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GEOLOGIC APPLICATION OF THERMAL INERTIA IMAGING USING HCMM DATA

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16. Abstract

The first set of satellite daytime data tapes of the Death Valley and Pisgah Crater, California and Goldfield, Nevada test sites was received and processing was begun during the October-December 1978 quarter of the JPL/HCMM Investigation. Comparison of the visible satellite data of Death Valley and U-2 aircraft data of the same area taken two months earlier shows definite drying of the valley floor. However, a comparison of the IR images of the two data sets seems to indicate that while the standing water has disappeared, the floor is still moist.

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Introduction

The JPL/HCMM investigation is a study of the feasibility of using thermal inertia, inferred from remotely sensed temperature data, to complement Landsat reflectivity data for reconnaissance geologic mapping and mineral exploration. During the October-December 1978 quarter of this investigation the first daytime satellite data tapes, obtained during the May 31, 1978 overflights of the Death Valley and Pisgah Crater, California and Goldfield, Nevada test sites, were received. Images of the visible and day temperature satellite data were produced.

Problems

A lack of any significant amount of satellite data, at this point in the investigation, is making further progress very difficult. No complete day/night data set over any of the test sites has yet been received. Satellite data, collected over the test sites during field trips timed to coincide with the satellite overpasses, have not, as yet, been made available. This presents a particular problem, in that without the seasonal data over the test sites, further field work cannot be properly planned.

Accomplishments

The first set of satellite daytime data tapes obtained during the May 31, 1978 HCMM overpass of the Death Valley and Pisgah Crater, California and Goldfield, Nevada test sites was received during this quarter and processing was begun. The following images were created using these data:

Fig. 1.	California coast including the 3 test sites - day visible.
Fig. 2.	California coast - day infrared.
Figs. 3a&b.	Pisgah Crater test site - day visible and infrared.
Figs. 4a&b.	Goldfield test site - day visible and infrared.
Figs. 5a&b.	Death Valley test site - day visible and infrared.

Significant Results

The day infrared and visible HCMM satellite data for Death Valley (Figs. 5a&b), taken on May 31, 1978, were compared with aircraft data (Figs. 6a&b) of the same area taken in March of the same year. In the visible image, it is possible to note the drying of the valley floor during the 2 month period between acquisition of the two data sets. On the IR image however, the valley floor remains cool, probably indicating that while the standing water has disappeared, the floor is still moist.

Presentations

Dr. Anne B. Kahle attended the HCMM Experiment Team (HET) Meeting on December 12, 1978, at Goddard Space Flight Center. A serious concern, expressed by all at the meeting, was the length of time being taken for the satellite data to get to the investigators. To date, all had received very little or no data thereby slowing their investigations considerably.

Program for Next Reporting Interval

Analysis of previously obtained aircraft and ground-truth data will continue. Analysis of satellite data will commence upon receipt of HCMM data tapes. MRI weather stations will be set up at the Death Valley test site in hopes of obtaining concurrent satellite and U-2 data sometime during the January/February/March overflights.

Recommendations

To help solve the problem of getting the satellite data out to the investigators and others in some reasonable length of time, it is recommended that GSFC hire a contractor to facilitate and speed up the data handling.

Funds Expended

Expenditures for October-December 1978: $9,945.00.

