

PETROGRAPHIC REPORT

CLIENT: Trevor Burr, AngloGoldAshanti
PROJECT/PROPERTY: CR STUDY
SAMPLE NUMBER: CR-0006

BY: James R. Shannon, Ph.D.
SAMPLE TYPE: Polished Thin Section
DATE: 21-June 2017

HAND SAMPLE DESCRIPTION: Piece of core from 23.5 m showing fine to medium grained, dark greenish gray actinolitic(?) metagabbro. No apparent preferred fabrics (foliation/lineation). The sample is nonmagnetic with a pencil magnet, and has weak effervescence (moderate along carbonate veinlets) with dilute HCl.

POLISHED-SECTION DESCRIPTION:

MINERAL	EST %	COMMENTS
PRIMARY	(99)	Very amphibole rich with remnants of magmatic hornblende and abundant metamorphic amphibole
Hornblende	80	Remnants of light brown-green pleochroic, magmatic hornblende (up to 2.5 mm) extensively replaced by colorless metamorphic amphibole; Approximately 25 percent remnant magmatic hornblende
Plagioclase	19	Subhedral-anhedral grains up to 1.0 mm in patches between amphiboles; Minor relict albite twinning; Locally recrystallized to mosaic intergrowths with local micro-myrmekite
ACCESSORY	(0.2)	
Ilmenite	0.2	
METAMORPHIC	(55)	
Amphibole	55	Colorless amphibole extensively replacing magmatic hornblende; Has slightly higher birefringence than hornblende; No twinning; Lacks bluegreen pleochroism of normal actinolite
Micro-myrmekite	Tr	Minor plagioclase-quartz intergrowths; probably related to Mm overprint
Sphene-Leucoxene	0.1	Subhedral grains up to 0.1 mm
ALTERATION	(22)	Local moderate chlorite alteration of amphiboles; and as patches along microshears
Chlorite	18	Pale greenish with gray birefringence; Locally replaces amphiboles and as patches (up to 3 mm) along shears
Calcite	4	Anhedral grains and patches up to 0.8 mm
SULFIDE	(Tr)	Very minor disseminated chalcopyrite and pyrite
Pyrite	Tr	Subhedral grains up to 0.04 mm in recrystallized plagioclase; some irregular patches to 0.2 mm
Chalcopyrite	Tr	Subhedral grains up to 0.03 mm associated with amphibole

TEXTURES

The sample displays a very fine to medium grained, relict, mafic-rich gabbroic texture with larger remnant magmatic hornblende grains and patches of relict plagioclase. The hornblende is extensively replaced by colorless amphibole related to metamorphic overprinting. The colorless

amphibole forms rims and patchy interior replacements that have slightly higher birefringence than magmatic hornblende. Both amphiboles are biaxial (-) with $2V \sim 80$ degrees. There is no evidence of other remnant mafic phases (e.g. olivine, clinopyroxene, orthopyroxene, biotite). Relict plagioclase grains up to about 1 mm, are locally recrystallized to subgrain mosaics and local patches of micro-myrmekite.

There are no apparent preferred penetrative deformation fabrics (foliations/lineations). Minor foliated chlorite and recrystallized plagioclase-quartz occur along narrow, irregular micro-shear bands. Shearing may be contemporaneous with metamorphic overprinting.

