THIN SECTION LABEL ID: **390C-U1558A-19X-2-W 45/49-TSB-TS109** Thin section no.:

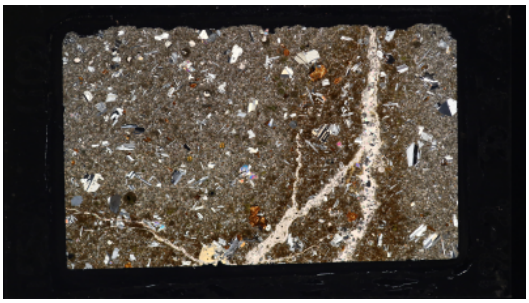
Observer: MH, EA Piece no.: 2

Total number of domains: 3 Unit/subunit:

Thin section summary: Branched carbonate vein with 2 halos, inner brown dominated by FeOH and outer dark grey halo dominated by presence of yellow-brown clay. some carbonate replaing plag phenocrysts and in background groundmass

Plane-polarized: 63279271

Cross-polarized: 63279291



No. of photomicrographs in database: 10

Igneous Petrology

Lithology:

Style of emplacement: pillow lava flow

Domain number (if >1):

Igneous domain type: flow interior

Domain relative abundance (%): 100

Major groundmass texture:

Groundmass grain size (avg):

Phenocrysts	Original (%)	Size MODE (mm)	Shape	Habit	Comments
Olivine	3	0.1	euhedral	equant	Entirely inferred from altered pseudomorphs. Phenocrysts are both isolated and glomerocrystic with plagioclase
Plagioclase	8	0.8	euhedral	tabular	Relatively seriate continuum from millimetric plag phenocrysts to micrometric groundmass laths. Many large phenocrysts have melt inclusions.
Clinopyroxene	0.5	0.2	euhedral	equant	Mostly fresh but very sparse, mostly as glomercrysts with plagioclase. Large glomerocrysts have a sub-ophitic texture.

Groundmass	Original (%)	Comment
Groundmass	87.5	Randomly oriented plag laths with interstices filled with weakly plumose cpx. Extremely sparse, micron-scale Fe-Ti oxides on late crystallization surfaces

Vesicle	Original (%)	Size Mode (mm)	Shape	Comments
Vesicle	1	0.2	round	

Alteration

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
background	43	100	clay + FeOH	2	carbonate spots in phenocrysts	5	brown clay	40	carbonate in patches and light brown clay with minor FeOH		

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
vein halo	48	100	clay +FeOH	3	yellow-brown clay	5	brown clay	40	brown clay iwht some spots of yellow-brown clay and minor FeOH		

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
vein halo	76	100	clay + FeOH	8	yellow-brown clay and carbonate in phenocryst cores	20	brown clay	75	brown clay and FeOH		

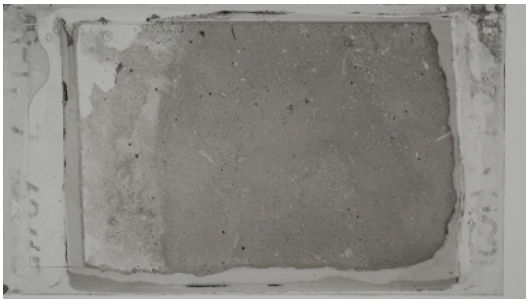
Veins

Vein width (mm)	Vein fill sequence (rim to center)	Vein comments	Halo comments
1	yellow clay - carbonate with feoh spots		2 halos (brown and dark grey) of variable width (up to 10mm)

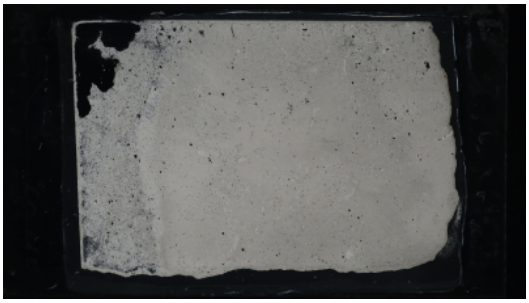
THIN SECTION LABEL ID:	**393-U1558D-4R-1-W 62/65-TSB-TS 122**	Thin section no.:	122
Observer:	Alina Shchepetkina	Piece no.:	7
Total number of domains:		Unit/subunit:	

Thin section summary: The thin section represent two major lithologies: micritic to microspar limestone separated by an irregular (erosional?) surface from microsparitic limestone with darker, micritic masses. The micritic to microspar limestone contains traces of concretions of framboidal pyrite, common circular cavities filled with neoformed calcite, shades of recrystallized bioclasts, and rare to common test walls of multichambered, recrystallized foraminifers of different sizes and shapes. Circular cavities likely represent fully or partially recrystyllized small foraminifers, with intermediate replacement stages found. Forams can be concentrated in lenses and thin layers. Some cavities present yellowish mineral filler (zeolite?). Elongated brownish crystals of igneous origin? and olivine crystals replaced by clay minerals are observed.

Plane-polarized: 63492881



Cross-polarized: 63492901



No. of photomicrographs in database: 41

THIN SECTION LABEL ID: **393-U1558D-5R-2-W 1/3-TSB-TS 125** Thin section no.: 125

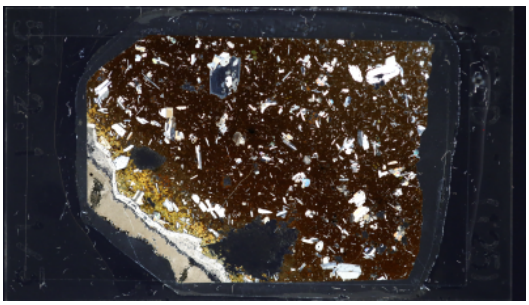
Observer: MJ, EA Piece no.: 1

Total number of domains: 1 Unit/subunit:

Thin section summary: Plagioclase-olivine-pyroxene phyric basalt pillow lava flow with a holocrystalline, equigranular texture with sparse phenocrysts of plagioclase and olivine in the groundmass., Glassy margin is completely altered, mostly to yellow clay. Alteration intensity of chilled margin is moderate, with brown clay + FeOH as alteration products. Glass-parallel vein composed of carbonate, zeolite, and metamorphosed sediment.

Plane-polarized: 63495431

Cross-polarized: 63495451



No. of photomicrographs in database: 11

Igneous Petrology

Lithology: **plagioclase-olivine-pyroxene phyric basalt pillow lava flow**

Style of emplacement: pillow lava flow

Domain number (if >1): **1**

Igneous domain type: flow interior

Domain relative abundance (%): 100

Major groundmass texture:

Groundmass grain size (avg): microcrystalline

Phenocrysts	Original (%)	Size MODE (mm)	Shape	Habit	Comments
Olivine	0.2	0.2	subhedral	subequant	Subhedral olivines (0.6mm) in altered groundmass.
Plagioclase	10	0.2	euhedral	elongate	Fresh laths of plagioclase (upto 2.2mm) phenocrysts are often seen with few grains displaying sieve texture. Smaller plagioclase grains (1mm) in size often occur as glomerocrysts, enclose olivine grains defining the intergranular texture. Olivine grains enclosing plagioclase laths partially are also observed giving rise to sub-ophitic texture
Clinopyroxene	0.5	0.2	subhedral	equant	Subhedral clinopyroxenes are often seen associated with plagioclase and characterized by low to medium interference colors. The cpx are often seen partially enclosing plagioclase laths defining the sub-ophitic texture.

Groundmass	Original (%)	Comment
Groundmass	88.8	Under the microscope, the groundmass is altered to a deep red clayey. Oxyhyrdroxides are often associated with yellowish clay. No original igneous groundmass composition can be observed other than few thin laths of plagioclase.

Vesicle	Original (%)	Size Mode (mm)	Shape	Comments
Vesicle	0.5	0.1	round	Vesicles are small, round to irregular (max size. 0.4 mm) mostly lined with yellow clay. Unfilled irregular vesicles are sparse.

Alteration

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
other halo-orange	100									100	yellow-orange clay

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
background	38							30	brown clay + FeOH, minor yellow-orange clay		

Veins

Vein width (mm)	Vein fill sequence (rim to center)	Vein comments	Halo comments
2	carbonate - zeolite - metamorphosed sediment	rim of TS represents glass-parallel vein with carbonate overgrown by euhedral zeolite followed by sediment	

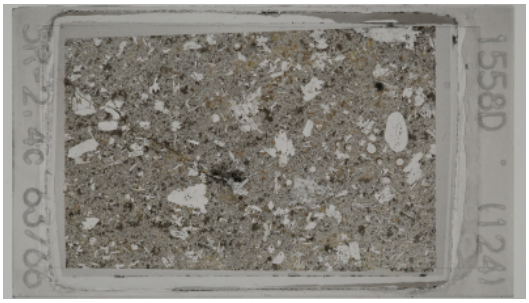
THIN SECTION LABEL ID: **393-U1558D-5R-2-W 63/66-TSB-TS 124** Thin section no.: 124

Observer: MJ, EA Piece no.: 4

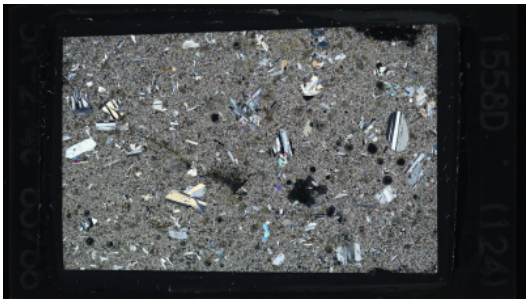
Total number of domains: 1 Unit/subunit:

Thin section summary: Plagioclase-olivine-pyroxene phyric basalt pillow lava flow with a microcrystalline intergranular groundmass with phenocrysts of plagioclase, olivine and minor clinopyroxene. Alteration intensity is moderate, with brown and yellow clay + FeOH as alteration products. Sub-millimetric clay vein crosscuts TS.

