

71566 – 415.4 grams

71567 – 146 grams

71509 – 1.7 grams

71565 – 24.1 grams

Ilmenite Basalt



Figure 1: Photo of 71566. Sample is 10 cm long. S73-31330.

Introduction

71566, 71567 and 71565 are coarse-grain, plagioclase-poikilitic ilmenite basalts similar to 71509 (Warner et al. 1978). They have vugs and vesicles and contain aggregates of ilmenite and pyroxene (figures 5 and 6). (note: also similar to 71556 etc.)

71525 - 71596 etc. are rake samples collected as part of a comprehensive sample at station 1, taken near Steno Crater, Apollo 17. They include numerous small ilmenite basalts.

Petrography

Plagioclase plates are intergrown with pyroxene. Large pyroxene grains are sector-zoned and enclose ilmenite and resorbed olivine. Pyroxene zoning includes

Mineralogical Mode

	71509	71565	71566	71567
Olivine	1.8	0.6	0.6	0.6
Pyroxene	46.8	48.2	48.7	52.3
Plagioclase	32.3	31.8	32	27.4
Opakes	16.8	14.6	15.1	15.6
Silica	1	3.5	2.7	3
Meostasis	1.3	1.3	1.2	1.1

pigeonite (figure 4). Minor minerals include zirconolite, tranquillityite, armalcolite, baddeleyite and blebs of metallic iron with trace Co and Ni (Warner et al. 1976). Large “crinkled” areas of silica can be found in the intersitices (Neal and Taylor 1973).

Armalcolite: Warner et al. (1976) give detailed analyses of armalcolite in three of these samples.

