



Antarctic Meteorite NEWSLETTER

A periodical issued by the Antarctic Meteorite Working Group to inform scientists of the basic characteristics of specimens recovered in the Antarctic.

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The Meteorite Working Group will meet next on April 10, 1980, to consider sample requests for Antarctic meteorites. Please submit requests to:

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Secretary, Meteorite Working Group
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NASA-Johnson Space Center
Houston, TX 77058

Availability of Large Chondrites for Studies of Cosmic-Ray-Interactions:

Two large ordinary chondrites, Allan Hills 78084 (~ 15 kg) and Meteorite Hills 78028 (~ 20 kg), appear to be complete specimens in that they are nearly fully covered with a fusion crust. Preliminary examination suggests that neither meteorite is appreciably weathered or fractured. It is the intention of the MWG that samples of one of these meteorites be made available to investigators wishing to make detailed studies of products of cosmic ray interactions as a function of depth in a relatively large chondrite. For such studies, the MWG will entertain moderately elaborate requests for multiple samples from accurately determined subsurface depths. The MWG will also entertain requests from investigators who wish to organize and lead a consortium-like study of the products of cosmic ray interactions in one of these chondrites. Although the descriptions and petrographic classifications of these chondrites will not be announced until the next Newsletter, persons wishing to participate in the planned investigations of cosmogenic products are encouraged to transmit a sample request or a statement of their intent to participate to the MWG before the April meeting.

1979-1980 Antarctic Search for Meteorites

The Antarctic Search for Meteorites (ANSMET) field party consisted of William A. Cassidy (Principal Investigator), University of Pittsburgh; Louis A. Rancitelli, Battelle Institute; Lee Benda, University of Washington and John O. Annextad, NASA. Everett K. Gibson, Jr., from the Johnson Space Center, was also a member of the field party for a portion of the season.

The work accomplished this season in Antarctica consisted of:

1 - The resurvey of the Allan Hills triangulation network for ice movement and ablation studies. Preliminary data indicates an average ablation rate of 5 centimeters per year in the meteorite concentration areas.

2 - A brief meteorite search in the Allan Hills area produced 52 chondrites, 1 achondrite and 2 possibles for a total of 52 specimens.

3 - An oversnow traverse by snowmobile and Nansen sleds resulted in the discovery of two new areas of meteorite concentration. These areas are located over 200 miles NW of McMurdo near a small mountain called Reckling Peak. Area I, tentatively identified as Reckling Moraine, is located 12 miles west of Reckling Peak. Fourteen chondrites and one iron were found there. Area 2, tentatively identified as Elephant Moraine, is located 45 miles west of Reckling Peak. Seven chondrites and five possible achondrites were found there.

Total meteorites found by the U.S. party this year are 80 plus 2 possibles. Since the primary purpose of the expedition was to reconnoiter previously unsearched blue ice areas, the total count is lower than previous years. The search team believes that the newly discovered fields could yield many more specimens in the years to come.

The magnetic orientation, at the time of recovery, of fifteen meteorites from the 1978 Antarctic collection has been recorded. The orientation of the samples is documented in the field photographs of each of the specimens. The following magnetically oriented meteorites, most of which have not been processed, will be available for study upon request from MWG:

ALHA78085	META78012
ALHA78102	META78014
ALHA78103	META78015
- ALHA78105	META78016
- META78002	META78028
- META78006	DRPA78007
META78007	DRPA78008
META78008	

1977 Collection

<u>NUMBER</u>	<u>FRACTURING</u>	<u>WEATHERING</u>	<u>PAGE</u>
ALHA77009	A	C	4
ALHA77010	A	C	5
ALHA77011	A	C	6
ALHA77012	A	C	7
ALHA77180	A	C	8
ALHA77183	A	C	8
ALHA77221	A	C	9
ALHA77223	C	C	9
ALHA77225	C	C	10
ALHA77232	C	C	11
ALHA77259	B	C	12
ALHA77268	C	C	12
ALHA77274	A	C	13
ALHA77286	B	C	14
ALHA77287	A	C	15
ALHA77292	A	B	15