Plane-polarized: 63495391



Cross-polarized: 63495411



No. of photomicrographs in database: 12

Igneous Petrology

Lithology: **plagioclase-olivine-pyroxene phyric basalt pillow lava flow**

Style of emplacement: pillow lava flow

Domain number (if >1): **1**

Igneous domain type: flow interior

Domain relative abundance (%): 100

Major groundmass texture: intergranular

Groundmass grain size (avg): microcrystalline

Phenocrysts	Original (%)	Size MODE (mm)	Shape	Habit	Comments
Olivine	1	0.2	subhedral	subequant	Subhedral olivine phenocrysts (upto 1mm) closely associated with plagioclase phenocrysts. Minor alteration along cracks.
Plagioclase	5	0.5	euhedral	elongate	Fresh laths of plagioclase mostly 1.2mm in size often occur as glomerocrysts closely associated with olivine grains. Large phenocrysts measuring (2mmx3.2mm) are sparse and display sieve texture. Laths of plagioclase enclosing olivine grains are observed at places defining the intergranular texture.
Clinopyroxene	2	0.2	euhedral	equant	Fresh subhedral clinopyroxene phenocrysts (1.6mm) restricted to the groundmass and seen associated with olivine and plagioclase laths occasionally. Low order interference colors are commonly observed.

Groundmass	Original (%)	Comment
Groundmass	91.5	Under the microscope the rock is fresh, microcrystalline with phenocrysts of plagioclase, olivine and clinopyroxene. The phenocrysts of plagioclase form glomerocrysts and enclose olivine and cpx grains defining the intergranular textures. Cpx phenocyrsts, 1.6 mm size are observed with minute grains in the groundmass.

Vesicle	Original (%)	Size Mode (mm)	Shape	Comments
Vesicle	0.5	0.2	round	Vesicles are small, round (max size. 0.6 mm) with irregularly shaped vesicles are sparsely observed. The vesicles at places, mainly lined with brown clay followed by oxyhydroxide at places.

Alteration

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
background	13	25	light brown clay	2	brown clay	2	brown clay	10	brown clay and FeOH		

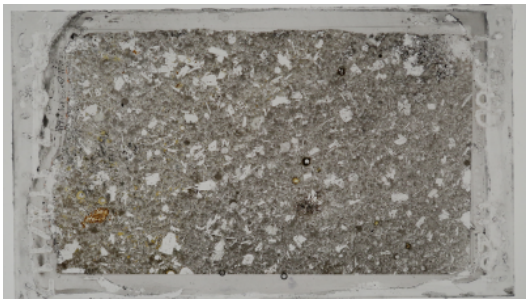
THIN SECTION LABEL ID: **393-U1558D-5R-2-W 114/117-TSB-TS 123** Thin section no.: 123

Observer: MJ, EA Piece no.: 7

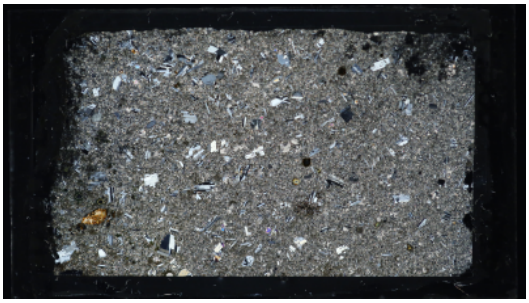
Total number of domains: 1 Unit/subunit:

Thin section summary: Plagioclase-olivine-pyroxene phyric basalt pillow lava flow with a microcrystalline intergranular groundmass with phenocrysts of plagioclase, olivine and minor clinopyroxene. Alteration intensity is moderate, with brown and yellow clay + FeOH + carbonate (replacing Ol phenocrysts) as alteration products.

Plane-polarized: 63495351



Cross-polarized: 63495371



No. of photomicrographs in database: 11

Igneous Petrology

Lithology: **plagioclase-olivine-pyroxene phyric basalt pillow lava flow**

Style of emplacement: pillow lava flow

Domain number (if >1): **1**

Igneous domain type: flow interior

Domain relative abundance (%): 100

Major groundmass texture: intergranular

Groundmass grain size (avg): microcrystalline

Phenocrysts	Original (%)	Size MODE (mm)	Shape	Habit	Comments
Olivine	2	0.1	subhedral	subequant	Subhedral olivines phenocrysts (0.4-0.6mm) closely associated with plagioclase phenocrysts. Minor alteration along cracks.
Plagioclase	5	0.6	euhedral	elongate	Fresh laths of plagioclase (1.4mm) in size often occur as glomerocrysts. Few grains display sieve textures. The laths are partially enclosed by pyroxenes imparting a sub-ophitic texture. Laths of plagioclase enclosing groundmass grains are observed at places defining the intergranular texture.
Clinopyroxene	1	0.2	subhedral	equant	Fresh subhedral clinopyroxene phenocrysts (0.6mm) associated with olivine and plagioclase laths. Low order interference colors are commonly observed. Probably pyroxene phenocryst completely altered to oxyhydroxide

Groundmass	Original (%)	Comment
Groundmass	91	Under the microscope the rock is microcrystalline exhibiting variolitic texture with phenocrysts of plagioclase and minor olivine. The phenocrysts of plagioclase form glomerocrysts with intergranular textures enclosing the groundmass.

Vesicle	Original (%)	Size Mode (mm)	Shape	Comments
Vesicle	1	0.2	round	Vesicles are small, round (max size. 0.4 mm) mostly unfilled. Irregularly shaped vesicles are sparsely observed. The vesicles at places, mainly lined with yellow clay. Some vesicles are filled with yellow clay followed by red oxyhydroxide at places and by carbonate material at other places.

Alteration

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
background	18	80	carbonate + FeOH	2	brown clay	2	brown clay	12	brown clay and FeOH, also some carbonate and yellow clay		

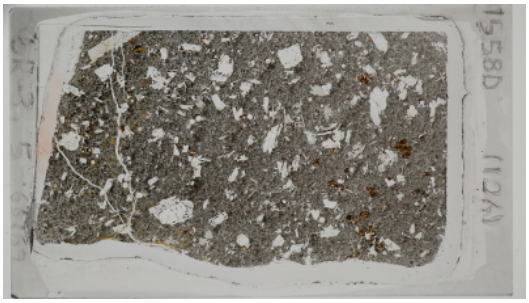
THIN SECTION LABEL ID: **393-U1558D-6R-3-W 66/69-TSB-TS 126** Thin section no.: 126

Observer: MJ, EA Piece no.: 5

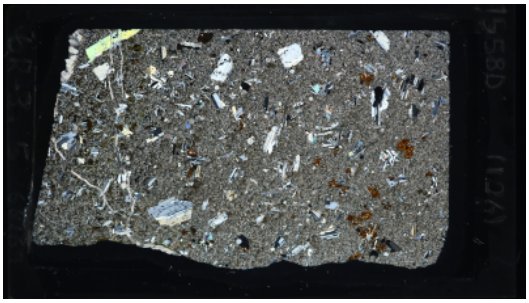
Total number of domains: 1 Unit/subunit:

Thin section summary: Plagioclase-olivine-pyroxene-phyric basaltic pillow lava flow with a microcrystalline intergranular groundmass. Alteration to red oxyhyroxide often associated with yellow clay. Calcite veins are observed running through the groundmass as well as crosscutting the clinopyroxene phenocryst., Alteration intensity is moderate (patchy background) to slightly more intense (two halo types), with brown and yellow clay (in halos) clay + FeOH as alteration products; Ol phenocrysts replaced by orange-brown clay + FeOH throughout TS. Carbonate vein crosscuts TS.

Plane-polarized: 63522541



Cross-polarized: 63522561



No. of photomicrographs in database: 19

Igneous Petrology

Lithology: plagioclase-olivine-augite phyric basalt pillow lava flow **Style of emplacement:** pillow lava flow

Domain number (if >1): 1

Igneous domain type: flow interior **Domain relative abundance (%):** 100

Major groundmass texture: intergranular **Groundmass grain size (avg):** microcrystalline

Phenocrysts	Original (%)	Size MODE (mm)	Shape	Habit	Comments
Olivine	0.5	0.2	subhedral	subequant	Subhedral fresh olivine phenocrysts (0.6mm) often associated with plagioclase and clinopyroxene phenocrysts. Minor alteration along cracks in observed in fresh grains. Bigger olivine's are seen to be pseudo morphically replaced by calcite with typical rhomb shaped cleavage.
Plagioclase	5	0.2	euhedral	elongate	Fresh laths of plagioclase (upto 2mm) phenocrysts are sparse and display sieve texture. Smaller plagioclase mostly 1mm in size often occur as glomerocrysts, enclose olivine grains defining the intergranular texture. Plagioclase laths partially enclosing olivine grains are observed giving rise to sub-ophitic texture
Clinopyroxene	0.5	0.2	subhedral	equant	Fresh subhedral clinopyroxene phenocrysts (0.6mm) seen associated with olivine and plagioclase phenocrysts occasionally. Low order interference colors are commonly observed.

Groundmass	Original (%)	Comment
Groundmass	93.5	Under the microscope the rock is microcrystalline with phenocrysts of plagioclase, olivine and clinopyroxene. The groundmass shows several patches where the original minerals are altered to red oxyhyroxide often associated with yellow clay. Calcite veins are observed running through the groundmass as well as crosscutting the clinopyroxene phenocryst.

Vesicle	Original (%)	Size Mode (mm)	Shape	Comments
Vesicle	0.5	0.1	round	Vesicles are small, round (max size. 0.6 mm) mostly filled with calcite or lined with yellow clay. Unfilled irregular vesicles are sparse. Most vesicles are completely filed with either yellow clay or calcite. Vesicles lined with yellow clay with the center filed with calcite and/or red oxyhydroxide is also observed.

