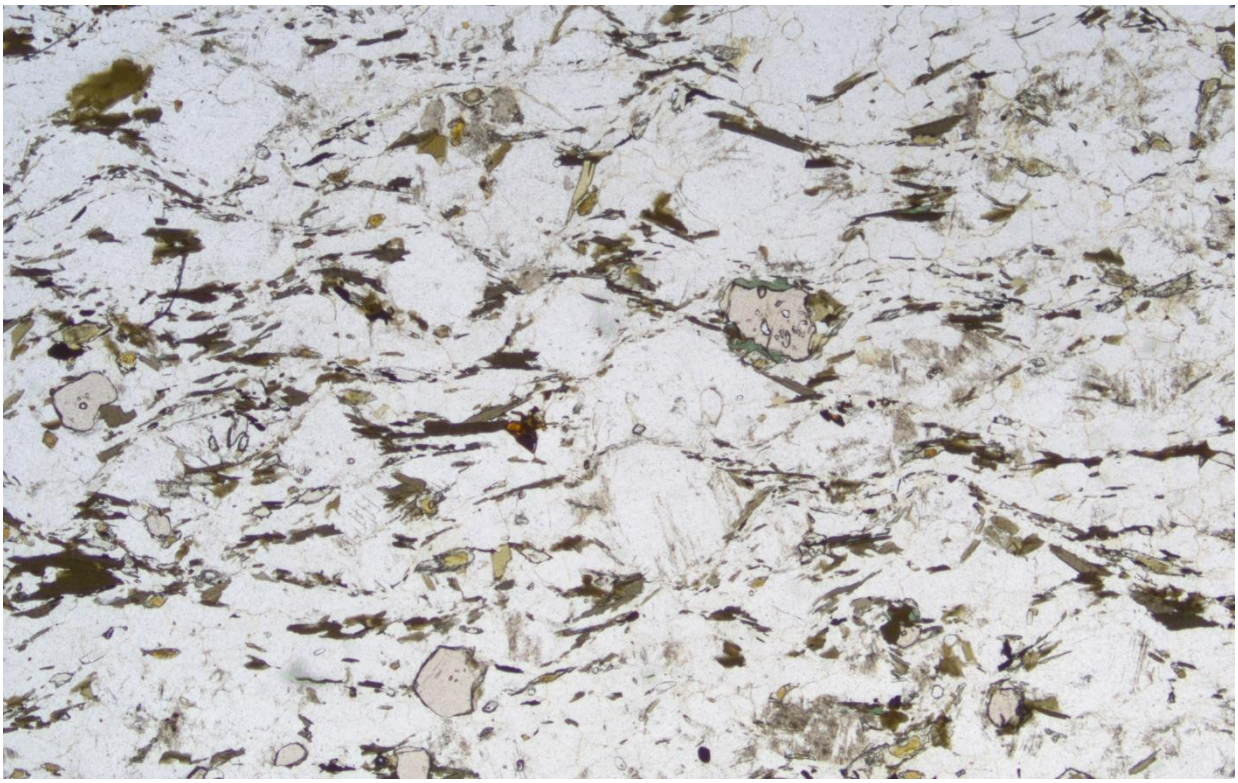
APPENDIX G

PETROGRAPHIC ANALYSIS

SAMPLE 22NPM01



Domain: FHVB domain

Hand specimen description: Grey to black foliated intermediate rock, with granular and mylonitic texture, fine-grain size (< 1mm), composed by Pl 40%, Bt, 45%, Amp 10% and Qz 10% and Grt 5%. The rock is highly deformed and exhibits a foliation marked by the mafic and felsic minerals; the rock is likely an ultramylonitic diorite.

Texture: Granoblastic, with a continuous cleavage domain defined by biotite (lepidoblastic microfabric), and the microlithons by Pl and Qz, the sample exhibits an anastomosed smooth cleavage.

PRINCIPAL MINERALS	**%**	**ALTERATION MINERALS**	**%**
Plagioclase	30	Sericite from plagioclase (albite)	
Quartz	20	Chlorite (biotite)	
Biotite	30	Epidote – zoisite (Allanite)	
Amphibole	10		
ACCESSORY MINERALS			
Garnet	5		
Apatite	2		
Allanite	2		
Zircon	1		

Paragenesis: Pl+Qz+Bt+Amp+Grt; Bt+Chl+Ep+Ser

Metamorphism: Dynamic metamorphism

Metamorphic facies: Greenschist-facies (Chlorite-epidote grade) from amphibolite. **Photolith:** Mafic

Classification: Mylonitic diorite

Plagioclase: Subhedral elongated crystals with prismatic shape varying in size from 100 to 500 um, with medium relief and cloudy pale brownish color product of replacement of ser. Some grains exhibit polysynthetic, Carlsbad, and perthitic twinning, with sericitization being incipient. The crystals are bent and present undulose extinction; it is observed as a porphyroblast with Qz recrystallization and inclusions.

Quartz: Colorless, low relief, and birefringence, with elongated irregular to subhedral shape, its size varies from 100 um to 1 mm, some grains are bent and present and undulose extinction, subgrain formation (dislocation) and polygonal granoblastic fabric resulting from static grain growth by GBM, some of those are founded as incipient elongated Qz ribbons. Furthermore, some Qz and Fls porphyroblasts are surrounded by recrystallized granoblastic quartz, indicative of medium temperature where BLG could be perceived.

Biotite: Present a laminar shape and defines an anastomosed spaced schistosity with high relief and pleochroism from pale yellow to dark brown. It varies in size from 100 um to 4 mm. With bird's eye interference color, it also presents some of Ap, Aln, Chl is observed replacing par of some biotite, biotite is replacing the amphiboles.

Amphibole: anhedral elongated, with grain size between 200 um, high relief, pleochroism from green brownish to pale yellow color, Oscillatory extinction at 45 degrees concerning the cleavage; the amp is pervasive replaced by Bt and Chl.

Garnet: Euhedral crystals, high relief, pink color, and isotropic

Epidote: Exhibits a moderate relief, colorless, in euhedral to subhedral tabular shape, with an average size of 200 um; interference colors are fluorescents high order (3^{rd} order), some grains are aligned to the foliation and enclosing some Aln grains, it is found as inclusion in Ttn.

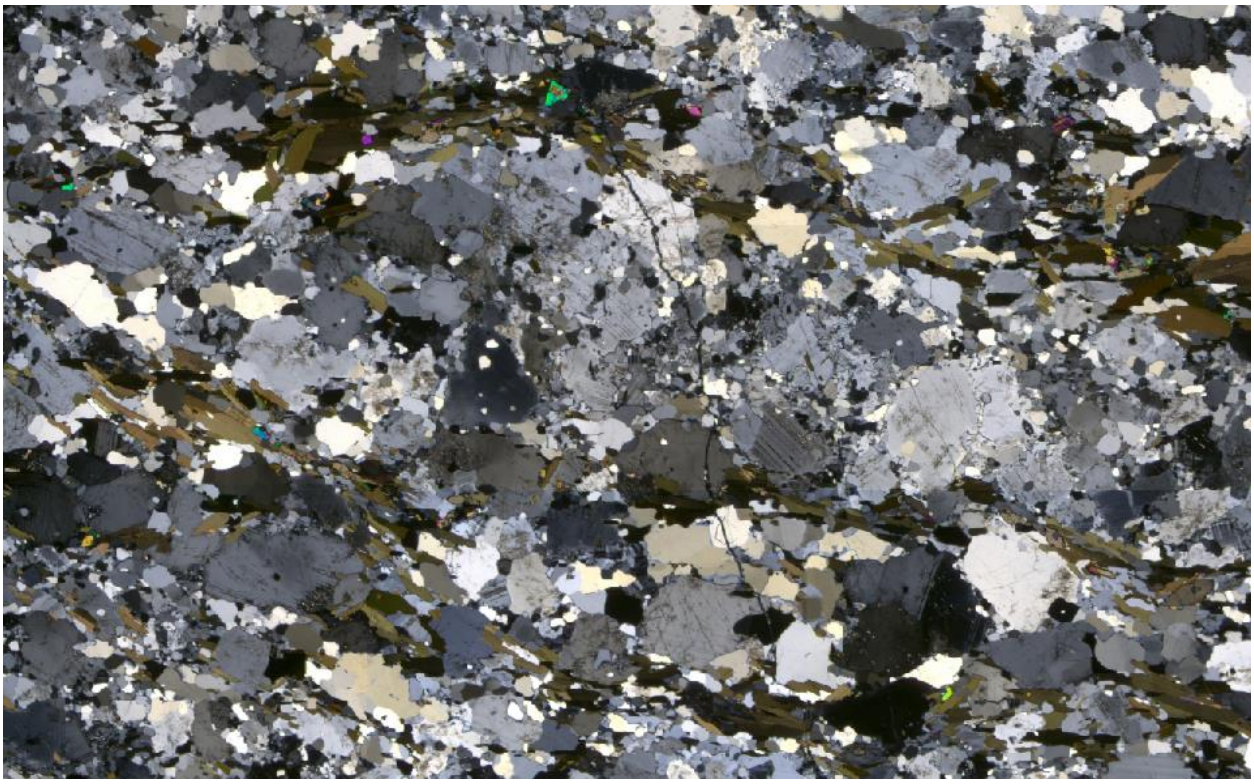
Chlorite: It is observed replacing the borders of the biotite and some amphiboles. It presents a pale green color with moderate relief, and the interference color is blue anomalous, presents some Ap, Aln, and ep inclusions

Sericite: Low to moderate relief, brownish to pale yellow, cloudy and ragged aggregates, exhibit high interference color 2-3 order (yellow, blue, grey). It is found to replace the plagioclase.

Apatite: Exhibits medium relief, with subhedral to an elongated rounded shape, is colorless, and exhibits interference colors of the first order (grey to white). It is found as inclusions in the biotite, Chl, and some ten.

Titanite: Present a high relief, pale yellow to brown color, high interference color strong (pink to green 3rd order), following the foliation marked by the Bt, its size varies from 100 um to 2 mm with the inclusion of ap and Zrn. Ttn observed with Aln, and is likely Aln replacing Ttn?

22NPM03



Domain: FHsz

Hand specimen description: Grey-whitish to black foliated intermediate rock, with granular and mylonitic texture, medium to coarse-grain size, composed by Fls and Pl 45%, Bt, 30 %, and Qz 25%; the rock exhibits a foliation marked by the mafic and felsic minerals, with mm feldspar porphyroblasts, the rock is a likely a granodioritic gneiss.

Texture: Granoblastic, with compositional banding differentiated, with a continuous cleavage domain defined by biotite (lepidoblastic microfabric), and the microlithons by Pl and Qz, the sample exhibits a parallel smooth cleavage.

PRINCIPAL MINERALS	**%**	**ALTERATION MINERALS**	**%**
Plagioclase	30	Sericite from plagioclase (albite)	
Quartz	20	Chlorite (biotite)	
Feldspar	20	Epidote - zoisite	
Biotite	24		
ACCESSORY MINERALS			
Apatite	2		
Titanite	2		
Allanite	1		
Zircon	1		

Paragenesis: Fls+Pl+Qz+Bt; Chl+Ep+Ser

Metamorphism: Dynamic metamorphism

Metamorphic facies: Greenschist-facies (Chlorite-epidote grade)**: Photolith:** Quartz-feldspathic

Classification: monzonitic augen gneiss.

Plagioclase: Subhedral elongated crystals with prismatic shape varying in size from 500 um to 2 mm, with medium relief and cloudy pale brownish color product of replacement of ser. Some grains exhibit polysynthetic, Carlsbad, and perthitic twinning, with incipient sericitization. The crystals are bent and present Ue. It is observed as porphyroblast with Qz recrystallization and as inclusions.

Feldspar: It is observed mostly in subhedral to euhedral crystals with tabular shapes varying in size from 250 um to 3 mm in porphyroblast or augens, low to medium relief, mostly colorless to white, the crystals exhibit Carlsbad twinning, but also the crystals look sprinkled with tiny confetti (sericite), interference color order I gray to white. (Myrmekitic is formed under metasomatic conditions, usually in conjunction with tectonic deformations) showing partial substitution of K-feldspar by myrmekite along the lower and upper contacts, low to medium relief, mostly colorless to white, the crystals exhibit the microcline with some Qz inclusions and Carlsbad twinning, but also the crystals look sprinkled with tiny confetti (sericite), interference color order I gray to white. Porphyroblast presents small, recrystallized K-feldspar, and medium-grade conditions can be inferred from the advanced recrystallization of K-feldspar along the rims of porphyroclasts.

Quartz: Colorless, low relief, and birefringence, with elongated irregular to subhedral shape, its size varies from 100 um to 1 mm; some grains are bent and present and undulose extinction, subgrain formation (dislocation) and myrmekitic textures. The bigger crystals> 200 um show a polygonal granoblastic fabric resulting from static grain growth by GBM; some of those are found to be incipient elongated Qz ribbons. Furthermore, some Qz and Fields porphyroblasts are surrounded by recrystallized granoblastic quartz, indicative of medium temperature where BLG could be perceived.

Biotite: Present a laminar shape and defines an anastomosed spaced schistosity with high relief and pleochroism from pale yellow to dark brown. It varies in size from 100 um to 4 mm. With bird's eye interference color, some of Ap, Aln, and Chl are observed replacing part of some biotite, and Ttn looks related to the Bt.

Epidote: Exhibits a moderate relief, colorless, in euhedral to subhedral tabular shape, with an average size of 200 um; interference colors are fluorescents high order (3^{rd} order), some grains are aligned to the foliation and enclosing some Aln grains, it is found as inclusion in Ttn,

Chlorite: It is observed to replace the borders of the biotite and some amphiboles. It presents a pale green color with moderate relief, and the interference color is anomalous blue, presenting some Ap, Aln, and ep inclusions.

Sericite: Low to moderate relief, brownish to pale yellow, cloudy and ragged aggregates, exhibit high interference color 2-3 order (yellow, blue, grey). It is found to replace the plagioclase.

Apatite: Exhibits medium relief, with subhedral to an elongated rounded shape, is colorless, and exhibits interference colors of the first order (grey to white). It is found as inclusions in the biotite, Chl, and some ten.

Titanite: Present a high relief, pale yellow to brown color, high interference color strong (pink to green 3rd order), following the foliation marked by the Bt, its size varies from 100 um to 2 mm with the inclusion of ap and Zrn. Ttn is observed with Aln, likely Aln replacing Ttn?

22NPM10

Domain: SZ1

Hand specimen Description: Gray to black-green mafic schist, with granular texture and fine-grain size; the rock exhibits a mylonitic to ultramylonitic texture and is composed mainly of amphibole 30%, Pl 30%, Qz 20%, and Bt 20%. The rock exhibits a schistosity marked by the biotite and the amphibole; the rock is likely an ultramylonitic diorite.

