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QUARTERLY PROGRESS REPORT

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A Comparison of HCMH Surface Temperatures
with In Situ Temperature Data

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1.0 Introduction

The primary purpose of this research project is to examine the absolute and relative accuracy of the HCMM infrared data. In situ sea-surface temperatures will be used from the Nantucket Shoals region where the sea-surface temperature normally ranges from 5 to about 15°C, and the Gulf of Mexico where the sea-surface temperature normally ranges from 20 to 30°C for the comparison. In order to accomplish the objectives of this research project, the following tasks are being performed:

- 1) Determine periods when simultaneous clear-sky HCMM infrared data and in situ sea-surface data are available in regions of interest.
- 2) Obtain the HCMM data, in situ data, and meteorological data for the time and places of interest.
- 3) Develop all parameters required to correct the HCMM data for atmospheric effect.
- 4) Develop a geographically corrected analysis of sea-surface temperature distribution using both the HCMM data that have been corrected and those that have not been corrected for atmospheric effect.
- 5) Compare the HCMM sea-surface temperature data with ground truth data to establish the absolute and relative accuracy of the HCMM infrared data.

2.0 Progress to Date

All HCMM data required for this project have been processed. Calibrated and atmospherically corrected sea surface temperatures have been developed for the Nantucket Shoals and Gulf of Mexico regions. These data have been analyzed and the sea surface temperatures along the various transacts have been compared with in situ data. The comparisons have indicated that there is, on the average, a root mean square difference between the in situ data and the HCMM sea surface temperatures of $\pm 1.0^{\circ}\text{C}$. The linear correlation coefficient was 0.97.

Examination of the uncalibrated HCMM data has indicated that, on the average, HCMM surface temperatures are 4.6°C too low. There is some evidence that there may have been calibration problems with the infrared radiometer aboard the HCMM satellite in the first few months (May and June, 1978) after launch. A comparison of digital counts corresponding to a in situ surface temperature of 25.0°C and having approximately the same atmospheric transmission indicated that there were cases when the digital counts were on the average 14 counts higher than other cases. At 25.0°C, a difference of 14 digital counts roughly corresponds to a temperature difference of 5.0°C. Those cases which had digital count values that were higher by approximately 14 counts produced surface temperatures that more closely corresponded to the in situ temperature. The remaining case studies had surface temperatures that were, on the average, 5.4°C too low. Since previous calibrations were performed using data in May and June, 1978, there is the possibility that the calibration results were derived from raw digital data which produced ground temperatures that were, on the average, 5.2° too high. After June, the digital count values corresponding to temperatures that were on the order of 25.0°C more closely corresponded to the lower digital count values found in June, 1978, suggesting that if there were a problem with the calibration of the satellite in the early days after launch, that problem had been somehow corrected. Therefore, the correction, the lowering of the temperature by 5.2°C, was no longer applicable.

3.0 Problem Areas

No major problem areas have been encountered during this period.

4 0 Work for the Next Reporting Period

As suggested by the report given in Section 2.0, all of the major research work for this project has been completed. We are now in the process of developing a draft of the final report. That report will be available to NASA/GSFC as soon as possible.