77535 – 578 grams
77536 – 355 grams
Ilmenite Basalt

Figure 1: Top view of 77535 showing numerous zap pits from micrometeorite bombardment. Sample is 8 cm across. S73-19122

Figure 2: Side view of 77535 showing rounded surface caused by long term micrometeorite bombardmant. Cube is 1 cm. S73-19124.

Introduction

77535 and 77536 are coarse-grained plagioclase-poikilitic ilmenite basalts similar to 71565, 71567 and 71509 (Warner et al. 1978). The average grain size of 77536 is about 2 mm. These samples deserve more study.

Petrography

Plagioclase plates are intergrown with pyroxene (figures 6 and 7). Large pyroxene grains are sector-zoned and enclose ilmenite and resorbed olivine. Minor minerals include zirconolite, tranquilityite, armalcolite

Figure 3a,b: Side and top view of 77536. Sample is 11 cm long. S73-19151 and 31326

and baddeleyite. Pyroxene diagrams show that these two rock have substantial low-Ca pigeonite (figure 5).

Chemistry

Warner et al. (1975) and Rhodes et al. (1976) determined the bulk composition (table 1, figures 8, 9 and 10). They remain unclassified.

Gibson et al. (1976) reported 1865 ppm S.

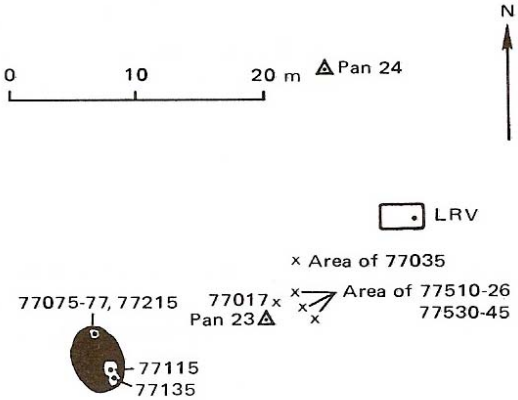


Figure 4: Map of station 7.

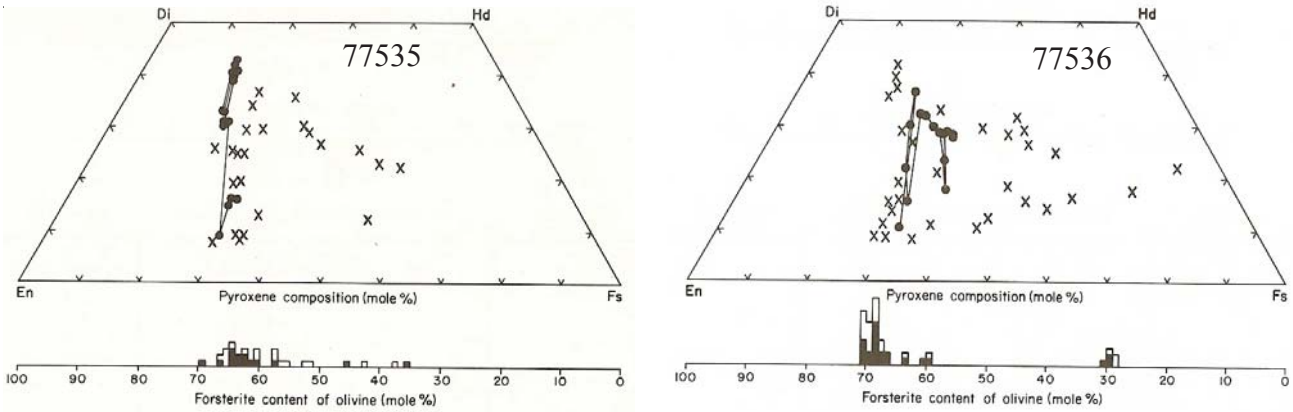


Figure 5a,b: Pyroxene and olivene composition of 77535 and 77536 (Warner et al. 1978).

Radiogenic age dating

Nyquist et al. (1976) determined Rb, Sr and $Sr^{87/86}$. Although 77535 is coarse-grained, and mineral separation should be easy, they did not determined an internal mineral isochron. The zirconolite in these samples, contains high U (table 3) and should prove easy to date by U-Pb ion probe.

