Fluid-rock interactions at high-pressure metamorphic conditions: An analysis of ~~atoll~~ garnets preserved in eclogitic breccias from the Zermatt-Saas zone, Italian Alps.

Kilian Lecacheur, O.Fabbri, S.Hertgen, H.Leclere

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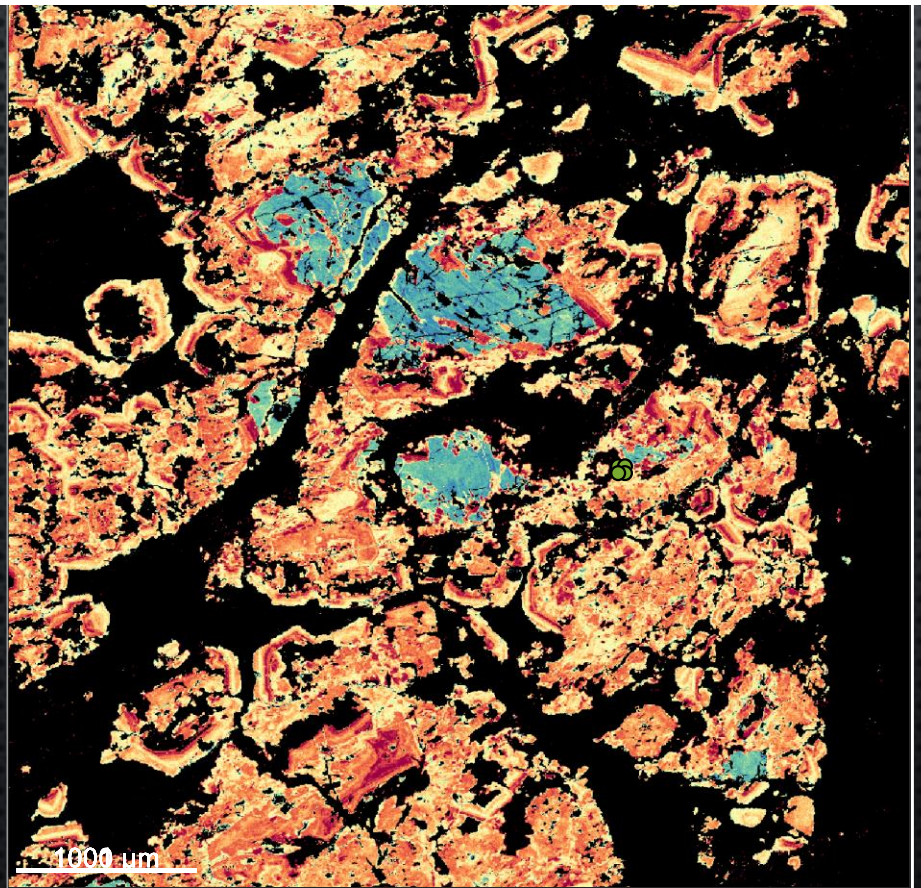