Alteration

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
background	17										

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
vein halo-dark grey	24										

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
vein halo-brown	29										

Veins

Vein width (mm)	Vein fill sequence (rim to center)	Vein comments	Halo comments
0.15			

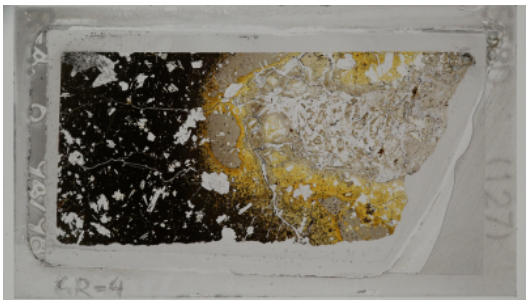
THIN SECTION LABEL ID: **393-U1558D-6R-4-W 94/98-TSB-TS 127** Thin section no.: 127

Observer: TB, EA Piece no.: 6

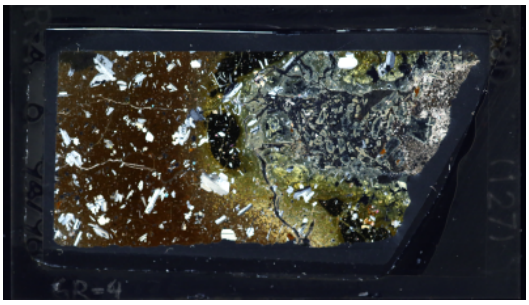
Total number of domains: 4 Unit/subunit:

Thin section summary: The thin section represents four domains viz. glassy basalt pillow lava flow showing glassy margin of yellow isotropic yellow glass to variolitic transition with microcrysts of olivine and plagioclase. Domain 2 consists of plagioclase-olivine-pyroxene phyric basalt pillow lava flow with sparse plagioclase laths set in an almost entirely-clay-altered matrix of plumose cpx pseudomorphs, some fresher cpx away from the margin. Hyaloclastite Breccia matrix with clasts of totally clay altered glass in a possibly zeolite matrix. Late calcite fills void space between clasts can be observed in Domain 3 followed by 20-40%, 50-100 micron calcite grains in variably Fe-Ox stained zeolite (?) matrix. No trace of fossils, calcite appears to recrystallized, Alteration intensity is high with yellow and brown clay + FeOH (in glassy margin) and mainly brown clay + FeOH (in chilled margin) as alteration products. Ol mostly replaced by brown clay + FeOH.

Plane-polarized: 63522581



Cross-polarized: 63522601



No. of photomicrographs in database: 18

Igneous Petrology

Lithology: **plagioclase-olivine-pyroxene phyric basalt pillow lava flow**

Style of emplacement: pillow lava flow

Domain number (if >1): **1**

Igneous domain type: flow interior

Domain relative abundance (%): 40

Major groundmass texture: intergranular

Groundmass grain size (avg): cryptocrystalline

Phenocrysts	Original (%)	Size MODE (mm)	Shape	Habit	Comments
Olivine	2	0.3	euhedral	equant	All completely altered to clay, estimates from pseudomorphs
Plagioclase	5	1	euhedral	elongate	Fresh laths and glomercrysts of plag with other plag crystals, olivine pseudomorphs, and locally with interstitial cpx.
Clinopyroxene	0.5	0.2	subhedral	glomeroporphyritic	Glomerocrystic with plagioclase, subhedral interstitial fill or euhedral floating in the matrix or attached to side of plag.

Groundmass	Original (%)	Comment
Groundmass	90.5	Sparse plagioclase laths set in an almost entirely-clay-altered matrix of plumose cpx pseudomorphs, some fresher cpx away from the margin.

Vesicle	Original (%)	Size Mode (mm)	Shape	Comments
Vesicle	2	0.2	round	Mostly filled with 10-30 micron-sized low interference grainy mineral, probably zeolite

Lithology: glassy basalt pillow lava flow **Style of emplacement:** pillow lava flow

Domain number (if >1): 2

Igneous domain type: glassy margin **Domain relative abundance (%):** 30

Major groundmass texture: variolitic **Groundmass grain size (avg):** glass

Phenocrysts	Original (%)	Size MODE (mm)	Shape	Habit	Comments
Olivine	1	0.1	euhedral	equant	
Plagioclase	3	0.5			
Clinopyroxene	1	0.3	euhedral	equant	Fresh cpx floating in glass

Groundmass	Original (%)	Comment
Groundmass	92	Variolitic transition to glassy gorundmass

Vesicle	Original (%)	Size Mode (mm)	Shape	Comments
Vesicle	3	0.3	round	

Lithology: hyaloclastite **Style of emplacement:**

Domain number (if >1): 3

Igneous domain type: breccia matrix **Domain relative abundance (%):** 25

Major groundmass texture: **Groundmass grain size (avg):**

Lithology: sediment inter-flow sediment **Style of emplacement:** inter-flow sediment

Domain number (if >1): 4

Igneous domain type: **Domain relative abundance (%):** 5

Major groundmass texture: **Groundmass grain size (avg):**

Alteration

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
	80	85	brown clay + FeOH	10	light brown clay	85	brown clay			75	yellow-orange clay

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
background	67							50	brown clay + FeOH, minor yellow-orange clay		

THIN SECTION LABEL ID: **393-U1558D-7R-6-W 66/69-TSB-TS 128** Thin section no.: 128

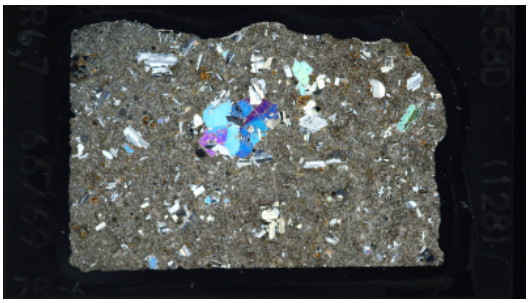
Observer: TB, EA Piece no.: 7

Total number of domains: 1 Unit/subunit:

Thin section summary: Plagioclase-olivine phyric basalt pillow lava flow. Alteration intensity is slightly patchy but overall moderate with brown clay + FeOH + minor yellow clay as alteration products. Carbonate vein present at rim of TS.

Plane-polarized: 63522621

Cross-polarized: 63522641



No. of photomicrographs in database: 9

Igneous Petrology

Lithology: **plagioclase-olivine phyric basalt pillow lava flow** **Style of emplacement:** pillow lava flow

Domain number (if >1): **1**

Igneous domain type: flow interior **Domain relative abundance (%):** 100

Major groundmass texture: **Groundmass grain size (avg):**

Phenocrysts	Original (%)	Size MODE (mm)	Shape	Habit	Comments
Olivine	1	0.5	Euhedral	equant	Almost all completely altered, one has relict core
Plagioclase	4	1.5	euhedral	elongate	
Clinopyroxene	4	1	euhedral	subequant	One 1 cm wide cpx glomercryst, of the distinctive type that characterizes Unit 1-2. Large cpx encloses equant plag in ophitic texture. Many smaller isolated and plag-ol attached cpx phenocrysts 0.2-3 mm.

Groundmass	Original (%)	Comment
Groundmass	91	

Alteration

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
	35	95	brown clay + FeOH					20	brown clay + FeOH, some yellow clay		

Veins

Vein width (mm)	Vein fill sequence (rim to center)	Vein comments	Halo comments
	yellow clay - carbonate - brown clay/FeOH	part of vein towards rim of TS	

THIN SECTION LABEL ID: **393-U1558D-9R-1-W 6/10-TSB-TS 129** Thin section no.: 129

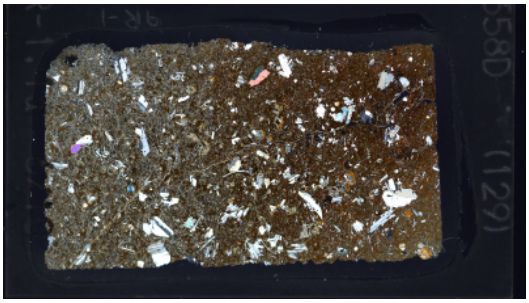
Observer: TB, EA Piece no.: 1

Total number of domains: 1 Unit/subunit:

Thin section summary: Plagioclase-olivine-pyroxene phyric basalt pillow lava flow. , Alteration style is patchy to variolitic, intensity is high with brown clay + FeOH as dominant alteration products; Pl appears unaltered. Crosscutting vein has variable filling of brown clay + FeOH + carbonate.

Plane-polarized: 63522741

Cross-polarized: 63522761



No. of photomicrographs in database: 13

Igneous Petrology

Lithology: **plagioclase-olivine-pyroxene phyric basalt pillow lava flow**

Style of emplacement: pillow lava flow

Domain number (if >1): **1**

Igneous domain type: flow interior

Domain relative abundance (%): 100

Major groundmass texture:

Groundmass grain size (avg):

Phenocrysts	Original (%)	Size MODE (mm)	Shape	Habit	Comments
Olivine	3	0.6	Euhedral	equant	Completely clay altered
Plagioclase	6	0.6	euhedral	elongate	
Clinopyroxene	1	0.3	subhedral	subequant	Almost all with rounded, partially resorbed corners.

Groundmass	Original (%)	Comment
Groundmass	90	

Alteration

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
background	65										

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
background	53										

Veins

Vein width (mm)	Vein fill sequence (rim to center)	Vein comments	Halo comments
0.07	clay/FeOH - carbonate	composition changes along vein - generally clay + FeOH as lining, carbonate in center; vein has much void space - broke apart during TS preparation?	

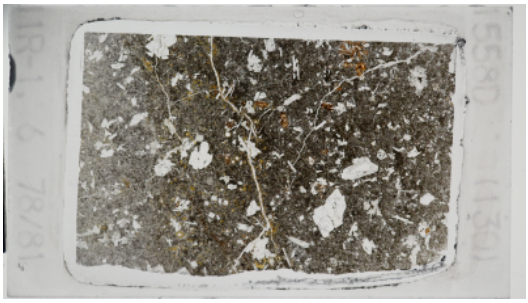
THIN SECTION LABEL ID: **393-U1558D-11R-1-W 78/81-TSB-TS 130** Thin section no.: 130

Observer: TB, EA Piece no.: 6

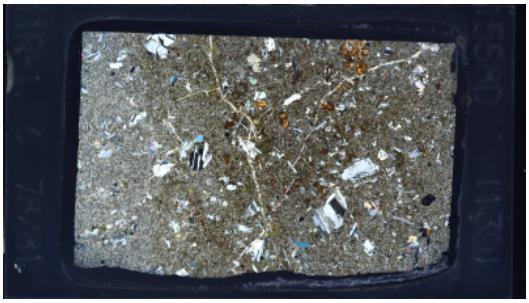
Total number of domains: 1 Unit/subunit:

Thin section summary: Plagioclase-olivine-pyroxene phyric basalt pillow lava flow. , Alteration intensity is moderate (background) to moderate-high (two halo types), with brown and yellow clay + FeOH + minor carbonate (replacing Ol) as alteration products. Crosscutting vein has variable filling of carbonate + minor brown and yellow clay + FeOH.

