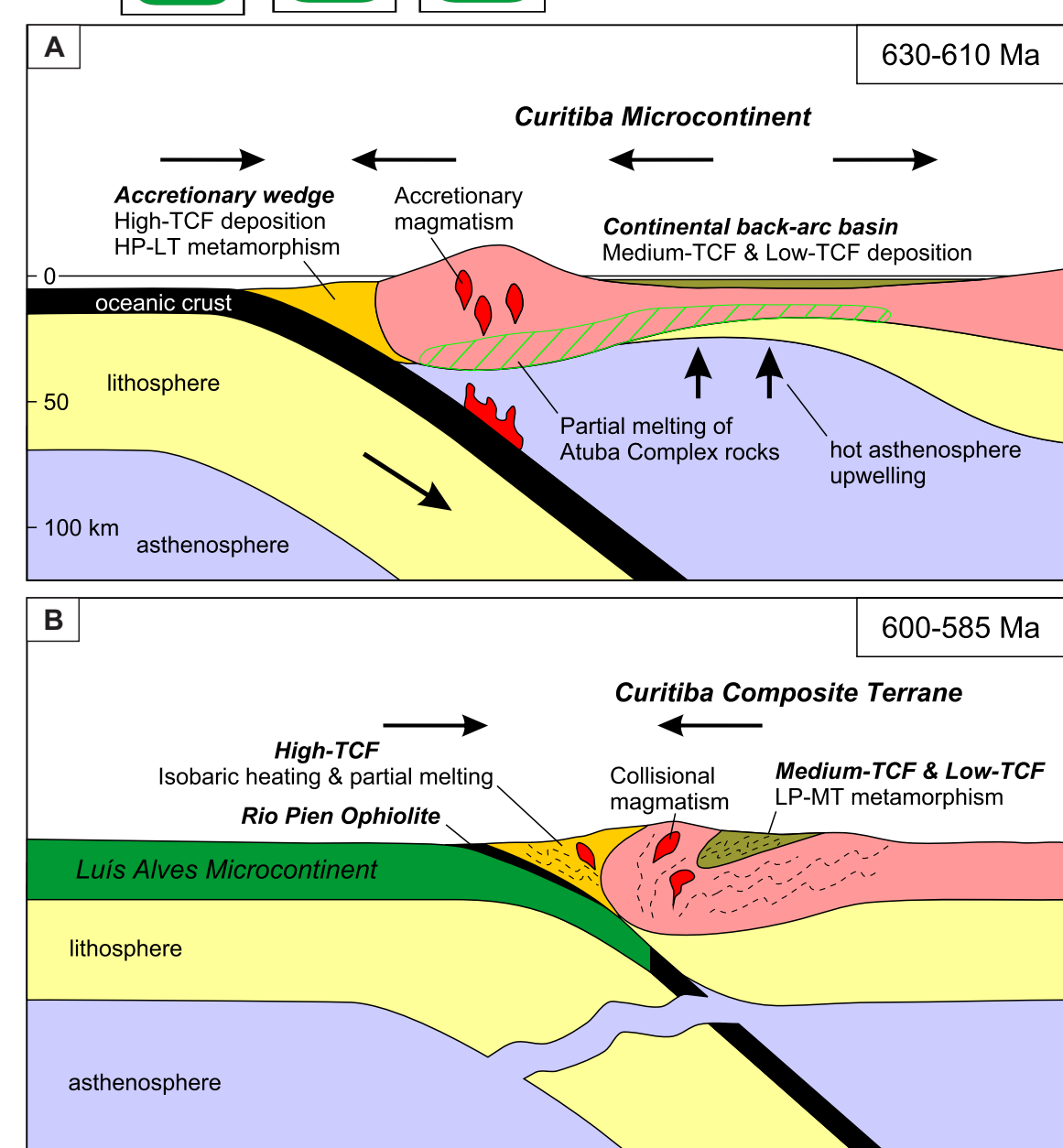


Fig. 8: Proposed model from Curitiba Terrain evolution.

## Next phases

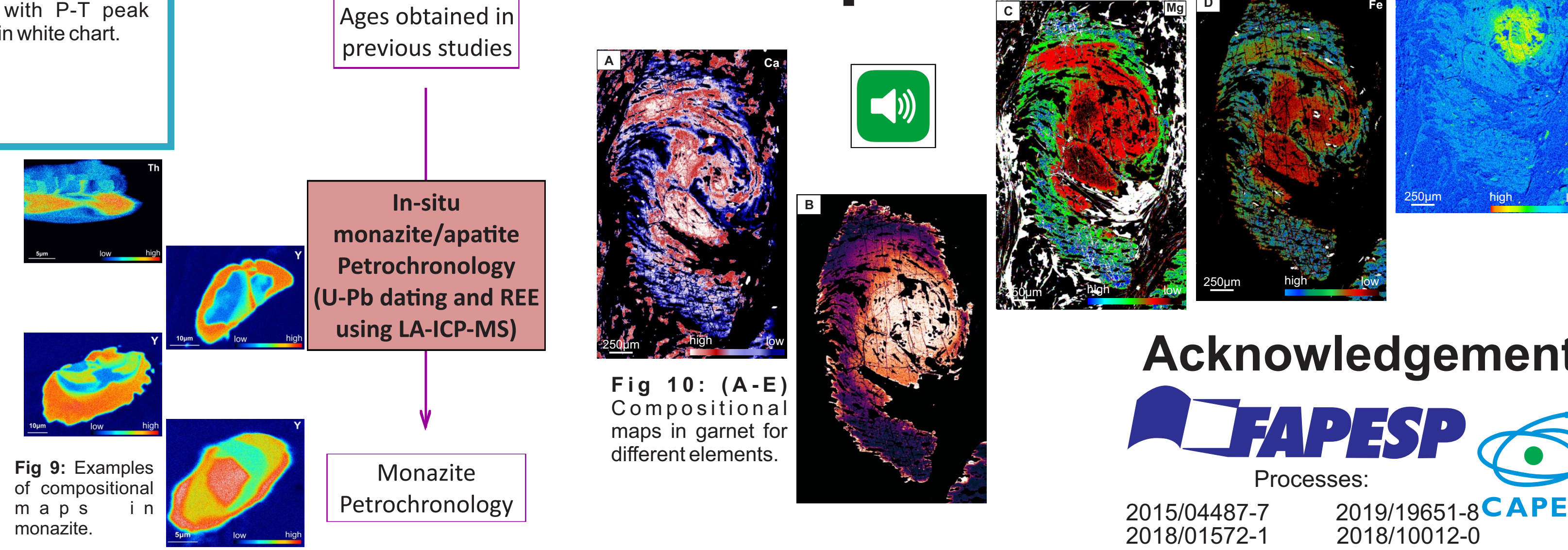


Fig 10: (A-E) Compositional maps in garnet for different elements.

## Acknowledgement

Processes:  
2015/04487-7  
2018/01572-1  
2016/12986-6  
2019/19651-8  
2018/10012-0  
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