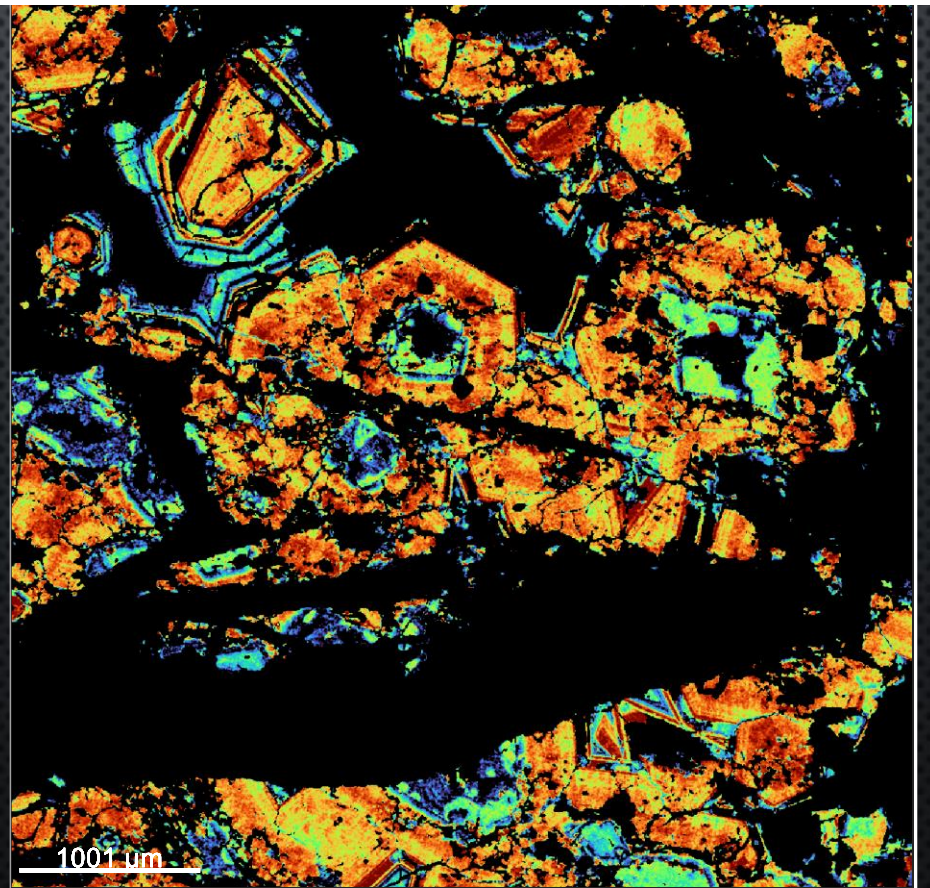

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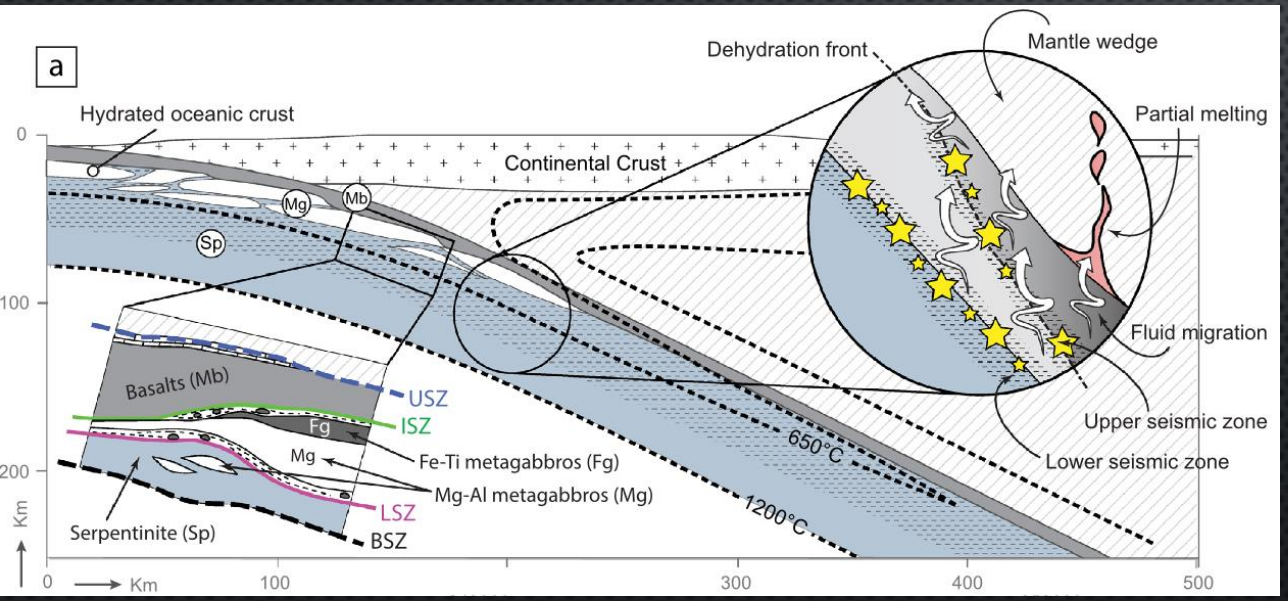
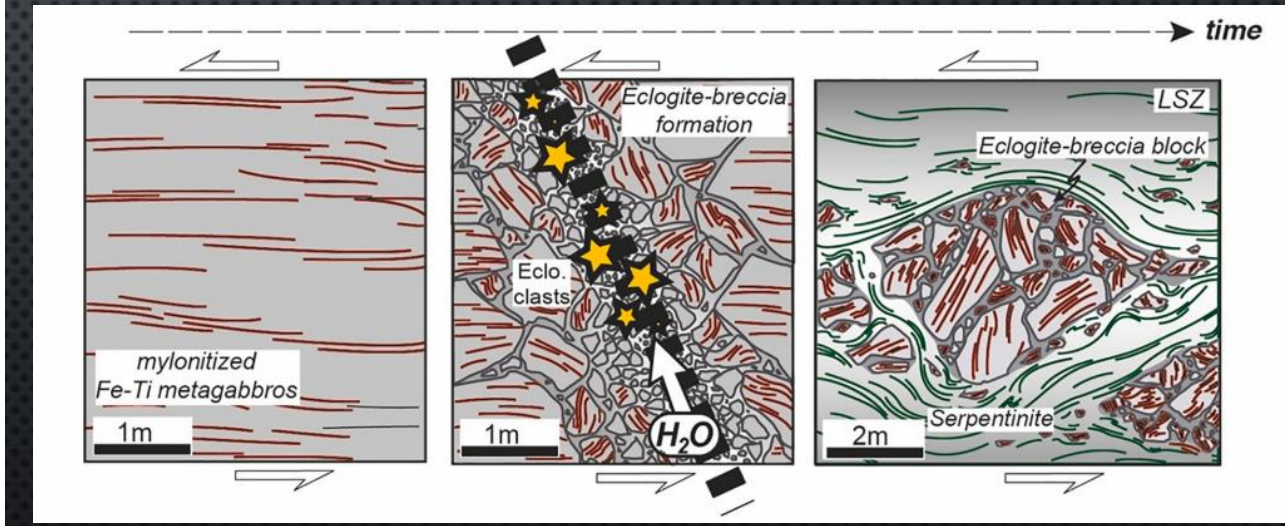
MOTIVATION

Fluide circulation in subduction permit modification of the rheology in eclogite facies with a transfer from ductile deformation to brittle deformation



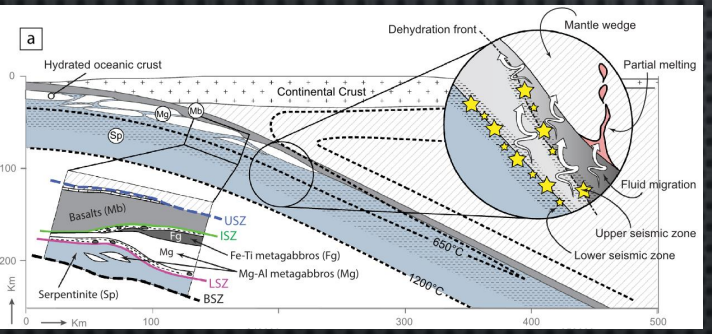
Brittle deformation is attested by eclogitic breccia



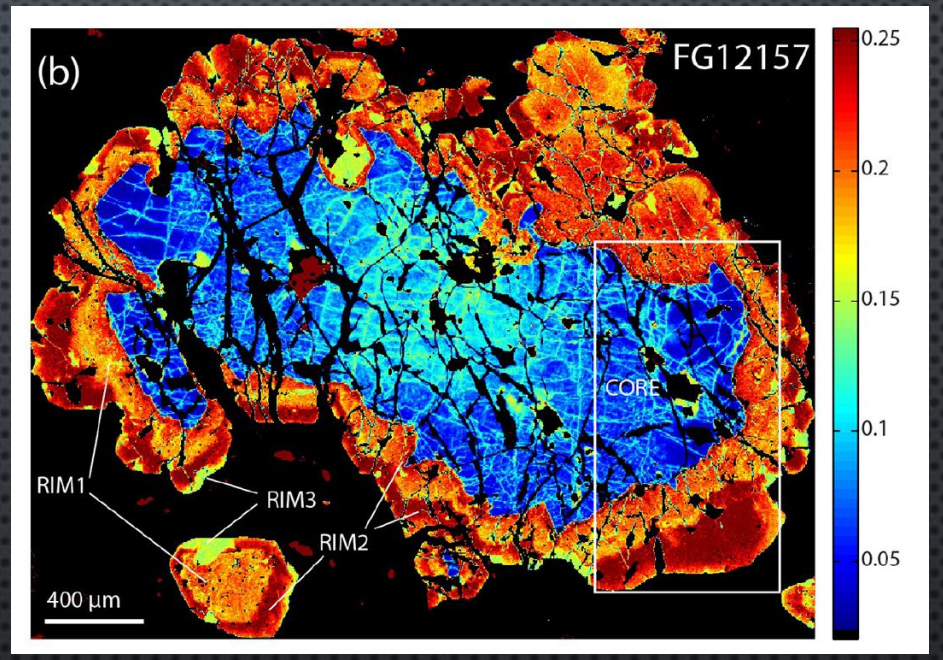
Locatelli et al. 2019, after Hacker et al. 2003 Angiboust et al., 2012a, Locatelli, 2018

