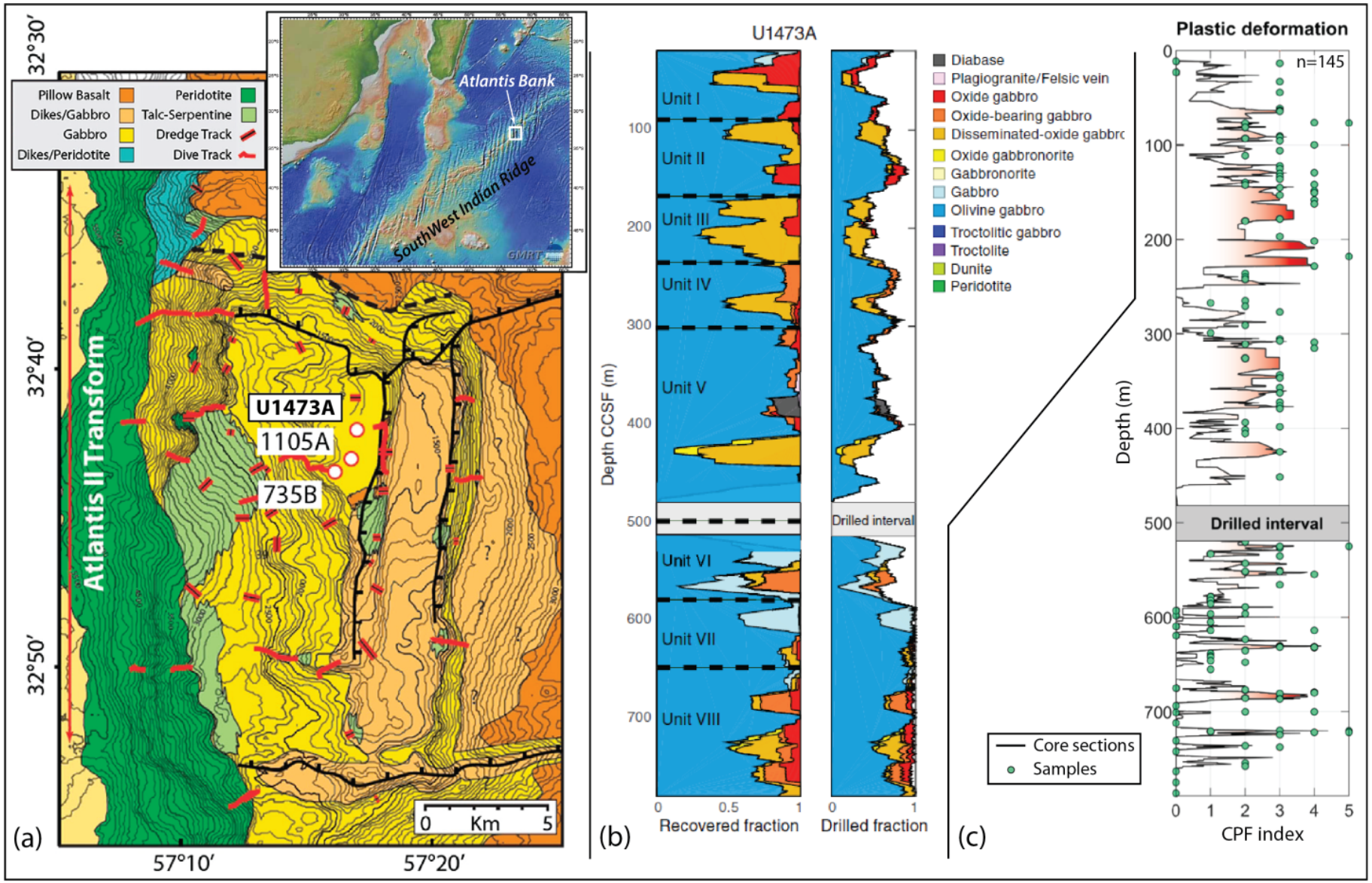
# A database of gabbro seismic properties from an ultraslow spreading ridge (IODP Hole U1473A, Southwest Indian Ridge)

Luiz F. G. Morales [1,2,*]; Maël Allard [3]; Benoît Ildefonse [3]
Émilien Oliot [3] & Fabrice Barou [3]

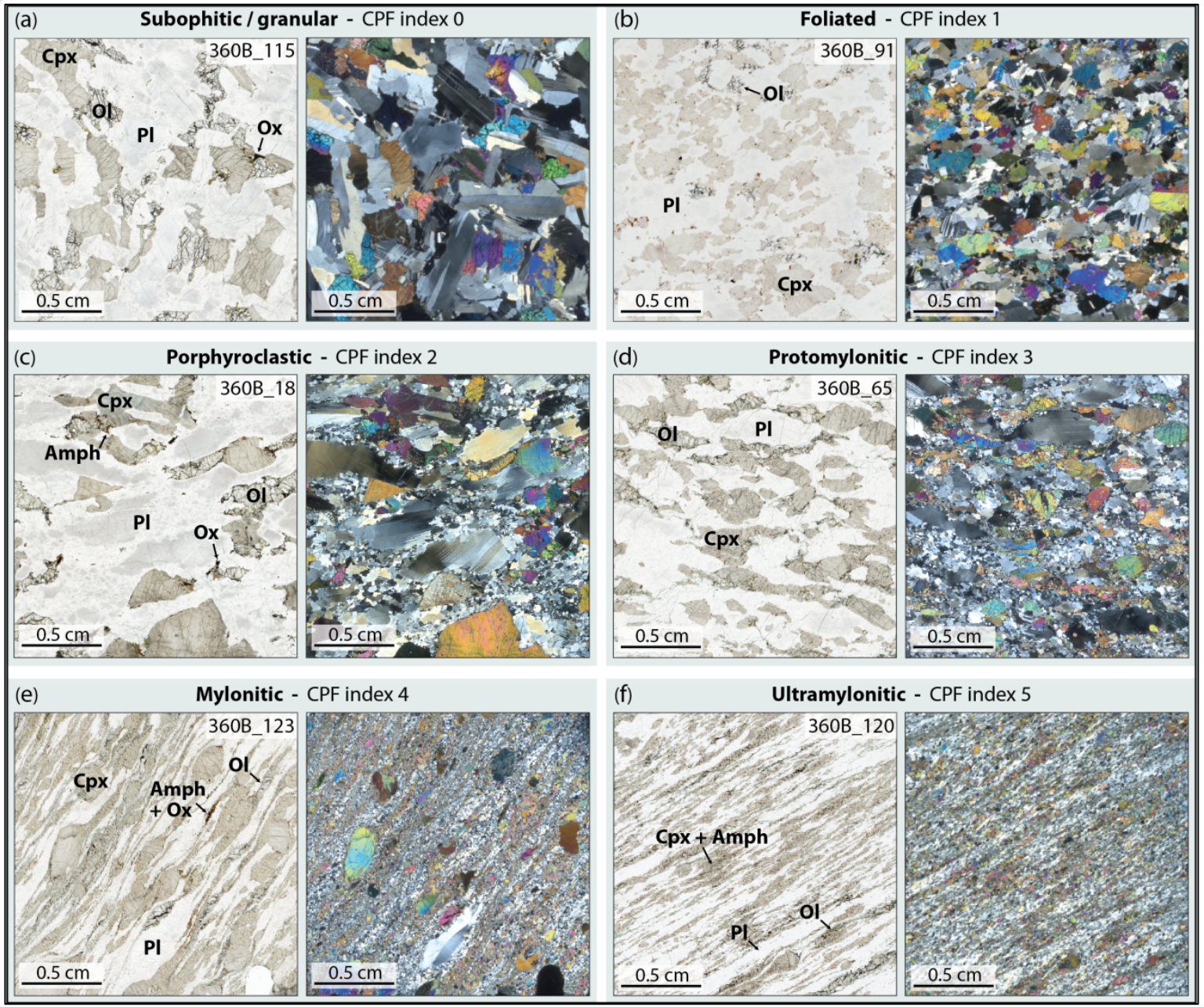
1 – Scientific Center for Optical and Electron Microscopy (ScopeM), ETH Zürich
2 – Geological Institute, Structural Geology and Tectonics group, ETH Zürich
3 – Géosciences Montpellier, Université Montpellier
*luiz.morales@scopem.ethz.ch

# Atlantis Bank location and sample locations on core



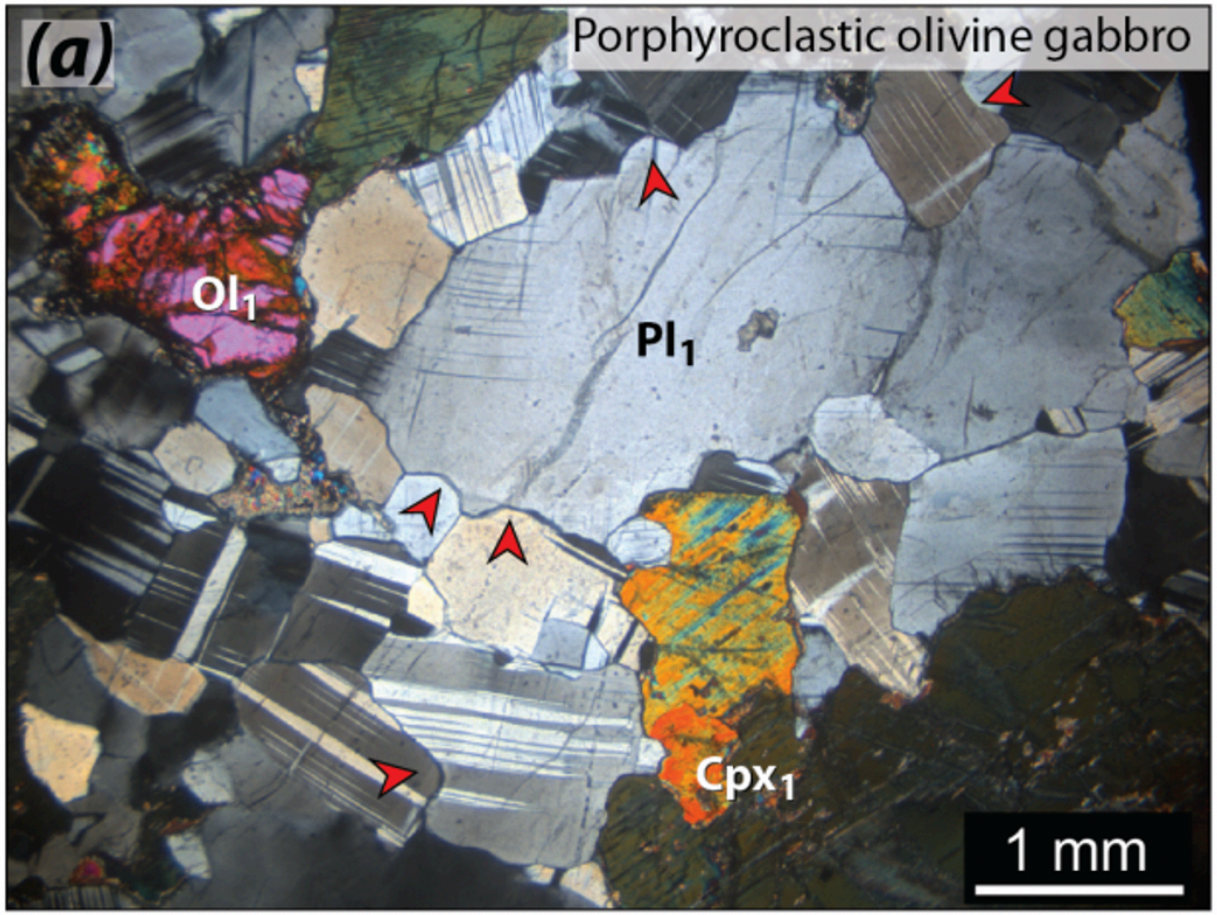

Allard et al. 2021, after Dick et al., 2019

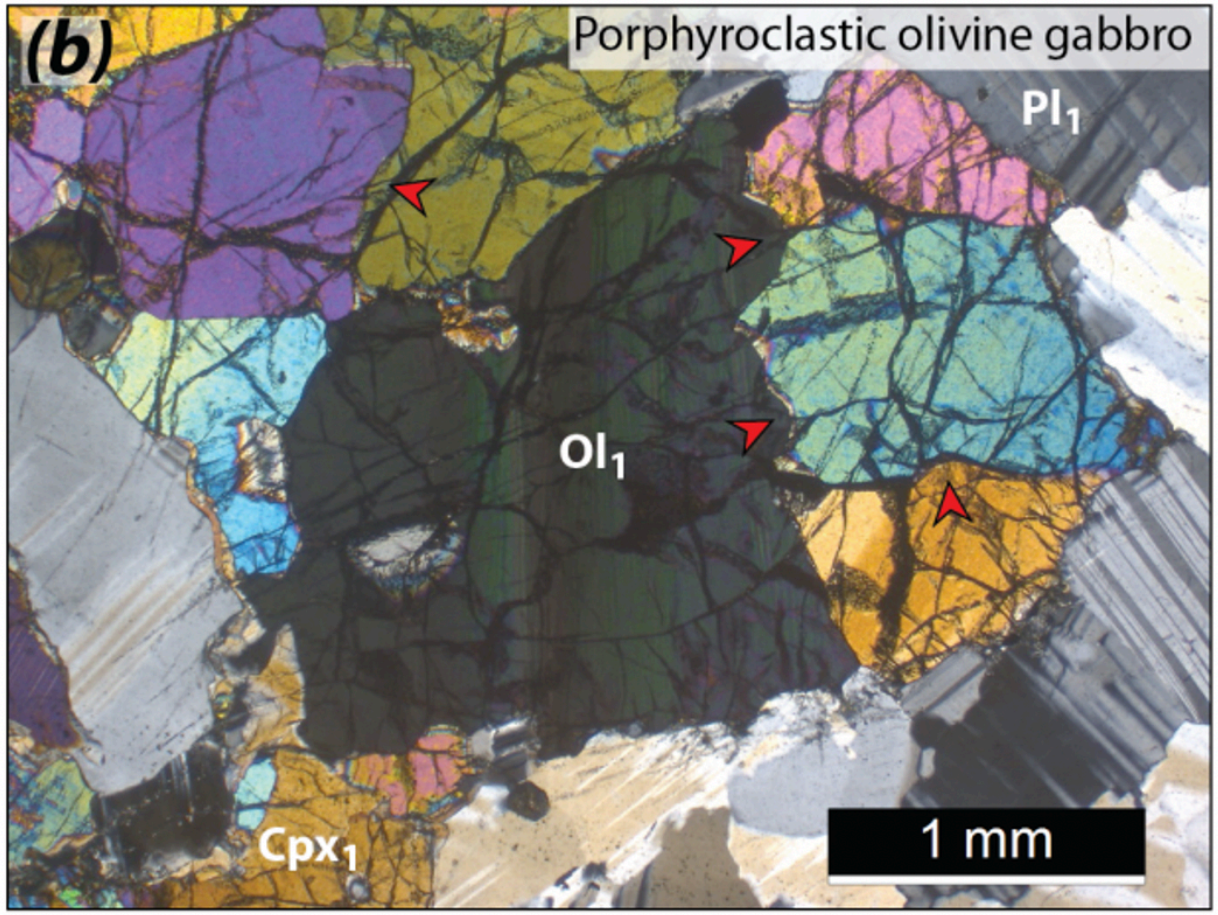
# Representative microstructures of the Hole U1473A




