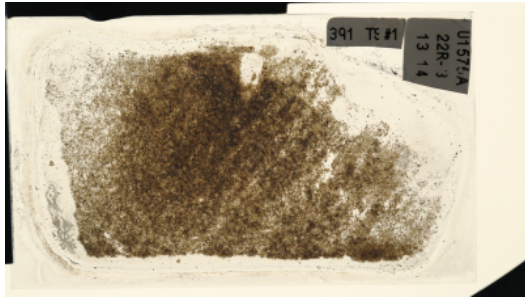


THIN SECTION LABEL ID:	391-U1575A-22R-3-W 11/15-TSB-TS #1	Thin section no.:	1
Observer:	DB	Piece no.:	
Thin section thickness:		Unit/subunit:	Unit III
Thin section summary:	Foraminifera sandstone or poorly washed packstone with a matrix composed of clay and nannofossils. Minor cement locally between the foraminifera. Rare volcanoclastic component (feldspars and palagonized glass). The laminae seen in the core are controlled by the relative abundance of clay and nannofossils; it could also be locally due to the occurrence of calcite cement.		

Plane-polarized: 60513251



Cross-polarized: 60513271



THIN SECTION LABEL ID: **391-U1575A-22R-5-W 2/6-TSB-TS # 2**

Thin section no.: 2

Observer: DB

Piece no.:

Thin section thickness:

Unit/subunit: Unit III

Thin section summary: Bioclastic sandstone or grainstone. Includes common red algae and a large diversity of subrounded to rounded bioclasts (e.g. echinoderm and inoceramid shell fragments), as well as foraminifera. Rare volcaniclasts and intraclasts. Only partly cemented by calcite.

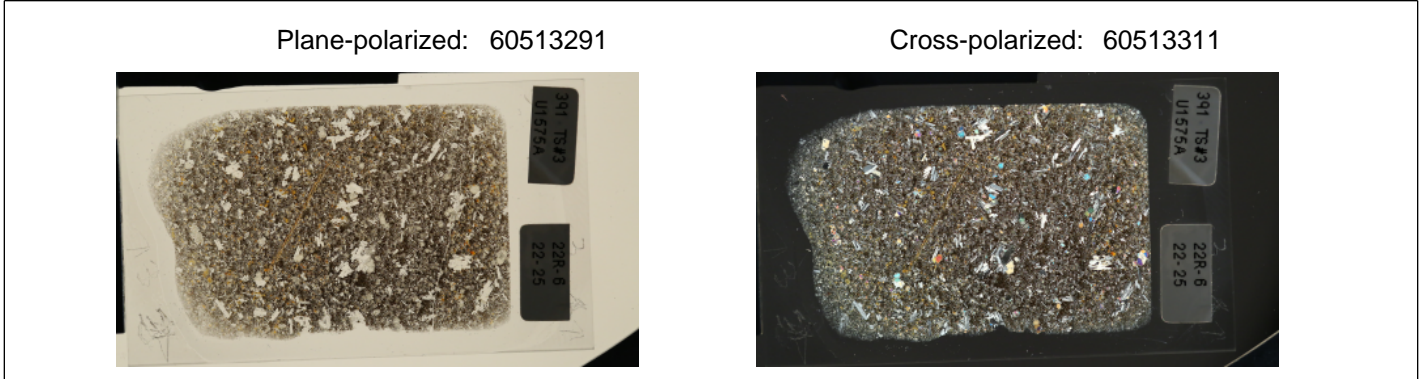
Plane-polarized: 60513211



Cross-polarized: 60513231



THIN SECTION LABEL ID: **391-U1575A-22R-6-W 21/24-TSB-TS# 3** Thin section no.: 3
 Observer: JLS Piece no.:
 Thin section thickness: Unit/subunit:
 Thin section summary: Highly plagioclase-augite phyric lava flow with glomerophyric and intersertal texture. Thin section contains large PLAG and CPX glomerocrysts and has a groundmass of PLAG, CPX, and altered glass. All OL phenocrysts have been altered to iddingsite and vesicles have been filled.



Igneous Petrology

Lithology: moderately plagioclase-augite phyric basalt lava flow

Grain size distribution: bimodal **Groundmass grain size (avg.):** fine-grained

Major texture: glomeroporphyritic **Minor Texture:** intersertal

Phenocrysts	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Olivine	10	0	10	0.4	3	subhedral	subhedral	OL pheocrysts are altered to iddigsite.
Plagioclase	5	5	0	0.8	3	euhedral	elongate	PLAG phenocrysts occur as individual crystals and glomerocryst. Some PLAG cores also exhibit sieve textue.
Clinopyroxene	11	10	1	0.6	1.5	subhedral	subequant	CPX occurs as glomerocrysts alongside plagioclase. Individual phenocrysts are small and often altered. Zoning is rare but present in the rims of large CPX phenocrysts.
Oxide Fe-Ti	0.1	0.1	0	0.01	0.02	anhedral	anhedral	

Groundmass	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Plagioclase	20	20	0	0.04	0.4	anhedral	elongate	
Clinopyroxene	13	10	3	0.02	0.08	subhedral	subequant	
Fe-Ti oxide	7	0.1	10	0.002	0.015	anhedral	elongate	N/A
Glass	55	25	30	N/A	N/A	N/A	N/A	

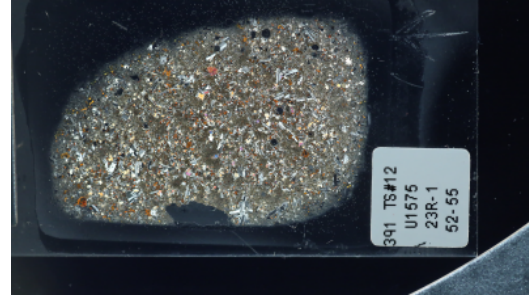
Vesicle	Original (%)	Empty (%)	Filled (%)	Size min. (mm)	Size max. (mm)	Shape	Comments
Vesicle	0.5	0	0.5			rounded	

THIN SECTION LABEL ID: **391-U1575A-23R-1-W 52/55-TSB-TS# 12** Thin section no.: 12
 Observer: JWS Piece no.:
 Thin section thickness: Unit/subunit:
 Thin section summary: Highly plagioclase-augite-phyric basalt with glomeroporphyritic and aphanitic textures. Plagioclase and pyroxene are both found in glomerocrysts and often contain melt inclusions. Groundmass consists of fine grained plagioclase and pyroxene with skeletal Fe-oxides.

Plane-polarized: 60547121



Cross-polarized: 60547141



Igneous Petrology

Lithology: highly plagioclase-augite phyric basalt lava flow
Grain size distribution: bimodal **Groundmass grain size (avg.):** microcrystalline
Major texture: glomeroporphyritic **Minor Texture:** aphanitic

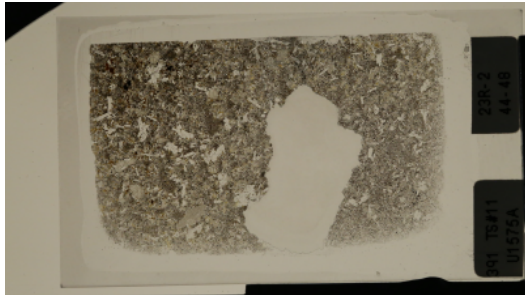
Phenocrysts	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Olivine	4	0	4	0.05	0.4	subhedral	subhedral	iddingsite
Plagioclase	12	12	0	0.4	2.2	euhedral	tabular	Plag-rich glomerocrysts with augite
Clinopyroxene	8	8	0	0.4	1.2	subhedral	elongate	
Oxide Fe-Ti	4	4						

Groundmass	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Olivine	8	0	8	0.05	0.2	subhedral	equant	iddingsite
Plagioclase	20	20	0	0.1	0.4	euhedral	tabular	slender laths
Clinopyroxene	10	10	0	0.02	0.2	anhedral	subequant	
Fe-Ti oxide		4	4					N/A
Mesostasis	32	32	0	N/A	N/A	N/A	N/A	
Glass	0	0	0	N/A	N/A	N/A	N/A	

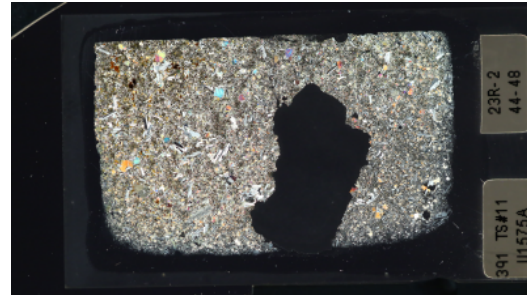
Vesicle	Original (%)	Empty (%)	Filled (%)	Size min. (mm)	Size max. (mm)	Shape	Comments
Vesicle	1		1	0.2	0.6	rounded	clay-filled

THIN SECTION LABEL ID: **391-U1575A-23R-2-W 44/48-TSB-TS# 11** Thin section no.: 11
 Observer: WN Piece no.:
 Thin section thickness: Unit/subunit:
 Thin section summary: Highly plagioclase-clinopyroxene-phyric basalt with a variable intersertal to holocrystalline groundmass. Sparse olivine phenocrysts are present but completely altered to iddingsite. Interstitial glass is also altered. Groundmass olivine = alkali basalt.

Plane-polarized: 60513171



Cross-polarized: 60513191



Igneous Petrology

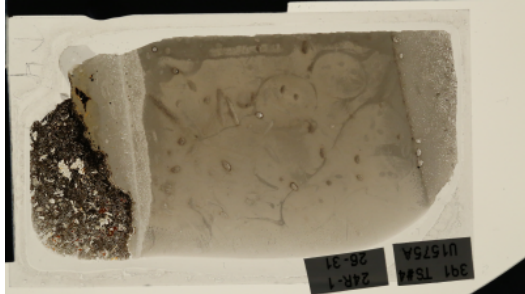
Lithology: highly **plagioclase-augite phyric basalt lava flow**
Grain size distribution: bimodal **Groundmass grain size (avg.):** fine-grained
Major texture: glomeroporphyritic **Minor Texture:** intersertal

Phenocrysts	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Olivine	3	0	3	0.1	0.7	subhedral	subhedral	altered to iddingsite
Plagioclase	10	10	0	0.3	2.6	euhedral	elongate	Present as phenocrysts and glomerocrysts. Polysynthetic twinning is common. A single crystal recorded extensive sieve texture with a thin, fresh rim. Other crystals are fresh and unzoned.
Clinopyroxene	7	7	0	0.2	1.4	subhedral	equant	Exists as phenocrysts and in glomerocrysts with plagioclase. Simple twinning is visible in multiple grains.

