Quarterly Report

Time Period: for July - September, 1996

Zhengming Wan
University of California at Santa Barbara

Contract Number: NAS5-31370

A) Near-term Objective

1. To organize an International LST Workshop.

2. To conduct a BOREAS field campaign for validation of LST algorithm.

3. To measure spectral BRDF/emissivities of terrestrial materials.

4. Working on LST V1 delivery.

5. To revise LST ATBD based on comments from the EOS AM1 Land workshop.

B) Task Progress

1. An International LST Workshop was held on September 17-19, 1996, at at the University of California at Santa Barbara. Twenty five participants from USA, France, Australia and Japan attended the workshop. Twenty presentations were followed by two discussion sessions. It was a successful and productive workshop.

2. A field campaign was conducted successfully in August in the southern BOREAS test site. A TIR spectrometer and an infrared thermometer were deployed at a tower to measure the canopy temperature at the same time MAS flight overpassed. A preliminary study indicates that all field measurement and MAS data are good.

3. More emissivity measurements have been made in laboratory for single leaves, leaf samples with small-scale structures by using the TIR spectrometer integrating sphere system. The reflectances of structured leaf samples were reduced to about one third of values of flat single leaves. This confirmed the modeling results that the emissivity of canopy should be larger than the values of single leaves and it varies in a narrow range. This makes the generalized split-window LST algorithm more useful and accurate.

4. A substantial progress has been made in LST V1 coding. Both the split window LST algorithm and the day/night LST algorithm were implemented in the V1 code. The size of the

V1 code is about four times the size of the Beta-3 code. L2G functions are used in the L2 and L3 LST processing. New PGS and MAPI toolkits were used in the V1 code.

5. The LST ATBD has being revised after receiving comments from the review panel at the EOS AM1 Land Workshop. More sensitivity study and error analysis have been made for the day/night LST algorithm, especially for the uncertainty in day/night registration. Simulations show that this LST algorithm works well up to an error of 20% in the day/night registration.

C) Anticipated Activities During the Next Quarter

1. To deliver LST V1 code of the levels 2 and 3 LST products.

2. To enhance emissivity knowledge base of land-surface materials.

3. To revise the LST ATBD for the next peer review.

D) Problems/Corrective Actions (None)

E) Publications

Z. Wan, and J. Dozier, A generalized split-window algorithm for retrieving land-surface temperatures from space, IEEE Transactions on Geoscience and Remote Sensing, vol. 34, no. 4, pp. 892-905, 1996.

W. Snyder, and Z. Wan, Surface temperature correction for active infrared reflectance measurements, Applied Optics, vol. 35, no. 13, pp. 2216-2220, 1996.

Z. Wan, W. Snyder, and Y. Zhang, Validation of land-surface temperature retrieval from space, