# 72335

Impact melt Breccia

108.9 grams


*Figure 1: Location of 72335 on boulder #2 on landslide off of South Massif. Boulder is ~ 2 - 3 meters high. AS17-137-20918.*

Transcript

LMP Hey, that's a different rock, Gene (station 2 boulder #2).

CDR Yes. Well, it looks like the same texture, but it's got that flaky fracture pattern all over it. I'm going to get a stereo while I'm at it. This ought to cover any samples I take off of that thing.

LMP This is a crystalline rock, Houston. It's got nice white halos around the pits. The zaps are not – dense black glass, but very dark greenish-grey.

CDR Are those halos or fragments?

LMP No, they're halos. Well, they are fragments, I think, also. It's fairly crystalline, but it is heterogeneous. Matter of fact there's a big fragment of a porphyry caught up in this thing, I think. There's a chunk there we can get. That's a big fragment within this crystalline rock - - Inclusion (72315).

CDR Take a picture of that and then your locator, I'll get it.

LMP Looks like a porphyry.

CDR It does look like a crystalline rock.

LMP Looks like an andesite prophyry.

CDR The - - has got the very large crystals in there. They're very reflective, elongated crystals.

LMP It's a relatively angular inclusion about ahalf a meter in size, and it's a square cross section. Well it's irregular; but generally square cross section. It's in bag 516, and looks like a high feldspar rock. It may be an anorthositic gabbro, but it does look like a prophyry.

CDR There's a big chunk where I've got – I can't get it out though; it's buried in a rock – half of an inch elongated – I can't see whether they are colorless or not, but they are certainly reflective crystals. And then in the big rock, you've got massive things like this big fragment here- that's 5 inches across.

LMP That may be spall point, Gene, that's a lighter color, in general, because of a zap or something.

CDR Let me get some more samples of it.

LMP Yes, we need to get some of the host rock here.

CDR We'll get a piece here.

LMP You're still sampling the one we just got. So we'll get another one (72335). The same kind – or the contact of that rock looks like it might be finer grained – but it's about the same – in 517. That's the contact in the inclusion side of the contact. Keep going after the other one, Gene, I'll get this in your bag.