Processing

77535 and 77536 have not been subdivided, nor much allocated. They only have three small thin sections between them.

Mineralogical Mode

	77535	77536
Olivine	0.5	1.3
Pyroxene	47.9	49.7
Plagioclase	30.8	26.8
Opaques	16.9	19.5
Silica	2.9	1.6
Meostasis	1	1

Table 2: Armalcolite for 77535.
(Warner et al. 1976)

TiO2	71.8	71.6	70.5	71.4	70.6
Al2O3	1.95	2.25	1.6	1.85	2.15
Cr2O3	1.89	1.86	1.53	1.74	1.95
V2O3	0.19	0.17	0.25	0.23	0.21
FeO	15.3	15.3	15.5	15.5	15.9
MgO	7.5	7.3	8	7.4	7.2
CaO	0.66	0.72	0.81	0.72	0.92
ZrO2	0.17	0.23	0.11	0.06	0.1

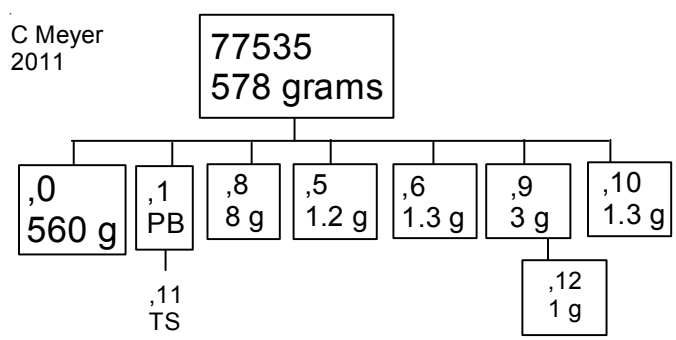
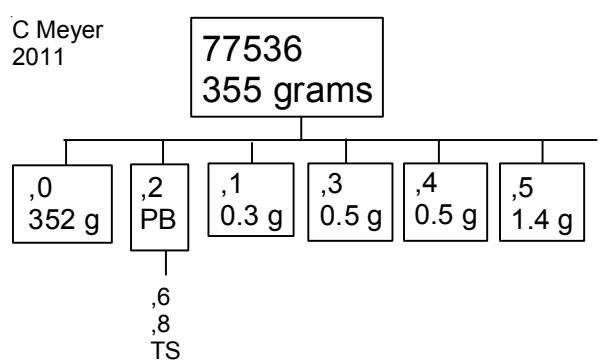


Table 3: Zirconolite in 77536.
(Warner et al. 1976)

TiO2	27.9	27.6
Al2O3	1.45	1.64
Cr2O3	0.47	0.46
FeO	8.6	9
MgO	0.34	0.42
CaO	4	4.3
ZrO2	33.6	35.8
HfO2	1.06	1.26
Nb2O5	2.84	2.25
Y2O3	10.8	10.8
UO2	0.31	0.18