Allard et al. 2021
(submitted JGR)

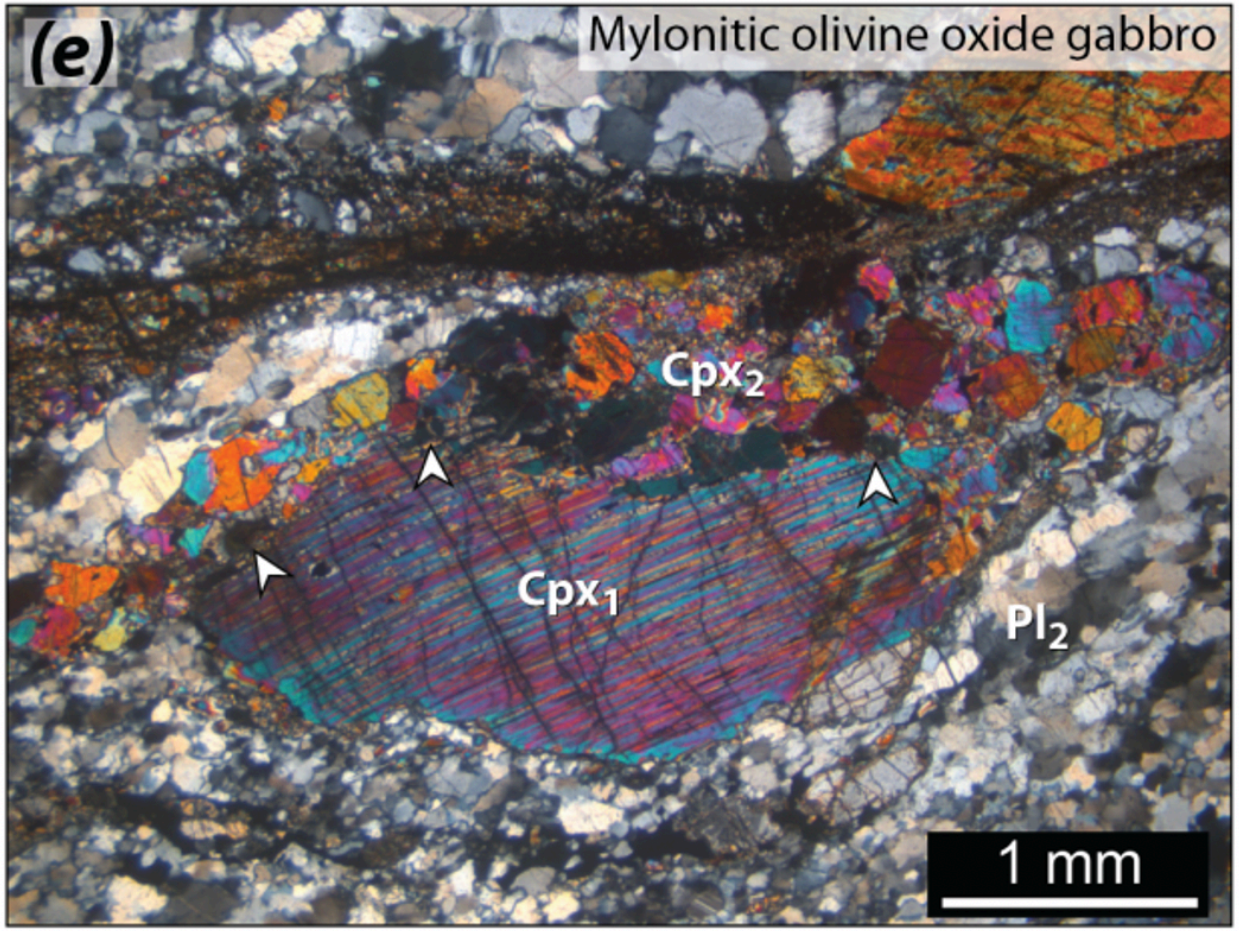
# Grain boundary migration microstructures in plg and ol

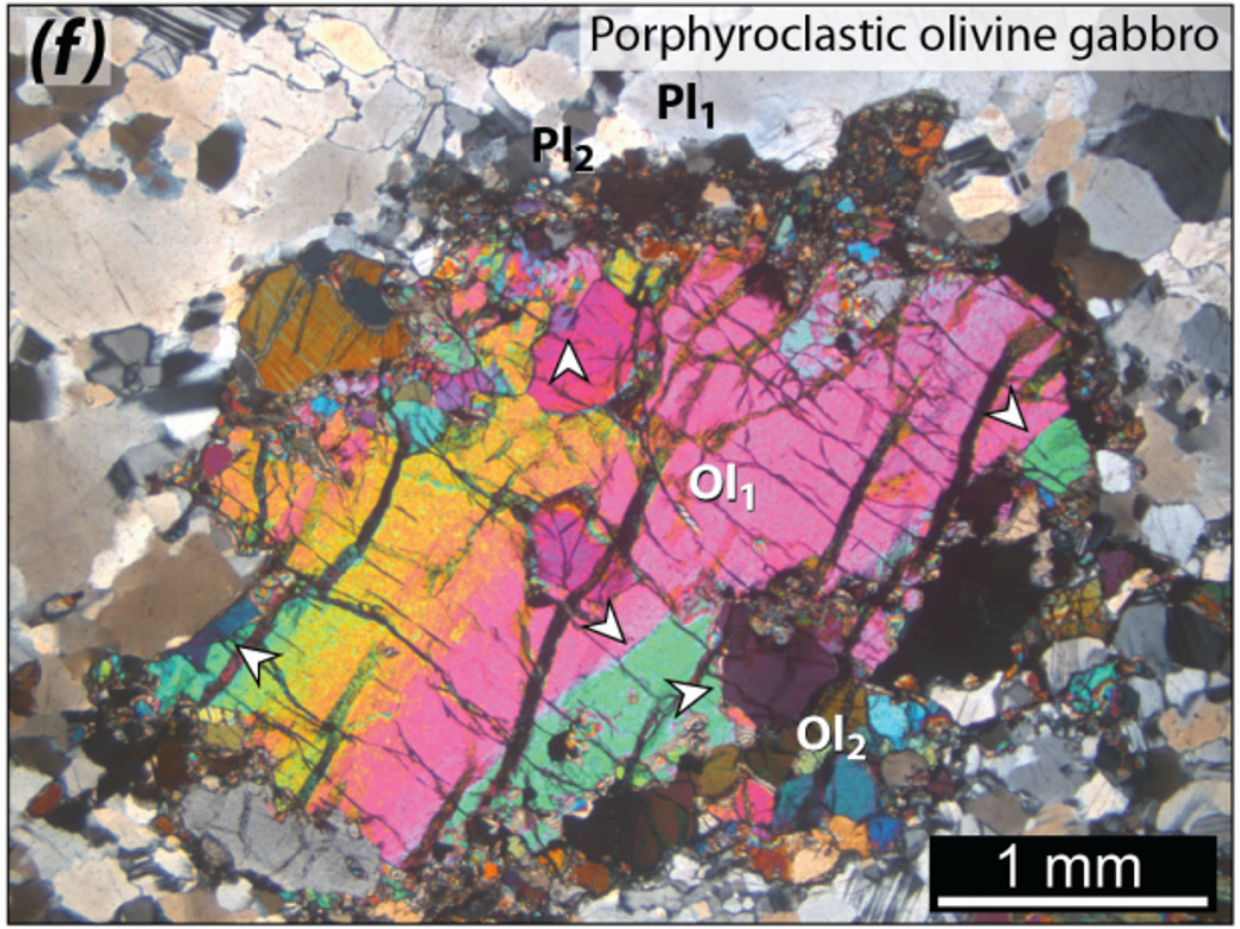



Allard et al. 2021
(submitted JGR)

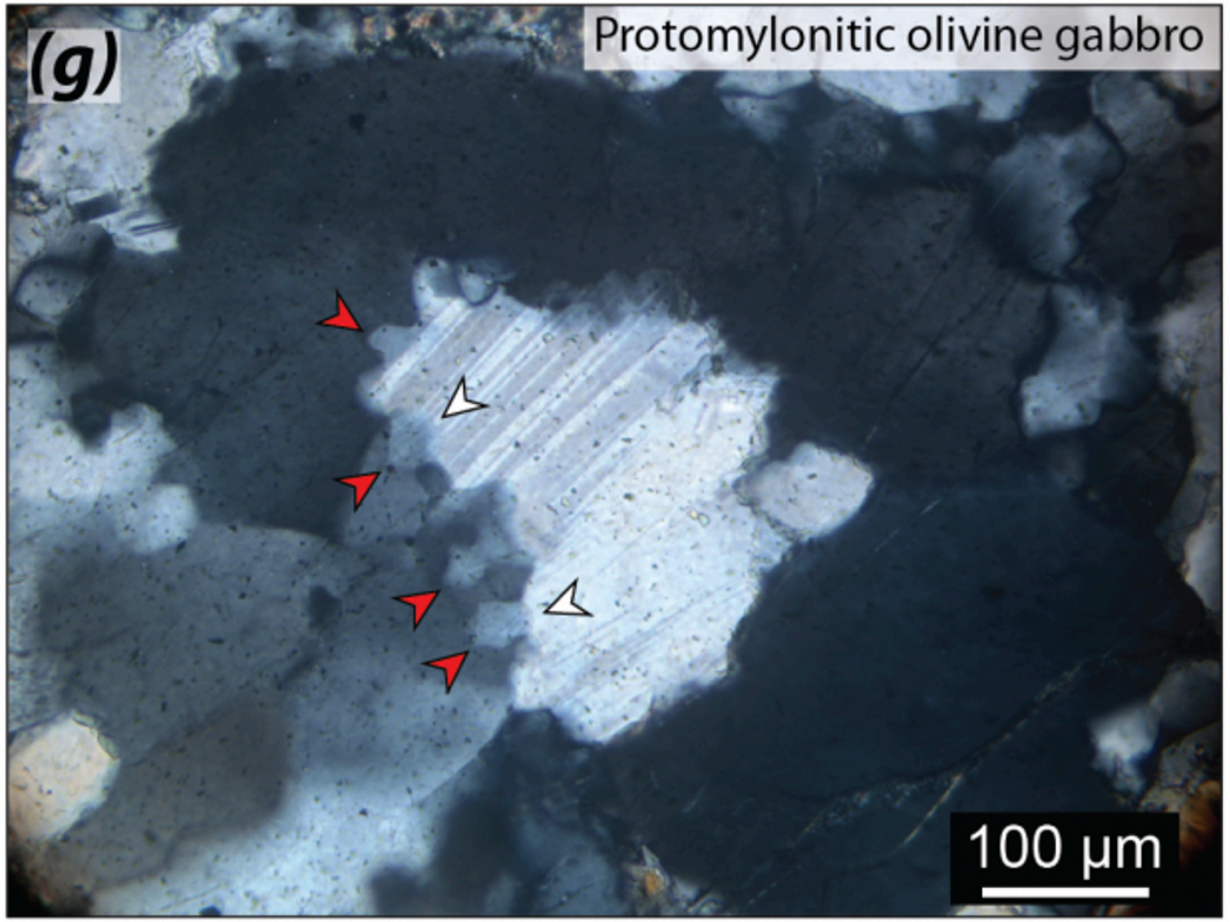
# Subgrain rotation recrystallization in cpx and ol