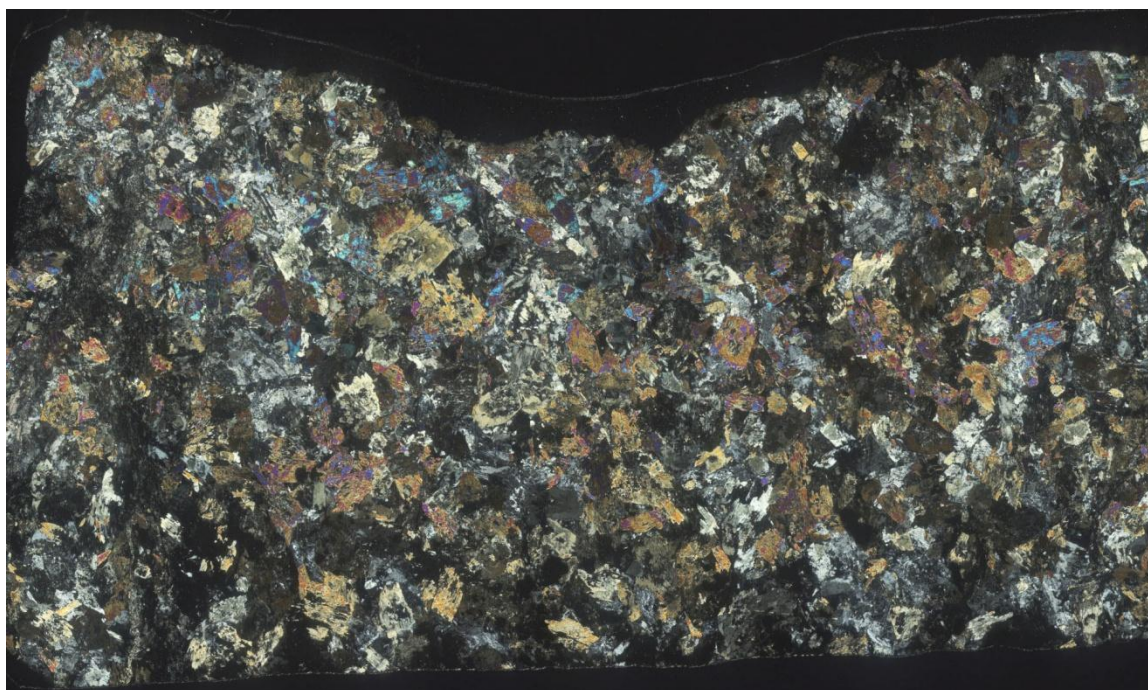
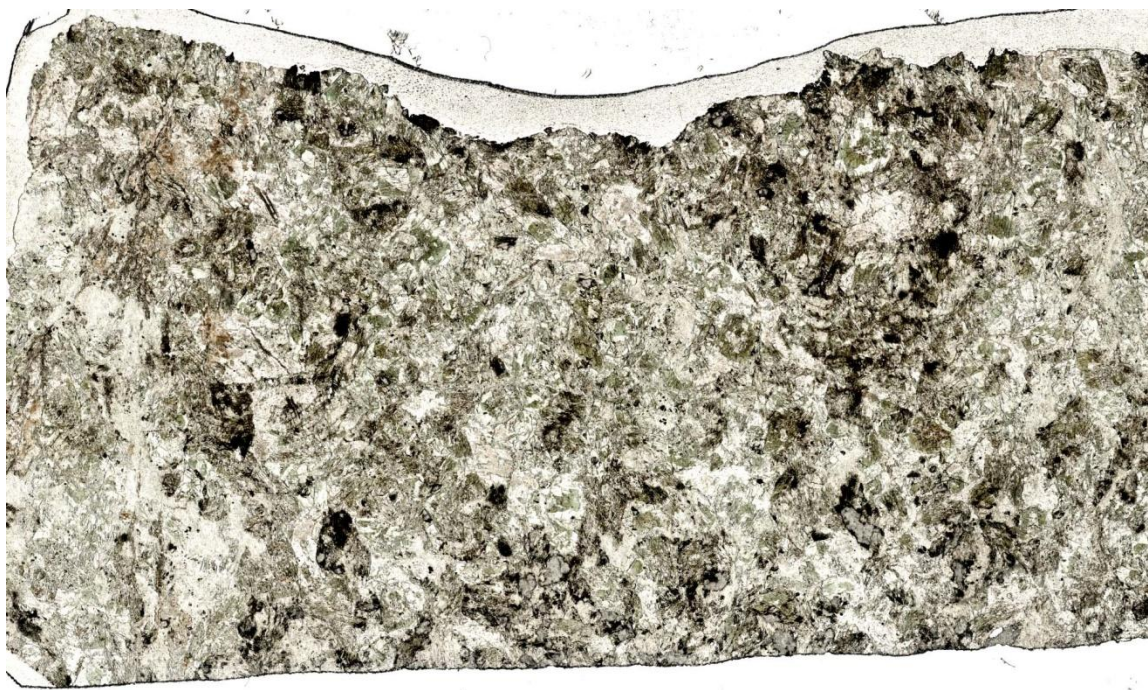
The colorless amphibole and some remnant hornblende are locally replaced by very fine chlorite and calcite. Thus, this alteration post-dates metamorphic overprinting. Very minor disseminated sulfide includes chalcopyrite (usually associated with amphibole) and pyrite (associated with recrystallized plagioclase). These associations suggest the sulfide may represent remobilized sulfides during the metamorphic overprinting.