Plane-polarized: 63675671



Cross-polarized: 63675691



No. of photomicrographs in database: 15

Igneous Petrology

Lithology: plagioclase-pyroxene-olivine phyric basalt pillow lava flow

Style of emplacement: pillow lava flow

Domain number (if >1): 1

Igneous domain type: flow interior

Domain relative abundance (%): 100

Major groundmass texture:

Groundmass grain size (avg):

Alteration

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
background	20										

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
vein halo-grey	35										

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
vein halo-brown	58										

Veins

Vein width (mm)	Vein fill sequence (rim to center)	Vein comments	Halo comments
0.2	yellow clay - carbonate - brown clay/FeOH - carbonate	composition changes along vein - generally yellow clay as lining, overgrown by 2 generations of carbonate separated by brown clay + FeOH	

THIN SECTION LABEL ID: **393-U1558D-11R-4-W 29/31-TSB-TS 131** Thin section no.: 131

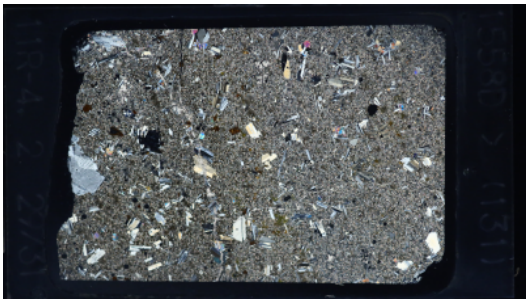
Observer: TB, EA Piece no.: 2

Total number of domains: 1 Unit/subunit:

Thin section summary: Plagioclase-olivine-pyroxene phyric basalt pillow lava flow. , Alteration style is in parts patchy, intensity is moderate with stronger alteration in patchy parts, with brown and yellow clay + FeOH + minor carbonate (replacing Ol?) as alteration products. Crosscutting vein has variable filling of carbonate + minor yellow clay + FeOH.

Plane-polarized: 63675711

Cross-polarized: 63675731



No. of photomicrographs in database: 6

Igneous Petrology

Lithology: plagioclase-olivine-pyroxene phyric basalt pillow lava flow

Style of emplacement: pillow lava flow

Domain number (if >1): 1

Igneous domain type: flow interior

Domain relative abundance (%): 100

Major groundmass texture:

Groundmass grain size (avg):

Alteration

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
background	29										

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
background	49										

Veins

Vein width (mm)	Vein fill sequence (rim to center)	Vein comments	Halo comments
0.08	clay/FeOH - carbonate	composition changes along vein, with local lining of FeOH or yellow clay (less common)	

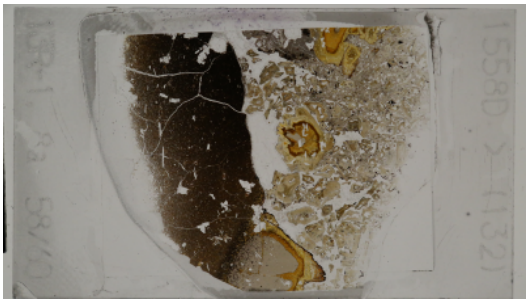
THIN SECTION LABEL ID: **393-U1558D-13R-1-W 58/60-TSB-TS 132** Thin section no.: 132

Observer: MJ, EA Piece no.: 8

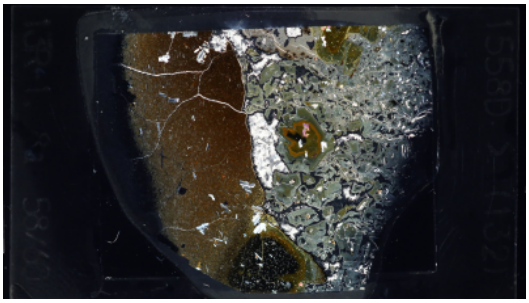
Total number of domains: 1 Unit/subunit:

Thin section summary: Plagioclase-olivine phyric basalt pillow lava flow, cryptocrystalline, variolitic, scattered ovoid brown varioles isolated in glassy groundmass with thin rim of fibrous anisotropic minerals. Groundmass texture changes from glomeroporphyritic to intersertal and intergranular as we move away from the variolitic chilled margin. Glassy margin highly altered to brown and yellow clay + FeOH; glassy breccia clasts nearly completely altered to light brown and yellow clay + FeOH, often with concentric alteration and local FeOH linings. Matrix is mostly recrystallized carbonaceous sediment; cement consists of zeolites, with open space filled with carbonate.

Plane-polarized: 63718191



Cross-polarized: 63718211



No. of photomicrographs in database: 5

Igneous Petrology

Lithology: **plagioclase-olivine phyric basalt pillow lava flow** **Style of emplacement:** pillow lava flow

Domain number (if >1): **1**

Igneous domain type: chilled margin **Domain relative abundance (%):** 20

Major groundmass texture: variolitic **Groundmass grain size (avg):** cryptocrystalline

Phenocrysts	Original (%)	Size MODE (mm)	Shape	Habit	Comments
Olivine	0.5	0.1	euhedral	equant	Fresh ol microlites upto (0.2mm), some altered along grain boundaries.
Plagioclase	1	1	euhedral	equant	Plagioclase crystals (upto 3mm) often form glomerocrysts and are associated with olivine.

Groundmass	Original (%)	Comment
Groundmass	98.5	Scattered ovoid brown varioles isolated in glassy groundmass with thin rim of fibrous anisotropic minerals.

Lithology: **plagioclase-olivine phyric basalt pillow lava flow** **Style of emplacement:** pillow lava flow

Domain number (if >1): **2**

Igneous domain type: flow interior **Domain relative abundance (%):** 20

Major groundmass texture: intersertal **Groundmass grain size (avg):** cryptocrystalline

Phenocrysts	Original (%)	Size MODE (mm)	Shape	Habit	Comments
Plagioclase	5	0.15	euhedral	equant	Plagioclase phenocrysts (upto 4mm) often forming glomerocrysts.

Groundmass	Original (%)	Comment
Groundmass	95	Groundmass texture changes from glomeroporphyritic to intersertal and intergranular as we move away from the variolitic chilled margin.

Alteration

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
other halo-orange	58	100	brown clay + FeOH	5	brown clay			60	brown clay + FeOH (very fine grained)	35	yellow/brown clay + FeOH

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
	90	95	brown clay + FeOH + carbonate	10	yellow clay + palagonite			50	brown clay + FeOH (very fine grained)	95	yellow/brown clay + FeOH

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
	100										

Veins

Vein width (mm)	Vein fill sequence (rim to center)	Vein comments	Halo comments
0.1	clay/FeOH - carbonate - clay/FeOH	brown clay + FeOH locally as lining and locally (also) in center of vein	

THIN SECTION LABEL ID: **393-U1558D-14R-2-W 80/83-TSB-TS 133** Thin section no.: 133

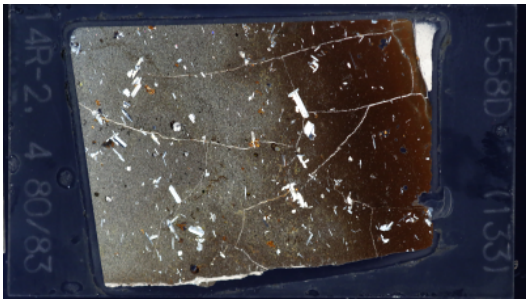
Observer: TB, EA Piece no.: 4

Total number of domains: 1 Unit/subunit:

Thin section summary: Plagioclase-olivine-pyroxene phyric basalt pillow lava flow with a cryptocrystalline groundmass. Alteration intensity is moderate (background) to high (chilled margin), with mainly brown clay and FeOH as alteration products. Veins dominantly filled with carbonate and zeolites.

Plane-polarized: 63675751

Cross-polarized: 63675781



No. of photomicrographs in database: 2

Igneous Petrology

Lithology: **plagioclase-olivine-pyroxene phyric basalt pillow lava flow**

Style of emplacement: pillow lava flow

Domain number (if >1): **1**

Igneous domain type: flow interior

Domain relative abundance (%): 100

Major groundmass texture:

Groundmass grain size (avg): cryptocrystalline

Alteration

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
other halo-orange	90	100	brown clay + FeOH					65	brown clay + FeOH		

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
other halo-orange	57	80	brown clay + FeOH, locally yellow-orange clay					50	brown clay + FeOH, locally yellow-orange clay		

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
background	28							40			

Veins

Vein width (mm)	Vein fill sequence (rim to center)	Vein comments	Halo comments
0.1		fill is carbonate, colorless phase with gray interference color (zeolite?), brown clay and FeOH; some yellow-orange clay as lining towards groundmass-side of TS	

Vein width (mm)	Vein fill sequence (rim to center)	Vein comments	Halo comments
3		metamorphosed sediment vein towards edge of TS	

Veins

Vein width (mm)	Vein fill sequence (rim to center)	Vein comments	Halo comments
0.1		fill is carbonate, colorless phase with gray interference color (zeolite?), brown clay and FeOH; some yellow-orange clay as lining towards groundmass-side of TS	

Vein width (mm)	Vein fill sequence (rim to center)	Vein comments	Halo comments
3		metamorphosed sediment vein towards edge of TS	

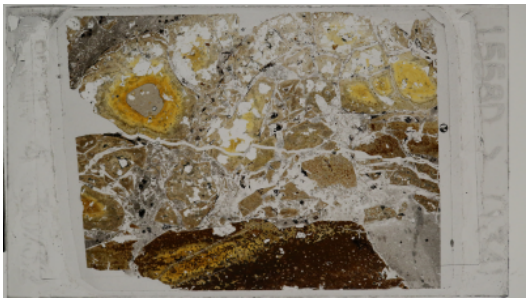
THIN SECTION LABEL ID: **393-U1558D-15R-1-W 30/32-TSB-TS 134** Thin section no.: 134

Observer: EA Piece no.: 4

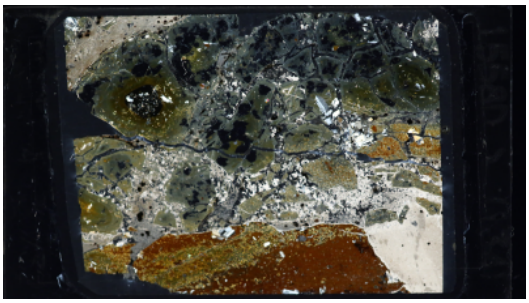
Total number of domains: Unit/subunit:

Thin section summary: Breccia clasts highly altered, glass to yellow clay with concentric alteration, groundmass fragments to brown clay + FeOH. Matrix composed of recrystallized carbonaceous sediment; cement consists of zeolites, with open space filled with carbonate.