MOTIVATION

Evidence of fluide circulation in the Alps : using garnet has a monitor of metamorphic evolution in HP condition

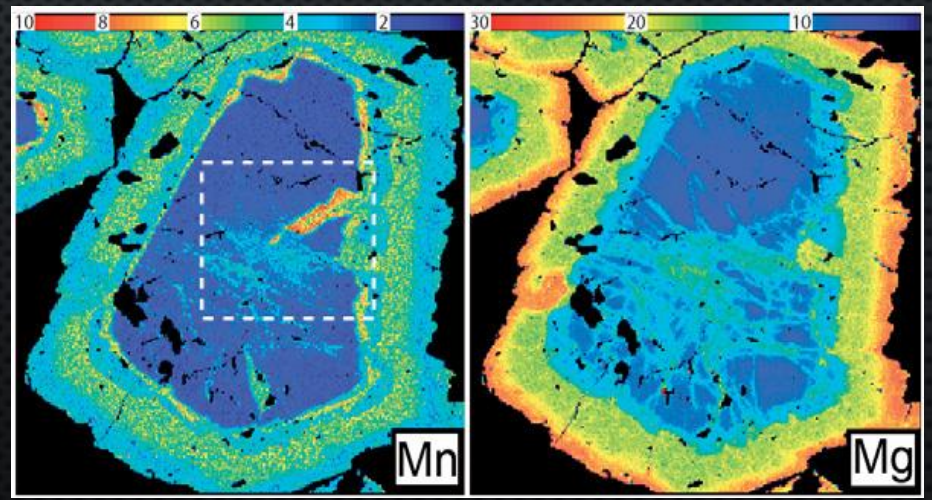


Locatelli et al. 2019, after Hacker et al. 2003

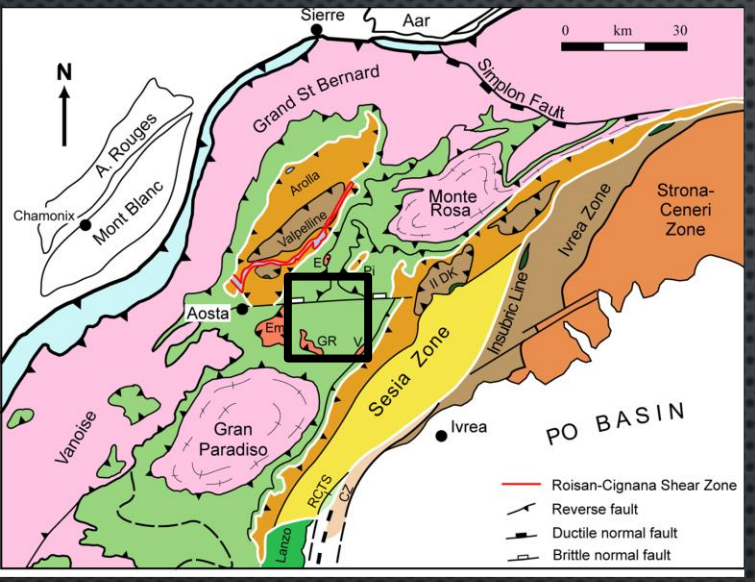


Polymetamorphic history (Variscan+alpine)
Xgrossular(Ca),
Giuntolli *et.al.*, 2018

Alpine subduction metamorphism
Angiboust et al., 2012a



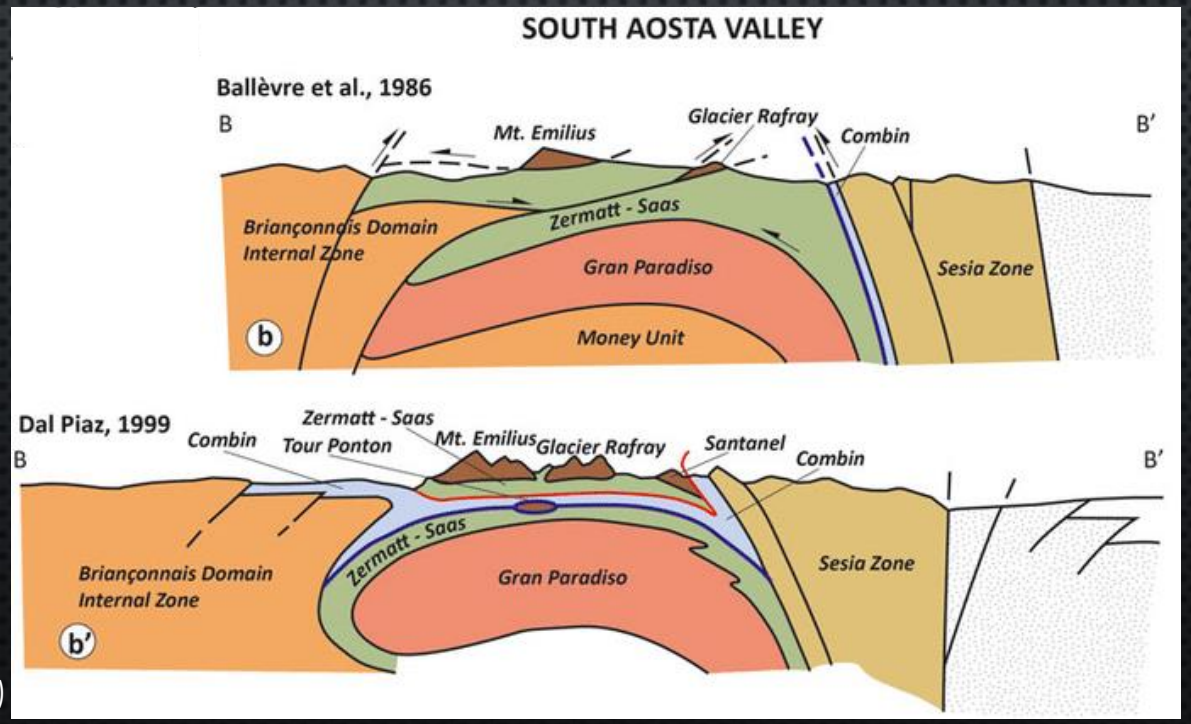
CONTEXT



Manzotti et al., 2014

Studying the alpine ophilites that have recorded subduction and eclogite metamorphique condition