Conclusions

None

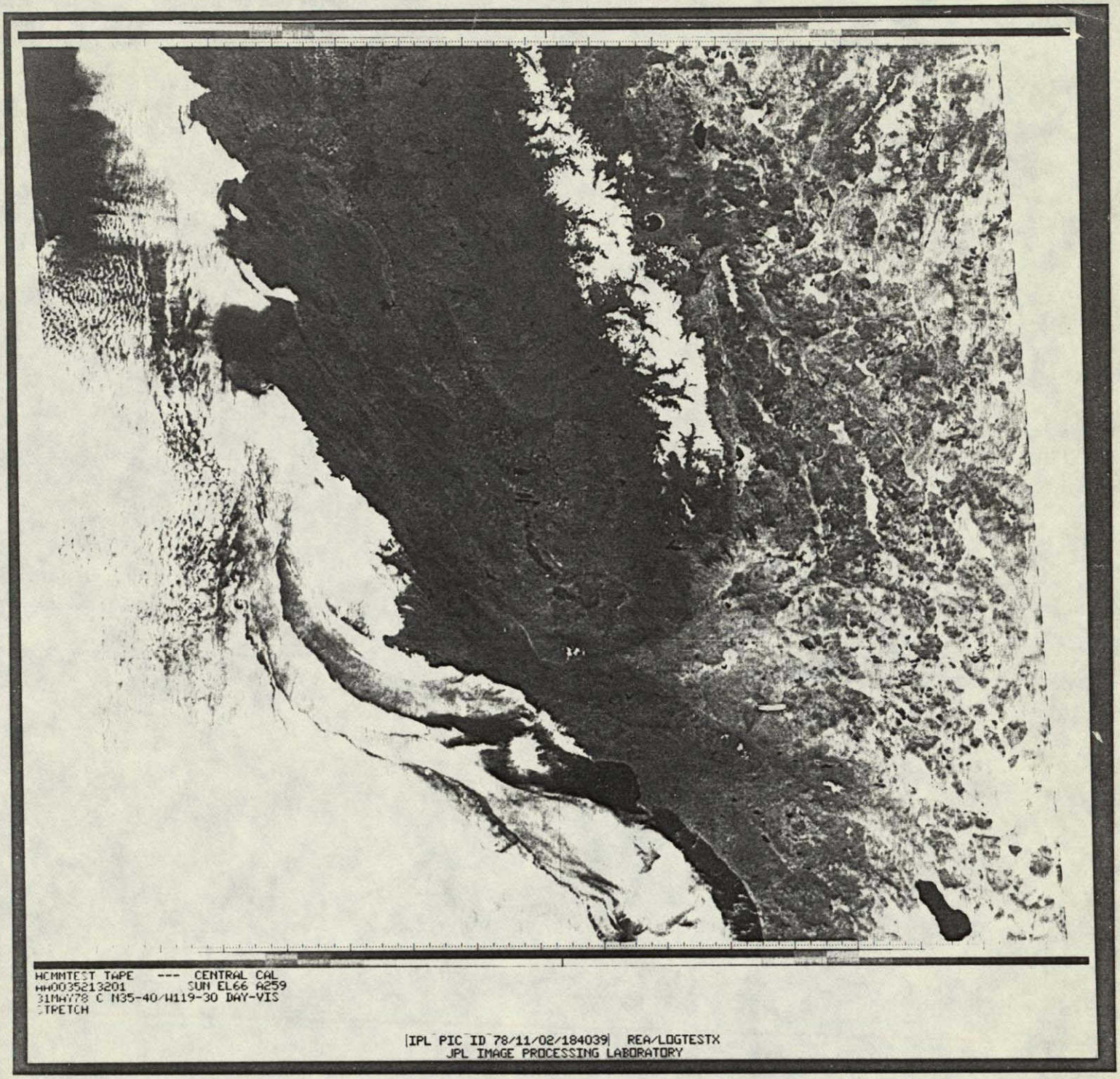

Figure 1. Day visible image of the California coast, including the three test sites, created from the HCMM data obtained during the May 31, 1978 overflight.