Plane-polarized: 63718231



Cross-polarized: 63718251



No. of photomicrographs in database: 3

Igneous Petrology

Lithology: **plagioclase phyric basalt pillow lava flow** **Style of emplacement:** pillow lava flow

Domain number (if >1): **1**

Igneous domain type: chilled margin **Domain relative abundance (%):** 20

Major groundmass texture: variolitic **Groundmass grain size (avg):** cryptocrystalline

Phenocrysts	Original (%)	Size MODE (mm)	Shape	Habit	Comments
Plagioclase	0.2	1	euhedral	equant	Plagioclase crystals (upto 1.5mm) often form glomerocrysts.

Groundmass	Original (%)	Comment
Groundmass	99.79	Scattered ovoid brown varioles isolated in glassy groundmass with thin rim of fibrous anisotropic minerals.

Vesicle	Original (%)	Size Mode (mm)	Shape	Comments
Vesicle	0.01	0.1	irregular	0.1mm sized vesicles lined with

Alteration

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
	83	95	brown clay + FeOH	10	brown clay + minor FeOH			70	brown clay + FeOH	100	yellow/brown clay + FeOH

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
	100										

Veins

Vein width (mm)	Vein fill sequence (rim to center)	Vein comments	Halo comments
		minute veins crosscutting breccia clasts, mostly filled with colorless material with 1st order interference colors - probably zeolite	

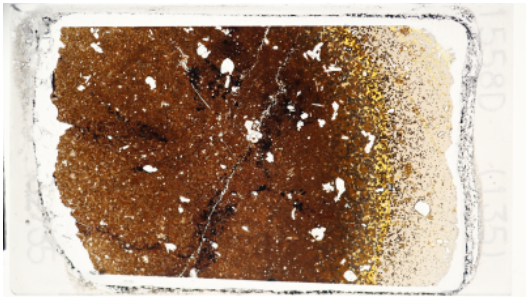
THIN SECTION LABEL ID: **393-U1558D-15R-3-W 32/35-TSB-TS 135** Thin section no.: 135

Observer: TB, EA Piece no.: 6

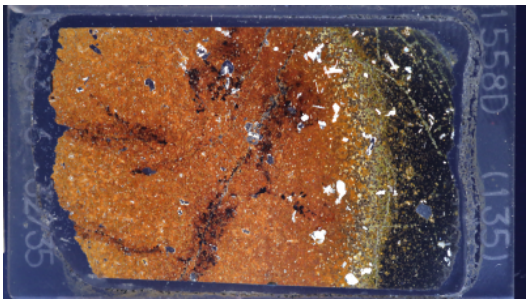
Total number of domains: 1 Unit/subunit:

Thin section summary: Glassy basalt pillow lava flow. Glassy margin is moderately altered to yellow clay + FeOH, alteration intensity in remaining TS is high, with brown and minor yellow clay + FeOH as alteration products. Ol replaced by orange-brown clay + FeOH.

Plane-polarized: 63675801



Cross-polarized: 63675821



No. of photomicrographs in database: 8

Igneous Petrology

Lithology: **glassy basalt pillow lava flow** **Style of emplacement:** pillow lava flow

Domain number (if >1): **2**

Igneous domain type: glassy margin **Domain relative abundance (%):** 15

Major groundmass texture: **Groundmass grain size (avg):**

Alteration

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
	28									30	yellow/brown clay + FeOH

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
other halo-orange	59	100	brown clay + FeOH					50	brown clay + FeOH (very fine grained)		

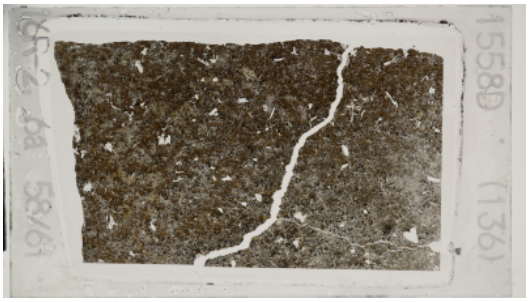
Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
other halo-orange	58	100	brown clay + FeOH					40	brown clay + FeOH (very fine grained) + yellow clay		

Veins

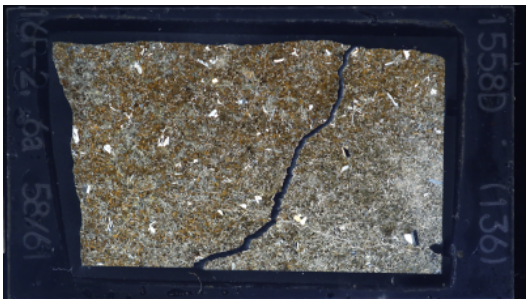
Vein width (mm)	Vein fill sequence (rim to center)	Vein comments	Halo comments
0.05	clay/FeOH - zeolite(??)	brown clay + FeOH as lining, colorless material with 1st order interference colors as fill (zeolite? could possibly also be epoxy)	

THIN SECTION LABEL ID:	**393-U1558D-16R-2-W 58/61-TSB-TS 136**	Thin section no.:	136
Observer:	TB	Piece no.:	6
Total number of domains:	1	Unit/subunit:	
Thin section summary:	Plagioclase phyric basalt pillow lava flow, fine-grained, intergranular, dominated by plag laths up to 1mm long. Alteration intensity is high, with light brown to brown (transition across TS) clay + FeOH as alteration products. Carbonate vein crosscuts TS.		

Plane-polarized: 63675841



Cross-polarized: 63675861



No. of photomicrographs in database: 3

Igneous Petrology

Lithology:	**plagioclase phyric basalt pillow lava flow**	**Style of emplacement:**	pillow lava flow
Domain number (if >1):	**1**		
Igneous domain type:	flow interior	**Domain relative abundance (%):**	100
Major groundmass texture:	intergranular	**Groundmass grain size (avg):**	fine-grained

Alteration

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
	67	80	brown clay + FeOH					70	light to dark brown clay + FeOH		

Veins

Vein width (mm)	Vein fill sequence (rim to center)	Vein comments	Halo comments
0.05			

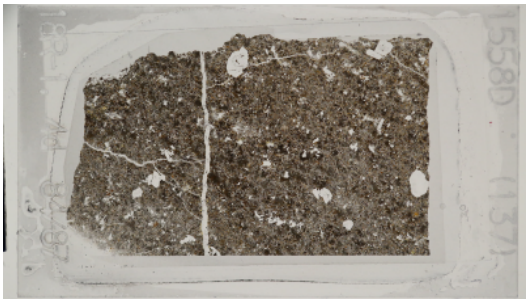
THIN SECTION LABEL ID: **393-U1558D-18R-1-W 84/87-TSB-TS 137** Thin section no.: 137

Observer: TB, EA Piece no.: 4

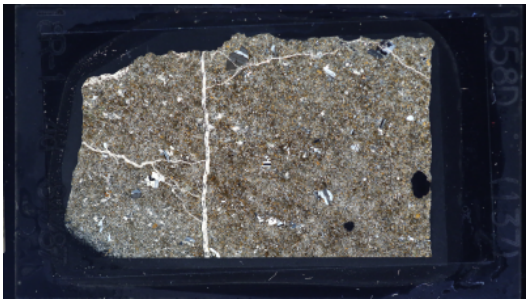
Total number of domains: 1 Unit/subunit:

Thin section summary: Plagioclase phyric basalt pillow lava flow, fine-grained, intergranular, dominated by plag laths up to 1mm long. Alteration intensity is high in background and halo, with brown and yellow (in halo) clay + FeOH + carbonate (locally replacing Ol) as alteration products. Crosscutting crack-seal vein mainly composed of carbonate.

Plane-polarized: 63675881



Cross-polarized: 63675901



No. of photomicrographs in database: 16

Igneous Petrology

Lithology:	**plagioclase phyric basalt pillow lava flow**	**Style of emplacement:**	pillow lava flow
Domain number (if >1):	**1**		
Igneous domain type:	flow interior	**Domain relative abundance (%):**	100
Major groundmass texture:	intergranular	**Groundmass grain size (avg):**	fine-grained

Alteration

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
background	68	100	brown clay + FeOH or carbonate					70	brown clay + FeOH, locally carbonate		

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
other halo-dark grey	71	100	brown clay + FeOH or carbonate					70	brown clay + FeOH, some yellow clay, locally carbonate		

Veins

Vein width (mm)	Vein fill sequence (rim to center)	Vein comments	Halo comments
0.3	yellow clay - carbonate - brown clay/FeOH	wider branch locally shows full sequence of yellow clay - carbonate - brown clay/FeOH; narrower branches oftentimes without yellow clay	

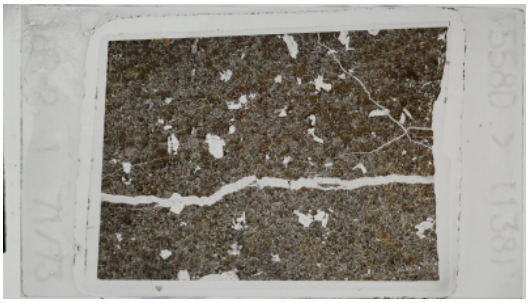
THIN SECTION LABEL ID: **393-U1558D-18R-2-W 71/73-TSB-TS 138** Thin section no.: 138

Observer: MJ, EA Piece no.: 1

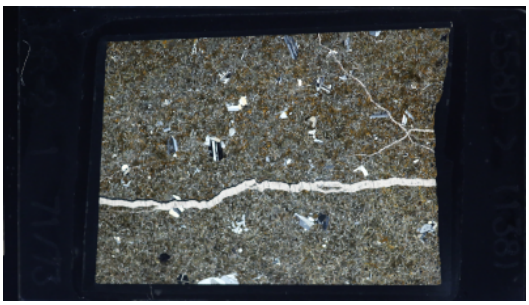
Total number of domains: 1 Unit/subunit:

Thin section summary: Plagioclase phyric basalt pillow lava flow with an altered groundmass, fine-grained with plag phenocrysts upto 2mm long. Seriate plagioclase laths are observed forming glomerocrysts and intergranular textures. Alteration style is patchy with moderate intensity, with brown and orange-brown clay + FeOH + mica(?) as alteration products. Ol replaced by mica(?). Veins have cross fiber texture and are composed of carbonate.

