

Quarterly Report

Time Period: for January - March, 1995

Zhengming Wan
University of California at Santa Barbara

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A) Near-term Objective

1. Sensitivity study of the MODIS LST algorithms.
2. To make the MIDAC TIR spectrometer ready for field measurements.

B) Task Progress

1. After the development of a generalized split-window LST algorithm and new methods to retrieve surface emissivity and temperature (included in the revised ATBD), rigorous sensitivity analysis is under way. According to the recent advances in validation of water vapor continuum absorption, the uncertainty in water vapor continuum coefficients is still a serious problem. In LOWTRAN7 (1988), the values of water vapor continuum coefficients in the 10-13 micron region was reduced by about 20% compared to that used in LOWTRAN6 (1983). In MODTRAN3 (1994), the coefficients was adjusted by a factor around +20% in the same region. Some results of long-path atmospheric transmission measurements indicate the error in the measured coefficients is 5%. Therefore, any LST and SST algorithms based on radiative transfer simulations should be stable to the uncertainties in water vapor (band and continuum) absorption coefficients at least at the 5% level.

2. After a few months delay, we finally received the stirling engine-cooled InSb/MCT detector. MIDAC made modifications after we identified problem with its sensitivity. Now it has achieved the same level of performance as the liquid nitrogen cooled detector. Besides, identified required spectrometer modification to correct the drift in performance related to the internal temperature increase of the spectrometer, designed and implemented modification with laser cooling. Identified problem with spectrometer angular performance and implemented solution with modified mirror drive. The pointing system and the platform on the roof of the building have been completed. The TIR spectrometer system is almost ready for field measurements as soon as a TIR source is built or purchased.

3. Other activities: attended the BOREAS Science Conference in late March and discussed BOREAS remote sensing activities in 1996.

C) Anticipated Activities During the Next Quarter

1. To continue the sensitivity study of LST algorithms.
2. To complete and improve the TIR spectrometer system and to use the system in field measurements during the requested MAS flight over Death Valley, CA in June or July.
3. To prepare the beta 3 software delivery.

D) Problems/Corrective Actions (None)

E) Publications

- Z. Wan, and J. Dozier, A generalized split-window algorithm for retrieving land-surface temperature from space, IEEE Trans. Geosci. Remote Sens., submitted January 1995.