1978 Collection

<u>NUMBER</u>	<u>FRACTURING</u>	<u>WEATHERING</u>	<u>PAGE</u>
ALHA78050	B	B	16
ALHA78105	A	B	17
ALHA78251	A	B	18
BTNA78002	A	not classified	19
BTNA78004	A	B	20
META78001	B	B/C	21
META78002	A	B	22
META78006	B	C	22
RKPA78001	B	C	23
RKPA78003	B	C	24
RKPA78004	A	A	25

ANTARCTIC METEORITE DATA SHEET

Sample No.: ALHA77009

Location: Allan Hills

Field No.: 77122943

Field Contamination Category: 2

Weight (gms): 235.5

Meteorite Type: H4 chondrite

Physical Description:

This is a complete specimen with fusion crust missing only on the corners and one small area on the T surface. The fusion crust, where present, is approximately 0.5 mm thick and black. On the surfaces not covered by fusion crust, many weathered inclusions are present. An ~0.5 cm green inclusion, that appears to radiate, is present on the T surface. Much of the interior of the sample has weathered to a reddish-brown.

Dimensions: ~6.5x4.5x4.3 cm.

Petrographic Description: Brian Mason

Chondritic structure is prominent. The usual variety of chondrule types is present, the commonest being barred oliving, granular olivine, and fine-grained radiating pyroxene. In a few of the barred chondrules the bars between the olivine are transparent brown glass, but in most the bars are turbid and devitrified. Some of the pyroxene is polysynthetically twinned clinobronzite. The groundmass between the chondrules consists of granular olivine and pyroxene, with minor amounts of nickel-iron and troilite. Remnants of fusion crust are present on one edge of the section. Microprobe analyses show olivine (Fa_{18}) and pyroxene (Fs_{16}) of essentially uniform composition. The meteorite is classified as an H4 chondrite.

ANARCTIC METEORITE DATA SHEET

Sample No.: ALHA77010 Location: Allan Hills
Field No.: 77122939 Field Contamination Category: 2
Weight (gms): 295.8
Meteorite Type: H4 Chondrite

Physical Description:

The exterior of the specimen is nearly a uniform reddish-brown. However, a small amount of thin, black fusion crust is present on the E surface. Several rounded (chondrules) and angular (lithic clasts) inclusions are apparent on the sawed surfaces. The inclusions are lighter in color than the reddish-brown, iron oxide stained matrix material.

Dimensions: 7.0x5.0x5.0 cm.

Petrographic Description: Brian Mason

Chondrules are prominent and well developed, 0.2-1.5 mm in diameter; a variety of types is present, the commonest being prophyritic olivine, granular olivine-pyroxene, and fine-grained pyroxene. Pyroxene grains in the olivine-pyroxene chondrules are polysynthetically twinned clinobronzite. The groundmass consists of fine-grained olivine and pyroxene, with minor amounts of nickel-iron and troilite. The section shows a considerable degree of weathering in the form of small areas and veinlets of brown limonite. Microprobe analyses show olivine of essentially uniform composition (Fa_{18}) and pyroxene of somewhat variable composition (Fs_{15} - Fs_{18} , average Fs_{16}). The meteorite is classified as an H4 chondrite.

ANTARCTIC METEORITE DATA SHEET

Sample No.: ALHA77011

Location: Allan Hills

Field No.: 77122937

Field Contamination Category: 2

Weight (gms): 2915

Meteorite Type: LL-3 Chondrite

Physical Description:

The major portion of the sample is covered with fusion crust. Inclusions are apparent through the thin fusion crust on the B surface. The fusion crust on the T surface is shiny blackish-red and appears to be more severely weathered than the other surfaces. Regmaglypts are present on the E surface. In areas where the fusion crust has been removed, probably by physical processes, many inclusions are apparent in the interior of the stone.

Petrographic Description: Brian Mason

Chondrules are numerous and well developed, 0.2-1.2 mm in diameter, and are close-packed with only a small amount of ground-mass. Some of the chondrules have prominent dark rims. The commonest types are granular olivine and prismatic or fine-grained pyroxene. Most of the pyroxene is polysynthetically twinned clinobronzite. Nickel-iron and troilite are present in unusually small amounts; troilite is concentrated in chondrule rims. A moderate amount of limonitic staining is present. Microprobe analyses show that olivine and pyroxene vary in composition; olivine ranges from Fa_4 to Fa_{36} , with a mean of Fa_{16} , and the pyroxene ranges from Fs_1 to Fs_{33} , with a mean of Fs_{12} . The low content of nickel-iron and troilite suggests LL group, and the meteorite is tentatively classified as an LL3 chondrite; however, definite assignment should await further investigation.

