Quarterly Report

Time Period: for January - March, 1994

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A) Near-term Objective

1. To complete the MODIS LST ATBD before the end of February.

2. To make beta delivery 1 of the MODIS LST product.

3. To improve the MIDAC TIR spectrometer.

B) Task Progress

1. I have completed the version 1 of the MODIS LST ATBD before the end of February and submitted it to Michael D. King, EOS Senior Project Scientist and the MODIS Science Team.

2. The MODIS LST beta delivery 1 was made to the MODIS Science Team. It is a prototype heritage software for LST from NOAA AVHRR data. Test data and basic instructions for running tests, and a brief description of the major known differences between this version of the software and the expected operational MODIS version are included in the delivery.

3. Based on testing results of the MIDAC TIR spectrometer in the past several months, investigations have been made to improve the performance of the spectrometer. First of all, the spectrometer should be stablized by cooling the beamsplitter unit, one of its critical components, to a lower fixed temperature in the range -10 to 0 degree C with a controlled thermoelectric cooler so that the system response function could be stablized and the SNR in the medium wavelength range 3.5-4.3 micron could be improved. It was found that the original InSb/MCT sandwich detector which MIDAC Corp. ordered from Graseby Infrared for my TIR spectrometer was not good in terms of low SNR in the medium wavelength range at low temperatures and the channeling effect in the output signal because of multiple reflection between two detector elements. Graseby Infrared could not solve these two problems in the past several months. I contacted several companies which build TIR detectors. Only EG&G Judson promises to eliminate the channeling effect by wedging the detector surface and to build a sandwich detector which performs better than MCT detector in the wavelength range 3-15 micron. So I urged MIDAC Corp. to order a LN2 cooled InSb/MCT sandwich detector from EG&G Judson for my TIR spectrometer. The detector size is specified as

1 by 1 mm, and the cold stop as 40 degree in order to achieve a better SNR.

C) Anticipated Activities During the Next Quarter

1. To make atmospheric radiative transfer simulations and to prepare beta delivery of MODIS version of LST software.

2. To improve the TIR spectrometer and to build a pointing structure for measurements of land-surface emissivity/temperature at a variable viewing angle in the nearly whole hemisphere.

3. To make preparations necessary for participation in BOREAS IFC 2 in the coming July.

D) Problems/Corrective Actions (None)

E) Publications

1. J. Dozier and Z. Wan, "Development of practical multiband algorithms for estimating land-surface temperature from EOS/MODIS data", Advances in Space Research, Vol. 14, No. 3, pp. 81-90, 1994.

2. Z. Wan, D. Ng and J. Dozier, "Spectral emissivity measurements of land-surface materials and related radiative transfer simulations", Advances in Space Research, Vol. 14, No. 3, pp. 91-94, 1994.