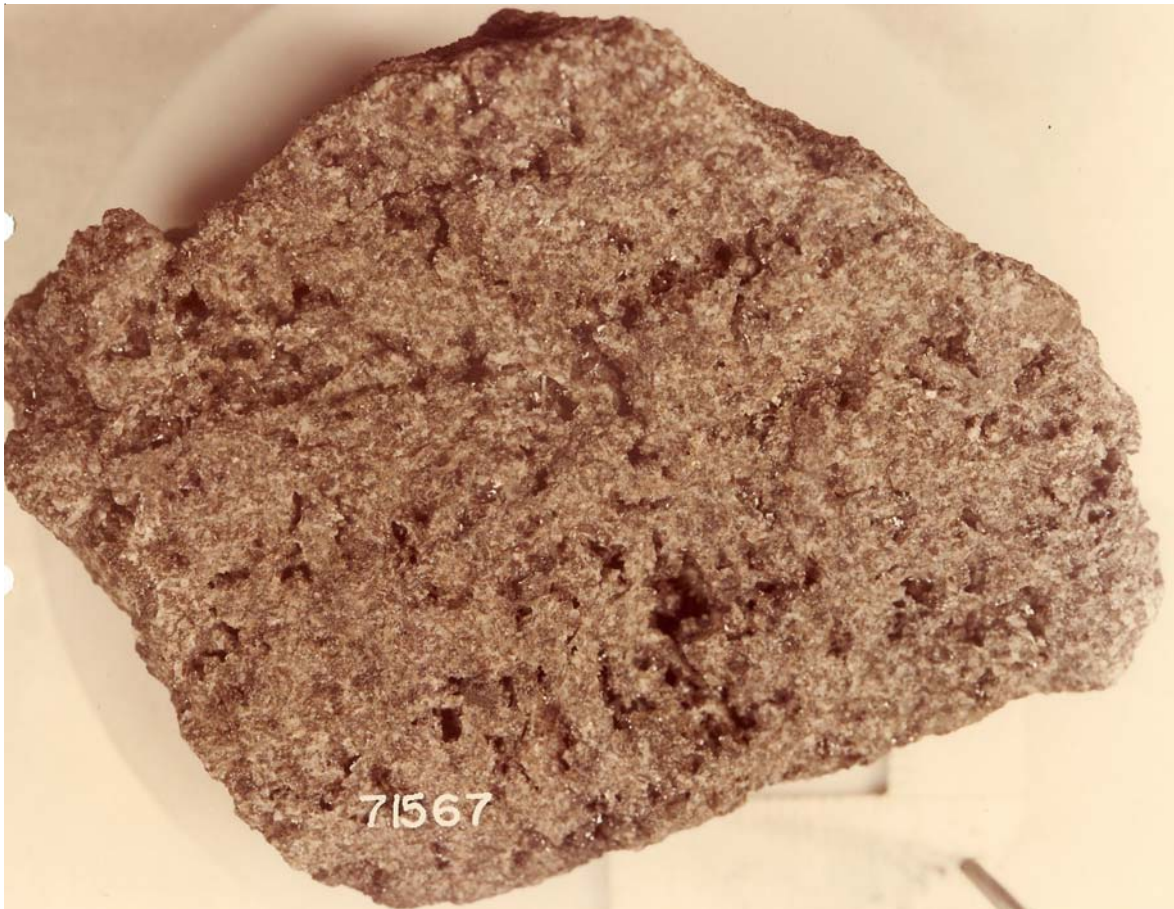


Figure 2: Photos of 71567 and 71565. Samples are about 10 cm and 4 cm across respectively. S73-31346 and S73-33451.

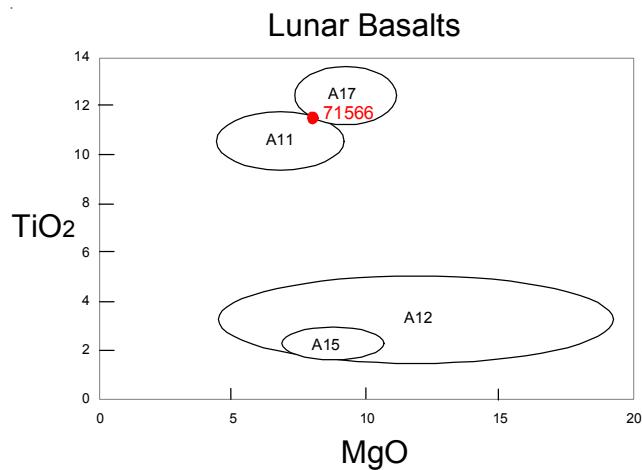


Figure 3: Composition of 71566.

Chemistry

Warner et al. (1975) and Rhodes et al. (1976) analyzed these samples (Tables 1 -3)(figures 3 and 8). Rhodes et al. termed the type U, but Neal and Taylor (1993) classified them as type A, based on trace element content.

Radiogenic age dating

none

Cosmogenic isotopes and exposure ages

O'Kelley et al. (1974) determined the cosmic-ray-induced activity of $^{22}\text{Na} = 49$ dpm/kg., $^{26}\text{Al} = 50$ dpm/kg., and $^{54}\text{Mn} = 95$ dpm/kg. for 71566.

Processing

71566,4 is a display sample at the LodeStar Astronomy Center in Albuquerque, NM.