ANTARCTIC METEORITE DATA SHEET

Sample No.: ALHA77012 Location: Allan Hills
Field No.: 77122942 Field Contamination Category: 2
Weight (gms): 180.2
Meteorite Type: H5 Chondrite

Physical Description:

The sample is roughly pyramidal in shape, with the E surface being semi-flat and a fracture surface. The B and S surfaces have very thin, patchy, black fusion crust. The remainder of the sample is stained reddish-brown by iron oxidation. No unweathered material was exposed during processing.

Petrographic Description: Brian Mason

Chondritic structure is well developed; chondrules are 0.3-0.9 mm in diameter, the commonest types being granular olivine, barred olivine, and fine-grained pyroxene. In the olivine chondrules the material interstitial to the olivine is a fine-grained aggregate probably of pyroxene and plagioclase. Some larger irregular aggregates of granular olivine (up to 6 mm in greatest dimension) are present. The matrix of the chondrules and aggregates is a granular aggregate of olivine and pyroxene, with minor nickel-iron and troilite (nickel-iron in excess of troilite). Somewhat eroded fusion crust is present along one edge. The section is pervaded with brown limonitic staining, and small patches and veinlets of limonite are present. Microprobe analyses show uniform olivine (Fa₁₈) and orthopyroxene (Fs₁₆) compositions. The meteorite is classified as an H5 chondrite.

ANTARCTIC METEORITE DATA SHEET

Sample No.: ALHA77274 Location: Allan Hills
Field No.: Y78010504 Field Contamination Category: 6
Weight (gms): 288.1
Meteorite Type: H5 Chondrite

Physical Description:

A small patch of dull black fusion crust remains on the B surface. The remaining surfaces are devoid of fusion crust and are weathered and stained a reddish-brown by iron oxidation. One small fracture is present on the B surface.

After sawing the interior of the sample revealed small metallic flecks, probably due to the abrasion of the saw blade against the metal included in the meteorite, as the remainder of the stone's sawed surface appeared a reddish-brown.

Dimensions: 7.5x6.0x3.0 cm.

Petrographic Description: Brian Mason

Chondritic structure is well developed, but many of the chondrules have indistinct margins and tend to merge with the groundmass. Chondrules range up to 2.4 mm in diameter; the commonest types are granular olivine and fine-grained radiating pyroxene. The groundmass consists of olivine and pyroxene with minor amounts of nickel-iron and troilite. Brown limonitic staining pervades the section. Microprobe analyses show olivine (Fa_{18}) and pyroxene (Fs_{16}) of uniform composition. The meteorite is classified as an H5 chondrite.

ANTARCTIC METEORITE DATA SHEET

Sample No.: ALHA77286 Location: Allan Hills
Field No.: Y78010506 Field Contamination Category: 6
Weight (gms): 245.8
Meteorite Type: H4 Chondrite

Physical Description:

The B surface and portions of the N surface are devoid of fusion crust. The remaining surfaces have remnants of a thin black fusion crust. The surfaces that are devoid of fusion crust are rough on a small scale. It appears that many ~1 mm inclusions produce the roughness. Chondrules and lithic clasts are present in the sample. Only one small fracture occurs on the T surface.

No unweathered material was exposed when the sample was sawed.

Dimensions: ~7.5x5.5x3.5 cm.

Petrographic Description: Brian Mason

The section shows a close-packed aggregate of chondrules, 0.2-1.8 mm in diameter, with a relatively minor amount of matrix material. A variety of chondrule types is present, the commonest being granular olivine, olivine-pyroxene, and fine-grained pyroxene. Much of the granular pyroxene in chondrules is polysynthetically twinned clinobronzite. The matrix consists of fine-grained olivine and pyroxene with minor nickel-iron and troilite; some of the troilite occurs as rims to chondrules. The matrix is infiltrated with veinlets of red-brown limonite. Microprobe analyses show olivine of essentially uniform composition (Fs_{12} - Fs_{16} , average Fs_{14}). The meteorite is classified as an H4 chondrite.