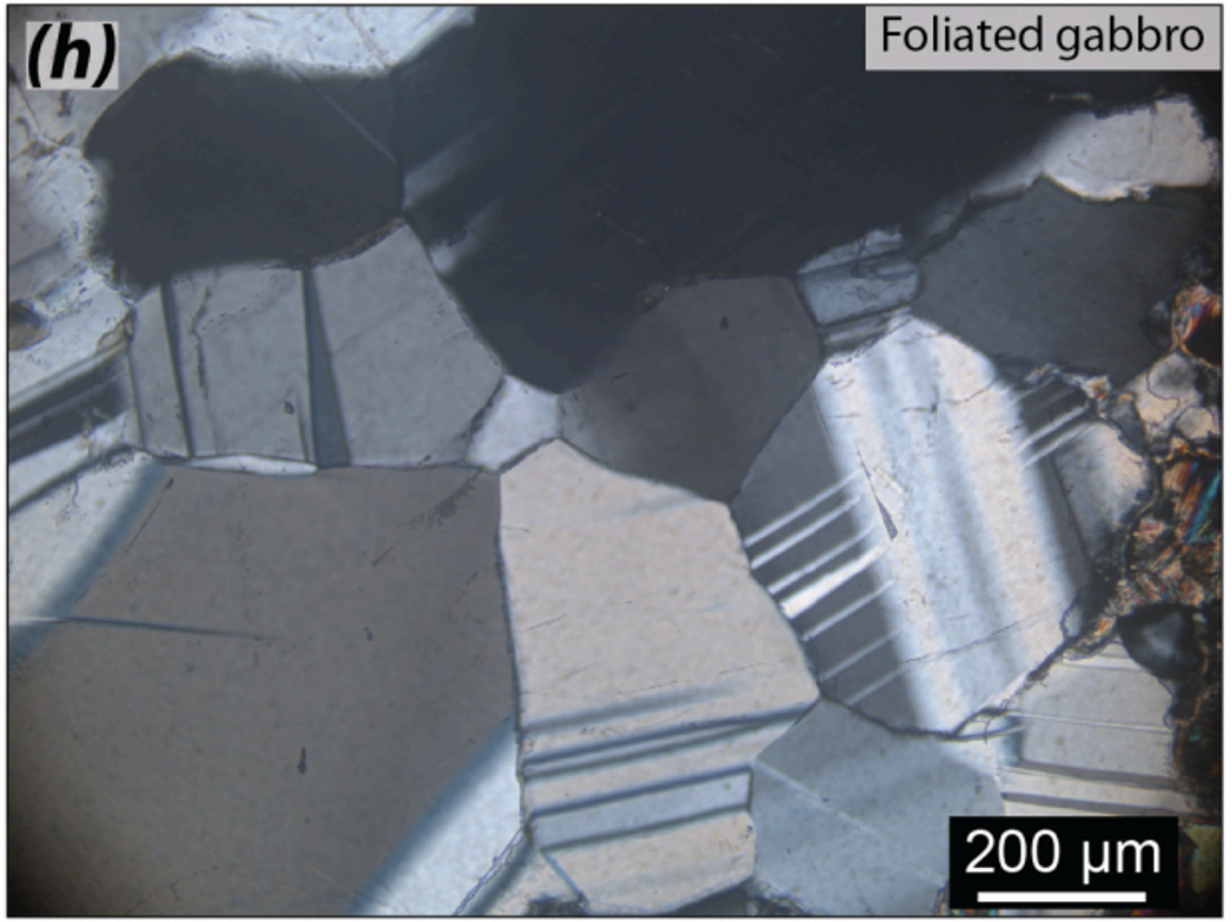



Allard et al. 2021
(submitted JGR)

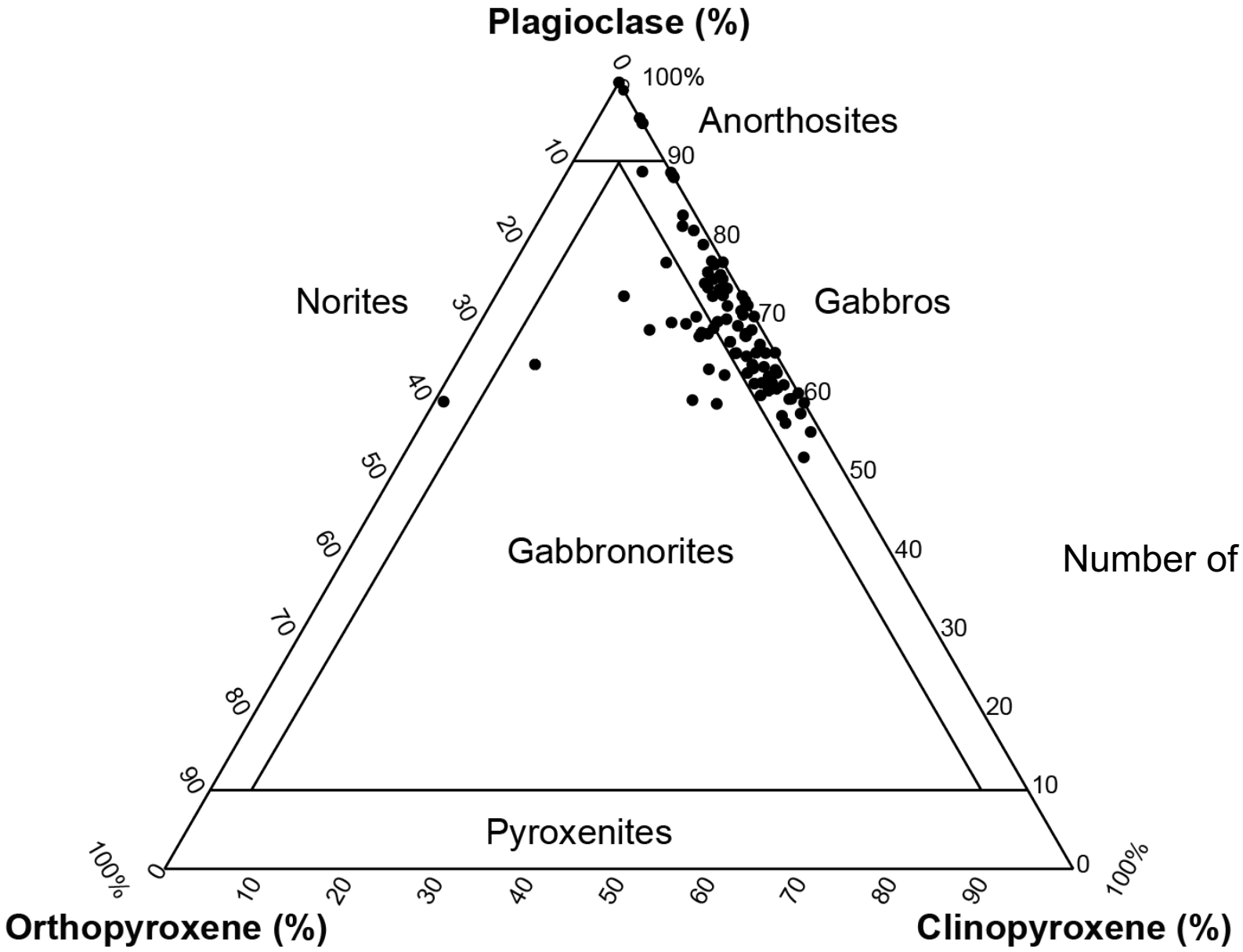
# Bulging (L) and annealing (R) in plagioclase



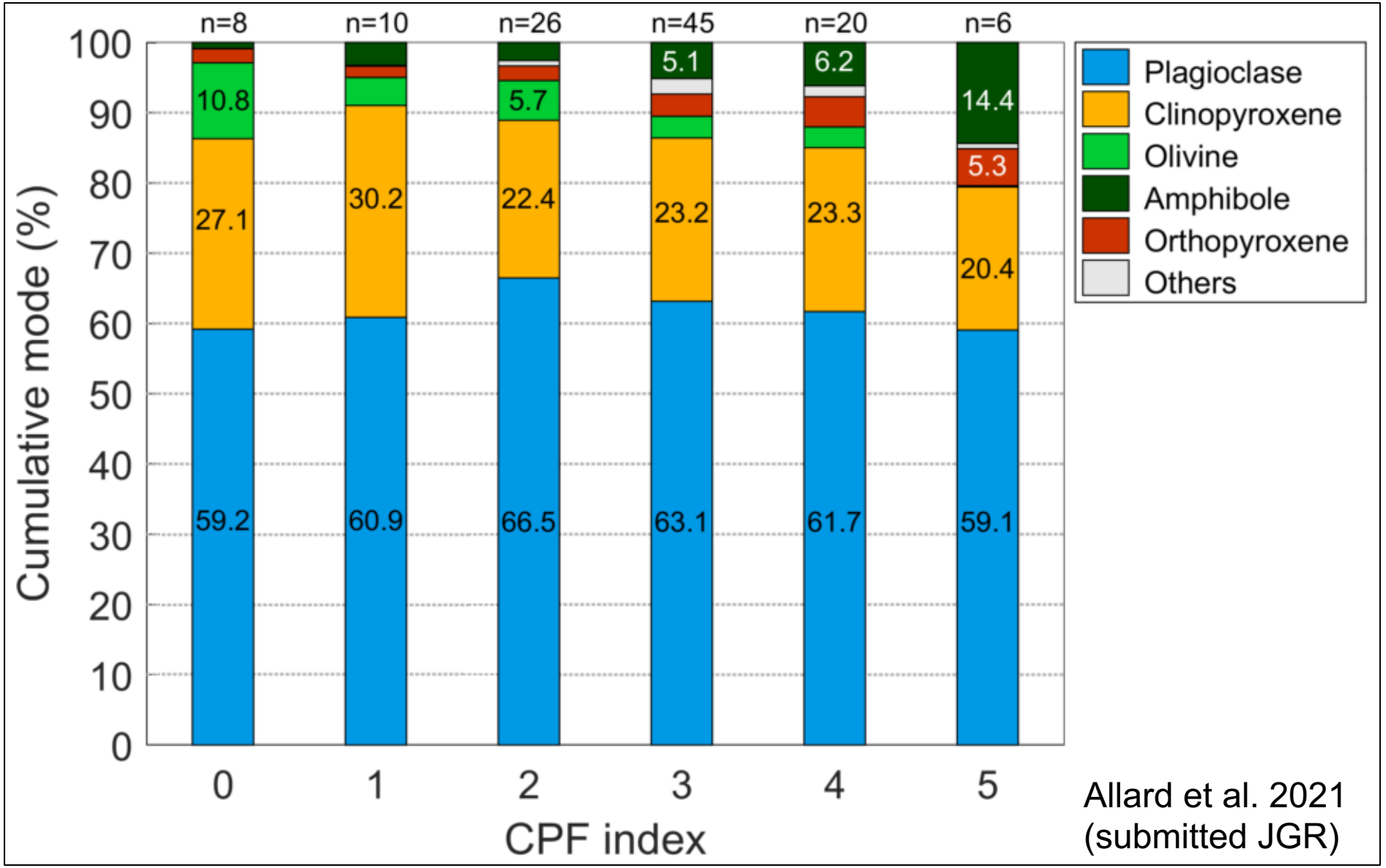

Allard et al. 2021
(submitted JGR)

