



Predictive models for strategic metal rich,
granite-related ore systems based on mineral
and geochemical fingerprints and footprints

*Final Seminar
7th and 8th June, 2024*

Petrographic analysis of cordierite(?) and andalusite-bearing metasediments of the Beiras Group, Castanheira de Pera region, Central Portugal

Elsa M. C. Gomes, Fernando Carlos Lopes, Ícaro Dias da Silva,
Maria Manuela Vinha, Hugo Rodrigues e Alcides Pereira



A Work in Progress

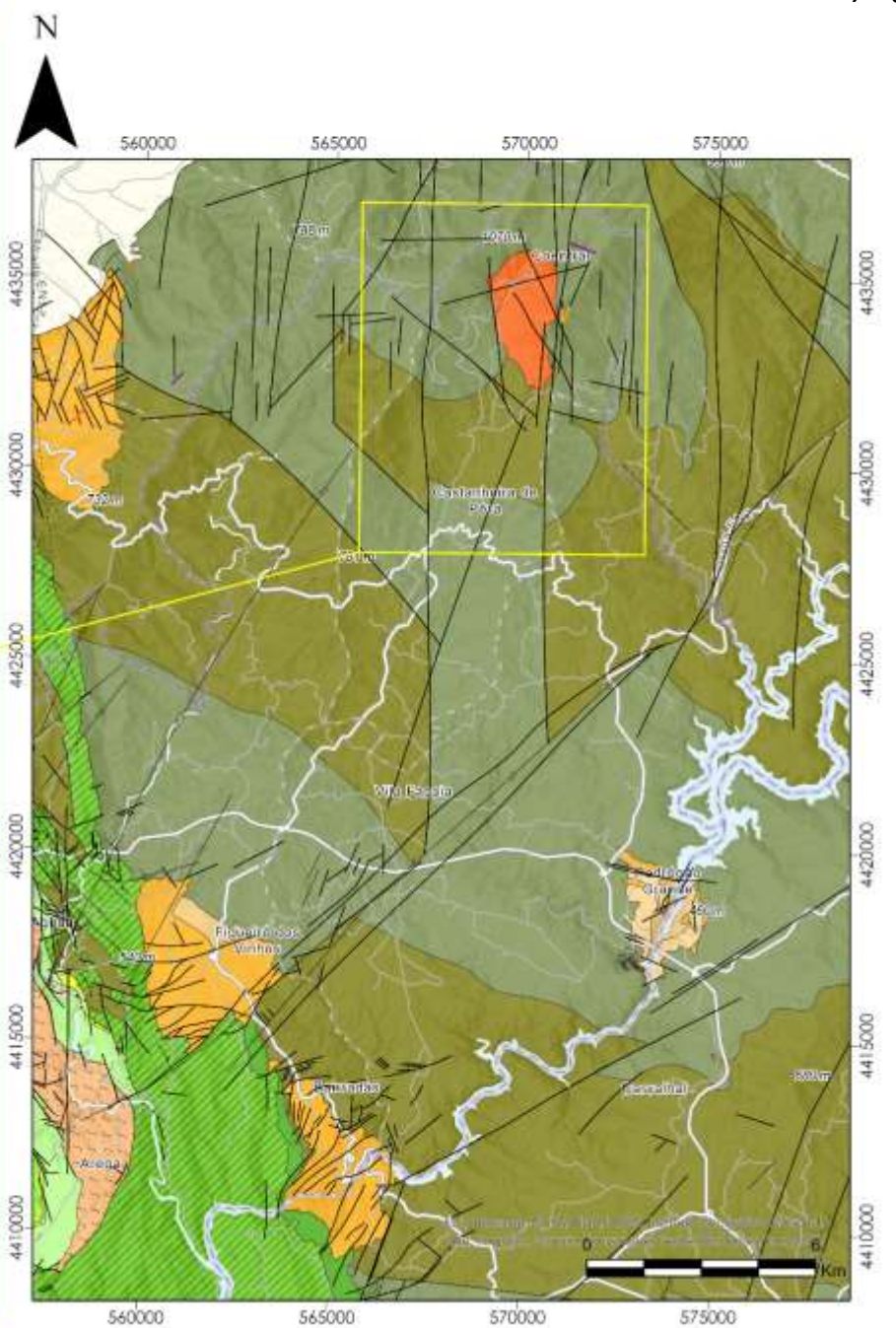
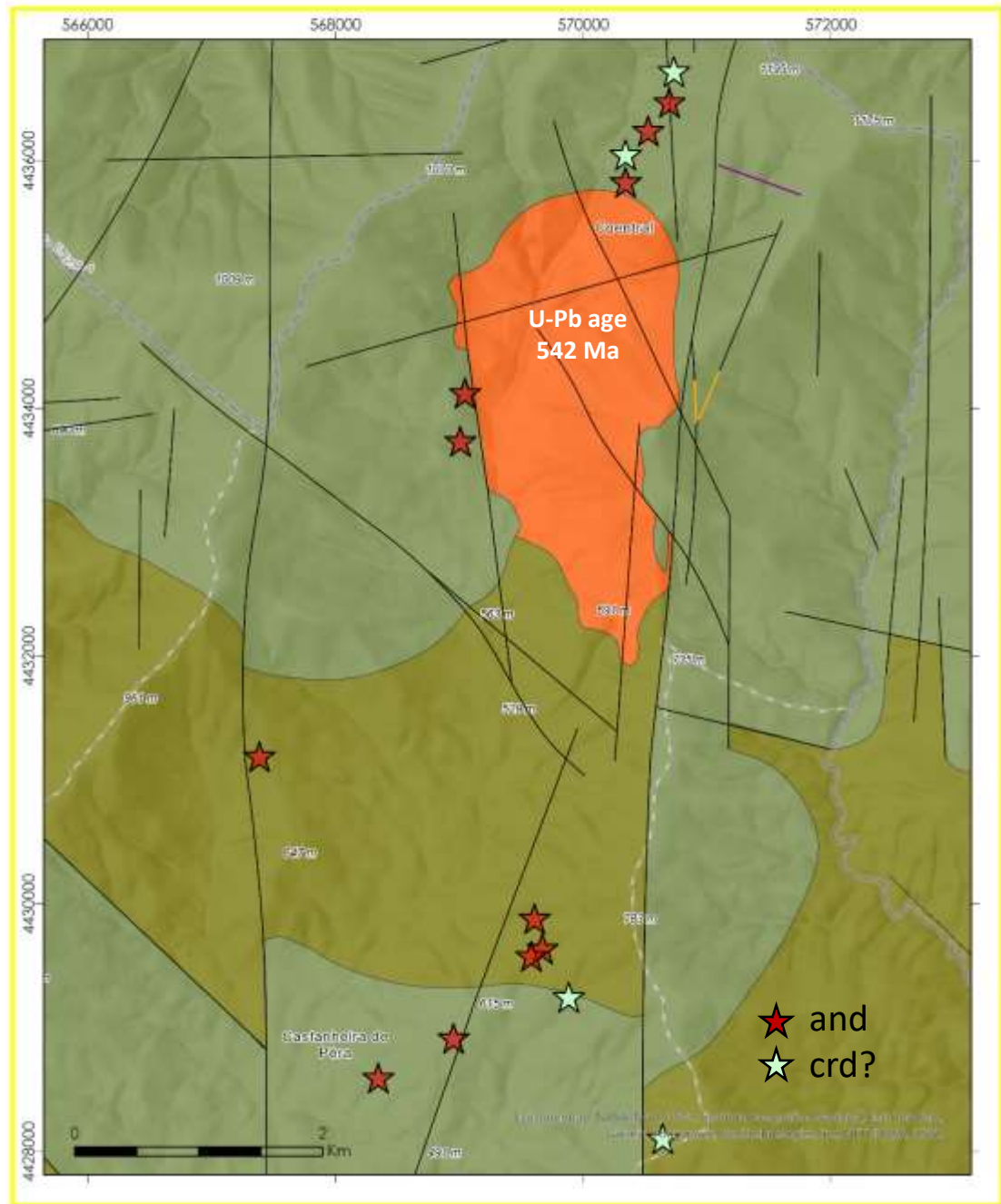
Objectives

Project

- “Identify ... minerals ... that might be used as proxies ... to identify most promising litho-stratigraphic sections and/or granite suites and foresee their potential metal endowment”.

