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Analysis of the data yielded the following results:

THERMAL SENSING OF THE CHIHUAHUAN:
FEASIBILITY STUDY WITH THE NOAA-4

NOAA-4 SATELLITE PASS

#882-1/24/75 #888-1/25/75

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ABSTRACT

Multiband and multistage scanning were used to locate broad promising agricultural sites in the Texas portion of the Chihuahuan Desert followed by a detailed study of ground temperature variances in these site locations. Ground truth obtained from thermal probes, and thermal imagery from a helicopter borne scanner were correlated with imagery VHRR scanning radiometer aboard the NOAA-4 satellite. Temperature estimates from the satellite were calculated from the analog tapes and image enhancement and density slicing of the satellite imagery were utilized.

Soil temperatures at three locations within the test sites were acquired with an automatic data logging system. The data from the multilevel sensing system were then correlated.

Some of the data were processed as part of the Screwworm Eradication Program (SEDS) currently being carried out by NASA's Health Applications Office. Examination of the imagery showed that relatively cool areas were primarily located in the Sierra Madre Occidental mountains in Western Mexico along the Gulf of California. The Davis Mountains in west Texas and ranges of the Rocky Mountains northwest of the research area maintain cool temperatures between 8° and 14°C during the morning pass of the satellite. Estimated temperature of the surface areas of the research site at 9:30p.m. on January 24 was 7°C and a comparable estimate for 9:30a.m. on January 25 was 13°C. Analysis of the data revealed that the best fit between satellite estimate of broad temperature zones and contact readings appears to be between subsurface soil temperatures at nighttime and air temperature readings during the day, although there was a direct correlation between air temperature measurements and satellite measurements.

Ground Truth

2-inch probes	7.0°C	4.7°C
Air probes	6.8°C	12.2°C

Imagery Estimates

7.6°C	13.1°C
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Density Slicing

6.3°C	12.3°C
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Acceptable satellite/ground truth correlations were obtained and the methods developed show that considerable promise for predicting heat summation in vast underdeveloped areas of the Chihuahuan Desert from satellite data are obtainable.