Plane-polarized: 63716541



Cross-polarized: 63716561



No. of photomicrographs in database: 0

Igneous Petrology

Lithology: plagioclase phyric basalt pillow lava flow **Style of emplacement:** pillow lava flow

Domain number (if >1): 1

Igneous domain type: flow interior **Domain relative abundance (%):** 100

Major groundmass texture: fibrous **Groundmass grain size (avg):** fine-grained

Phenocrysts	Original (%)	Size MODE (mm)	Shape	Habit	Comments
Plagioclase	2	1	euhedral	equant	Laths of plagioclase (2mm) forming glomerocrysts. Carbonate veins cross-cutting the phenocrysts are observed at places.

Groundmass	Original (%)	Comment
Groundmass	97.9	Under the microscope the groundmass is altered, fine-grained with phenocrysts of plagioclase upto 2mm long. The plagioclase form glomerocrysts and intergranular textures. Seriate plagioclase laths are observed.

Vesicle	Original (%)	Size Mode (mm)	Shape	Comments
Vesicle	0.1	0.2	round	Vesicles are small, round (max size. 0.6 mm) mainly lined with yellow and bluish clay aces.

Alteration

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
vein halo-brown	42										

Veins

Vein width (mm)	Vein fill sequence (rim to center)	Vein comments	Halo comments
1.5		several cross fiber carbonate veins, in parts with crosscutting relationships	

Veins

Vein width (mm)	Vein fill sequence (rim to center)	Vein comments	Halo comments
1.5		several cross fiber carbonate veins, in parts with crosscutting relationships	

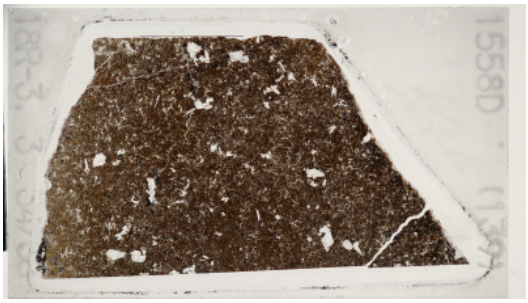
THIN SECTION LABEL ID: **393-U1558D-18R-3-W 34/38-TSB-TS 139** Thin section no.: 139

Observer: MJ, EA Piece no.: 3

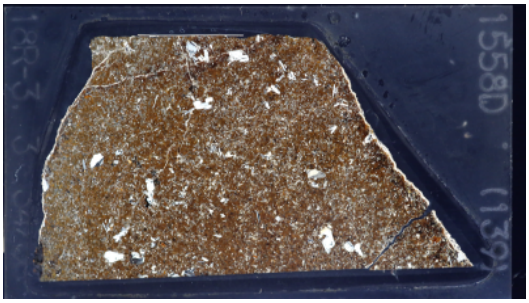
Total number of domains: 1 Unit/subunit:

Thin section summary: Plagioclase phyric basalt pillow lava flow with groundmass consisting of brown clay, phenocrysts locally cross-cut by carbonate. Alteration intensity is high, with brown clay + FeOH as alteration products; Ol replaced by brown clay + FeOH or carbonate. Crosscutting veins composed of carbonate with local clay lining.

Plane-polarized: 63675921



Cross-polarized: 63675941



No. of photomicrographs in database: 0

Igneous Petrology

Lithology: plagioclase phyric basalt pillow lava flow **Style of emplacement:** pillow lava flow

Domain number (if >1): 1

Igneous domain type: flow interior **Domain relative abundance (%):** 100

Major groundmass texture: fibrous **Groundmass grain size (avg):** fine-grained

Phenocrysts	Original (%)	Size MODE (mm)	Shape	Habit	Comments
Plagioclase	2	0.4	euhedral	equant	Phenocyrsts of plagioclase (1.2mm) forming glomerocrysts at places. Plag Phenocrysts are embayed along grain boundaries and intensely cracked when near veins.

Groundmass	Original (%)	Comment
Groundmass	97.95	The groundmass consists of brown clay, phenocrysts locally cross-cut by carbonate

Vesicle	Original (%)	Size Mode (mm)	Shape	Comments
Vesicle	0.05	0.1	round	Vesicles are small, round (max size. 0.2 mm) mainly empty, at times filled with carbonate.

Alteration

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
background	64	100	brown clay + FeOH, locally yellow-orange clay and/or carbonate	15	brown clay, phenocrysts locally by carbonate			60	brown clay + FeOH (very fine grained)		

Veins

Vein width (mm)	Vein fill sequence (rim to center)	Vein comments	Halo comments
0.05	FeOH - carbonate	FeOH in places as lining	

Vein width (mm)	Vein fill sequence (rim to center)	Vein comments	Halo comments
0.08	carbonate - clay/FeOH	carbonate towards host rock, clay + FeOH in center; locally with yellow clay as lining	

Veins

Vein width (mm)	Vein fill sequence (rim to center)	Vein comments	Halo comments
0.05	FeOH - carbonate	FeOH in places as lining	

Vein width (mm)	Vein fill sequence (rim to center)	Vein comments	Halo comments
0.08	carbonate - clay/FeOH	carbonate towards host rock, clay + FeOH in center; locally with yellow clay as lining	

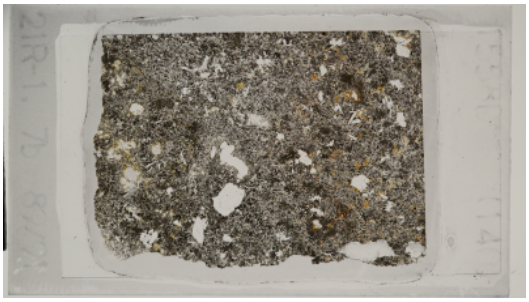
THIN SECTION LABEL ID: **393-U1558D-21R-1-W 89/92-TSB-TS 140** Thin section no.: 140

Observer: MJ, EA Piece no.: 7

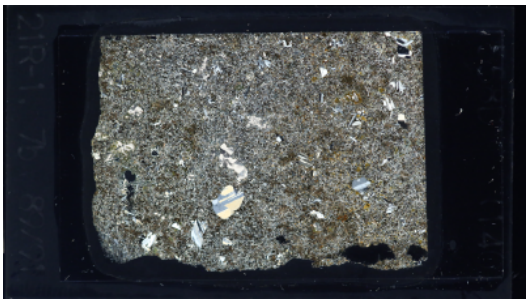
Total number of domains: 1 Unit/subunit:

Thin section summary: Plagioclase phyric basalt pillow lava flow. Alteration is partly spotty, alteration intensity moderate to high (in spotty domain and halo), with brown and yellow (in spotty domain and halo) + FeOH as alteration products. Vugs filled by carbonate with minor clay lining.

Plane-polarized: 63675961



Cross-polarized: 63675981



No. of photomicrographs in database: 2

Igneous Petrology

Lithology: **plagioclase phyric basalt pillow lava flow** **Style of emplacement:** pillow lava flow

Domain number (if >1): **1**

Igneous domain type: flow interior **Domain relative abundance (%):** 100

Major groundmass texture: intergranular **Groundmass grain size (avg):**

Phenocrysts	Original (%)	Size MODE (mm)	Shape	Habit	Comments
Plagioclase	2	0.6	euhedral	equant	Fresh plagioclase equant as well as lath shaped grains (max 1.6 mm size) forming glomerocrysts set in a finer groundmass of plagioclase and possibly clinopyroxene grains. Intergranular texture is commonly observed at places.

Groundmass	Original (%)	Comment
Groundmass	97.9	Under the microscope the groundmass shows

Vesicle	Original (%)	Size Mode (mm)	Shape	Comments
Vesicle	0.1	0.1	round	Vesicles are small, round and lined with yellow or grey clay?

Alteration

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
background	41										

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
background	63										

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
vein halo-dark grey	53										

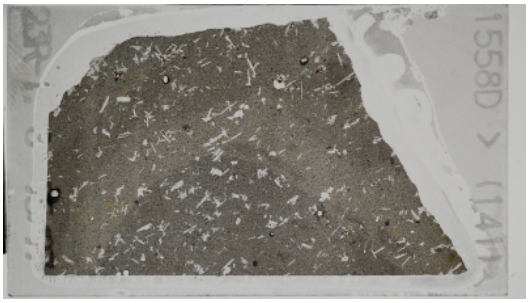
THIN SECTION LABEL ID: **393-U1558D-23R-1-W 95/97-TSB-TS 141** Thin section no.: 141

Observer: MJ, EA Piece no.: 8

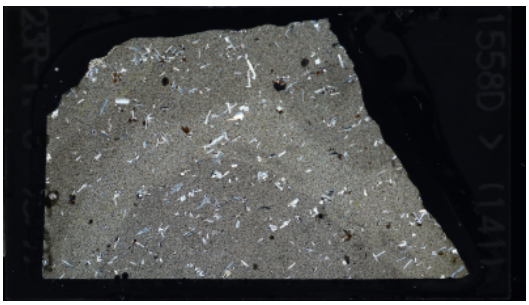
Total number of domains: 1 Unit/subunit:

Thin section summary: Plagioclase-olivine phyric basalt sheet lava flow, microcrystalline. The plagioclase in groundmass enclose olivine grains defining sub-ophitic textures along with intergranular textures. Alteration intensity is moderate (background) to slightly higher (two halo types), with brown clay + FeOH as alteration products; some Ol phenocrysts replaced by carbonate.

Plane-polarized: 63718111



Cross-polarized: 63718131



No. of photomicrographs in database: 0

Igneous Petrology

Lithology: **plagioclase-olivine phyric basalt sheet lava flow** **Style of emplacement:** sheet lava flow

Domain number (if >1): **1**

Igneous domain type: flow interior **Domain relative abundance (%):** 100

Major groundmass texture: intergranular **Groundmass grain size (avg):** microcrystalline

Phenocrysts	Original (%)	Size MODE (mm)	Shape	Habit	Comments
Olivine	0.1	0.2	subhedral	equant	Subhedral olivine phenocrysts (0.6mm max). Minimum alteration observed along cracks. Some euhedral grains are completely altered to oxyhydroxide.
Plagioclase	5	0.4	euhedral	elongate	Fresh plagioclase equant as well as lath shaped grains (max 2.4 mm size) forming glomerocrysts set in a finer groundmass of plagioclase and olivine grains showing intergranular texture.

Groundmass	Original (%)	Comment
Groundmass	94.8	Under the microscope the rock is moderately fresh, microcrystalline with phenocrysts of plagioclase and olivine. The plagioclase in groundmass enclose olivine grains defining sub-ophitic textures along with intergranular textures. Seriate plagioclase laths with plumose olivine are observed.

Vesicle	Original (%)	Size Mode (mm)	Shape	Comments
Vesicle	0.1	0.4	round	Vesicles are small, round (max size. 0.4 mm) mainly unfilled.

Alteration

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
background	13	20	brown clay + FeOH					15	brown clay + FeOH		

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
vein halo-dark grey	19	100	brown clay + FeOH, some carbonate					20	brown/yellow clay + FeOH		

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
vein halo-brown	25	100	brown clay + FeOH, some carbonate					25	brown clay + FeOH, minor yellow clay		

THIN SECTION LABEL ID: **393-U1558D-25R-1-W 104/107-TSB-TS 142** Thin section no.: 142

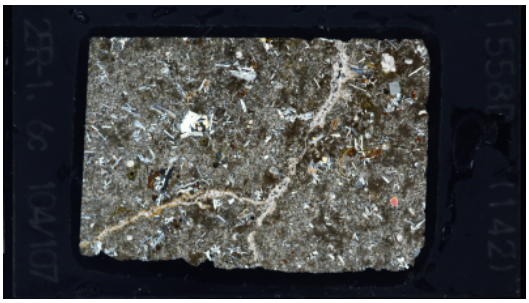
Observer: MJ, EA Piece no.: 6

Total number of domains: 1 Unit/subunit:

Thin section summary: Plagioclase-olivine phyric basalt pillow lava flow, microcrystalline forming glomerocrysts and exhibit sub-ophitic textures with intergranular textures. Carbonate veins cutting through plagioclase phenocrysts are observed. Alteration style is patchy/variolitic (background), intensity is variable but generally moderate (background) to high (in halo) with mostly brown clay + FeOH as alteration products. Crack-seal vein with carbonate fill and minor clay lining.

Plane-polarized: 63716461

Cross-polarized: 63716481



No. of photomicrographs in database: 0

Igneous Petrology

Lithology: **plagioclase-olivine phyric basalt pillow lava flow** **Style of emplacement:** pillow lava flow

Domain number (if >1): **1**

Igneous domain type: flow interior **Domain relative abundance (%):**

Major groundmass texture: intergranular **Groundmass grain size (avg):** microcrystalline

Phenocrysts	Original (%)	Size MODE (mm)	Shape	Habit	Comments
Olivine		0.4	subhedral	equant	Moderately fresh subhedral olivines (0.6mm) associated with plagioclase laths. Alteration along cracks is noticed.
Plagioclase	5	0.2	euhedral	elongate	Fresh laths of plagioclase (2.4mm) in size often occur as glomerocrysts or singular laths. Few grains display sieve textures. The laths are partially enclosed by olivines imparting a sub-ophitic texture. Laths of plagioclase enclosing groundmass grains are observed at places defining the intergranular texture.

Groundmass	Original (%)	Comment
Groundmass	94.9	Under the microscope the rock is fresh, microcrystalline with phenocrysts of plagioclase and olivine. The phenocrysts of plagioclase form glomerocrysts and exhibit sub-ophitic textures along with intergranular textures. Carbonate veins cutting through plagioclase phenocrysts are observed. Patches of carbonate are also observed.

Vesicle	Original (%)	Size Mode (mm)	Shape	Comments
Vesicle	0.1	0.2	round	Vesicles are small, round (max size. 0.7 mm) mainly lined with yellow clay.

Alteration

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
vein halo-brown	56	5	brown clay + FeOH					75	brown clay + FeOH		

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
background	48	85	brown clay + FeOH	25	brown clay			45	brown/yellow clay + FeOH		

Veins

Vein width (mm)	Vein fill sequence (rim to center)	Vein comments	Halo comments
0.4	clay/FeOH - carbonate	yellow clay + FeOH locally as lining, yellow clay only at narrow branch of main vein	irregular halo along main vein with increased groundmass alteration to brown clay + FeOH

THIN SECTION LABEL ID: **393-U1558D-27R-1-W 29/33-TSB-TS 143** Thin section no.: 143

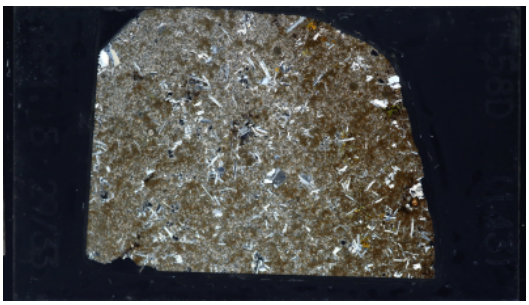
Observer: MJ, EA Piece no.: 5, 6

Total number of domains: 1 Unit/subunit:

Thin section summary: Plagioclase-olivine phyric basalt massive lava flow with altered groundmass, fine-grained seriate plagioclase laths. Alteration style is slightly variolitic (background) and alteration intensity is moderate to high (background, very variable) to high (halo), with brown and yellow (in halo) clay + FeOH as alteration products; Pl + Cpx moderately altered in halo.

Plane-polarized: 63716501

Cross-polarized: 63716521



No. of photomicrographs in database: 0

Igneous Petrology

Lithology: **plagioclase-olivine phyric basalt massive lava flow** **Style of emplacement:** massive lava flow

Domain number (if >1): **1**

Igneous domain type: flow interior **Domain relative abundance (%):** 65

Major groundmass texture: intersertal **Groundmass grain size (avg):** microcrystalline

Phenocrysts	Original (%)	Size MODE (mm)	Shape	Habit	Comments
Olivine	0.2	0.2	anhedral	skeletal	Subhedral olivines (0.6mm), completely altered to red oxyhydroxides.
Plagioclase	5	0.2	euhedral	elongate	Fresh plagioclase laths (max 1.6 mm size) set in a groundmass of seriate plagioclase.

Groundmass	Original (%)	Comment
Groundmass	94.7	Under the microscope the groundmass is altered with fine-grained seriate plagioclase laths.

Vesicle	Original (%)	Size Mode (mm)	Shape	Comments
Vesicle	0.1	0.2	round	Vesicles are small, round (max size. 0.2 mm) mainly lined with yellow clay.

Alteration

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
background	65	100	yellow-brown clay + FeOH	5	brown clay			45	brown clay + FeOH		

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
other halo-brown	65	100	yellow-brown clay + FeOH	5	brown clay			45	brown/yellow clay + FeOH		

THIN SECTION LABEL ID: **393-U1558D-29R-1-W 77/79-TSB-TS 144** Thin section no.: 144

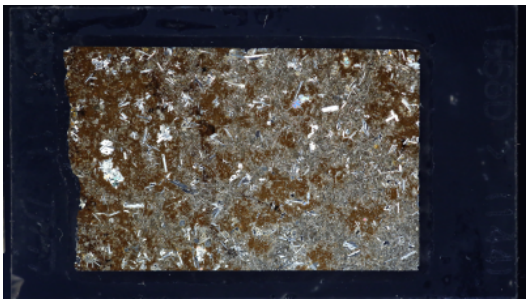
Observer: MJ, EA Piece no.: 11

Total number of domains: 1 Unit/subunit:

Thin section summary: Plagioclase-olivine phyric basalt pillow lava flow with altered brown clay groundmass + FeOH. Variolitic alteration with variable moderate to high alteration intensity with brown clay + FeOH as dominant alteration products.

Plane-polarized: 63676001

Cross-polarized: 63676021



No. of photomicrographs in database: 3

Igneous Petrology

Lithology: **plagioclase-olivine phyric basalt pillow lava flow**

Style of emplacement: pillow lava flow

Domain number (if >1): **1**

Igneous domain type: flow interior

Domain relative abundance (%): 100

Major groundmass texture: intersertal

Groundmass grain size (avg): fine-grained

Phenocrysts	Original (%)	Size MODE (mm)	Shape	Habit	Comments
Olivine	0.5	0.4	subhedral	subequant	Anhedral sub-rounded olivine grains (upto 1mm) in association with plagioclase laths defining the sub-ophitic texturel
Plagioclase	3	0.2	euhedral	equant	Fresh plagioclase equant as well as lath shaped grains (max 1.6 mm size) forming glomerocrysts set in a finer groundmass of plagioclase and possibly olivine grains. Sieve texture is commonly observed at places.

Groundmass	Original (%)	Comment
Groundmass	96.45	Under the microscope, the groundmass is altered to brown clay + FeOH - much more intense (70-80%) alteration in varioles, including the alteration of Plag microphenocrysts, otherwise about 40% altered with more preserved Plag microphenocrysts; Ol completely altered to yellow-brown clay + minor FeOH; Plag phenocrysts slightly altered with sieve texture.

Vesicle	Original (%)	Size Mode (mm)	Shape	Comments
Vesicle	0.05	0.1	round	Vesicles are small, round and lined with grey clay?

Alteration

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
background	77										

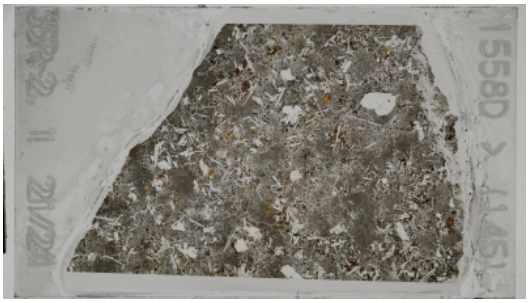
THIN SECTION LABEL ID: **393-U1558D-35R-2-W 21/24-TSB-TS 145** Thin section no.: 145

Observer: MJ, EA Piece no.: 1

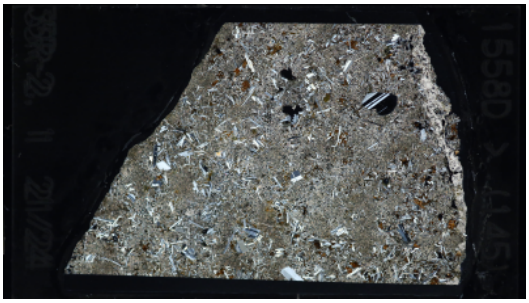
Total number of domains: 1 Unit/subunit:

Thin section summary: Plagioclase-olivine phyric basalt sheet lava flow microcrystalline with plagioclase in groundmass enclose plumose olivine grains defining sub-ophitic textures along with intergranular textures. Spotty alteration with moderate intensity, with brown and yellow clay + FeOH as alteration products. Crosscutting veins mainly composed of carbonate.