# Gabbros EBSD-derived mineral composition



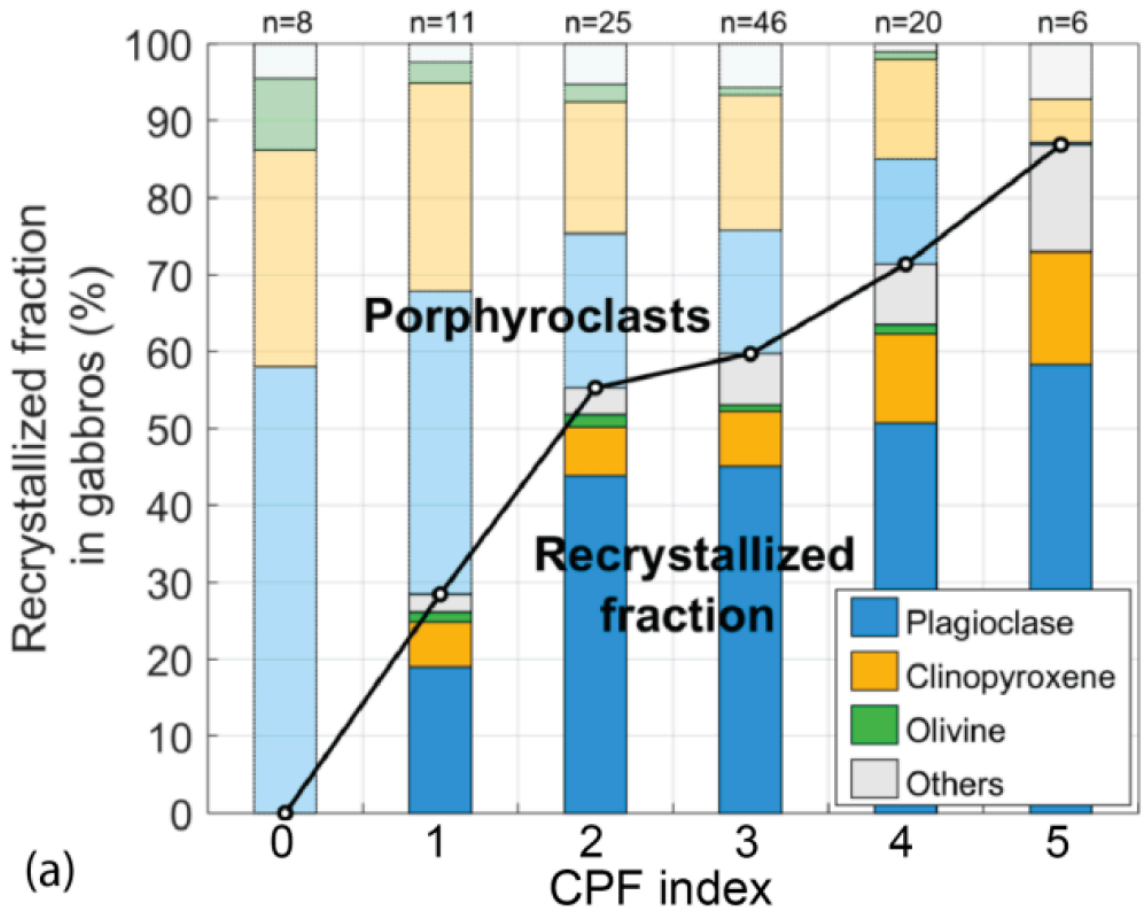

Number of samples = 90

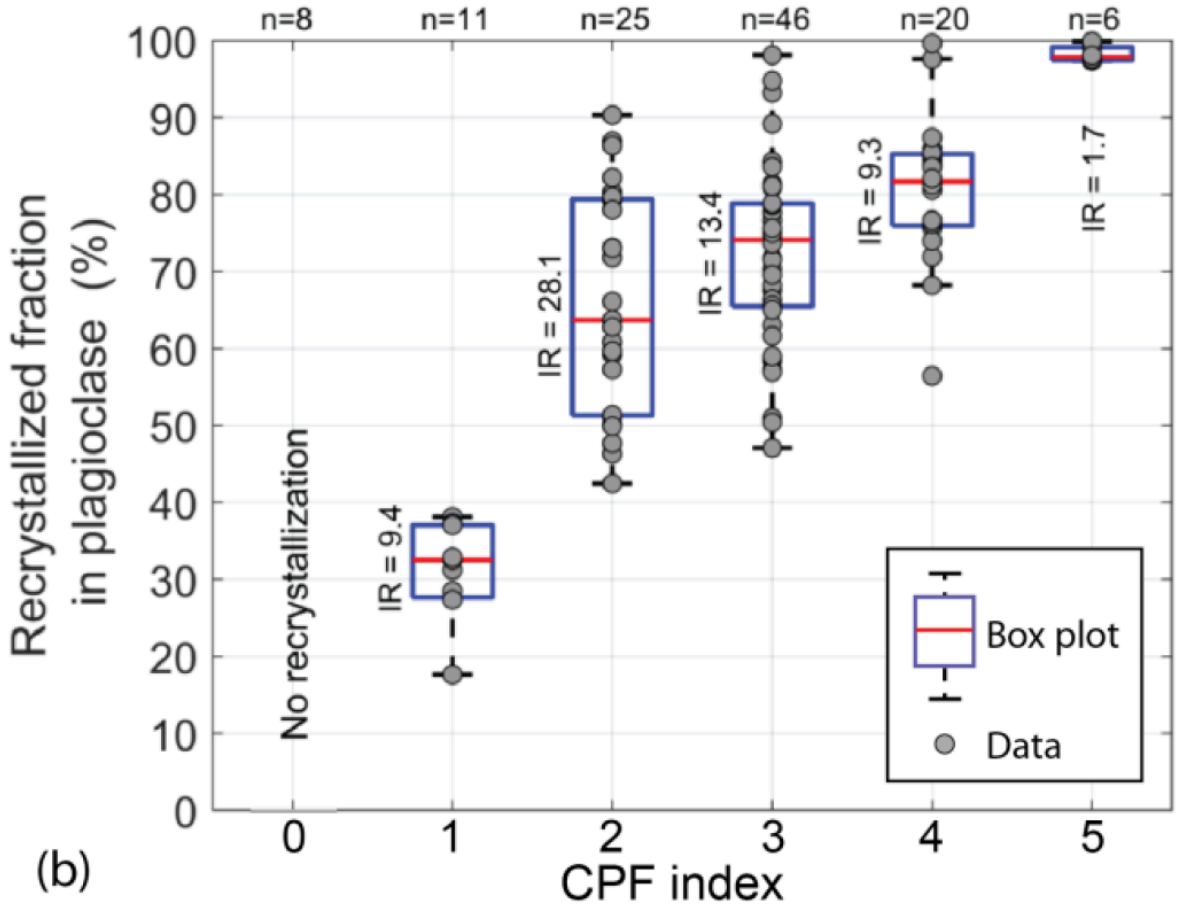
# Compositional variation x deformation




Allard et al. 2021
(submitted JGR)

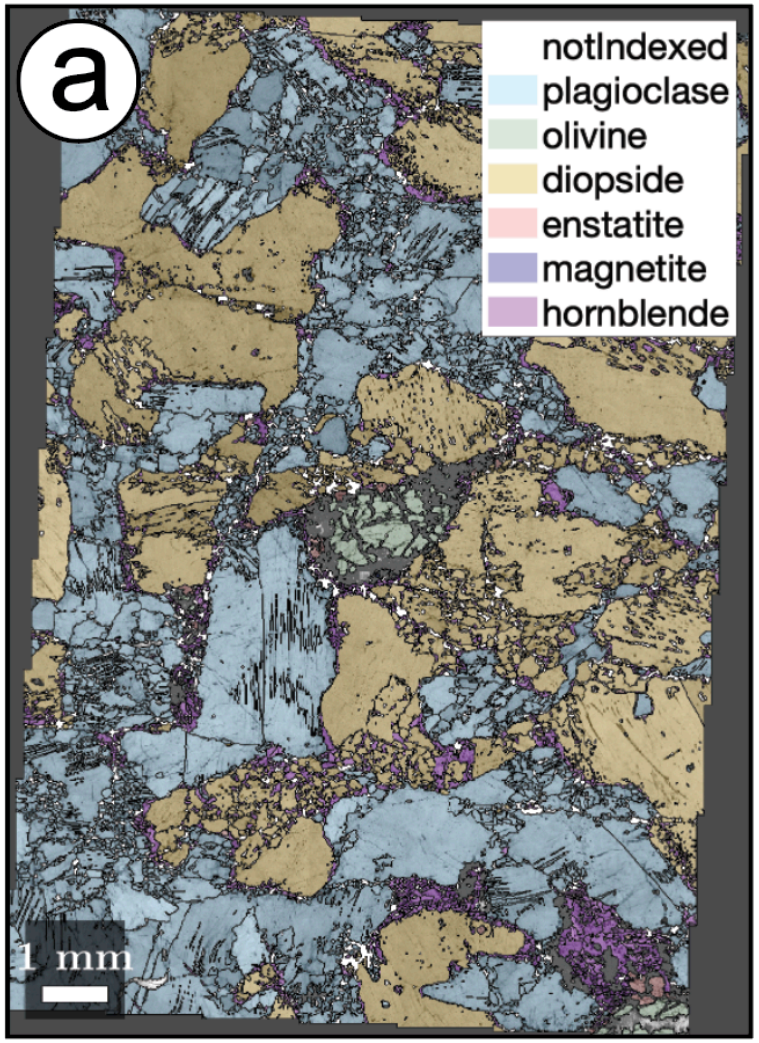
# Modal proportions of recrystallized grains x deformation



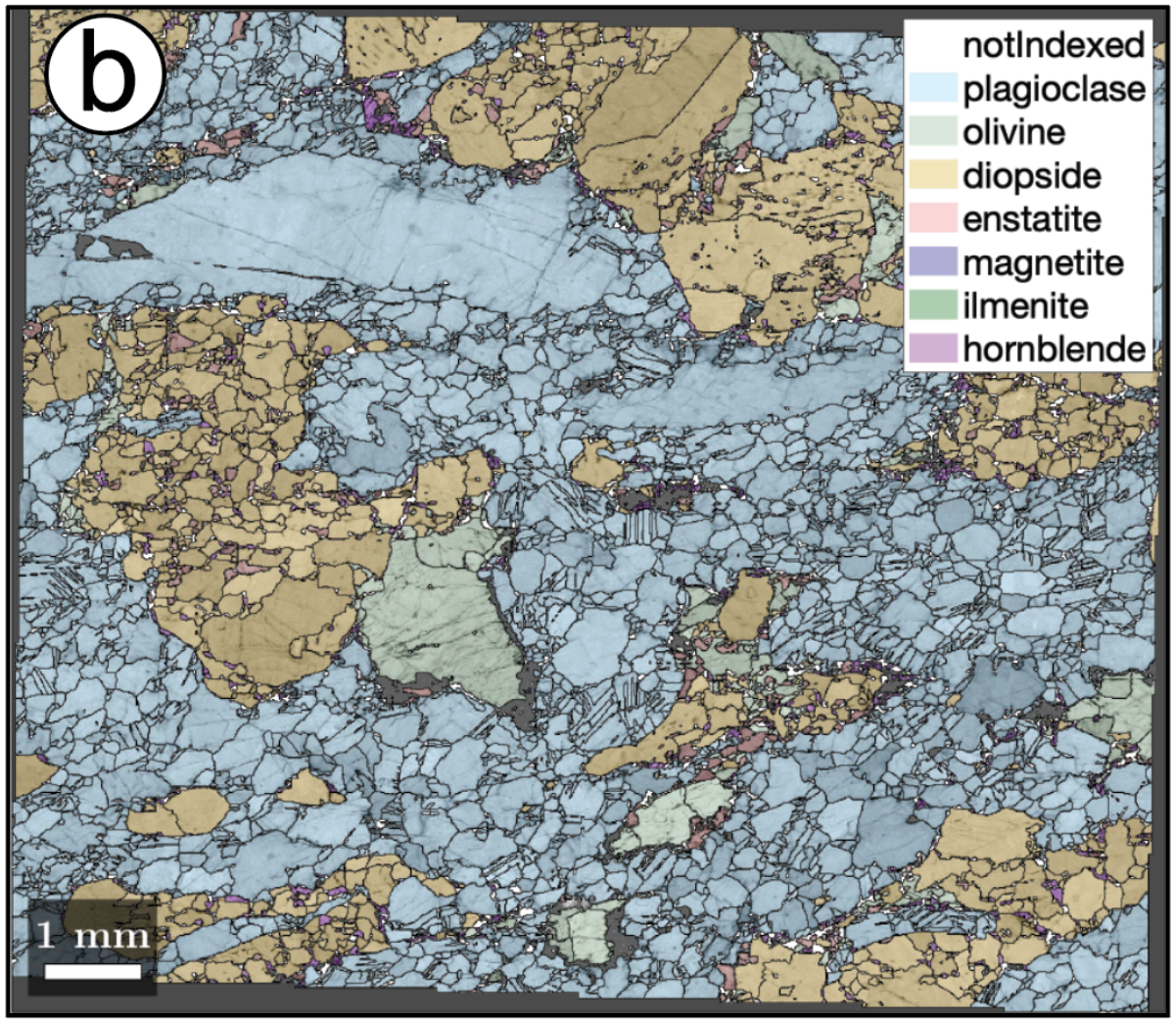




Allard et al. 2021
(submitted JGR)