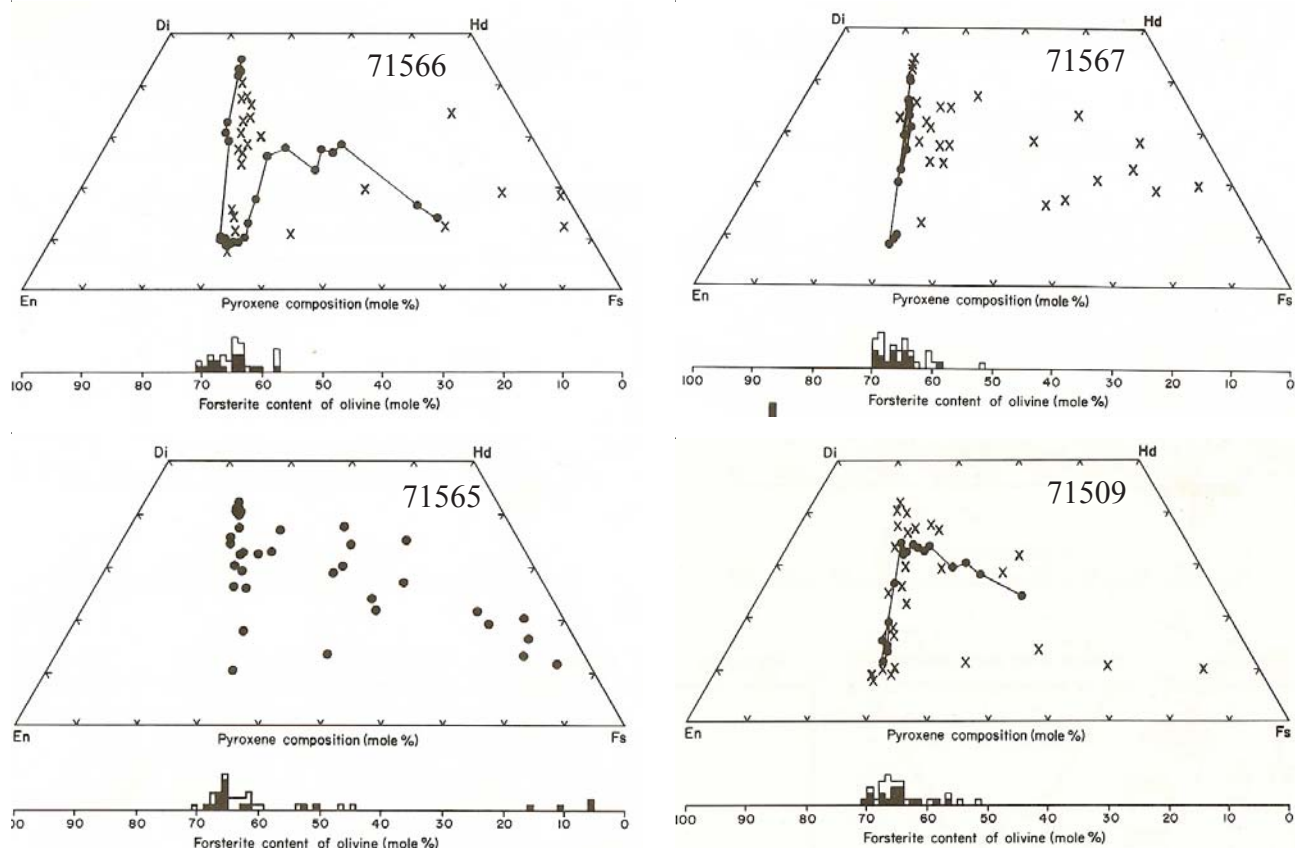


Figure 4: Composition of pyroxene and olivine in 71566 and related samples (Warner et al. 1978).