ANTARCTIC METEORITE DATA SHEET

Sample No.: ALHA78050

Location: Allan Hills

Field No.: 262

Weight (gms): 1045

Meteorite Type: L6 Chondrite

Physical Description:

This is not a complete specimen. The N, T and B surfaces are fracture surfaces that are stained reddish-brown by iron-oxidation. Inclusions in the meteorite are apparent on these surfaces and patches of remnant fusion crust remain on the B surface. The fusion crust, where present, is mottled brown and black.

Unoxidized (<5%) metallic particles, and some metallic particles with oxidation halos are apparent on the sawed surfaces of the sample. Fracturing, with oxidation staining along the margins, is apparent on the W sawed face, as are small irregular inclusions.

Dimensions: 15x8x6 cm.

Petrographic Description: Brian Mason

Chondrules are sparse and ill-defined, their borders tending to merge with the granular groundmass, which consists of olivine and pyroxene, minor subequal amounts of nickel-iron and troilite, a little plagioclase, and accessory chromite. A little limonitic staining is associated with some of the nickel-iron grains. Microprobe analyses show olivine (Fa_{23}), orthopyroxene (Fs_{20}), and plagioclase (An_{12}) of uniform composition. The meteorite is classified as an L6 chondrite.

ANTARCTIC METEORITE DATA SHEET

Sample No.: ALHA78105

Location: Allan Hills

Field No.: 249

Weight (gms): 9417

Meteorite Type: L6 Chondrite

Physical Description:

The exterior of the sample is irregular and rough on a mm scale. The character of the exterior appears to be the result of the weathering of the fusion crust. Small patches of fusion crust remain on the B and N surfaces. Where the sample is devoid of fusion crust, light to medium gray matrix material with chondrules and lithic clasts is exposed.

When the specimen was cleaved the interior of the sample appeared greenish-gray and fine grained. Only a very small amount of a metallic mineral phase is present in the sample. One fracture that penetrates the specimen is stained by iron oxidation along the margins.

Dimensions: 11x7x6 cm.

Petrographic Description: Brian Mason

Chondrules are sparse and ill-defined, their borders tending to merge with the granular groundmass, which consists mainly of olivine and pyroxene, with minor subequal amounts of nickel-iron and troilite, plagioclase, and accessory chromite. A moderate amount of limonitic staining is associated with some of the nickel-iron grains. Microprobe analyses show olivine (Fa₂₃), orthopyroxene (Fs₂₀), and plagioclase (An₁₁) of uniform composition. The meteorite is classified as an L6 chondrite.

ANTARCTIC METEORITE DATA SHEET

Sample No.: ALHA78251 Location: Allan Hills
Field No.: Allan Camp #1
Weight (gms): 1312
Meteorite Type: L6 Chondrite

Physical Description:

The exterior of the sample is rough and irregular and macroscopically appears similar to ALHA77105. The sample is completely devoid of fusion crust.

A small piece of material has been removed from the S surface, revealing a fine grained, greenish-gray interior. Metallic particles are apparent in the interior of the sample, and some oxidation of these has occurred.

Oxidation halos around metallic particles (~10%) are also apparent on the sawed surfaces of the sample. Several fractures are apparent with iron oxidation along their margins.

Dimensions: 12x7.5x10 cm.

Petrographic Description: Brian Mason

Chondrules are sparse and poorly defined, merging with the granular groundmass, which consists mainly of olivine and pyroxene, with minor amounts of plagioclase, nickel-iron, and troilite, and accessory chromite. Limonitic staining is prominent around the nickel-iron grains. Microprobe analyses show olivine (Fa_{23}), orthopyroxene (Fs_{20}), and plagioclase (An_{10}) of uniform composition. The meteorite is classified as an L6 chondrite.

ANTARCTIC METEORITE DATA SHEET

Sample No.: BTNA78004

Location: Bates Nunatak

Field No.: 324

Weight (gms): 1079

Meteorite Type: LL6 Chondrite

Physical Description:

One surface of this sample is a fracture surface. The remaining surfaces of the sample are covered with thin (~ 0.5 mm) dull black fusion crust. Regmaglypts are present on the N and S surfaces.

Macroscopically, the sample appears to be composed of angular, light colored clasts, surrounded by greenish-brown to gray interstitial material. The clasts comprise approximately 70% of the surface area and have a wide range in size, some are as much as 2.0 cm in diameter. Chondrules are apparent on the surfaces exposed during cleaving.

Dimensions: 12x7x7 cm.