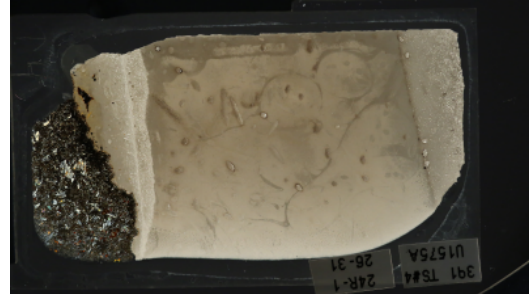
Groundmass	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Olivine	5		5			subhedral	equant	altered to iddingsite
Plagioclase	18	17	1	0.02	0.3	euhedral	elongate	long, thin blades
Clinopyroxene	38	35	3	0.02	0.06	subhedral	subequant	
Fe-Ti oxide	12		3	0.01	0.06	subhedral	equant	N/A
Mesostasis	81	74	7	N/A	N/A	N/A	N/A	Alteration is pervasive but mild

THIN SECTION LABEL ID: **391-U1575A-24R-1-W 26/31-TSB-TS #4** Thin section no.: 4
 Observer: DB Piece no.:
 Thin section thickness: Unit/subunit: Unit IV
 Thin section summary: Micrite infills in a void within a basalt. Possible burrows and micropeloidal cement.

Plane-polarized: 60512831



Cross-polarized: 60512851



Igneous Petrology

Lithology: moderately **plagioclase-augite phyric basalt lava flow**
Grain size distribution: bimodal **Groundmass grain size (avg.):** glass
Major texture: porphyritic **Minor Texture:** hypohyaline

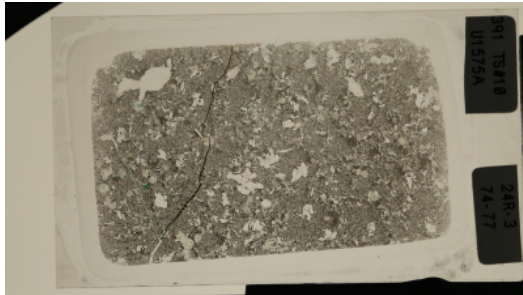
Phenocrysts	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Olivine	0	0	0					
Plagioclase	15	15	0	0.2	1.4	euhedral	tabular	Isolated plag phenocrysts, or gloms of mostly plag
Clinopyroxene	4	4	0	0.4	1.4	subhedral	equant	
Oxide Fe-Ti	2	2	0	0.05	0.1	anhedral	anhedral	

Groundmass	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Olivine	3	0	3	0.1	0.4	euhedral	equant	red oxide
Plagioclase	12	12	0	0.04	0.4	euhedral	elongate	laths
Clinopyroxene	0	0	0					
Fe-Ti oxide	6	2	0	0.01	0.03	subhedral	equant	N/A
Glass	58	0	58	N/A	N/A	N/A	N/A	

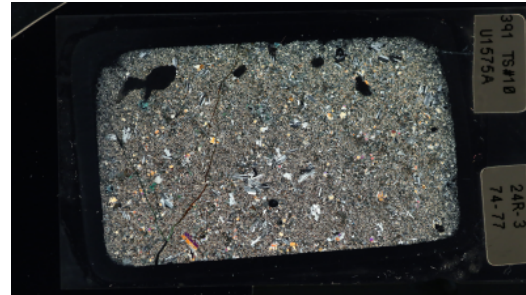
Vesicle	Original (%)	Empty (%)	Filled (%)	Size min. (mm)	Size max. (mm)	Shape	Comments
Vesicle	0	0	0				

THIN SECTION LABEL ID: **391-U1575A-24R-3-W 74/77-TSB-TS# 10** Thin section no.: 10
 Observer: WN, JWS Piece no.:
 Thin section thickness: Unit/subunit:
 Thin section summary: Highly plagioclase-clinopyroxene-phyric basalt with subophitic textures in intersertal to holocrystalline groundmass. Glassy mesostasis contains abundant skeletal crystals. Sparse olivine is present but altered to serpentinite.

Plane-polarized: 60513131



Cross-polarized: 60513151



Igneous Petrology

Lithology: highly **plagioclase-augite-olivine phyric basalt lava flow**
Grain size distribution: bimodal **Groundmass grain size (avg.):** fine-grained
Major texture: glomeroporphyritic **Minor Texture:** intersertal

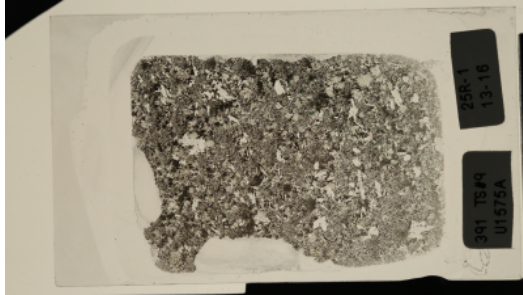
Phenocrysts	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Olivine	3	0	3	0.1	0.2	euhedral	euhedral	Completely altered to saponite.
Plagioclase	9	8	1	0.2	3.7	euhedral	tabular	Sparse phenocrysts with zoned interiors. The interiors display mild sieve textures.
Clinopyroxene	3	3		0.2	2	subhedral	elongate	Subophitic. Exists as phenocrysts and glomerocrysts. Often highly fractured.

Groundmass	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Plagioclase	18	17	1	0.03	0.3	subhedral	elongate	Slender plagioclase lathes, some with skeletal interiors.
Clinopyroxene	30	30		0.02	0.1	subhedral	equant	
Fe-Ti oxide	12		3	0.01	0.1	subhedral	elongate	N/A
Mesostasis	25	20	5	N/A	N/A	N/A	N/A	contains abundant skeletal phases

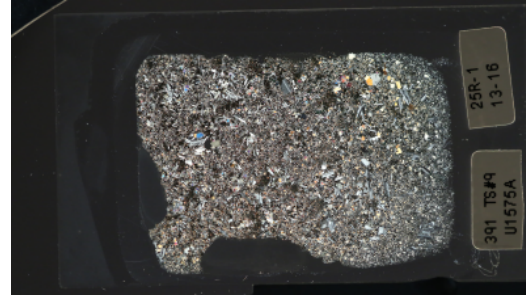
Vesicle	Original (%)	Empty (%)	Filled (%)	Size min. (mm)	Size max. (mm)	Shape	Comments
Vesicle	1		1	0.6	1	subrounded	filled with 1-2 secondary minerals

THIN SECTION LABEL ID: **391-U1575A-25R-1-W 13/16-TSB-TS# 9** Thin section no.: 9
 Observer: WN Piece no.:
 Thin section thickness: Unit/subunit:
 Thin section summary: Highly plagioclase-clinopyroxene-phyric basalt with intersertal, glomeroporphyritic, and porphyritic textures. Plagioclase and pyroxene are both found as glomerocrysts as well as phenocrysts. Olivine is present but completely altered. Glassy mesostasis contains abundant skeletal Fe-Ti oxides.

Plane-polarized: 60513091



Cross-polarized: 60513111



Igneous Petrology

Lithology: highly **plagioclase-augite-olivine phyric basalt lava flow**
Grain size distribution: bimodal **Groundmass grain size (avg.):** cryptocrystalline
Major texture: aphanitic **Minor Texture:** porphyritic

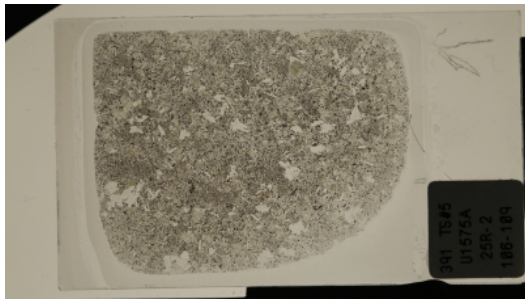
Phenocrysts	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Olivine	5	0	5	0.1	0.5	subhedral	subhedral	Completely altered to a pale green material, likely saponite.
Plagioclase	18	15	3	0.2	3	subhedral	tabular	Zoned cores sometimes display sieve texture

Groundmass	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Plagioclase	18	17	1	0.08	0.3	euhedral	elongate	slender groundmass plag, sometimes with hollow, skeletal cores
Clinopyroxene	22	22	0	0.02	0.1	subhedral	equant	
Fe-Ti oxide	12		5	0.01	0.06	subhedral	subequant	N/A
Mesostasis	25	20	5	N/A	N/A	N/A	N/A	contains abundant skeletal Fe-Ti oxides

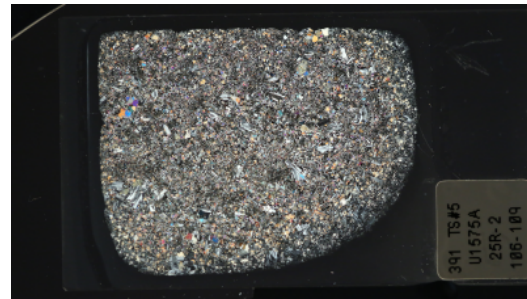
Vesicle	Original (%)	Empty (%)	Filled (%)	Size min. (mm)	Size max. (mm)	Shape	Comments
Vesicle	0.5		0.5	0.3	0.3	rounded	Calcite infill

THIN SECTION LABEL ID: **391-U1575A-25R-2-W 106/109-TSB-TS# 5** Thin section no.: 5
 Observer: JWS Piece no.:
 Thin section thickness: Unit/subunit:
 Thin section summary: Highly plagioclase-augite-olivine phyric basalt. Plagioclase occurs as individual phenocrysts as well as gloms with augite and less commonly olivine. Large tabular grains commonly display oscillatory zoning, especially in outer margins. Olivine altered to yellow clay, probably saponite. Some plagioclase crystals have thin exsolution blebs of Kspar.