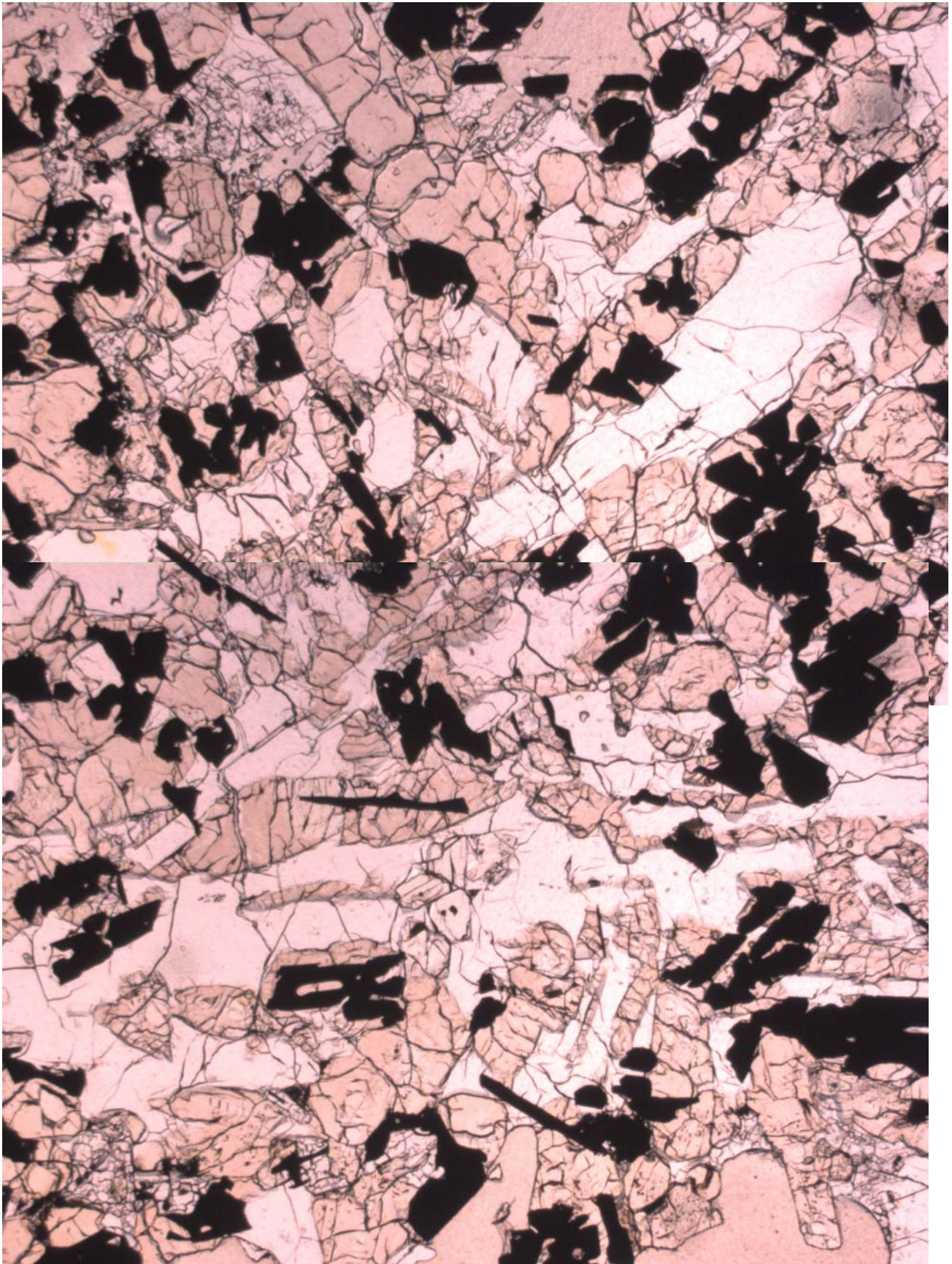


Figure 5a: Photomicrograph of thin section 71566,15. 2.8 mm across.