# EBSD-derived compositional maps – Hole U1473A

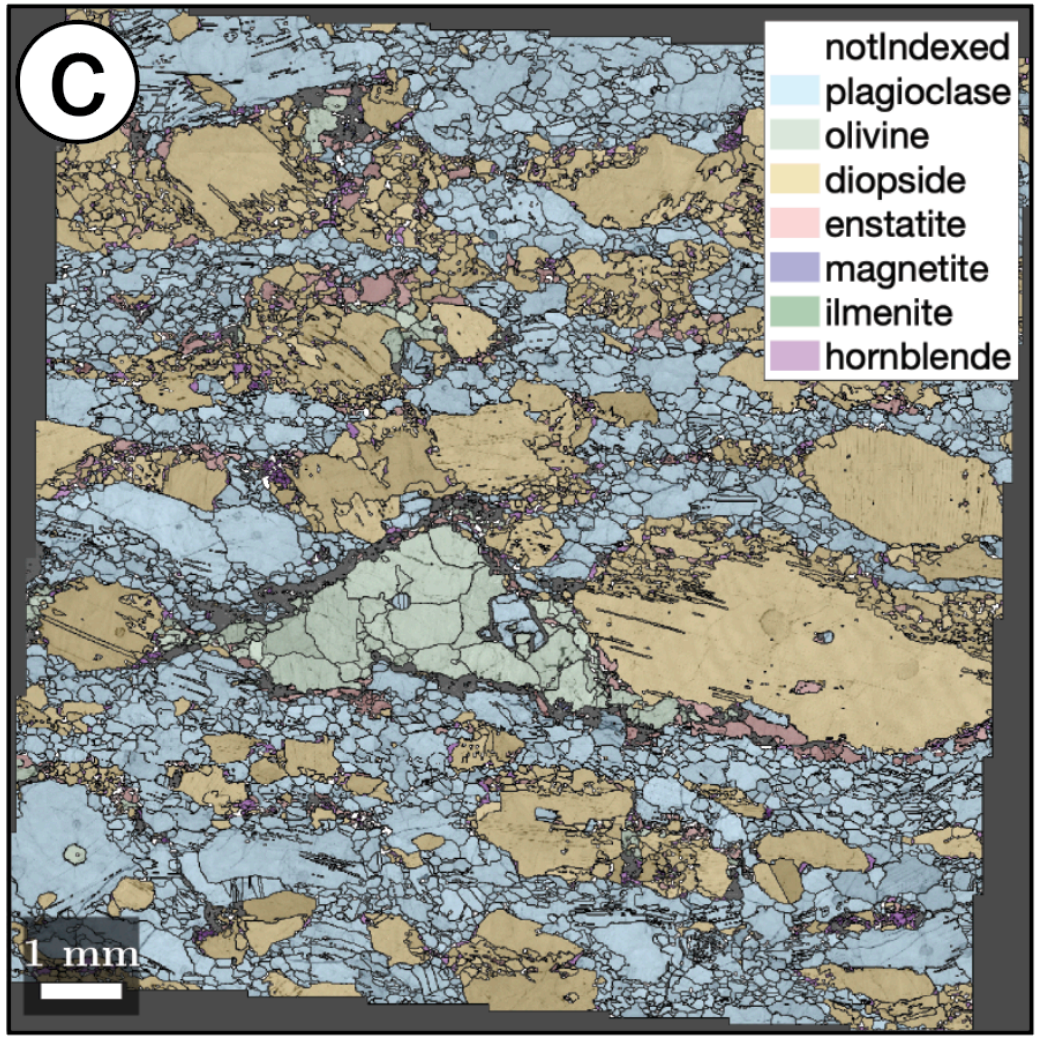



Subophitic – granular texture
CPF ~ 0

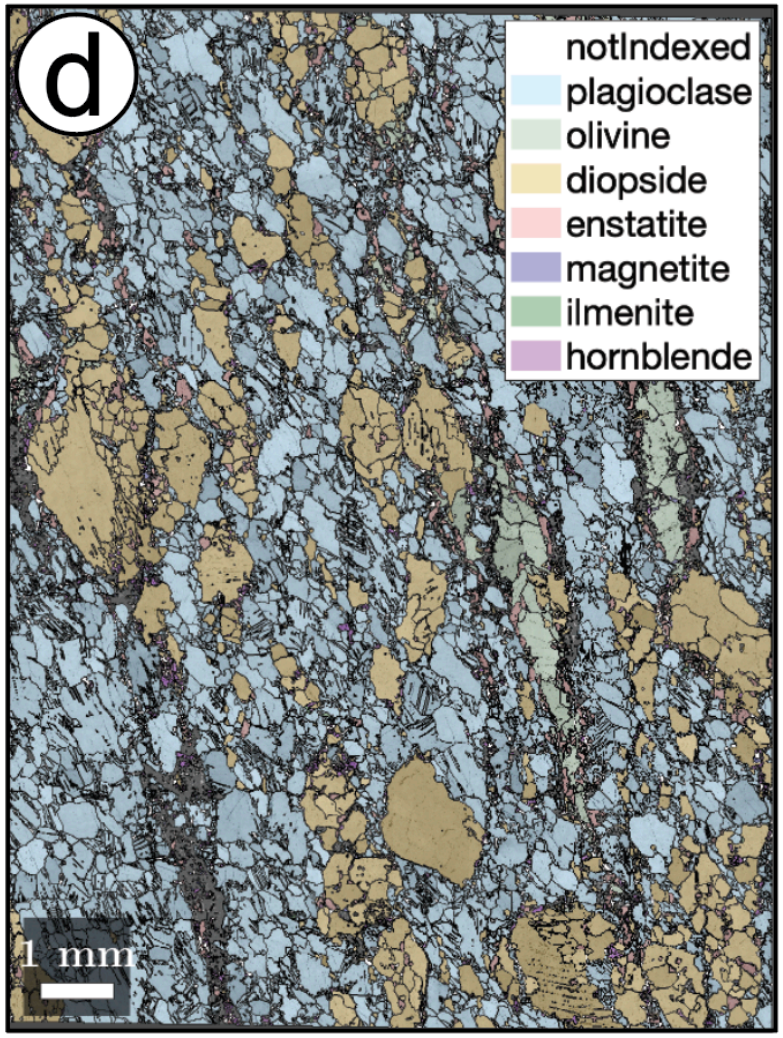



Porphyroclastic texture
CPF ~ 2

# EBSD-derived compositional maps – Hole U1473A

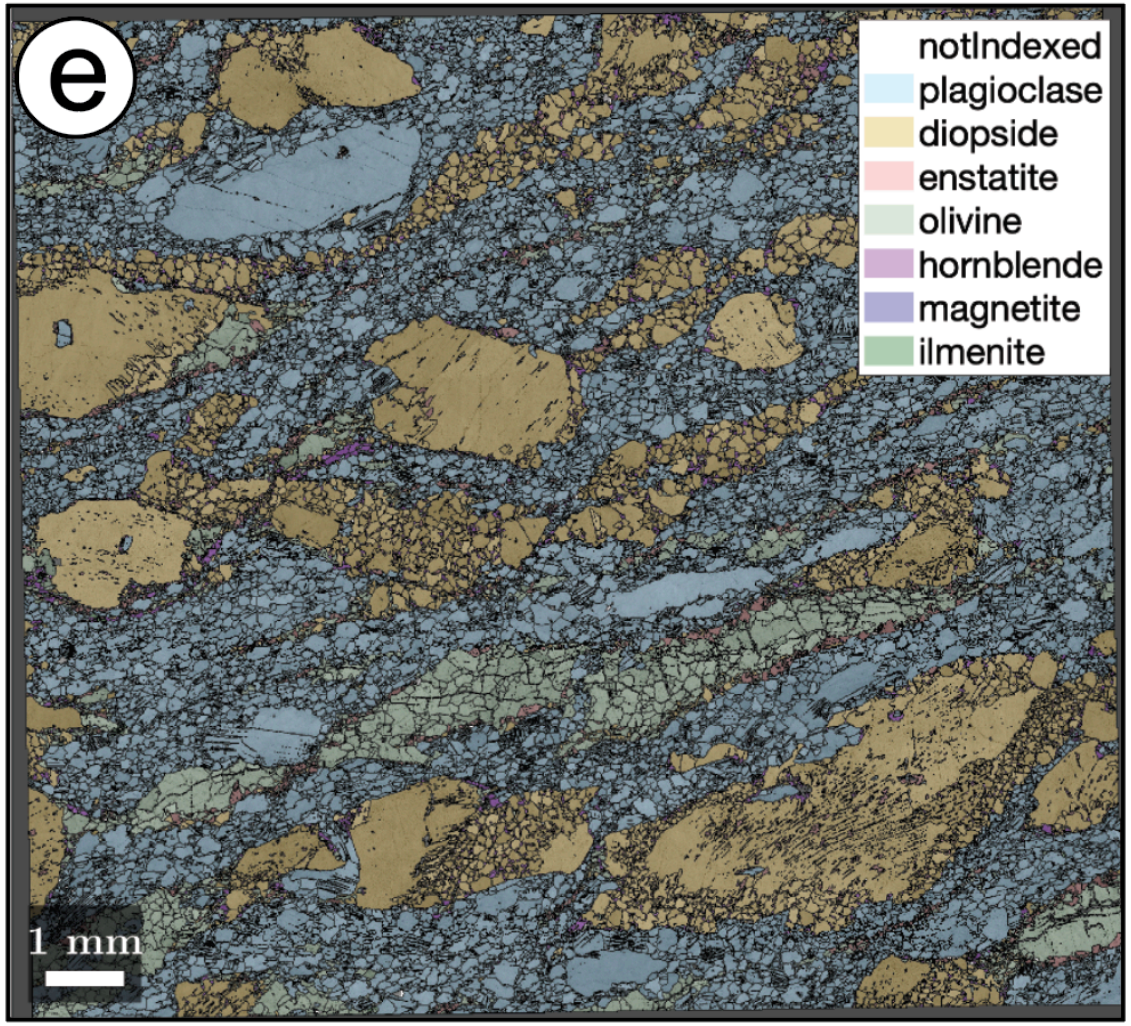



Porphyroclastic - protomylonitic texture
CPF ~3

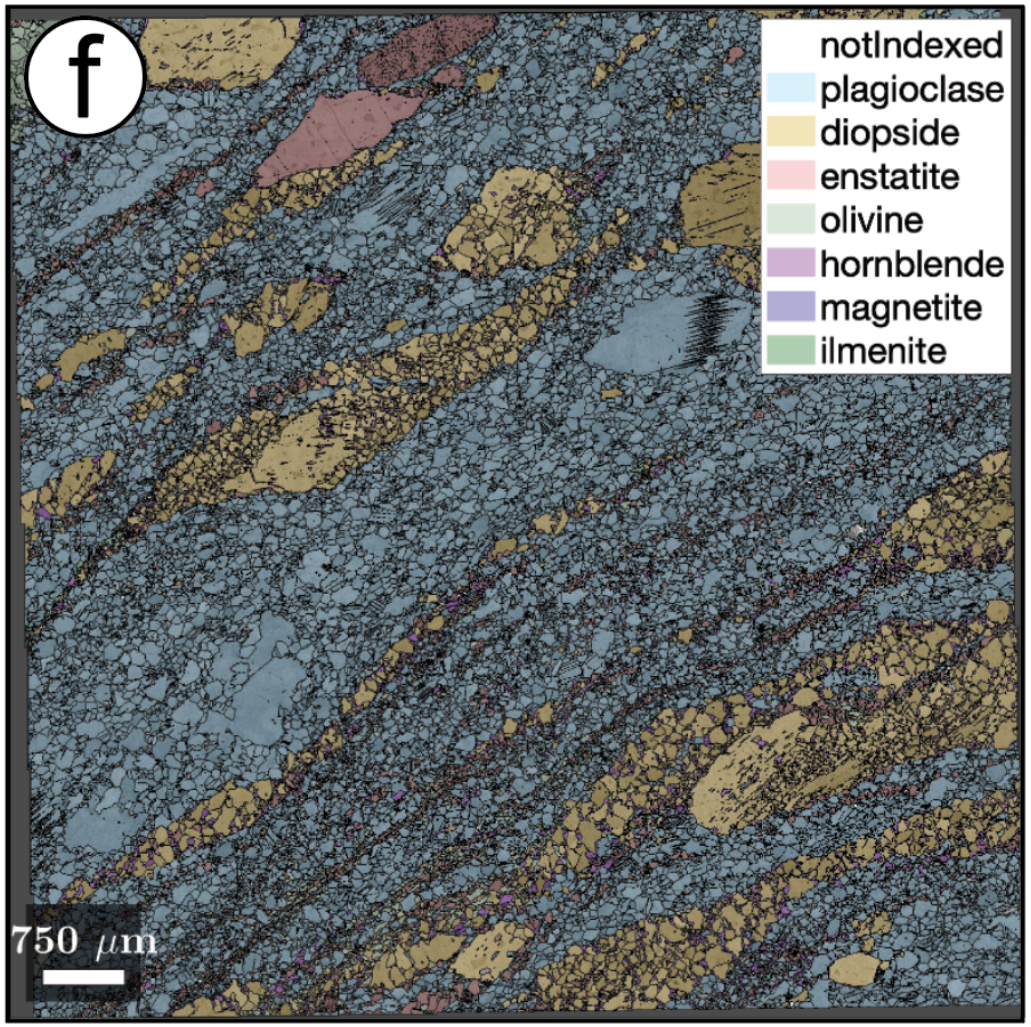



Protomylonitic texture
CPF ~4

# EBSD-derived compositional maps – Hole U1473A

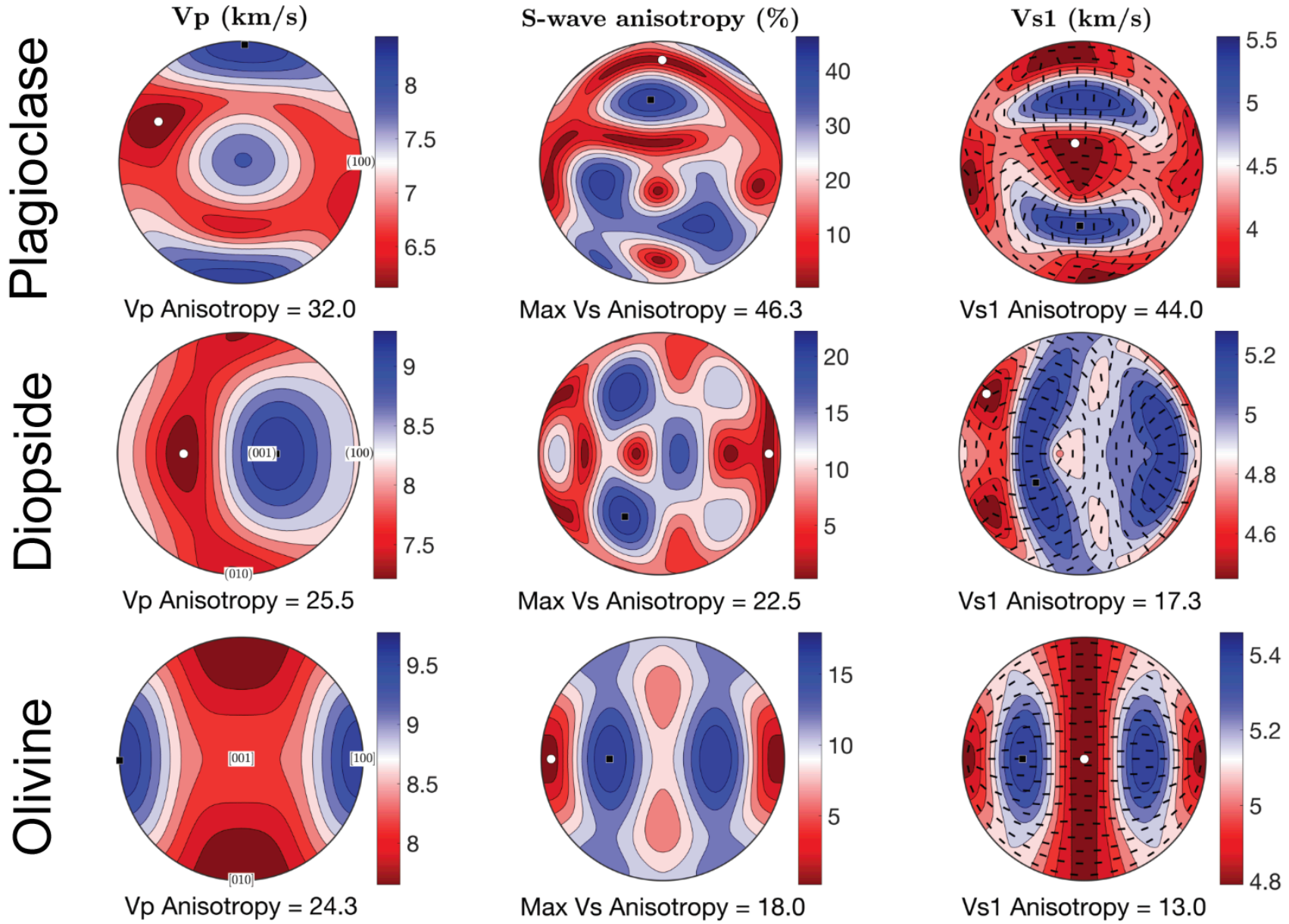



Mylonitic texture
CPF ~ 5



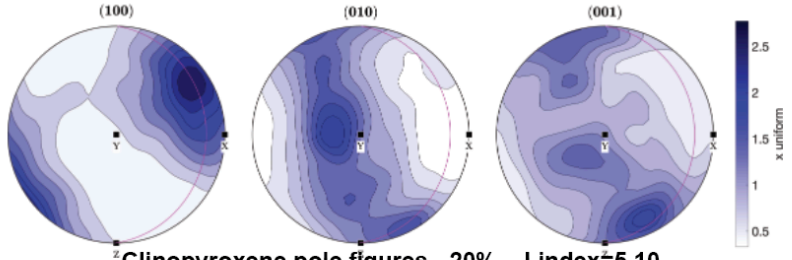

Ultramylonitic texture
CPF ~ 5

# Single-crystal seismic properties

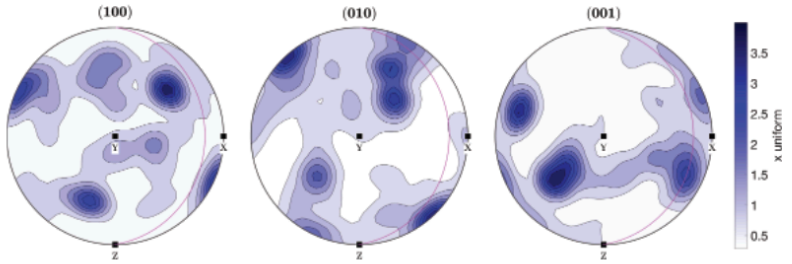


# Seismic properties – sample 360-B1 - Hill average

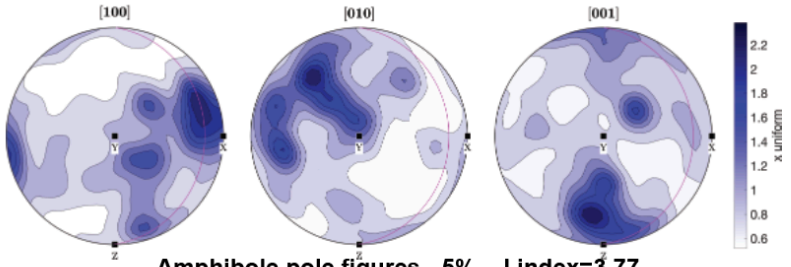
Plagioclase pole figures - 68% - J index=2.40