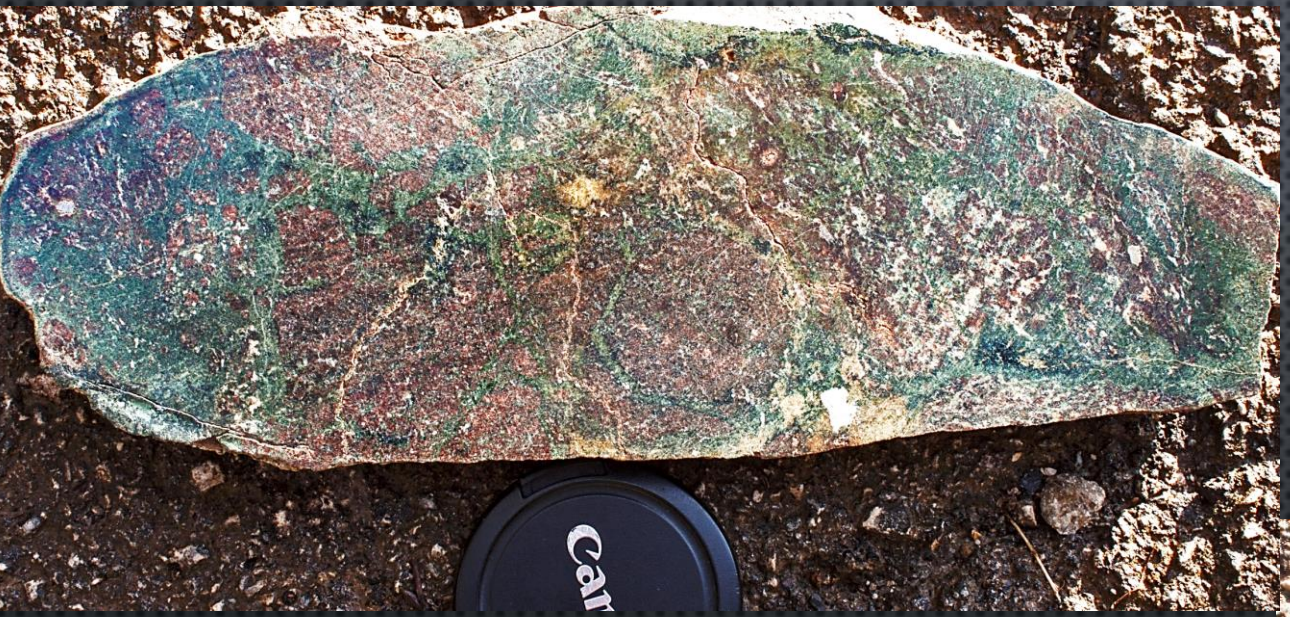
Searching evidence of brittle deformation and fluid interaction



Ellero, A., & Loprieno, A. (2018)

RESULTS

Evidence of eclogite fracturation, sealed by new omp generation



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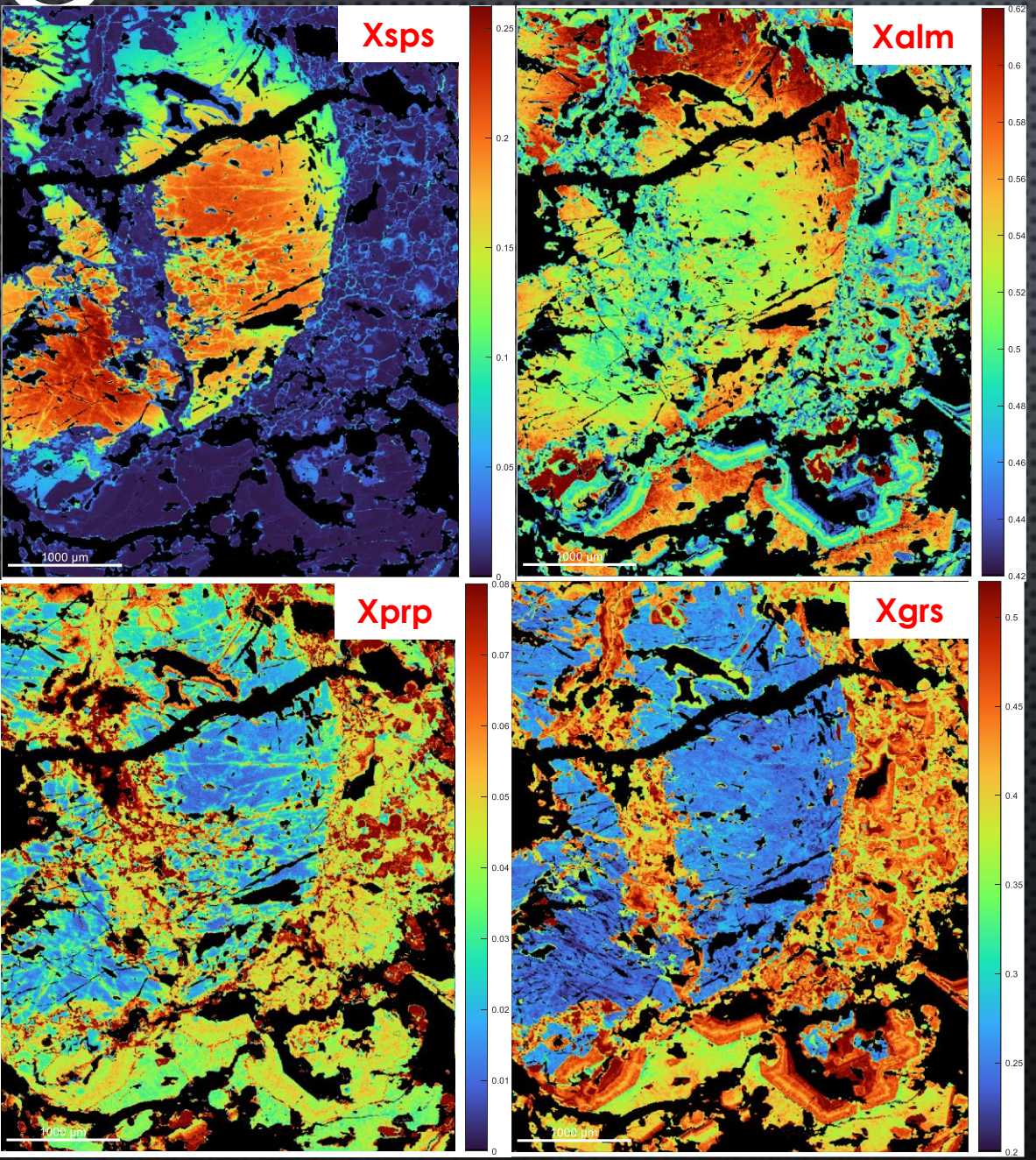
RESULTS