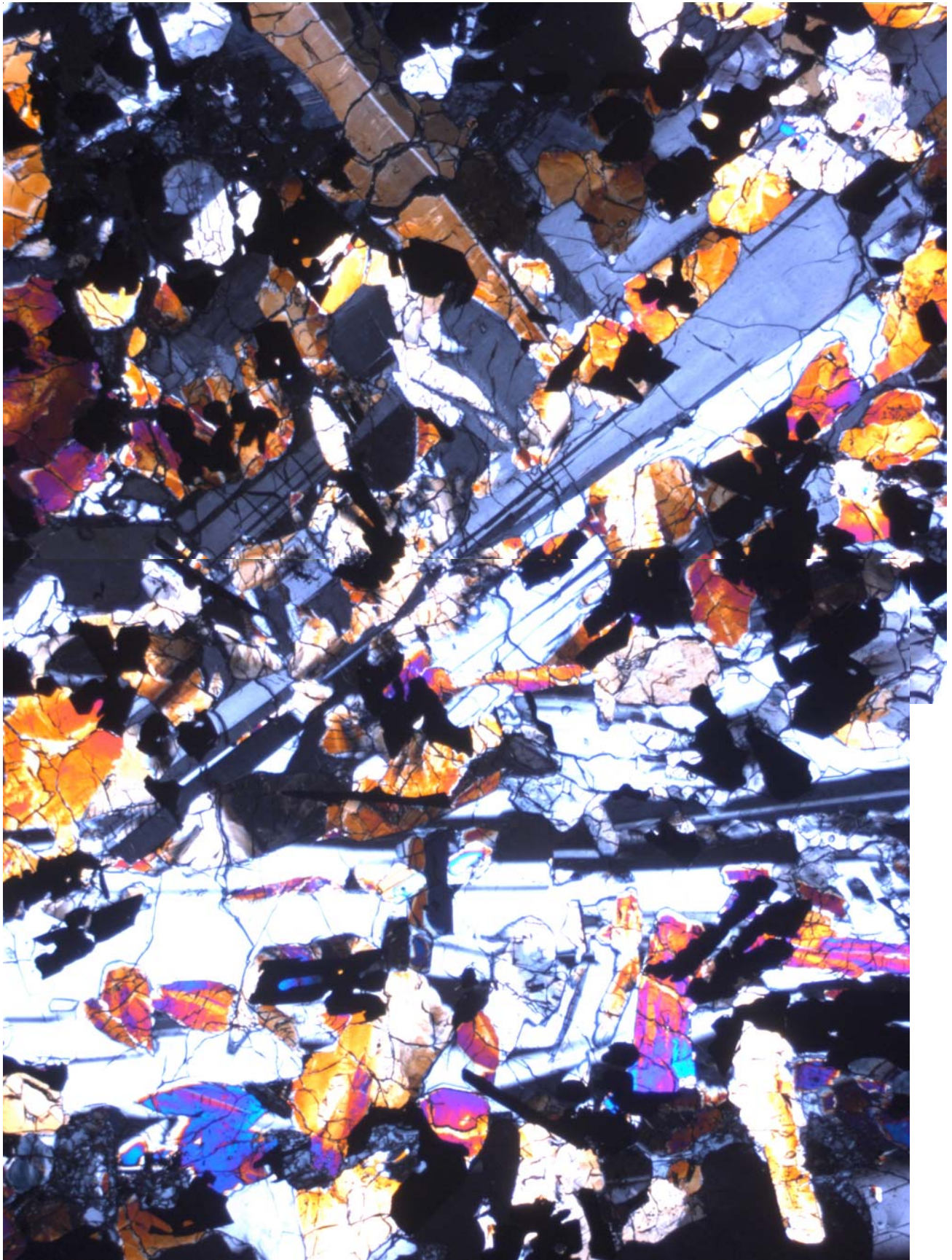


Figure 5b: Photomicrograph of thin section 71566,15. Crossed Nicols. 2.8 mm across.

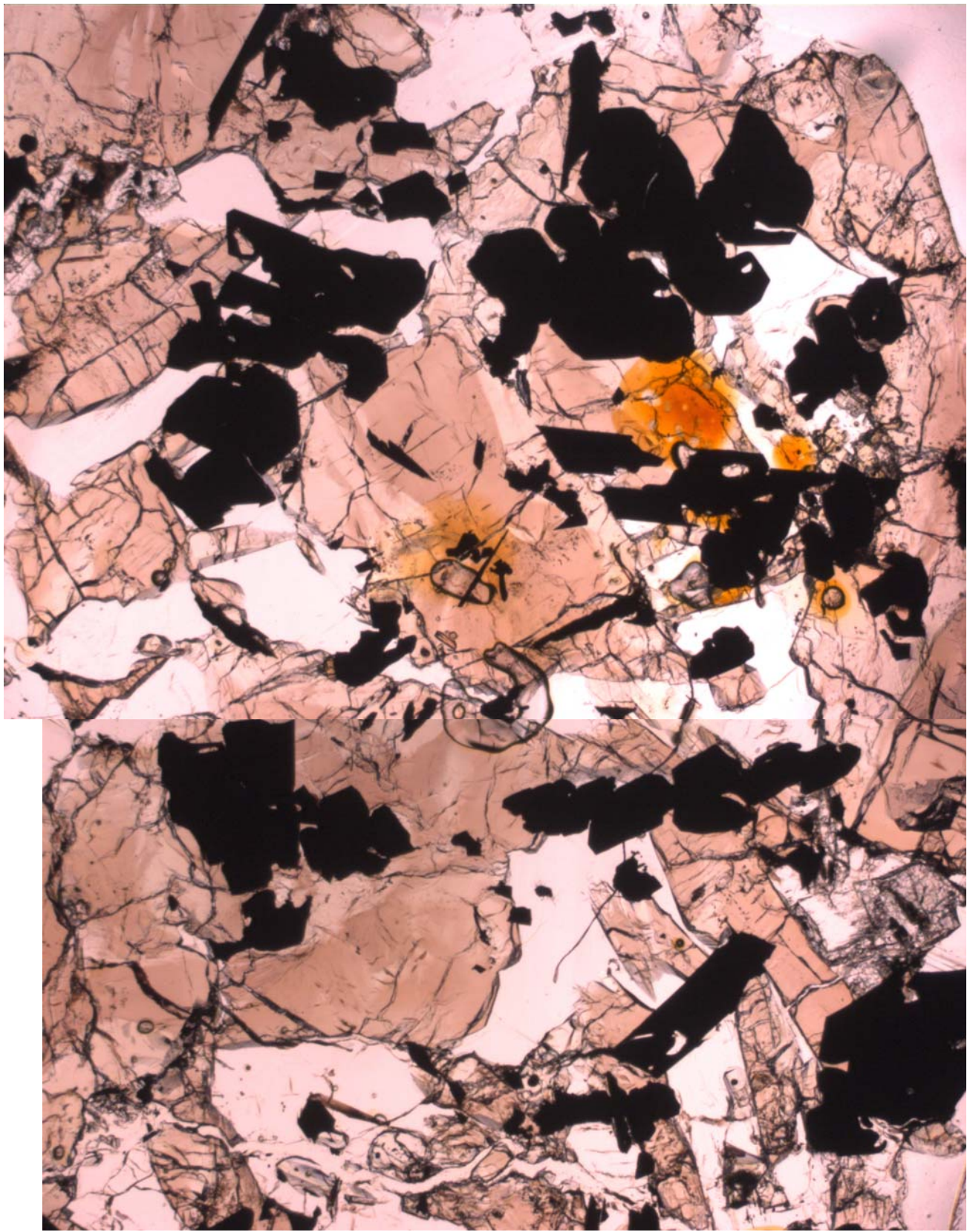


Figure 6a: Photomicrograph of thin section 71567,13. 2.8 mm across.