METAMORPHIC OVERPRINT

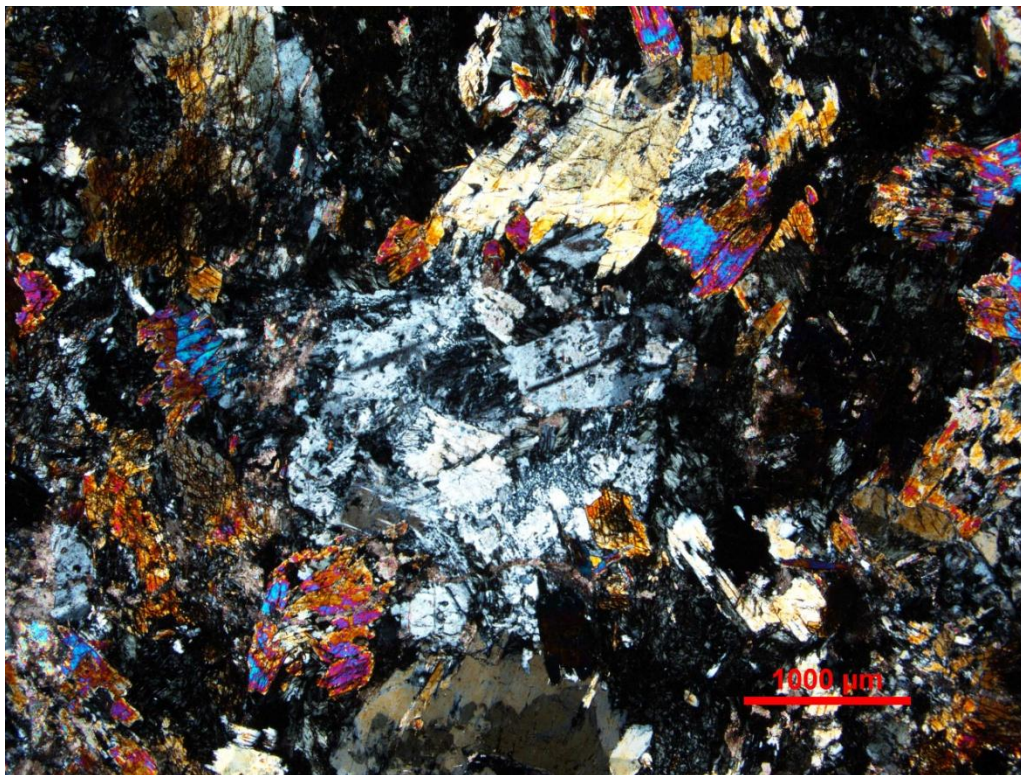
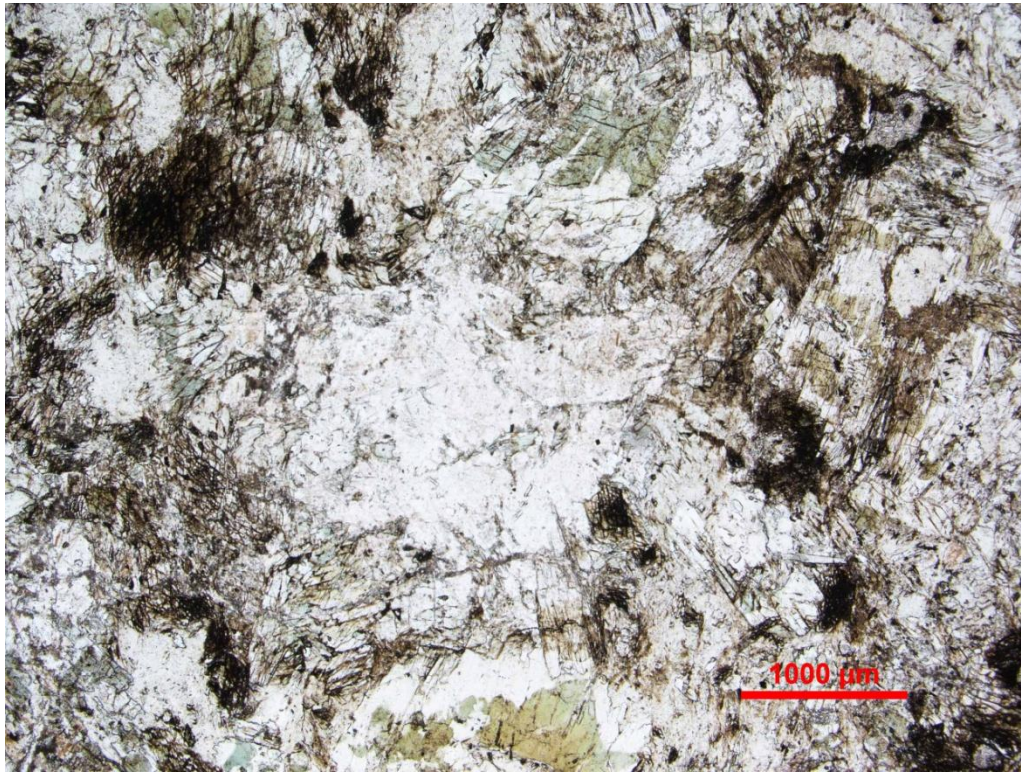
The sample has a moderate-strong metamorphic overprint with extensive amphibolitization. The metamorphic amphibole is colorless and replaces magmatic hornblende with light brown-green pleochroism. The colorless nature of the metamorphic amphibole suggests a different composition than the hornblende. Other than slight difference in birefringence, they have similar optical properties. The metamorphic overprint was mostly a medium grade thermal metamorphism equivalent to amphibolites facies.

ROCK NAME: Hornblende Metagabbro

PROTOLITH: Hornblende Gabbro (There are no remnants of olivine, pyroxenes or biotite, so the protolith mafic assemblage is not clear)