Garnet 1 : Core = Alm_{51} Sps_{25} Grs_{22} Prp_{2}
Rim : Alm_{62} Sps_{10} Grs_{26} Prp_{2}

Garnet 2 : Oscillatory zoning when growing with other phase (titanite + omp)

Alm_{50} Grs_{45} SPs_{0} Prp_{5}

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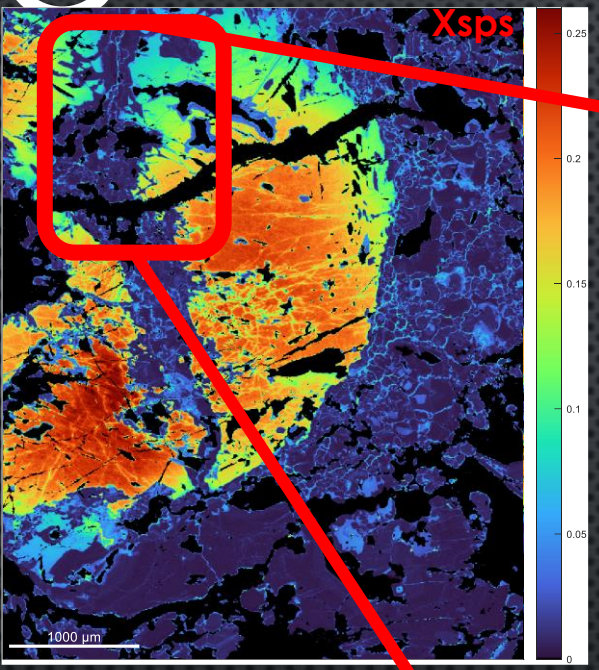
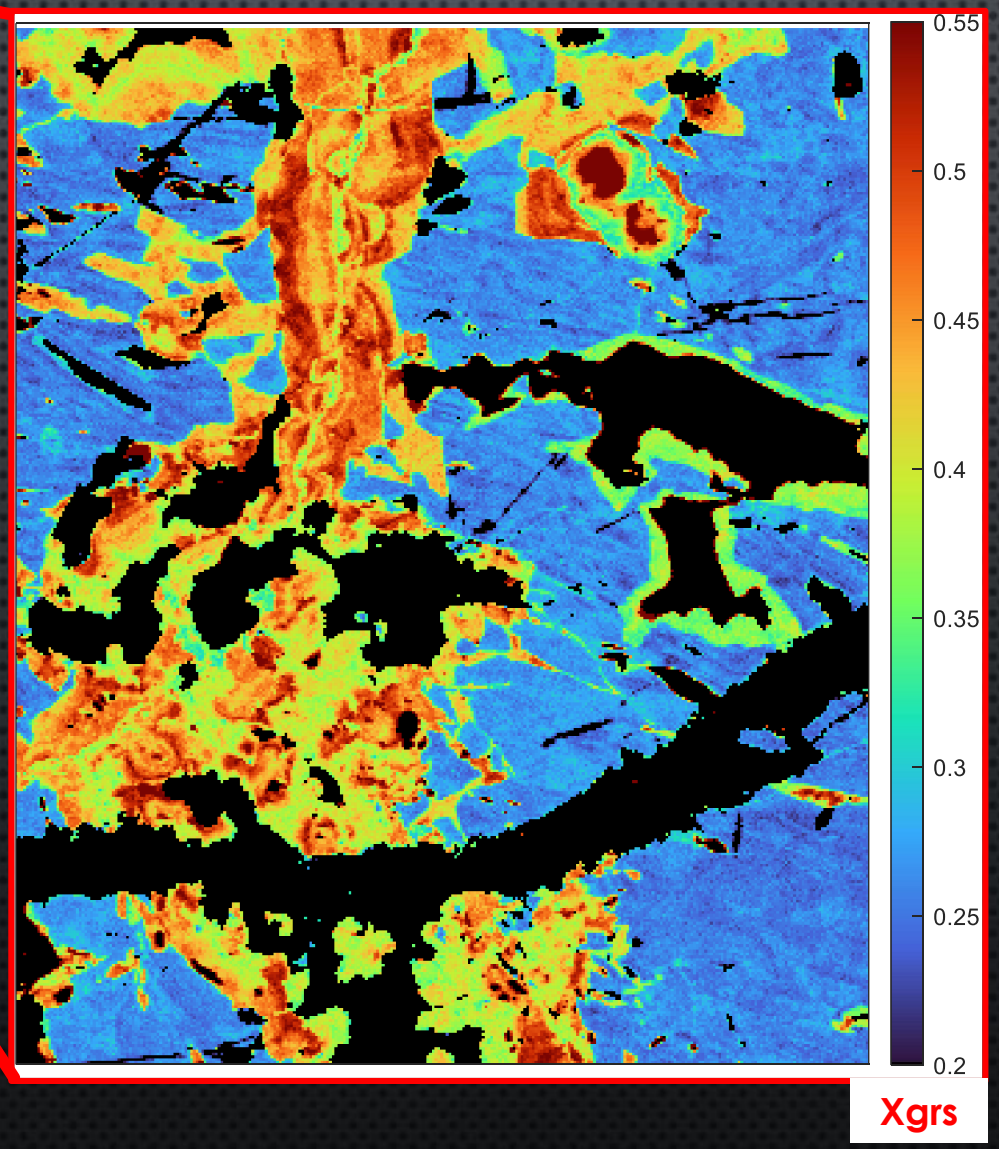
RESULTS





