

CURATORIAL NEWSLETTER	DATE: APRIL 8, 1980	NO: 27
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LUNAR HIGHLANDS STUDIES

The first year of Highlands Initiative research culminated in the Conference on the Lunar Highlands Crust, held at the LPI November 14-16, 1979. At the conference, it was clear that two broad topics are dominating the research of a large number of the lunar sample investigators participating in the Highlands Initiative. These topics are: 1) processes involved in formation of the endogenous magmatic rocks of the crust (with emphasis on studies of the earliest crust); and 2) processes involved in formation of the most abundant impact-generated rocks. These two topics are crucial to furtherance of our understanding of the highlands. Accordingly, LAPST intends to encourage additional research on these topics. We hope to see workshops held during May or June to define specific productive lines of research and coordinate efforts; topical conferences should be held at suitable time intervals. The rationale for each topic, efforts currently underway, and specific research that should be especially productive are summarized below. Investigators interested in participating in the research and workshops should communicate with the Lunar Sample Curator as soon as possible.

Volume 2, No. 1 of the Lunar Highlands Newsletter (March 1980) expands on the subject of future direction with these three items.

- I. Future Directions for Highlands Initiative Research by the Highlands Subcommittee of LAPST
- II. Conference on the Lunar Highlands Crust, November 14-16, 1979. Summary by C. H. Simonds, C. T. Herzberg, and J. J. Papike
- III. Evaluation of Mission Objectives for the Geological Exploration of the Apollo 16 Landing Site. LAPST Subcommittee

Use the order blank attached to obtain this issue of the Highlands Newsletter. A preprint of the lead paper of the Proceedings of the Lunar Highlands Conference "Mission Objectives for Geological Exploration of the Apollo 16 Landing Site" is also available. Item III of the Highlands Newsletter is a condensation of this paper,

which in its full version relates sample numbers to the geologic questions. It is essential for planning research on the Apollo 16 site.

SCHEDULE FOR OPENING LUNAR CORE SAMPLES - PROPOSED CHANGES

The LAPST has tentatively recommended revising the schedule as shown below for opening, dissecting, and allocating core samples. The change would allow study of core 64001-64002 concurrently with present and planned studies on the Lunar Highlands.

PRESENT SCHEDULE (Curatorial Newsletter No. 26, January 1980)
CORE DISSECTION SCHEDULE

	CY 1980												CY 1981												CY 1982																																			
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D																								
cabinet 46	5008					15007							64002												64001												69001																							
cabinet 47						15009																			68002												68001												Apollo 17											

PROPOSED REVISED SCHEDULE

	CY 1980												CY 1981																							
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D												
Cabinet 46	15008					15007							64001												68001											
Cabinet 47													64002												68002											

Core 64001-64002 was collected on the slopes of Stone Mountain in order to sample pure Descartes regolith. What differences there are between the materials of the Cayley Plains and those of the Descartes Mountains have not yet been established from studies of the other Apollo 16 samples. Since the Cayley Plains and the Descartes Mountains are major physiographic units, knowledge of any compositional differences, or absence of differences, is critical for understanding the lunar Highlands. Therefore, opening Core 64001-64002 this year is likely to be done, at least in the absence of good reasons not to do it.

A final decision on the proposed changes in the schedule for processing core will be made on the basis of whatever recommendations are made by LAPST at their May 10-13 meeting. Please write the Curator before the meeting if the proposed changes will affect your research plans. LAPST can then take the effects into account in considering its recommendations.

Comments are also invited on a suggestion to slow down the opening and dissection of cores. This would allow more effort to be applied to cataloging and organizing the wealth of data generated from the already dissected cores. Taking such a breather would undoubtedly lead to improvements in the methods for dissection and documentation. More thorough study of the existing data would probably show that some observations are now being irretrievably missed. At present two double cores (60013/14 and 73001/2) are stored in the storage vault at Brooks Air Force Base in San Antonio, and are not scheduled for dissection. Perhaps more of the other unopened cores should also be set aside. The decision to open a given core, whether at Brooks or not, would be based on what special data might be obtained from that particular core. The LAPST would be asked for advice on this matter. Opinions from investigators of core samples would be most helpful for the discussions.

Recent progress in processing cores has been the completion of dissecting 12027 and 15008. Double core 64001-64002 was stereographically reimaged in the core tubes by X-radiography, using compensating plates for the effects of the cylindrical shape. (The post-mission X-radiography was done without the compensation.) Spectral reflectance imagings have just been completed on the post-dissection surfaces of cores 12027, 14220, and 15008. The methods, and the form and availability of the image data are described by Pieters et al. (1980) Lunar Core Multispectral Imaging Experiment: First Results. Lunar and Planetary Science XI, p.882-884. These core remainders have now been impregnated. Over the next several months polished thin sections will be made to give continuous coverage down the length of the cores.

LAPST AND REQUESTS FOR SAMPLES

The Lunar and Planetary Sample Team (LAPST) met February 14-17, 1980, and recommended allocations of 48 splits from 16 different samples to go to 11 Principal Investigators (PI's). The team's next meeting is scheduled for May 10-13, 1980, to be followed by another meeting in mid-August. Please submit requests for samples as far in advance of these meetings as you can to allow time for assembly of background information. Also, remember to include your schedule for studying the samples so that appropriate priorities can be set for their preparation.

CATALOGS AND OTHER REPORTS ON THE LUNAR SAMPLES

<u>APOLLO 11</u>	<u>PUBLISHED</u>	<u>COPIES IN STOCK</u>
A Summary of Apollo 11 Chemical, Age, and Modal Data. Warner	1971	69
Apollo 11 Lunar Sample Information Catalog (JSC-12522). Kramer, Twedell, Walton	1977	18
Lunar Sample Information Catalog (Addendum - Sheet 1). Phinney	1977	21
Apollo 11 Organic Contamination History. Flory		6
<u>APOLLO 12</u>		
NASA Technical Report - R353; Apollo 12 Lunar Sample Information. Warner	1970	292
Lunar Surface Closeup Stereoscopic Photography on the Ocean of Storms (Apollo 12 Landing Site)(NASA TMS-58078). Heiken, Carrier	1971	35
Apollo 12 Voice Transcript Pertaining to the Geology of the Landing Site		(1)
Apollo 12 Coarse Fines (2-10) Sample Location, Description and Inventory. Marvin	1978	38
<u>APOLLO 14</u>		
Documentation of the Apollo 14 Samples. Swann, Batson, Eggleton, Larson, Schafer, Sutton	1971	45
NASA Technical Report - TMX-58062 Apollo 14 Sample Information Catalog	1971	309

<u>APOLLO 14(Cont'd)</u>	<u>PUBLISHED</u>	<u>COPIES IN STOCK</u>
Lunar Surface Closeup Stereoscopic Photography at Fra Mauro (Apollo 14 Site) NASA TMX-58972. Carrier, Heiken	1972	25
Apollo 14 Coarse Fines (4-10 mm): Sample Classification, Description, and Inventory (JSCI2922), Kramer and Twedell. 91 pages	1977	(2)
Description, Classification, and Inventory of the Comprehensive Samples from Apollo 14. Phinney, Simonds, Warner	1975	49
Geology of the Apollo 14 Landing Site in the Fra Mauro Highlands	1977	57
Lithologic Maps of Selected Apollo 14 Breccia Samples. (JSCI3842). Twedell, Feicht, Carlson, Meyer. 89 pages	1978	8
Apollo 14 Rock Samples (JSCI 4240), 413 pages. Carlson, Walton	1978	71
<u>APOLLO 15</u>		
Lunar Sample Information Catalog, Lunar Receiving Laboratory	1971	78
Apollo 15 Coarse Fines (4-10 mm) Sample Classification, Description and Inventory. Powell	1972	40
Apollo 15 Lunar Samples	1972	3
Apollo 15 Preliminary Science Report (NASA SP-289)	1972	1
<u>APOLLO 16</u>		
Lunar Sample Information Catalog, Lunar Receiving Laboratory (MSC-03210)	1972	528
Lunar Sample Information Catalog, Update No. I	1972	500
Apollo 16 Rake Samples 67515 and 68537 Sample Classification, Description, and Inventory. Smith, Steele. 124 pages	1972	157
Apollo 16 Coarse Fines (4-10 mm) Sample Classification, Description and Inventory. Marvin. 143 pages	1972	157
Description, Classification, and Inventory of 152 Apollo 16 Rake Samples from the LM Area and Station 5. Keil, Dowty, Prinz, Bunch. 166 pages	1972	177
Description, Clarification, and Inventory of 16 Rake Samples from Stations 1, 4, and 13. Phinney, Lofgren. 69 pages	1973	150
Preliminary Science Report		3
Apollo 16 Lunar Samples: A Petrographic and Chemical Description of Samples from the Lunar Highlands		12
Apollo 16 Special Samples. Hörz, Carrier, Young, Duke, Nagle, Fryxell. 47 pages	1973	0
Mission Objectives for Geological Exploration of the Apollo 16 Landing Site. (Preprint) Muehlberger, Hörz, Sevier, Ulrich. 60 pages	1980	100

<u>APOLLO 17</u>	<u>PUBLISHED</u>	<u>COPIES IN STOCK</u>
Lunar Sample Information Catalog: Lunar Receiving Laboratory (MSC-03211)	1973	704
Apollo 17 Coarse Fines (4-10 mm): Sample Location, Classification, and Photo Index. Meyer	1973	150
Preliminary Data on Boulders at Station 6 Apollo 17 Landing Stide. (NASA TMX-58116)(JSC-08484)	1973	(2)
Description, Classification, and Inventory of 113 Apollo 17 Rake Samples from Stations 1A, 2, 7, and 8. (MSC-03211). Keil, Dowty, Prinz	1974	200
Description, Classification, and Inventory of Apollo 17 Rake Samples from Station 6. Phinney, Simonds, Warner	1974	200
Preliminary Science Report (SP-330)		(8)
<u>LUNA 24</u>		
Luna 24 Catalog and Preliminary Description. Walton, Nagle	1977	19
<u>CORE CATALOGS</u>		
Lunar Core Catalog (JSC-09252). Duke and Nagle. About 250 pages	1976	200
Lunar Core Catalog: Supplement #3. Apollo 16 and Apollo 17 Cores		24
The Apollo 11 Drive Tubes: Dissection and Description. Allton. 27 pages	1978	21
Description of Core Samples Returned by Apollo 12. (NASA TMX-58066). Lindsay, Heiken, Fryxell. 22 pages	1971	50
Description, Dissection, and Subsampling of Apollo 14 Core Samples 14230 (NASA TMX-58070)	1971	42
Stratigraphy of the Apollo 15 Drill Core (NASA TMX-58101). Heiken, Duke, Fryxell, Nagle, Scott, Sellers. 24 pages	1971	36
Apollo 15 Deep Drill Core: Classification, Description, and Inventory of Separated Particles	1974	250
Drive Tubes 74001 and 74002	1978	24
<u>BRECCIA GUIDEBOOKS</u>		
Breccia Guidebook No. 1, 14321.(JSCI4753) Meyer and King. 56 pages	1979	70
Breccia Guidebook No. 2, 66095 "Rusty Rock." (JSCI6198) Garrison and Taylor. 27 pages	1979	60
Breccia Guidebook No. 3, 67915. (JSCI6242) J. Taylor and A. Mosie 43 pages	1979	100

<u>GENERAL CATALOGS AND DESCRIPTIONS</u>	<u>PUBLISHED</u>	<u>COPIES IN STOCK</u>
Introduction to the Apollo Collections. Part I Lunar Igneous Rocks McGee, Warner, Simonds. 96 pages	1977	80
Introduction to the Apollo Collections. Part II Lunar Breccias. McGee, Simonds, Warner, Phinney. 203 pages	1979	37
Guidebook to Accompany the Lunar Thin Section Educational Package. General discussion of lunar petrology and geochemistry along with specific descriptions of the representative rocks and soils used in the thin section set. Warner. 96 pages	1975	100
A Catalog of Lunar Soils. (Draft). Heiken. 221 pages	1974	22
Handbook of Lunar Materials. NASA Reference Publication 1057. Williams and Jadwick. 120 pages	1974	0
Occurrence of ANT (Anorthosite, Norite, Troctolite) Fragments in Lunar Soils and Breccias: Guide to Polished Thin Sections. Bickel and Warner. 16 pages	1978	160
Catalog of Pristine Non-Mare Material: Part I Non-Anorthosites. Ryder and Norman	1979	200
Catalog of Pristine Non-Mare Materials: Part II Anorthosites. Ryder and Norman.	1979	200

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Mission Objectives for Geological Exploration of the Apollo 16 Landing Site
(Preprint)

Lunar Highlands Newsletter March 1980 Issue

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Sample Catalogs and Descriptions (list below)

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