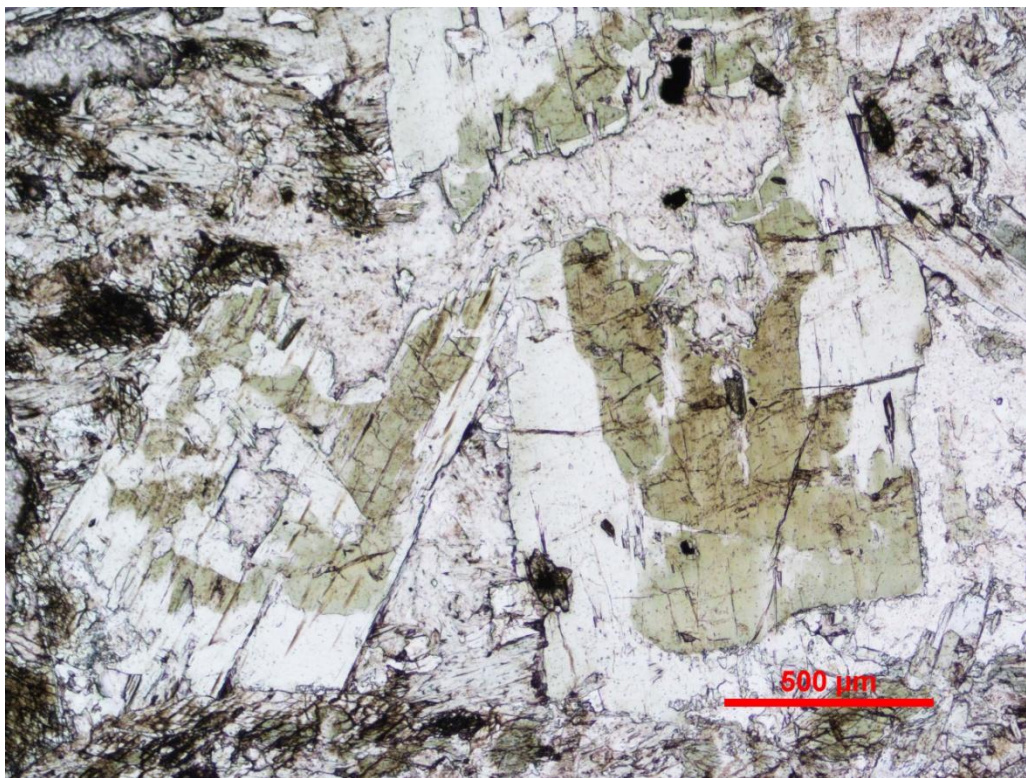
Sample CR-0006. Wide-field, full-thinsection view showing amphibole-rich metagabbro cut by irregular shear bands. Top- plane light; Bottom- crossed polarizers.

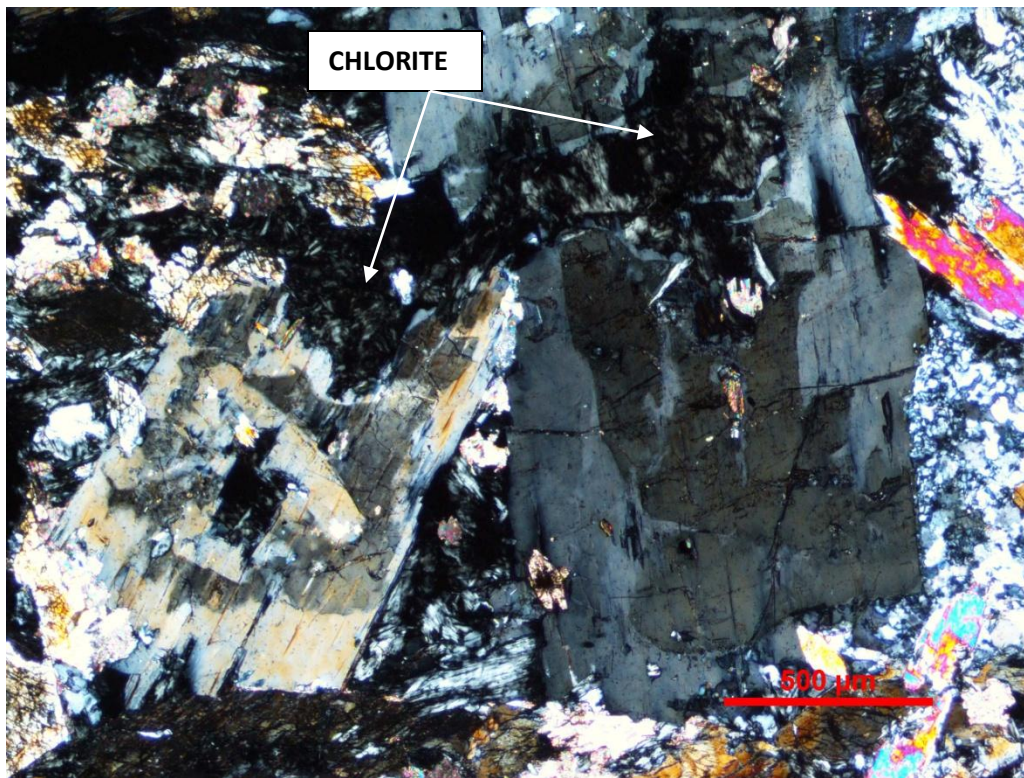


Sample CR-0006. Relict patch of plagioclase and remnants of light green-brown hornblende with abundant colorless, metamorphic amphibole. Top- plane light; Bottom- crossed polarizers.