Plane-polarized: 60512871



Cross-polarized: 60512891



Igneous Petrology

Lithology: highly **plagioclase-augite-olivine phyric basalt lava flow**

Grain size distribution: **Groundmass grain size (avg.):**

Major texture: **Minor Texture:**

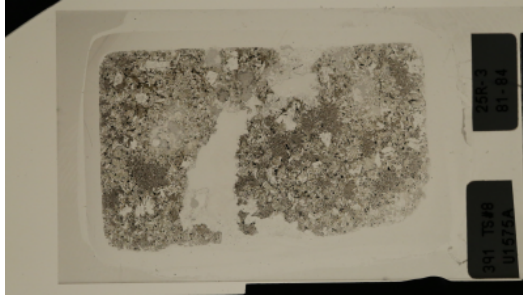
Phenocrysts	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Olivine	2	0	2	0.4	1.6	euhedral	euhedral	Completely altered to saponite, pseudomorphs olivine shape
Plagioclase	14	14	0	0.3	2.6	euhedral	tabular	
Clinopyroxene	12	12	0	0.4	1	subhedral	equant	
Oxide Fe-Ti	1	1	0	0.04	0.3	euhedral	euhedral	

Groundmass	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Olivine	2		2					
Plagioclase	30	30	0	0.06	0.4	euhedral	tabular	
Clinopyroxene	28	28	0	0.06	0.2	anhedral	subequant	
Fe-Ti oxide	2	1	2	0.04	0.1	euhedral	equant	N/A
Mesostasis	5	5	0	N/A	N/A	N/A	N/A	
Glass	4		4	N/A	N/A	N/A	N/A	

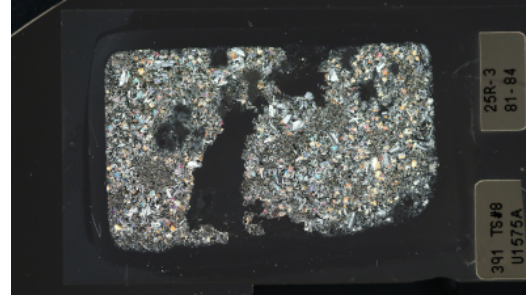
Vesicle	Original (%)	Empty (%)	Filled (%)	Size min. (mm)	Size max. (mm)	Shape	Comments
Vesicle	1		1	0.04	0.1	rounded	Clay filled

THIN SECTION LABEL ID: **391-U1575A-25R-3-W 81/84-TSB-TS# 8** Thin section no.: 8
 Observer: JWS Piece no.:
 Thin section thickness: Unit/subunit:
 Thin section summary: Highly plagioclase-augite-phyric basalt with glomeroporphyritic and intersertal textures. Plagioclase and pyroxene are both found in glomerocrysts and often contain melt inclusions. Groundmass consists of fine grained plagioclase and pyroxene with skeletal Fe-oxides.

Plane-polarized: 60513051



Cross-polarized: 60513071



Igneous Petrology

Lithology: highly plagioclase-augite phyric basalt lava flow
Grain size distribution: bimodal **Groundmass grain size (avg.):** fine-grained
Major texture: glomeroporphyritic **Minor Texture:** intersertal

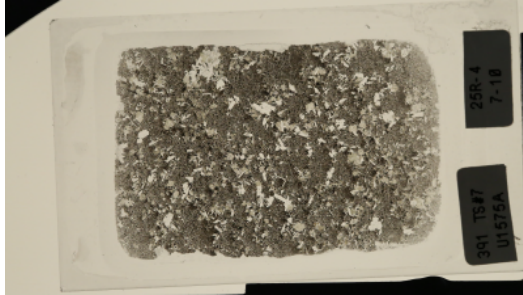
Phenocrysts	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Olivine	0	0	0					Some clay patches may be former olivine.
Plagioclase	10	10	0	0.25	3	euhedral	tabular	Almost all plag forms glomerocrysts with pyroxene. Several large isolated Plag crystals (not in gloms) have thin needle like inclusions aligned in planes - looks like may be Kspar exsolution!
Clinopyroxene	5	5	0	0.2	1.4	euhedral	equant	Almost all pyroxene forms glomerocrysts with Plag. Cpx commonly has slight pinkish pleochroism, suggesting titan augite.
Oxide Fe-Ti	2	2		0.06	0.4	euhedral	euhedral	

Groundmass	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Plagioclase	25	25	0	0.1	0.4	euhedral	tabular	Slender laths
Clinopyroxene	25	25	0	0.06	0.3	anhedral	subequant	
Fe-Ti oxide	10	2	0			euhedral	elongate	N/A
Mesostasis	13	10	3	N/A	N/A	N/A	N/A	
Glass	10		10	N/A	N/A	N/A	N/A	Devitrified

Vesicle	Original (%)	Empty (%)	Filled (%)	Size min. (mm)	Size max. (mm)	Shape	Comments
Vesicle	1	0	1	0.4	0.8	rounded	Clay filled

THIN SECTION LABEL ID: **391-U1575A-25R-4-W 7/10-TSB-TS# 7** Thin section no.: 7
 Observer: JLS Piece no.:
 Thin section thickness: Unit/subunit:
 Thin section summary: Highly plagioclase-augite-phyric basalt with glomeroporphyritic and intersertal textures. Plagioclase and pyroxene are both found in glomerocrysts and often contain melt inclusions. Groundmass consists of fine grained plagioclase and pyroxene with skeletal Fe-oxides.

Plane-polarized: 60513011



Cross-polarized: 60513031



Igneous Petrology

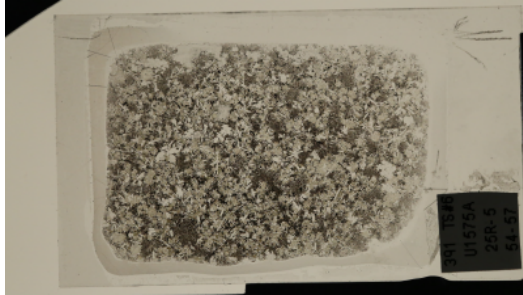
Lithology: highly plagioclase-augite phyric basalt lava flow
Grain size distribution: bimodal **Groundmass grain size (avg.):** fine-grained
Major texture: glomeroporphyritic **Minor Texture:** interstitial

Phenocrysts	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Olivine	0	0	0					
Plagioclase	10	10	0	0.5	3	euhedral	tabular	Plagioclase phenocrysts often exhibit sieve texture and contain large melt inclusions.
Clinopyroxene	7	5	2	0.2	1.3	euhedral	equant	CPX phenocryst exhibit oscillatory zoning.

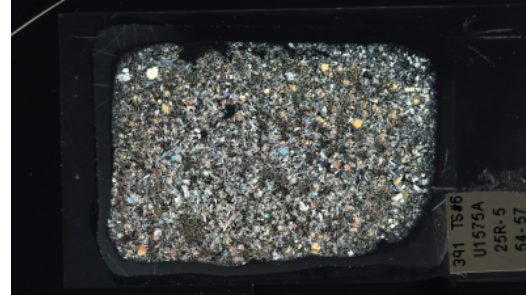
Groundmass	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Plagioclase	17	15	2	0.09	0.6	anhedral	elongate	
Clinopyroxene	30	30	0	0.01	0.05	anhedral	subequant	
Fe-Ti oxide	15		0	0.02	0.06	anhedral	elongate	N/A
Glass	25	25	0	N/A	N/A	N/A	N/A	

THIN SECTION LABEL ID: **391-U1575A-25R-5-W 54/57-TSB-TS# 6** Thin section no.: 6
 Observer: JLS Piece no.:
 Thin section thickness: Unit/subunit:
 Thin section summary: Highly augite-plagioclase-phyric basalt with glomeroporphyritic and intersertal textures. Plagioclase and pyroxene are often found in glomerocysts. Pyroxene often contains melt inclusions. Groundmass consists of fine grained plagioclase and pyroxene with skeletal Fe-oxides.

Plane-polarized: 60512971



Cross-polarized: 60512991



Igneous Petrology

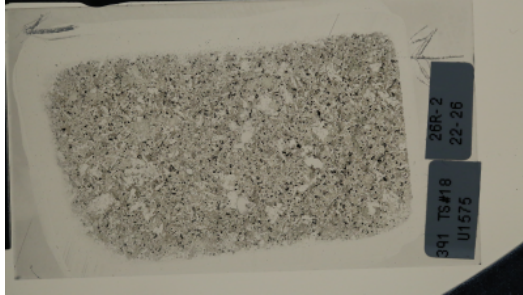
Lithology: highly **augite-plagioclase phyric basalt lava flow**
Grain size distribution: bimodal **Groundmass grain size (avg.):** fine-grained
Major texture: glomeroporphyritic **Minor Texture:** ophitic

Phenocrysts	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Olivine	1	0	1	0.3	0.4	subhedral	subhedral	Olivine phenocrysts appear to be altered to serpentine.
Plagioclase	26	25	1	0.3	4	euhedral	tabular	Glomerocrysts of plag exhibit oscillatory zoning and rare exsolution lamellae.
Clinopyroxene	27	25	2	0.3	3	subhedral	equant	CPX often encloses plagioclase phenocrysts and some exhibit exsolution lamellae.

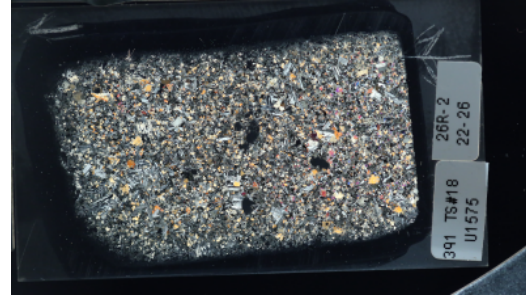
Groundmass	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Olivine	4	0	4	0.05	0.2	euhedral	equant	to serpentine.
Plagioclase	7	5	2	0.03	0.2	anhedral	elongate	
Clinopyroxene	13	10	3	0.01	0.3	anhedral	subequant	
Fe-Ti oxide	10		1	0.01	0.06	anhedral	elongate	N/A
Mesostasis	12	10	2	N/A	N/A	N/A	N/A	
Glass	17	7	10	N/A	N/A	N/A	N/A	

THIN SECTION LABEL ID: **391-U1575A-26R-2-W 22/26-TSB-TS# 18** Thin section no.: 18
 Observer: JLS Piece no.:
 Thin section thickness: Unit/subunit:
 Thin section summary: Highly plagioclase-augite-phyric basalt with glomeroporphyritic and intersertal textures. Plagioclase and pyroxene often found in glomerocysts. Plagioclase phenocrysts often exhibit sieve texture and exsolution lamellae. Groundmass consists of fine grained plagioclase and pyroxene with skeletal Fe-oxides.