This study

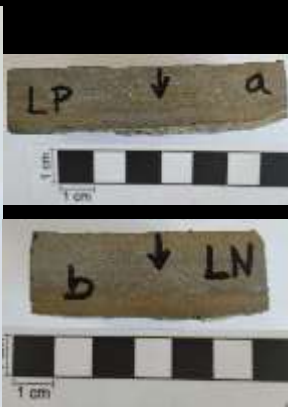
- Identify the mineral phases of the metasedimentary rocks in the study region
- Analyze the temporal relationship between the fabric and the porphyroblasts
- Recognize different generations of porphyroblasts
- Explain the possible origin of these porphyroblasts



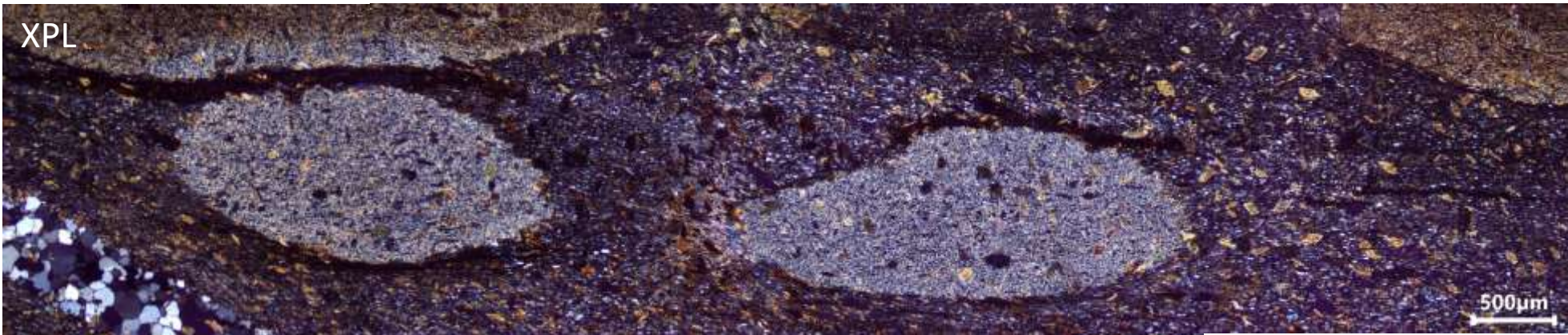
Outcrop aspects



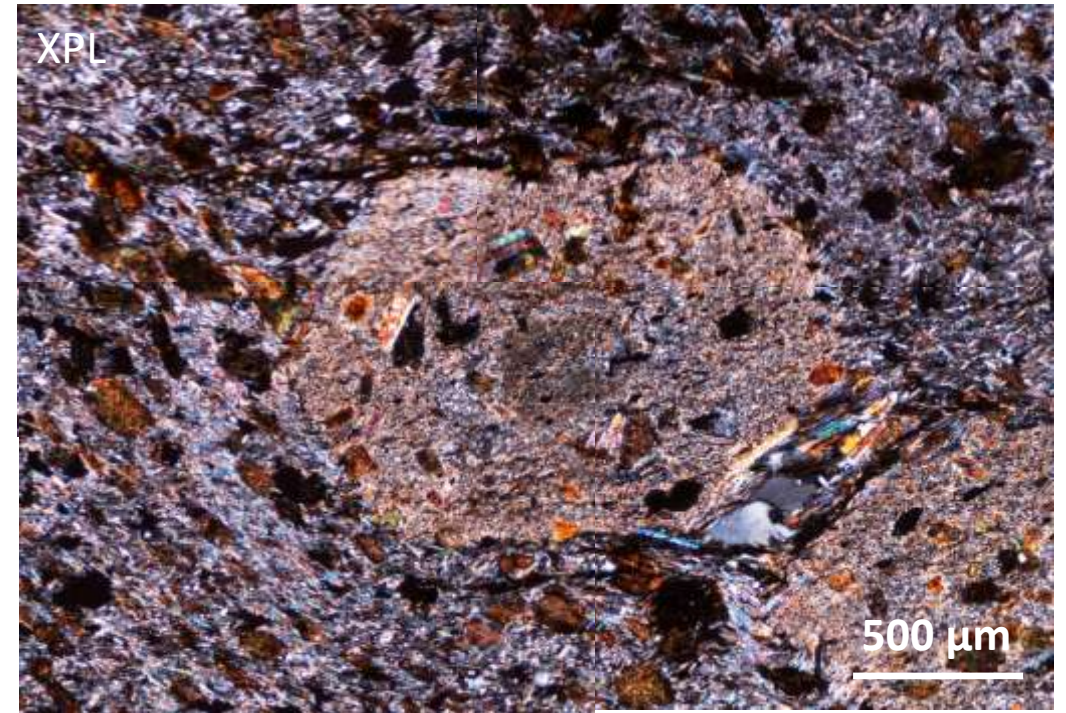
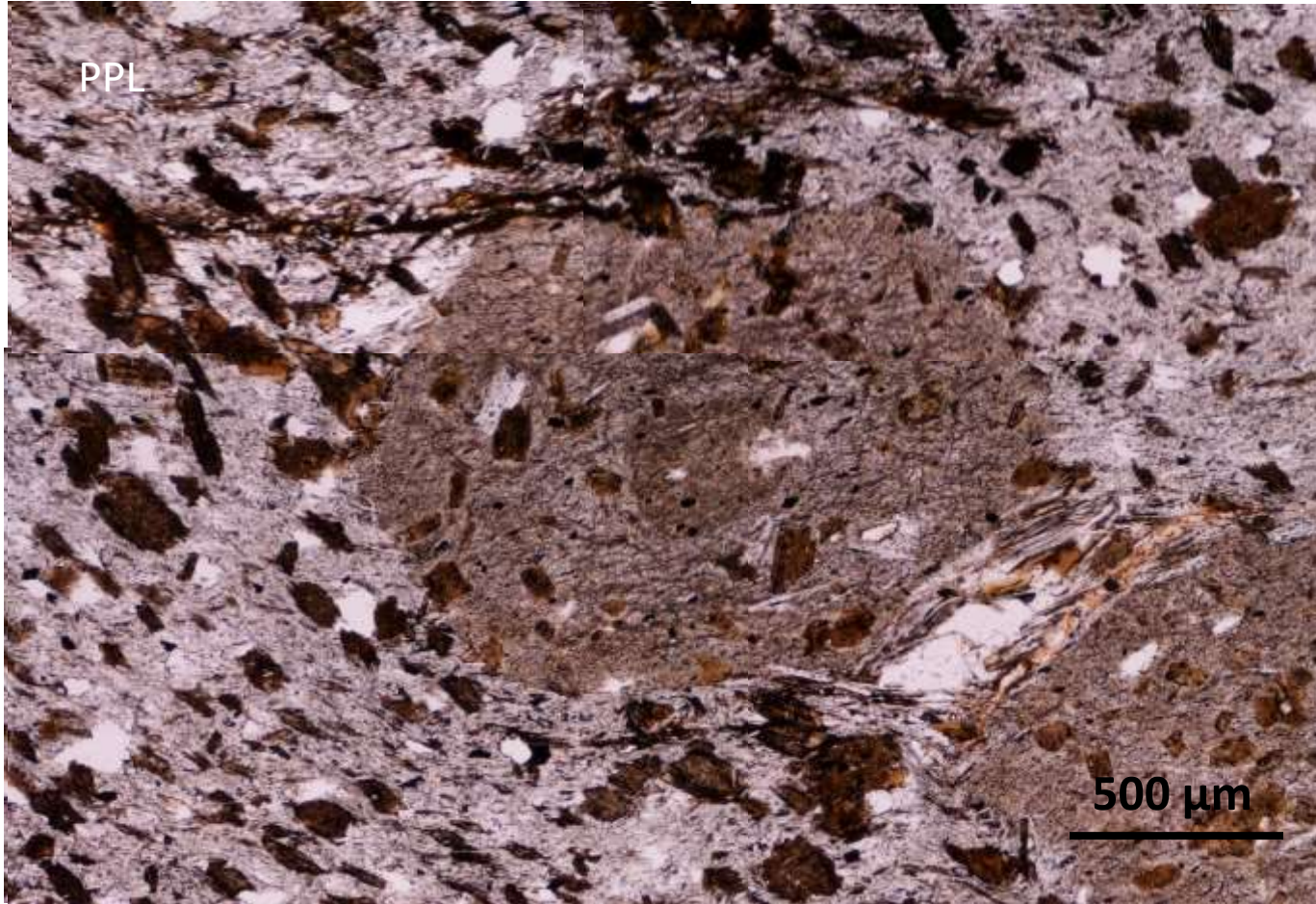
Samples