Petrographic Description: Brian Mason

The section shows a granular aggregate consisting mainly of olivine and pyroxene (average grain size 0.1-0.2 mm), with minor amounts of plagioclase, nickel-iron, and troilite, and accessory chromite. Chondritic structure is barely visible in a few places, and the chondrules are somewhat fragmented. Many of the silicate grains show undulose extinction. The meteorite has a brecciated structure, and the breccia fragments are outlined by an anastomosing network of black glassy veinlets which contain numerous minute troilite globules. A small amount of limonite staining is present around some of the nickel-iron grains. Microprobe analyses show olivine (Fa_{30}) and orthopyroxene (Fs_{24}) of essentially uniform composition; plagioclase is somewhat variable in composition, An_{13} - An_{22} , average An_{19} . The black glass is quite variable in composition, as follows (range and average, in weight percent): SiO_2 31.5-49.9, 40.4; Al_2O_3 0-6.3, 2.8; FeO 17.5-40.9, 23.9; MgO 16.7-31.3, 27.3; CaO 0-3.3, 1.6; Na_2O 0-2.4, 1.1; TiO_2 0-0.15, 0.09; MnO 0.3-0.5, 0.4. The meteorite is classed as an LL6 chondrite; it shows to a high degree the brecciation characteristic of many LL chondrites.

ANTARCTIC METEORITE DATA SHEET

Sample No.: META78001

Location: Meteorite Hills

Field No.: 323

Weight (gms): 624.4

Meteorite Type: H4 Chondrite

Physical Description:

This sample is shaped like a boomerang and is entirely covered with fusion crust. The fusion crust on the B surface has an iridescent sheen, is much thinner than the fusion crust on the remainder of the sample, and has a well defined area of weathering, 1 cm from the edge of the sample. Remaining surfaces have dull, brownish-black fusion crust. Small regmaglypts are apparent on the T and N surfaces and flow bands are present on the B surface at the E and W ends. Small fractures exist on the T and B surfaces, but they do not appear to penetrate the specimen.

The interior material of the meteorite ranges from being completely weathered and iron oxide stained to unweathered. The weathered portions are massive and are preferentially located in the T half of the sample. The unweathered areas are light grayish-green and contain unoxidized metallic fragments.

Dimensions: 14.5x8x3 cm.

Petrographic Description: Brian Mason

Chondritic structure barely observable, the sparse chondrules merging with the granular groundmass, which consists of olivine and pyroxene with minor amounts of nickel-iron and troilite (the nickel-iron in excess of troilite). The section shows areas of blackening which appear to be due to fine-grained troilite, possibly a shock effect. Minor limonitic staining pervades part of the section. Microprobe analyses show olivine of essentially uniform composition (Fa₁₇) and somewhat variable pyroxene (Fs₁₄-Fs₂₁, average Fs₁₆). The meteorite is classified as an H4 chondrite.

ANTARCTIC METEORITE DATA SHEET

Sample No.: RKPA78004

Location: Reckling Peak

Field No.: Reckling Peak #4

Weight (gms): 166.9

Meteorite Type: H4 Chondrite

Physical Description:

All but one surface of the sample is covered with thin, dull black fusion crust, although portions of the fusion crust on another surface appear to have been physically plucked away. The portions of the sample devoid of fusion crust are shiny reddish-brown. Chipping this small stone was impossible. Sawing revealed an interior with many clasts discernible in the dark gray matrix. Metallic fragments are present. On the cut face of the sample it appears that the inclusions in the meteorite have a more dense population around the circumference of the sample, from the exterior margin to a depth of approximately 1 cm.

Petrographic Description: Brian Mason

Chondritic structure is well developed, but many of the chondrules appear to be deformed or broken. The groundmass consists of finely granular olivine and pyroxene, with minor amounts of nickel-iron and troilite (nickel-iron in excess of troilite). Well-preserved fusion crust is present along one edge of the section. Brown limonitic staining pervades the section, and veinlets and patches of limonite are present. Microprobe analyses show olivine of essentially uniform composition (Fa_{17}) and pyroxene of somewhat variable composition (Fs_{14} - Fs_{21} , average Fs_{16}); some analysed spots within the pyroxene grains show up to 15% CaO, suggesting exsolution of diopsidic pyroxene. The meteorite is classified as an H4 chondrite.