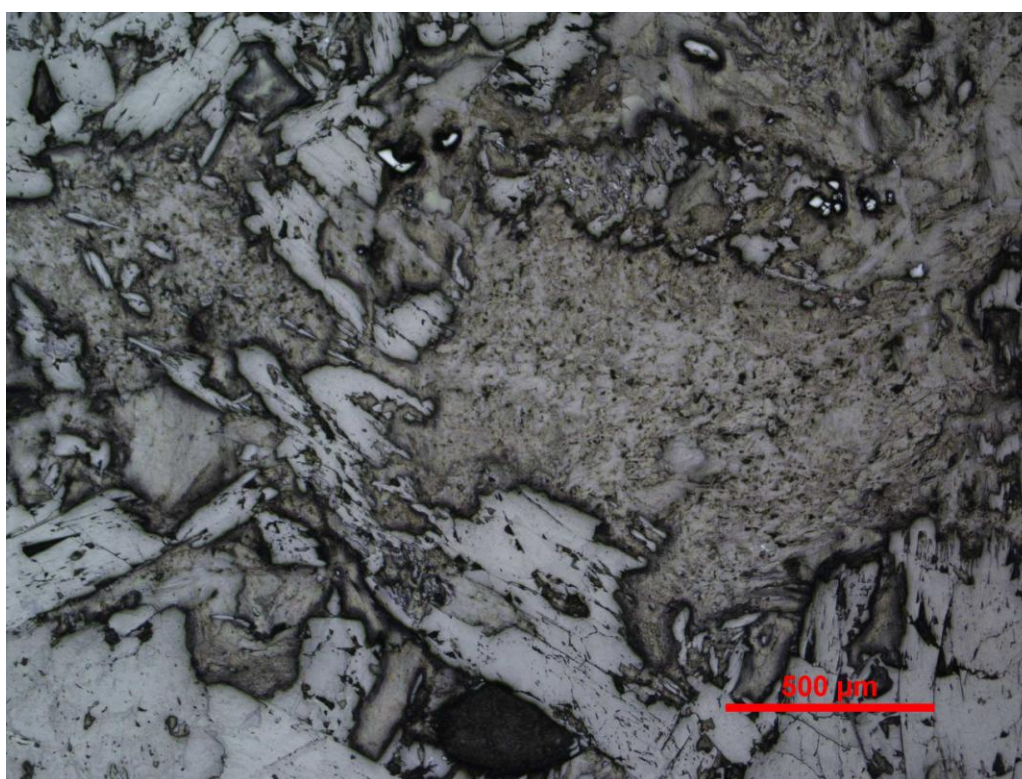
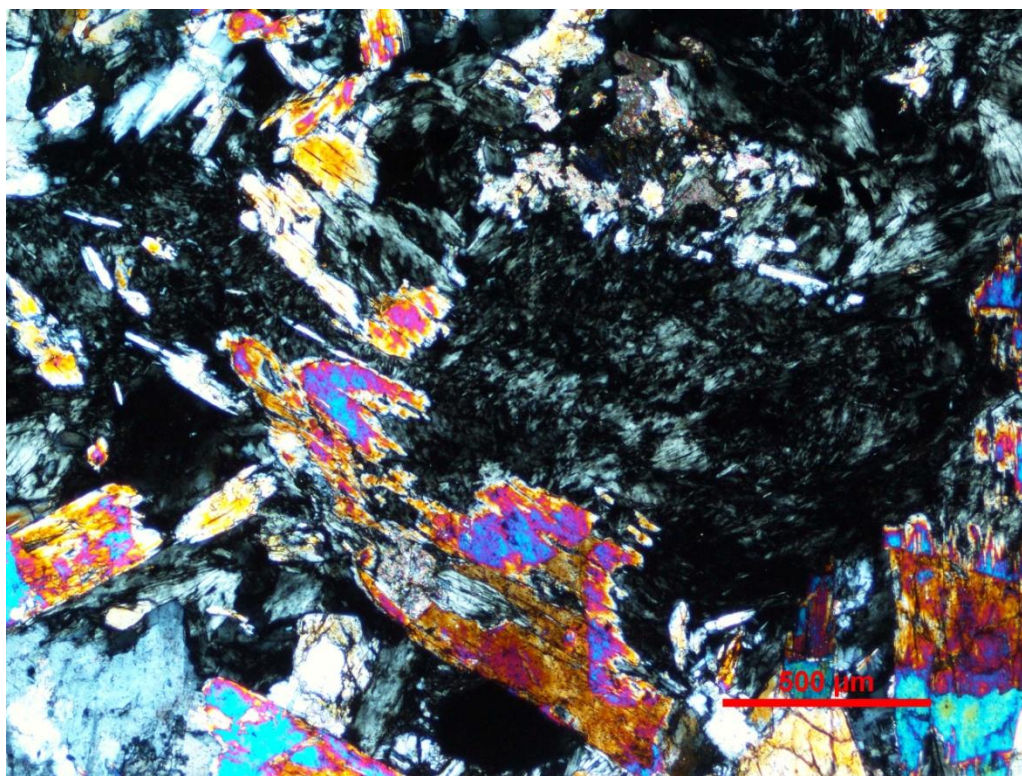
Sample CR-0006. Close-up from above showing relict twinned plagioclase locally recrystallized and replaced by micro-myrmekite (quartz-plagioclase symplectite). Crossed polarizers.