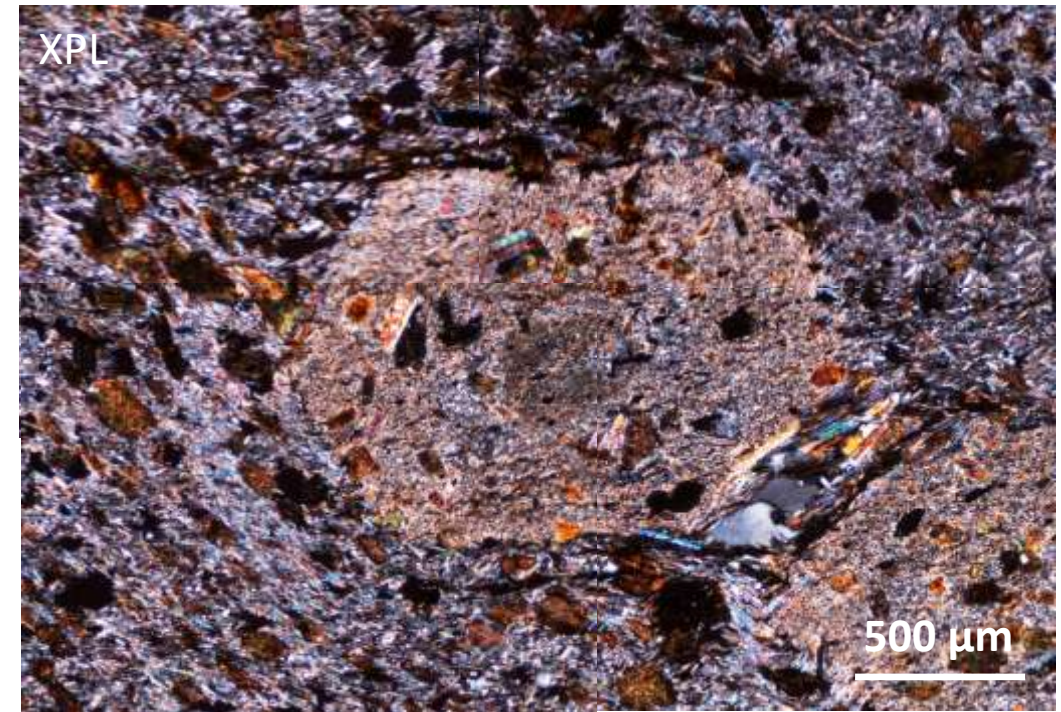
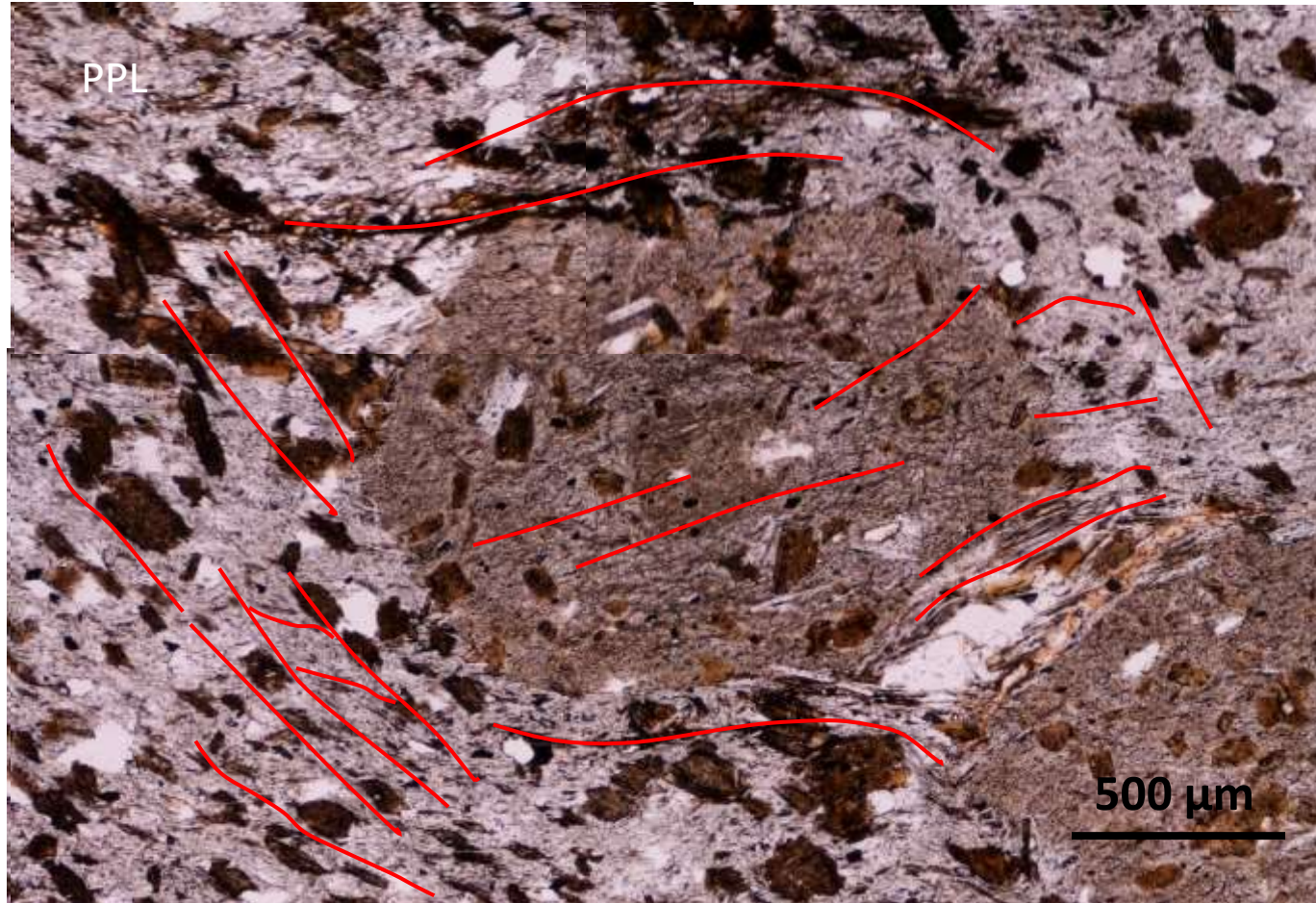
Ghost porphyroblasts



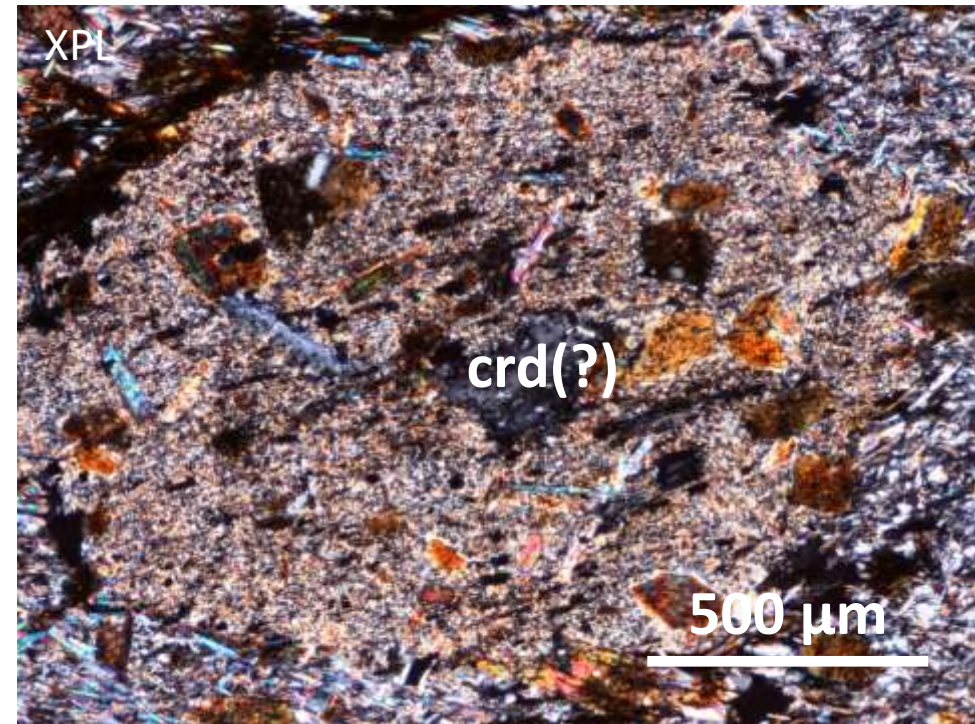
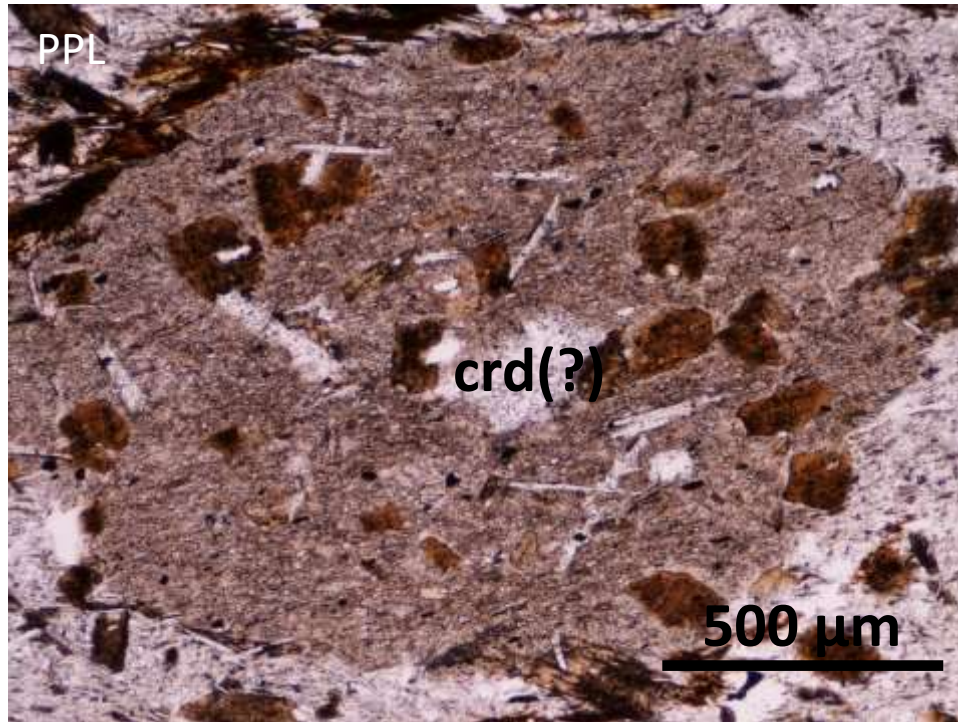
Ghost porphyroblasts