Plane-polarized: 60560671



Cross-polarized: 60560691



Igneous Petrology

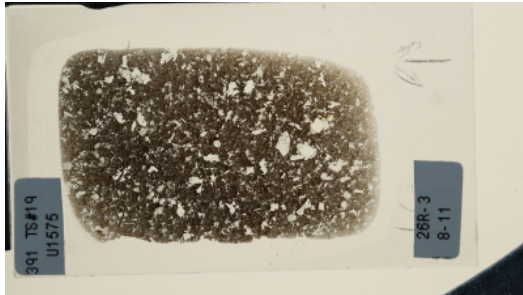
Lithology: highly plagioclase-augite phyric basalt lava flow
Grain size distribution: bimodal **Groundmass grain size (avg.):** fine-grained
Major texture: glomeroporphyritic **Minor Texture:** intersertal

Phenocrysts	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Olivine	3	0	3	0.4	0.8	subhedral	subhedral	Altered to clay (saponite).
Plagioclase	17	15	2	0.4	2	euhedral	tabular	Glomerocysts of plag often exhibit sieve texture.
Clinopyroxene	13	10	3	0.5	1.3	subhedral	equant	Melt inclusions are common.
Oxide Fe-Ti	5	5	0	0.4	0.6	anhedral	anhedral	

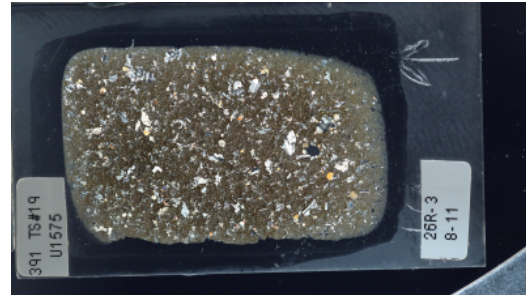
Groundmass	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Plagioclase	22	20	2	0.09	0.2	anhedral	elongate	
Clinopyroxene	16	15	1	0.03	0.2	subhedral	subequant	
Fe-Ti oxide	2	5	3	0.002	0.015	anhedral	elongate	N/A
Glass	22	15	7	N/A	N/A	N/A	N/A	

THIN SECTION LABEL ID: **391-U1575A-26R-3-W 8/11-TSB-TS# 19** Thin section no.: 19
 Observer: JLS Piece no.:
 Thin section thickness: Unit/subunit:
 Thin section summary: Moderately plagioclase-augite-phyric basalt with glomeroporphyritic and intersertal textures. Plagioclase and pyroxene often found in glomerocysts. Groundmass is highly altered.

Plane-polarized: 60560711



Cross-polarized: 60560731



Igneous Petrology

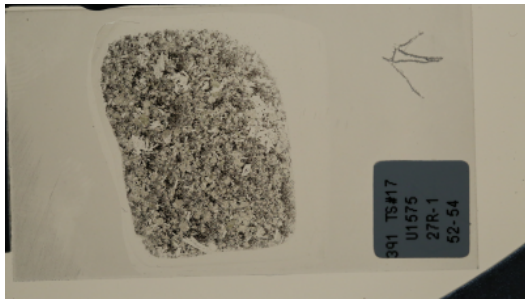
Lithology: moderately **plagioclase-augite phyric basalt lava flow**
Grain size distribution: bimodal **Groundmass grain size (avg.):** microcrystalline
Major texture: glomeroporphyritic **Minor Texture:** intersertal

Phenocrysts	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Olivine	0	0						
Plagioclase	6	5	1	0.4	1	euhedral	tabular	Plag often exhibits sieve texture.
Clinopyroxene	4	3	1	0.4	0.8	subhedral	equant	Melt inclusions often present.

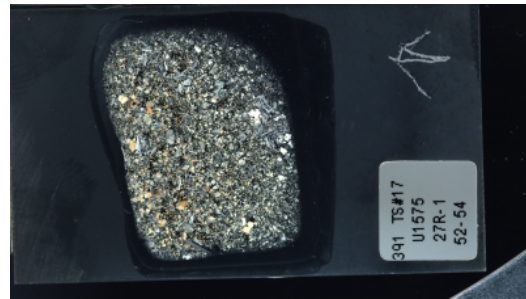
Groundmass	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Plagioclase	15	10	5	0.02	0.2	anhedral	elongate	
Clinopyroxene	5	2	3	0.005	0.1	subhedral	subequant	
Fe-Ti oxide	1			0.001	0.01	anhedral	elongate	N/A
Glass	69	2	67	N/A	N/A	N/A	N/A	Highly altered

THIN SECTION LABEL ID: **391-U1575A-27R-1-W 52/54-TSB-TS# 17** Thin section no.: 17
 Observer: JLS Piece no.:
 Thin section thickness: Unit/subunit:
 Thin section summary: Highly plagioclase-augite-phyric basalt with glomeroporphyritic and intersertal textures. Plagioclase and pyroxene are both found in glomerocrysts and often contain melt inclusions. Plagioclase and pyroxene also exhibit zoning and exsolution lamellae. Groundmass consists of fine grained plagioclase and pyroxene with skeletal Fe-oxides. Groundmass also has unaltered glass.

Plane-polarized: 60547971



Cross-polarized: 60547991



Igneous Petrology

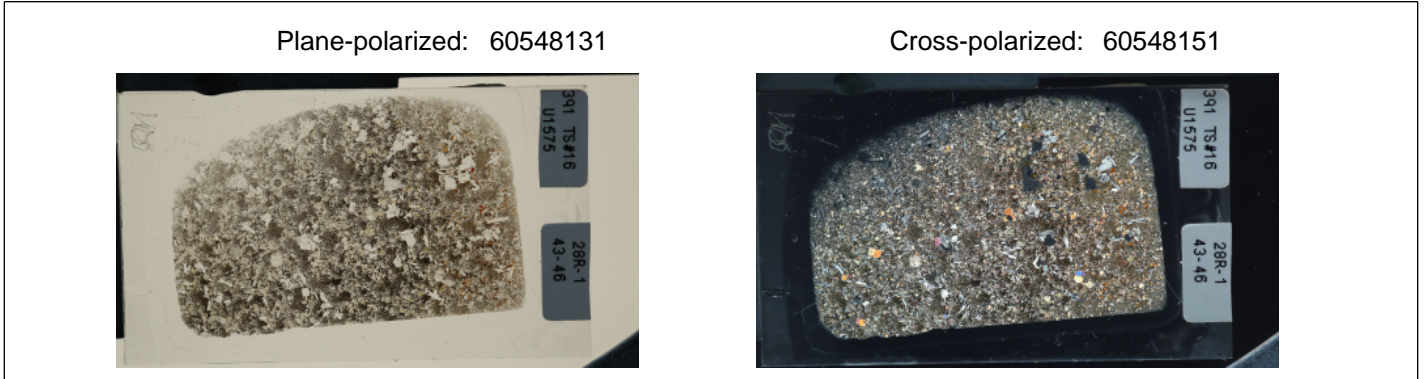
Lithology: highly
Grain size distribution: bimodal **Groundmass grain size (avg.):** fine-grained
Major texture: glomeroporphyritic **Minor Texture:** ophitic

Phenocrysts	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Olivine	0	0						
Plagioclase	11	10	1	0.8	2.5	euhedral	tabular	Plagioclase often contain exsoluion lamellae.
Clinopyroxene	9	7	2	0.5	1.3	subhedral	equant	CPX often exhibit sector and oscillatory zoning. Pheoncrysts also contain melt inclusion rich oscillations near their rims.

Groundmass	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Olivine	3	0	3	0.05	0.3	euhedral	equant	Altered to serpentine
Plagioclase	30	30	0	0.03	0.2	anhedral	elongate	
Clinopyroxene	17	15	2	0.02	0.25	anhedral	subequant	
Fe-Ti oxide	15			0.01	0.08	anhedral	elongate	N/A
Glass	15	5	10	N/A	N/A	N/A	N/A	

Vesicle	Original (%)	Empty (%)	Filled (%)	Size min. (mm)	Size max. (mm)	Shape	Comments
Vesicle	1		1	0.1	0.4	rounded	Clay filled

THIN SECTION LABEL ID: **391-U1575A-28R-1-W 119/122-TSB-TS# 16** Thin section no.: 16
 Observer: WN Piece no.:
 Thin section thickness: Unit/subunit:
 Thin section summary: Lava flow with (1) a darker macroscopic hue and, (2) a lighter/more orange macroscopic hue. The difference between the two domains is due to alteration minerals: In Domain 1, olivine altered to saponite/serpentine but the other mineral phases and groundmass were largely unaltered. In Domain 2, the olivine and patches of groundmass were altered to iddingsite, providing the lighter orange tint. Mineralogically and texturally, the zones are identical. Both are highly plagioclase-clinopyroxene-olivine-phyric in an intersertal, fine-grained groundmass. Groundmass phases consist of plagioclase, clinopyroxene, and Fe-Ti oxides. Sparse zoning is visible in blocky plagioclase phenocrysts but not tabular phenocrysts. Block plagioclase and all phenocrystic clinopyroxene show disequilibrium textures (i.e. varying degrees of core resorption).



Igneous Petrology

Lithology: highly plagioclase-augite-olivine phyric basalt lava flow

Grain size distribution: bimodal **Groundmass grain size (avg.):** fine-grained

Major texture: intersertal **Minor Texture:** glomeroporphyritic

Phenocrysts	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Olivine	4	0	4	0.06	0.5	subhedral	subhedral	Completely altered to saponite, providing the rock with a greenish alteration hue.
Plagioclase	16	15	1	0.1	2.4	subhedral	tabular	Numerous plag populations. The largest phenocrysts are blocky and sometimes show oscillatory zoning. These phenocrysts can also show resorption textures in their interior. Elongate plag phenocrysts show twinning but not zoning.
Clinopyroxene	8	7	1	0.1	1.2	subhedral	elongate	Occurs as both phenocrysts and glomerocrysts. Many are highly fractured. Some phenocrysts show resorption features and mild zoned rims.

Groundmass	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Plagioclase	25	25		0.05	0.12	euhedral	elongate	Long and slender. Many are skeletal with hollow centers.
Clinopyroxene	15	15		0.02	0.1	subhedral	subequant	
Fe-Ti oxide	7		4	0.02	0.07	subhedral	equant	N/A
Mesostasis	25	20	5	N/A	N/A	N/A	N/A	cryptocrystalline, brown with only minor oxidation

Vesicle	Original (%)	Empty (%)	Filled (%)	Size min. (mm)	Size max. (mm)	Shape	Comments
Vesicle	3		3	0.1	0.6	rounded	Filled with clay and calcite

Igneous Petrology

Lithology: highly

**plagioclase-augite-olivine phyric
basalt lava flow**

Grain size distribution: bimodal

Groundmass grain size (avg.): fine-grained

Major texture: intersertal

Minor Texture: glomeroporphyritic

Phenocrysts	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Olivine	4	0	4	0.06	0.5	subhedral	subhedral	Completely altered to iddingsite, providing the rock with a reddish alteration hue.
Plagioclase	16	15	1	0.1	2.4	subhedral	tabular	Numerous plag populations. The largest phenocrysts are blocky and sometimes show oscillatory zoning. These phenocrysts can also show resorption textures in their interior. Elongate plag phenocrysts show twinning but not zoning.
Clinopyroxene	8	7	1	0.1	1.2	subhedral	elongate	Occurs as both phenocrysts and glomerocrysts. Many are highly fractured. Some phenocrysts show resorption features and mild zoned rims.