Lobates structures + peninsulas + fractures

XMapTools

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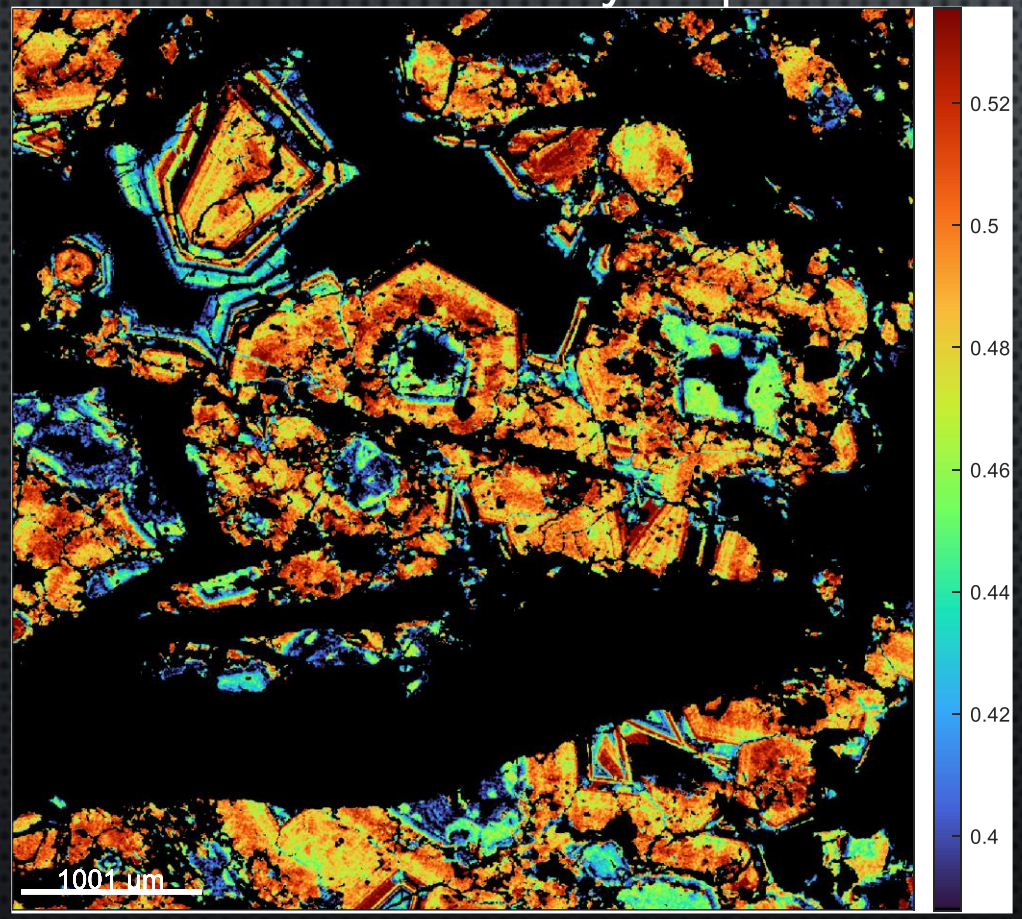
RESULTS

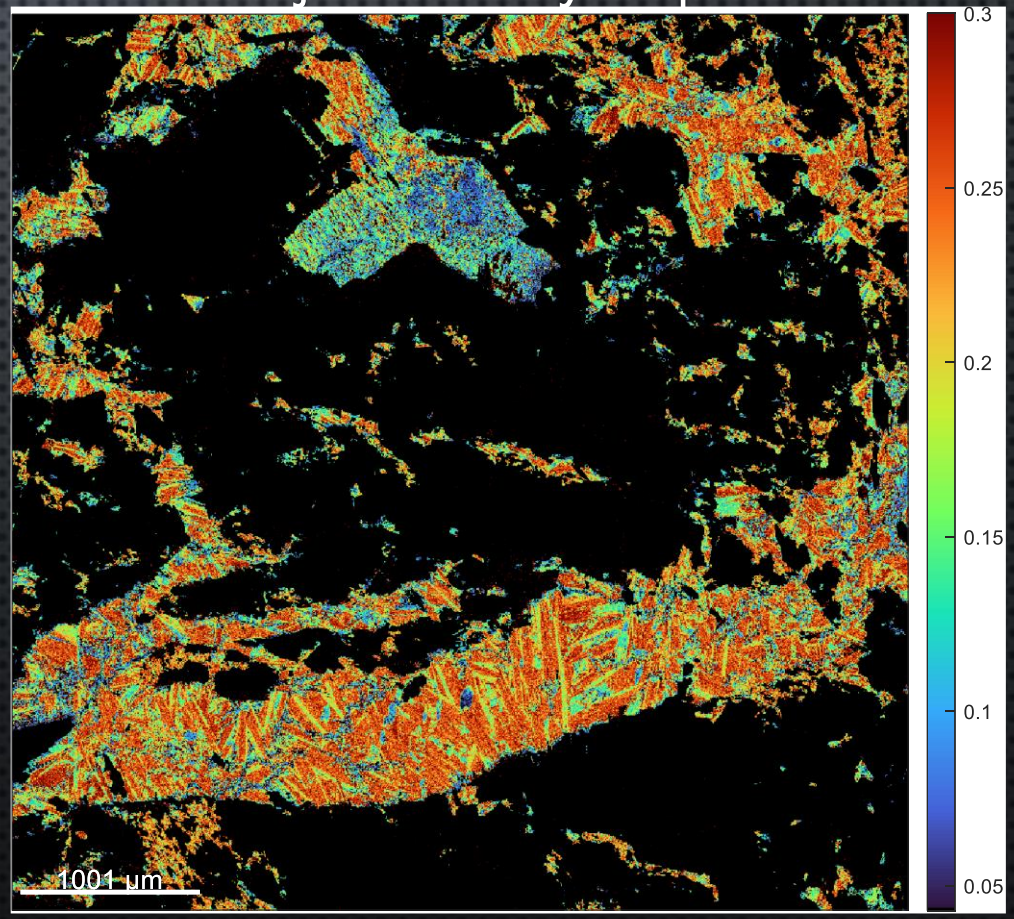
GRT2 is always fractured and sealed by late omp2

