

15665 and 15669

Vesicular Olivine-normative Basalt

10.2 and 4.4 grams



Figure 1: Photo of 15665. Sample is 2.5 cm. S75-22672.

Mineralogical Mode

	15665	15669
Olivine	8 %	10
Pyroxene	56	59
Plagioclase	25	20
Opaques	8	7
Silica	-	
Meostasis	3	4

Dowty et al. 1973

Introduction

Lunar samples 15665 and 15669 are rake samples from the edge of Hadley Rille in an area called The Terrace (see section on 15614). They are similar to the rest of the olivine-normative basalt samples from this location, except, perhaps, they contains abundant Fe-rich pyroxene rather than fayalite in the residuum. The habit of ilmenite is also unusual. They have not been dated.

Petrography

The matrix of 15665 and 15669 is rather fine-grained, with scattered, eroded olivine phenocrysts (figure 2 a,b). Ilmenite in 15665 is platy and skelytal (Dowty et al. 1973) and these two basalt fragments sem to have more Ti. The eroded olivine phenocrysts have silicate melt inclusions (figure 2b). The pyroxene grains are optically and chemically zoned. Nehru et al. (1974) noted that chromite has a distinct boundary with ulvospinel overgrowth. Metallic iron grains with significant Co and Ni are present.

Chemistry

The chemical composition of 15665 and 15669 is somewhat high in TiO_2 , but otherwise similar to other olivine-normative basalts at Apollo 15 (figures 4, 5 and 6).

Processing

There are 4 thin sections of 15665 and three thin sections of 15669.