Plane-polarized: 63718151



Cross-polarized: 63718171



No. of photomicrographs in database: 0

Igneous Petrology

Lithology: **plagioclase-olivine phyric basalt sheet lava flow**

Style of emplacement: sheet lava flow

Domain number (if >1): **1**

Igneous domain type: flow interior

Domain relative abundance (%): 100

Major groundmass texture: intergranular

Groundmass grain size (avg): fine-grained

Phenocrysts	Original (%)	Size MODE (mm)	Shape	Habit	Comments
Olivine	0.5	0.4	euhedral	equant	Euhedral olivines (0.8mm), completely altered to oxyhydroxides.
Plagioclase	2.5	0.4	euhedral	elongate	Fresh plagioclase laths (max 2 mm size) set in a finer groundmass of plagioclase and olivine grains showing intergranular texture.

Groundmass	Original (%)	Comment
Groundmass	96.9	Under the microscope the rock is moderately fresh, microcrystalline with phenocrysts of plagioclase and olivine. The plagioclase in groundmass enclose olivine grains defining sub-ophitic textures along with intergranular textures. Seriate plagioclase laths with plumose olivine are observed.

Vesicle	Original (%)	Size Mode (mm)	Shape	Comments
Vesicle	0.1	0.4	round	Vesicles are small, round (max size. 0.4 mm) mainly lined with yellow clay.

Alteration

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
background	27	100	yellow-brown clay + FeOH	2	yellow clay			25	brown/yellow clay + FeOH		

Veins

Vein width (mm)	Vein fill sequence (rim to center)	Vein comments	Halo comments
0.5	yellow clay - carbonate - brown clay/FeOH - carbonate	composition variable along vein - generally filled with (multiple generations of) carbonate separated by brown clay + FeOH; locally, yellow clay as thin lining	

Vein width (mm)	Vein fill sequence (rim to center)	Vein comments	Halo comments
0.05		narrow veinlet	

Veins

Vein width (mm)	Vein fill sequence (rim to center)	Vein comments	Halo comments
0.5	yellow clay - carbonate - brown clay/FeOH - carbonate	composition variable along vein - generally filled with (multiple generations of) carbonate separated by brown clay + FeOH; locally, yellow clay as thin lining	

Vein width (mm)	Vein fill sequence (rim to center)	Vein comments	Halo comments
0.05		narrow veinlet	

THIN SECTION LABEL ID: **393-U1558D-37R-1-W 122/124-TSB-TS 146** Thin section no.: 146

Observer: MJ, EA Piece no.: 9

Total number of domains: 1 Unit/subunit:

Thin section summary: Plagioclase-olivine phyric basalt massive lava flow with groundmass altered to patchy/variolitic texture (70-80%) to dark brown clay + FeOH. Plag microphenocrysts are slightly altered with Ol mostly completely altered to orange-brown clay + FeOH. Patchy/variolitic alteration with variable moderate to high alteration intensity and brown clay + FeOH as alteration products.

Plane-polarized: 63724731

Cross-polarized: 63724751

No. of photomicrographs in database: 0

Igneous Petrology

Lithology: **plagioclase-olivine phyric basalt massive lava flow** **Style of emplacement:** massive lava flow

Domain number (if >1): **1**

Igneous domain type: flow interior **Domain relative abundance (%):** 100

Major groundmass texture: variolitic **Groundmass grain size (avg):** fine-grained

Phenocrysts	Original (%)	Size MODE (mm)	Shape	Habit	Comments
Plagioclase	1	0.2	euhedral	elongate	Seriate Plag phenocrysts set in a clay rich groundmass. Plag phenocrysts show minor alteration. Ol altered to orange-brown clay + FeOH

Groundmass	Original (%)	Comment
Groundmass	99	Groundmass altered to patchy/variolitic texture (70-80%) to dark brown clay + FeOH. Plag microphenocrysts are slightly altered with Ol mostly completely altered to orange-brown clay + FeOH

Alteration

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
background	65	100	yellow-brown clay + FeOH	5	brown clay			50	brown clay + FeOH		

THIN SECTION LABEL ID: **393-U1558D-37R-3-W 34/38-TSB-TS 147** Thin section no.: 147

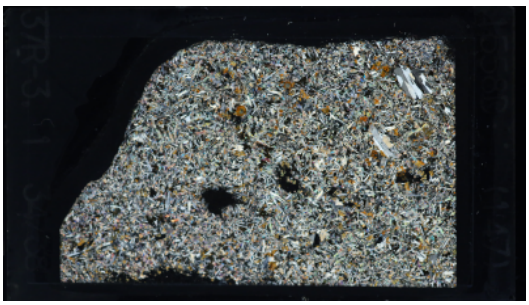
Observer: MJ, EA Piece no.: 1

Total number of domains: 1 Unit/subunit:

Thin section summary: Plagioclase-olivine phyric basalt massive lava flow fine-grained with phenocrysts of plagioclase, olivine and sparse clinopyroxene. The plagioclase in groundmass form glomerocrysts and exhibit sub-ophitic textures along with intergranular textures. Spotty alteration with moderate alteration intensity, with brown and yellow clay + FeOH as alteration products. Crosscutting vein composed of carbonate with local FeOH lining.

Plane-polarized: 63716581

Cross-polarized: 63716601



No. of photomicrographs in database: 0

Igneous Petrology

Lithology: **plagioclase-olivine phyric basalt massive lava flow** **Style of emplacement:** massive lava flow

Domain number (if >1): **1**

Igneous domain type: flow interior **Domain relative abundance (%):** 100

Major groundmass texture: intergranular **Groundmass grain size (avg):** fine-grained

Phenocrysts	Original (%)	Size MODE (mm)	Shape	Habit	Comments
Olivine	1	0.1	anhedral	elongate	Anhedral elongate grains (0.8 - 1.2 mm) olivines in association with plagioclase laths.
Plagioclase	0.5	1.2	euhedral	elongate	Fresh plagioclase laths (max 2.2 mm size) set in a finer groundmass of plagioclase and olivine grains showing intergranular texture.

Groundmass	Original (%)	Comment
Groundmass	98.3	Under the microscope the rock is moderately fresh, fine-grained with phenocrysts of plagioclase, olivine and sparse clinopyroxene. The plagioclase in groundmass form glomerocrysts and exhibit sub-ophitic textures along with intergranular textures. Seriate plagioclase laths with plumose olivine are observed.

Vesicle	Original (%)	Size Mode (mm)	Shape	Comments
Vesicle	0.2	0.2	round	Vesicles are small, round (max size. 0.6 mm) mainly lined with yellow clay. Some vesicles are filled with yellow clay followed by red oxyhydroxide at places and by carbonate material at other places.

Alteration

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
background	25	20	yellow clay + FeOH					20	brown/yellow clay + FeOH, minor carbonate		

Veins

Vein width (mm)	Vein fill sequence (rim to center)	Vein comments	Halo comments
0.05	FeOH - carbonate	local FeOH as lining	

THIN SECTION LABEL ID: **393-U1558D-39R-1-W 134/138-TSB-TS 148** Thin section no.: 148

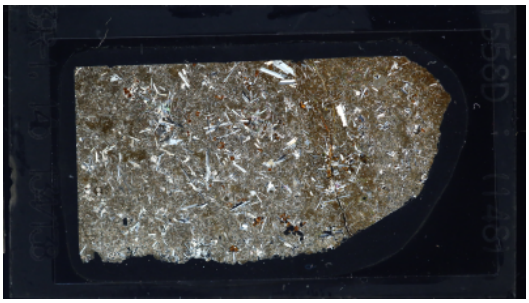
Observer: EA Piece no.: 14

Total number of domains: 1 Unit/subunit:

Thin section summary: Alteration intensity is moderate-high (background) to high (halo), with brown and yellow (in halo) clay + FeOH as alteration products; Ol is replaced by brown clay + FeOH or carbonate. Crack-seal vein composed of yellow clay + FeOH + carbonate.

Plane-polarized: 63716621

Cross-polarized: 63716651



No. of photomicrographs in database: 0

Igneous Petrology

Lithology: **plagioclase-olivine phyric basalt pillow lava flow**

Style of emplacement: pillow lava flow

Domain number (if >1): **1**

Igneous domain type: flow interior

Domain relative abundance (%): 100

Major groundmass texture: variolitic

Groundmass grain size (avg): fine-grained

Phenocrysts	Original (%)	Size MODE (mm)	Shape	Habit	Comments
Olivine	0.5	0.2	anhedral	elongate	Anhedral grains (approx. 1.2 mm) olivines in association with plagioclase laths.
Plagioclase	5	0.2	euhedral	elongate	Plagioclase laths (max 5mm) long set in a finer groundmass of plagioclase and olivine grains (altered) showing intergranular texture. Glomerocrysts of the plagioclase are observed in places.

Groundmass	Original (%)	Comment
Groundmass	94.4	Under the microscope the rock is altered to brown clay + FeOH with no fresh olivines preserved. Ol completely replaced by orange-brown clay + FeOH and carbonate. The plagioclase in groundmass form glomerocrysts and exhibit sub-ophitic textures along with intergranular textures. Seriate plagioclase laths with plumose olivine are observed.

Vesicle	Original (%)	Size Mode (mm)	Shape	Comments
Vesicle	0.1	0.1	round	Vesicles are filled with carbonate.

Alteration

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
background	56	100	yellow-brown clay + FeOH and carbonate	2	brown clay			35	brown clay + FeOH		

Domain type	Alteration %	% Ol repl.	Ol repl. by	% Plag repl.	Plag repl. by	% CPX repl.	CPX repl. by	% groundmass repl.	Groundmass repl. by	% glass repl.	Glass repl. by
vein halo-brown	68		yellow-brown clay + FeOH					50			

Veins

Vein width (mm)	Vein fill sequence (rim to center)	Vein comments	Halo comments
0.15	clay/FeOH - carbonate	composition changes along vein, locally with carbonate in center	