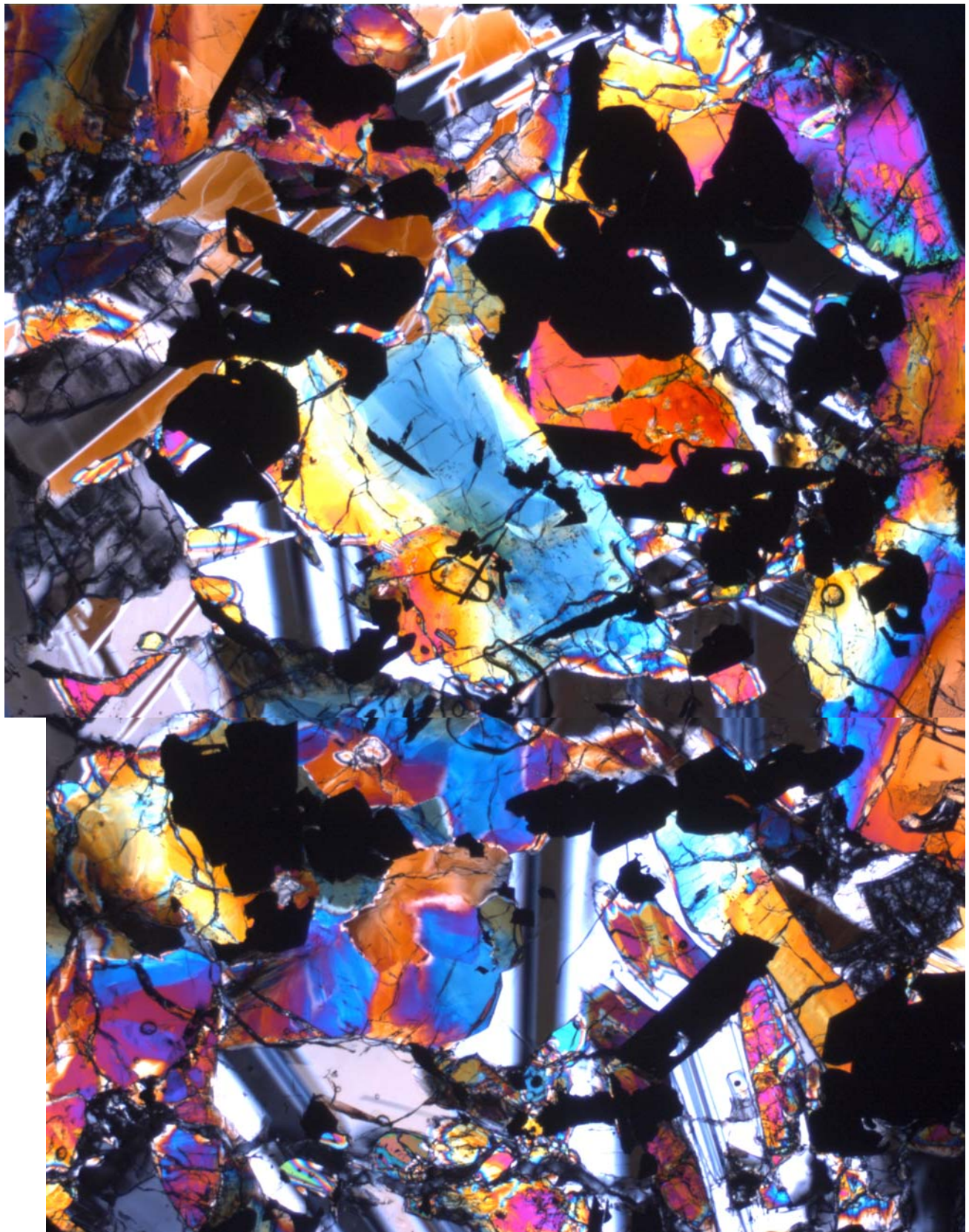


Figure 6b: Photomicrograph of thin section 71567,13. Crossed Nicols. 2.8 mm across.