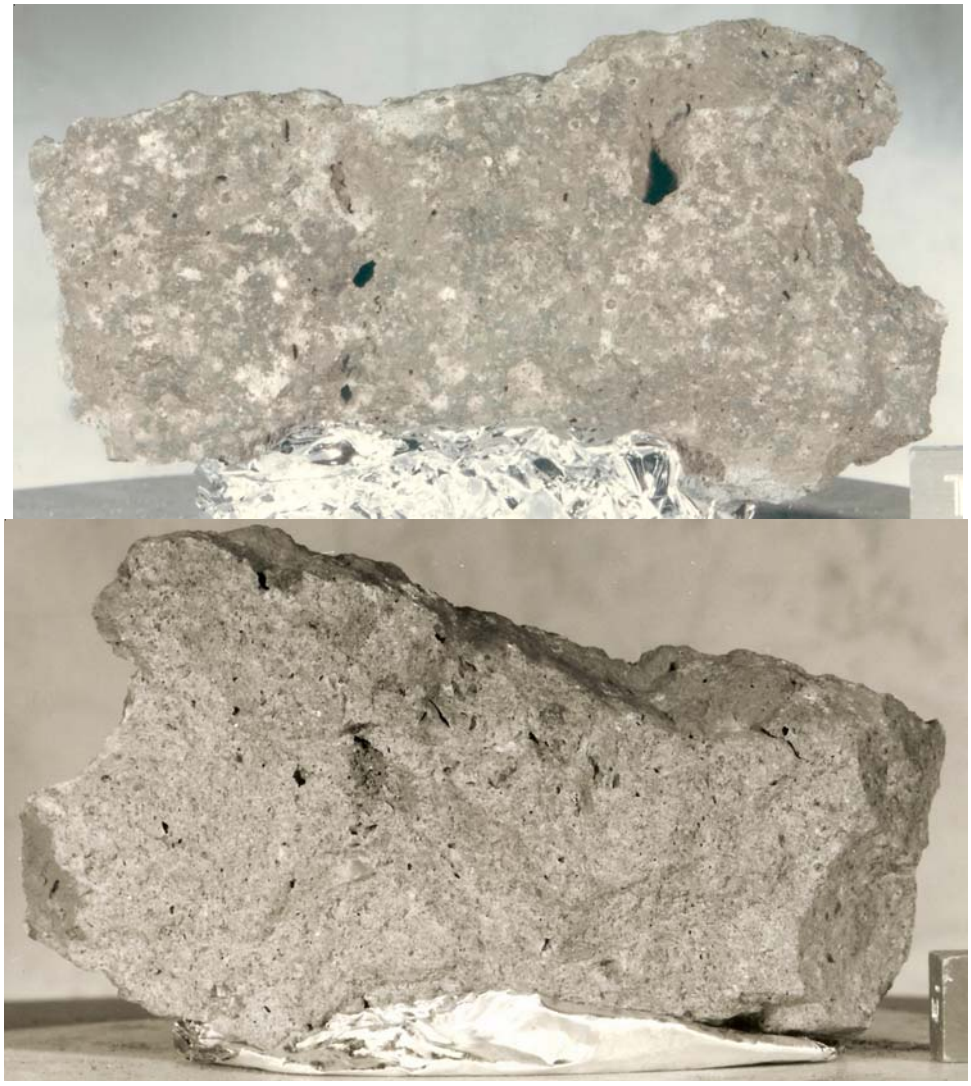


*Figure 2: Exterior and interior surface of 72335. Cube is 1 cm. S73-16247 and S73-23543.*

LMP The host rock for the inclusion, which appears to be also crystalline, but may be a recrystallized rock of some kind - - metamorphic – also looks like a high plagioclase – high feldspar, anyway. That's in bag 518 – and that was a loose frag – fairly loose, but in place fragment along the fracture zone (72355).

CRD I'm going to try to get the rest of it up there.

LDR This is a medium-green anorthositic gabbro, and it looks like it has some pastel-green olivine crystals in it. Did you get it?

CDR I can't get any more of it, Jack, up there. I can't reach any more.

LMP OK, and that small chip of that is in bag 519 (72375). It's the same host rock, much like the previous samples. Another chunk of the host – It's in there. I haven't closed your bag yet. And we got to get one soil sample up the hill here.

- - - -

CC Was that last sample in 518, as well?

LMP No. We haven't put it in yet.

CRD That will go in 499 (72395).

LMP This is a fairly uniform looking rock. It does have some widely spaced fractures across it. It's clearly crystalline and had crystalline inclusions in it. Both rocks look like they might be in the anorthositic class of rocks. It's just that it has the appearance of being finer grain matrix. Looks like a porphyry in the boulder.

## Mineralogical Mode for 72395

| | Dymek et al. 1976 |
|---|---|
| Olivine | 8.8 vol. % |
| Low-Ca Pyx. | 25.4 |
| High-Ca Pyx. | 5.9 |
| Plagioclase | 56.2 |
| Ilmenite | 1.3 |
| Phosphate | 0.9 |

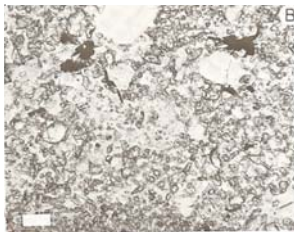


*Figure 3: Thin section 72335 (referred to as "anomalous" by Dymek et al. 1976).*

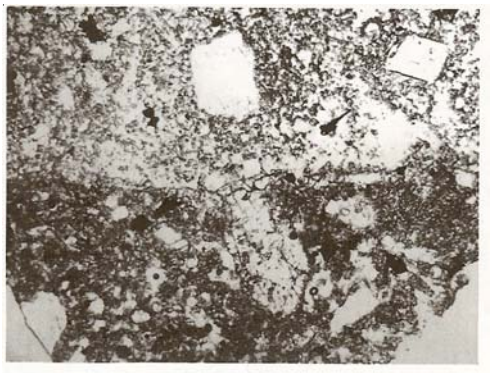


*Figure 4: Thin section photomicrograph of 72335 by Ryder (1993) illustrating granulite clast in micropoikilitic matrix.*

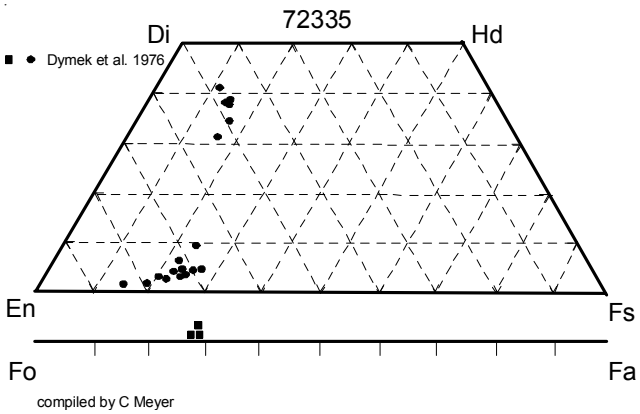



*Figure 5: Composition of pyroxene and olivine in 72335 (from Dymek et al. 1976).*