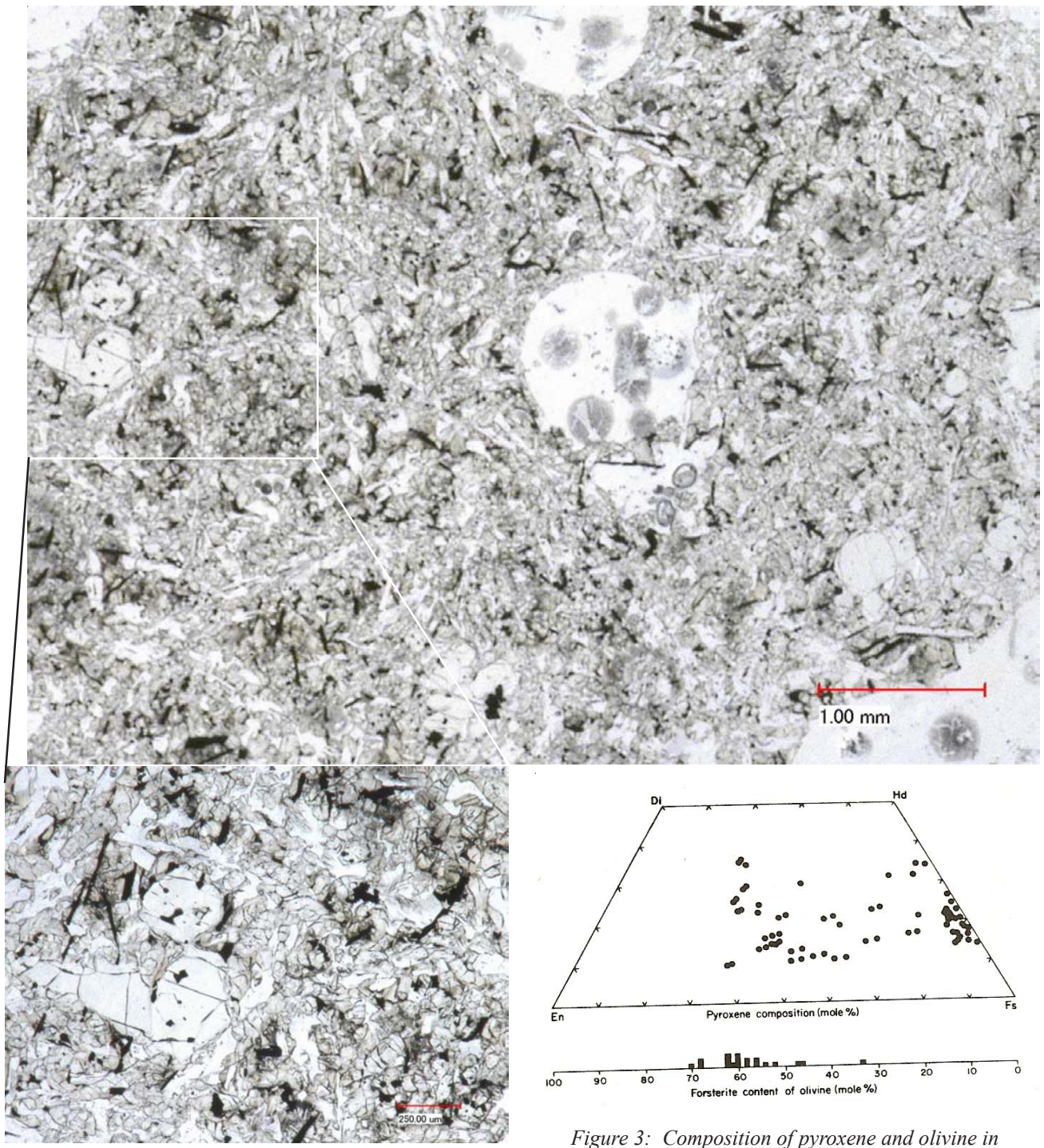


Figure 2a: Photomicrographs of thin section 15665, 13 by C Meyer @ 50x and 150x.

Figure 3: Composition of pyroxene and olivine in 15665 (Dowty et al. 1973).