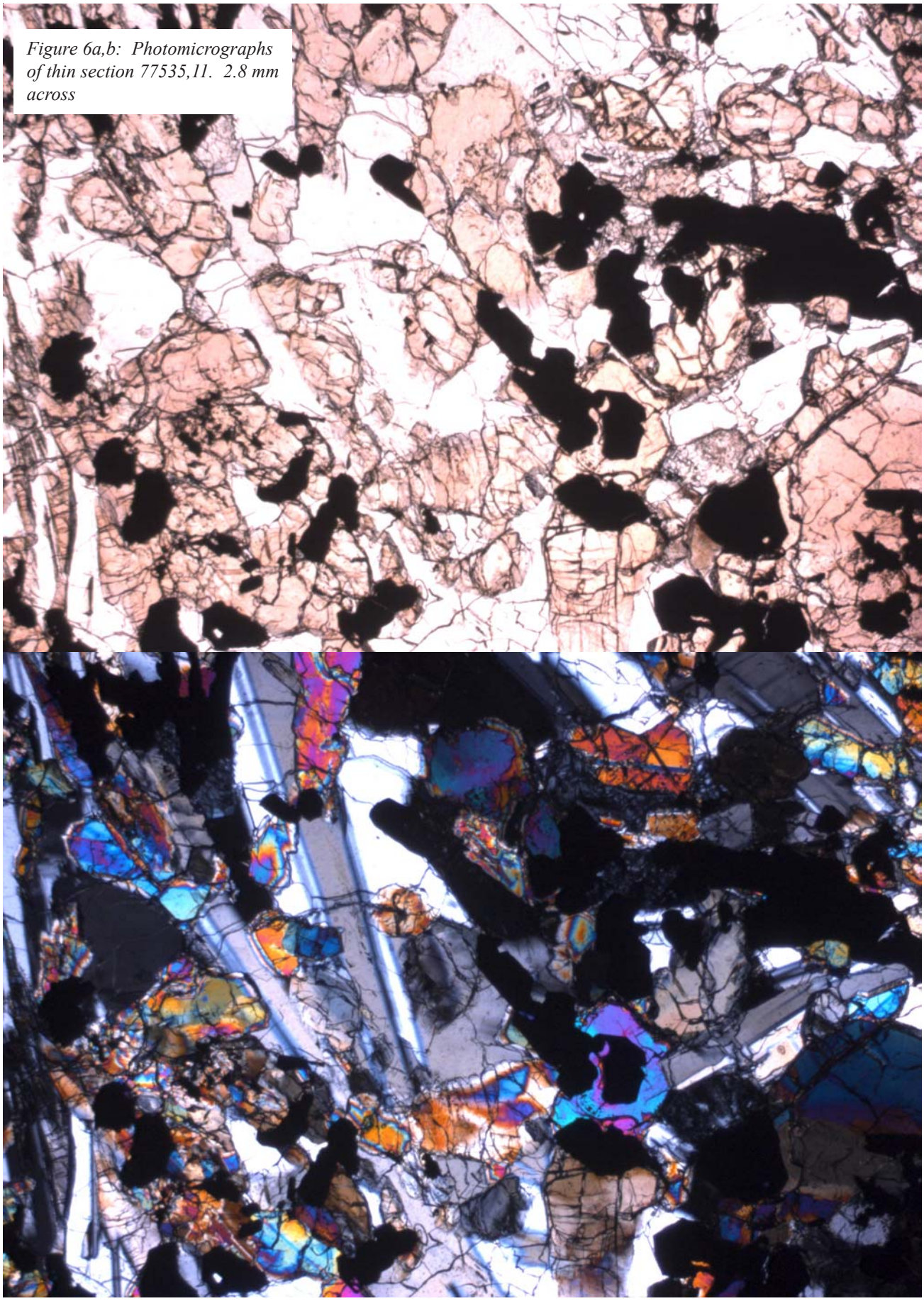


Figure 6a,b: Photomicrographs of thin section 77535,11. 2.8 mm across

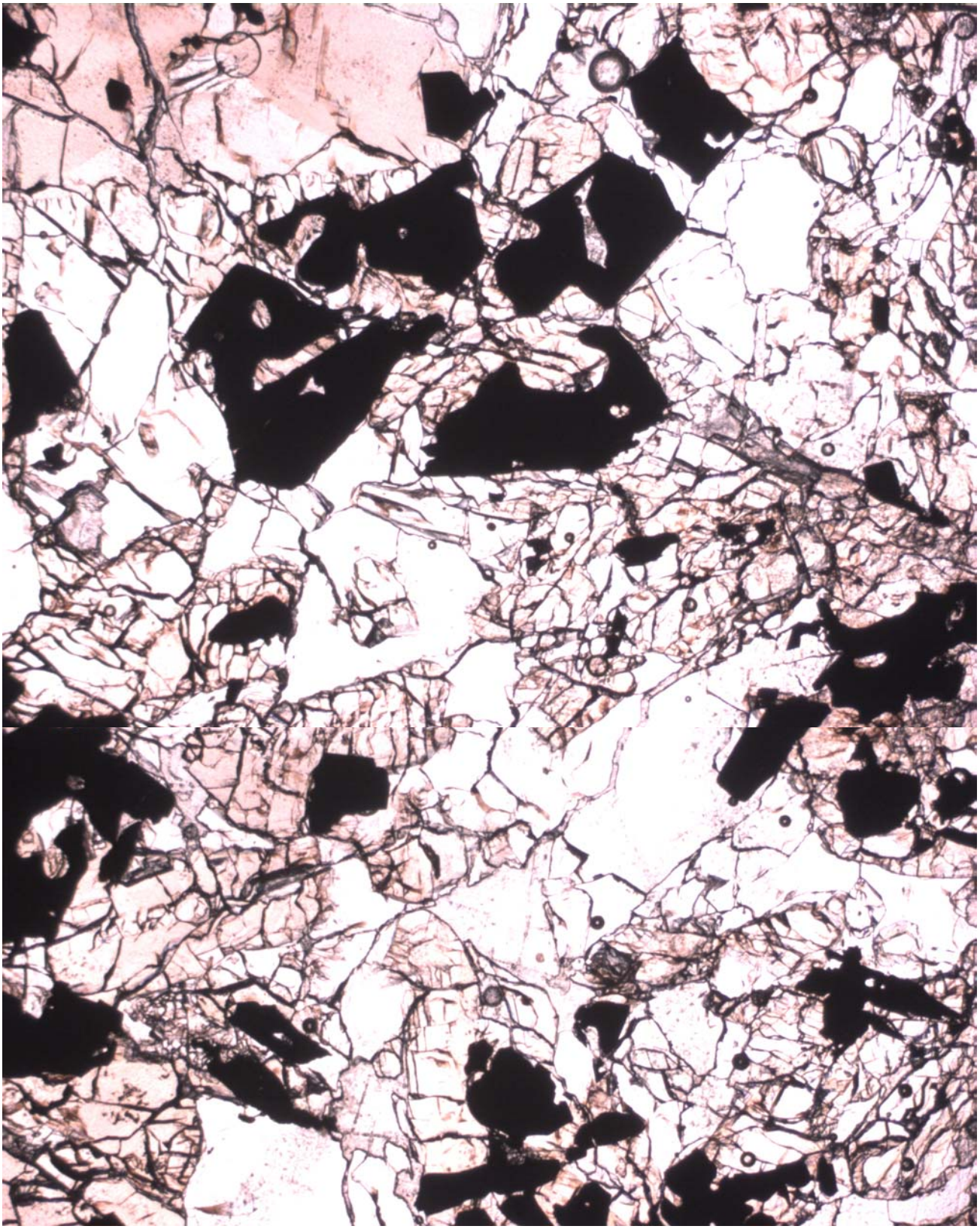


Figure 7a: Photomicrograph of thin section 77536,8. 2.8 mm across

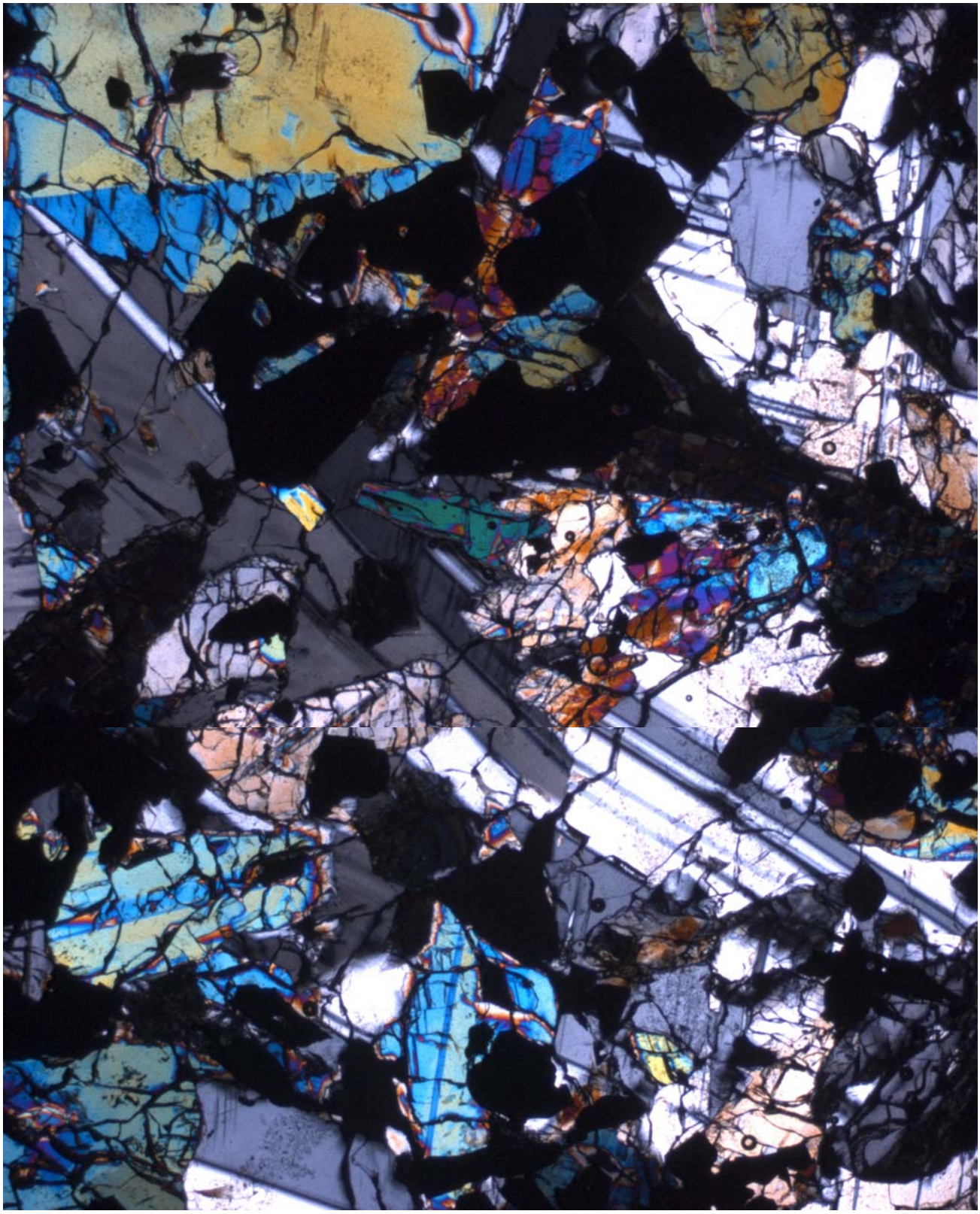


Figure 7b: Crossed nicols for 77536,8.

Table 1. Chemical composition of 77535.

reference	Rhodes76		Warner75	
weight	Nyquist76			
SiO2 %	38.57	(a)		
TiO2	12.39	(a)	12.1	(c)