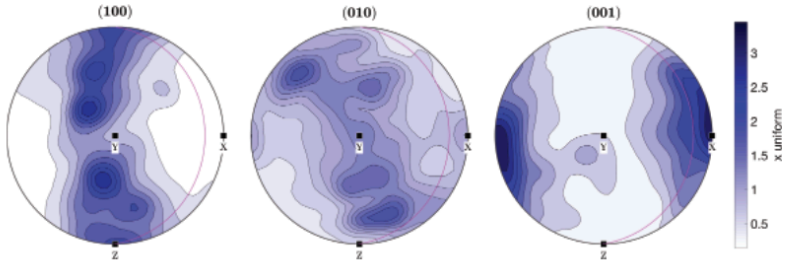

Clinopyroxene pole figures - 20% - J index=5.10

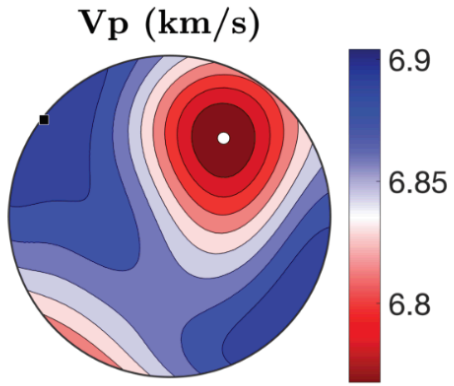



Olivine pole figures - 5% - J index=1.50

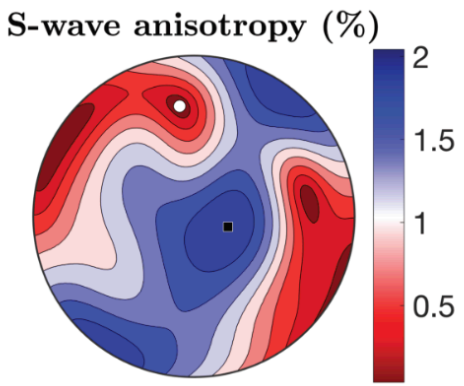



Amphibole pole figures - 5% - J index=3.77

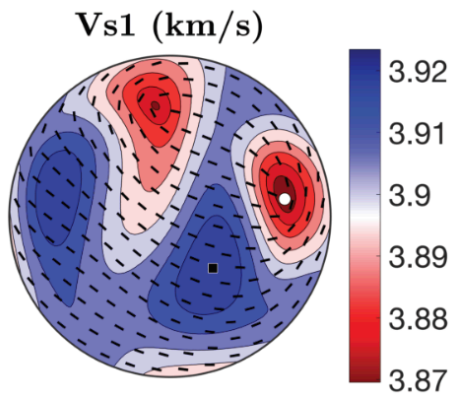


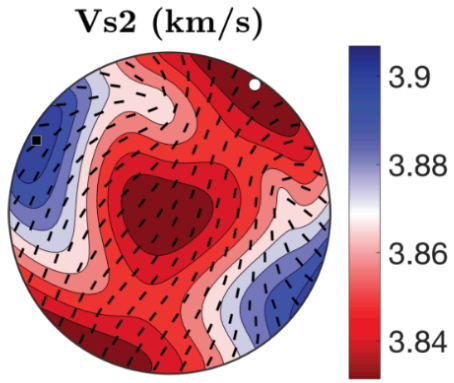

Vp Anisotropy = 2.0



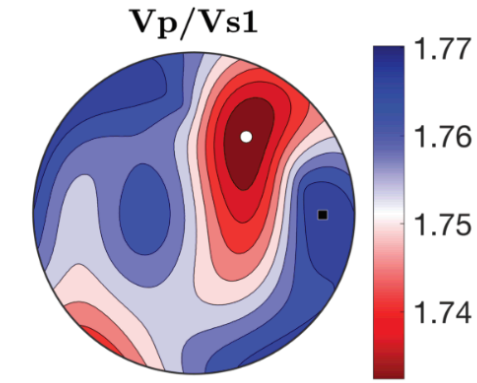

Max Vs Anisotropy = 2.0



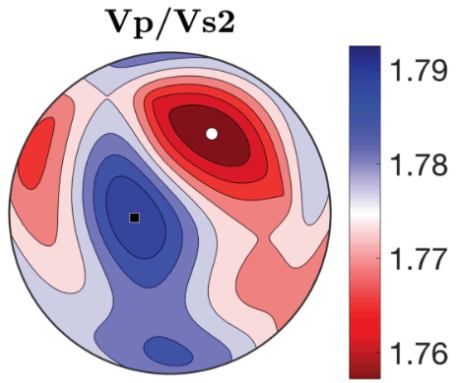

Vs1 Anisotropy = 1.4




Vs2 Anisotropy = 2.0



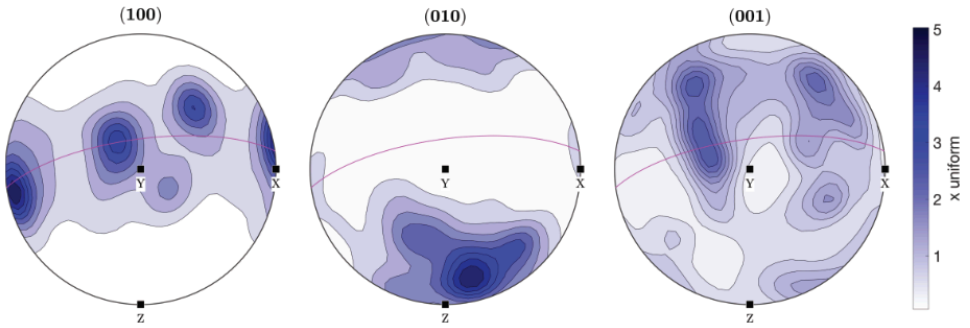

Vp/Vs1 Anisotropy = 2.2



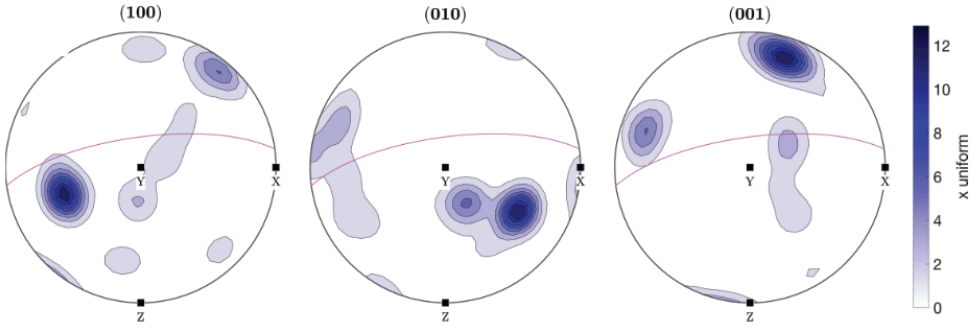

Vp/Vs2 Anisotropy = 2.0

# Seismic properties – sample 360-B18 - Hill average

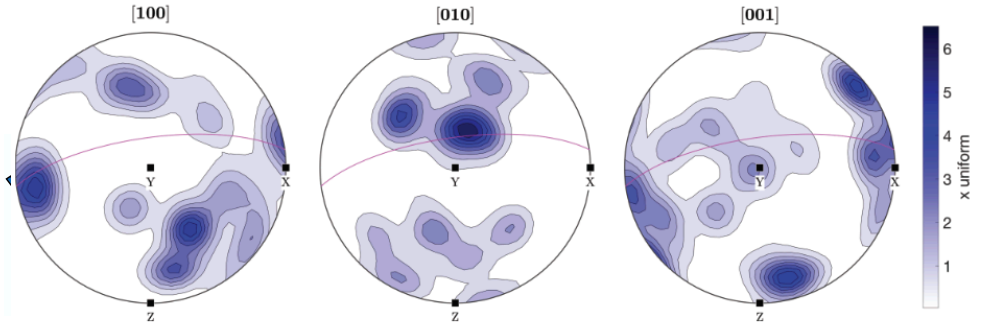
**Plagioclase pole figures - 71% - J index=6.50**

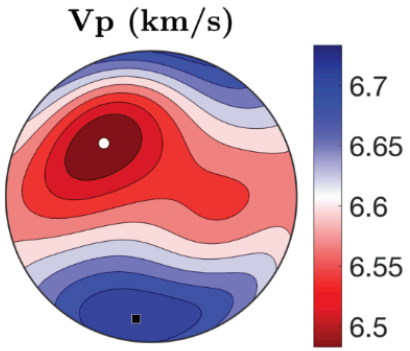



**Clinopyroxene pole figures - 22% - J index=31.50**

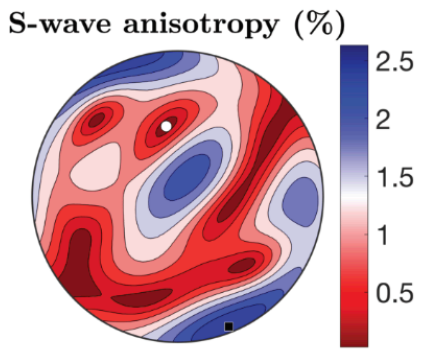



**Olivine pole figures - 6% - J index=6.80**

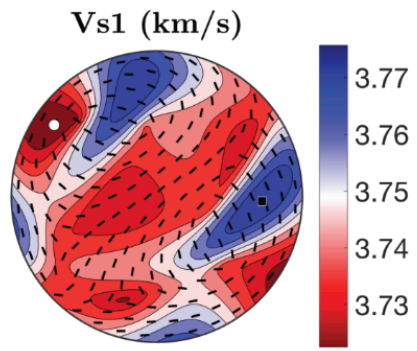


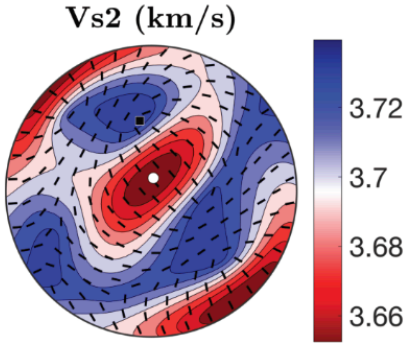

Vp Anisotropy = 3.8



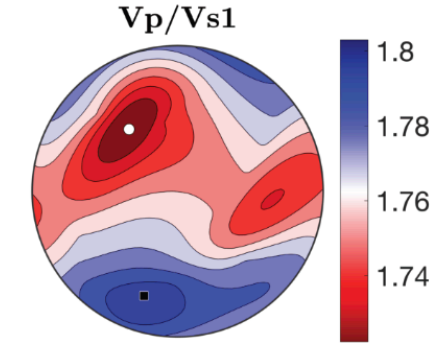

Max Vs Anisotropy = 2.6



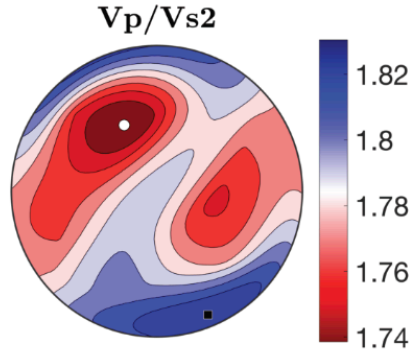

Vs1 Anisotropy = 1.4




Vs2 Anisotropy = 2.4



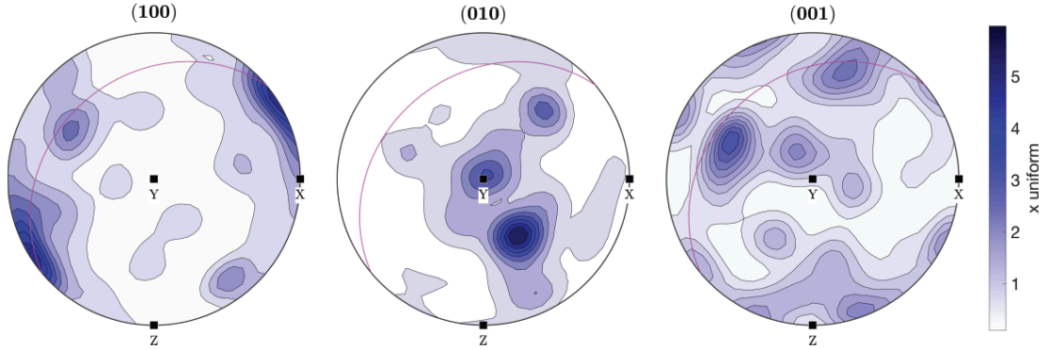

Vp/Vs1 Anisotropy = 4.6



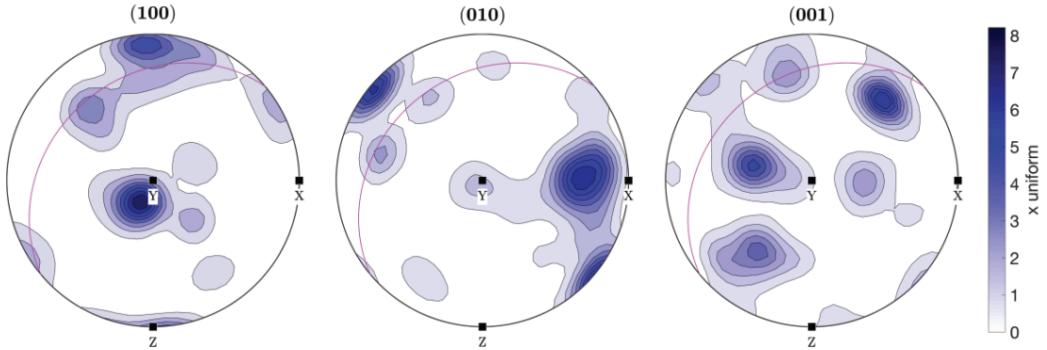

Vp/Vs2 Anisotropy = 5.1

# Seismic properties – sample 360-B116 - Hill average

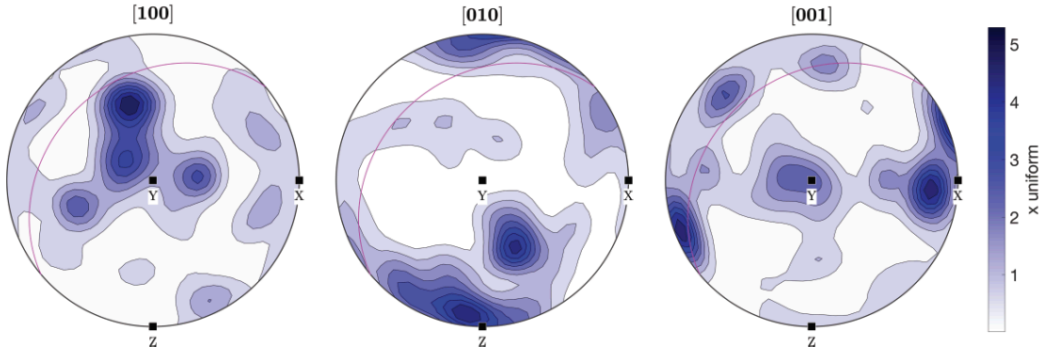
**Plagioclase pole figures - 59% - J index=6.30**