Texture: Decussated, with continuous schistosity and nematoblastic-to-lepidoblastic texture defined by the Amp and Bt and Ep, and the microlithons by Pl and Qz, and spaced to crenulated cleavage, the transition between the cleavage domain and the microlithons is discrete.

PRINCIPAL MINERALS	**%**	**ALTERATION MINERALS**	**%**
Plagioclase (Feldspar)	30	Sericite from plagioclase (albite)	
Amphibole	30	Chlorite (biotite)	
Biotite	20	Epidote - zoisite	
Quartz	10		
ACCESSORY MINERALS			
Epidote	5		
Apatite	2		
Titanite	2		
Allanite	1		
Zircon	Tr		

Paragenesis: Fls+Pl+Qz+Bt+Amp; Chl+Ep+Ser

Metamorphism: Dynamic metamorphism

Metamorphic facies: Greenschist-facies or Epidote-Amphibolite-facies (biotite-epidote grade)

Photolith: Mafic

Classification: Amphibolitic - biotitic schist.

Plagioclase: Subhedral and elongated crystals varying in size from 100 um to 1 mm, with medium relief and cloudy pale brownish color product of replacement of ser. It makes part of the microlithons. Some grains exhibit the polysynthetic albite twinning with sericitization being incipient. Present some inclusions of Ap.

Amphibole: Subhedral elongated, diamond-shape and tabular crystals with grain size between 200 um and 1 mm, high relief, pleochroism from green to pale yellow color, rhombic cleavage of 120 degrees, Oscillatory extinction at 45 degrees concerning the cleavage, interference color from blue to green 3rd order, and some of the crystals present a color zonation, likely a chemical disequilibrium (Mn-Fe)?, The Amp presents some Ep and Ap inclusions and reaction borders of Ep or Zo; the Amp defines the schistosity (s1) with Bt.

Biotite: Presents a laminar shape and defines the schistosity, with high relief, pleochroism from pale yellow to brown; it varies in size from 100 um to 3 mm and presents bird eye interference color. It is observed being replaced by Ep in the borders, but euhedral decussated epidote grains are also observed in the Bt. Some laminar thin Bt is observed as inclusion in the Amp.

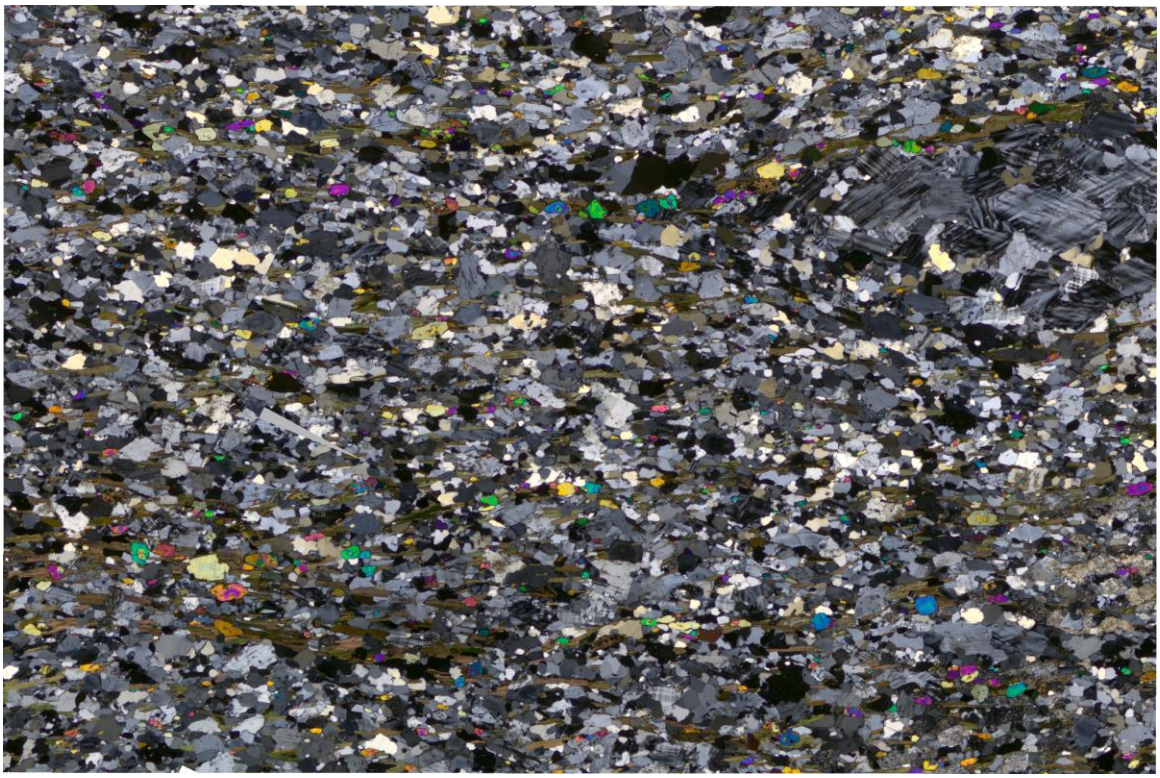
Quartz: Colorless, low relief, and birefringence, with irregular to subhedral shape, its size varies from 100 um to 1 mm; some grains are bent and present and undulose extinction, subgrain formation (dislocation), and bulging as microstructure.

Epidote: Exhibits a moderate relief, light yellow green pleochroic color; it is found as granular aggregates with an average size of 300 um; high interference colors are fluorescents 3rd order, zoning or concentric rings are present in variation with interference color. The grains are aligned to the schistosity and replacing some Bt, as inclusions within the Amp and Bt (Ep1?), but also some epidotes are observed with the triple junction with euhedral form cutting some Bt and Amp (Ep2?). The Ep presents a rim likely another generation or overgrowing of Ep. Likely product of hydrothermal alteration, in outcrops in the shear zones observed in pods, Pl may be altered to saussurite.

Zoisite: High relief, colorless, low birefringence, granular aggregate altering the biotite, interference color grey and white to anomalous blue 1st order, parallel extinction, it is observed replacing the borders of some amphiboles and Ep inclusions within the Amp.

Sericite: Low to moderate relief, brownish to pale yellow, cloudy and ragged aggregates, exhibit high interference color 2-3 order (yellow, blue, grey). It is found replacing the plagioclase.

22NPM11A



Domain: SZ1

Hand specimen description: Grey to black highly foliated intermediate rock, with a granular texture and fine-grain size, with mm to cm k-fls porphyroblasts or augens; the rock exhibits a mylonitic texture and is composed mainly of Pl 30%, Qz 20%, Fls 20% and Bt 30%,.The rock exhibits a foliation marked by the biotite, with K-feldspar porphyroblasts and augens; the rock is likely a granitic gneiss.

Texture: Granoblastic, with continuous schistosity and lepidoblastic texture defined by the Bt, and the microlithons by Pl and Qz, the sample exhibits a parallel smooth cleavage.

PRINCIPAL MINERALS	**%**	**ALTERATION MINERALS**	**%**
Plagioclase	25	Sericite from plagioclase (albite)	
Quartz	25	Chlorite (biotite)	
Feldspar	20	Epidote - zoisite	
Biotite	20		
Amphibole	2		
Epidote	3		
ACCESSORY MINERALS			
Apatite	2		
Titanite	2		
Allanite	1		
Zircon	Tr		

Paragenesis: Fls+Pl+Qz+Bt+Amp; Chl+Ep+Ser

Metamorphism: Dynamic metamorphism

Metamorphic facies: Greenschist-facies (Chlorite-epidote grade)**: Photolith:** Quartz-feldspathic

Classification: granitic gneiss.

Plagioclase: Subhedral elongated crystals with prismatic shape varying in size from 200 um to 1 mm, with medium relief and cloudy pale brownish color product of replacement of ser. It makes part of the microlithons. Some grains exhibit the polysynthetic albite twinning with sericitization being incipient. Present some inclusions of Ap.

Quartz: Colorless, low relief, and birefringence, with irregular to subhedral shape, its size varies from 100 um to 1 mm; some grains are bent and present and undulose extinction, subgrain formation (dislocation), and bulging as microstructure.

Feldspar: It is observed mostly in subhedral to euhedral crystals with tabular shapes varying in size from 250 um to 8 mm in porphyroblast or augens with perthitic and myrmekitic texture (intergrowth of Qz in Pl?) (Myrmekite is formed under metasomatic conditions, usually in conjunction with tectonic deformations) showing partial substitution of K-feldspar by myrmekite along the lower and upper contacts, low to medium relief, mostly colorless to white, the crystals exhibit the microcline with some Qz inclusions and Carlsbad twinning, but also the crystals look like sprinkled with tiny confetti (sericite), interference color order I gray to white. Porphyroblasts showing a NE side moving up. These porphyroblasts have a sigmoidal or delta shape and are embedded in a matrix of small, recrystallized K-feldspar, fine-grained biotite, and quartz. Medium-grade conditions can be inferred from the advanced K-feldspar recrystallization along the porphyroclasts' rims.

Biotite: Presents a laminar shape and defines an anastomosed spaced schistosity, with high relief pleochroism from pale brown to green, product of a pervasive chloritization. It varies in size from 100 um to 3 mm. It is observed to be replaced by Ep and Zo in the borders, but euhedral epidote grains are also observed in the Bt, and some Ttn grains are observed following the foliation with the Bt (S1).

Amphibole: Subhedral crystals with grain size between 500 um and 1 mm, high relief, pleochroism from green to pale yellowish color, rhombic cleavage of 120 degrees, the crystals are hexagonal subhedral to anhedral, some of them are bent and present undulous extinction. Oscillatory extinction at 45 degrees with respect to the cleavage, interference color from green to dark green (Chl replacement

Chlorite: It is observed replacing and overprinting pervasively the biotite and the amphiboles. It presents a pale green color with moderate relief, and the interference color is blue anomalous, presents some Ap, Aln, and ep inclusions

Sericite: Low to moderate relief, brownish to pale yellow, cloudy and ragged aggregates, exhibit high interference color 2-3 order (yellow, blue, grey). It is found to replace the plagioclase.

Epidote: Exhibits a moderate relief, pale yellow to pale green, in euhedral to subhedral tabular shape, with an average size of 300 um; interference colors are fluorescents high order (3^{rd} order), some grains are aligned to the foliation and replacing some Bt and enclosing some Aln and Pl grains. The epidote presents a rim, likely another generation overgrowing Ep

Titanite: Present a high relief, pale yellow to brown color, high interference color strong (pink to green 2^{nd} order), following the foliation marked by the Bt, Ep, its size varies from 100 um to 600 um with the

inclusion of Zrn. The titanite grains are fractured and present a lighter border of titanite with a corrosive or reprecipitated texture.

22NPM12

Domain: SZ1

Hand specimen description: Grey to beige color, highly deformed intermediate rock, with a granular texture and medium-grain size, with mm to cm K-Fls porphyroblasts or augens; the rock exhibits a mylonitic texture, and is composed mainly of Pl 30%, K- Fls 20%, Qz 20%, and Bt 30%. The rock exhibits a foliation marked by the biotite, with K-feldspar porphyroblasts and augens; the rock is likely a granitic augen gneiss.

Texture: Granoblastic, with spaced schistosity and lepidoblastic texture defined by the Bt, and the microlithons by Pl and Qz, K- Fls, and Ttn porphyroblasts, the sample exhibits an anastomosed smooth cleavage.

PRINCIPAL MINERALS	**%**	**ALTERATION MINERALS**	**%**
Plagioclase	30	Sericite from plagioclase (albite)	
Feldspar	25	Chlorite (biotite)	
Quarzt	20	Epidote - zoisite	
Biotite	20		
ACCESSORY MINERALS			
Titanite	3		
Apatite	1		
Zircon	1		
Alnanite	Tr		

Paragenesis: Fls+Pl+Qz+Bt; Ep+Ser

Metamorphism: Dynamic metamorphism

Metamorphic facies: Greenschist-facies (Chlorite-epidote grade)**: Photolith:** Quartz-feldspathic

Classification: granitic augen gneiss.

Plagioclase: Subhedral elongated crystals with prismatic shape varying in size from 200 um to 2 mm, with medium relief and cloudy pale brownish color product of incipient replacement of ser. It makes part of the microlithons. Some grains exhibit the polysynthetic albite twinning with sericitization being incipient. Present some inclusions of Ep.

Quartz: Colorless, low relief, and birefringence, with irregular to anhedral shape, its size varies from 100 um to 1 mm, the grains are bent and present and undulose extinction, subgrain formation (dislocation) and subgrain rotation as microstructure, it is also observed as myrmekitic texture close to some K-fls porphyroblasts.

Feldspar: It is observed mostly in subhedral to euhedral crystals with tabular shapes varying in size from 250 um to 8 mm in porphyroblast or augens with perthitic and myrmekitic texture (intergrowth of Qz in Pl) (Myrmekite is formed under metasomatic conditions, usually in conjunction with tectonic deformations), low to medium relief, mostly colorless to white, the crystals exhibit the but also the crystals look like sprinkled with tiny confetti (sericite), interference color order I gray to white

Biotite: Presents a laminar shape and defines an anastomosed spaced schistosity with high relief and pleochroism from pale yellow to green-brown; it varies in size from 100 um to 3 mm. Some grains of 200 um exhibit interlaminated replacement by Chl (Bt1?), but also euhedral epidote grains are observed in the large Bt crystals, which together with Ttn are observed following the foliation with the Bt (Bt2?); this Bt is observed with an incipient replacement of Ms? and is more abundant in the sample.

Chlorite: It is observed to replace biotite, and as a thin laminar crystal, it presents a pale green color with moderate relief, and the interference color is anomalous blue.

Sericite: Low to moderate relief, brownish to pale yellow, cloudy and ragged aggregates, exhibit high interference color 2-3 order (yellow, blue, grey). It is found to replace the plagioclase.

Epidote: Exhibits a moderate relief, pale yellow to pale green, in euhedral to subhedral tabular shape, with an average size of 300 um; interference colors are fluorescents high order (3^{rd} order), the grains are aligned to the foliation and replacing some Bt and enclosing some Aln grains. The epidote is found following the foliation, and it is related to the Bt, which is also observed in some ten porphyroblasts.

Titanite: Present a high relief subhedral with a wedge-shape and rounded, pale yellow to brown color, high interference color strong but masked by the color of the mineral, following the foliation marked by the Bt, Ep, its size varies from 100 um to 1 mm with inclusion of Zrn. The titanite grains are observed as porphyroblast fractured and present a lighter border of titanite with a corrosive or reprecipitated texture and a brown core, likely representing two generations of growing?. The porphyroblasts are marking a north side to the east (dextral sense).

Allanite: Rounded shape, yellow color to orange-brown, presents a high relief with alteration rims; Ep is found as a rim enclosing the Aln crystals.