XMapTools

Grossular Xray map

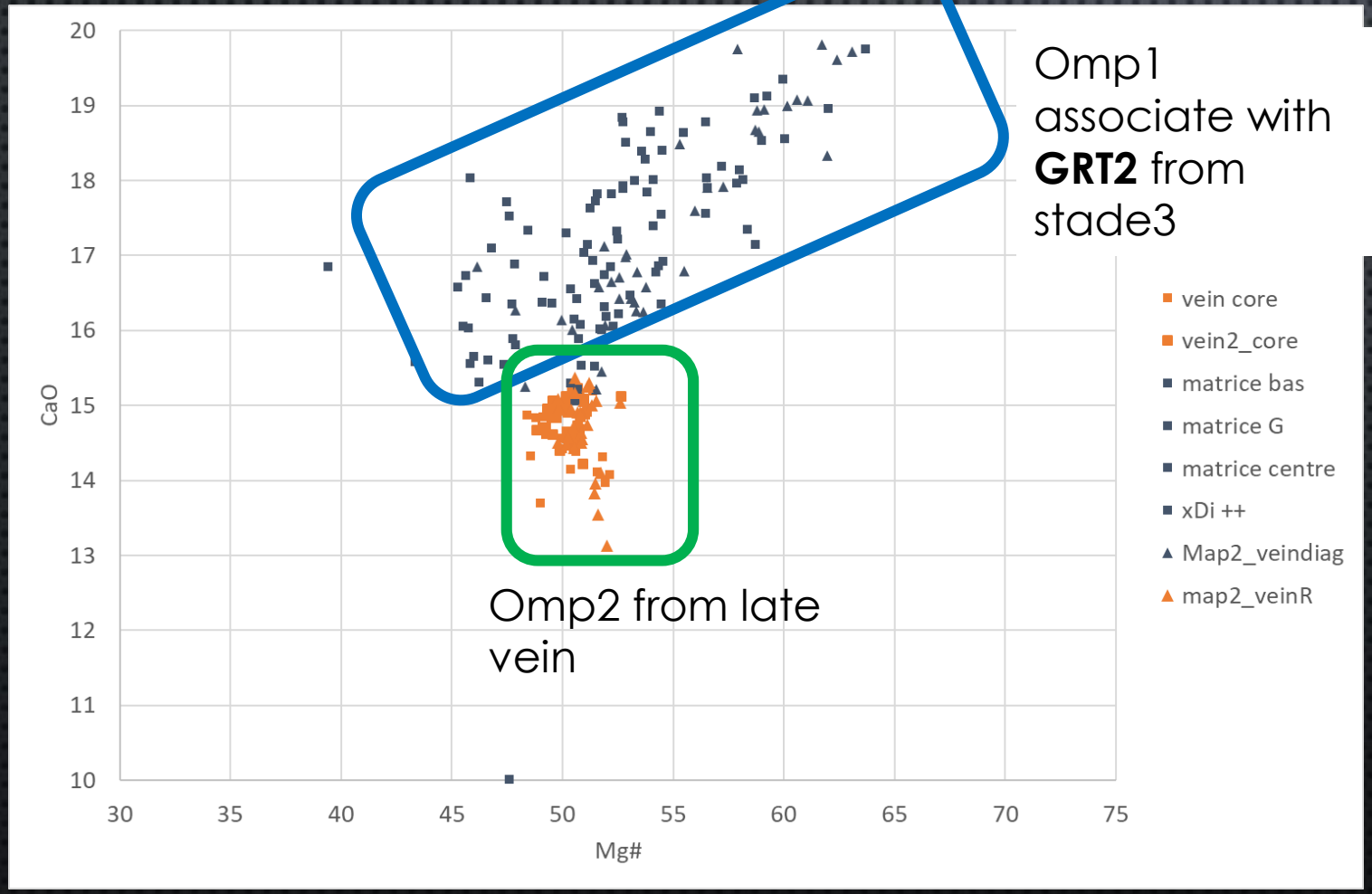


jadeite Xray map



RESULTS

Chemical evolution of Omphacite



Omp1 associate with **GRT2** from stade3

Omp2 from late vein

The increasing in Ca is alo visible with the 2 different omp

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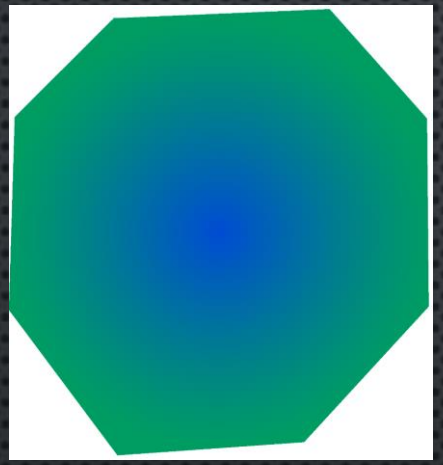
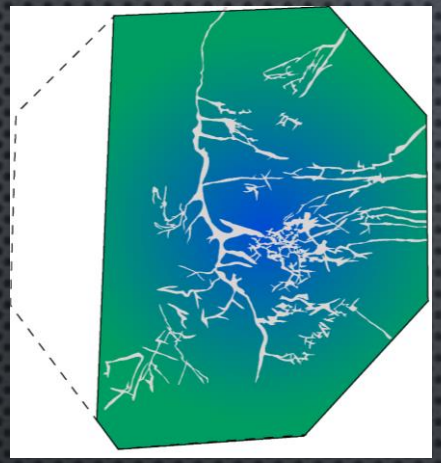
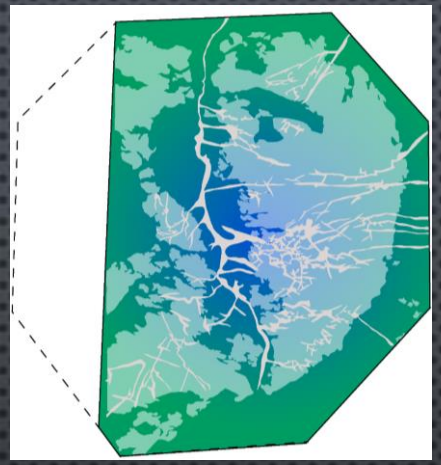
SYNTHESIS



