Antarctic Meteorite Newsletter

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

Edited by Cecilia Satterwhite and Kevin Righter, NASA Johnson Space Center, Houston, Texas 77058

Curator's Comments

Kevin Righter
NASA-JSC

This newsletter reports 212 new meteorites from the 2006 and 2007 ANSMET seasons from Graves Nunataks (GRA), Larkman Nunatak (LAR), and the Miller Range (MIL). These new samples include 1 diogenite, 3 eucrites,4 howardites, and 6 carbonaceous chondrites (4 CV, 1 CO, and 1 CM).

The Meteorite Processing lab and thin section staff has been busy finishing off the characterization of the 2006 season ANSMET samples – all 854 samples have been through the step of initial processing and only a few hundred are left to be formally classified by the staff at the Smithsonian. Additionally, the meteorite collection had 64 requests at the Fall meeting, and had 19 since then, so we have been trying to fill as many of the approved requests as possible, while doing initial processing of the 2006 and 2007 season samples.

With the characterization of the 2006-2007 season nearly complete, we can reflect on the bounty of meteorites provided by that team: 2 lunars, 1 martian, 2 paired LL chondritic impact melts, 2 paired ungrouped achondrites (that appear to be associated with brachinites and record early melting events in the solar system), CR, CV, CM, and CK carbonaceous chondrites, 3 irons, 1 ureilite, and 7 HEDs. This great diversity of samples will contribute to many fields of planetary science for years, and is a testament to the value of continuing support of the ANSMET field teams.

New email address for submitting sample requests

In order to better serve the US Antarctic meteorite community, we have a new email address for you to use when submitting sample requests. Please make note of this and use it for sample requests for this newsletter and all future requests:

JSC-ARES-MeteoriteRequest@nasa.gov

The new address should ensure that requests will be processed in due time since they can be read by several JSC staff rather than just one person.

Hurricane Ike

The greater Houston area was affected deeply by Hurricane Ike in early September. Ike formed September 1 in the Atlantic Ocean, and made landfall September 13 in Galveston, Texas. Despite being a strong Category 2 hurricane, Ike was the third most destructive Atlantic hurricane in history, and had the highest integrated kinetic energy of any hurricane in history, primarily due to its large size. Hurricane Ike made landfall just a few weeks after we re-

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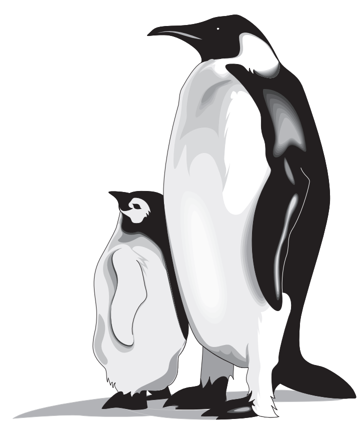


Sample Request Deadline
March 12, 2009

MWG Meets
March 27-28, 2009

Free publication available at: **http://curator.jsc.nasa.gov/antmet/amn/amn.cfm**

leased Antarctic Meteorite Newsletter 31, no. 2, in August. Needless to say, the NASA Johnson Space Center and its employees were profoundly affected by this hurricane. The center shut down for close to one week, and then once open, there was a significant recovery period. The Antarctic Meteorite collection faired well during this period, with the short period of power loss to our freezers being offset by the presence of large ice blocks therein. Many samples from our collection were safely stored in the watertight vault in Building 31N. Both Building 31 and 31N, home of all of NASA's sample collections, had no major damage - lucky indeed considering the damage suffered by some areas nearby. Ike undoubtedly slowed down our operation in the Fall – we appreciate your understanding during the difficult time for us.

Report on the 2008-2009 ANSMET Field Season

Ralph Harvey, ANSMET

Call me Ralfstradamus. In last fall's newsletter I predicted a challenging season ahead given warnings of aircraft shortages, reduced field party size and a late change to a target icefield littered with shiny dark terrestrial rocks. Obviously the kind of prediction one hopes is wrong, but alas, there was no shortage of difficulties. The story has a happy ending, however, so read on!

The field team (Jani Radebaugh, Amy McAdam, Deon van Niekerk, Duck Mittlefehldt, Joe Boyce, John Schutt and myself) made it to McMurdo only one day behind schedule; but even before that delays began piling up. A pre-season reconnaissance flight over the Davis-Ward icefields (between Davis Nunataks and Mt. Ward, and one of the homes of the DOM meteorites) revealed no landing site suitable for the Basler aircraft we were slated to use. That in turn meant two of our people had to go out to the site early, in a smaller Twin Otter airplane, and spend a day or two towing a groomer with a snowmobile to produce a skiway. But then the groomer broke before the job was done; and needing another Twin Otter flight to deliver a replacement, the delays piled up. It wasn't until Dec. 23 that the field team was finally complete, two weeks of our six-week field season gone. We've had delays approaching this duration in the past, but this one had a personal impact on me- I had planned to come OUT of the field on Dec. 22, so in the end I missed the fieldwork entirely, letting my mid-season replacement Joe go out in my stead.

Of course, every gray cloud has a silver lining. Many Antarctic projects had no field time at all; we at least got 2/3rds of what we'd planned. My children were very happy to have daddy home for only my 2nd Christmas in their lifetimes, and most of the field team appreciated the shorter deprecations of the 4-week season (except for Duck and John, who endured a full 6 weeks). High winds during the shortened season meant only 16 days of searching, yet Davis-Ward revealed a startling number of finds and very high density concentration. Before the season, John and I felt that good weather might allow us complete recoveries at the site. Now, not so much - in fact, we'll be lucky to finish it with two more full-size seasons. The best analogy to the Davis-Ward icefield among previously-known sites is the Lewis Cliff Ice Tongue, where a high density of finds led to 3+ full seasons of work and many great specimens, acquired only through slow, highly methodical searching in the accompanying high density of terrestrial rocks. The season total was 521 finds; there are some nice achondrites and carbonaceous in that collection and certainly other interesting samples masquerading as modest-sized ordinary chondrites. Let me close with a final cryptic quatrain from Ralfstradamus (interpret as you will).

The eyes of the righteous will be blinded
and doubled seas will surge. to ponder
stones from iron coffins whose cloaks of
darkness hide parentage mundane.
fugitives from the sky wearing raven
masks will bear witness to cold and
danger. treasure pursued by the vexed.

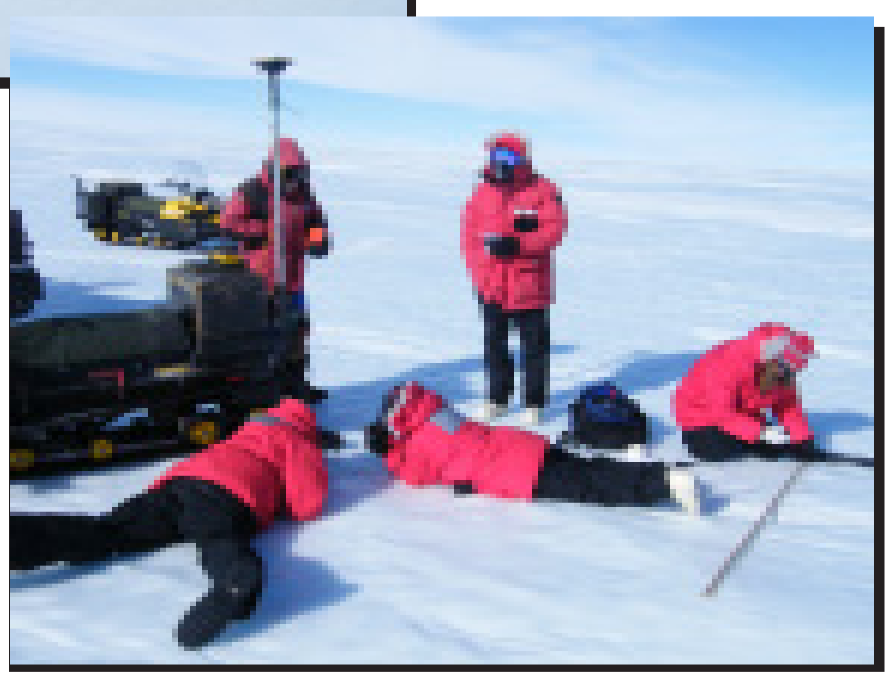
View from the flank of Mount Ward, part of the icefield searched in '08-09 season

Behind the Scenes

Tim McCoy, Smithsonian Institution

If you are a regular reader of this Newsletter, you are probably familiar with the workings of the Antarctic Meteorite Program. You may keep tabs on those that join Ralph Harvey in the field each year, you read Kevin Righter's article in the Newsletter, and you know the staff at the Smithsonian who classify the meteorites. Unless you have worked with one of those organizations, you are probably far less familiar with the hundreds of people who have to do their jobs to make it possible for us to announce new meteorites to the community. Staff at the National Science Foundation have to process the grant; maintenance personnel in McMurdo have to ensure safe operations of the aircraft in the field; liquid nitrogen has to be delivered at Johnson Space Center for curation; and, of special note for this newsletter, technicians at JSC and the Smithsonian have to prepare the thin sections we need to complete the classifications. You may have noticed the last couple of newsletters were a bit on the thin side. A big reason for this has been turnover in the thin section labs at both JSC and the Smithsonian. For the latter, our long-term thin section preparator Tim Gooding moved on to a position at the National Institute of Standards and Technology. We wish him well in his new job. While we've been searching for his replacement, thin section preparation has been a bit slow. We hope to have a new hire in place by the next newsletter and you should see an increase in the number of "interesting" meteorites we describe. But remember, it's not just the field party members or curators who make this newsletter possible – it really takes a large, talented, dedicated team!

The team arrives at Pegasus Field, Antarctica



The team collecting a "very small" meteorite

2006 and 2007 Collections

Pages 5-14 contain preliminary descriptions and classifications of meteorites that were completed since publication of issue 31(2), Sept. 2008. Specimens of special petrologic type (carbonaceous chondrite, unequilibrated ordinary chondrite, achondrite, etc.) are represented by separate descriptions unless they are paired with previously described meteorites. However, some specimens of non-special petrologic type are listed only as single line entries in Table 1. For convenience, new specimens of special petrological type are also recast in Table 2.

Macroscopic descriptions of stony meteorites were performed at NASA/JSC. These descriptions summarize hand-specimen features observed during initial examination. Classification is based on microscopic petrography and reconnaissance-level electron microprobe analyses using polished sections prepared from a small chip of each meteorite. For each stony meteorite the sample number assigned to the preliminary examination section is included. In some cases, however, a single microscopic description was based on thin sections of several specimens believed to be members of a single fall.

Meteorite descriptions contained in this issue were contributed by the following individuals:

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Antarctic Meteorite Locations

ALH — Allan Hills
BEC — Beckett Nunatak
BOW — Bowden Neve
BTN — Bates Nunataks
CMS — Cumulus Hills
CRA — Mt.Cranfield Ice Field
CRE — Mt. Crean
DAV — David Glacier
DEW — Mt. DeWitt
DNG — D'Angelo Bluff
DOM — Dominion Range
DRP — Derrick Peak
EET — Elephant Moraine
FIN — Finger Ridge
GDR — Gardner Ridge
GEO — Geologists Range
GRA — Graves Nunataks
GRO — Grosvenor Mountains
HOW — Mt. Howe
ILD — Inland Forts
KLE — Klein Ice Field
LAP — LaPaz Ice Field
LAR — Larkman Nunatak
LEW — Lewis Cliff
LON — Lonewolf Nunataks
MAC — MacAlpine Hills
MBR — Mount Baldr
MCY — MacKay Glacier
MET — Meteorite Hills
MIL — Miller Range
ODE — Odell Glacier
OTT — Outpost Nunatak
PAT — Patuxent Range
PCA — Pecora Escarpment
PGP — Purgatory Peak
PRA — Mt. Pratt
PRE — Mt. Prestrud
QUE — Queen Alexandra Range
RBT — Roberts Massif
RKP — Reckling Peak
SAN — Sandford Cliffs
SCO — Scott Glacier
STE — Stewart Hills
TEN — Tentacle Ridge
TIL — Thiel Mountains
TYR — Taylor Glacier
WIS — Wisconsin Range
WSG — Mt. Wisting

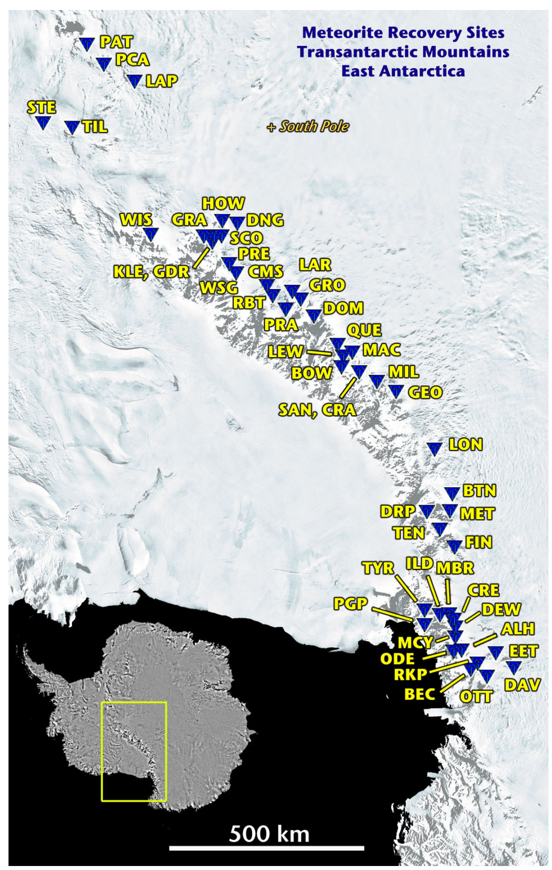

Table 1

List of Newly Classified Antarctic Meteorites **

Sample Number		Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
GRA 06106	~	4530.0	H5 CHONDRITE	B	A		
GRA 06108	~	2323.4	L5 CHONDRITE	A/B	A/B		
GRA 06109	~	1618.9	L5 CHONDRITE	A/B	B		
GRA 06112	~	996.3	L5 CHONDRITE	B/C	B		
GRA 06113	~	1254.7	L5 CHONDRITE	B/C	A/B		
GRA 06114	~	906.7	L5 CHONDRITE	B/C	B		
LAR 06254	~	2301.8	H6 CHONDRITE	B/Ce	A/B		
LAR 06256	~	3180.0	H6 CHONDRITE	B	A		
LAR 06258	~	1828.2	H6 CHONDRITE	B/Ce	A/B		
LAR 06260	~	1177.8	L5 CHONDRITE	B	A/B		
LAR 06266	~	1893.6	H5 CHONDRITE	A/B	A/B		
LAR 06270	~	2541.3	H6 CHONDRITE	B/CE	A		
LAR 06272	~	3190.0	H6 CHONDRITE	A/B	B		
LAR 06305	~	2885.1	H6 CHONDRITE	B/C	A/B		
LAR 06370	~	19.9	L4 CHONDRITE	B	A		
LAR 06371	~	11.8	H6 CHONDRITE	C	A/B		
LAR 06372	~	7.8	H6 CHONDRITE	C	A		
LAR 06373	~	6.9	H5 CHONDRITE	B/C	B		
LAR 06374	~	33.2	H6 CHONDRITE	C	B		
LAR 06375	~	40.1	H6 CHONDRITE	B/C	B		
LAR 06376	~	65.6	L4 CHONDRITE	C	A/B		
LAR 06377	~	4.8	H6 CHONDRITE	C	A/B		
LAR 06378	~	7.0	H6 CHONDRITE	C	A/B		
LAR 06379	~	51.9	H5 CHONDRITE	C	C		
LAR 06380	~	32.7	H6 CHONDRITE	C	B		
LAR 06381	~	87.5	L5 CHONDRITE	B/C	A/B		
LAR 06382	~	9.1	H6 CHONDRITE	C	A/B		
LAR 06383	~	20.6	L5 CHONDRITE	C	A/B		
LAR 06384	~	33.7	H6 CHONDRITE	C	A/B		
LAR 06385	~	11.1	H6 CHONDRITE	C	A/B		
LAR 06386	~	11.7	L5 CHONDRITE	C	A/B		
LAR 06387	~	13.2	H6 CHONDRITE	C	A/B		
LAR 06388	~	6.2	H6 CHONDRITE	C	A/B		
LAR 06389	~	8.0	H6 CHONDRITE	C	A/B		
LAR 06390	~	10.7	H6 CHONDRITE	C	A/B		
LAR 06391	~	22.0	H6 CHONDRITE	C	B		
LAR 06392	~	90.9	H5 CHONDRITE	A/B	A/B		
LAR 06393	~	86.7	H6 CHONDRITE	C	B		
LAR 06394	~	21.5	L5 CHONDRITE	B	B		
LAR 06395	~	36.3	H6 CHONDRITE	C	A/B		
LAR 06396	~	27.3	H6 CHONDRITE	C	B/C		
LAR 06397	~	19.6	H5 CHONDRITE	A	A/B		
LAR 06398	~	30.7	H6 CHONDRITE	C	B		
LAR 06410	~	20.0	L4 CHONDRITE	A/B	A/B		
LAR 06411	~	34.8	L5 CHONDRITE	B/C	A/B		
LAR 06412	~	8.5	L5 CHONDRITE	C	A/B		
LAR 06413	~	8.3	H6 CHONDRITE	C	A/B		
LAR 06414	~	7.9	H6 CHONDRITE	C	A/B		
LAR 06415	~	5.6	H6 CHONDRITE	C	A/B		

Sample Number		Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
LAR 06416	~	33.8	H6 CHONDRITE	C	A/B		
LAR 06417	~	9.7	H6 CHONDRITE	C	A/B		
LAR 06418	~	10.8	H6 CHONDRITE	C	A/B		
LAR 06419	~	14.0	L5 CHONDRITE	B/C	A/B		
LAR 06420	~	67.5	L5 CHONDRITE	C	B		
LAR 06421	~	17.7	H6 CHONDRITE	C	A/B		
LAR 06422	~	65.4	L5 CHONDRITE	C	A/B		
LAR 06424	~	3.6	L6 CHONDRITE	C	A/B		
LAR 06425	~	20.4	L6 CHONDRITE	C	A/B		
LAR 06426	~	7.1	H6 CHONDRITE	C	A/B		
LAR 06427	~	19.3	L6 CHONDRITE	C	A/B		
LAR 06428	~	10.8	H6 CHONDRITE	C	A/B		
LAR 06429	~	6.9	H6 CHONDRITE	C	A/B		
LAR 06450	~	108.7	H6 CHONDRITE	C	A/B		
LAR 06451	~	23.8	L4 CHONDRITE	B	A		
LAR 06452	~	52.1	H6 CHONDRITE	C	A/B		
LAR 06453	~	13.0	H6 CHONDRITE	C	A/B		
LAR 06454	~	98.8	L4 CHONDRITE	C	A/B		
LAR 06455	~	118.5	L4 CHONDRITE	B	B		
LAR 06456	~	32.0	H6 CHONDRITE	C	B		
LAR 06457	~	92.2	H6 CHONDRITE	C	B		
LAR 06458	~	113.2	L4 CHONDRITE	C	A/B		
LAR 06459	~	87.7	H6 CHONDRITE	C	A/B		
LAR 06480	~	11.5	H6 CHONDRITE	C	A/B		
LAR 06481	~	14.2	H6 CHONDRITE	C	A/B		
LAR 06482	~	14.6	H6 CHONDRITE	C	B		
LAR 06483	~	10.8	H6 CHONDRITE	C	A/B		
LAR 06484	~	5.1	H6 CHONDRITE	C	A/B		
LAR 06485	~	5.0	L4 CHONDRITE	B/C	A/B		
LAR 06486	~	14.2	H6 CHONDRITE	C	A/B		
LAR 06487	~	15.2	H6 CHONDRITE	CE	A/B		
LAR 06488	~	7.9	H6 CHONDRITE	C	A/B		
LAR 06489	~	63.8	H6 CHONDRITE	C	B		
LAR 06490	~	53.4	L4 CHONDRITE	B	A/B		
LAR 06491	~	7.4	H6 CHONDRITE	C	A		
LAR 06492	~	8.2	H6 CHONDRITE	C	A		
LAR 06493	~	5.7	H6 CHONDRITE	C	A/B		
LAR 06494	~	13.7	H6 CHONDRITE	CE	B		
LAR 06495	~	1.0	H6 CHONDRITE	B	A		
LAR 06496	~	15.4	H6 CHONDRITE	CE	B		
LAR 06497	~	20.9	H6 CHONDRITE	C	A/B		
LAR 06498	~	54.6	L5 CHONDRITE	B	A/B		
LAR 06499	~	16.5	H6 CHONDRITE	CE	B		
LAR 06510	~	38.5	L4 CHONDRITE	B	A		
LAR 06511	~	12.4	H6 CHONDRITE	C	A		
LAR 06513	~	16.9	H6 CHONDRITE	CE	A/B		
LAR 06514	~	87.6	L5 CHONDRITE	BE	B		
LAR 06515	~	13.5	H6 CHONDRITE	C	A/B		
LAR 06516	~	45.1	H6 CHONDRITE	C	C		
LAR 06517	~	30.7	H6 CHONDRITE	C	C		
LAR 06518	~	49.9	H5 CHONDRITE	C	A/B		
LAR 06519	~	86.4	H6 CHONDRITE	C	A/B		
LAR 06520	~	19.1	H6 CHONDRITE	C	A/B		
LAR 06521	~	23.7	H6 CHONDRITE	C	A/B		
LAR 06522	~	9.4	H4 CHONDRITE	B/C	B		

Sample Number		Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
LAR 06523	~	22.2	H6 CHONDRITE	C	A/B		
LAR 06524	~	15.5	H6 CHONDRITE	C	A/B		
LAR 06525	~	39.8	H6 CHONDRITE	C	A/B		
LAR 06526	~	33.3	L5 CHONDRITE	A/B	A		
LAR 06527	~	24.3	H6 CHONDRITE	CE	A/B		
LAR 06528	~	18.4	H6 CHONDRITE	C	A/B		
LAR 06529	~	26.4	H6 CHONDRITE	C	B		
LAR 06530	~	12.0	H6 CHONDRITE	C	A		
LAR 06531	~	34.8	H6 CHONDRITE	C	A		
LAR 06532	~	15.4	L5 CHONDRITE	CE	A/B		
LAR 06533	~	13.2	H6 CHONDRITE	C	A/B		
LAR 06534	~	16.5	H6 CHONDRITE	C	A		
LAR 06535	~	16.0	L5 CHONDRITE	C	A		
LAR 06536	~	3.0	H6 CHONDRITE	C	A		
LAR 06537	~	19.7	L5 CHONDRITE	B/C	A/B		
LAR 06538	~	11.6	H6 CHONDRITE	C	A		
LAR 06539	~	15.8	H4 CHONDRITE	CE	A/B		
LAR 06550	~	27.0	H6 CHONDRITE	C	B		
LAR 06551	~	10.3	H6 CHONDRITE	C	A/B		
LAR 06552	~	11.6	H6 CHONDRITE	C	A/B		
LAR 06553	~	7.9	H5 CHONDRITE	C	A/B		
LAR 06554	~	5.1	H6 CHONDRITE	C	B		
LAR 06555	~	14.1	H6 CHONDRITE	C	B		
LAR 06556	~	10.6	H6 CHONDRITE	C	B		
LAR 06557	~	28.9	H6 CHONDRITE	C	B		
LAR 06558	~	15.7	H6 CHONDRITE	C	B		
LAR 06559	~	15.7	H6 CHONDRITE	C	B		
LAR 06580	~	23.6	H6 CHONDRITE	C	B		
LAR 06581	~	17.4	H6 CHONDRITE	C	A/B		
LAR 06582	~	15.0	L5 CHONDRITE	CE	C		
LAR 06583	~	7.7	H6 CHONDRITE	CE	C		
LAR 06584	~	8.0	H6 CHONDRITE	B	A/B		
LAR 06586	~	7.1	H6 CHONDRITE	C	B		
LAR 06587	~	16.9	H6 CHONDRITE	C	A		
LAR 06588	~	9.9	L5 CHONDRITE	CE	A/B		
LAR 06589	~	10.1	H6 CHONDRITE	C	A/B		
LAR 06670	~	63.2	L5 CHONDRITE	C	A		
LAR 06671	~	30.7	H6 CHONDRITE	C	A/B		
LAR 06672	~	56.0	H6 CHONDRITE	C	A/B		
LAR 06675	~	33.8	L5 CHONDRITE	B	A/B		
LAR 06676	~	50.9	L5 CHONDRITE	C	A		
LAR 06677	~	24.6	H6 CHONDRITE	C	CE		
LAR 06678	~	19.7	H6 CHONDRITE	C	A		
LAR 06679	~	24.6	H6 CHONDRITE	B	A/B		
LAR 06680	~	14.8	H6 CHONDRITE	C	A/B		
LAR 06681	~	4.1	H6 CHONDRITE	C	B		
LAR 06682	~	20.7	H6 CHONDRITE	C	A/B		
LAR 06683	~	7.6	H6 CHONDRITE	C	A/B		
LAR 06684	~	22.4	H6 CHONDRITE	B	A/B		
LAR 06687	~	18.5	L5 CHONDRITE	B/C	A/B		
LAR 06688	~	18.2	L6 CHONDRITE	C	A/B		
LAR 06689	~	12.4	H6 CHONDRITE	C	A/B		
LAR 06720	~	11.9	H6 CHONDRITE	C	B		
LAR 06721	~	33.9	H6 CHONDRITE	C	C		
LAR 06722	~	24.0	L5 CHONDRITE	B	B		

Sample Number		Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
LAR 06723	~	34.8	H6 CHONDRITE	C	A/B		
LAR 06724	~	64.2	L5 CHONDRITE	CE	A/B		
LAR 06725	~	43.0	H6 CHONDRITE	C	B/C		
LAR 06726	~	47.2	L5 CHONDRITE	B/C	A/B		
LAR 06727	~	38.6	H6 CHONDRITE	C	A		
LAR 06728	~	21.2	L5 CHONDRITE	B	B		
LAR 06729	~	18.3	H6 CHONDRITE	C	B		
LAR 06750	~	66.8	L5 CHONDRITE	C	B		
LAR 06751	~	66.9	LL6 CHONDRITE	B	B		
LAR 06752	~	165.1	H6 CHONDRITE	C	B		
LAR 06753	~	176.7	L6 CHONDRITE	B	A/B		
LAR 06754	~	61.5	H6 CHONDRITE	C	B		
LAR 06755	~	76.1	L5 CHONDRITE	C	A/B		
LAR 06756	~	58.2	H6 CHONDRITE	C	A/B		
LAR 06757	~	17.6	H6 CHONDRITE	C	A/B		
LAR 06758	~	33.5	H6 CHONDRITE	C	A/B		
LAR 06759	~	58.4	L5 CHONDRITE	C	A/B		
LAR 06840	~	15.0	H6 CHONDRITE	C	A/B		
LAR 06841	~	32.4	H6 CHONDRITE	C	A/B		
LAR 06842	~	13.7	L5 CHONDRITE	B/C	B		
LAR 06843	~	7.2	H6 CHONDRITE	C	A/B		
LAR 06844	~	22.8	H6 CHONDRITE	C	A/B		
LAR 06845	~	12.4	H6 CHONDRITE	C	A/B		
LAR 06846	~	8.9	H6 CHONDRITE	C	A/B		
LAR 06847	~	34.1	L5 CHONDRITE	B/C	B		
LAR 06848	~	17.5	H6 CHONDRITE	C	A/B		
LAR 06849	~	32.5	H6 CHONDRITE	C	C		
LAR 06850	~	12.8	H6 CHONDRITE	C	A/B		
LAR 06851	~	15.7	H6 CHONDRITE	C	A/B		
LAR 06852	~	5.3	H6 CHONDRITE	C	B		
LAR 06853	~	6.5	H6 CHONDRITE	C	A/B		
LAR 06854	~	6.1	H6 CHONDRITE	C	B		
LAR 06855	~	34.1	H6 CHONDRITE	C	B		
LAR 06856	~	13.0	H6 CHONDRITE	C	B		
LAR 06857	~	35.1	H6 CHONDRITE	C	C		
LAR 06858	~	10.3	H6 CHONDRITE	CE	B		
LAR 06859	~	20.3	H6 CHONDRITE	C	A/B		
MIL 07016		302.4	EUCRITE (BRECCIATED)	A/B	A/B		49-64
MIL 07613		4.6	DIOGENITE	B	A/B		14-36
MIL 07634	~	12.3	L6 CHONDRITE	C	C		
MIL 07658		3.3	EUCRITE	A	A		27-63
MIL 07659		7.0	LL6 CHONDRITE	A/B	A	31	26
MIL 07660		2.4	EUCRITE (BRECCIATED)	A	A		26-61
MIL 07661		26.7	HOWARDITE	A	A	37-38	27-43
MIL 07663		9.9	HOWARDITE	A	A	1-36	22-53
MIL 07664		30.6	HOWARDITE	A	A		20-64
MIL 07665		71.1	HOWARDITE	A/B	A/B		20-60
MIL 07670		7.7	CM2 CHONDRITE	B	A/B	1-48	5
MIL 07671		19.4	CV3 CHONDRITE	BE	B	0-9	1
MIL 07686		13.4	CV3 CHONDRITE	CE	B/C	0-6	1
MIL 07687		5.5	CO3 CHONDRITE	CE	A/B	1-50	3-41
MIL 07697		15.5	CV3 CHONDRITE	CE	C	1-6	1-2
MIL 07698		25.1	CV3 CHONDRITE	CE	C	0-9	

Table 2

Newly Classified Specimens Listed By Type

Sample Number	Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
		Achondrites				
MIL 07613	4.6	DIOGENITE	B	A/B		14-36
MIL 07658	3.3	EUCRITE	A	A		27-63
MIL 07016	302.4	EUCRITE (BRECCIATED)	A/B	A/B		49-64
MIL 07660	2.4	EUCRITE (BRECCIATED)	A	A		26-61
MIL 07661	26.7	HOWARDITE	A	A	37-38	27-43
MIL 07663	9.9	HOWARDITE	A	A	1-36	22-53
MIL 07664	30.6	HOWARDITE	A	A		20-64
MIL 07665	71.1	HOWARDITE	A/B	A/B		20-60
		Carbonaceous Chondrites				
MIL 07670	7.7	CM2 CHONDRITE	B	A/B	1-48	5
MIL 07687	5.5	CO3 CHONDRITE	CE	A/B	1-50	3-41
MIL 07671	19.4	CV3 CHONDRITE	BE	B	0-9	1
MIL 07686	13.4	CV3 CHONDRITE	CE	B/C	0-6	1
MIL 07697	15.5	CV3 CHONDRITE	CE	C	1-6	1-2
MIL 07698	25.1	CV3 CHONDRITE	CE	C	0-9	

**Notes to Tables 1 and 2:

“Weathering” Categories:

A: Minor rustiness; rust haloes on metal particles and rust stains along fractures are minor.
B: Moderate rustiness; large rust haloes occur on metal particles and rust stains on internal fractures are extensive.
C: Severe rustiness; metal particles have been mostly stained by rust throughout.
E: Evaporite minerals visible to the naked eye.

“Fracturing” Categories:

A: Minor cracks; few or no cracks are conspicuous to the naked eye and no cracks penetrate the entire specimen.
B: Moderate cracks; several cracks extend across exterior surfaces and the specimen can be readily broken along the cracks.
C: Severe cracks; specimen readily crumbles along cracks that are both extensive and abundant.

The ~ indicates classification by optical methods. This can include macroscopic assignment to one of several well-characterized, large pairing groups (e.g., the QUE LL5 chondrites), as well as classification based on oil immersion of several olivine grains to determine the approximate index of refraction for grouping into H, L or LL chondrites. Petrologic types in this method are determined by the distinctiveness of chondrules boundaries on broken surfaces of a 1-3 g chip. While this technique is suitable for general characterization and delineation of equilibrated ordinary chondrites, those undertaking detailed study of any meteorite classified by optical methods alone should use caution. It is recommended that a polished thin section be requested to accompany any chip and appropriate steps for a more detailed characterization should be undertaken by the user. (Tim McCoy, Smithsonian Institution)

Table 3

Tentative Pairings for New Meteorites

Table 3 summarizes possible pairings of the new specimens with each other and with previously classified specimens based on descriptive data in this newsletter issue. Readers who desire a more comprehensive review of the meteorite pairings in the U.S. Antarctic collection should refer to the compilation provided by Dr. E.R. D. Scott, as published in issue 9(2) (June 1986). Possible pairings were updated in Meteoritical Bulletins No. 76 (Meteoritics 29, 100-143), No. 79 (Meteoritics and Planetary Science 31, A161-174), No. 82 (Meteoritics and Planetary Science 33, A221-A239), No. 83 (Meteoritics and Planetary Science 34, A169-A186), No. 84 (Meteoritics and Planetary Science 35, A199-A225), No. 85 (Meteoritics and Planetary Science 36, A293-A322), No. 86 (Meteoritics and Planetary Science 37, A157-A184), No. 87 (Meteoritics and Planetary Science 38, A189-A248), No. 88 (Meteoritics and Planetary Science 39, A215-272), No. 89 (Meteoritics and Planetary Science 40, A201-A263), No. 90 (Meteoritics and Planetary Science 41, 1383-1418), No. 91 (Meteoritics and Planetary Science, 42, 413-466), No. 92 (Meteoritics and Planetary Science 42, 1647-1692), No. 93 (Meteoritics and Planetary Science 43, 571-632) and No. 94 (Meteoritics and Planetary Science 43, 1551–1588) and No. 95 (Meteoritics and Planetary Science 44, in press).

CV3 CHONDRITES

MIL 07686, MIL 07697 and MIL 07698 with MIL 07671

Petrographic Descriptions

Sample Number:	MIL 07016
Location:	Miller Range
Field Number:	18302
Dimensions (cm):	7.5 x 6.0 x 4.0
Weight (g):	302.39
Classification:	Eucrite (Brecciated)

Macroscopic Description: Cecilia Satterwhite

80% of the exterior surface has black, fractured fusion crust. Some areas look shiny and wet. The exterior is pitted and the exposed matrix is gray. The interior reveals a fine-grained gray matrix with minor oxidation scattered throughout. Light and dark minerals are visible.

Thin Section (,4) Description: Tim McCoy and Linda Welzenbach

This meteorite is dominated by fine-grained (~200 micron average grain size) basaltic material which occurs as both the host and clasts within the meteorite. Shock effects are extensive, with mosaicism of the pyroxene. Pyroxene compositions are $Fs_{49-64}Wo_{6-23}$ and plagioclase is An_{88}. The Fe/Mn ratio of the pyroxene is ~28. The meteorite is a brecciated eucrite.

Sample Number:	MIL 07613
Location:	Miller Range
Field Number:	18795
Dimensions (cm):	2.0 x 2.0 x 1.0
Weight (g):	4.560
Classification:	Diogenite

Macroscopic Description: Kathleen McBride

The exterior has 40% brown/black fusion crust. The interior matrix is fine grained, tan in color and has black inclusions.

Thin Section (,3) Description: Tim McCoy and Linda Welzenbach

The section consists of an unbrecciated mass 2-5 mm orthopyroxene grains which interfinger at grain boundaries. Blebby diopside lamellae are common within the orthopyroxene. Large (several hundred micron) chromites are common at grain boundaries. Orthopyroxene has a composition of $Fs_{36}Wo_{2}$, diopside is $Fs_{14}Wo_{45}$ and plagioclase is An_{92}. The Fe/Mn ratio of the pyroxene is ~30. The meteorite is likely a diogenite, although the texture is unlike typical diogenites and the pyroxene composition more FeO-rich than typical of diogenites.

Oxygen isotopic analysis: D.Rumble, Carnegie Institution of Washington

$\delta^{17}O = 1.62$, $\delta^{18}O = 3.57$, $\Delta^{17}O = -0.260$

$\delta^{17}O = 1.55$, $\delta^{18}O = 3.55$, $\Delta^{17}O = -0.316$

[where $\Delta^{17}O = \delta^{17}O - 0.52 \times \delta^{18}O$]

Sample No.:	MIL 07658
Location:	Miller Range
Field No.:	17590
Dimensions (cm):	2.0 x 1.25 x 0.75
Weight (g):	3.310
Classification:	Eucrite

Macroscopic Description: Kathleen McBride

95% of the exterior is covered with black, shiny fusion crust with bubbles. The interior matrix is white, fine grained and is moderately friable. The inclusions are tan, black, and greenish in color.

Thin Section (,4) Description: Tim McCoy and Linda Welzenbach

The section exhibits a range of grain sizes, although boundaries between these regions are diffuse. The meteorite is heavily-shocked, commonly exhibiting mosaicism. Mineral compositions are homogeneous with orthopyroxene ($Fs_{63}Wo_{2}$), with lamellae of augite ($Fs_{27}Wo_{43}$) and plagioclase ($An_{85-89}Or_{0.5}$). The Fe/Mn ratio of the pyroxene is ~28. The meteorite is a eucrite.

Sample No.:	MIL 07660
Location:	Miller Range
Field No.:	17340
Dimensions (cm):	1.5 x 1.0 x 1.25
Weight (g):	2.40
Classification:	Eucrite (Brecciated)

Macroscopic Description: Kathleen McBride

The fusion crust on this meteorite is black and shiny. The interior is a gray matrix with a few green patches.

Thin Section (,3) Description: Tim McCoy and Linda Welzenbach

This meteorite consists of 2-3 mm clasts of moderate grain-sized basalts set in a comminuted matrix. The meteorite is extensively shocked. Mineral compositions are homogeneous with orthopyroxene ($Fs_{61}Wo_2$), with lamellae of augite ($Fs_{26}Wo_{44}$) and plagioclase ($An_{89}Or_{0.5}$). The Fe/Mn ratio of the pyroxene is ~28. The meteorite is a brecciated eucrite.

Sample No.:	MIL 07661
Location:	Miller Range
Field No.:	18330
Dimensions (cm):	2.25 x 1.5 x 3.25
Weight (g):	26.720
Classification:	Howardite

Macroscopic Description: Kathleen McBride

60% of the surface has brown/black fusion crust with polygonal fractures. The interior is black, gray, and white fined grained matrix with green, white and gray inclusions.

Thin Section (,5) Description: Tim McCoy and Linda Welzenbach

The section shows a groundmass of comminuted pyroxene and plagioclase (up to 0.5 mm) with fine- to coarse-grained basaltic clasts exceeding 2 mm. Pyroxene includes diogenite-like compositions of $Fs_{27-29}Wo_{2-3}$ and pigeonite of $Fs_{43}Wo_9$. Plagioclase is An_{80-85} and olivine is Fa_{37-38}. A distinctive feature of this meteorite is patches of troilite that appear to have been melted, forming a web structure that encloses silicates. The meteorite is a howardite.

Sample No.:	MIL 07663
Location:	Miller Range
Field No.:	18737
Dimensions (cm):	2.5 x 2.0 x 1.5
Weight (g):	9.920
Classification:	Howardite

Macroscopic Description: Kathleen McBride

Brown/black fusion crust with shiny patches covers 95% of this meteorite's exterior surface. The interior is a gray to tan matrix with white and dark gray inclusions and tan clasts.

Thin Section (,4) Description: Tim McCoy and Linda Welzenbach

The section shows a groundmass of comminuted pyroxene and plagioclase (up to 0.5 mm). A single diogenitic clast reaches 5 mm and dominates most of the section examined. A mm-sized carbonaceous chondrite clast is also present. Most of the pyroxene is orthopyroxene with compositions ranging from $Fs_{22-53}Wo_{1-4}$ (most Fs_{20-30}), a single pigeonite of $Fs_{41}Wo_6$ and an olivine of Fa_{1-36} (with the Fa_1 in the carbonaceous clast). The meteorite is a howardite.

Sample No.:	MIL 07664
Location:	Miller Range
Field No.:	18765
Dimensions (cm):	3.0 x 2.5 x 2.0
Weight (g):	30.560
Classification:	Howardite

Macroscopic Description: Kathleen McBride

Brown/black fusion crust with shiny patches covers 95% of this meteorite's exterior surface. The interior is a gray to tan matrix with white and dark gray inclusions and tan clasts.

Thin Section (,4) Description: Tim McCoy and Linda Welzenbach

The section shows a groundmass of comminuted pyroxene and plagioclase (up to 0.5 mm) with fine- to coarse-grained basaltic clasts ranging up to 2 mm. Several clasts are aphanitic or exhibit acicular pyroxenes suggestive of an origin as impact melts. Pyroxene includes diogenite-like compositions ($Fs_{20}Wo_2$) and eucrite-like compositions ($Fs_{21-64}Wo_{1-40}$). Plagioclase is An_{85-92}. The meteorite is a howardite.

Sample No.:	MIL 07665
Location:	Miller Range
Field No.:	19209
Dimensions (cm):	6.0 x 4.0 x 2.5
Weight (g):	71.120
Classification:	Howardite

Macroscopic Description: Kathleen McBride

85% of the meteorite is covered with brown/black fusion crust with shiny patches. The interior is a gray to tan matrix with white and dark gray inclusions and tan clasts. It has plucked areas and more weathering than 663 and 664.

Thin Section (,4) Description: Tim McCoy and Linda Welzenbach

The section shows a groundmass of comminuted pyroxene and plagioclase (up to 0.5 mm) with fine- to coarse-grained basaltic clasts ranging up to 3 mm. Large, mm-sized metal particles are relatively common in this section. Pyroxene includes diogenite-like compositions ($Fs_{20-30}Wo_{1-2}$) and eucrite-like compositions ($Fs_{28-60}Wo_{2-42}$). Plagioclase is An_{89-96}. The meteorite is a howardite.

Sample No.:	MIL 07670
Location:	Miller Range
Field No.:	18138
Dimensions (cm):	2.5 x 2.0 x 1.5
Weight (g):	7.650
Classification:	CM2 Chondrite

Macroscopic Description: Kathleen McBride

Small patches of purplish fusion crust are visible on the exterior surface. The interior is a black powdery matrix with an oxidation rind. Small (mm sized) light colored chondrules are visible.

Thin Section (,4) Description: Tim McCoy and Linda Welzenbach

The section consists of a few small chondrules (up to 0.5 mm), mineral grains and CAIs set in a black matrix; rare metal and sulfide grains are present. Olivine compositions are Fa_{1-48}, orthopyroxene is Fs_5. Aqueous alteration of the matrix is substantial, but the chondrules are only modestly altered. The meteorite is a CM2 chondrite.

Sample No.:	MIL 07671; MIL 07686; MIL 07697; MIL 07698
Location:	Miller Range
Field No.:	17972; 17967; 17963; 18340
Dimensions (cm):	3.5 x 2.5 x 1.5; 3.75 x 1.25 x 2.0; 3.5 x 2.0 x 1.5; 4.0 x 3.0 x 2.0
Weight (g):	19.420; 13.380; 15.470; 25.100
Classification:	CV3 Chondrite

Macroscopic Description: Kathleen McBride

The fusion crust on these paired meteorites ranges from none to 20% purplish black with fractures. The interiors range in colors from brown to gray to black with evaporites. Abundant multicolored chondrules are visible.

Thin Section (, 4, 4, 4, and 3) Description: Tim McCoy and Linda Welzenbach

The sections are so similar that a single description suffices. The sections exhibit large chondrules (up to 3 mm) and CAIs in a dark matrix. Olivines range from Fa_{0-9} and low-Ca pyroxene is Fs_{1-2}. The meteorites are unequilibrated carbonaceous chondrites, probably CV3.