22NPM14

Domain: SZ1

Hand specimen description: Grey to beige color, highly deformed intermediate rock, with granular texture and fine to medium-grain size; the rock exhibits an ultramylonitic texture and is composed mainly of Pl 30%, Fls 20%, Qz 20%, and Bt 30%. The rock exhibits a foliation marked by the biotite, with mm K-feldspar porphyroblasts; the rock is likely an ultramylonitic granodiorite.

Texture: Granoblastic, with continuous schistosity and lepidoblastic texture defined by the Bt, and the microlithons by Pl and Qz, and K-fls; the sample exhibits an anastomosed smooth cleavage, and the foliation is also marked by the recrystallized Qz ribbons.

PRINCIPAL MINERALS	**%**	**ALTERATION MINERALS**	**%**
Feldspar	30	Sericite from plagioclase (albite)	
Quartz	25	Chlorite (biotite)	
Plagioclase	25	Epidote - zoisite	
Biotite	20	Muscovite	
ACCESSORY MINERALS			
Titanite	3		
Apatite (or zoisite)	2		
Zircon	1		
Allanite	Tr		

Paragenesis: Fls+Pl+Qz+Bt; Ep+Zo+Ser+Ap (lower T)

Metamorphism: Dynamic metamorphism (Qz recrystallization High T), and Lower T (Ep –Chl zone)

Metamorphic facies: Greenschist-facies (Chlorite-epidote grade)**: Photolith:** Quartz-feldspathic

Classification: granitic augen mylonite.

Feldspar: It is observed mostly in subhedral to euhedral crystals with tabular shapes varying in size from 100 um to 2 mm in porphyroblast with perthitic and myrmekitic texture (intergrowth of Qz in Pl?) (Myrmekite is formed under metasomatic conditions, usually in conjunction with tectonic deformations), low to medium relief, mostly colorless to white, the crystals exhibit sprinkled with tiny confetti (sericite), interference color order I gray to white

Quartz: Colorless, low relief, and birefringence, with irregular to anhedral shape, its size varies from 100 um to 1 mm, the grains are bent and present and undulose extinction, subgrain formation (dislocation) and subgrain rotation as microstructure, it is also observed as myrmekitic texture close to some K-fls porphyroblasts. quartz ribbons indicating growth by high-temperature grain boundary migration.

Plagioclase: Subhedral elongated crystals with prismatic shape varying in size from 200 um to 600 um, with medium relief and cloudy pale brownish color product of incipient replacement of ser. It makes part of the microlithons. Some grains exhibit the polysynthetic albite twinning and present some inclusions of Ep.

Biotite: Presents a laminar shape and defines an anastomosed spaced schistosity with high relief and pleochroism from pale yellow to brown; it varies in size from 100 um to 1 mm. Some grains of 200 um exhibit interlaminated replacement by Chl (Bt1?), an incipient S-C structure is observed with the Bt marking the foliation with the Qz ribbons

Chlorite: Moderate relief, with tabular crystals, with pleochroism from pale yellow-green to green, and interference color is blue anomalous to purplish It is observed replacing the biotite and as a thin laminar crystals

Sericite: Low to moderate relief, brownish to pale yellow, cloudy and ragged aggregates, exhibit high interference color 2-3 order (yellow, blue, grey). It is found to replace the plagioclase.

Epidote: Exhibits a moderate relief, pale yellow to pale green, in euhedral to subhedral tabular shape, with an average size of 300 um; interference colors are fluorescents high order (3^{rd} order), the grains are aligned to the foliation and replacing some Bt and enclosing some Aln grains. The epidote is found following the foliation, and it is related to the Bt, which is also observed in some ten porphyroblasts.

Zoisite: High relief, colorless, low birefringence, parallel extinction, prismatic and columnar shape altering the border of the biotite, interference color grey and white to anomalous blue, orthogonal extinction

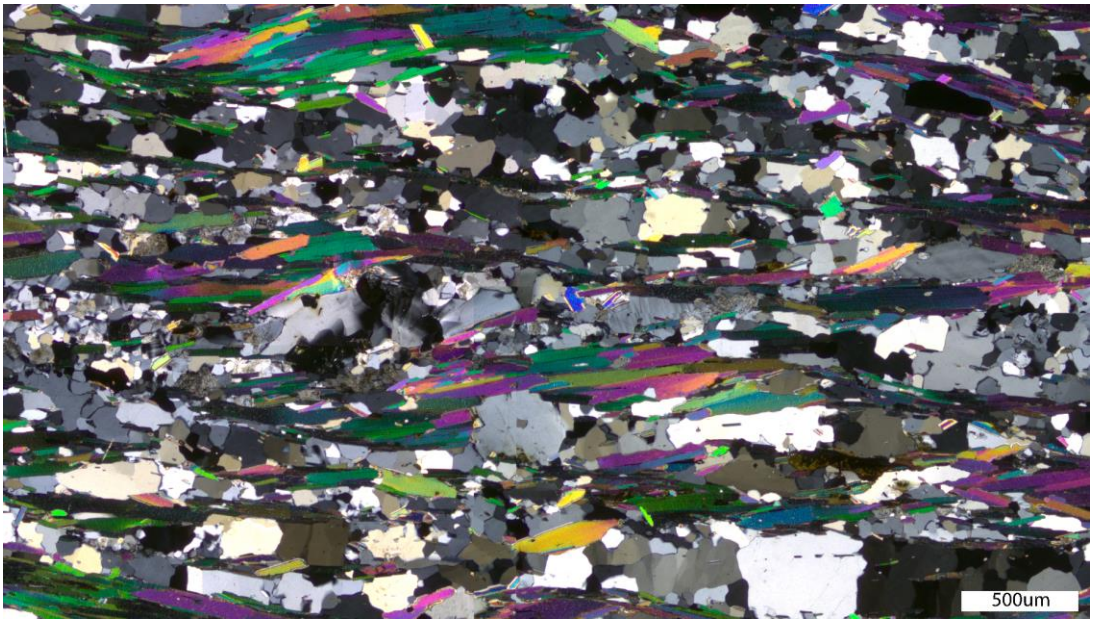
Apatite: Exhibits medium relief, with subhedral to an elongated rounded shape. It is colorless, has low birefringence, and exhibits interference colors of first order (grey to white). It is found as inclusions in the biotite in oval shape and rounded form

Titanite: Present a high relief subhedral with a wedge-shape and rounded, pale yellow to brown color, high interference color strong but masked by the color of the mineral, following the foliation marked by the Bt, Ep, its size varies from 100 um to 1 mm with inclusion of Zrn. The titanite grains are observed as porphyroblast fractured and present a lighter border of titanite with a corrosive or reprecipitated texture

and a brown core, likely representing two generations of growing?. The porphyroblasts are marking a north side to the east (dextral sense).

Allanite: Rounded shape, yellow color to orange-brown, presents a high relief with alteration rims; Ep is found as a rim enclosing the Aln crystals.

22NPM15



Domain: SZ1

Hand specimen description: Grey beige to greenish deformed rock with a granular texture and fine to medium-grain size; the rock exhibits a schistosity texture and is composed mainly of Qz 30%, fields 20%, Pl 20%, Ms 20%, and Bt 10%. The rock exhibits a schistosity marked by the micas and the felsic minerals, and some mm Qz porphyroblasts are observed. The rock is likely a mylonitic schist.

Texture: Granoblastic, with continuous schistosity and lepidoblastic texture defined by the Ms, and the microlithons by recrystallized Qz and Fls elongated ribbons, the sample exhibits an anastomosed smooth cleavage with some S-C fabrics (N side Up)

PRINCIPAL MINERALS	**%**	**ALTERATION MINERALS**	**%**
Quartz	40	Sericite from plagioclase (albite)	
Muscovite	30	Chlorite (biotite)	
Feldspar	20	Epidote - **zoisite**	
Plagioclase	10		
ACCESSORY MINERALS			
Apatite	Tr		
Zircon	Tr		
Opaque	Tr		

Paragenesis: Fls+Pl+Qz+Ms; Chl+(Ep,Zo)+Ser+Ap (lower T)

Metamorphism: Dynamic metamorphism (Qz recrystallization High T), and Lower T (Ep-Zo –Chl zone)

Metamorphic facies: Greenschist-facies (Chlorite-epidote grade)**: Photolith:** Pelitic

Classification: Medium-grade micaceous quartzite (medium to high-grade mylonite).

Quartz: Colorless, low relief, and birefringence, with subhedral shape, and granoblastic texture; its size varies from 100 um to 600 um; it is observed in monocrystalline recrystallized large and elongated ribbons, representing strongly deformed granoblastic grains, which grown with polygonal granoblastic fabric statically by grain boundary migration. The ribbon shape is preserved because, along both sides of each ribbon, relatively small, recrystallized K feldspar and Ms. Crystals impeded the growth of quartz. The grains are bent and present and undulose extinction, subgrain formation (dislocation); it is also observed as myrmekitic texture close to some K-fls porphyroblasts

Muscovite: Presents a laminar and tabular shape, and it defines an anastomosed spaced schistosity, with low to moderate relief, colorless, with extinction parallel to cleavage and high interference color, it varies in size from 200 um to 4 mm. Some grains of 200 um exhibit interlaminated replacement by Chl (Bt1?), An S-C and mica fish schistosity is observed with the Ms marking the foliation with the Qz ribbons, showing an N side Up. (The mylonitic structure is apparent from the curvature of the foliation fish, indicating a dextral sense of shear. The fabric can also be described as a C/S fabric with S planes inclined to the right and sub-horizontal C planes.

Feldspar: It is observed with low to medium relief, mostly colorless to white; the crystals also exhibit a look like they are sprinkled with tiny confetti (sericite), with interference color order I gray to white. Most feldspar is recrystallized to polygonal crystalloblastic aggregates, mostly in subhedral crystals with tabular shapes varying in size from 100 um to 2 mm in porphyroblast with perthitic and myrmekitic texture (intergrowth of Qz in Plg?) (Myrmekite is formed under metasomatic conditions, usually in conjunction with tectonic deformations), Qz and feldspar recrystallization are observed enclosing some Fls porphyroblasts.

Plagioclase: Subhedral elongated crystals with prismatic shape varying in size from 200 um to 400 um, with medium relief and cloudy pale brownish color product of ser replacement of ser. Some grains exhibit polysynthetic albite twinning.

Chlorite: Moderate relief, with tabular crystals, with pleochroism from pale yellow-green to green, and interference color is blue anomalous to purplish It is observed replacing the biotite and as a thin laminar crystals

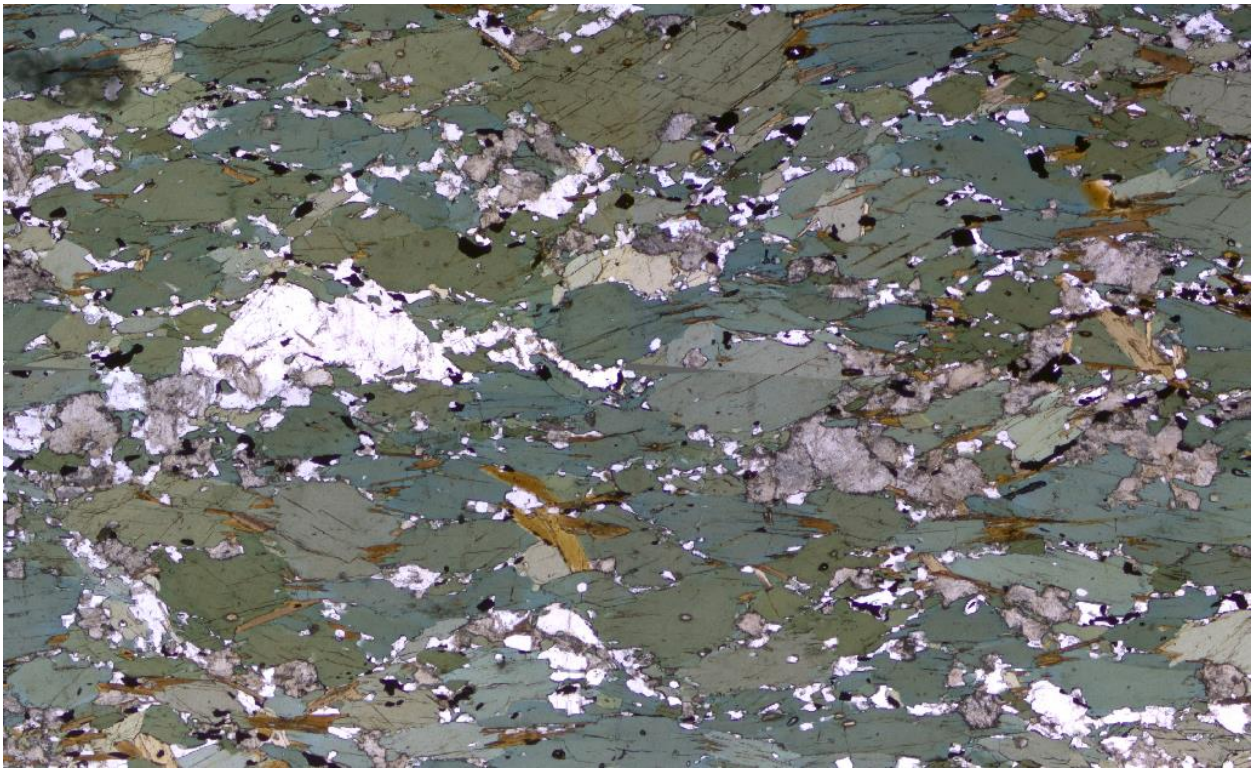
Sericite: Low to moderate relief, brownish to pale yellow, cloudy and ragged aggregates, exhibit high interference color 2-3 order (yellow, blue, grey). It is found to replace the plagioclase.

Zoisite: High relief, colorless, low birefringence, parallel extinction, columnar and wedged shape as inclusions and replacement in the Ms, interference color grey and yellow to anomalous blue, orthogonal extinction

Apatite: Exhibits medium relief, with subhedral to an elongated rounded shape; it is colorless, has low birefringence, and exhibits interference colors of the first order (grey to white) It is found as inclusions in the Qz matrix and Ms in oval and rounded shape.

Brown mineral: likely Aln, with rounded and elongated shape, yellow color to orange-brown, presenting a cloudy patchy texture, and it is found replacing or altering the Ms.

22NPM17



Domain: FHsz

Hand specimen description: Grey to black-greenish color, highly deformed rock, with a granular texture and fine to medium-grain size; the rock exhibits a gneissic texture and is composed mainly of Amp 30%, Bt 20%, Pl 20%, and Qz 10%. The rock exhibits a foliation marked by the mafic minerals and some elongated Qz or Pl crystals. The rock is likely a mylonitic amphibolic diorite.