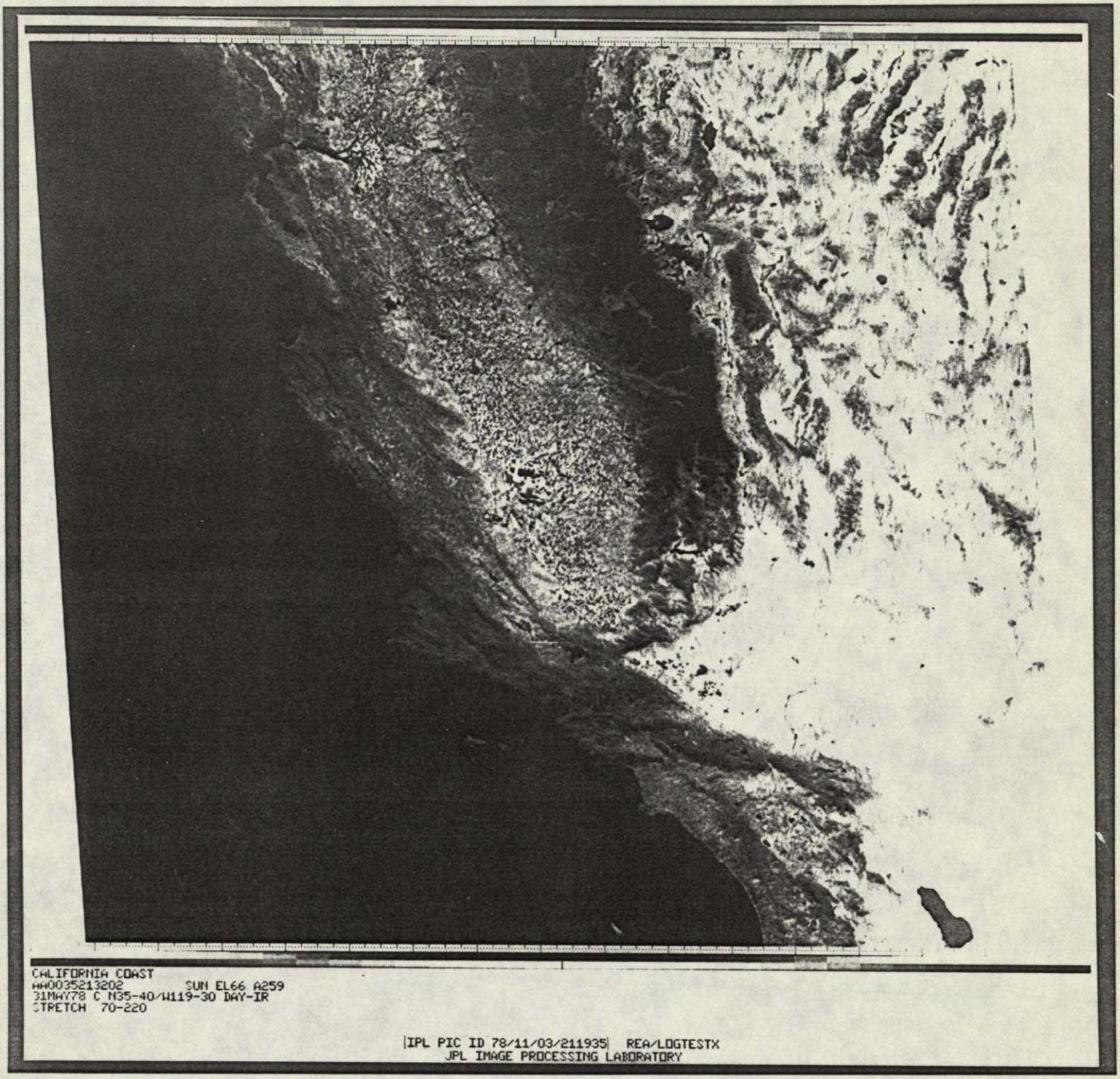

Figure 2. Day infrared image of the California coast, including the three test sites, created from the HCMM data obtained during the May 31, 1978 overflight.

Figure 3a. Day visible image of the Pisgah Crater, California test site from HCMM.

Figure 3b. Day infrared image of the Pisgah Crater, California test site from HCMM.

Figure 4a. Day visible image of the Goldfield, Nevada test site from HCMM.

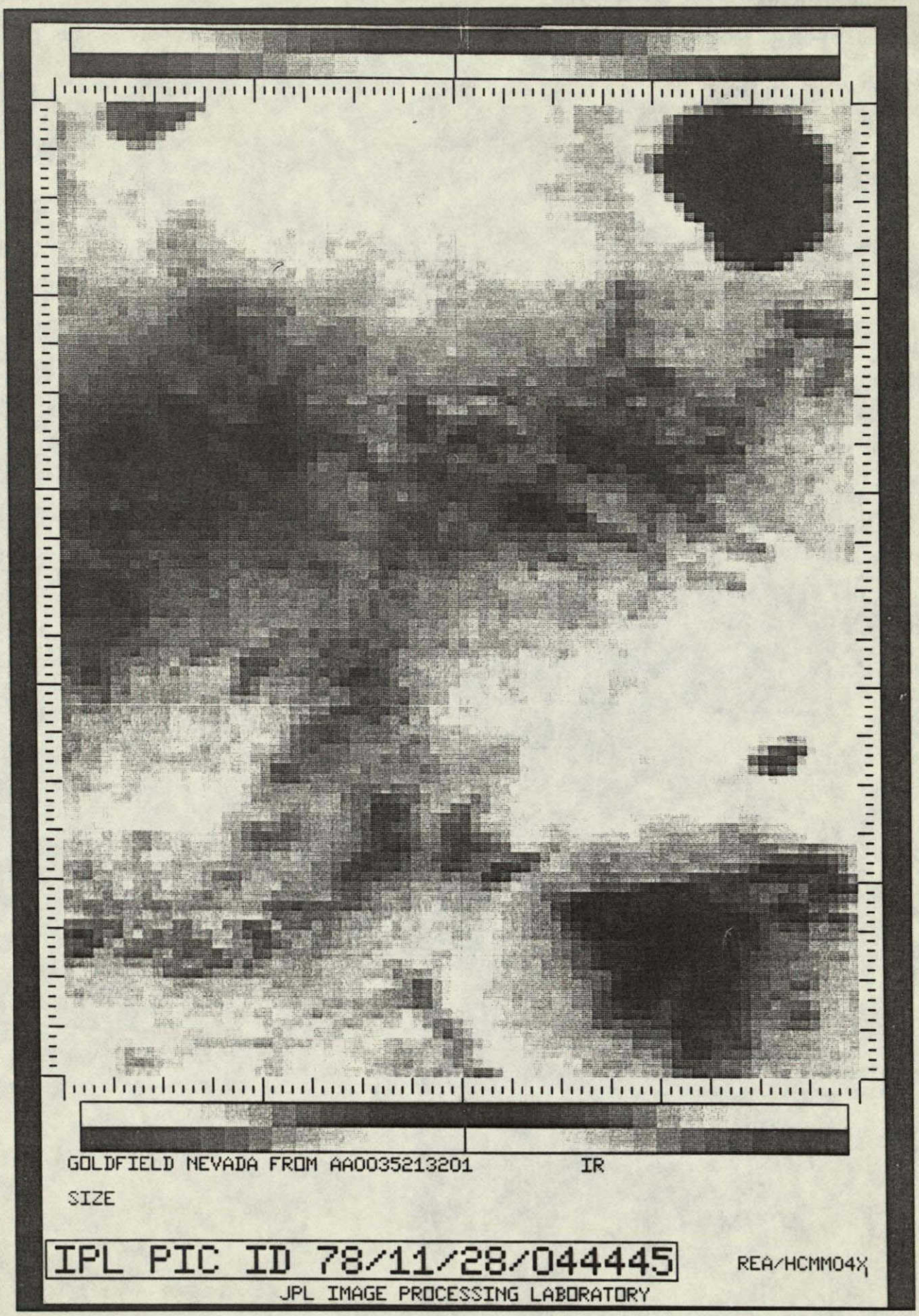

Figure 4b. Day infrared image of the Goldfield, Nevada test site from HCMM.

