

14069 – 24.87 grams
14070 - 36.56 grams
Crystalline matrix Breccia



Figure 1: Photo of 14069,0. Scale in cm and mm. S78-28808.



Figure 2: Photo of 14070. Scale is in cm. S71-22168.

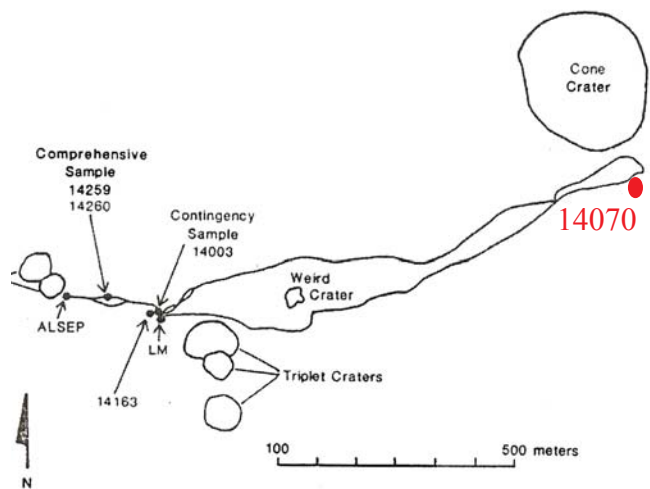


Figure 3: Traverse map for Apollo 14 showing location of 14070 on rim of Cone Crater.

Introduction

14069 and 14070 are small breccia samples that were picked up by tongs from between the MET tracks in the boulder field on the rim of Cone Crater (Swann et al. 1971) (figure 3). They are similar, but have different exposure ages.



Figure 4: Location of 14070 between tracks left by MET. S71-64-9125.

Petrography

14069 and 14070 are tan impact melt rocks with fine crystalline matrix (Carlson and Kramer 1987). They have vesicles, mare basalt clasts and other similarity with 14321 and are most likely pieces of the Fra Mauro Formation (Wilshire and Jackson 1972, Simonds et al. 1977).

Chemistry

The chemical composition of 14069 and 14070 have not been determined.

Radiogenic age dating

Stadermann et al. (1991) determined Ar/Ar plateau ages of 3.78 ± 0.02 b.y. for 14069 and 3.71 ± 0.02 b.y. for 14070 (figure).

Cosmogenic isotopes and exposure ages

Stadermann et al. (1991) determined an exposure age of 95 m.y. for 14069 and 30 m.y. for 14070 by the ^{38}Ar method.

Processing

These samples were returned, under vacuum, in ALSRC 1006. There are three thin sections each for 14069 and 14070.