Texture: Granoblastic, with spaced schistosity and nematoblastic texture defined by the Amp, and the microlithons are defined by Pl, Qz, and Fls; the sample exhibits an anastomosed smooth cleavage.

PRINCIPAL MINERALS	**%**	**ALTERATION MINERALS**	**%**
Amphibole	50	Sericite from plagioclase (albite)	
Plagioclase (feldspar)	20	Biotite (amphibole)	
Quartz	10	Epidote - zoisite	
Biotite + Muscovite	20		
ACCESSORY MINERALS			
Apatite	Tr		
Zircon	Tr		
Opaque	Tr		

Paragenesis: Amp+Pl+Qz+Fls; Bt+Ms+Ep+Ser

Metamorphism: Dynamic metamorphism (Qz recrystallization lower T), and Lower T (Bt –Ep zone)

Metamorphic facies: Greenschist-facies (Biotite grade)**: Photolith:** Mafic

Classification: Biotitic amphibolite schist.

Amphibole: crystal of medium grain size (1-3 mm) with high relief, pleochroism from green to pale yellowish color, rhombic cleavage of 120 degrees, the crystals are prismatic to hexagonal subhedral to anhedral, and in diamond-shape, some of them are bent and present undulose extinction. Oscillatory extinction at 45 degrees with respect to the cleavage, high interference colors blue, purple, and yellow of the third order, exhibits some inclusion of Aln, sericite (plagioclase), and Zrn. Present a narrow reaction border of Bt, and some fractures (mechanic deformation twinning) and cleavages are being replaced by Bt (retrograde?)

Plagioclase: It is observed mostly in subhedral to anhedral crystals with prismatic shapes varying in size from 500 um to 2 mm, low to medium relief, and pale brownish to in color (clouded), product of alteration and replacement of ser. Some grains exhibit polysynthetic twinning with sericitization.

Quartz: Colorless, with irregular to subhedral shape, its size varies from 100 um to 500 um, low relief and birefringence, some grains look bent and present and undulose extinction and bulging filling or following the foliation.

Biotite: Present a prismatic and tabular shape, with high relief and pleochroism from pale yellow to brown; it is found to be associated with the amp (replacing it). Biotite is found interlaminated with muscovite and zoisite and looks to be intersecting the amphibole (late growing?). Retrograde growing?

Muscovite: Present well-formed tabular crystals with moderate relief, white to pale yellow color; it exhibits high interference colors 2nd to 3rd order and parallel extinction. It is found and interlaminated with biotite marking a lepidoblastic texture.

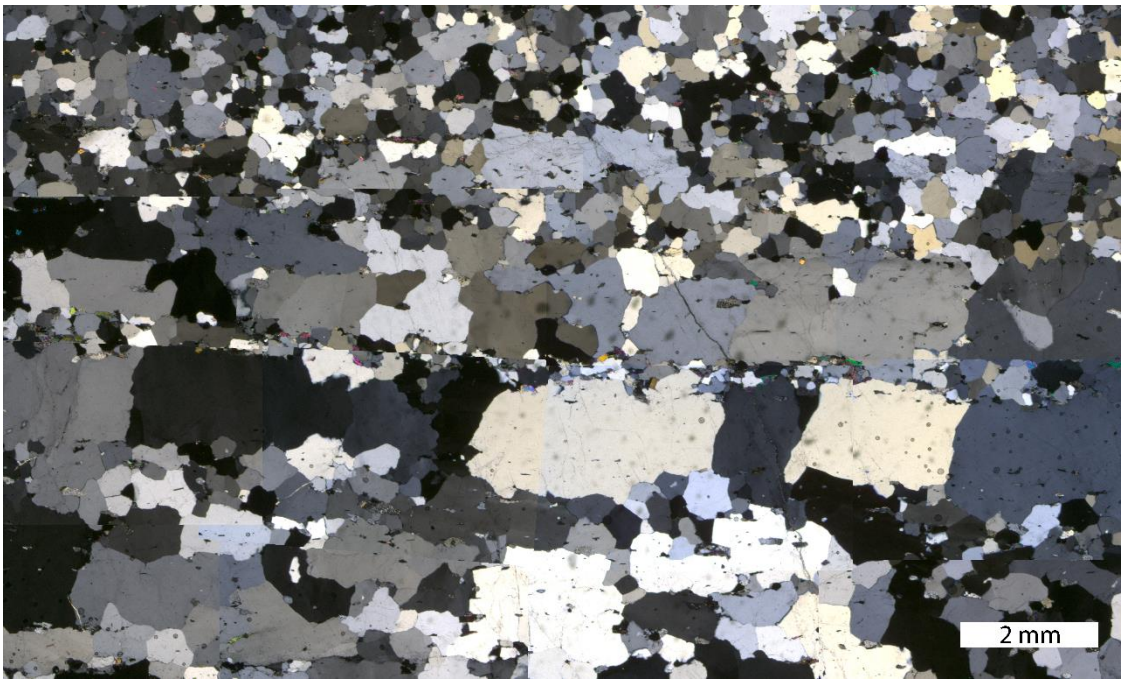
Sericite: Low to moderate relief, brownish to pale yellow, cloudy and ragged aggregates, exhibit high interference color 2-3 order (yellow, blue, grey). It is found to replace the plagioclase.

Epidote-Czo : Exhibits moderate relief, yellow to green light, replacing the borders of the amphibole and plagioclase, interference colors are fluorescents high order (3^{rd} order),

Zoisite: High relief, colorless, low birefringence, granular aggregate altering the biotite, interference color grey and white to anomalous blue 1^{st} order, parallel extinction

Allanite: Rounded shape, yellow color to orange brown, presents a high relief with alteration rims; it is found mostly in the amphiboles as inclusions. Ep is found as a rim enclosing the Aln crystals, probable product of Aln alteration to ep?

22NPM21



Domain: FHVB

Hand specimen description: Beige to brownish foliated quarzitic rock, with a granular texture and medium to coarse-grain size, composed mainly by Qz 70 %, likely Fls 20%, and micas (Ms) 10 %. The rock exhibits a foliation marked by Qz bands or veinlets; the rock is likely a quartzite.

Texture: Granoblastic, with continuous cleavage defined by the Qz bands and aligned Ms and Bt, and the microlithons by Pl and Qz, and K- fls and Ttn porphyroblasts, the sample exhibits an anastomosed

PRINCIPAL MINERALS	**%**	**ALTERATION MINERALS**	**%**
Quartz	70	Sericite from feldspar	
Feldspar	15	Chlorite (Bt and Ms)	
Muscovite	10	Epidote - zoisite	
Biotite	5		
ACCESSORY MINERALS			
Apatite	Tr		
Zircon	Tr		
Allanite	Tr		

Paragenesis: Qz+Fls+Bt; Chl+Ser

Metamorphism: Dynamic metamorphism (Qz recrystallization) high-to-medium mylonite with lower temperature by Chl and sericite replacing the micas

Metamorphic facies: Greenschist-facies (Chlorite-epidote grade)**: Photolith:** Pelitic

Classification: granitic augen gneiss.

Quartz: Colorless, low relief, and birefringence, with subhedral shape and granoblastic texture, its size varies from 100 um to 600 um; it is observed in monocrystalline recrystallized large and elongated ribbons marking the foliation and enclosing some K-fls porphyroblast with Bt, representing strongly deformed granoblastic grains, which grown with polygonal granoblastic fabric statically grown by grain boundary migration. The ribbon varies in Qz grain size from 500 mm to 3 mm crystals; the shape is preserved because, along both sides of each ribbon, relatively small, recrystallized K feldspar and Bt Crystals impeded the growth of quartz. The grains are bent and present and undulose extinction, subgrain formation (dislocation), it is also observed as myrmekitic texture close to some K-fls porphyroblasts. Recrystallized small crystals are observed likely a product of SGR. Micas are observed and included following the foliation, and the Qz is recrystallized, trapping them and producing window texture.

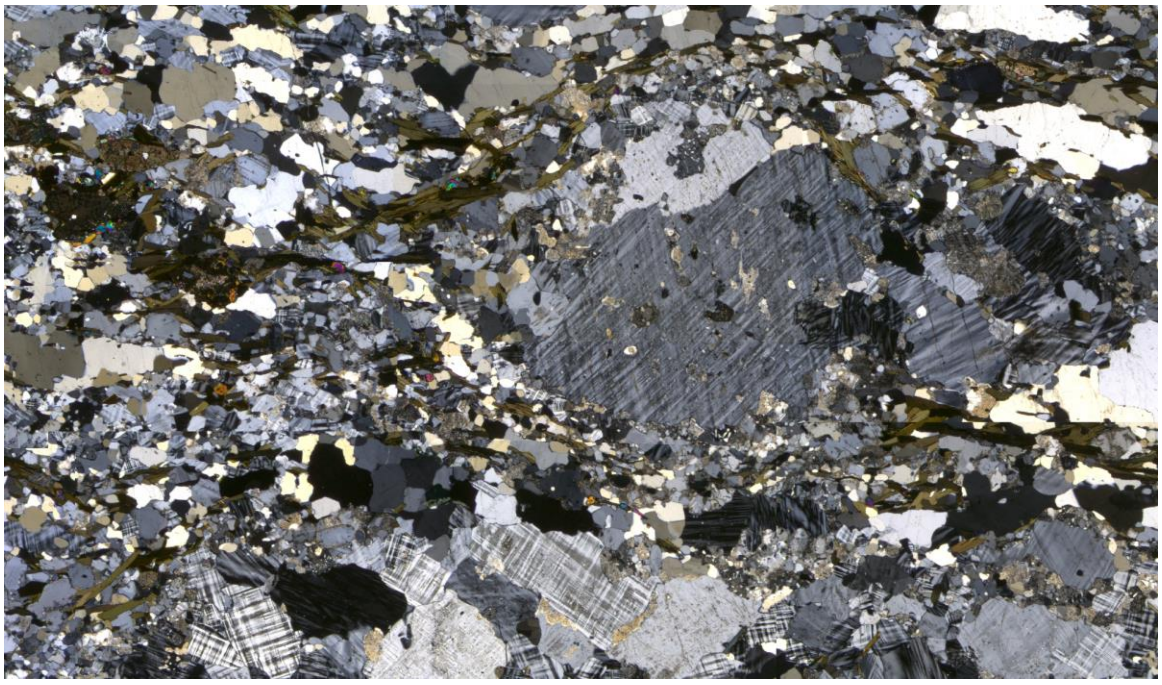
Feldspar: It is observed mostly in subhedral crystals with tabular shapes varying in size from 200 um to 1 mm, mostly colorless to white; the crystals look like they are sprinkled with tiny confetti (sericite), low to medium relief, interference color order I gray to white, it is with perthitic and undulose extinction texture. Most of the grains are sericitized, bent, and present subgrain formation by dislocation.

Muscovite: Present well-formed elongated tabular and prismatic crystals, with an average size of 400 um, with moderate relief, colorless; it exhibits high interference colors 2nd to 3rd order and parallel extinction. Some grains exhibit interlaminated replacement by Chl.

Biotite: Present a laminar shape, and it defines an anastomosed spaced schistosity with high relief, and pleochroism from pale yellow to dark brown; it varies in size from 100 um to 500 um. Some grains exhibit interlaminated replacement by Chl.

Chlorite: It is observed to replace the Ms and Bt, and as a thin laminar crystal, it presents a pale green color with moderate relief, and the interference color is anomalous blue.

22NPM22 (22NPM18 Similar)



Domain: FHVB

Hand specimen Description: Pink to beige foliated felsic rock, with a granular texture and medium to coarse-grain size, composed by K-falls 40 %, Qz 20%, Pl 20%, Bt 20. The rock exhibits a foliation marked by the mafic and felsic minerals, with mm to cm K-feldspar porphyroblasts and augens; the rock is likely a quartz monzogranitic augen gneiss.

Texture: Granoblastic, with spaced schistosity and lepidoblastic texture defined by the Bt, and the microlithons by Pl and Qz, and K- fls and Ttn porphyroblasts, the sample exhibits an anastomosed

PRINCIPAL MINERALS	**%**	**ALTERATION MINERALS**	**%**
Feldspar	40	Sericite from plagioclase (albite)	
Quartz	23	Chlorite (biotite)	
Biotite	20	Epidote - zoisite	
Plagioclase	15		
ACCESSORY MINERALS			
Titanite	2		
Apatite	Tr		
Zircon	Tr		
Alnanite	Tr		

Paragenesis: Fls+Pl+Qz+Bt; Chl+Ep+Ser

Metamorphism: Dynamic metamorphism

Metamorphic facies: Greenschist-facies (Chlorite-epidote grade)**: Photolith:** Quartz-feldspathic

Classification: granitic augen gneiss.

Feldspar: It is observed mostly in subhedral to euhedral crystals with tabular shapes varying in size from 250 um to 8 mm, mostly colorless to white; the crystals look like sprinkled with tiny confetti (sericite), low to medium relief, interference color order I gray to white, it is observed in porphyroblast or augens with perthitic and myrmekitic texture (intergrowth of Qz in Plg?) (Myrmekite is formed under metasomatic conditions, usually in conjunction with tectonic deformations), Porphyroblast presents small recrystallized K-feldspar. Medium-grade conditions can be inferred from the advanced recrystallization of K-feldspar along the rims of porphyroclasts like the product of SGR.

Quartz: Colorless, low relief, and birefringence, with subhedral shape and granoblastic texture. Its size varies from 100 um to 600 um. It is observed in monocrystalline recrystallized large and elongated ribbons marking the foliation and enclosing some K-fls porphyroblast with Bt, representing strongly deformed granoblastic grains, which grown with polygonal granoblastic fabric statically by grain boundary migration. The ribbon shape is preserved because, along both sides of each ribbon, relatively small recrystallized K feldspar and Bt Crystals impeded the growth of quartz. The grains are bent and present and undulose extinction, subgrain formation (dislocation); it is also observed as myrmekitic texture close to some K-fls porphyroblasts. Recrystallized Small crystals are observed as likely products of SGR.

Plagioclase: Subhedral elongated crystals with prismatic shape varying in size from 200 um to 2 mm, with medium relief and cloudy pale brownish color product of incipient replacement of ser. It makes part of

the microlithons. Some grains exhibit polysynthetic albite twinning with sericitization. Some inclusions of Ep are present.

Biotite: Present a laminar shape defining an anastomosed spaced schistosity, with high relief pleochroism from pale yellow to dark brown; it varies in size from 100 um to 3 mm. Some grains of 200 um exhibit interlaminated replacement by Chl (Bt1?), but euhedral epidote grains are observed in the large Bt crystals, which together with Ttn are observed following the foliation with the Bt (Bt2?), Bt is also observed replacing some borders of Amp crystals.

