A STUDY OF MORPHOLOGY, PROVENANCE, AND MOVEMENT OF DESERT SAND SEAS IN AFRICA, ASIA AND AUSTRALIA

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15. Supplementary Notes

16. Abstract: With an original Standing Order of 70 mm positive transparencies covering 385 frames, materials are arriving at a rate so rapid that the present staff can barely keep up with processing. However, results of the study have, in general, been encouraging. Reducing the number of frames to 278 through elimination of many desert areas that did not contain dunes, and changing our standing order to obtain larger transparencies which can be catalogued and analyzed more quickly have alleviated the processing problem. Meanwhile, the gathering of ground truth data is underway in the form of accumulating weather information from established stations and by adding some small but readily accessible U.S.A. sites to our standing order as analogs for the larger foreign sites under observation. Studies currently underway involve determination of the optical appearance of materials such as sand, rocks, vegetation and water; methods of recognizing the effects of atmospheric and surface water in dune areas; and criteria for interpreting in dune areas light and "shadow" patterns related to sun angle. Photographic techniques for interpreting the images are being tested. A significant conclusion of the studies to date is that dune complexes are visible on ERTS images and so the extent and nature of dune fields in many different areas can be observed simultaneously and directly compared.

17. Key Words Suggested by Author	18. Distribution Statement
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19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
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Figure 2A. Technical Report Standard Title Page. This page provides the data elements required by DoD Form DD-1473, HEW Form OE-6000 (ERIC), and similar forms.

INT: 2090-72

Type II Progress Report

ERTS-A

a. Title: A Study of Morphology, Provenance, and Movement of Desert Sand Seas in Africa, Asia and Australia

ERTS-A Proposal No.: SR 131

b. GSFC ID No. of P.I.: IN 402

c. Statement and explanation of any problems that are impeding the progress of the investigation:

1. Progress is being impeded by the long lapse between the time of ordering and that of receipt of Retrospective Data Requests. Some requests were sent in as long ago as early October and were approved by our Technical Monitor, but we have received none of the materials as yet. In order to get some results faster, we have requested a small number of 70 mm. negative transparencies (which we hope will be available sooner than the other Data Requests) so that we can produce a few experimental prints with which to begin studies.

2. The great number of bulk images generated by our original Standing Order (70 mm. positive transparencies, 385 frames) has resulted in a man-power shortage. We are solving this problem by:

a. Changing our standing order to provide us with the larger size ($9\frac{1}{2}$ in.) transparencies. (This change was reported in Type I Progress Report for period 1 September - 31 October 1972). This larger product can be read without magnifying glasses, so can be catalogued and analyzed more quickly.

b. A new standing order, reducing the number of frames required from 385 to 278 (a reduction of 107 frames) is being prepared and will go into effect, we anticipate, by 1 January 1973. As more ERTS images are received and scanned for significant data, we anticipate further reductions.

c.--continued

3. A third problem impeding progress is the difficulty of obtaining adequate meteorological data and ground truth for foreign sites, under present budget limitations. To deal with this problem, we are including in our standing order 11 frames that will provide us with coverage of five small areas of dune complexes within the United States. It is believed that the readily accessible United States sites (which are in New Mexico, Colorado, Arizona, California, and Utah) will provide analogs for more remote, foreign dune areas observed on ERTS imagery and thus that the U.S. areas will serve as partial ground checks for our interpretations of the ERTS images.

d. Discussion of the accomplishments during the reporting period and those planned for the next reporting period:

1. We are investigating the optical appearance of various materials, such as sand, water, vegetation, and rocks, on ERTS images, and the means by which these appearances can be recognized for geological application. Repetitive coverage provided by ERTS is essential in determination of the effects of atmospheric moisture and of other seasonal, climatic factors, as well as the changes in light and "shadow" patterns that may be related to sun angle and are therefore subject to misinterpretation.

2. The effect of the color of various sand bodies upon ERTS images and their interpretation is being tested with sand samples already obtained by the Principal Investigator in field studies of dunes in Libya, Australia, and Saudi Arabia. These samples will be photographed using a system that will be comparable to the ERTS-1 MSS system, and the resulting films will be analyzed and compared to actual ERTS films of the sites from which the samples were taken.

d.--continued

3. We are beginning experimentation with products derived from ERTS films by photographic techniques (these are described in the Data Analysis Plan). Lawrence Harris spent November 20 in Denver in order to discuss with Ken Watson, Howard Pohn, Al Chidester and Harry Smedes problems of interpreting images and of techniques for reproducing ERTS photographic materials.