scale = 2.8 mm across

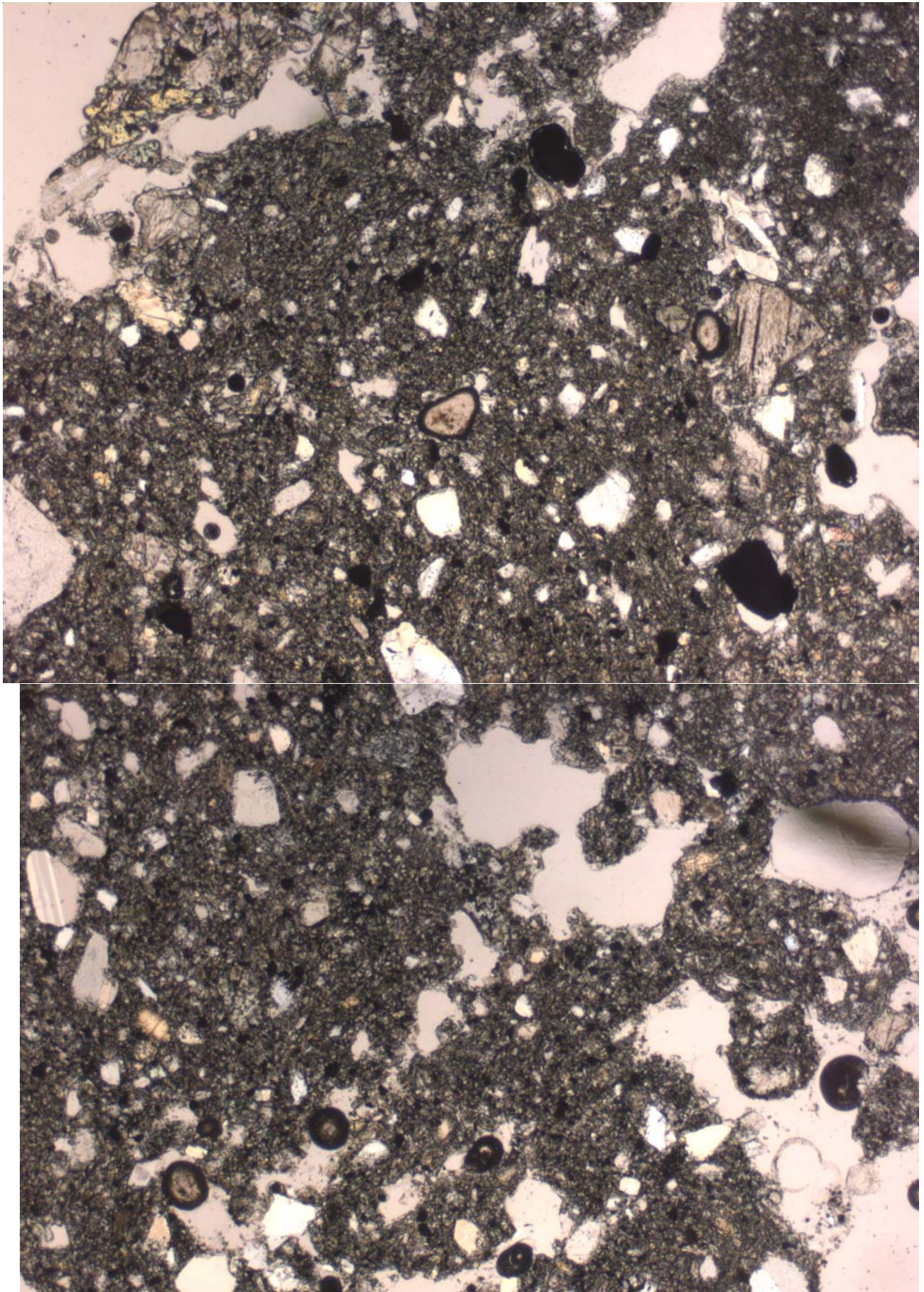


Figure
5:
14069,5

scale = 2.8 mm across

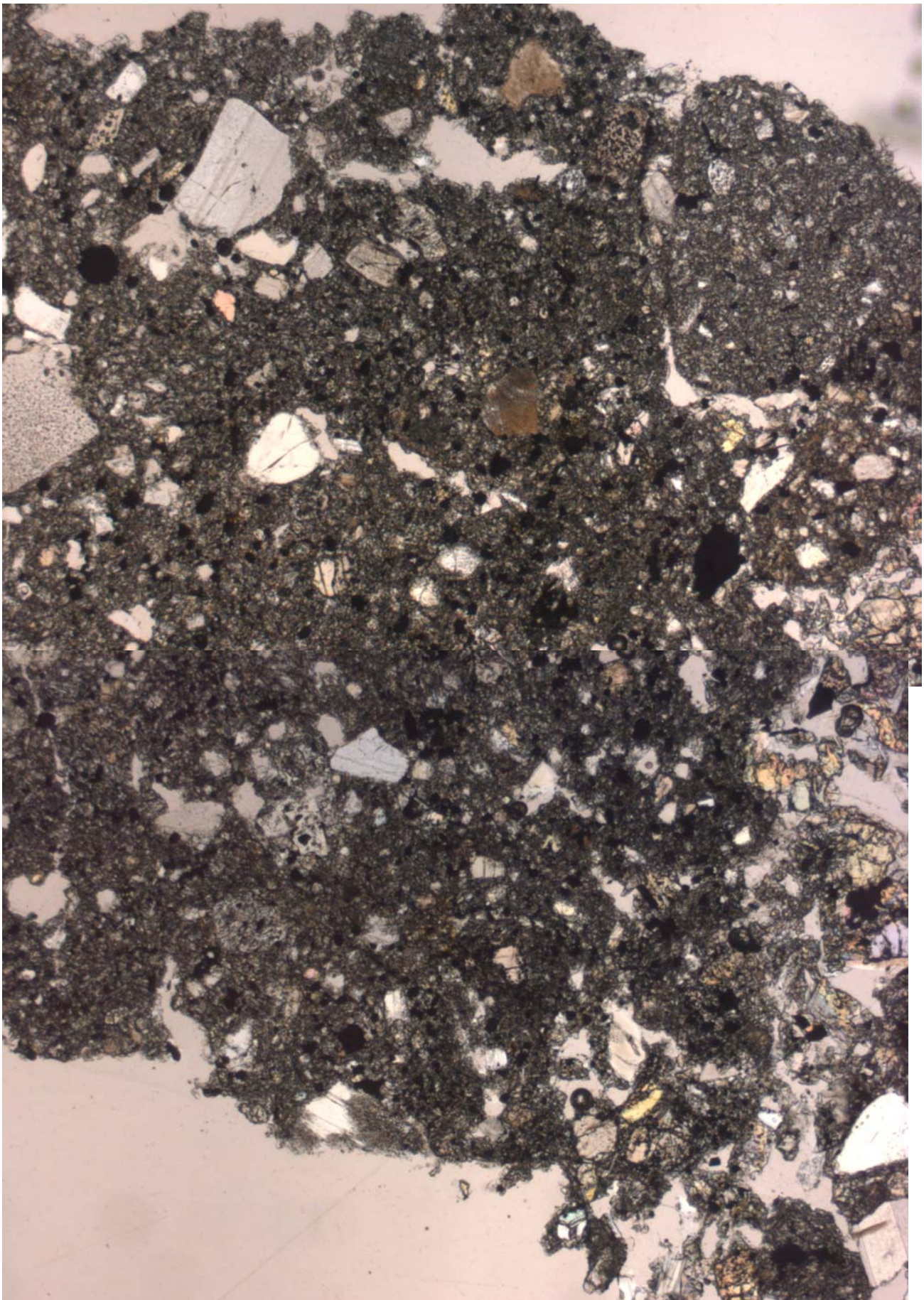


Figure 6:
14070,3

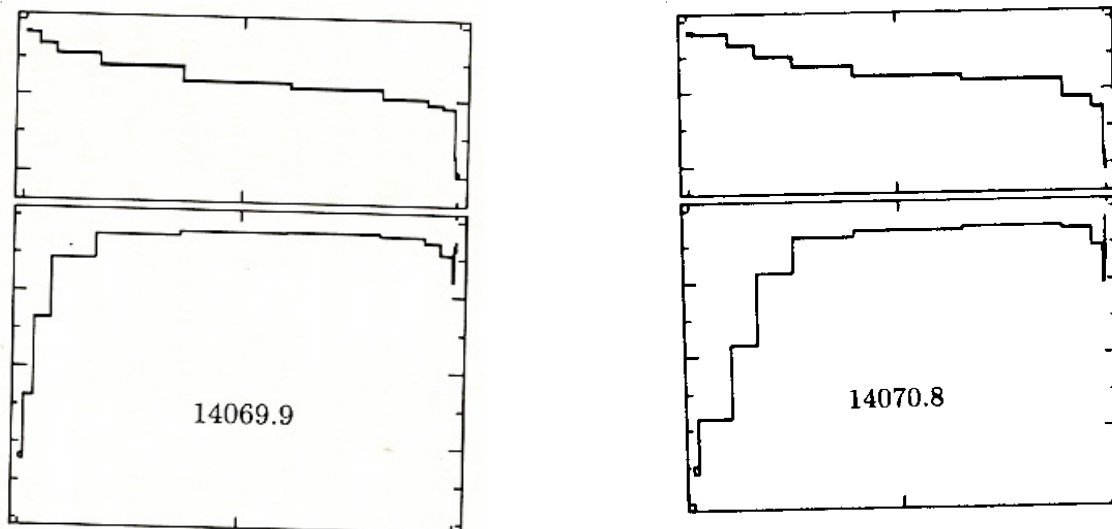


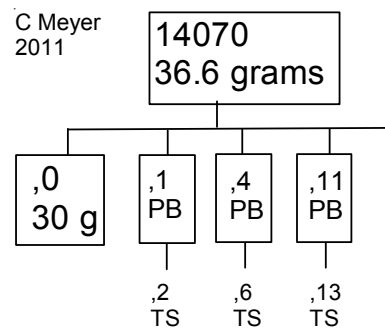
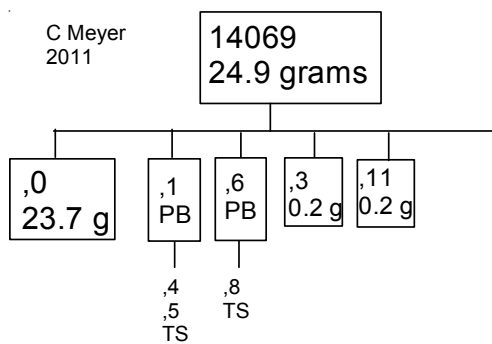
Figure7 : Ar plateau diagrams for 14069 and 14070 (Stadermann et al. 1991).

Summary of Age Data for 14069, 14070

	Ar/Ar
14069	3.78 ± 0.02 b.y.
14070	3.71 ± 0.02

Stadermann et al. 1991

Caution : Ar standard ?



References for 14069 – 14070.

Carlson I.C. and Walton W.J.A. (1978) **Apollo 14 Rock Samples**. Curators Office. JSC 14240

Deutsch A. and Stoffler D. (1987) Rb-Sr analysis of Apollo 16 melt rocks and a new age estimate for the Imbrium basin: Lunar basin chronology and the early heavy bombardment of the moon. *Geochim. Cosmochim. Acta* **51**, 1951-1964.

LSPET (1971a) Preliminary examination of lunar samples from Apollo 14. *Science* **173**, 681-693.