Al2O3	8.95	(a)	8.6	(c)
FeO	18.53	(a)	19.5	(c)
MnO	0.27	(a)	0.239	(c)
MgO	8.85	(a)	8.7	(c)
CaO	10.66	(a)	9.8	(c)
Na2O	0.39	(a)	0.36	(c)
K2O	0.05	(a)	0.066	(c)
P2O5	0.04	(a)		
S %	0.16	(a)		
sum				
Sc ppm	80	(c)	79	(c)
V			120	(c)
Cr	2942	(a)	3318	(c)
Co	20.4	(c)	20.5	(c)
Ni				
Cu				
Zn				
Ga				
Ge ppb				
As				
Se				
Rb	0.55	(b)		
Sr	184	(b)		
Y				
Zr				
Nb				
Mo				
Ru				
Rh				
Pd ppb				
Ag ppb				
Cd ppb				
In ppb				
Sn ppb				
Sb ppb				
Te ppb				
Cs ppm				
Ba	70.7	(b)		
La	5.24	(b)	5.7	(c)
Ce	18.3	(b)	23	(c)
Pr				
Nd	20.7	(b)	22	(c)
Sm	8.7	(b)	8.8	(c)
Eu	1.98	(b)	1.94	(c)
Gd	13.6	(b)		
Tb			2.4	(c)
Dy	15.8	(b)	15	(c)
Ho				
Er	9.84	(b)		
Tm				
Yb	8.91	(b)	8.1	(c)
Lu	1.29	(c)	1.3	(c)
Hf	8.6	(c)	8.6	(c)
Ta			1.6	(c)
W ppb				
Re ppb				
Os ppb				
Ir ppb				
Pt ppb				
Au ppb				
Th ppm				
U ppm				

technique: (a) XRF, (b) IDMS, (c) INAA

Table 2. Chemical composition of 77536.