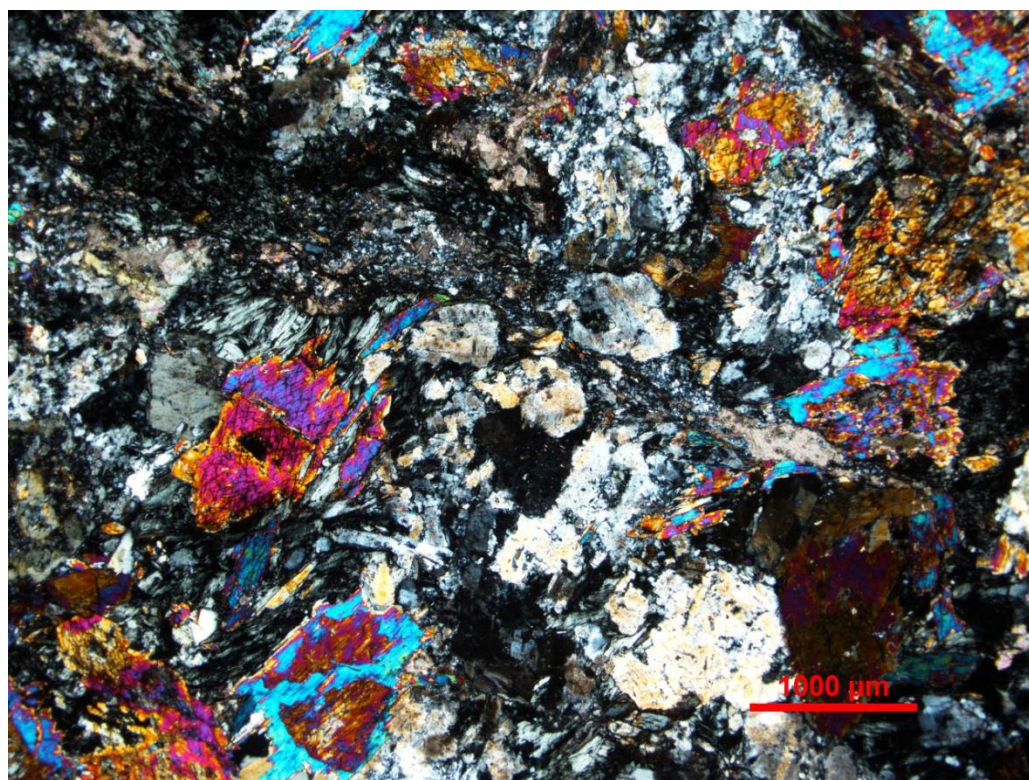
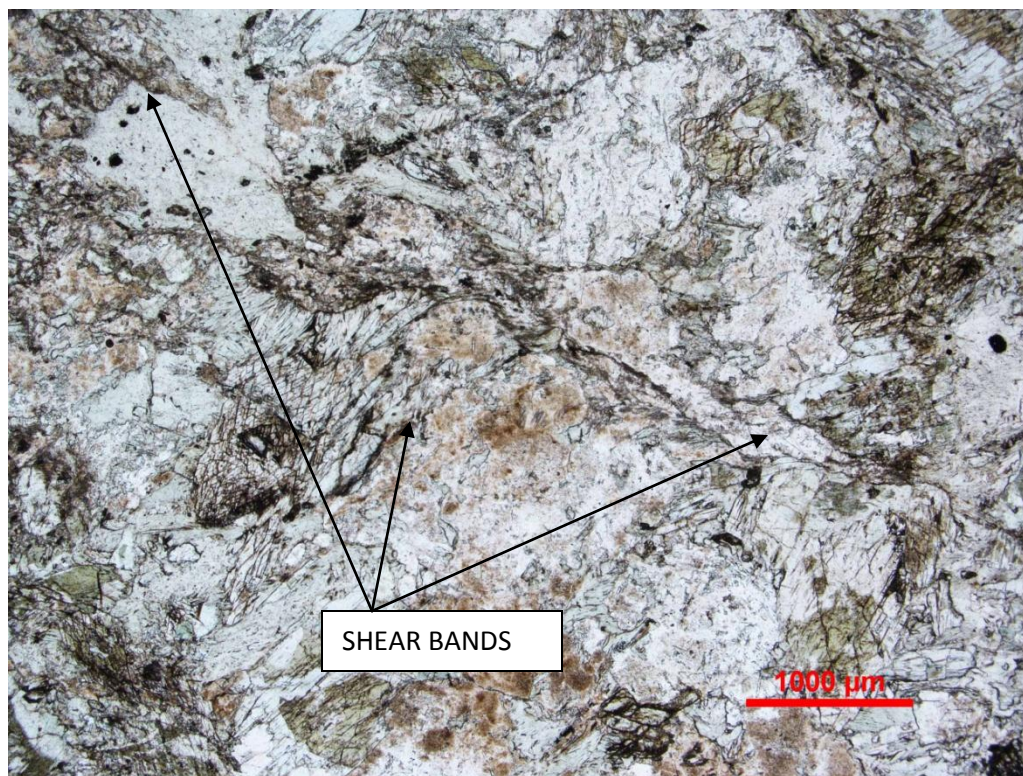


Sample CR-0006. Remnants of brown-green pleochroic magmatic hornblende with overgrowths and replacements by colorless, metamorphic amphibole. Note colorless amphibole partly replaced by chlorite. Top- plane light; Bottom- crossed polarizers.