Ghost porphyroblasts



Ghost porphyroblasts



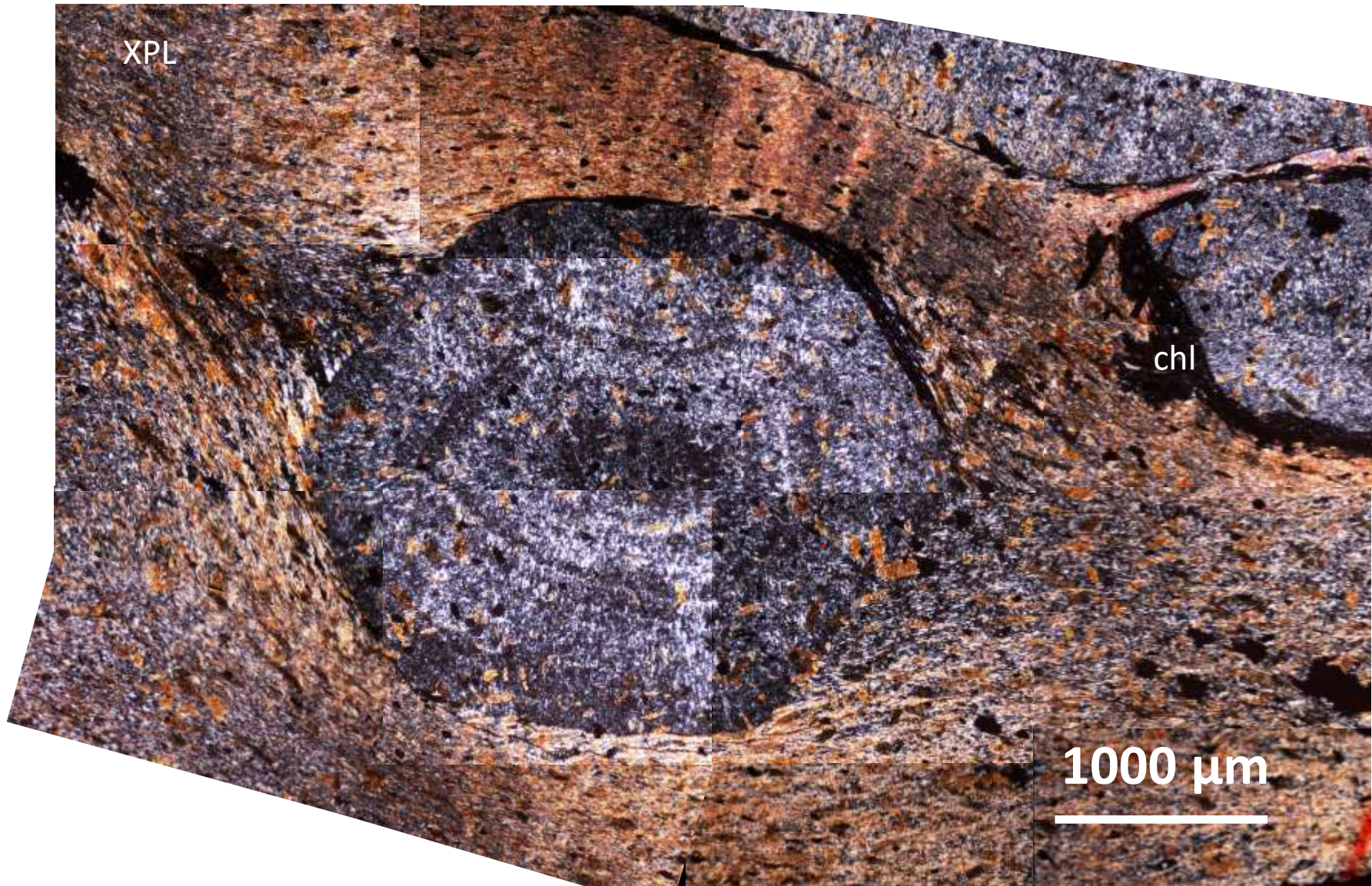
Question:

The cordierite(?) is the result of neocrystallization, recrystallization or represents a relict?

