

Quarterly Report

Time Period: for July - September, 1993

Zhengming Wan
University of California at Santa Barbara

Contract Number: NAS5-31370

A) Near-term Objective

1. To complete a draft of MODIS Land-Surface Temperature Algorithm Theoretical Basis Document (LST ATBD) by the end of July.
2. To develop experimental and data processing procedures for land surface emissivity and temperature measurements in the field.

B) Task Progress

1. The draft (version 0) of MODIS Land-Surface Temperature Algorithm Theoretical Basis Document (LST ATBD) has been completed. A comparison between different methods for estimating LST from space was made. An error estimate including the effects of instrument, algorithm, and input data has been also made in this ATBD. The LST ATBD was submitted to the team on July 21.
2. The thermal infrared spectrometer, which I will use for measurements of surface emissivity and temperature of land covers in laboratory and in the field, and for validation of the LST algorithm, was received in August. A purchase request of a notebook, software for the spectrometer, and a liquid nitrogen dewar was submitted to NASA/GSFC Contracting Office on June 1, 1993. After receiving the approval dated August 13 from the contracting office, purchase orders were made immediately. The notebook and spectrometer software were received in early September. After a preliminary test of the TIR spectrometer, it was found that the instrument was not well aligned and the signal-to-noise ratio is not good as the demonstration data from the same model instrument.
3. I received 1km resolution AVHRR data of 10 scenes covering Tibet lakes from Dr. Dave Carneggie, the EROS Data Center in July. These data are in the period from June 1991 to March 1993. High-altitude lakes in Tibet will be used as ground calibration sites for EOS/MODIS thermal infrared bands.

The objectives of using AVHRR data over Tibet lakes are: 1) to estimate the seasonal variation of lake surface temperature; 2) to investigate the spatial homogeneity of lake surface temperature; 3) to investigate the feasibility of using partially frozen lake surface to calibrate thermal infrared bands of space-borne spectrometers in case of ground-based measurement data not available.

The raw 1b AVHRR data have been processed and converted to percent albedo values in bands 1 and 2, and brightness temperature values in bands 3 to 5.

4. I attended the MODIS Calibration Group meeting and Science Team meeting, from September 28 to October 1 at NASA/GSFC.

C) Anticipated Activities During the Next Quarter

1. It was planned to visit MIDAC Corp. in early October, the company built the TIR spectrometer for me. I will show them the problems I found and ask them to make a fine alignment and check the quality of the sandwich detector used in the spectrometer. I will also use this chance to learn maintenance procedures. After correcting these problems, a further test of the spectrometer will be made. Appropriate operating procedures will be developed as soon as possible. Then a series of measurements will be made to characterize the blackbody which is used for TIR calibration. After these two necessary steps, spectral measurements of simple land covers will be made.

2. To continue working on the AVHRR data for the Tibet lakes area and to consider cloud detection, land cover classification, and radiative transfer simulations for correcting atmospheric effects.

3. To attend the ASTER US-Japan joint science team meeting, November 8-12 in Tokyo, Japan.

4. To revise the LST ATBD if necessary after reading ATBDs of other MODIS Land products and receiving comments from other MODLAND group members.

5. To prepare a prototype of LST algorithm which is due January, 1994.

D) Problems/Corrective Actions (None)

E) Publications (None)