LSPET (1971b) Preliminary examination of lunar samples from Apollo 14. *In Apollo 14 Preliminary Sci. Rpt. NASA SP-272*

Mitchell J.K., Bromwell L.G., Carrier W.D., Costes N.C. and Scott R.F. (1971) Soil Mechanics Experiment. *In Apollo 14: Preliminary Science Report NASA SP-272*.

Phinney W.C., McKay D.S., Simonds C.H. and Warner J.L. (1976a) Lithification of vitric- and elastic-matrix breccias: SEM photography. *Proc. 7th Lunar Sci. Conf.* 2469-2492.

Simonds C.H., Phinney W.C., Warner J.L., McGee P.E., Geeslin J., Brown R.W. and Rhodes J.M. (1977) Apollo 14 revisited, or breccias aren't so bad after all. *Proc. 8th Lunar Sci. Conf.* 1869-1893.

Stadermann F.J., Heusser E., Jessberger E.K., Lingner S. and Stoffler D. (1991) The case for a younger Imbrium basin: New ⁴⁰Ar-³⁹Ar ages of Apollo 14 rocks. *Geochim. Cosmochim. Acta* **55**, 2339-2349.

Sutton R.L., Hait M.H. and Swann G.A. (1972) Geology of the Apollo 14 landing site. *Proc. 3rd Lunar Sci. Conf.* 27-38.

Swann G.A., Trask N.J., Hait M.H. and Sutton R.L. (1971a) Geologic setting of the Apollo 14 samples. *Science* **173**, 716-719.