## Introduction

72335 was sampled, along with 72315, as a white clast in the large station #2 boulder (see transcript). However, most of it turned out to be similar to the matrix of the boulder (see section on 72395), and the astronauts were apparently simply seeing an area (spall?) that was free of dark patina (figure 2). This sample has not been dated, but can be assumed to have the same age as 72395 (3.9 b.y.).

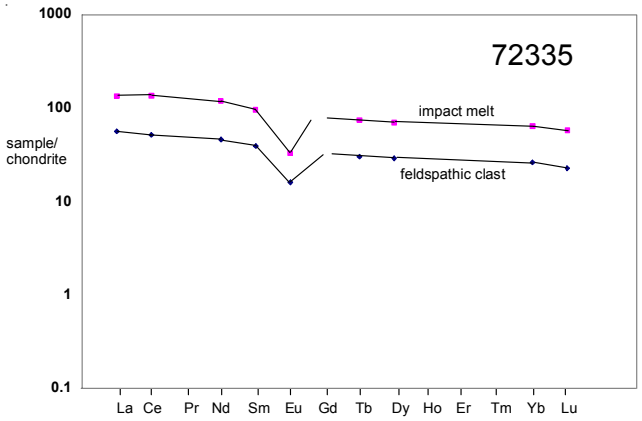



*Figure 6: Normalized rare-earth-element diagram for 72335, including the initial data for a clast.*

## Petrography

Most of 72335 is similar to the other samples collected form this same boulder (72315, 72355, 72375 and 72395). They are all vesicular micropoikilitic impact melt breccias.

## Significant Clast

***Feldspathic Granulite:*** Dymek et al. (1976) show a granulitic texture for a clast from 72335 (figure 3).

## Mineralogy

***Olivine:*** The compositon of olivine grains is tightly grouped at $Fo_{70\pm2}$.

***Pink Spinel:*** Pink spinel grains are Mg- and Al-rich in the center and zone to more Cr-rich at the edge.

***Pyroxene:*** The composition of pyroxene is depicted in figure 5.

***Plagioclase:*** Plagioclase ranges in composition from $Or_{0.2}Ab_2An_{98}$ to about $Or_3Ab_{22}An_{75}$ (Dymek et al. 1976).

***Ilmenite:*** Ilmenite in 72335 is evenly dispersed in the matrix, has a seive-like texture and is Mg-rich.

***Metallic Iron:*** Metallic iron is meteoritic in origin (see figure 7 in section on 72395).

***Armalcolite:*** Armalcolite is found included in ilmenite and is Zr-rich.

## Chemistry

The chemical composition of the matrix of 72335 is found to be identical to that of other samples of this