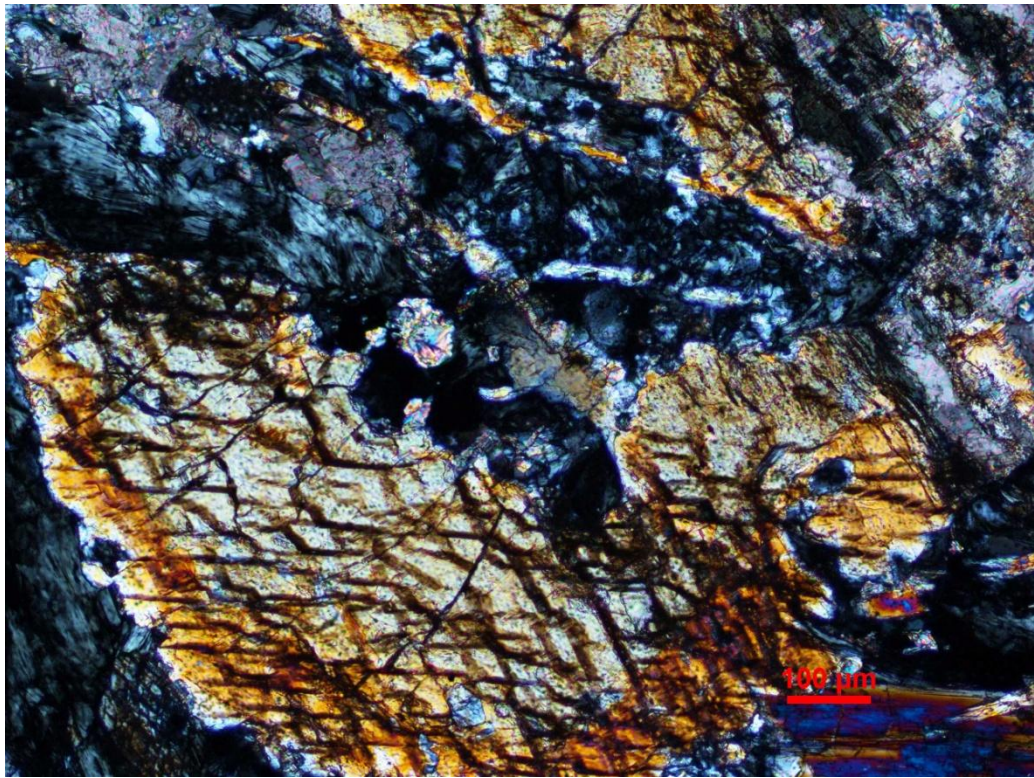
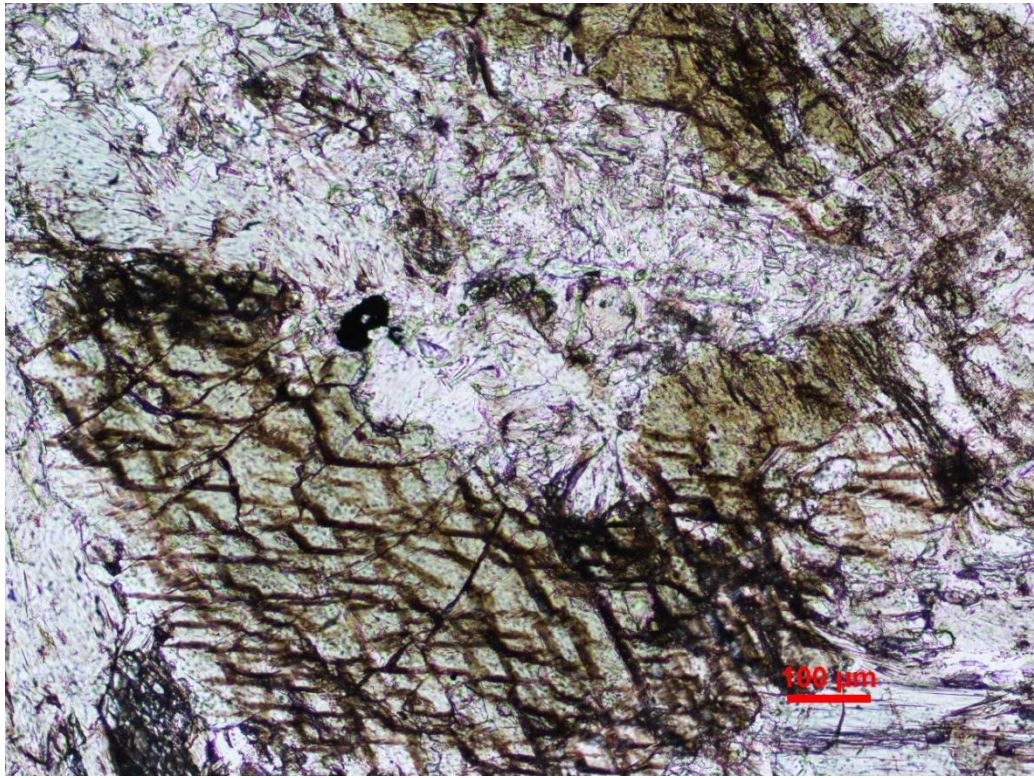




Sample CR-0006. Chlorite extensively replacing amphibole. Note minor disseminated ilmenite associated with chlorite. Top- plane light; Middle- crossed polarizers; Bottom- reflected light.