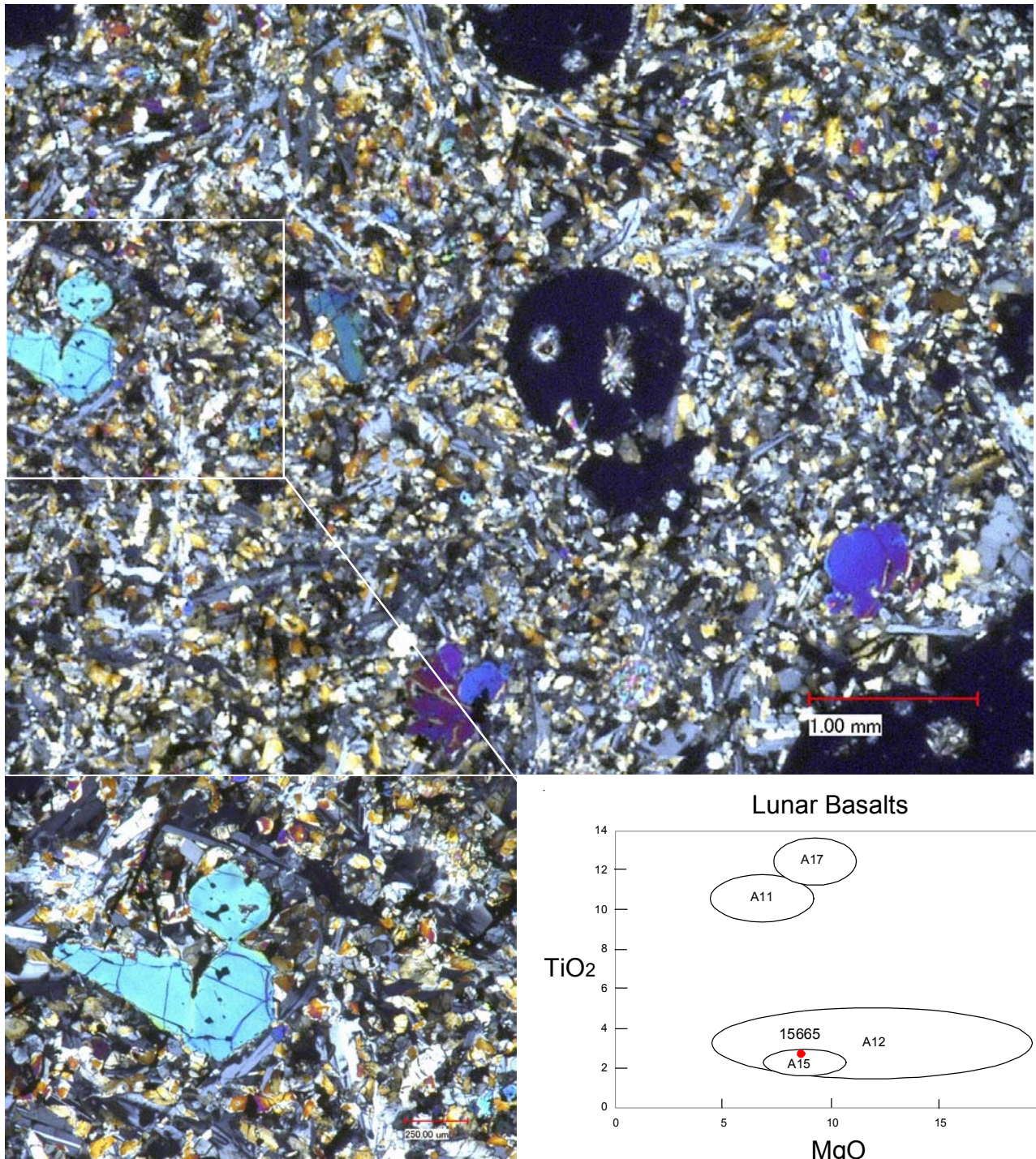


Figure 2b: Photomicrographs of thin section 15665, 13 by C Meyer @ 50x and 150x (crossed polarizers).

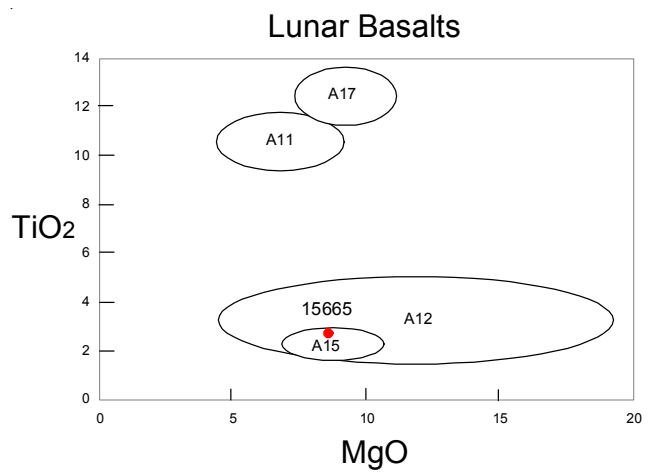


Figure 4: Chemical composition of 15665 compared with that of other Apollo basalts.