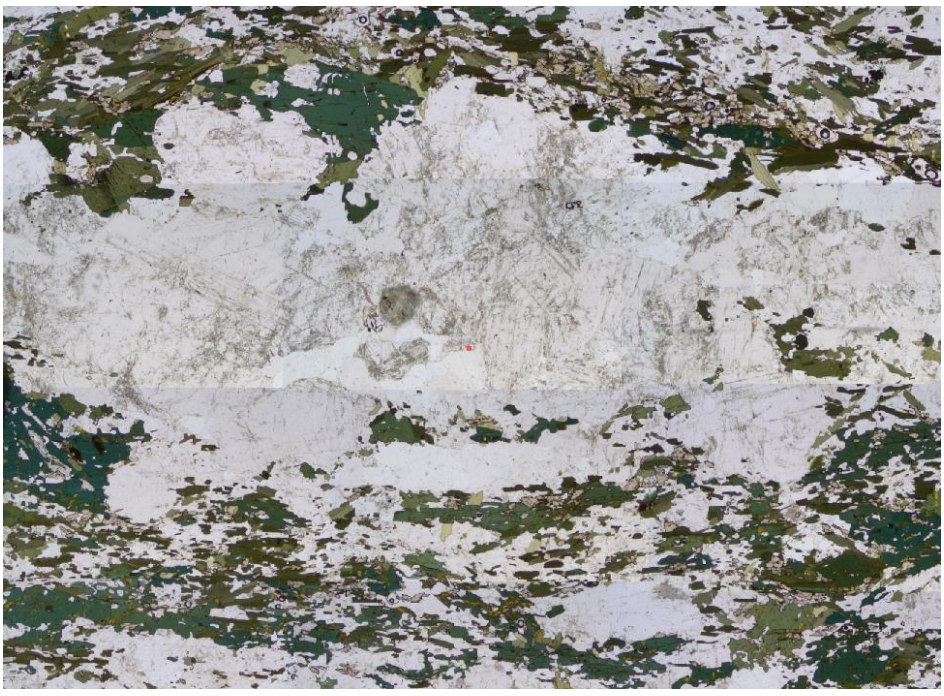
Chlorite: It is observed to replace biotite, and as a thin laminar crystal, it presents a pale green color with moderate relief, and the interference color is anomalous blue.

Epidote: Exhibits a moderate relief, pale yellow to pale green, in euhedral to subhedral tabular and granular shape, with an average size of 300 um, interference colors are fluorescents high order (3rd order), the grains are aligned to the foliation and replacing some Bt and enclosing some Aln grains. The epidote is found following the foliation, and it is related to the Bt, which is also observed in some ten porphyroblasts.

Titanite: Present a high relief subhedral with a wedge-shape and rounded, pale yellow to brown color, high interference color strong but masked by the color of the mineral, following the foliation marked by the bt, Ep, its size varies from 100 um to 1 mm with inclusion of Zrn. The titanite grains are observed as porphyroblast fractured and present a lighter border of titanite with a corrosive or reprecipitated texture and a brown core, likely representing two generations of growing?. The porphyroblasts are found with Ep and Ap

Alnanite: Rounded shape, yellow color to orange-brown, presents a high relief with alteration rims; Ep is found as a rim enclosing the Aln crystals.

22NPM25



Domain: FHVB

Hand specimen Description: Pink to beige foliated felsic rock, with granular texture and medium to coarse-grain size, composed by Fls and Pl 40%, Qz 20%, Bt, 20, Amp 18 %, and a reddish mineral in a 2 % (Allanite) The rock exhibits a foliation marked by the mafic and felsic minerals, with K-feldspar porphyroblasts and augens, the rock is a likely a quartz monzonitic augen gneiss.

Texture: Granoblastic, with compositional banding differentiated, with a continuous cleavage domain defined by biotite and amphibole (lepidoblastic microfabric), and the microlithons by Pl and Qz, the sample exhibits a parallel smooth cleavage.

PRINCIPAL MINERALS	**%**	**ALTERATION MINERALS**	**%**
Feldspar	30	Sericite from plagioclase (albite)	
Plagioclase	25	Chlorite (biotite)	
Quartz	15	Epidote - zoisite	
Biotite	15		
Amphibole	10		
ACCESSORY MINERALS			
Apatite	2		
Titanite	2		
Allanite	1		
Zircon	Tr		

Paragenesis: Fls+Pl+Qz+Bt+Amp; Chl+Ep+Ser

Metamorphism: Dynamic metamorphism

Metamorphic facies: Greenschist-facies (Chlorite-epidote grade)**: Photolith:** Quartz-feldspathic

Classification: quartz monzonitic augen gneiss.

Feldspar: It is observed mostly in subhedral to euhedral crystals with tabular shapes varying in size from 250 um to 4 mm in porphyroblast or augens with perthitic texture (Pl replacement?), low to medium relief, mostly colorless to white. The crystals exhibit the microcline with some Qz inclusions and Carlsbad twinning, but also, the crystals look like they are sprinkled with tiny confetti (sericite), interference color order I gray to white.

Plagioclase: Subhedral to euhedral elongated crystals with prismatic shape varying in size from 1 um to 2 mm, with medium relief and cloudy pale brownish color product of replacement of ser. It makes part of the microlithons. Some grains exhibit zoning where the core is sericitized, and the rim is an overgrowth of Pl (alternation from Ca to Na?). Some grains exhibit polysynthetic twinning, with sericitization being incipient. Present some inclusions of Ap.

Quartz: Colorless, low relief, and birefringence, with irregular to subhedral shape; its size varies from 100 um to 1 mm. Some grains are bent and present and undulose extinction, subgrain formation (dislocation), and bulging as microstructure near the feldspathic porphyroblasts; some elongated bands look like ribbons.

Biotite: Presents a laminar shape and defines an anastomosed spaced schistosity, with high relief pleochroism from a pale brown-green product of a pervasive chloritization. It varies in size from 100 um

to 3 mm. It also presents also some Ap and Aln inclusions; some Ttn grains are observed following the foliation, with the Bt likely overgrowing with or by the Bt.

Amphibole: Subhedral to anhedral crystals with grain size between 500 um and 3 mm, high relief, pleochroism from green to pale yellowish color, rhombic cleavage of 120 degrees, the crystals are hexagonal subhedral to anhedral, some of them are bent and present undulous extinction. Oscillatory extinction at 45 degrees is concerning cleavage, interference color from pale green to yellow (2nd order), and others from green to dark green (Chl replacement?). Inclusions of Ap and Aln, Ttn and Ep are observed replacing. Present a reaction border of Chl and epidote replacement.

Chlorite: It is observed replacing and overprinting pervasively the biotite and the amphiboles, it presents a pale green color with moderate relief and interference color is anomalous blue, presents some Ap, Aln, and ep inclusions

Sericite: Low to moderate relief, brownish to pale yellow, cloudy and ragged aggregates, exhibit high interference color 2-3 order (yellow, blue, grey). It is found to replace the plagioclase.

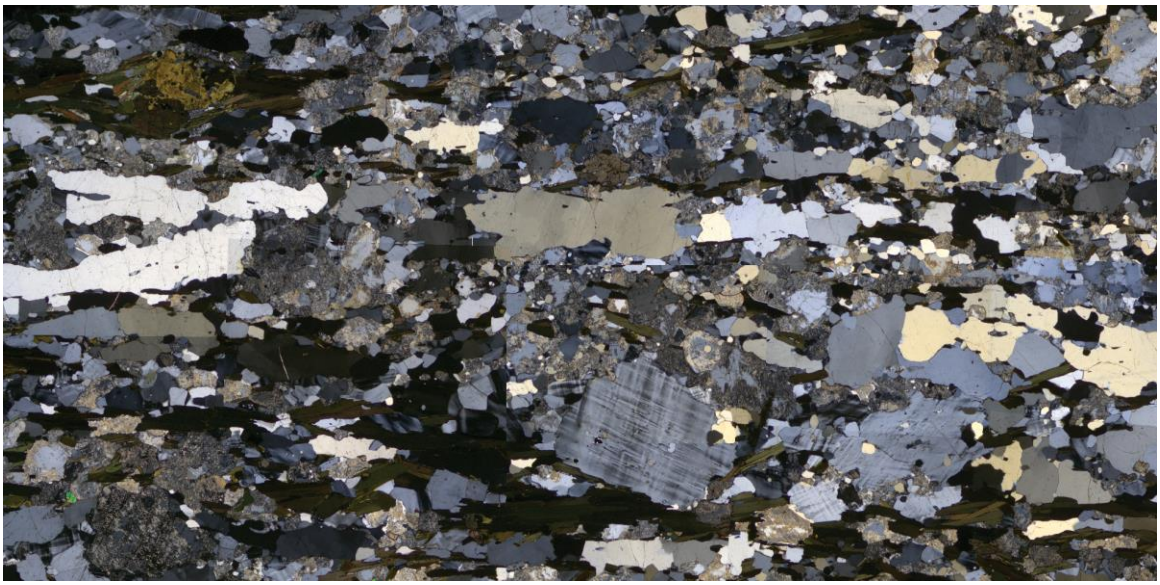
Epidote: Exhibits a moderate relief, pale yellow to pale green, in euhedral to subhedral tabular shape, with an average size of 200 um; interference colors are fluorescents high order (3^{rd} order), some grains are aligned to the foliation and enclosing some Allanite grains, it is found as inclusion in Ttn,

Apatite: Exhibits medium relief, with subhedral to an elongated rounded shape, is colorless, and exhibits interference colors of the first order (grey to white). It is found as inclusions in the biotite, Chl, and some ten.

Allanite: Rounded shape, yellow color to orange brown, presents a high relief with alteration rims; it is found mostly in the amphiboles as inclusions. Ep is found as a rim enclosing the Aln crystals, a probable product of Aln alteration to Ep.

Titanite: Present a high relief, pale yellow to brown color, high interference color strong (pink to green 3rd order), following the foliation marked by the Bt, Chl, and amp; its size varies from 100 um to 2 mm with the inclusion of ap and Zrn. At least two generations of titanite are observed; the bigger ones have an average size of 1 mm with reprecipitated or corroded texture and inclusion of Ap, Zr, and Aln; the other ones are smaller and vary from 100 to 200 um with no inclusions and subhedral shape found in the Amp.

22NPM28



Domain: SZ1

Hand specimen Description: Pink to beige foliated felsic rock, granular and mylonitic texture, medium to coarse-grain size, composed by Fls and Pl 45%, Qz 25%, Bt 25%, and Amp 5 %.The rock exhibits a foliation marked by the mafic and felsic minerals, with K-feldspar porphyroblasts and augens; the rock is likely a monzonitic augen gneiss.

Texture: Granoblastic, with compositional banding differentiated, with a continuous cleavage domain defined by biotite (lepidoblastic microfabric), and the microlithons by Pl and Qz, the sample exhibits a parallel smooth cleavage.

PRINCIPAL MINERALS	**%**	**ALTERATION MINERALS**	**%**
Feldspar	30	Sericite from plagioclase (albite)	
Plagioclase	20	Chlorite (biotite)	
Quartz	20	Epidote - zoisite	
Biotite	20		
Amphibole	4		
ACCESSORY MINERALS			
Apatite	2		
Titanite	2		
Alnanite	1		
Zircon	1		

Paragenesis: Fls+Pl+Qz+Bt+Amp; Chl+Ep+Ser

Metamorphism: Dynamic metamorphism

Metamorphic facies: Greenschist-facies (Chlorite-epidote grade)**: Photolith:** Quartz-feldspathic

Classification: monzonitic augen gneiss.

Feldspar: It is observed mostly in subhedral to euhedral crystals with tabular shapes varying in size from 250 um to 3 mm in porphyroblast or augens, low to medium relief, mostly colorless to white, the crystals exhibit the microcline twinning with some Qz inclusions and Carlsbad twinning, but also the crystals look like sprinkled with tiny confetti (sericite), interference color order I gray to white.

Plagioclase: Subhedral to euhedral elongated crystals with prismatic shape varying in size from 1 um to 2 mm, with medium relief and cloudy pale brownish color product of replacement of ser. It makes part of the microlithons. Some grains exhibit zoning where the core is sericitized, and the rim is an overgrowth of Pl? (alternation from Ca to Na?). Some grains exhibit polysynthetic and perthitic twinning or graphic texture, with sericitization being incipient. Present some inclusions of Ap.

Quartz: Colorless, low relief, and birefringence, with elongated irregular to subhedral shape, its size varies from 100 um to 1 mm; some grains are bent and present and undulose extinction, subgrain formation (dislocation) and grain boundary migration.

Biotite: Present a laminar shape and defines an anastomosed spaced schistosity with high relief and pleochroism from pale yellow to brown. It varies in size from 100 um to 4 mm. With bird's eye interference color, some of Ap, Aln, and Chl is also observed replacing some biotite, and Ttn looks to be related to the Bt.

Amphibole: Small anhedral crystals with grain size between 500 um and 1 mm, high relief, pleochroism from green to pale yellowish color, rhombic cleavage of 120 degrees, the crystals are hexagonal subhedral to anhedral, interference color from pale green to yellow (2^{nd} order), and others are from green to dark green (Chl replacement?). Inclusions of Ap and Aln, Ttn and Ep are observed replacing. Present a reaction border of Chl replacement.

Chlorite: It is observed replacing the borders of the biotite and some amphiboles. It presents a pale green color with moderate relief, and the interference color is blue anomalous, presenting some Ap, Aln, and Ep inclusions.

Sericite: Low to moderate relief, brownish to pale yellow, cloudy and ragged aggregates, exhibit high interference color 2-3 order (yellow, blue, grey). It is found to replace the plagioclase.