Table 1. Chemical composition of 71566.

reference weight	Warner78	Rhodes76	Eldridge74
SiO ₂ %		39.27 (b)	
TiO ₂	11.5	(a) 12.01 (b)	
Al ₂ O ₃	9.4	(a) 9.22 (b)	
FeO	18.4	(a) 18.73 (b)	
MnO	0.23	(a) 0.27 (b)	
MgO	8.2	(a) 8.4 (b)	
CaO	11	(a) 10.89 (b)	
Na ₂ O	0.44	(a) 0.4 (b)	0.054 (d)
K ₂ O	0.05	(a) 0.03 (b)	
P ₂ O ₅		0.03 (b)	
S %		0.16 (b)	
sum			
Sc ppm	73	(c) 78 (c)	
V	90	(c)	
Cr		2600 (b)	
Co	20	(c) 18 (c)	
Ni			
Cu			
Zn			
Ga			
Ge ppb			
As			
Se			
Rb			
Sr			
Y			
Zr			
Nb			
Mo			
Ru			
Rh			
Pd ppb			
Ag ppb			
Cd ppb			
In ppb			
Sn ppb			
Sb ppb			
Te ppb			
Cs ppm			
Ba			
La	4.1	(c) 4.29 (c)	
Ce	20	(c) 17.2 (c)	
Pr			
Nd	18	(c)	
Sm	6.9	(c) 7.62 (c)	
Eu	1.7	(c) 1.75 (c)	
Gd			
Tb	1.8	(c)	
Dy	12	(c)	
Ho			
Er			
Tm			
Yb	6.4	(c) 7.9 (c)	
Lu	0.98	(c) 1.16 (c)	
Hf	6.6	(c) 7.8 (c)	
Ta	1.3	(c)	
W ppb			
Re ppb			
Os ppb			
Ir ppb			
Pt ppb			
Au ppb			
Th ppm			0.31 (d)
U ppm			0.092 (d)

technique (a) broad beam e probe, (b) XRF, (c) INAA, (d) radiation count.

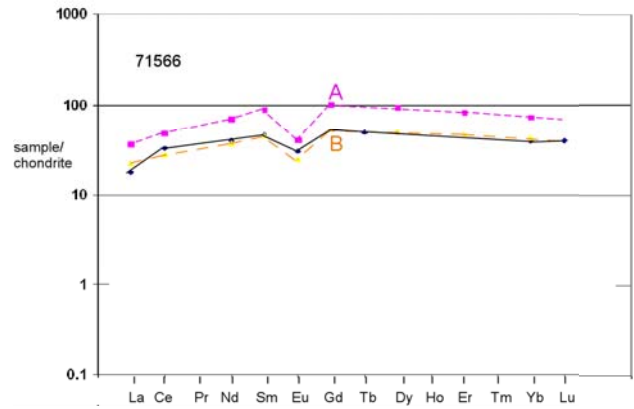


Figure 7: Normalized rare-earth-element diagram for 71566 and type A and B basalts.

Table 2. Chemical composition of 71567.

reference weight	Warner78	Rhodes76	Warner75
SiO2 %		38.06	(b)
TiO2	11.4	(a)	12.98 (b)
Al2O3	9.3	(a)	8.59 (b)
FeO	18	(a)	19.4 (b)
MnO	0.23	(a)	0.28 (b)
MgO	7.5	(a)	8.83 (b)
CaO	10.3	(a)	10.57 (b)
Na2O	0.4	(a)	0.38 (b)
K2O	0.07	(a)	0.03 (b)
P2O5			0.02 (b)
S %			0.16 (b)
sum			
Sc ppm	73	(a)	
V	100	(a)	
Cr	1574	(a)	2942 (b)
Co	16.7	(a)	
Ni			
Cu			
Zn			
Ga			
Ge ppb			
As			
Se			
Rb			
Sr			
Y			
Zr			
Nb			
Mo			
Ru			
Rh			
Pd ppb			
Ag ppb			
Cd ppb			
In ppb			
Sn ppb			
Sb ppb			
Te ppb			
Cs ppm			
Ba			
La	6	(a)	
Ce	24	(a)	
Pr			
Nd			
Sm	10.9	(a)	
Eu	2	(a)	
Gd			
Tb	2.6	(a)	
Dy	15	(a)	
Ho			
Er			
Tm			
Yb	9.4	(a)	
Lu	1.3	(a)	
Hf	8.4	(a)	
Ta	1.7	(a)	
W ppb			
Re ppb			
Os ppb			
Ir ppb			
Pt ppb			
Au ppb			
Th ppm			
U ppm			
technique:	(a) INAA, (b) XRF		