Groundmass	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Plagioclase	25	25		0.05	0.12	euhedral	elongate	Long and slender. Many are skeletal with hollow centers.
Clinopyroxene	15	15		0.02	0.1	subhedral	subequant	
Fe-Ti oxide	7		4	0.02	0.07	subhedral	equant	N/A
Mesostasis	25	10	15	N/A	N/A	N/A	N/A	cryptocrystalline, brown with only minor oxidation

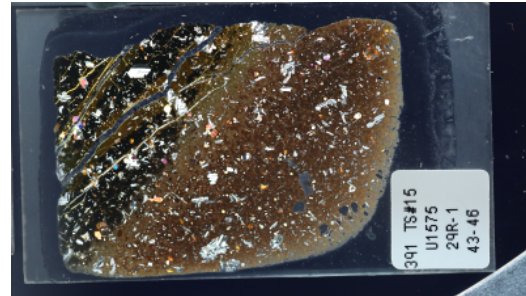
Vesicle	Original (%)	Empty (%)	Filled (%)	Size min. (mm)	Size max. (mm)	Shape	Comments
Vesicle	3		3	0.1	0.6	rounded	Filled with clay and calcite

THIN SECTION LABEL ID: **391-U1575A-29R-1-W 43/46-TSB-TS# 15** Thin section no.: 15
 Observer: WN Piece no.:
 Thin section thickness: Unit/subunit:
 Thin section summary: Pillow basalt with (1) a glassy rim domain and a (2) pillow interior domain. Both domains contain plagioclase and clinopyroxene phenocrysts and glomerocrysts. Olivine is also present in sparse amounts but it has been completely replaced by iddingsite. The glassy domain consists of fresh basaltic glass with plagioclase microlite and bands of palagonite. The pillow interior has a highly altered matrix that appears to be highly oxidized glass with skeletal plagioclase groundmass crystals. Altered olivine is also present in the groundmass, but clinopyroxene and Fe-Ti oxides are not present.

Plane-polarized: 60548051



Cross-polarized: 60548071



Igneous Petrology

Lithology: moderately **plagioclase-augite-olivine phyric basalt pillow lava flow**
Grain size distribution: bimodal **Groundmass grain size (avg.):** cryptocrystalline
Major texture: aphanitic **Minor Texture:** porphyritic

Phenocrysts	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Olivine	2	0	2	0.06	0.1	euhedral	euhedral	Completely altered to iddingsite
Plagioclase	10	10		0.15	1.8	euhedral	tabular	Plag occurs mostly as individual phenocrysts but also in occasional glomerocrysts with cpx and altered olivine. Some grains are fresh while others show varying degrees of sieving.
Clinopyroxene	4	4		0.3	0.8	subhedral	equant	Most cpx have sieve texture centers and rounded exteriors. No compositional zoning is visible but the some of the sieve holes run subparallel to crystal exterior. Rare cpx crystal clusters are present (cumulate?).

Groundmass	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Olivine	1		1	0.02	0.08	subhedral	elongate	completely altered to iddingsite
Plagioclase	8	8		0.01	0.05	subhedral	elongate	Tiny, skeletal groundmass plag.
Fe-Ti oxide			2					N/A
Glass	75		75	N/A	N/A	N/A	N/A	Most of the groundmass, apart from skeletal plagioclase, is oxidized glass

Vesicle	Original (%)	Empty (%)	Filled (%)	Size min. (mm)	Size max. (mm)	Shape	Comments
Vesicle	1		1	0.08	0.16	rounded	clay filled

Igneous Petrology

Lithology: moderately

**plagioclase-augite-olivine phyric
basalt pillow lava flow**

Grain size distribution: bimodal

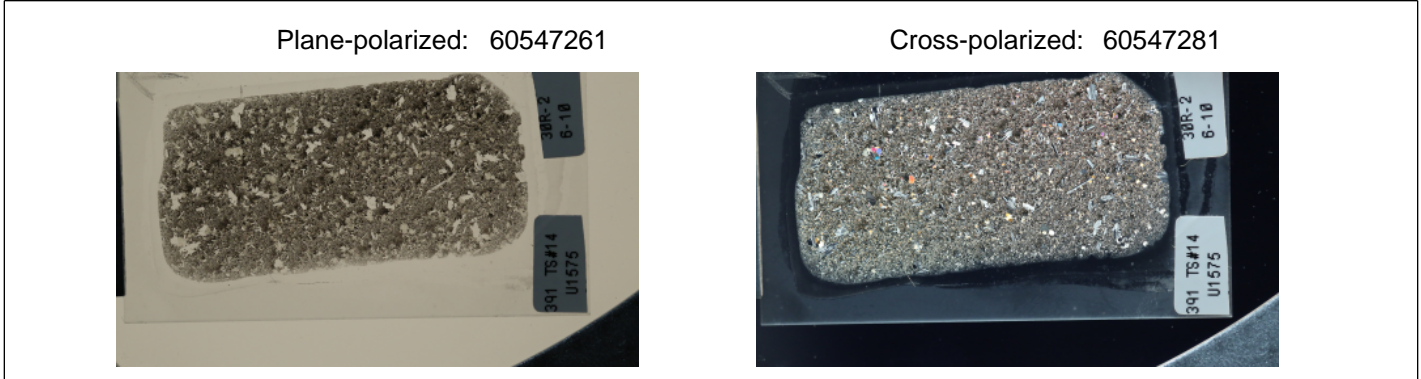
Groundmass grain size (avg.): glass

Major texture: vitrophyric

Minor Texture: porphyritic

Phenocrysts	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Olivine	2	0	2	0.06	0.4	euhedral	euhedral	Completely altered to iddingsite
Plagioclase	6	6	0	0.1	1.4	euhedral	tabular	Plag occurs mostly as individual phenocrysts but also in occasional glomerocrysts with cpx and altered olivine. Grains are fresh without sieving or resorbtion
Clinopyroxene	2	1.5	0.5	0.12	0.8	subhedral	equant	Most cpx have sieve texture centers. No compositional zoning is visible but the some of the sieve holes run subparallel to crystal exterior. Rare cpx crystal clusters are present (cumulate?).
Groundmass	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Plagioclase								No groundmass plagioclase visible
Fe-Ti oxide			2					N/A
Glass	90	45	45	N/A	N/A	N/A	N/A	Glass is either fresh with microlites or altered (in veins) to palagonite. Microlites are present in the glass (5-7%)
Vesicle	Original (%)	Empty (%)	Filled (%)	Size min. (mm)	Size max. (mm)	Shape	Comments	
Vesicle	2		2	0.08	0.14	rounded	clay filled	

THIN SECTION LABEL ID: **391-U1575A-30R-2-W 6/10-TSB-TS# 14** Thin section no.: 14
 Observer: JWS Piece no.:
 Thin section thickness: Unit/subunit:
 Thin section summary: Highly plagioclase-augite phyric basalt with glomerocrysts of plagioclase-augite and plagioclase-olivine, as well as phenocrysts of plagioclase, augite, and olivine. Subophitic to intergranular groundmass of plagioclase, augite, olivine, and oxides. The occurrence of euhedral olivine in the groundmass indicates that this is an alkali basalt, not tholeiitic.



Igneous Petrology

Lithology: highly **plagioclase-augite-olivine phyric basalt lava flow**

Grain size distribution: bimodal **Groundmass grain size (avg.):** medium-grained

Major texture: glomeroporphyritic **Minor Texture:** subophitic

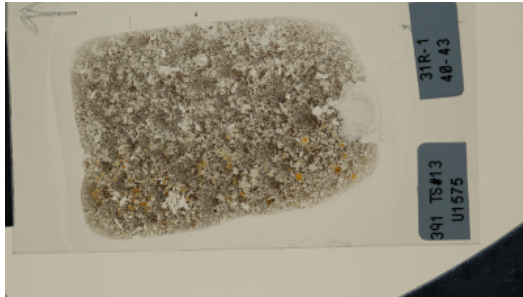
Phenocrysts	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Olivine	8	0	8	0.2	0.7	subhedral	subhedral	Altered to saponite.
Plagioclase	12	12	0	0.3	3.2	euhedral	tabular	Plag occurs as individual phenocrysts and as glomerocrysts with pyroxene. Inclusions rare or absent.
Clinopyroxene	9	9	0	0.3	0.8	subhedral	equant	Augite occurs almost always in glomerocrysts with plagioclase. Minimal zoning. Small clusters of pyroxene with equilibrium grain boundaries look like xenocrysts; some have plag+pyroxene.
Oxide Fe-Ti	15	15	0	0.02	0.06	subhedral	subhedral	

Groundmass	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Olivine	6	0	6	0.05	0.12	euhedral	equant	Altered to serpentine
Plagioclase	20	20	0	0.05	1	euhedral	elongate	Subophitic to ophitic, enclosed in pyroxene.
Clinopyroxene	30	30	0	0.04	0.4	anhedral	subequant	
Fe-Ti oxide		15	8					N/A
Glass	0	0	0	N/A	N/A	N/A	N/A	

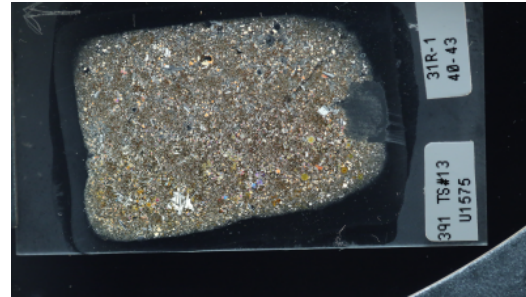
Vesicle	Original (%)	Empty (%)	Filled (%)	Size min. (mm)	Size max. (mm)	Shape	Comments
Vesicle	0.05		0.05	0.1	0.5	rounded	Clay filled

THIN SECTION LABEL ID: **391-U1575A-31R-1-W 40/43-TSB-TS# 13** Thin section no.: 13
 Observer: WN Piece no.:
 Thin section thickness: Unit/subunit:
 Thin section summary: Highly plagioclase-clinopyroxene-phyric basalt with intersertal, glomeroporphyritic, and porphyritic textures. Plagioclase and pyroxene are both found as subophitic glomerocrysts as well as phenocrysts. Glassy mesostasis contains abundant Fe-Ti oxides. Pockets of crystal-free glass are completely altered.

Plane-polarized: 60547201



Cross-polarized: 60547241



Igneous Petrology

Lithology: highly plagioclase-augite phyric basalt lava flow
Grain size distribution: bimodal **Groundmass grain size (avg.):** fine-grained
Major texture: intersertal **Minor Texture:** porphyritic

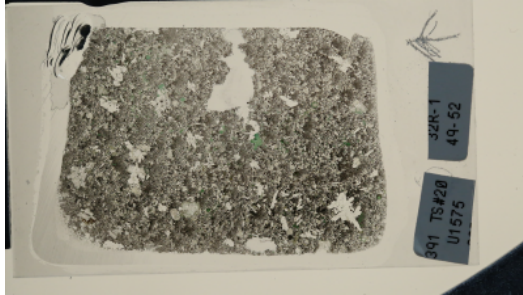
Phenocrysts	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Olivine	0	0						
Plagioclase	13	10	3	0.25	1.4	subhedral	tabular	Single phenocrysts and glomerocrysts of plagioclase. A few show resorbed interiors. A few larger phenocrysts show oscillatory zoning. Alteration is patchy and tied to zones of alteration within the t.s.
Clinopyroxene	10	7	3	0.2	1	subhedral	equant	Present as subophitic glomerocrysts and single phenocrysts. Alteration is patchy and present on a specific side of the thin section.