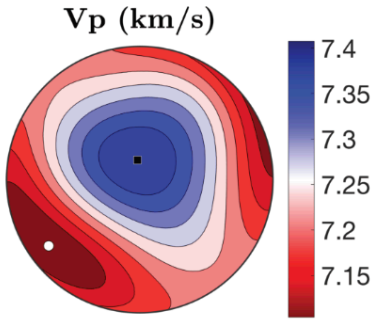



**Diopside pole figures - 11% - J index=14.0**

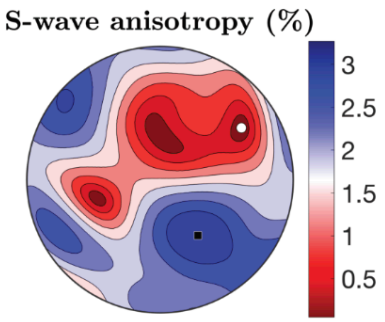



**Olivine pole figures - 29% - J index=4.70**

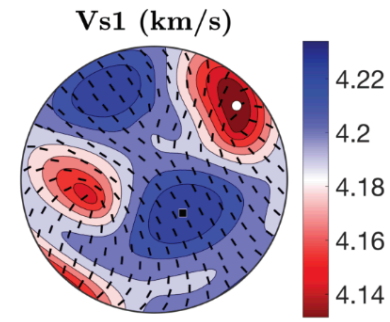


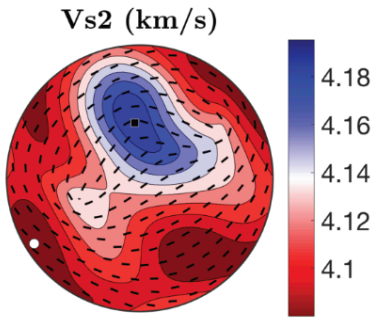

Vp Anisotropy = 4.2



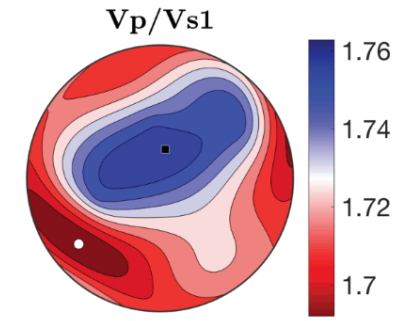

Max Vs Anisotropy = 3.3



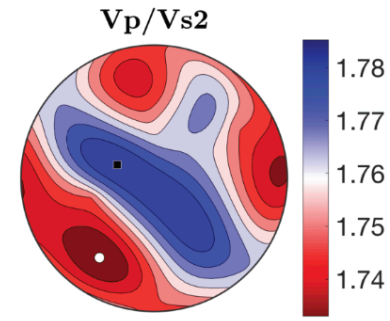

Vs1 Anisotropy = 2.5




Vs2 Anisotropy = 2.8

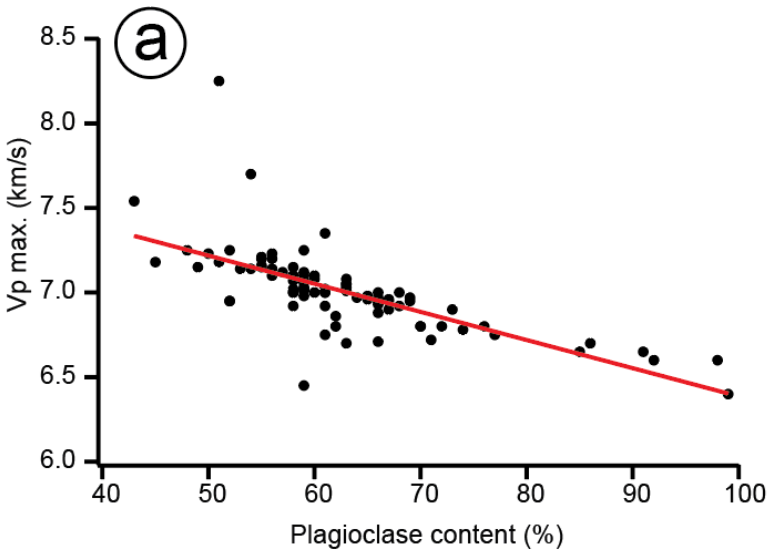


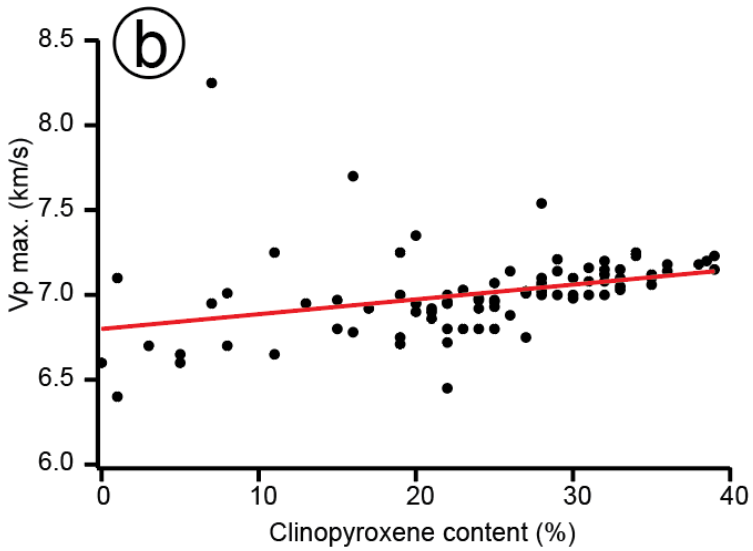

Vp/Vs1 Anisotropy = 4.1

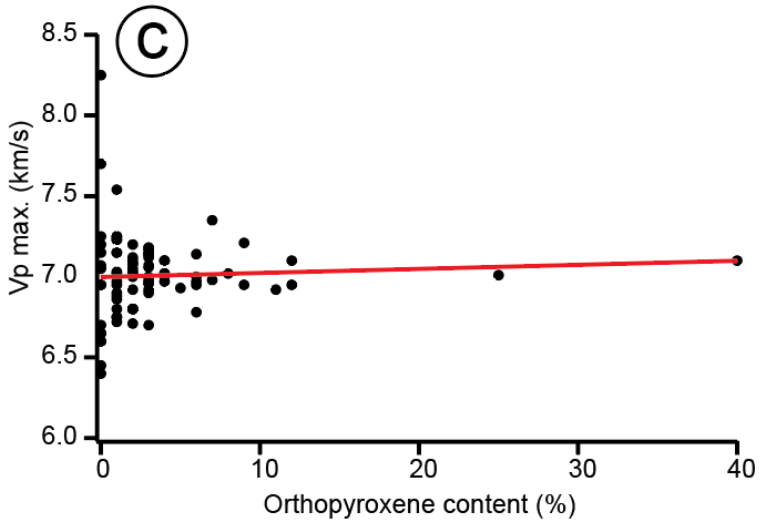


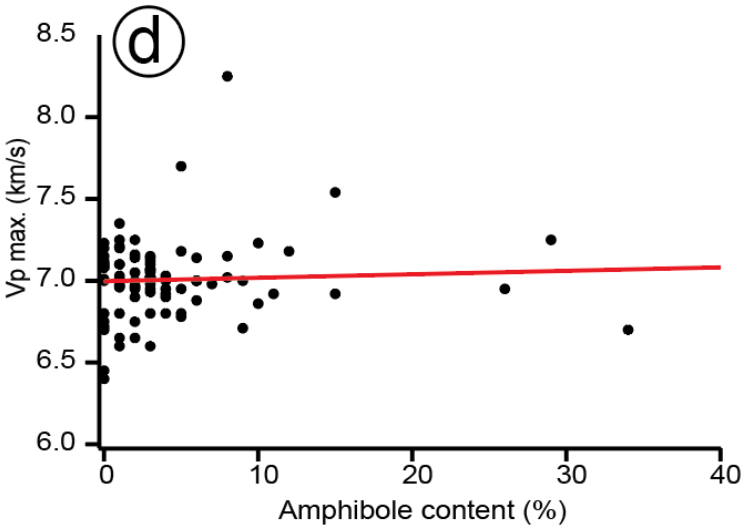

Vp/Vs2 Anisotropy = 3.0

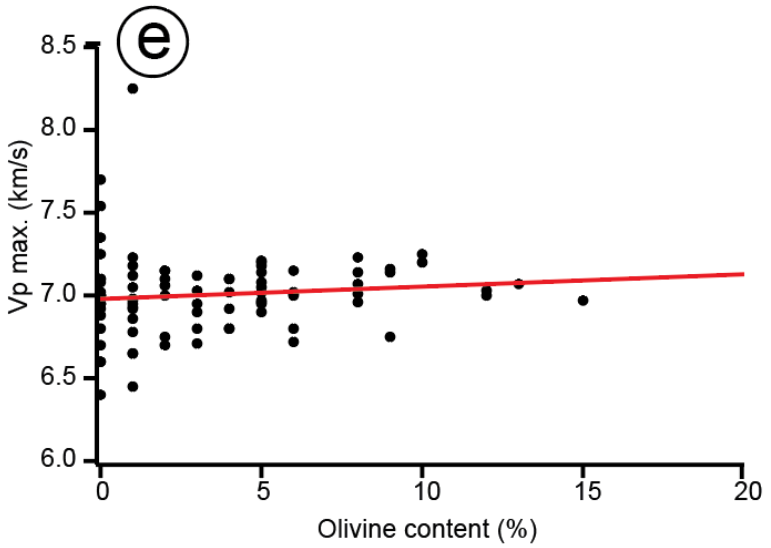
# P-wave velocities x mineral composition