Table 3. Chemical composition of 71565.

reference weight	Warner75
SiO2 %	
TiO2	10.8 (a)
Al2O3	10.1 (a)
FeO	17.6 (a)
MnO	0.225 (a)
MgO	7.5 (a)
CaO	11.7 (a)
Na2O	0.43 (a)
K2O	0.071 (a)
P2O5	
S %	
sum	
Sc ppm	76 (a)
V	90 (a)
Cr	2443 (a)
Co	16.1 (a)
Ni	
Cu	
Zn	
Ga	
Ge ppb	
As	
Se	
Rb	
Sr	
Y	
Zr	
Nb	
Mo	
Ru	
Rh	
Pd ppb	
Ag ppb	
Cd ppb	
In ppb	
Sn ppb	
Sb ppb	
Te ppb	
Cs ppm	
Ba	
La	6.4 (a)
Ce	26 (a)
Pr	
Nd	
Sm	9.2 (a)
Eu	2.11 (a)
Gd	
Tb	2.3 (a)
Dy	15 (a)
Ho	
Er	
Tm	
Yb	8.3 (a)
Lu	1.4 (a)
Hf	8 (a)
Ta	1.9 (a)
W ppb	
Re ppb	
Os ppb	
Ir ppb	
Pt ppb	
Au ppb	
Th ppm	
U ppm	
technique:	(a) INAA

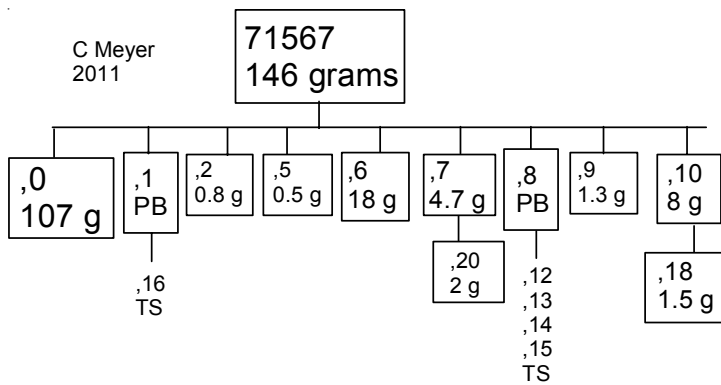
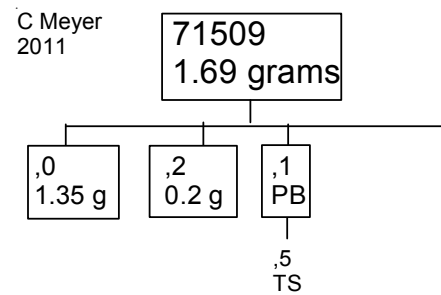
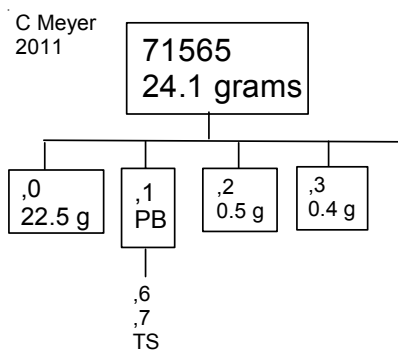
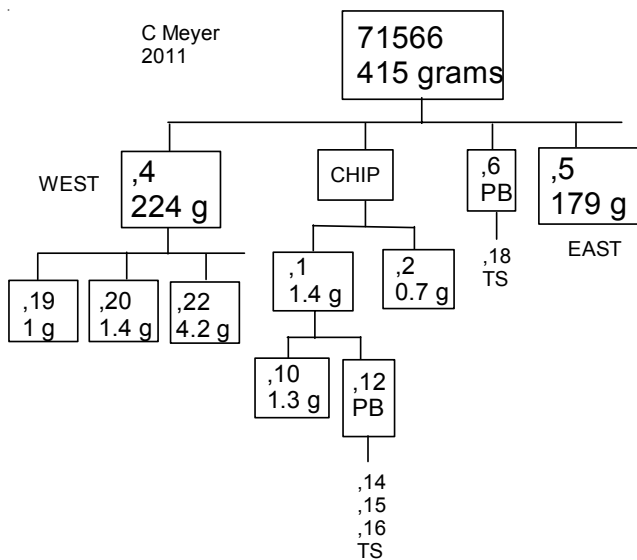


Figure 8: Subdivison of 71566 with cm scale and cube. S74-19016

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