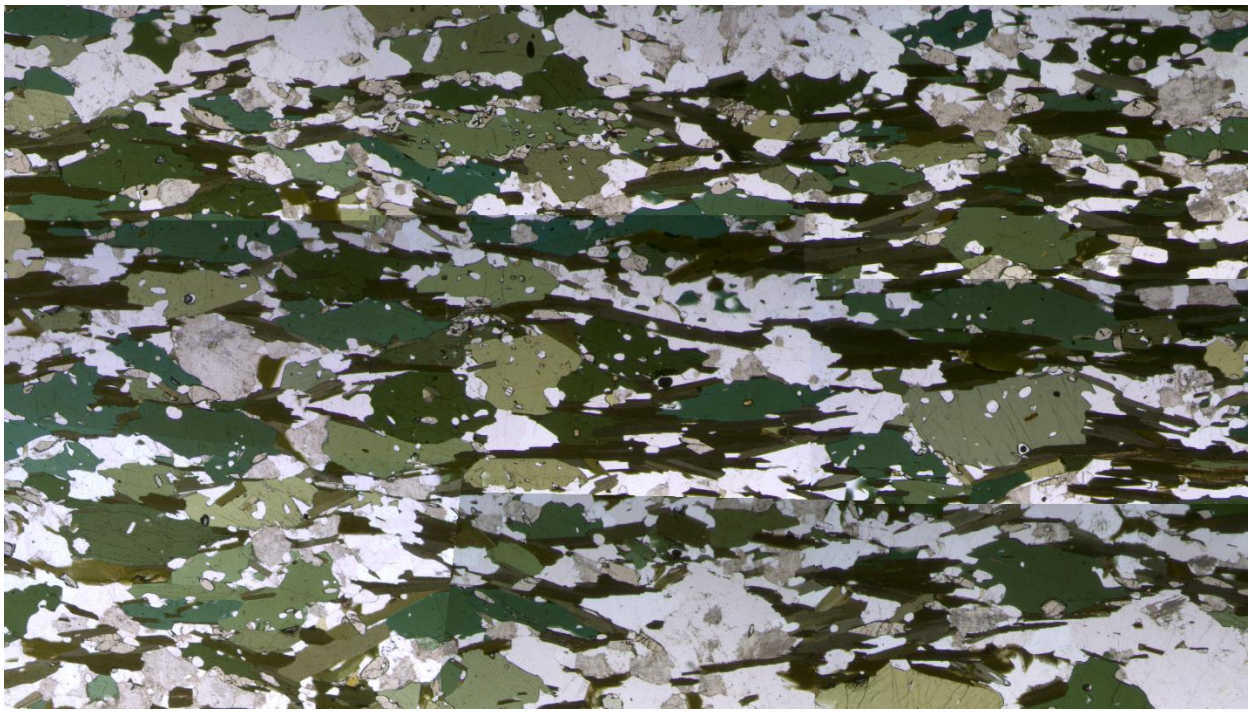
Epidote: Exhibits moderate relief, colorless, in euhedral to subhedral tabular shape, with an average size of 200 um, interference colors are fluorescents high order (3^{rd} order), some grains are aligned to the foliation and enclosing some Allanite grains, it is found as inclusion in Ttn,

Apatite: Exhibits medium relief, with subhedral to an elongated rounded shape, is colorless, and exhibits interference colors of the first order (grey to white). It is found as inclusions in the biotite, Chl, and some ten.

Allanite: Rounded shape, yellow color to orange-brown, presents a high relief with alteration rims; it is found mostly in the amphiboles as inclusions and is observed enclosing some grains. Allanite is late?.

Titanite: Present a high relief, pale yellow to brown color, high interference color strong (pink to green 3rd order), following the foliation marked by the Bt, its size varies from 100 um to 2 mm with the inclusion of ap and Zrn. Ttn is observed with Aln, likely Aln replacing Ttn?

22NPM36A



Domain: FHsz

Hand specimen description: Grey to black color, highly deformed rock, with a granular texture and medium to coarse-grained size; the rock exhibits a gneissosity texture marked by Amp, Bt, and Pl; the rock is composed mainly of Amp 40%, Bt 30%, Pl 20%, and Qz 10%.The rock is likely a mylonitic granodiorite.

Texture: Granoblastic, with spaced schistosity and nematoblastic to lepidoblastic texture defined by the Amp and the Bt, respectively; the microlithons are defined by Pl, Qz, and Fls, and the sample exhibits an anastomosed smooth cleavage.

PRINCIPAL MINERALS	**%**	**ALTERATION MINERALS**	**%**
Amphibole	40	Sericite from plagioclase (albite)	
Biotite	35	Biotite (amphibole)	
Plagioclase (feldspar)	20	Epidote - zoisite	
Quartz	15		
ACCESSORY MINERALS			
Apatite	Tr		
Zircon	Tr		
Opaque	Tr		

Paragenesis: Amp+Pl+Qz+Fls; Bt+Ep+Ser+Ttn

Metamorphism: Dynamic metamorphism

Metamorphic facies: Greenschist-facies (Biotite grade)**: Photolith:** Quartz feldspathic - mafic

Classification: Mylonitic granodiorite

Amphibole: crystal of medium grain size (1-3 mm) with high relief, pleochroism from green to pale yellowish color, rhombic cleavage of 120 degrees, the crystals are prismatic to hexagonal subhedral to anhedral, and in diamond-shape, some of them are bent and present undulose extinction. Oscillatory extinction at 45 degrees is concerned with the cleavage and high interference colors pink, green, and yellow. it exhibits some inclusion of Aln, Ttn, Ep, sericite (plagioclase), Ap, and Zr. It is observed as a porphyroblast enclosed by Bt, Qz, and Pl (ser), likely showing an inclined movement towards the right (N side to the right); the Amp is bent and present undulose extinction. Bt is observed also replacing the borders of the Amp.

Biotite: Prismatic and tabular shape, euhedral with high relief, pleochroism from yellow light to brown dark, some of the biotite are marking the foliation, some of them replacing, in the border of the amphiboles, growing in the Amp fractures (bird eye extinction) and marking the s1 foliation enclosing some Amp porphyroblast Bt2, the color of interference a high order 4th order, from green to pink, present inclusion of Ap, Ep, Qz, and Ttn. And Ttn as docusate texture, A brownish and massive no pleochroic bt replacing the Amp is observed, likely another generation of Bt1?

Plagioclase: It is observed mostly in subhedral to anhedral crystals with prismatic shapes varying in size from 500 um to 2 mm, low to medium relief, and pale brownish (clouded), the product of alteration and replacement of ser. Some grains exhibit polysynthetic twinning with sericitization.

Quartz: Colorless, with irregular to subhedral shape, its size varies from 100 um to 500 um, low relief and birefringence; some grains are bent and present and undulose extinction and bulging filling or following the foliation.

Sericite: Low to moderate relief, brownish to pale yellow, cloudy and ragged aggregates, exhibit high interference color 2-3 order (yellow, blue, grey) it is found replacing the plagioclase.

Epidote: Exhibits a moderate relief, yellow to green light, as inclusions of the amphibole and Bt interference colors are fluorescents high order (3^{rd} order), with zoning.

Titanite: High relief, brown to orange color, some grains show a brown core with a black to yellow rim it is found in contact with the amphiboles and biotite, and some grains present a wedge (sphene) crystal in the Amp with no rims

Allanite: Rounded shape, yellow color to orange-brown, presents a high relief with alteration rims; it is found mostly in the amphiboles as inclusions. Ep is found as a rim enclosing the Aln crystals, a probable product of Aln alteration to Ep?

22NPM37

Domain: LHsz

Hand specimen Description: Gray to whitish foliated intermediate phaneritic rock, with a granular texture and medium-grain size (1-3 mm), composed by Pl 40%, Amp 30 %, Qz 15%, and Bt 15%. The rock is likely a quartz diorite gneiss.

Texture: Granoblastic, with spaced schistosity, the cleavage domain is defined by micas, and the microlithons by Pl, Qz and Amp, the sample exhibits a smooth anastomosed gradational schistosity.

PRINCIPAL MINERALS	**%**	**ALTERATION MINERALS**	**%**
Plagioclase	35	Sericite from plagioclase (albite)	
Amphibole	25	Chlorite (biotite)	
Biotite	14	Epidote - zoisite	
Muscovite	12		
Quartz	10		
ACCESSORY MINERALS			
Apatite	2		
Titanite	2		
Zircon	Tr		
Alnanite	Tr		

Paragenesis: Amphibole-plagioclase

Metamorphism: Dynamic metamorphism

Metamorphic facies: Greenschist-facies (Chlorite-epidote grade)**: Photolith:** Mafic

Classification: Quartz diorite Gneiss

Plagioclase: Subhedral to euhedral elongated crystals with prismatic shape varying in size from 500 um to 2 mm, with medium relief and pale brownish color product of replacement of ser. It makes part of the microlithons.

Amphibole: Subhedral to anhedral crystals with grain size (1-3 mm), high relief, pleochroism from green to pale yellowish color, rhombic cleavage of 120 degrees, the crystals are hexagonal subhedral to anhedral, some of them are bent and present undulous extinction. Oscillatory extinction at 45 degrees with respect to the cleavage, interference color from pale green to yellow (2^{nd} order), and others from green to dark green (Chl replacement?). Inclusions of ep, ser (plagioclase), Qz, Chl, Aln and Zrn. Present a reaction border of Chl and epidote replacement.

Biotite: Present a laminar shape and defines an anastomosed spaced schistosity with high relief pleochroism from pale brown to dark brown. Biotite is found interlaminated with muscovite, and it is almost entirely replaced by Chl; it also presents some inclusions along the 001 planes of Ap and Ttn. An S-C fabric is observed, marked clearly by the micas.

Muscovite: Exhibits a laminar shape, with moderate relief, white to pale yellow color; it exhibits high interference colors 2nd to 3rd order and parallel extinction. It is found and interlaminated with biotite and Chlorite, marking a lepidoblastic texture; some ep is also observed in contact with the Ms.

Quartz: Colorless, low relief, and birefringence, with irregular to subhedral shape, its size varies from 200 um with to 1 mm; some grains are bent and present and undulose extinction, subgrain formation (dislocation), and grain boundary migration.

Chlorite: It is observed replacing and overprinting in a major portion of the biotite and some of the amphiboles. It presents a pale green color with moderate relief, and the interference color is blue anomalous, presenting some Ap and ep inclusions.

Sericite: Low to moderate relief, brownish to pale yellow, cloudy and ragged aggregates, exhibit high interference color 2-3 order (yellow, blue, grey). It is found to replace the plagioclase.

Epidote: Exhibits moderate relief, colorless, in subhedral tabular shape, interference colors are fluorescents high order (3^{rd} order), some grains are aligned to the foliation and enclosing some Allanite grains, it is found as inclusion in Chl and the border of the Amp.

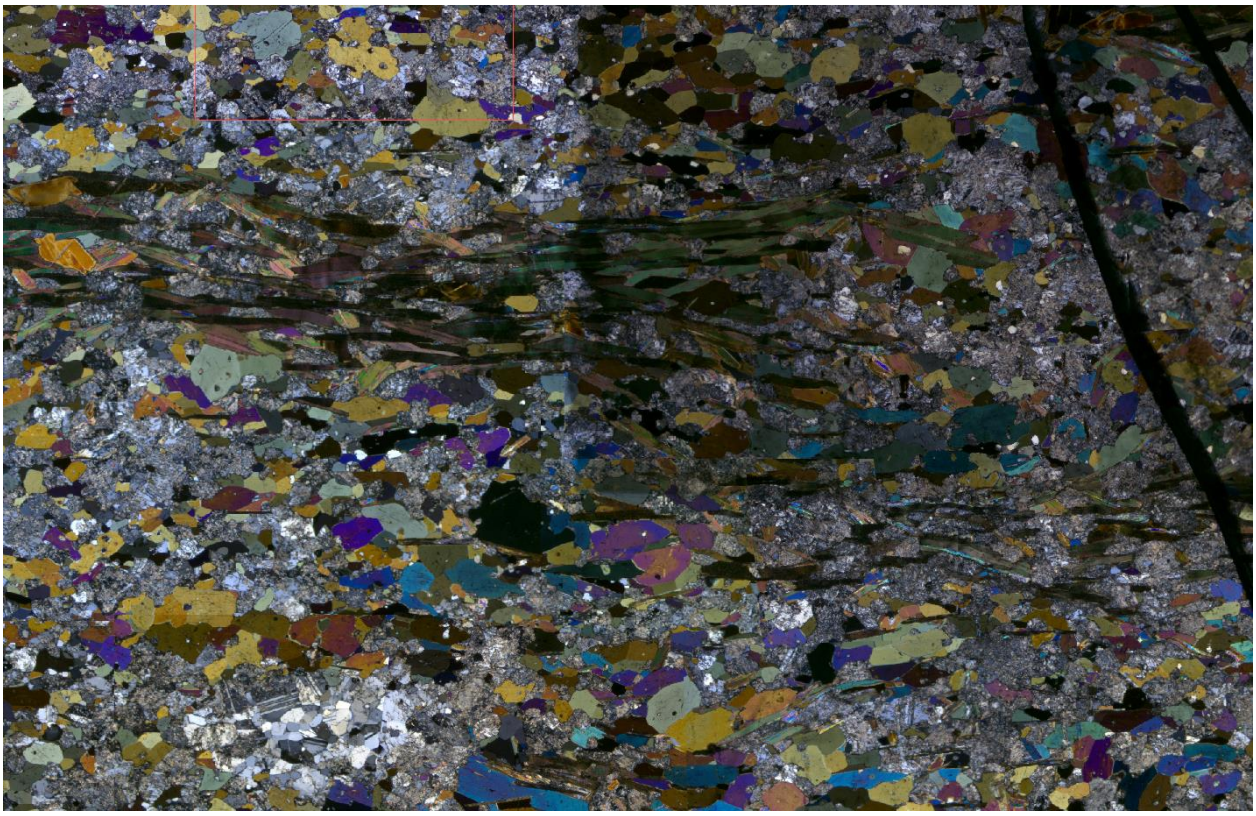
Clinozoisite: High relief, colorless, prismatic shape altering the biotite, interference color grey and white to anomalous blue, orthogonal extinction.

Apatite: Exhibits medium relief, with anhedral to elongated rounded shape; it is colorless and exhibits interference colors of the first order (grey to white). It is included in biotite and muscovite and sometimes in Chlorite.

Allanite: Rounded shape, yellow color to orange brown, presents a high relief with alteration rims; it is found mostly in the amphiboles as inclusions. Ep is found as a rim enclosing the Aln crystals, a probable product of Aln alteration to Ep.

Titanite: Present a high relief, pale yellow to brown color, interference color string brown, with diamond-shaped to subrounded, its size varies from 100 um to 2 mm with inclusion of ap and Zrn, it is found as inclusion in Amp, Bt, and Chl, some of them are aligned to the foliation

22NPM38



Domain: LHsz

Hand specimen Description: Gray to black foliated phaneritic rock, with a granular texture and medium-grain size (1-3 mm), composed by Amp 40%, Pl 30 %, Bt in bands 20%, Qz and likely Fls in a 10 %. The rock is a diorite to granodiorite gneiss.

Texture: Granoblastic polygonal to decussated, with spaced schistosity and mylonitic texture, where the smooth anastomosed gradational schistosity domine is defined by the amphibole, while the microlithons are defined mostly by plagioclase. Furthermore, a lepidoblastic microtexture is defined by biotite and muscovite.

PRINCIPAL MINERALS	**%**	**ALTERATION MINERALS**	**%**
Amphibole	35	Sericite from plagioclase (albite)	
Plagioclase	29	Chlorite	
Biotite	20	Epidote - zoisite	
Muscovite	12		
Quartz	3		
ACCESSORY MINERALS			

Apatite	1		
Zircon	Tr		
	Tr		
	Tr		

Paragenesis: Amphibole-plagioclase, and biotite-muscovite

Metamorphism: Dynamo-thermic metamorphism?