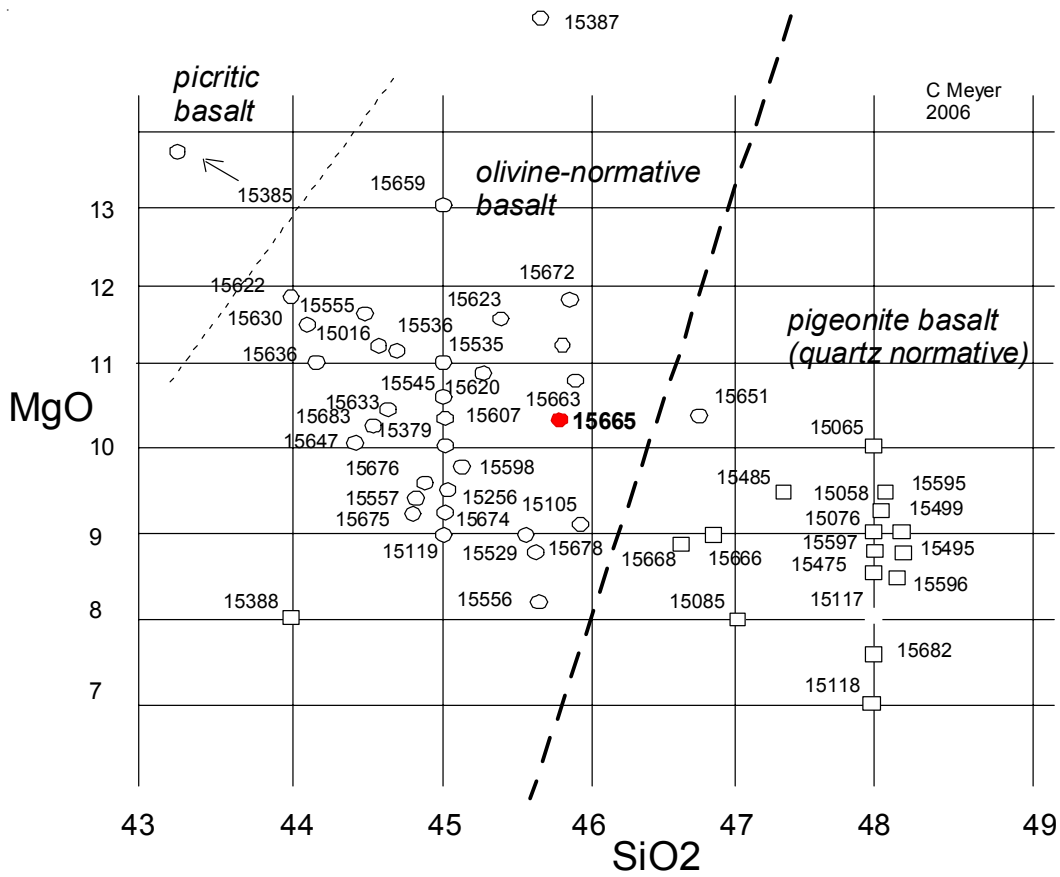


Figure 5: Chemical composition of 15665 compared with other Apollo 15 basalts.