Groundmass	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Plagioclase	23	20	3	0.05	0.12	euhedral	elongate	slender lathes, some with hollow, skeletal centers
Clinopyroxene	20	15	5	0.01	0.1	subhedral	subequant	
Fe-Ti oxide	12			0.02	0.07	subhedral	subequant	N/A
Mesostasis	15		15	N/A	N/A	N/A	N/A	most looks to be turned to iddingsite
Glass	7		7	N/A	N/A	N/A	N/A	red in color

Vesicle	Original (%)	Empty (%)	Filled (%)	Size min. (mm)	Size max. (mm)	Shape	Comments
Vesicle	1		1	0.4	1	rounded	clay filled

THIN SECTION LABEL ID: **391-U1575A-32R-1-W 49/52-TSB-TS# 20** Thin section no.: 20
 Observer: JLS Piece no.:
 Thin section thickness: Unit/subunit:
 Thin section summary: Highly plagioclase-augite-phyric basalt with glomeroporphyritic and intersertal textures. Plagioclase is often found in glomerocysts. Groundmass consists of fine grained plagioclase and pyroxene with skeletal Fe-oxides. Green clay can be found in altered regions of the sample.

Plane-polarized: 60560751



Cross-polarized: 60560771



Igneous Petrology

Lithology: highly plagioclase-augite phyric basalt lava flow
Grain size distribution: bimodal **Groundmass grain size (avg.):** fine-grained
Major texture: glomeroporphyritic **Minor Texture:** intersertal

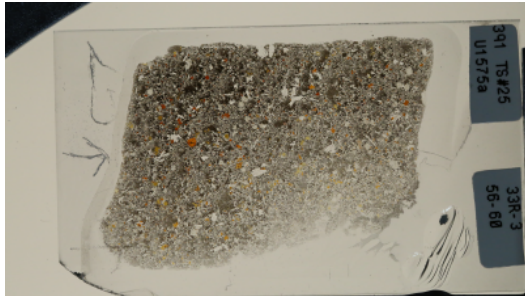
Phenocrysts	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Olivine	0	0						
Plagioclase	11	10	1	0.5	3.4	euhedral	tabular	Plag glomerocrysts often contain melt inclusions.
Clinopyroxene	5	3	2	0.4	1	subhedral	equant	

Groundmass	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Plagioclase	27	25	2	0.02	0.3	anhedral	elongate	
Clinopyroxene	18	15	3	0.01	0.1	subhedral	subequant	
Fe-Ti oxide	10			0.01	0.05	anhedral	elongate	N/A
Glass	29	20	9	N/A	N/A	N/A	N/A	

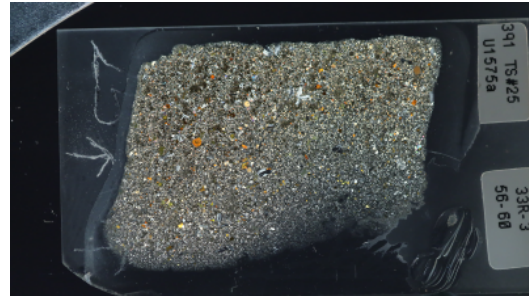
Vesicle	Original (%)	Empty (%)	Filled (%)	Size min. (mm)	Size max. (mm)	Shape	Comments
Vesicle	3	0	3	0.05	1	rounded	Clay filled

THIN SECTION LABEL ID: **391-U1575A-33R-3-W 56/60-TSB-TS# 25** Thin section no.: 25
 Observer: YK, WN Piece no.:
 Thin section thickness: Unit/subunit:
 Thin section summary: Highly plagioclase-pyroxene-olivine-phyric basalt with phenocrysts and glomerocrysts of plagioclase +/-pyroxene in a felty groundmass. Subophitic textures a common in 2-phase glomerocrysts. There may be 2 pyroxene populations (1) bright orange with conspicuous cleavage and anomalous interference colors, and (2) colorless with 2nd order interference colors. Olivine is present as a phenocryst but is completely altered to iddingsite. The groundmass assemblage consists of plagioclase, pyroxene, and Fe-Ti oxides in a dark mesostasis. Sparse vesicles are completely filled.

Plane-polarized: 60620241



Cross-polarized: 60620261



Igneous Petrology

Lithology: highly **plagioclase-augite-olivine phyric basalt lava flow**
Grain size distribution: bimodal **Groundmass grain size (avg.):** microcrystalline
Major texture: glomeroporphyritic **Minor Texture:** subophitic

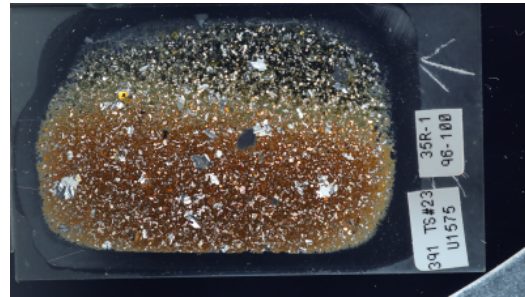
Phenocrysts	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Olivine	3	0	3	0.1	1	subhedral	subhedral	Completely altered iddingsite and/or clay. Alteration mineral is very bright orange.
Plagioclase	10	10		0.16	1.4	subhedral	tabular	Aside from the largest phenocrysts, plagioclase has a seriate texture, making it difficult to discern between phenocryst and groundmass grains.
Clinopyroxene	7	5	2	0.1	0.5	subhedral	equant	Two populations of pyroxene are visible: (1) bright orange with pronounced cleavage and anomalous orange interference colors, and (2) colorless with 2nd order interference colors. The orange pyroxene is likely a pseudomorph. Colorless pyroxene show mild and sporadic zoning.
Groundmass	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Plagioclase	30	30		0.15	0.2	euhedral	elongate	Long, slender habits in a felty pattern
Clinopyroxene	25	20	5	0.02	0.12	subhedral	equant	
Fe-Ti oxide	7		3	0.01	0.05	euhedral	equant	N/A
Mesostasis	18	15	3	N/A	N/A	N/A	N/A	
Vesicle	Original (%)	Empty (%)	Filled (%)	Size min. (mm)	Size max. (mm)	Shape	Comments	
Vesicle	3		3	0.1	0.3	subrounded	filled with a clay mineral	

THIN SECTION LABEL ID: **391-U1575A-35R-1-W 96/100-TSB-TS# 23** Thin section no.: 23
 Observer: WN Piece no.:
 Thin section thickness: Unit/subunit:
 Thin section summary: Pillow basalt with (1) a glassy rim domain and a (2) pillow interior domain. Both domains contain plagioclase and clinopyroxene phenocrysts and glomerocrysts. Olivine is also present (~3-5%) but it has been completely replaced by iddingsite. Glomerocrysts consist of plagioclase, subophitic plagioclase + clinopyroxene, and subophitic plagioclase + clinopyroxene + olivine assemblages. The glassy domain consists of fresh basaltic glass without microlites. Phenocrysts in this region have glass alteration halos. There is a gradual (as opposed to a sharp) transition to the pillow interior. The pillow interior consists of highly oxidized glass with phenocrysts. Clinopyroxene and Fe-Ti oxides are not present.

Plane-polarized: 60560951



Cross-polarized: 60560971



Igneous Petrology

Lithology: moderately
Grain size distribution: bimodal
Major texture: aphanitic

plagioclase-augite-olivine phyric basalt pillow lava flow
Groundmass grain size (avg.): cryptocrystalline
Minor Texture: porphyritic

Phenocrysts	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Olivine	7	0	7	0.1	0.6	subhedral	subhedral	Completely altered to iddingsite
Plagioclase	13	12	1	0.1	1.8	euhedral	tabular	Blocky plag shows minor oscillatory zoning. More elongate plag is less likely to show zoning. Plag is in various states of freshness - some are fresh while others look broken with partially resorbed interiors
Clinopyroxene	4	4		0.06	0.2	subhedral	equant	Many cpx have rounded corners and lightly sieve textured interiors. They can be present as stand alone phenocrysts or as glomerocrysts with plagioclase +/- olivine.

Groundmass	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Plagioclase	3	3		0.04	0.15	euhedral	elongate	Very thin and sometimes skeletal
Clinopyroxene	1	1		0.02	0.04	euhedral	equant	
Fe-Ti oxide			7					N/A
Glass	72		72	N/A	N/A	N/A	N/A	

Igneous Petrology

Lithology: moderately

**plagioclase-augite-olivine phyric
basalt pillow lava flow**

Grain size distribution: bimodal

Groundmass grain size (avg.): glass

Major texture: vitrophyric

Minor Texture: porphyritic

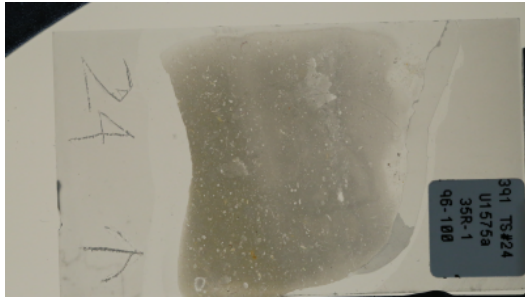
Phenocrysts	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Olivine	4	0	4	0.04	0.12	subhedral	subhedral	Completely altered to iddingsite
Plagioclase	11	10	1	0.1	1.2	euohedral	tabular	Blocky plag shows minor oscillatory zoning. More elongate plag is less likely to show zoning. Plag is in various states of freshness - some are fresh while others look broken with partially resorbed interiors
Clinopyroxene	5	5		0.06	0.2	subhedral	equant	Many cpx have rounded corners and lightly sieve textured interiors. They can be present as stand alone phenocrysts or as glomerocrysts with plagioclase +/- olivine.

Groundmass	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Plagioclase								No groundmass plagioclase visible
Fe-Ti oxide			4					N/A
Glass	80	50	30	N/A	N/A	N/A	N/A	

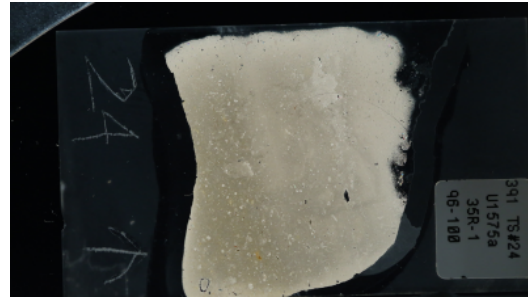
Vesicle	Original (%)	Empty (%)	Filled (%)	Size min. (mm)	Size max. (mm)	Shape	Comments
Vesicle	1	0.5	0.5	0.2	0.4	subrounded	Partially filled with zeolite.