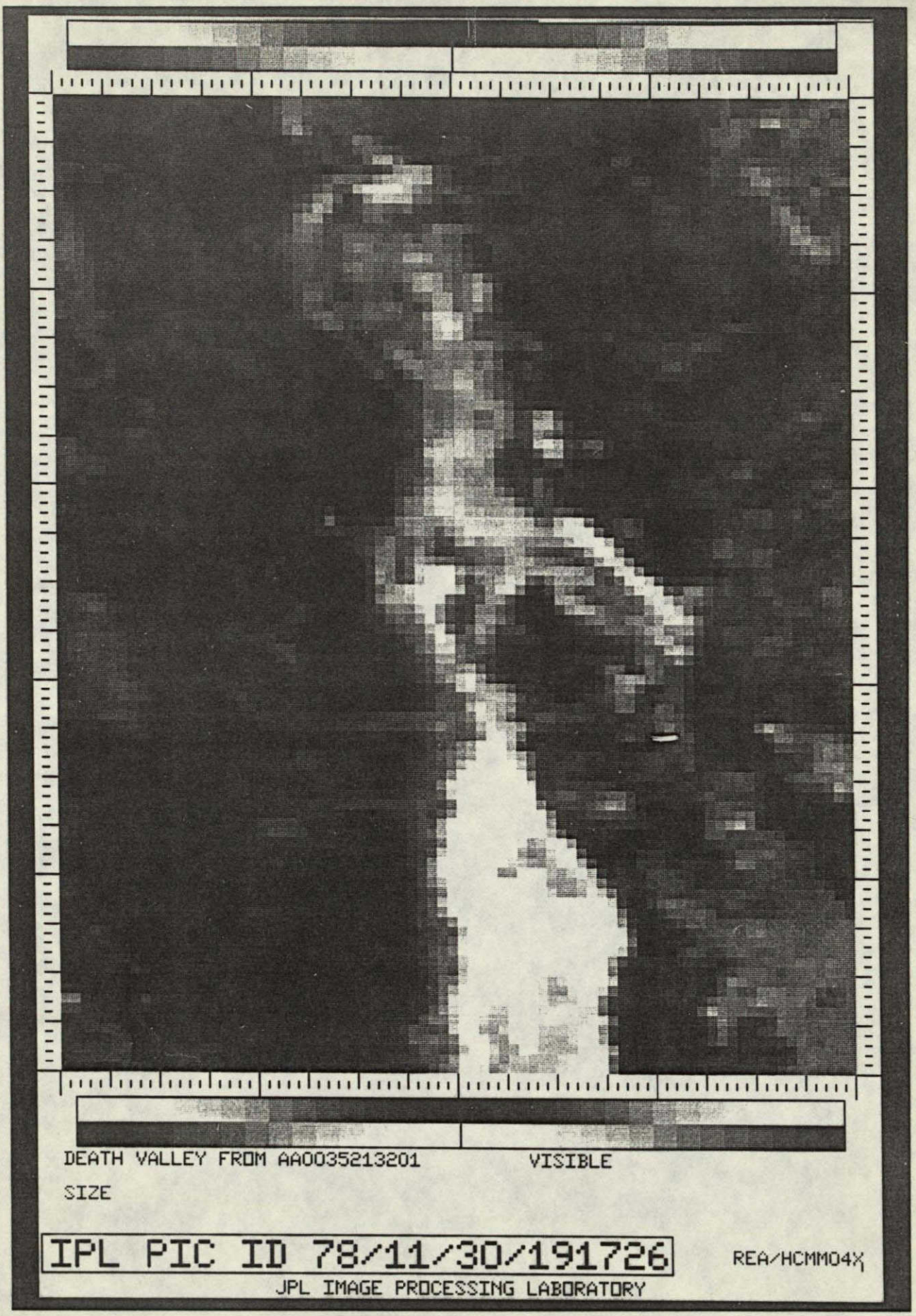

Figure 5a. Day visible image of the Death Valley, California test site from HCMM.