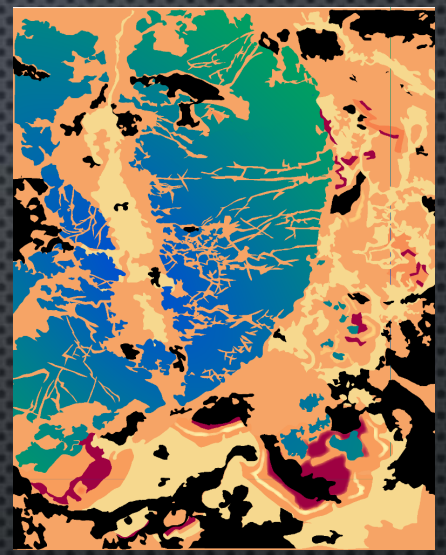
<u>Stade 1 :</u>
Formation of **GRT1** richer in Fe/Mn



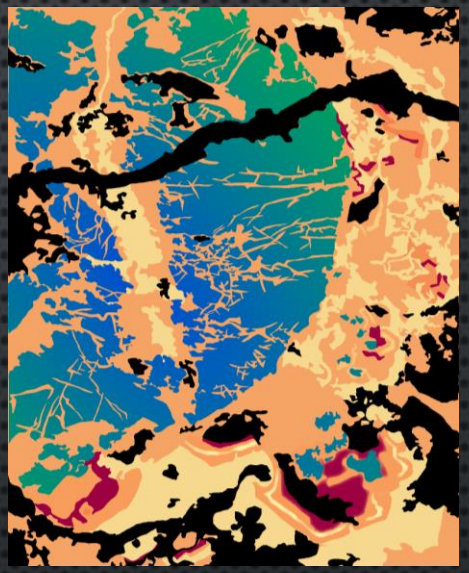
<u>Stade 2 :</u>
Fracturation of **GRT1**



<u>Stade 2 :</u>
Fracturation of **GRT1**

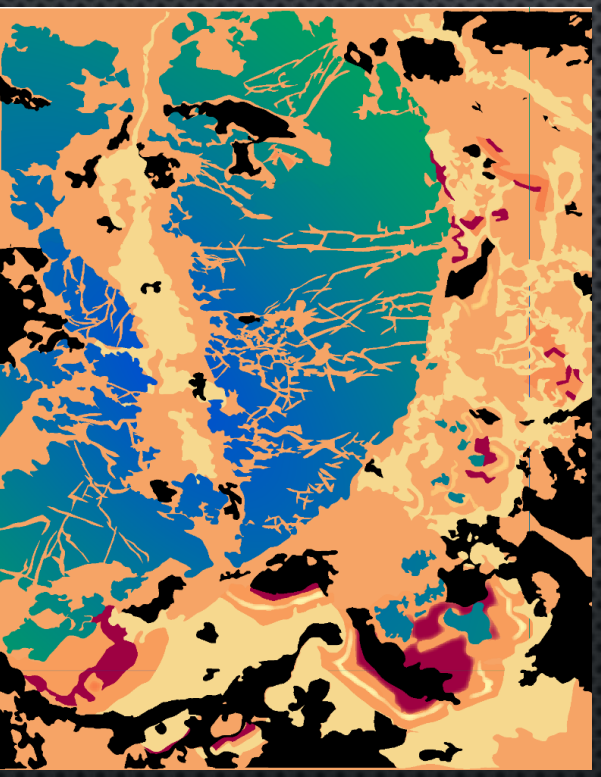


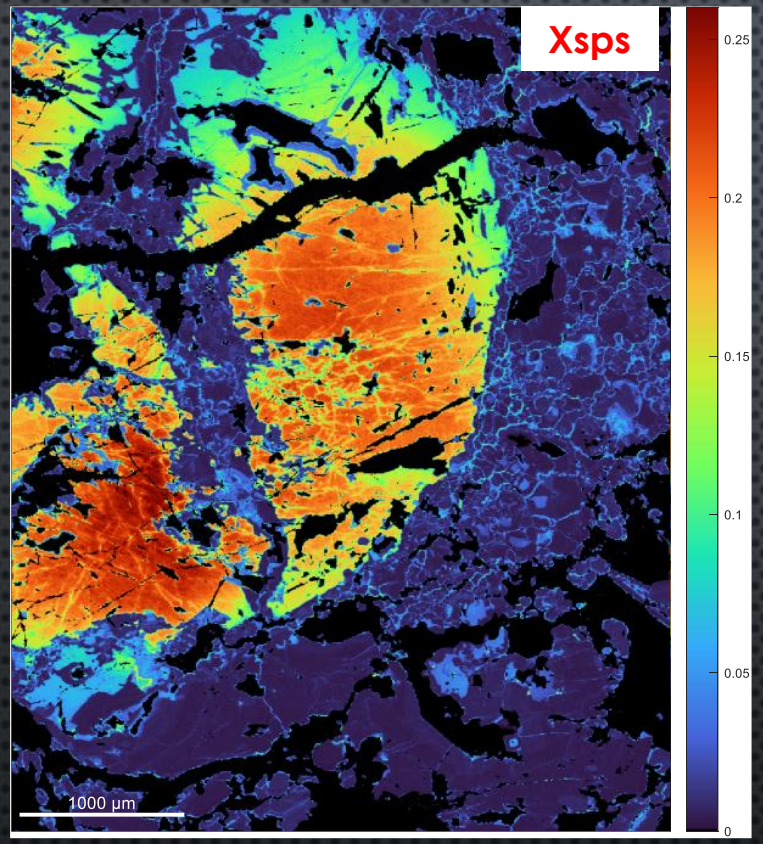
<u>Stade 3 :</u>
Dissolution/re sorption of **GRT1**
Growing of **GRT2** richer in Ca



Stade 4 :
Late Fracturation of **GRT2**

CONCLUSION





- Resorption of **GRT1** : lobate structures and peninsulas
- Fractures of **GRT1** sealed by **GRT2**
- Growing of 2nd generation of Ca-rich minerals

Indication of fluid-minerals interactions and Ca importation

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