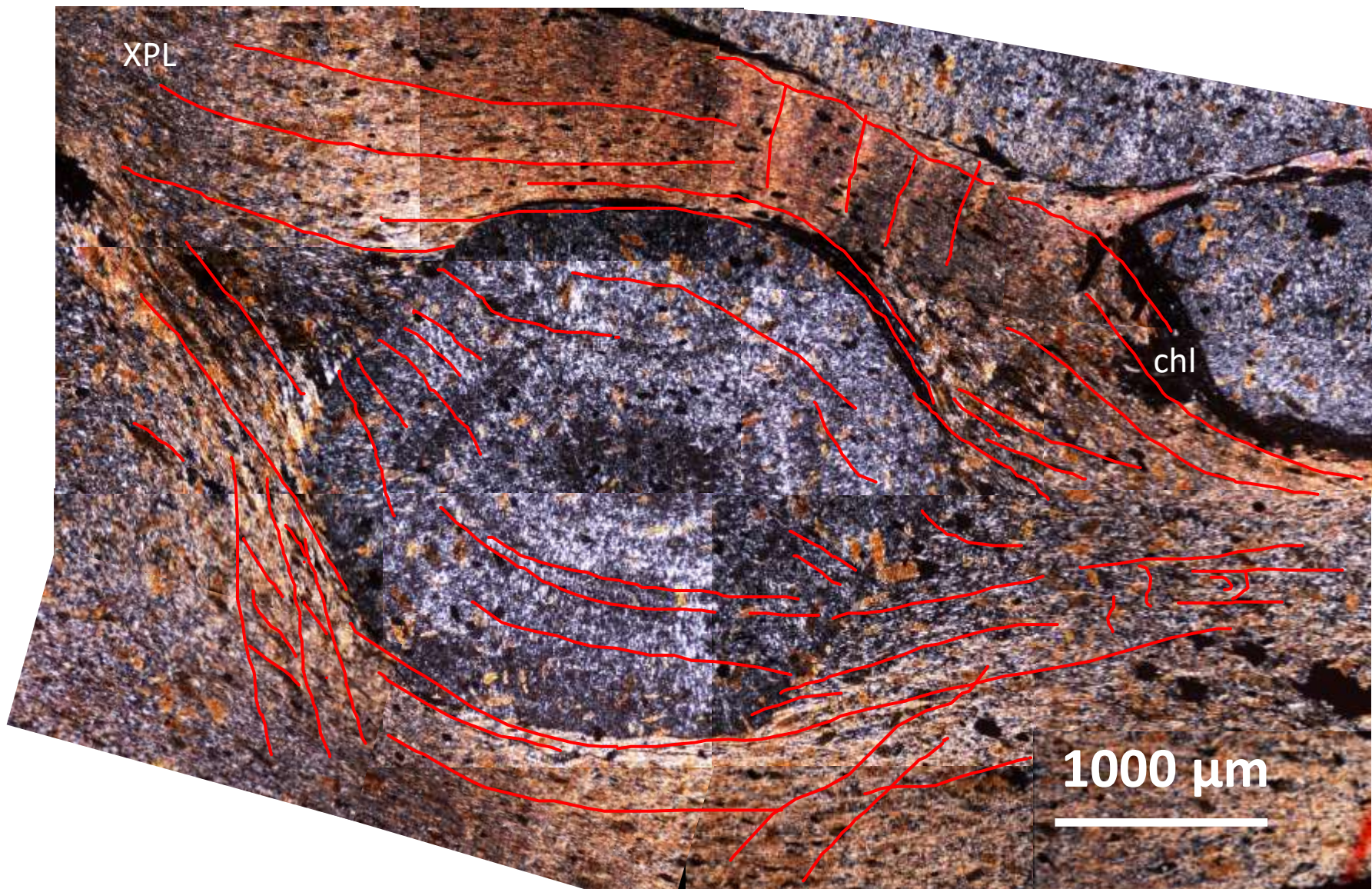
Ghost porphyroblasts

Question:

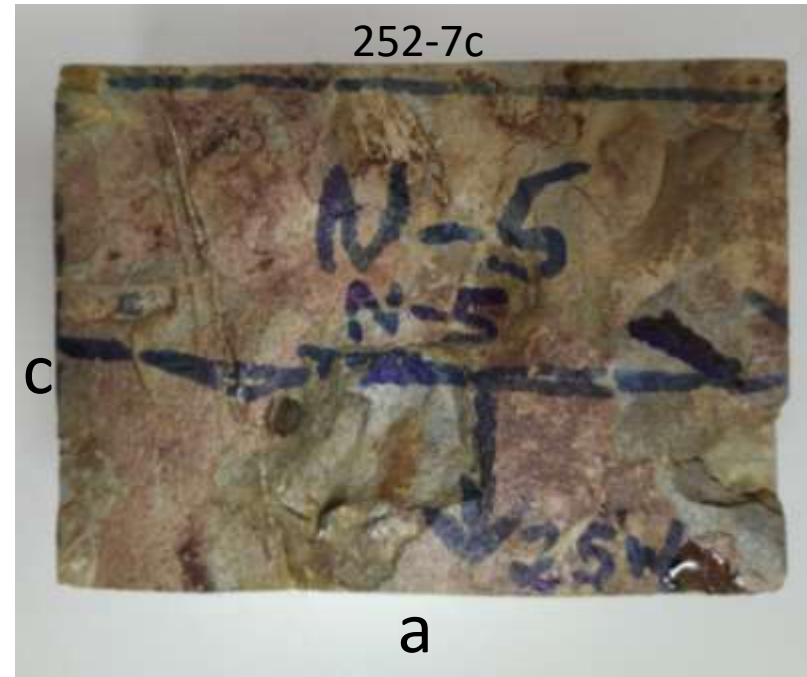
Could it be a garnet or a staurolite?