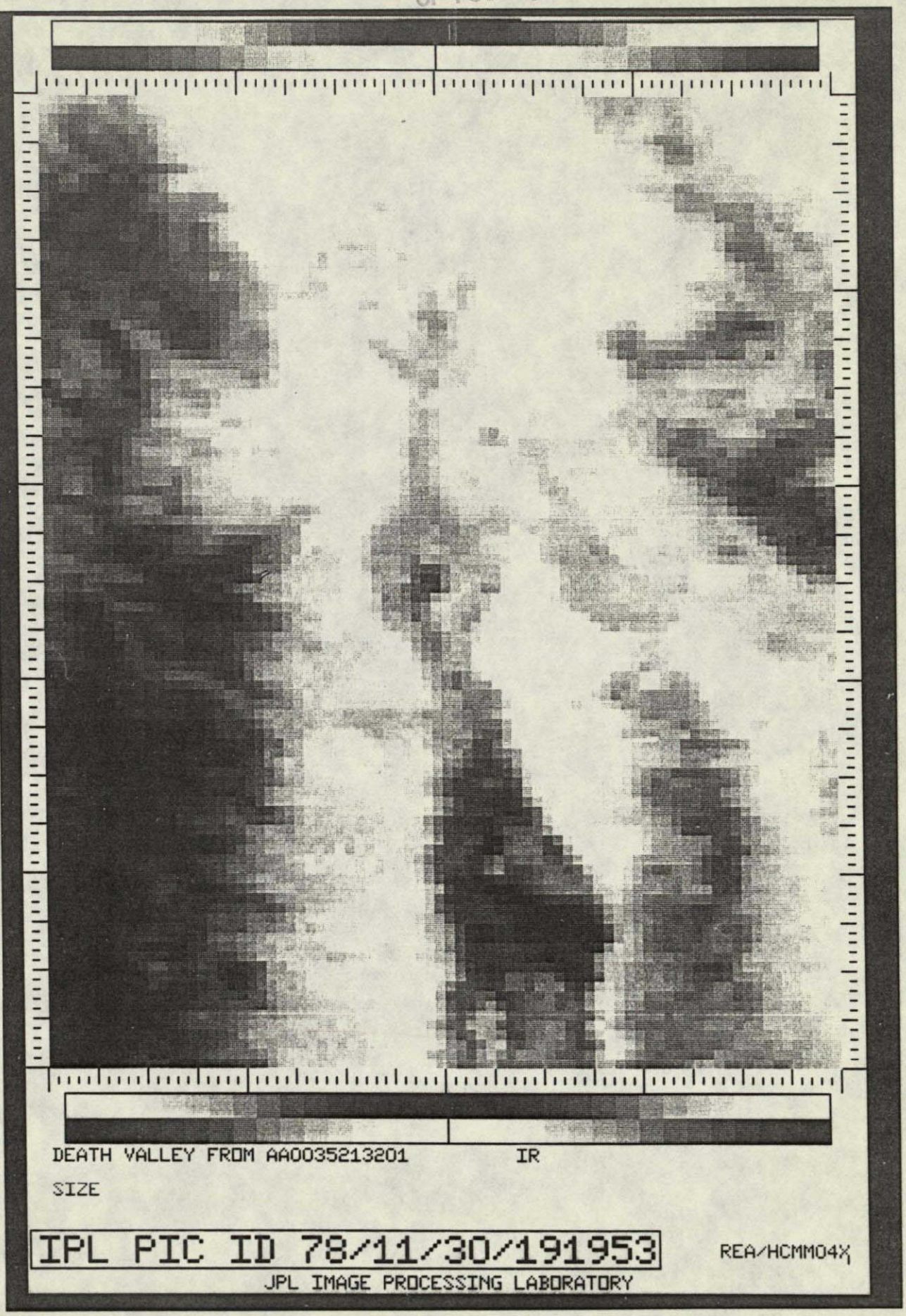

Figure 5b. Day infrared image of the Death Valley, California test site from HCMM.

Figure 6a. Day visible image of the Death Valley, California test site from data obtained by the NASA/Ames U-2 during March, 1978 overflights.

Figure 6b. Day infrared image of the Death Valley, California test site from data obtained by the NASA/Ames U-2 during March, 1978 overflights.


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