Metamorphic facies: Greenschist-facies from amphibolite (Bt-Chl-Ep grade)**: Photolith:** Mafic

Classification: Amphibolitic- biotitic Schist with plagioclase

Amphibole: crystal of medium grain size (1-3 mm) with high relief, pleochroism from green to pale yellowish color, rhombic cleavage of 120 degrees, the crystals are prismatic to hexagonal subhedral to anhedral, some of them are bent and present undulose extinction. Oscillatory extinction at 45 degrees for the cleavage, high interference colors blue, purple, and yellow of the third order, but also lower interference color from pale green to yellow (2nd order) present some inclusion of epidote, sericite (plagioclase), Zo, and Zrn. A narrow reaction border of Chl is present, and some fractures are filled by ep or Ms. The amphiboles are marking a schistosity and are enclosing some Fls and Qz porphyroblast, showing an S-C fabric. Besides, some grains are bent and exhibit undulose extinction, exposing a deformational event (S1)

Plagioclase: It is observed mostly in subhedral to euhedral crystals with prismatic to rectangle shapes varying in size from 500 um to 2 mm, low to medium relief, and pale brownish to in color (clouded), product of alteration and replacement of ser in the matrix, and parallel extinction. Present some inclusions of Amp, Ep. Some grains exhibit polysynthetic twinning. It is also observed in the porphyroblasts, which have a characteristic twinning but with less sericite alteration.

Biotite: Present a prismatic and tabular shape, with high relief pleochroism from pale yellow to brown. It is found marking the foliation and likely intersecting the schistosity defined by the amphiboles; the Bt exhibits a lepidoblastic texture with anastomosed spaced schistosity. Biotite is found interlaminated with muscovite and zoisite and looks to be intersecting the amphibole and plagioclase crystals (late growing?). A different biotite in the border of the amphiboles (replacing) looks to be present apparently with no Ms associated (two generations? Thermal overprint?)) (S2).

Muscovite: Present well-formed tabular crystals with moderate relief, white to pale yellow color; it exhibits high interference colors 2nd to 3rd order and parallel extinction. It is found and interlaminated with biotite, marking a lepidoblastic texture.

Quartz: Colorless, with irregular to subhedral shape, its size varies from 100 um with a subhedral shape to 500 um some porphyroblast, low relief, and birefringence, and some grains look to be bent and present and undulose extinction.

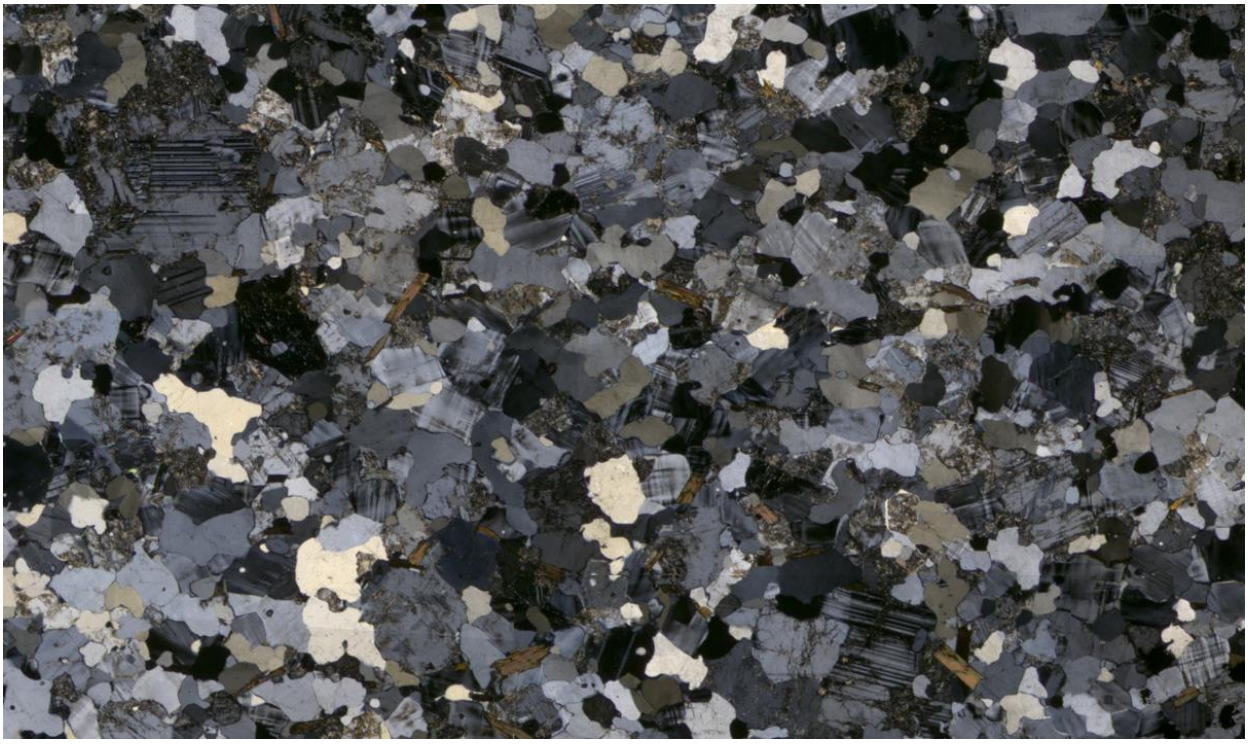
Sericite: Low to moderate relief, brownish to pale yellow, cloudy and ragged aggregates, exhibit high interference color 2-3 order (yellow, blue, grey); it is found replacing the plagioclase.

Epidote: Exhibits moderate relief, colorless, in granular and rounded aggregates as inclusions within the amphibole and plagioclase; interference colors are fluorescents high order (3^{rd} order).

Zoisite: High relief, colorless, low birefringence, granular aggregate altering the biotite, interference color grey and white to anomalous blue 1st order, parallel extinction.

Apatite: Exhibits medium relief, with anhedral to an elongated rounded shape. It is colorless and exhibits interference colors of the first order (grey to white). It is found as inclusions in the amphiboles and plagioclase

22NPM39A



Domain: LHsz

Hand specimen Description: White to beige color granitic rock, with a granular texture and fine-grain size (< 1 mm), composed of Pl and Fls 70%, Qz 20 %, and Bt 10 %. The rock is slightly foliated, with Pl, Qz, and Bt marking the foliation. The rock is an aplitic felsic granitoid slightly deformed, likely an aplitic monzogranite or quartz monzonite dyke.

Texture: Granoblastic, with roughly continuous cleavage.

PRINCIPAL MINERALS	**%**	**ALTERATION MINERALS**	**%**
Feldspar	39	Sericite from plagioclase (albite)	
Plagioclase	30	Chlorite	
Quartz	20	Epidote	
Biotite	8		
Muscovite	2		
ACCESSORY MINERALS			
Opaque	1		
Zircon	Tr		
Carbonate	Tr		

Paragenesis: Plagioclase-quartz-biotite, and Chlorite-epidote

Metamorphism: Dynamic metamorphism

Metamorphic facies: Greenschist-facies (Chl-ep grade)**: Photolith:** Quartz-feldspathic

Classification: Quartz-monzonite (slightly deformed)

Feldspar: It is observed mostly in subhedral to euhedral crystals with tabular shapes varying in size from 250 um to 1 mm, low to medium relief, and mostly colorless to white, the crystals exhibit the microcline with some Qz inclusions and Carlsbad twinning, but also the crystals look like sprinkled with tiny confetti (sericite), interference color order I gray to white.

Plagioclase: It is observed mostly in subhedral to euhedral crystals with tabular and elongated shapes varying in size from 500 um to 1 mm, low relief, mostly colorless, but some grains are cloudy due to incipient alteration (ser). Some crystals exhibit an albitic polysynthetic twinning and perthite, with some Qz inclusions; it is found elongated, sometimes defining the cleavage or foliation with the biotite.

Quartz: Colorless, with irregular to anhedral shape, its size varies from 100 um with a subhedral shape to 3 mm in an anhedral and rounded shape, low relief and birefringence, grains are bent and present and undulose extinction and subgrain generation.

Biotite: Present a prismatic and tabular shape, with high relief, pleochroism from pale yellow to brown, with an average size of 400 um. It is found marking a rough cleavage, and it is being replaced by Chlorite and zoisite. Some inclusion of likely apatite and epidote? Are observed.

Muscovite: It is observed with subhedral crystals, laminar shape, low relief, and white to pale yellow color; it exhibits high interference colors 2nd to 3rd order and parallel extinction. It is found and interlaminated with biotite and Chlorite, marking the foliation.

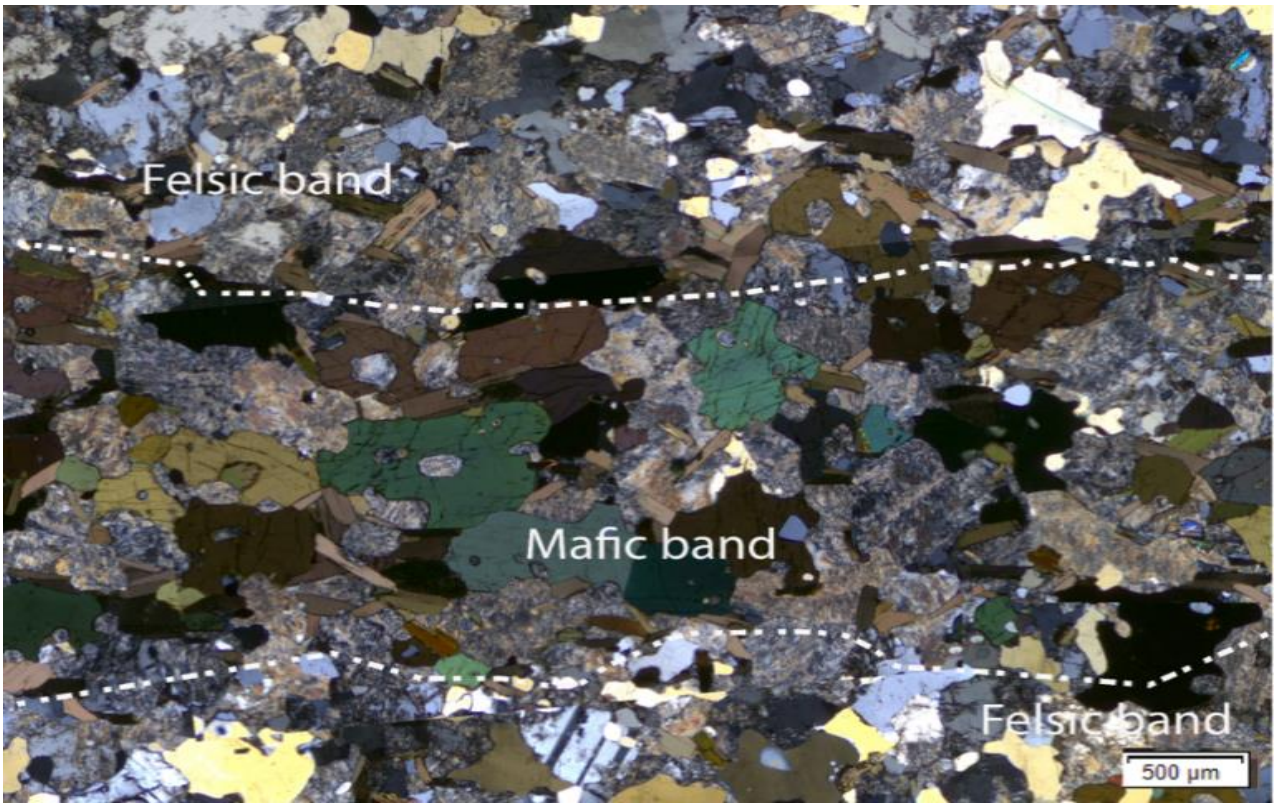
Sericite: Low to moderate relief, brownish to pale yellow, cloudy and ragged aggregates, exhibit high interference color 2-3 order (yellow, blue, grey). It is found replacing the plagioclase and feldspar.

Chlorite: It is observed replacing biotite and muscovite crystals; it presents a pale green color with moderate relief and perfect cleavage; the interference color is very weak (gray to pale blue); it is also observed as a laminar shape in the quartz-feldspathic matrix, maybe as pseudomorph from Bt.

Epidote: Exhibits a high positive relief, colorless, in granular aggregates and prismatic shape as inclusions or altering the biotite; interference colors are fluorescents high order (3^{rd} order),

Zoisite: High relief, colorless, prismatic, and flake shape, altering the border of the biotite, interference color grey and white to anomalous blue, orthogonal extinction

22NPM39B



Domain: LHsz

Hand specimen description: Foliated rock with medium-grain size (1-3 mm), exhibiting some compositional and gneissic banding. The darker band corresponds to mafic minerals like biotite and Amp. The felsic bands exhibit Qz, Pl, Fls, and Bt. These minerals mark foliation. The rock is granodioritic mylonite

Texture: Granoblastic, with gneissic foliation and mylonitic texture. The gneissic banding is parallel and discrete.

PRINCIPAL MINERALS	**%**	**ALTERATION MINERALS**	**%**
Amphibole	30	Sericite from plagioclase (albite)	
Plagioclase	25	Chlorite	
biotite	20	Epidote - zoisite	
Quartz	13		
Feldspar	12		
ACCESSORY MINERALS			
Apatite	3		
Allanite	Tr		
Zircon	Tr		
Titanite	Tr		

Paragenesis: Amphibole, plagioclase, biotite and feldspar (mafic band), and Quartz, plagioclase, biotite (felsic band)

Metamorphism: Dynamothermal metamorphism?

Metamorphic facies: Greenschist-facies **(Chlorite-Biotite-epidote grade)**

Photolith: Mafic

Classification: Amphibolitic-feldspathic-biotitic and quartz Gneiss

Compositional description

Amphibole: crystal of medium grain size (mm) with high relief, pleochroism from green to yellowish mineral, with rhombic cleavage of 120 degrees, the crystals are subhedral to anhedral, some of them are bent and present undulose extinction. Oscillatory extinction at 45 degrees with respect to the cleavage, high interference colors green, blue, purple, and pink of the third order, present some inclusion of sericite (feldspar), Qz, Zrn, Ep, and Aln. Present a reaction border of Chl, and some of them are replaced entirely by Chl, and some fractures are filled by ep and zoisite.