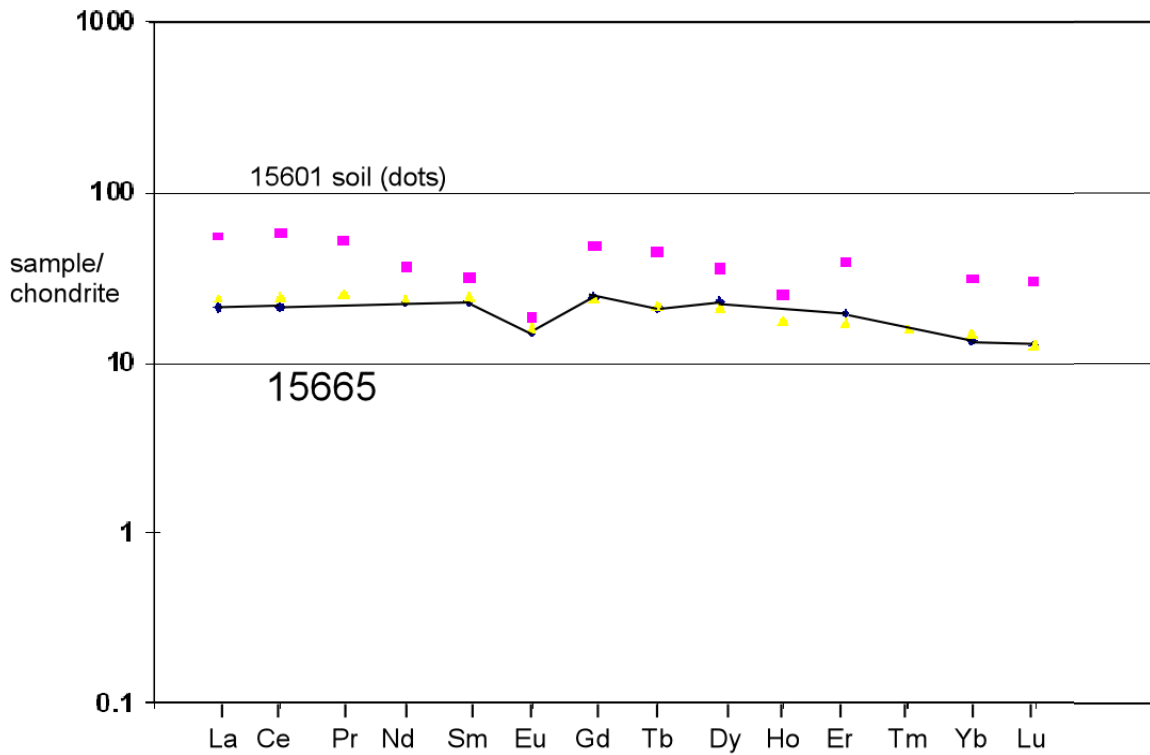


Figure 6: Normalized rare-earth-element diagram for 15665 with 15601 soil for comparison.

Table 1. Chemical composition of 1566x.

reference	15665 Helmke73	15665 Dowty73	15669 Ma et al. 78	15669 Dowty73	
<i>weight</i>					
SiO ₂ %	44.4	(a) 46.7	(b)	44.3	(b)
TiO ₂	2.64	(a) 2.94	(b) 2.4	(a) 3.1	(b)
Al ₂ O ₃	8.25	(a) 10.2	(b) 9.3	(a) 8	(b)
FeO	23.4	(a) 21.7	(b) 22.3	(a) 24.3	(b)
MnO				0.28	(b)
MgO	10.3	(a) 7.7	(b) 10	(a) 10.1	(b)
CaO	9.42	(a) 10.6	(b) 11.3	(a) 9.4	(b)
Na ₂ O	0.3	(a) 0.39	(b) 0.267	(a) 0.31	(b)
K ₂ O	0.046	(a) 0.06	(b) 0.04	(a) 0.03	(b)
P ₂ O ₅		0.09	(b)	0.07	(b)
S %					
<i>sum</i>					
Sc ppm	43.2	(a)	41	(a)	
V			203	(a)	
Cr	3950	(a) 4450	(b) 3670	(a)	
Co	54	(a)	45	(a)	
Ni			65	(a)	
Cu					
Zn					
Ga	3.1	(a)			
Ge ppb					
As					
Se					
Rb	1.1	(a)			
Sr					
Y					
Zr					
Nb					
Mo					
Ru					
Rh					
Pd ppb					
Ag ppb					
Cd ppb					
In ppb					
Sn ppb					
Sb ppb					
Te ppb					
Cs ppm	0.021	(a)			
Ba			55	(a)	
La	4.87	(a)	5.1	(a)	
Ce	12.6	(a)			
Pr					
Nd	10.2	(a)			
Sm	3.39	(a)	3.5	(a)	
Eu	0.84	(a)	0.87	(a)	
Gd	4.7	(a)			
Tb	0.75	(a)	0.8	(a)	
Dy	5.5	(a)	4.4	(a)	
Ho	1	(a)			
Er	3.1	(a)			
Tm					
Yb	2.23	(a)	2.1	(a)	
Lu	0.31	(a)	0.32	(a)	
Hf	2.2	(a)	2.6	(a)	
Ta			0.37	(a)	
W ppb					
Re ppb					
Os ppb					
Ir ppb					
Pt ppb					
Au ppb					
Th ppm					
U ppm					

technique: (a) AA, INAA, (b) broad-beam e-probe

References for 15665

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