It is hoped that the above investigations will lead to a useful key for interpretation of geological data from ERTS satellites.

e. Discussion of significant scientific results and their relationship to practical applications or operational problems including estimates of the cost benefits of any significant results:

The most significant result to date is recognition that dune complexes (above an as-yet-undetermined threshold size and shape) are indeed visible on ERTS images, and that the extent and nature of dune fields in many remote areas of the world can, for the first time, be observed almost simultaneously and directly compared. The primary scientific problem at this stage in this project is to determine accurately the relationships among certain patterns, trends, and boundaries clearly revealed on ERTS imagery to true surface configurations of desert landforms, and further, to relate the defined features to controlling factors such as wind direction and intensity, moisture in the air and on the ground, and barriers to sand movement.

We hope to produce, by photographic and cartographic extraction from ERTS images, a set of thematic maps that will illustrate the relationships discussed in the preceding paragraph. Our interpretation of these relationships will be contained in reports to follow.

f. A listing of published articles, and/or papers, preprints, in-house reports, abstracts of talks, that were released during the reporting period:

None

g. Recommendation concerning practical changes in operations, additional investigative effort, correlation of effort and/or results as related to a maximum utilization of the ERTS system:

None

h. A listing by date of any changes in Standing Order Forms:

July 12, 1972

1. Reduction of frames from 1,153 to 385. Increase in test sites from original 7 large units to 15 smaller units based on actual dune distribution.
2. Change (3.1) rejection because of "cloud cover" from 100% to 50%.
3. Changes (3.2) in time periods for which data are required.

July 12, 1972, Letter to Technical Monitor--

4. Change number of copies ordered and bands required (4.0) to 2 bulk B & W 70 mm. positive, RBV 1,2,3 bands.
5. Change color composite bulk processed products (5.3) to positive transparency 2 type A and positive paper print 2 type A.

October 25, 1972

Section 4.0 changed our Standing Order to the larger size black-and-white positive transparencies and also asked for black-and-white bulk positive prints. The latter, we believe, are no longer available as a Standing Order, but we would like to order retrospectively, one print of each frame from at least one cycle, after viewing the transparencies. (This matter was discussed with Technical Monitor by phone in advance).

i. ERTS Image Descriptor forms: N/A.

j. Listing by date of any changes Data Request forms submitted to Goddard Space Flight Center/NDPF during the reporting period:

Retrospective Data Requests after viewing the 70-mm positive transparencies of these frames were as follows:

10/26/72	ADDDHHMMS Observation Identifier	E1051-05513
10/30/72	ADDDHHMMS Observation Identifier	E1040-06242
"	" " "	E1016-09151
"	" " "	E1053-07533
"	" " "	E1053-05511
"	" " "	E1016-09145
"	" " "	E1016-09154
"	" " "	E1059-06253
"	" " "	E1059-06251
"	" " "	E1059-06244
"	" " "	E1027-10180
"	" " "	E1027-10183
"	" " "	E1027-10185
10/31/72	ADDDHHMMS Observation Identifier	E1027-10194
"	" " "	E1027-10201
"	" " "	E1027-10215
"	" " "	E1027-10192
"	" " "	E1034-11004
"	" " "	E1011-00250
"	" " "	E1011-00255
"	" " "	E1011-00253
"	" " "	E1032-10501
"	" " "	E1035-00594
"	" " "	E1035-00582
"	" " "	E1035-00585
"	" " "	E1035-00591

11/14/72	ADDDHHMMS Observation Identifier	E1055-08041
"	"	E1023-09543
"	"	E1023-09540
"	"	E1023-09534
"	"	E1041-06253
"	"	E1041-06244
"	"	E1041-06251
"	"	E1051-05391
"	"	E1036-01052
11/15/72	ADDDHHMMS Observation Identifier	E1048-05261
"	"	E1036-01040
"	"	E1036-01043
"	"	E1036-01045
"	"	E1031-00373
"	"	E1031-00375
"	"	E1031-00382
"	"	E1031-01061
"	"	E1036-01034
"	"	E1034-00542
"	"	E1034-00535
"	"	E1034-00544
11/16/72	ADDDHHMMS Observation identifier	E1011-05193
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"	"	E1065-10324
"	"	E1065-10322
"	"	E1065-10315
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"	"	E1030-00310
"	"	E1030-00315
11/17/72	ADDDHHMMS Observation Identifier	E1071-09210
"	"	E1071-09212
"	"	E1071-04072
"	"	E1071-04075
"	"	E1030-00321
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"	"	E1030-00324
"	"	E1078-04483
"	"	E1078-04474

11/20/72	ADDDHHMMS Observation Identifier	E1073-04190
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11/21/72	ADDDHHMMS Observation Identifier	E1072-05554
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11/22/72	ADDDHHMMS Observation Identifier	E1073-06024
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11/24/72	ADDDHHMMS	Observation	Identifier	E1075-06134
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"	"	"	"	E1072-07592
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"	"	"	"	E1074-06071
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11/28/72	ADDDHHMMS	Observation	Identifier	E1028-10254
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11/29/72	ADDDHHMMS	Observation	Identifier	E1066-05263
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