Biotite: Prismatic and tabular shape, euhedral, with high relief, pleochroism from yellow light or dark brown, some of the biotite is marking the foliation some of them deformed, in the border of the amphiboles (replacing) and a different direction to the foliation cutting other biotite (two generations? Thermal overprint?)), they vary in size from mm to nm, color of interference a high order 4 order, from green to pink, present inclusion of ap, ep, Qz and Ttn. The biotite is being replaced by Chl and ep. Thermal vent

Chlorite: It is observed replacing euhedral to subhedral amphibole crystals; it presents a pale green color with moderate relief and perfect cleavage; the interference color is very weak (gray to pale blue); it is also observed replacing some biotite

Plagioclase-Feldspar: It is observed mostly in anhedral to subhedral crystals with prismatic to rectangle shapes varying in size from 500 um to 1 mm, low to medium relief, and pale brownish to in color (clouded), product of alteration and replacement of ser. Some grains present Albite polysynthetic twinning (Michel - Levy method), plagioclase present, and some chessboard twinning, which is interpreted to be replacing Ca plagioclase or K fields for albite; there is an altered specific feldspar, and another one without alteration in the lighter bands with slight to zero alteration by ser.

Quartz: Colorless, with an irregular shape, its size varies from 100 um with a rounded shape to 500 um in an irregular shape with irregular contact, low relief, and birefringence; it is most found in the felsic bands with feldspar and plagioclase; the quartz exhibit some recrystallization textures like BLG, SGR, and GBM, besides undulose extinction, some grains are bent producing Sub grains

Sericite: Low to moderate relief, brownish to pale yellow, cloudy and ragged aggregates, exhibit high interference color 2-3 order (yellow, blue, grey). It is found to replace the plagioclase and feldspar in both the mafic and the felsic bands

Epidote: Exhibits a high positive relief, colorless, in granular aggregates and prismatic shape as inclusions or altering the biotite; it is also found in inclusion within the amphiboles, interference colors are fluorescents high order (3^{rd} order).

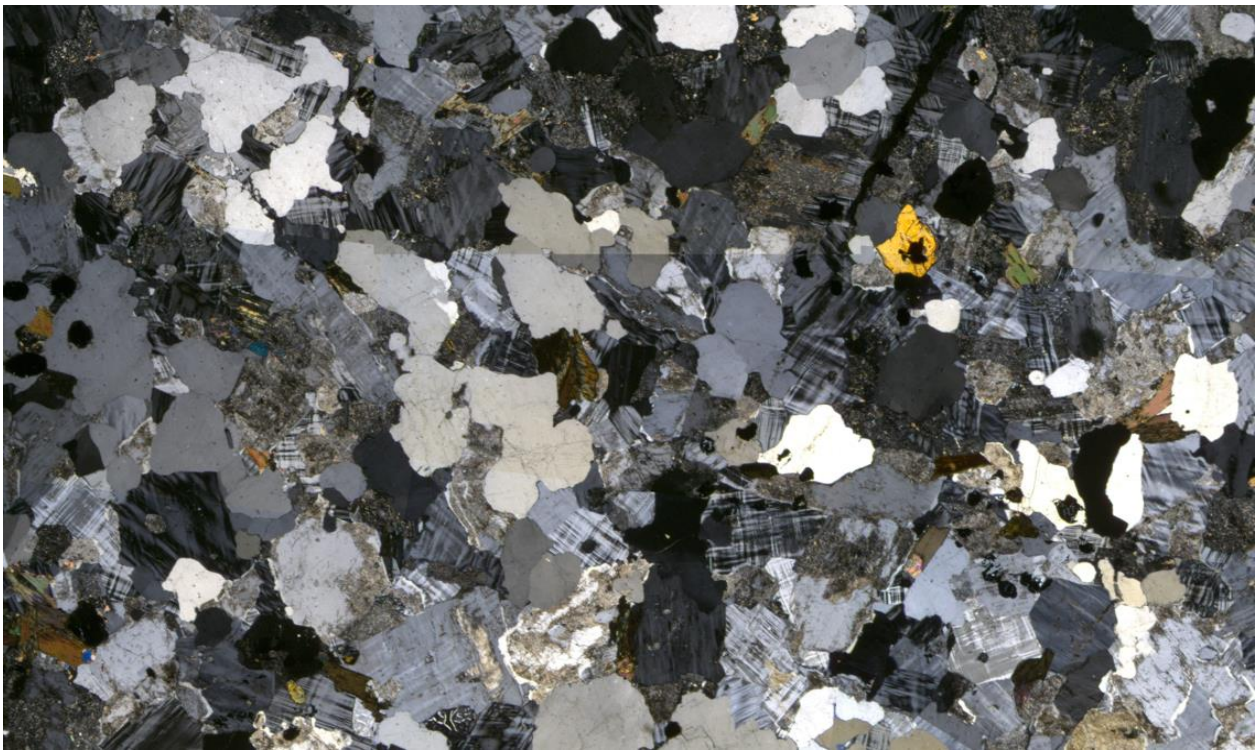
Zoisite: High relief, colorless, prismatic shape altering the biotite, interference color grey and white to anomalous blue, orthogonal extinction

Apatite: Exhibits medium relief, with an anhedral to elongated rounded shape; it is colorless and exhibits interference colors of the first order (grey to white). It is found as inclusions in the biotite in oval shape and rounded form

Titanite: High relief, brown to orange color, some grains show a brown core with a black to yellow rim it is found in contact with the amphiboles and biotite, and some grains present wedge-shaped (sphene) crystals in the biotite with no rims

Allanite: Rounded shape, yellow color, present a high relief with alteration rims; it is found mostly in the amphiboles as inclusions

22NPM40



Domain: LHsz

Hand specimen description: White to beige color granitic rock, with granular phaneritic texture and medium to coarse-grain size, composed of Pl and Fls 50%, Qz 30 %, and Bt 20 %. The rock is a monzogranite crosscutting the shear zone's foliation.

Texture: Granoblastic graphic textures

Paragenesis: Plagioclase-feldspar-quartz-biotite-muscovite, and Chlorite-epidote

Metamorphism: ---- **Metamorphic facies:** Greenschist-facies (Chl-ep grade) or hydrothermal alteration?

Photolith: Quartz-feldspathic

Classification: Quartz-monzonite (slightly deformed)

PRINCIPAL MINERALS	%	ALTERATION MINERALS	%
Feldspar	39	Sericite from plagioclase (albite)	
Plagioclase	30	Chlorite	
Quartz	20	Epidote	
Biotite	8		
Muscovite	2		
ACCESSORY MINERALS			
Opaque	1		
Zircon	Tr		
Carbonate	Tr		

Feldspar: It is observed in subhedral to euhedral crystals with tabular shapes varying in size from 500 um to 3 mm, low to medium relief, and mostly colorless to white. The crystals exhibit the microcline with some Qz inclusions, but also, the crystals look like they are sprinkled with tiny confetti (sericite), interference color order I gray to white. Graphic texture is observed in the feldspar with intergrowth of quartz.

Plagioclase: It is observed mostly in subhedral to euhedral crystals with tabular and elongated shapes varying in size from 500 um to 3 mm, low relief, mostly colorless, but some grains are cloudy due to incipient alteration (ser). Some crystals exhibit an albitic polysynthetic and perthite twinning (or dislocations produced by nucleation of stress?), with some Qz inclusions, the ones with sericite exhibit zoning with sericitized core, while the rim is an overgrowth of Pl? (Alternation from Ca to Na?).

Quartz: Colorless, with irregular to anhedral shape, its size varies from 100 um with a subhedral shape to 3 mm in an anhedral and rounded shape, low relief and birefringence, grains are present and undulose extinction and subgrain generation.

Biotite: Present a prismatic and tabular shape, with high relief, pleochroism from pale yellow to brown, with size varying from 400 um to 1 mm, with "bird's eye extinction, it is found to be replaced by Chlorite.

Muscovite: It is observed with subhedral crystals, laminar shape, low relief, and white to pale yellow color; it exhibits high interference colors 2nd to 3rd order and parallel extinction. It was found that interlaminated chlorite is likely the product of the replacement of chlorite from Ms.

Sericite: Low to moderate relief, brownish to pale yellow, cloudy and ragged aggregates, exhibit high interference color 2-3 order (yellow, blue, grey). It is exhibited replacing the plagioclase and feldspar.

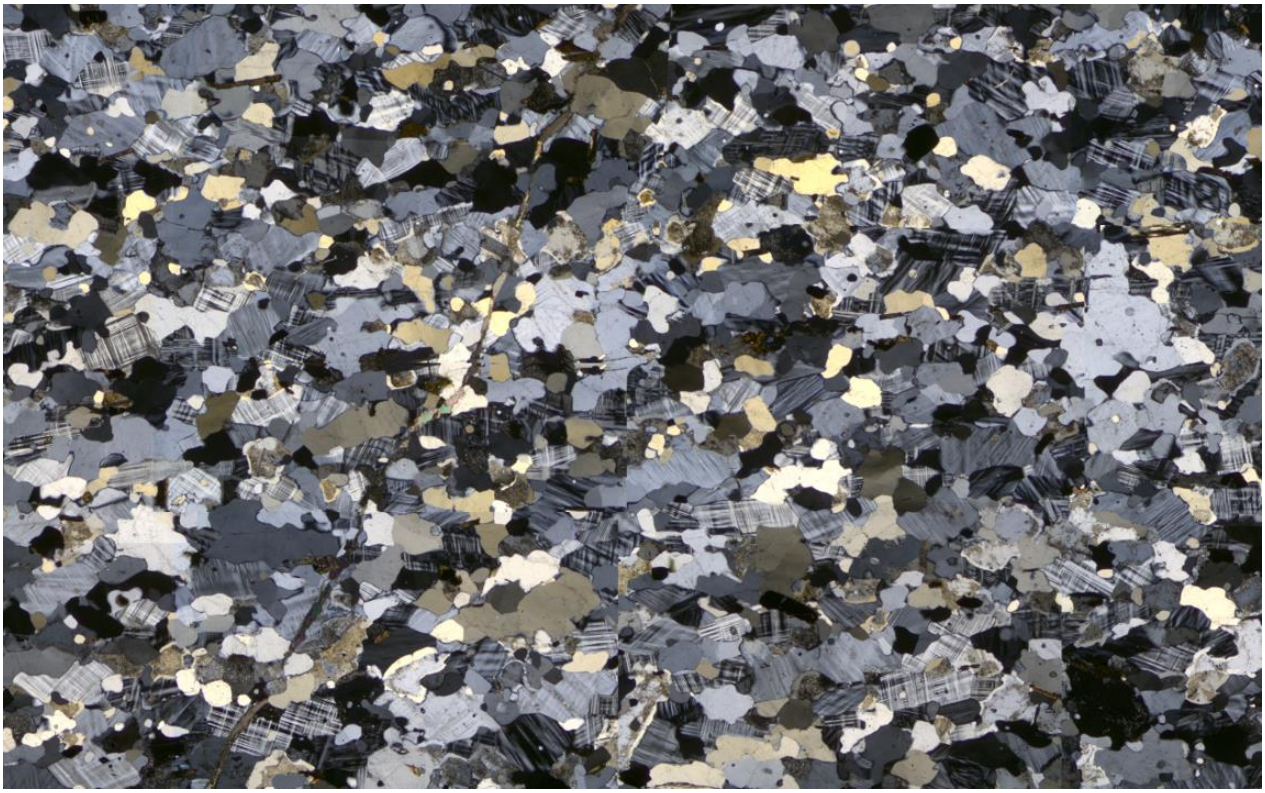
Chlorite: It is observed replacing biotite and muscovite crystals; it presents a pale green color with moderate relief and perfect cleavage; the interference color is very weak (gray to pale blue); it is also observed as a laminar shape in the quartz-feldspathic matrix, maybe as pseudomorph from Bt.

Epidote: Exhibits a high positive relief, colorless, in granular aggregates and prismatic shape as inclusions or altering the biotite; interference colors are fluorescents high order (3^{rd} order),

Titanite: High relief, brown to orange color, with high interference color; some grains show ilmenite and apatite inclusions,

Allanite: Rounded shape, yellow color, present a high relief with alteration rims, it is found mostly in the amphiboles as inclusions

22NPM41



Domain: LHsz

Hand specimen Description: White to beige color granitic rock, with a granular texture and fine-grain size (< 1 mm), composed of Pl 45%, Qz 35 %, 10 % Fls, and Bt 10 %. The rock is slightly foliated with Pl, Qz, and Bt marking the foliation; some veinlets are cutting this rock. The rock is an aplitic tonalite slightly deformed.

Texture: Granoblastic, with continuous cleavage, some minerals are elongated (Pl Qz, Bt).

PRINCIPAL MINERALS	**%**	**ALTERATION MINERALS**	**%**
Feldspar	33	Sericite from plagioclase (albite)	
Plagioclase	29	Chlorite	
Quartz	25		
Biotite	9		
Muscovite	3		
ACCESSORY MINERALS			
Titanite	1		
Zircon	Tr		
Titanite	Tr		
Allanite	Tr		

Paragenesis: Plagioclase-quartz-biotite

Metamorphism: Dynamic metamorphism

Metamorphic facies: Greenschist-facies (Bt-Chl-Ms grade)**: Photolith:** Quartz-feldspathic

Classification: Quartz-monzonite (slightly deformed)

Feldspar: It is observed mostly in subhedral crystals with tabular and elongated shapes varying in size from 500 um to 1 mm, low to medium relief, and mostly colorless; the crystals exhibit microcline twinning with some Qz inclusions.

Plagioclase: It is observed mostly in subhedral crystals with tabular and elongated shapes varying in size from 500 um to 1 mm, low relief, mostly colorless, but some grains are cloudy due to incipient alteration (ser); the ones with sericite exhibit zoning where the core is sericitized, and the rim is, am overgrowth of Pl? (alternation from Ca to Na?). Some crystals exhibit an albitic polysynthetic twinning and perthite, with some Qz inclusions, it is found to define the cleavage or foliation.

Quartz: Colorless, with irregular to subhedral shape, its size varies from 100 um with a subhedral shape to 500 um some porphyroblast, low relief, and birefringence, and some grains look to be bent and present and undulose extinction and BLG. It is observed that the foliation is defined with the plagioclase.

Biotite: Present a prismatic and tabular shape, with high relief, pleochroism from pale yellow to brown, with an average size of 400 um; it is found marking a rough cleavage, and it is found being replaced by Chlorite and zoisite.

Muscovite: It Is observed with subhedral crystals, laminar shape, low relief, and white to pale yellow color; it exhibits high interference colors 2nd to 3rd order and parallel extinction. It is found and interlaminated with biotite and Chlorite, marking the foliation.

Sericite: Low to moderate relief, brownish to pale yellow, cloudy and ragged aggregates, exhibit high interference color 2-3 order (yellow, blue, grey). It is found to replace the plagioclase.

Chlorite: It is observed replacing biotite and muscovite crystals; it presents a pale green color with moderate relief and perfect cleavage; the interference color is very weak (gray to pale blue); it is also observed as a laminar shape in the quartz-feldspathic matrix, maybe as pseudomorph from Bt.

Zoisite: High relief, colorless, prismatic shape altering the border of the biotite, interference color grey and white to anomalous blue, orthogonal extinction