reference	Warner75	
weight		
SiO2 %		
TiO2	14.5	(a)
Al2O3	8	(a)
FeO	18.8	(a)
MnO	0.233	(a)
MgO	9.2	(a)
CaO	10.2	(a)
Na2O	0.33	(a)
K2O	0.07	(a)
P2O5		
S %		
sum		
Sc ppm	78	(a)
V	140	(a)
Cr	3831	(a)
Co	17.8	(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	6.1	(a)
Ce	20	(a)
Pr		
Nd	25	(a)
Sm	8.5	(a)
Eu	1.94	(a)
Gd		
Tb	2	(a)
Dy	14	(a)
Ho		
Er		
Tm		
Yb	8.5	(a)
Lu	1.3	(a)
Hf	8.8	(a)
Ta	2	(a)
W ppb		
Re ppb		
Os ppb		
Ir ppb		
Pt ppb		
Au ppb		
Th ppm		
U ppm		

technique: (a) INAA

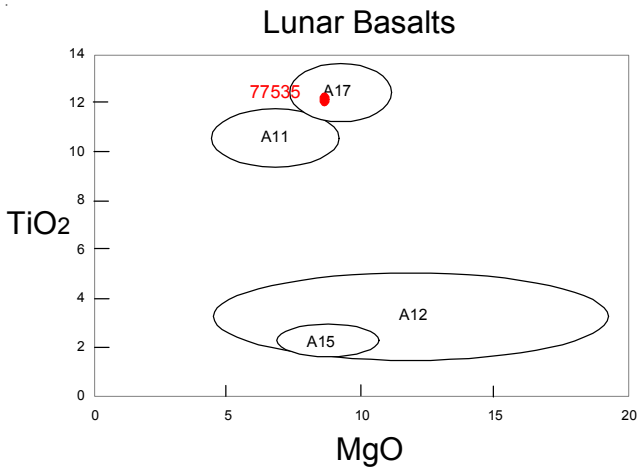


Figure 8: Composition of 77535 and 77536 compared with that of other Apollo basalts.

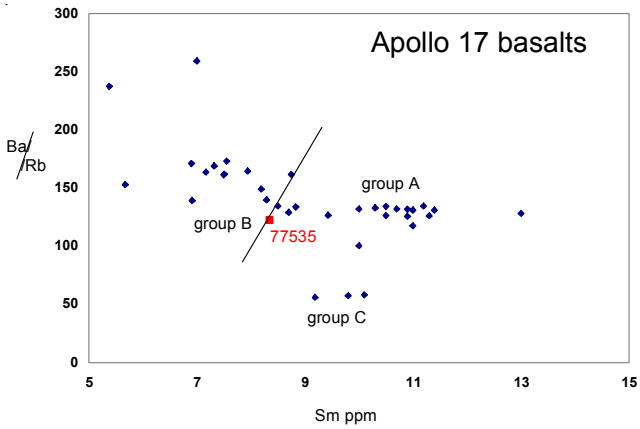


Figure 9: Trace element characteristics of 77535 compared with that of other Apollo 17 basalts.

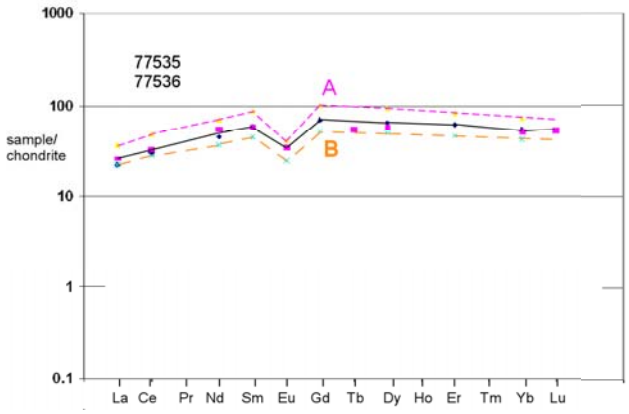


Figure 10: Normalized rare-earth-element diagram for 77535 compared with A and B types of Apollo 17 basalt.

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