Sample No.:	MIL 07687
Location:	Miller Range
Field No.:	18659
Dimensions (cm):	1.5 x 2.0 x 1.0
Weight (g):	5.490
Classification:	CO3 Chondrite

Macroscopic Description: Kathleen McBride

90% rough brown/black fusion crust with polygonal fractures covers the exterior surface. The interior is a fine grained brown/black matrix with evaporites. The meteorite has a rusty oxidation rind and small (mm sized) rust colored chondrules are visible.

Thin Section (,3) Description: Tim McCoy and Linda Welzenbach

The section consists of abundant small (up to 1 mm) chondrules, chondrule fragments and mineral grains in a dark matrix. Metal and sulfide occur within and rimming the chondrules. Olivine ranges in composition from Fa_{1-50}, with a strongly bimodal distribution (Fa_{0-1} and Fa_{40-50}). Two pyroxene analyses range from Fs_{3-41}. The meteorite is a CO3 chondrite.

Sample Request Guidelines

The Meteorite Working Group (MWG), is a peer-review committee which meets twice a year to guide the collection, curation, allocation, and distribution of the U.S. collection of Antarctic meteorites. The deadline for submitting a request is 2 weeks prior to the scheduled meeting.

Requests that are received by the MWG secretary by **March 12, 2009 deadline** will be reviewed at the MWG meeting **March 27-28, 2008 in Houston, TX**. Requests that are received after the deadline may be delayed for review until MWG meets again in the Fall of 2009. Please submit your requests on time. Questions pertaining to sample requests can be directed to the MWG secretary by e-mail, fax or phone.

Requests for samples are welcomed from research scientists of all countries, regardless of their current state of funding for meteorite studies. Graduate student requests should have a supervising scientist listed to confirm access to facilities for analysis. All sample requests will be reviewed in a timely manner. Sample requests that do not meet the curatorial allocation guidelines will be reviewed by the Meteorite Working Group (MWG). Issuance of samples does not imply a commitment by any agency to fund the proposed research. Requests for financial support must be submitted separately to an appropriate funding agency. As a matter of policy, U.S. Antarctic meteorites are the property of the National Science Foundation, and all allocations are subject to recall.

Samples can be requested from any meteorite that has been made available through announcement in any issue of the ***Antarctic Meteorite Newsletter*** (beginning with 1(1) in June, 1978). Many of the meteorites have also been described in five *Smithsonian Contributions to the Earth Sciences*: Nos. 23, 24, 26, 28, and 30. Tables containing all classified meteorites as of August 2006 have been published in the Meteoritical Bulletins and *Meteoritics* and *Meteoritics and Planetary Science* (these are listed in Table 3 of this newsletter. They are also available online at:

http://www.meteoriticalsociety.org/simple_template.cfm?code=pub_bulletin

The most current listing is found online at:

http://curator.jsc.nasa.gov/curator/antmet/us_clctn.htm

All sample requests should be made electronically using the form at:

http://curator.jsc.nasa.gov/curator/antmet/samreq.htm

The purpose of the sample request form is to obtain all information MWG needs prior to their deliberations to make an informed decision on the request. Please use this form if possible.

The preferred method of request transmittal is via e-mail. Please send requests and attachments to:

JSC-ARES-MeteoriteRequest@nasa.gov

Type **MWG Request** in the e-mail subject line. Please note that the form has signature blocks. The signature blocks should only be used if the form is sent via Fax or mail.

Each request should accurately refer to meteorite samples by their respective identification numbers and should provide detailed scientific justification for proposed research. Specific requirements for samples, such as sizes or weights, particular locations (if applicable) within individual specimens, or special handling or shipping procedures should be explained in each request. Some meteorites are small, of rare type, or are considered special because of unusual properties. Therefore, it is very important that all requests specify both the optimum amount of material needed for the study and the minimum amount of material that can be used. Requests for thin sections that will be used in destructive procedures such as ion probe, laser ablation, etch, or repolishing must be stated explicitly.

Consortium requests should list the members in the consortium. All necessary information should be typed on the electronic form, although informative attachments (reprints of publication that explain rationale, flow diagrams for analyses, etc.) are welcome.

Antarctic Meteorite Laboratory Contact Numbers

Please submit request to: **JSC-ARES-MeteoriteRequest@nasa.gov**

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Meteorites On-Line

Several meteorite web site are available to provide information on meteorites from Antarctica and elsewhere in the world. Some specialize in information on martian meteorites and on possible life on Mars. Here is a general listing of ones we have found. We have not included sites focused on selling meteorites even though some of them have general information. Please contribute information on other sites so we can update the list.

JSC Curator, Antarctic meteorites	http://www-curator.jsc.nasa.gov/antmet/index.cfm
JSC Curator, Lunar Meteorite Compendium	http://www-curator.jsc.nasa.gov/antmet/lmc/index.cfm
JSC Curator, martian meteorites	http://www-curator.jsc.nasa.gov/antmet/marsmets/index.cfm
JSC Curator, Mars Meteorite Compendium	http://www-curator.jsc.nasa.gov/antmet/mmc/index.cfm
Antarctic collection	http://geology.cwru.edu/~ansmet/
Smithsonian Institution	http://www.minerals.si.edu/
LPI martian meteorites	http://www.lpi.usra.edu
NIPR Antarctic meteorites	http://www.nipr.ac.jp/
Museo Nazionale dell'Antartide	http://www.mna.it/english/Collections/collezioni_set.htm
BMNH general meteorites	http://www.nhm.ac.uk/research-curation/departments/mineralogy/research-groups/meteoritics/index.html
UHI planetary science discoveries	http://www.psrd.hawaii.edu/index.html
Meteoritical Society	http://www.meteoriticalsociety.org/
Meteoritics and Planetary Science	http://meteoritics.org/
Meteorite! Magazine	http://meteoritemag.uark.edu
Geochemical Society	http://www.geochemsoc.org
Washington Univ. Lunar Meteorite	http://epsc.wustl.edu/admin/resources/moon_meteorites.html
Washington Univ. "meteor-wrong"	http://epsc.wustl.edu/admin/resources/meteorites/meteorwrongs/meteorwrongs.htm

Other Websites of Interest

Mars Exploration	http://mars.jpl.nasa.gov
Rovers	http://marsrovers.jpl.nasa.gov/home/index.html
Near Earth Asteroid Rendezvous	http://near.jhuapl.edu/
Stardust Mission	http://stardust.jpl.nasa.gov
Genesis Mission	http://genesismission.jpl.nasa.gov
ARES	http://ares.jsc.nasa.gov/
Astromaterials Curation	http://www-curator.jsc.nasa.gov/