Ghost porphyroblasts



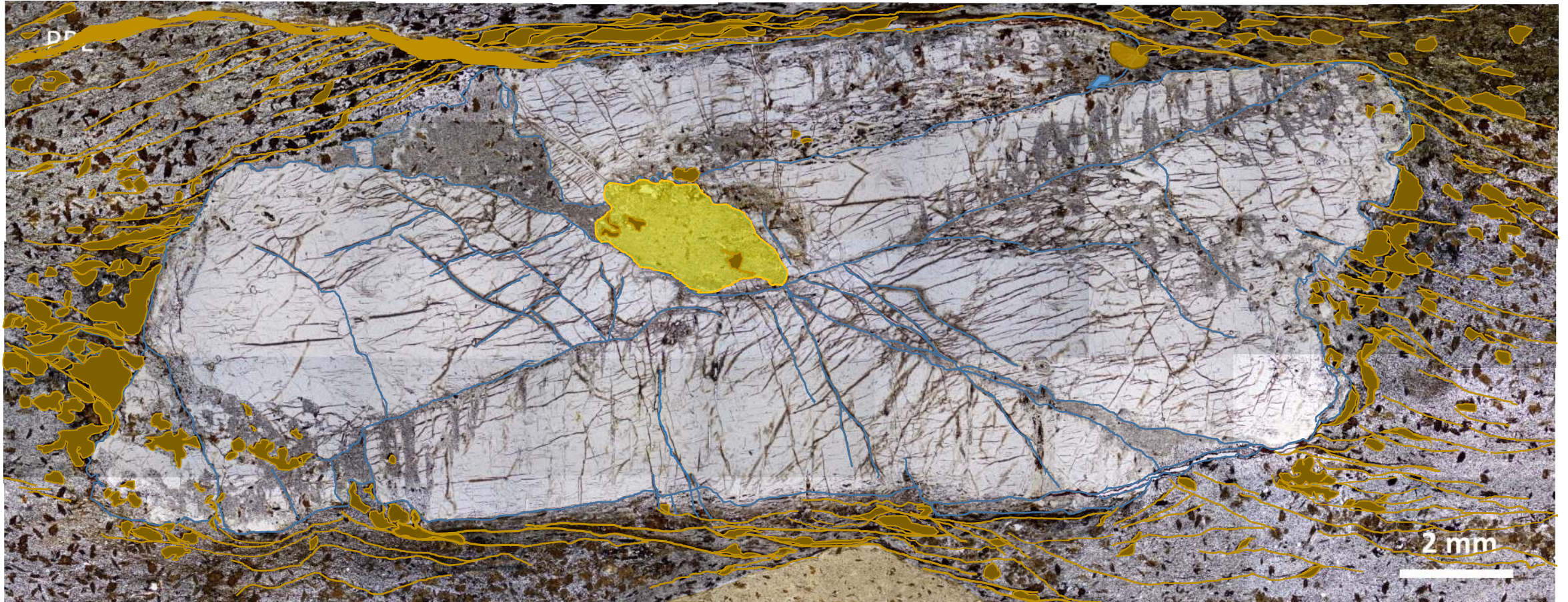
Porphyroblasts of andalusite



Porphyroblasts of andalusite



Microscopic scale Porphyroblasts of andalusite



Microscopic scale

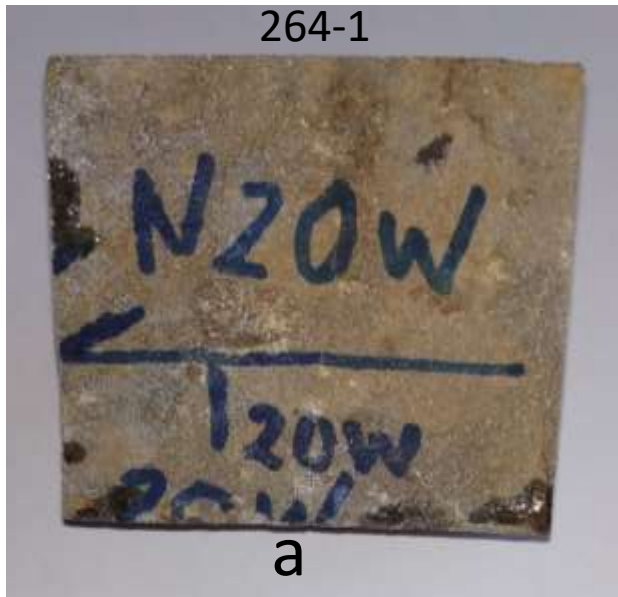
Porphyroblasts of andalusite



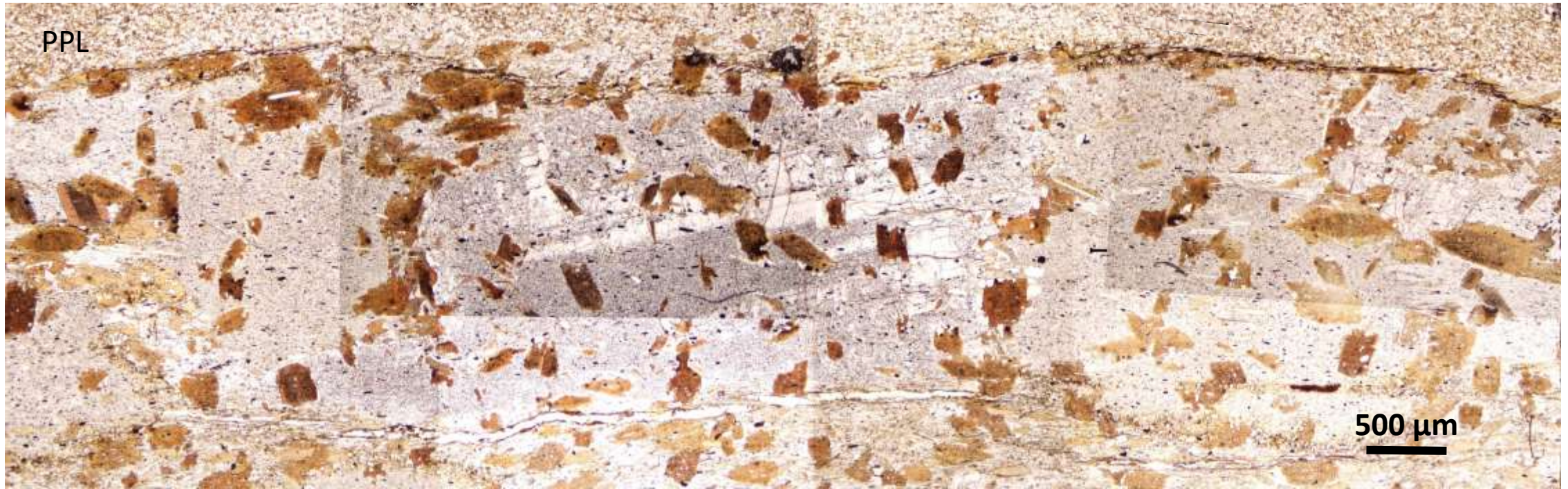
Porphyroblasts of andalusite



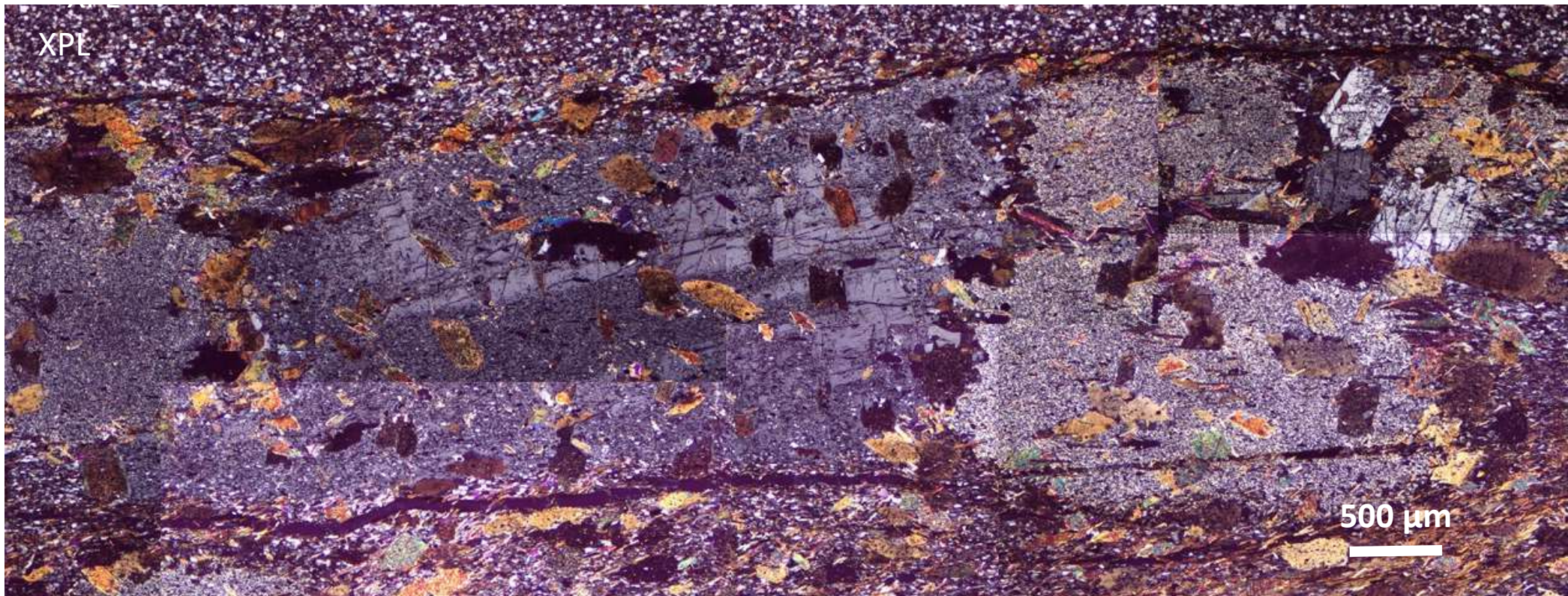
Porphyroblasts of andalusite



Porphyroblasts of andalusite



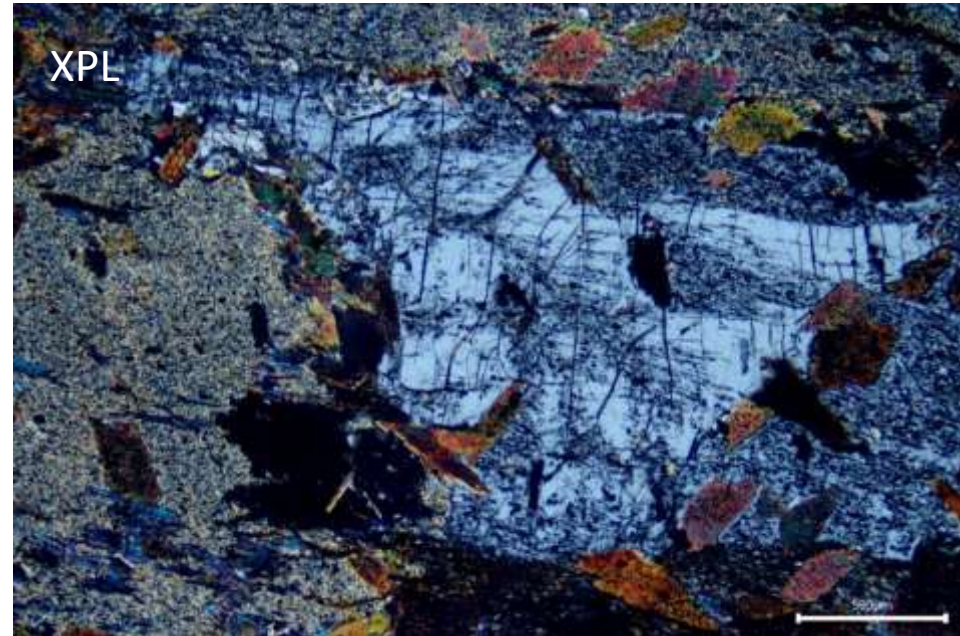
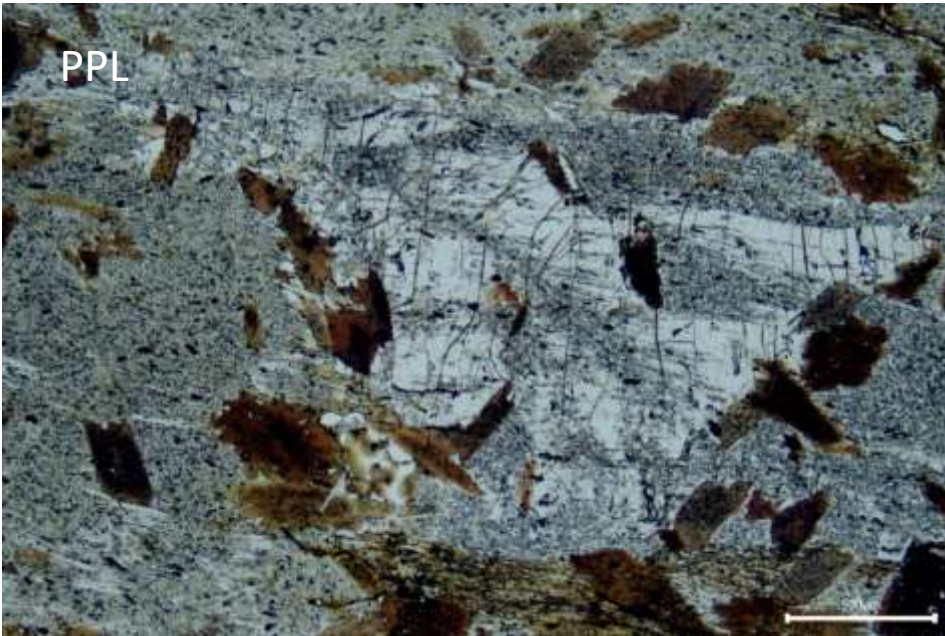
Porphyroblasts of andalusite