Swann G.A., Bailey N.G., Batson R.M., Eggleton R.E., Hait M.H., Holt H.E., Larson K.B., Reed V.S., Schaber G.G., Sutton R.L., Trask N.J., Ulrich G.E. and Wilshire H.G. (1977) Geology of the Apollo 14 landing site in the Fra Mauro Highlands. U.S.G.S. Prof. Paper 880.

Swann G.A., Bailey N.G., Batson R.M., Eggleton R.E., Hait M.H., Holt H.E., Larson K.B., McEwen M.C., Mitchell E.D., Schaber G.G., Schafer J.P., Shepard A.B., Sutton R.L., Trask N.J., Ulrich G.E., Wilshire H.G. and Wolfe E.W. (1972) 3. Preliminary Geologic Investigation of the Apollo 14 landing site. *In Apollo 14 Preliminary Science Rpt. NASA SP-272*. pages 39-85.

Warner J.L. and Duke M.B. (1971) Apollo 14 lunar sample information catalog. NASA TM X-58062.

Williams R.J. (1972) The lithification of metamorphism of lunar breccias. *Earth Planet. Sci. Lett.* **16**, 250-256.

Wilshire H.G. and Jackson E.D. (1972b) Petrology and stratigraphy of the Fra Mauro Formation at the Apollo 14 site. US Geol. Survey Prof. Paper 785