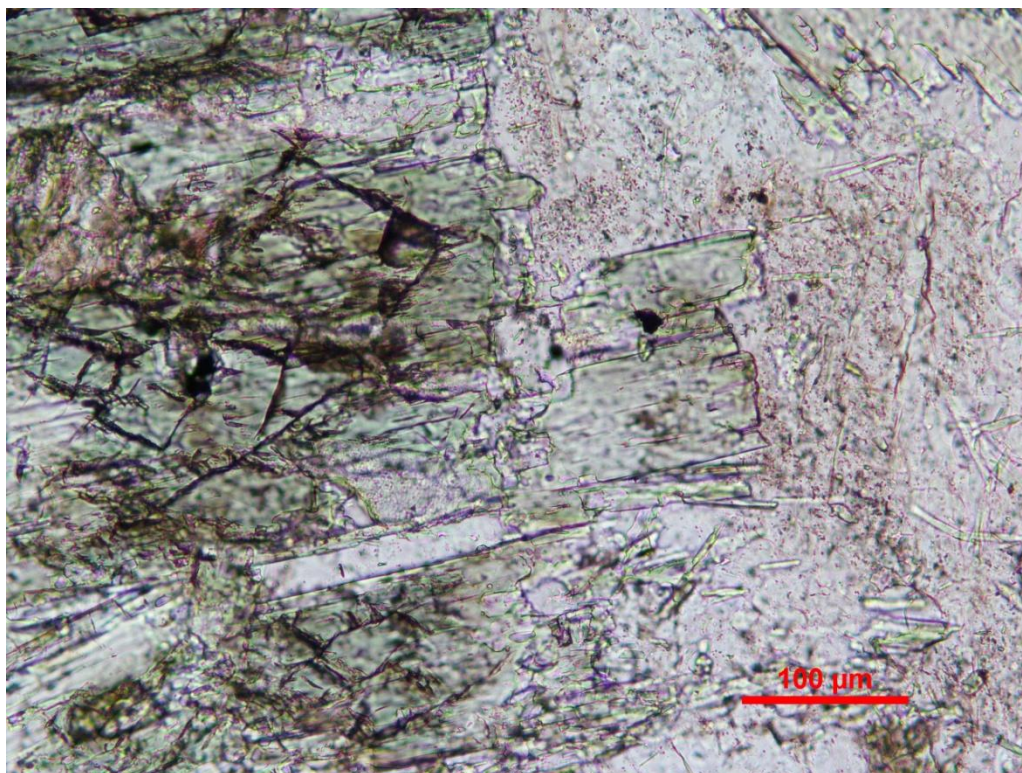


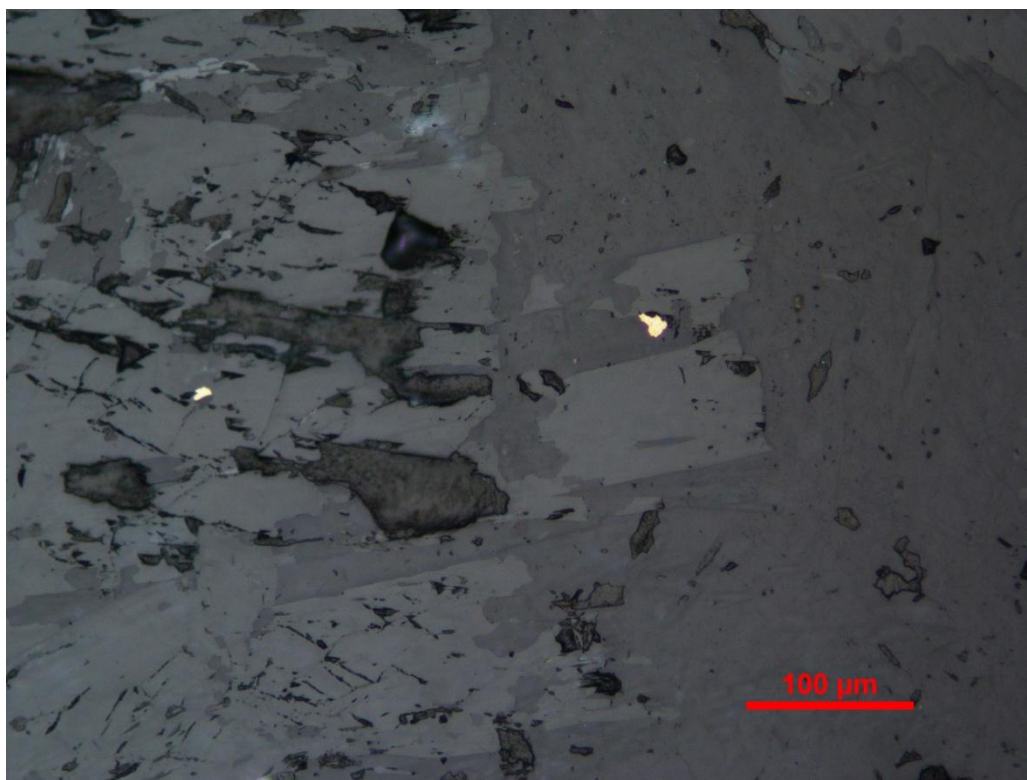
Sample CR-0006. Microshear band with minor grain-size reduced plagioclase and patchy chlorite and calcite. Top- plane light; Bottom- crossed polarizers.





Sample CR-0006. Fine, subhedral-anhedral, disseminated chalcopyrite associated with chlorite, calcite and amphibole. Top- plane light; Middle- crossed polarizers; Bottom- reflected light.





Sample CR-0006. Subhedral-anhedral disseminated chalcopyrite associated with amphibole. Top-plane light; Bottom- reflected light.