**Table 1. Chemical composition of 72335.**

| *reference* | Laul74 | Laul and Schmitt 1975 | | | Tera74 | |
|---|---|---|---|---|---|---|
| *weight* | exterior | | | | | |
| SiO2 % | | | | | | |
| TiO2 | 0.6 | 1.6 | 1.6 | (a) | | |
| Al2O3 | 27.3 | 18.2 | 18.3 | (a) | | |
| FeO | 4.8 | 8.6 | 8.8 | (a) | | |
| MnO | 0.06 | 0.112 | 0.114 | (a) | | |
| MgO | 8 | 11 | 12 | (a) | | |
| CaO | 15.4 | 10.7 | 11 | (a) | | |
| Na2O | 0.45 | 0.61 | 0.6 | (a) | | |
| K2O | 0.12 | 0.27 | 0.34 | (a) | 0.1037 | (c ) |
| P2O5 | | | | | | |
| S % | | | | | | |
| *sum* | | | | | | |
| | | | | | | |
| Sc ppm | 8 | 16 | 18 | (a) | | |
| V | 30 | 50 | 50 | (a) | | |
| Cr | 684 | 1300 | 1368 | (a) | | |
| Co | 28 | 23 | 26 | (a) | | |
| Ni | 360 | 200 | 230 | (a) | | |
| Cu | | | | | | |
| Zn | 1.7 | | | | | |
| Ga | | | | | | |
| Ge ppb | | | | | | |
| As | | | | | | |
| Se | 67 | | | | | |
| Rb | 2 | | | | 1.88 | (c ) |
| Sr | 145 | | | | 148 | (c ) |
| Y | | | | | | |
| Zr | 150 | 450 | 450 | (a) | | |
| Nb | | | | | | |
| Mo | | | | | | |
| Ru | | | | | | |
| Rh | | | | | | |
| Pd ppb | | | | | | |
| Ag ppb | 0.7 | | | | | |
| Cd ppb | 80 | | | | | |
| In ppb | 0.8 | | | | | |
| Sn ppb | | | | | | |
| Sb ppb | 1.5 | | | | | |
| Te ppb | | | | | | |
| Cs ppm | 0.095 | | | | | |
| Ba | 120 | 300 | 300 | (a) | | |
| La | 13.2 | 31.6 | 30 | (a) | | |
| Ce | 31 | 82 | 80 | (a) | | |
| Pr | | | | | | |
| Nd | 21 | 54 | 50 | (a) | | |
| Sm | 5.8 | 14.1 | 13.5 | (a) | | |
| Eu | 0.9 | 1.84 | 1.82 | (a) | | |
| Gd | | | | | | |
| Tb | 1.1 | 2.7 | 3.1 | (a) | | |
| Dy | 7 | 17 | 20 | (a) | | |
| Ho | | | | | | |
| Er | | | | | | |
| Tm | | | | | | |
| Yb | 4.2 | 10.4 | 10.2 | (a) | | |
| Lu | 0.55 | 1.4 | 1.4 | (a) | | |
| Hf | 4.2 | 10 | 10 | (a) | | |
| Ta | 0.59 | 1.5 | 1.5 | (a) | | |
| W ppb | | | | | | |
| Re ppb | 1.4 | | | | | |
| Os ppb | | | | | | |
| Ir ppb | 15 | | | | | |
| Pt ppb | | | | | | |
| Au ppb | 5.3 | 4 | 4 | (a) | | |
| Th ppm | 2.4 | 4.6 | 4.8 | (a) | | |
| U ppm | 0.71 | 1.3 | 1.3 | (a) | | |

*technique: (a) INAA, (b) RNAA, (c ) IDMS*

boulder (see 73215). However, Laul and Schmitt (1974) also determined the composition of a white clast (figure 6).

## Radiogenic age dating

The age of 72335 has not been measured, but is assumed to be ~ 3.9 b.y. (as measured for 72395). Tera et al. (1974) determined a Rb-Sr model age of 4.49 b.y.

## Processing

Boulder 2 was a "Wasserburg consortium". A saw cut, but not a slab, was made through the middle of 72335 (figure 7), so that part could be placed in "remote storage". There are 4 thin sections.


*Figure 7: Saw cut through 72335. S75-34401. Scale is marked in cm and mm.*

*Figure 8: Sawn surface of 72335,16. Sample is 3.5 cm across. S76-24377.*

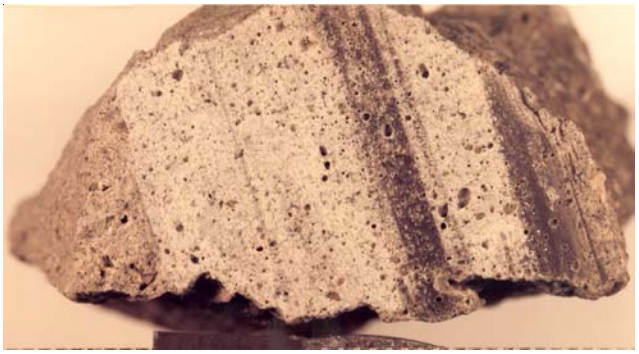
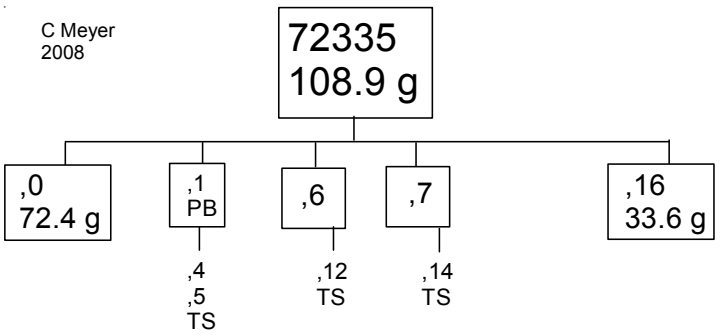


*Figure 9: Sawn surface of 72335,0 showing saw marks and vesicular interior. S75-34400.*



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