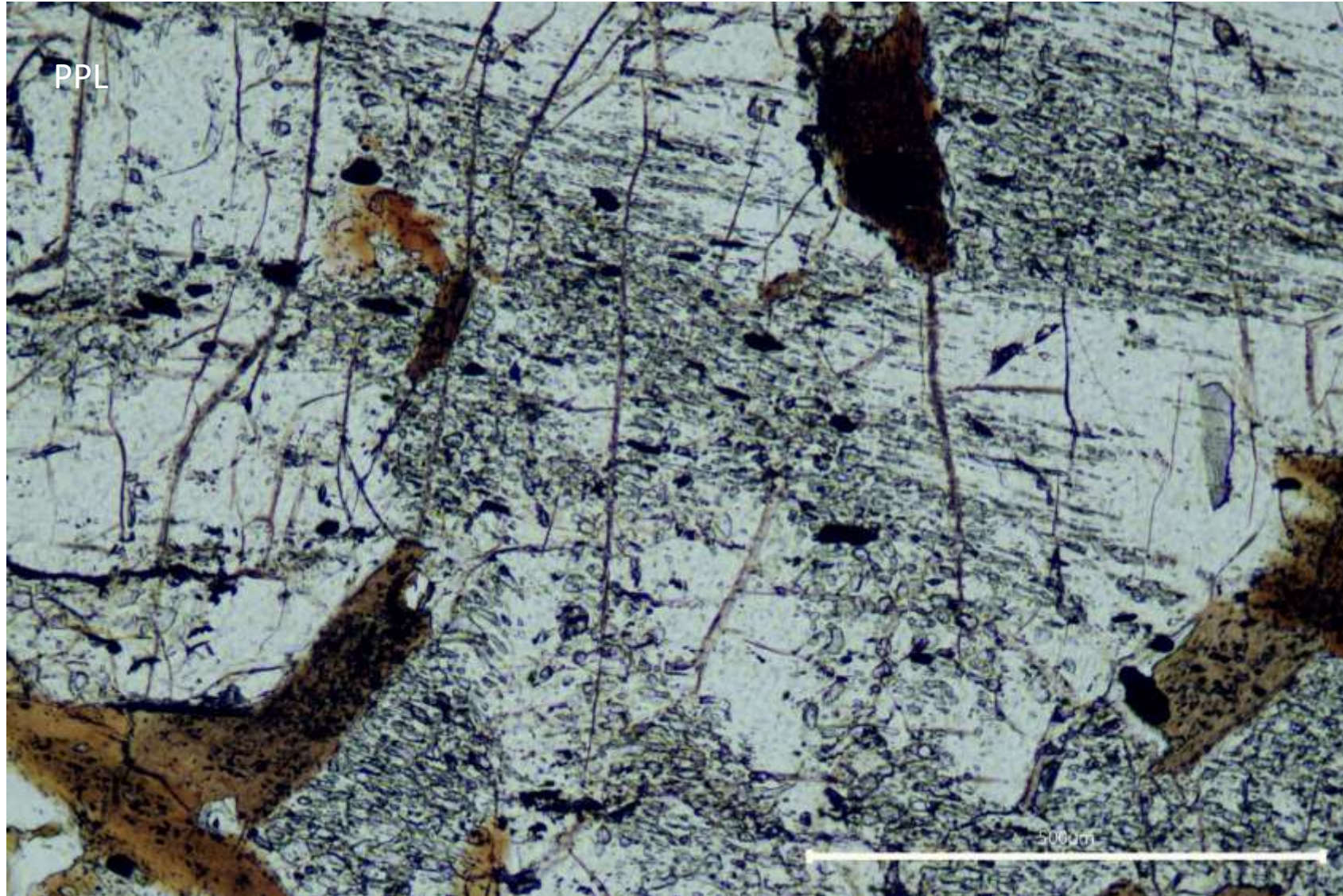
264-1a

Porphyroblasts of andalusite

Trails of inclusions

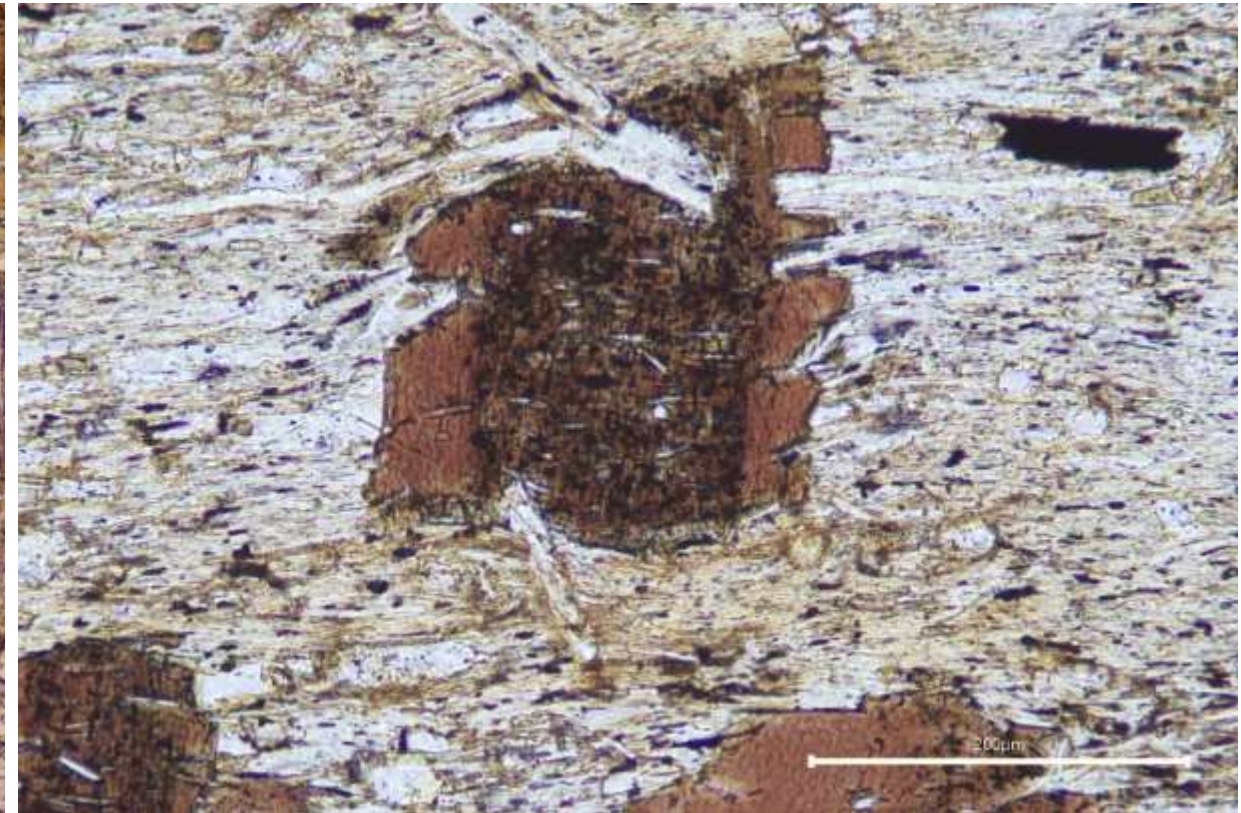
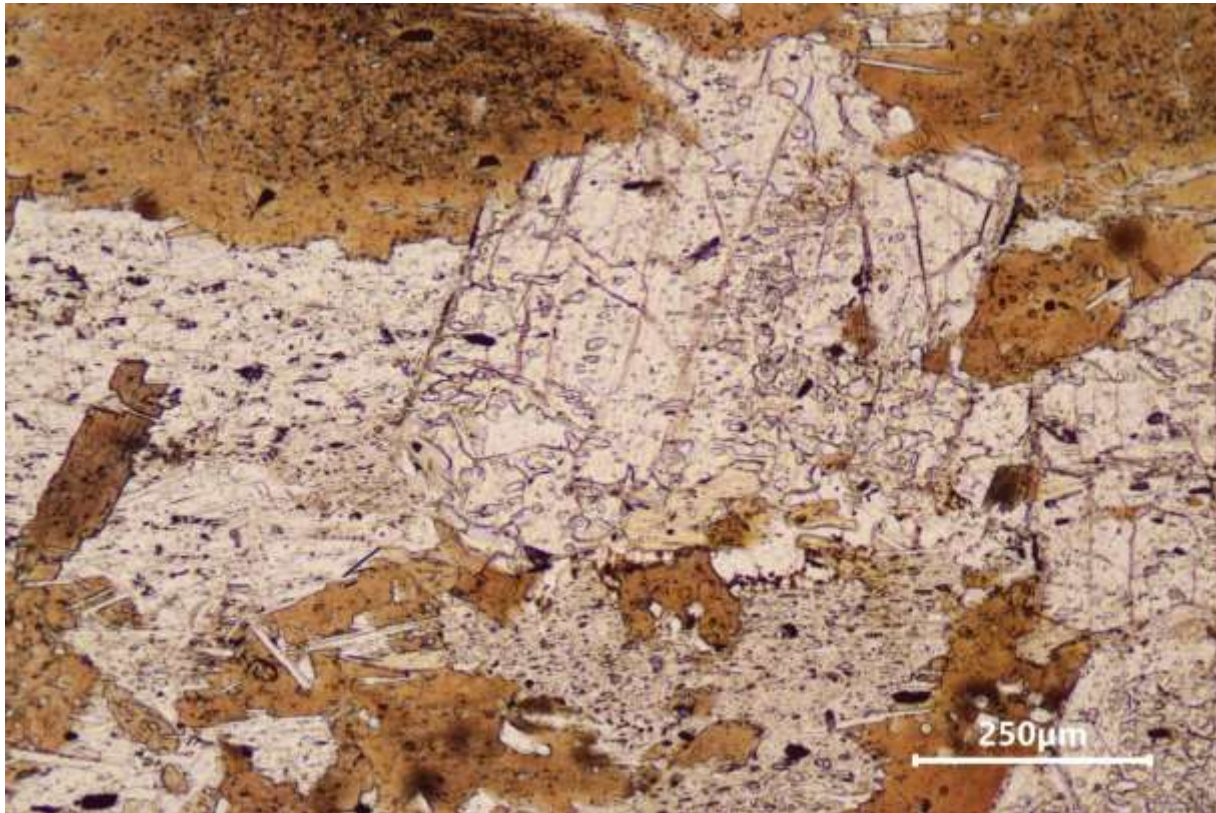