THIN SECTION LABEL ID:	391-U1575A-35R-1-W 138/141-TSB-TS# 24	Thin section no.:	24
Observer:	DB	Piece no.:	
Thin section thickness:		Unit/subunit:	Unit IV
Thin section summary:	Limestone in pillow stack. Biomicrite with common foraminifera and rare possible echinoderms.		

Plane-polarized: 60619981

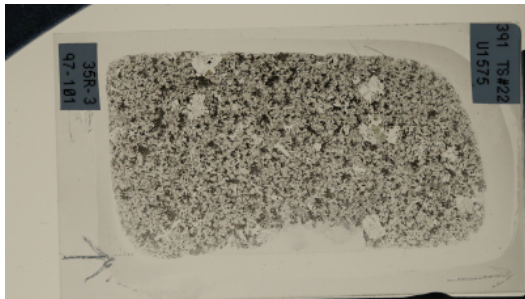


Cross-polarized: 60620181



THIN SECTION LABEL ID: **391-U1575A-35R-3-W 97/101-TSB-TS# 22** Thin section no.: 22
 Observer: JWS Piece no.:
 Thin section thickness: Unit/subunit:
 Thin section summary: Moderately plagioclase-augite phyric basalt. Plag occurs as individual phenocrysts as well as gloms with augite. Much of the augite is highly altered to saponite (?). Plagioclase is very clear, no inclusions. Pyroxene typically occurs with plagioclase in glomerocrysts; smaller pyroxene grains commonly intergrown with plagioclase (subophitic), but large grains are discrete. No mixing textures evident.

Plane-polarized: 60560831



Cross-polarized: 60560851



Igneous Petrology

Lithology: moderately **plagioclase-augite phyric basalt lava flow**
Grain size distribution: seriate **Groundmass grain size (avg.):** fine-grained
Major texture: glomeroporphyritic **Minor Texture:** intersertal

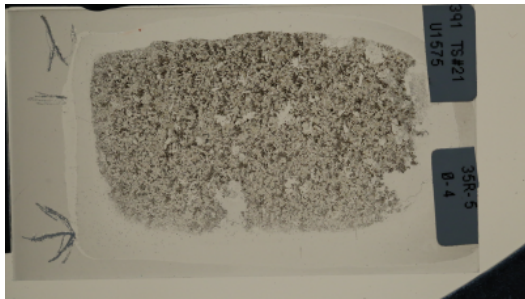
Phenocrysts	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Olivine	0	0						Can't tell if there was any olivine because Cpx is altered to saponite, obscuring any potential measure of prior olivine.
Plagioclase	13	12	1	0.5	1.6	euhedral	tabular	Plag occurs as individual phenocrysts as well as gloms with augite
Clinopyroxene	12	6	6	0.2	2	subhedral	equant	Occurs as phenocrysts and gloms with plagioclase. Much of the augite is altered to saponite, while adjacent Cpx grains are completely fresh.

Groundmass	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Olivine	4	3	1	0.08	0.2	subhedral	equant	
Plagioclase	28	25	3	0.06	0.3	euhedral	tabular	
Clinopyroxene	30	20	10	0.06	0.3	anhedral	subequant	
Fe-Ti oxide	3			0.01	0.02	subhedral	equant	N/A
Mesostasis	15	15		N/A	N/A	N/A	N/A	very fine grained

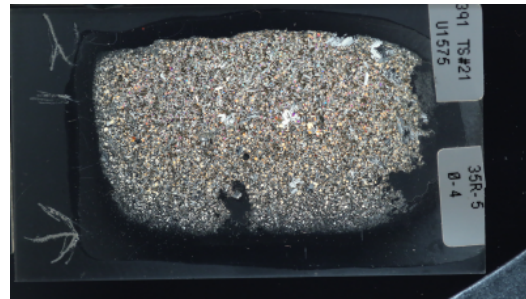
Vesicle	Original (%)	Empty (%)	Filled (%)	Size min. (mm)	Size max. (mm)	Shape	Comments
Vesicle	1	0	1	0.5	0.8	rounded	Clay filled

THIN SECTION LABEL ID: **391-U1575A-35R-5-W 0/4-TSB-TS# 21** Thin section no.: 21
 Observer: JWS Piece no.:
 Thin section thickness: Unit/subunit:
 Thin section summary: Highly plagioclase-augite-olivine phyric basalt. Plag occurs as individual phenocrysts as well as gloms with augite and more rarely olivine. Very clear, no inclusions. Pyroxene and olivine typically occur with plagioclase in glomerocrysts; pyroxene commonly intergrown with plagioclase (subophitic). No mixing textures evident. Groundmass olivine shows that this is alkali basalt.

Plane-polarized: 60560791



Cross-polarized: 60560811



Igneous Petrology

Lithology: highly **plagioclase-augite-olivine phyric basalt lava flow**
Grain size distribution: bimodal **Groundmass grain size (avg.):** fine-grained
Major texture: glomeroporphyritic **Minor Texture:** subophitic

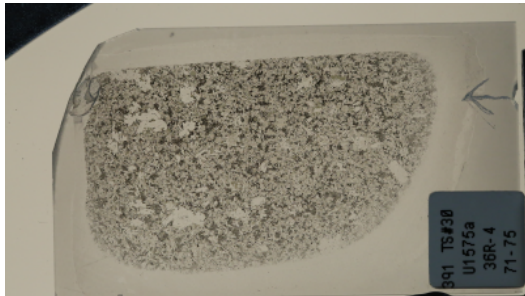
Phenocrysts	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Olivine	2	0	2	0.15	1	euhedral	euhedral	Completely altered to saponite.
Plagioclase	15	15	0	0.25	1.6	euhedral	tabular	Plag occurs as individual phenocrysts as well as gloms with augite and more rarely olivine. Very clear, no inclusions.
Clinopyroxene	9	9	0	0.2	0.6	subhedral	equant	

Groundmass	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Olivine	4	0	4	0.05	0.1	subhedral	equant	Altered to serpentine
Plagioclase	30	30	0	0.1	0.4	subhedral	tabular	
Clinopyroxene	20	20	0	0.04	0.2	anhedral	subequant	
Fe-Ti oxide	2		2			anhedral		N/A
Mesostasis	18	12	6	N/A	N/A	N/A	N/A	

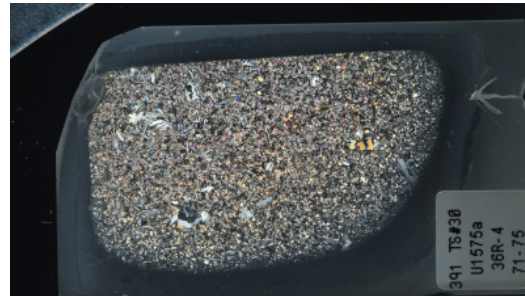
Vesicle	Original (%)	Empty (%)	Filled (%)	Size min. (mm)	Size max. (mm)	Shape	Comments
Vesicle	0	0	0				

THIN SECTION LABEL ID: **391-U1575A-36R-4-W 71/75-TSB-TS# 30** Thin section no.: 30
 Observer: JWS Piece no.:
 Thin section thickness: Unit/subunit:
 Thin section summary: Highly plagioclase-augite phyric basalt. Plag occurs as individual phenocrysts as well as gloms with augite. Very clear, no inclusions. Large tabular grains commonly display oscillatory zoning in outer margins. Augite typically occurs as gloms with plagioclase, more rarely as individual phenocrysts. Some of the augite is altered to saponite, while adjacent augite grains are completely fresh. Augite in gloms is clear, typically untwinned, with smooth grain boundaries. and minor blebby exsolution. Can't tell if there was primary olivine because at least some saponite pseudomorphs clearly replace augite.

Plane-polarized: 60620521



Cross-polarized: 60620541



Igneous Petrology

Lithology: highly **plagioclase-augite phyric basalt lava flow**
Grain size distribution: bimodal **Groundmass grain size (avg.):** fine-grained
Major texture: glomeroporphyritic **Minor Texture:** intergranular

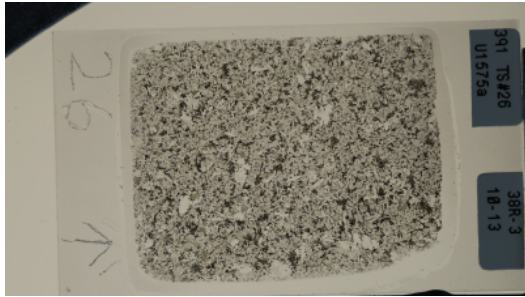
Phenocrysts	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Olivine	0	0						Can't tell if there was any olivine because Cpx is altered to saponite, obscuring any potential measure of prior olivine.
Plagioclase	14	14	0	0.4	2.6	euhedral	tabular	Plag occurs as individual phenocrysts as well as gloms with augite. Very clear, no inclusions. Large tabular grains commonly display oscillatory zoning in outer margins.
Clinopyroxene	11	8	3	0.3	0.8	subhedral	equant	Typically occurs as gloms with plagioclase, more rarely as individual phenocrysts. Some of the augite is altered to saponite, while adjacent augite grains are completely fresh. Augite in gloms is clear, typically untwinned, with smooth grain boundaries. and minor blebby exsolution.

Groundmass	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Plagioclase	34	30	4	0.1	0.6	euhedral	tabular	Subophitic to intersertal textures.
Clinopyroxene	24	18	6	0.07	0.4	anhedral	subequant	
Fe-Ti oxide	2			0.01	0.1	anhedral	elongate	N/A
Mesostasis	15	15		N/A	N/A	N/A	N/A	Small plag laths in poorly crystallized pyroxene, with abundant Fe-Ti oxides.

Vesicle	Original (%)	Empty (%)	Filled (%)	Size min. (mm)	Size max. (mm)	Shape	Comments
Vesicle	1	0	1	0.1	0.5	rounded	Clay-filled; some have radial calcite in center.

THIN SECTION LABEL ID: **391-U1575A-38R-3-W 10/13-TSB-TS# 26** Thin section no.: 26
 Observer: JWS Piece no.:
 Thin section thickness: Unit/subunit:
 Thin section summary: Highly plagioclase-augite-olivine phyric basalt. Plagioclase occurs as individual phenocrysts as well as gloms with augite and less commonly olivine. Very clear, no inclusions. Large tabular grains commonly display normal continuous zoning, especially in outer margins. Olivine altered to yellow clay, probably saponite. Rare very large augite attached to very large plagioclase. Some plagioclase crystals have thin exsolution blebs of Kspar.