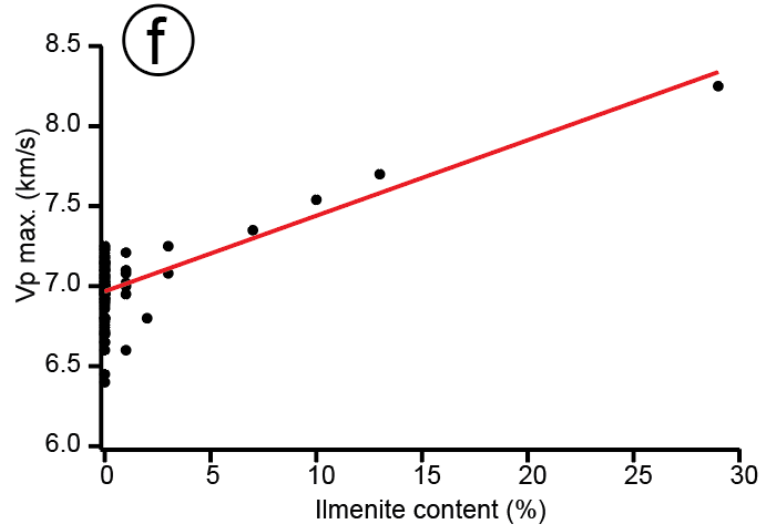


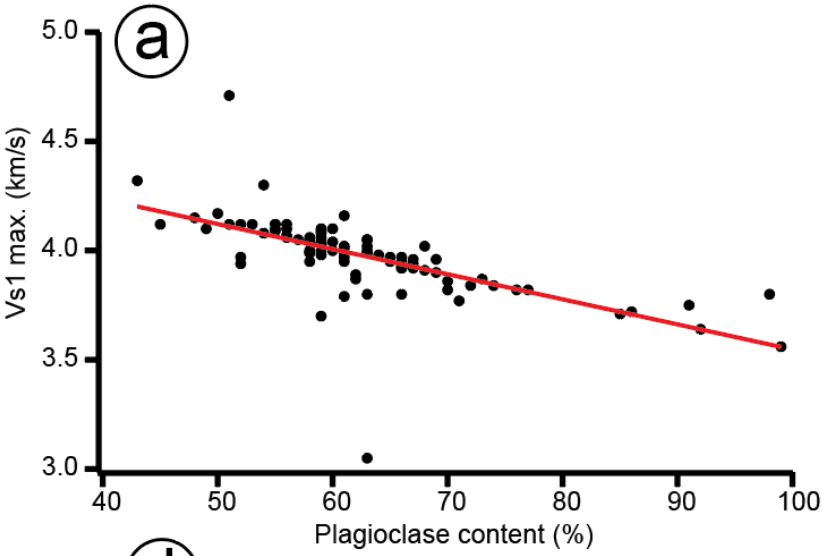



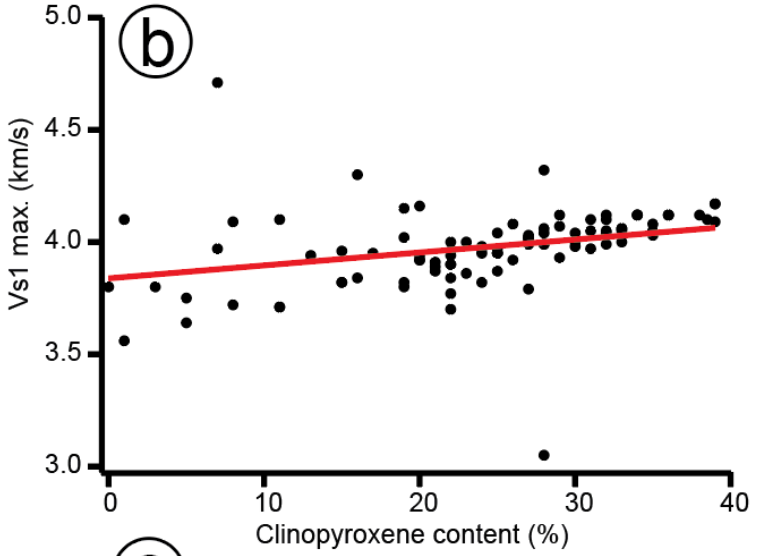



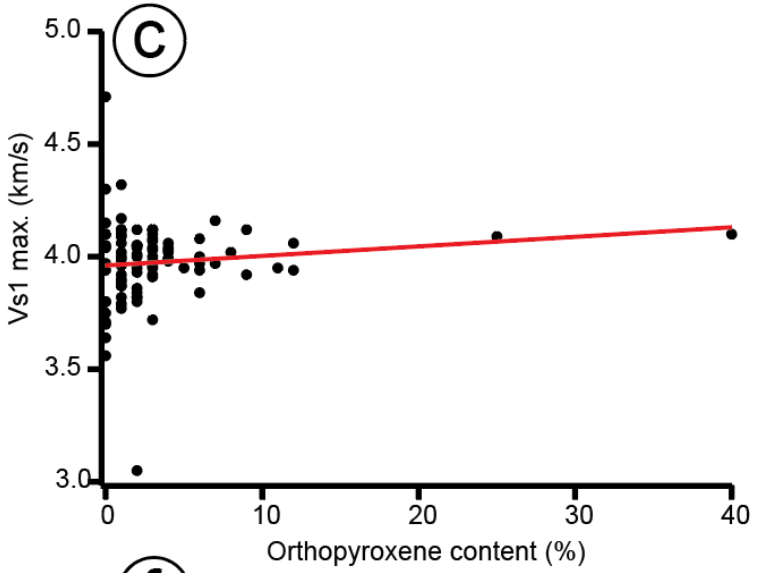



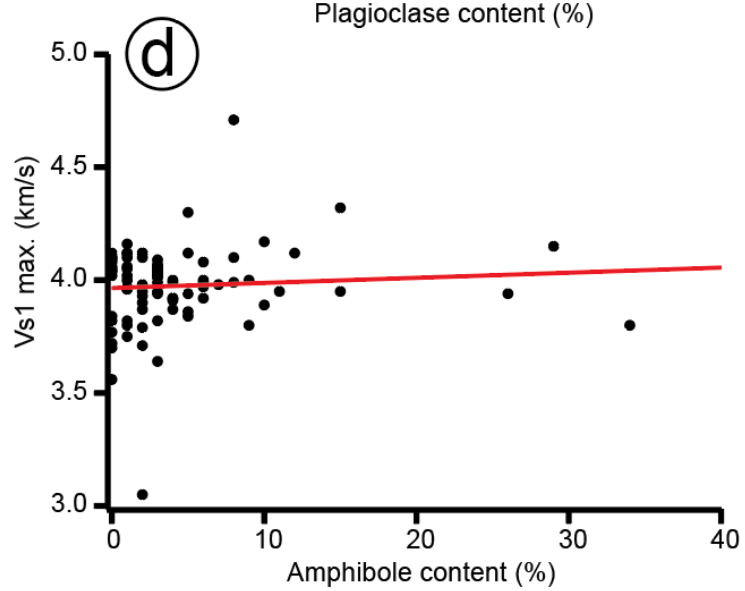



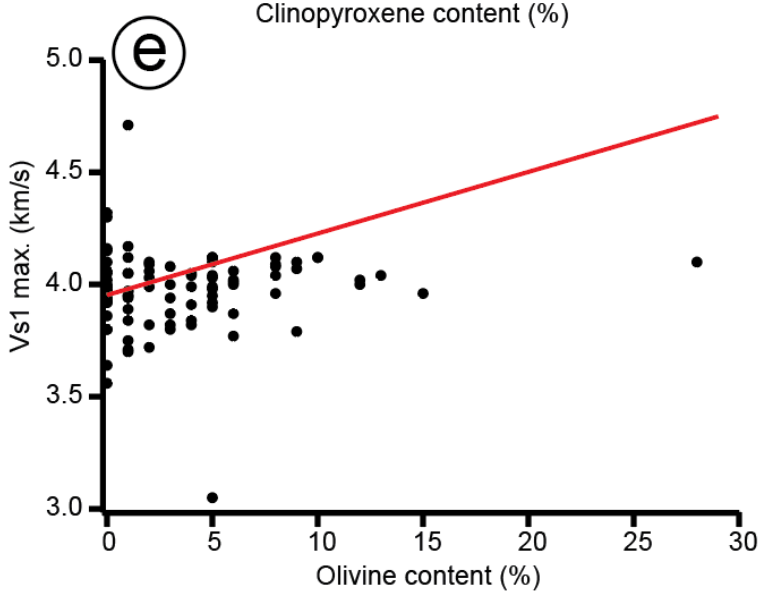
# S-wave velocities x mineral composition

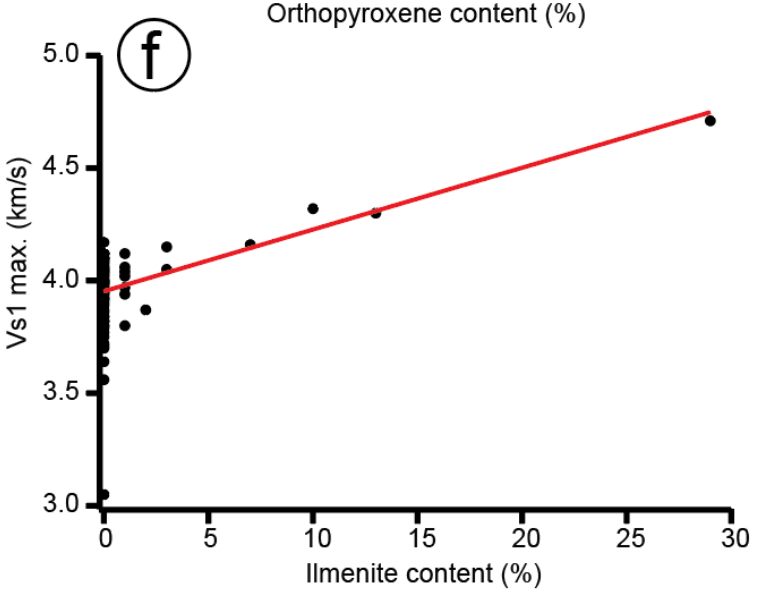


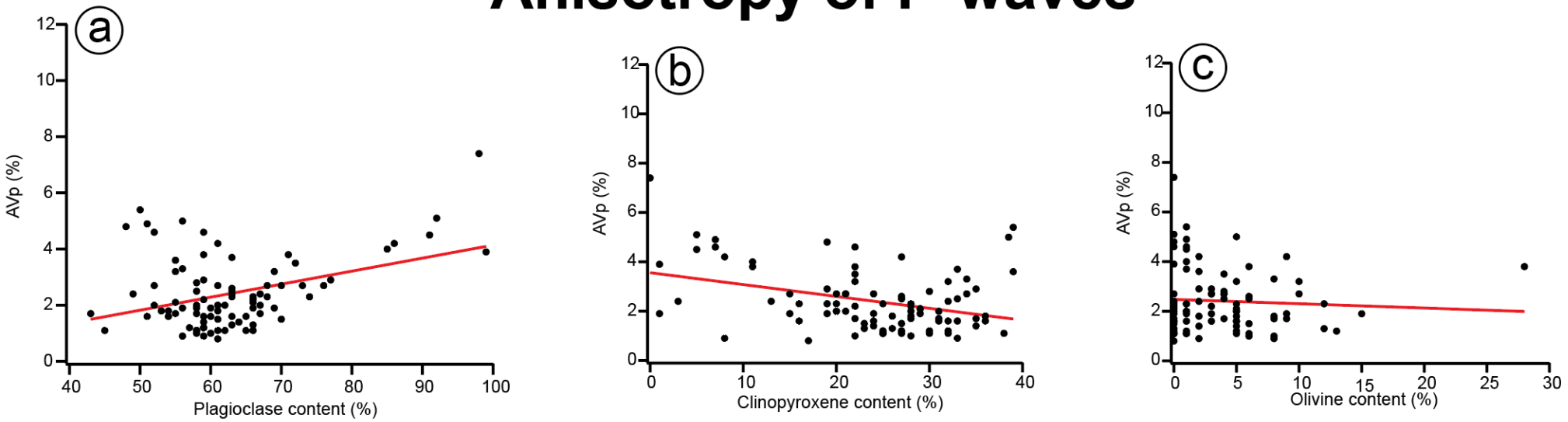



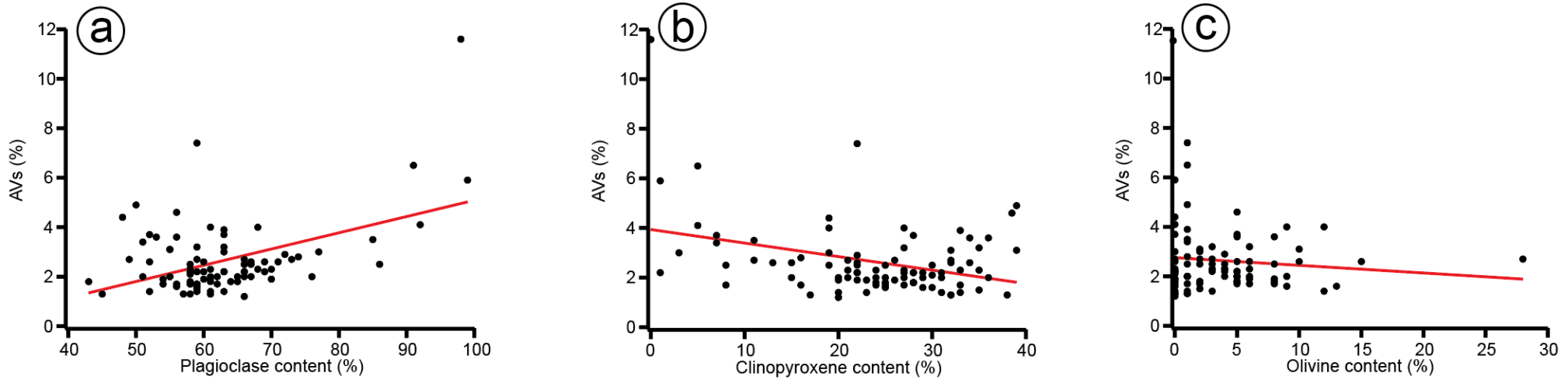



# Anisotropy of P and S waves vs. composition

## Anisotropy of P-waves

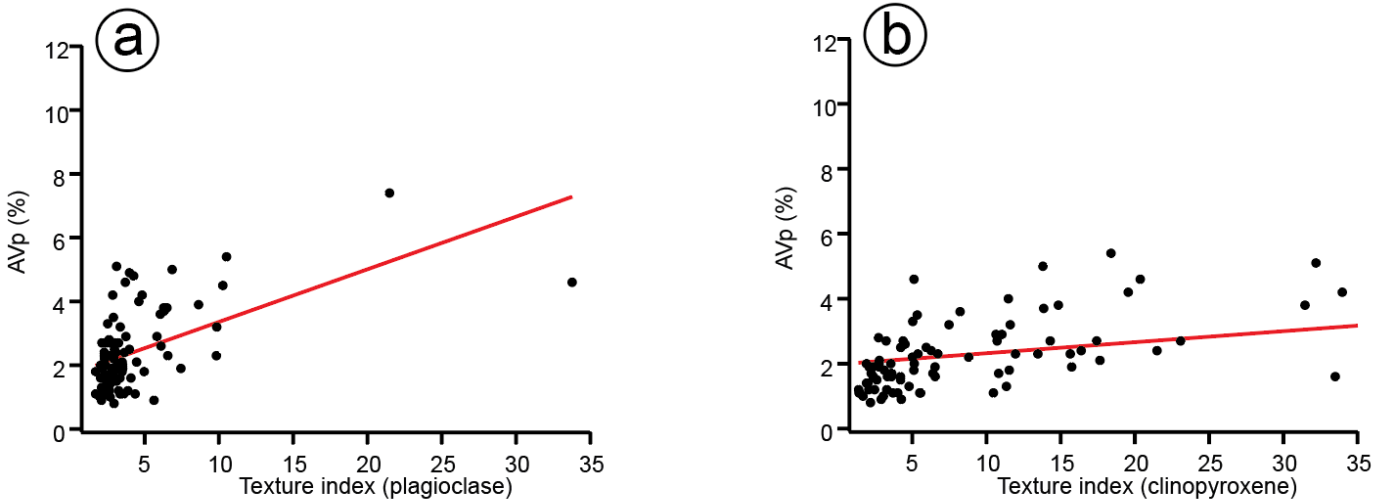



## Anisotropy of S-waves



# Anisotropy of P and S waves vs. CPO strength

## P-wave anisotropy x CPO strength




## S-wave anisotropy x CPO strength