Trails of inclusions

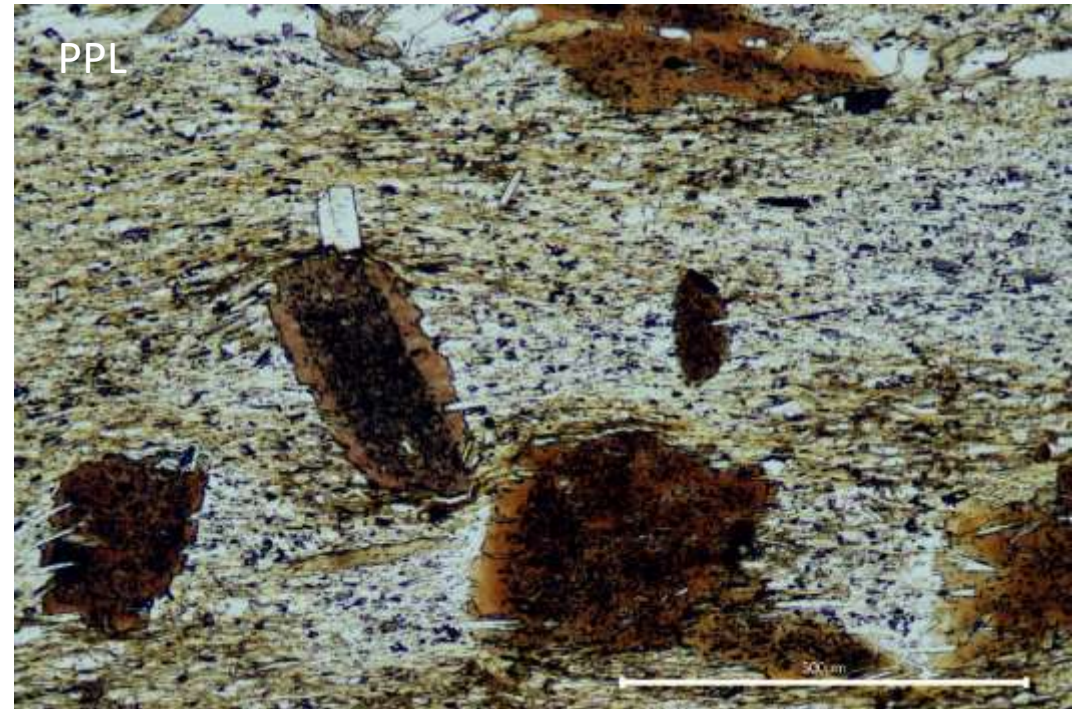
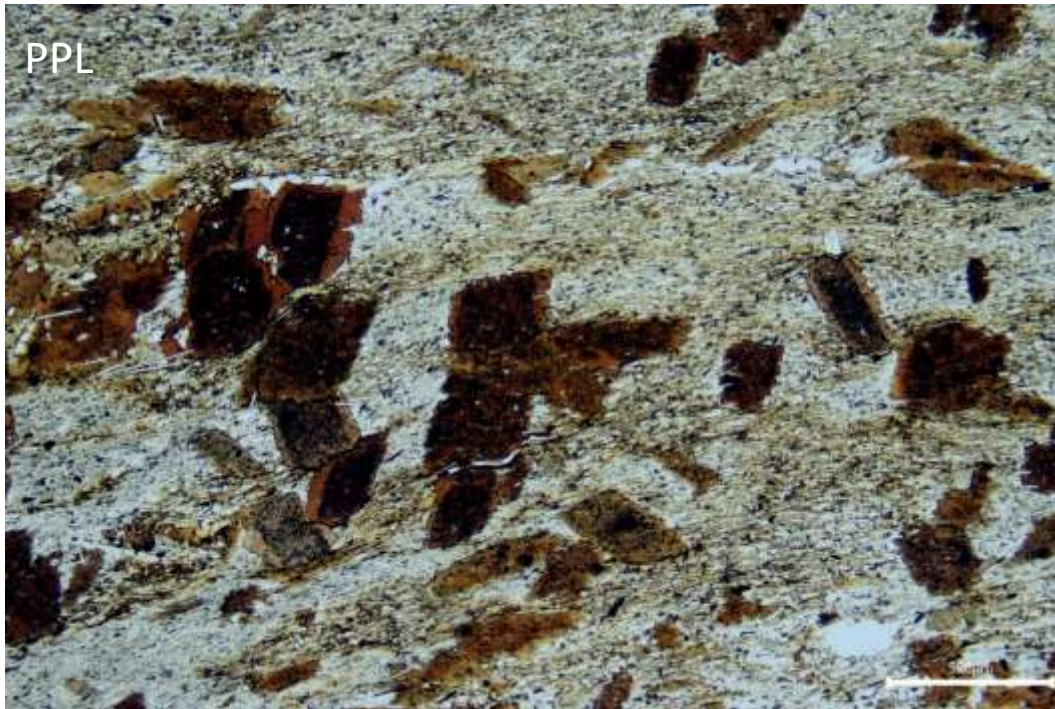


Porphyroblasts of andalusite and biotite

Trails of inclusions



Blastesis of biotite



The rocks are composed by the following **main assemblages**:

- Quartz + biotite + muscovite + andalusite
- Quartz + biotite + muscovite + cordierite
- Quartz + biotite + muscovite + cordierite? + andalusite

The **accessory minerals** are tourmaline, plagioclase, titanite, zircon and ilmenite

Final remarks

- Pseudo-hexagonal porphyroblasts of cordierite may represent contact metamorphism developed by late- to post-orogenic Cadomian intrusions
- Two generations of Variscan(?) andalusite are recognized:
 - Syn- to late-kinematic porphyroblasts
 - Post-kinematic andalusite that mimics the previous fabric
- Two generations of Variscan(?) biotite are recognized:
 - Syn- to late kinematic biotite coeval of the 1st generation of andalusite
 - Post-kinematic biotite coeval of the 2nd generation of andalusite
- The characteristics of the metamorphism in the study area could be assigned to:
 - Thermal metamorphism related to non-outcropping Variscan intrusions
 - Orogenic metamorphism of Buchan type (andalusite-cordierite)

Next steps

- Identify the main tectono-metamorphic events
- Relate the mineral assemblages to the main deformation events
- Characterize the chemical composition of the mineral phases, including compositional maps of the porphyroblasts