Plane-polarized: 60620281



Cross-polarized: 60620301



Igneous Petrology

Lithology: highly **plagioclase-augite-olivine phyric basalt lava flow**
Grain size distribution: seriate **Groundmass grain size (avg.):** fine-grained
Major texture: glomeroporphyritic **Minor Texture:** intersertal

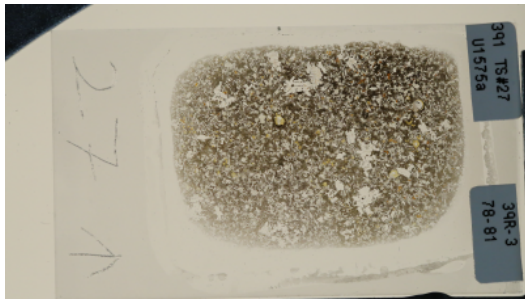
Phenocrysts	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Olivine	4	0	4	0.15	0.5	euhedral	euhedral	Altered to yellow clay, probably saponite. .
Plagioclase	14	14	0	0.4	2.1	euhedral	tabular	Plagioclase occurs as individual phenocrysts as well as gloms with augite and less commonly olivine. Very clear, no inclusions. Large tabular grains commonly display normal continuous zoning, especially in outer margins.
Clinopyroxene	10	8	2	0.2	1.9	anhedral	equant	Rare very large augite attached to very large plagioclase.

Groundmass	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Olivine	5	0	5	0.06	0.2	subhedral	equant	
Plagioclase	32	32	0	0.04	0.25	euhedral	tabular	
Clinopyroxene	22	18	4	0.03	0.5	anhedral	subequant	
Fe-Ti oxide			4					N/A
Mesostasis	12	12	0	N/A	N/A	N/A	N/A	Small plag laths in poorly crystallized pyroxene, with abundant Fe-Ti oxides. Appears to be former interstitial glass. Probably quenched melt on eruption.

Vesicle	Original (%)	Empty (%)	Filled (%)	Size min. (mm)	Size max. (mm)	Shape	Comments
Vesicle	0	0	0				

THIN SECTION LABEL ID: **391-U1575A-39R-3-W 78/81-TSB-TS# 27** Thin section no.: 27
 Observer: JWS Piece no.:
 Thin section thickness: Unit/subunit:
 Thin section summary: Highly plagioclase-augite phyric basalt. Plagioclase forms giant glomerocrysts up 3 mm across, typically just plagioclase but some with augite. Olivine microphenocryst are euhedral but completely replaced by clays (saponite?). Sector zoning common. Imperfect, looks like butterfly wings. Aphanitic groundmass is entirely mesostasis; probably devitrified glass. There is no typical crystalline groundmass.

Plane-polarized: 60620321



Cross-polarized: 60620341

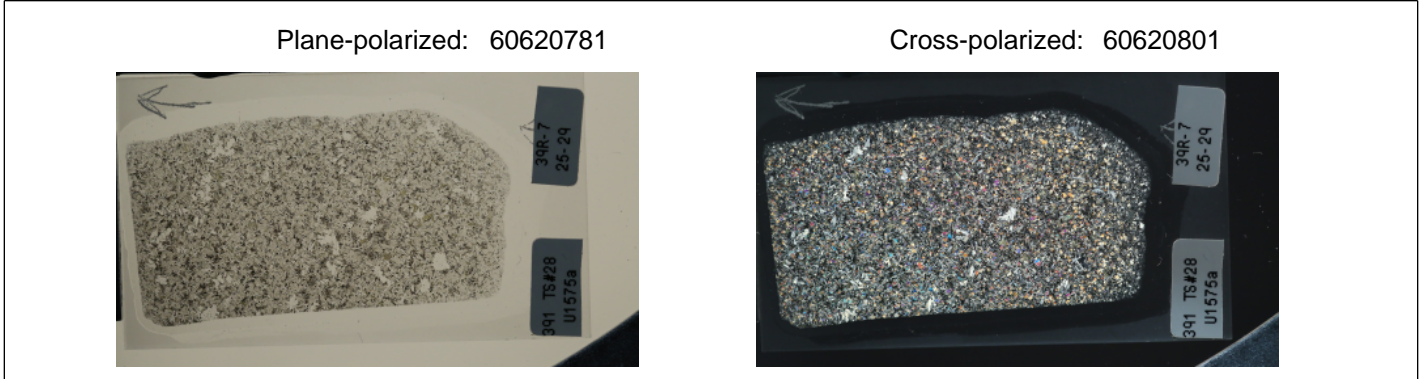


Igneous Petrology

Lithology: highly **plagioclase-augite-olivine phyric basalt lava flow**
Grain size distribution: bimodal **Groundmass grain size (avg.):** cryptocrystalline
Major texture: glomeroporphyritic **Minor Texture:** aphanitic

Phenocrysts	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Olivine	3	0	3	0.15	0.5	euhedral	euhedral	Altered to yellow clay, with hematite.
Plagioclase	14	14	0	0.15	2	euhedral	tabular	Plagioclase forms giant glomerocrysts up 3 mm across, typically just plagioclase but some with augite.
Clinopyroxene	10	8	2	0.1	0.7	anhedral	equant	Sector zoning common. Imperfect, looks like butterfly wings.
Groundmass	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Fe-Ti oxide			3					N/A
Mesostasis	72	70	2	N/A	N/A	N/A	N/A	
Vesicle	Original (%)	Empty (%)	Filled (%)	Size min. (mm)	Size max. (mm)	Shape	Comments	
Vesicle	2	0	2	0.2	1	rounded	Filled with clay, calcite	

THIN SECTION LABEL ID: **391-U1575A-39R-7-W 25/29-TSB-TS# 28** Thin section no.: 28
 Observer: JLS Piece no.:
 Thin section thickness: Unit/subunit:
 Thin section summary: Highly plagioclase-augite-phyric basalt with glomeroporphyritic and intersertal textures. Plagioclase and pyroxene are both found in glomerocrysts and often contain melt inclusions. Groundmass consists of fine grained plagioclase and pyroxene with skeletal Fe-oxides.



Igneous Petrology

Lithology: highly plagioclase-augite phyric basalt lava flow

Grain size distribution: Groundmass grain size (avg.): fine-grained

Major texture: glomeroporphyritic **Minor Texture:** intergranular

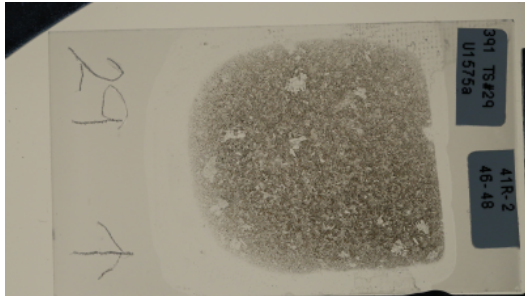
Phenocrysts	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Olivine	0	0						
Plagioclase	15	15	0	0.8	3.5	euhedral	tabular	Plagioclase forms in glomerocrysts and often contains melt inclusions.
Clinopyroxene	12	10	2	0.5	1	subhedral	equant	Sector and oscillatory zoning is present in the pyroxene phenocrysts. Pyroxene also occurs in glomerocrysts.

Groundmass	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Plagioclase	21	20	1	0.08	0.3	euhedral	elongate	
Clinopyroxene	12	10	2	0.04	0.2	subhedral	subequant	
Fe-Ti oxide	7			0.005	0.2	anhedral	elongate	N/A
Glass	33	3	30	N/A	N/A	N/A	N/A	

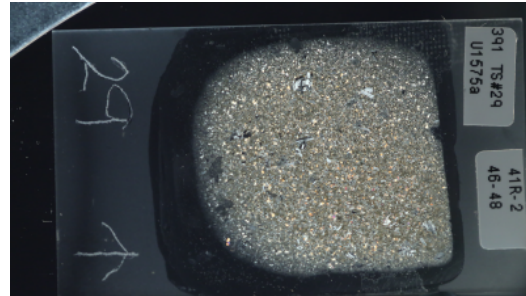
Vesicle	Original (%)	Empty (%)	Filled (%)	Size min. (mm)	Size max. (mm)	Shape	Comments
Vesicle	2	0	2	0.2	0.5	rounded	Filled with clay.

THIN SECTION LABEL ID: **391-U1575A-41R-2-W 46/48-TSB-TS# 29** Thin section no.: 29
 Observer: JWS Piece no.:
 Thin section thickness: Unit/subunit:
 Thin section summary: Highly plagioclase-augite-olivine phyric basalt. Plag occurs as individual phenocrysts as well as gloms with augite. Very clear, no inclusions. Large tabular grains commonly display oscillatory zoning in outer margins. Augite typically occurs as gloms with plagioclase, more rarely as individual phenocrysts. Some of the augite is altered to saponite, while adjacent augite grains are completely fresh. Augite in gloms is clear, with smooth grain boundaries. and minor blebby exsolution. Can't tell if there was primary olivine because at least some saponite psuedomorphs clearly replace augite.

Plane-polarized: 60620431



Cross-polarized: 60620501



Igneous Petrology

Lithology: moderately **plagioclase-augite phyric basalt lava flow**
Grain size distribution: seriate **Groundmass grain size (avg.):** fine-grained
Major texture: glomeroporphyritic **Minor Texture:** intersertal

Phenocrysts	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Olivine	0	0						
Plagioclase	10	10	0	0.3	1.2	euhedral	tabular	Plag occurs as individual phenocrysts as well as gloms with augite. Very clear, no inclusions. Large tabular grains commonly display oscillatory zoning in outer margins.
Clinopyroxene	10	7	3	0.1	0.3	anhedral	equant	

Groundmass	Original (%)	Present (%)	Replaced (%)	Size min. (mm)	Size max. (mm)	Shape	Habit	Comments
Olivine								Can't tell if there is groundmass olivine because augite alters to similar saponite phase.
Plagioclase	35	35	0	0.05	0.3	euhedral	tabular	
Clinopyroxene	18	10	8	0.05	0.25	anhedral	subequant	
Fe-Ti oxide	1					subhedral	equant	N/A
Mesostasis	25	20	5	N/A	N/A	N/A	N/A	Small plag laths in poorly crystallized pyroxene, with abundant Fe-Ti oxides. Appears to be former interstitial glass - plag laths feather out into Px, as if into melt. Probably quenched melt on eruption.
Glass	0	0	0	N/A	N/A	N/A	N/A	

Vesicle	Original (%)	Empty (%)	Filled (%)	Size min. (mm)	Size max. (mm)	Shape	Comments
Vesicle	1	0	1	0.1	0.3	rounded	Clay-filled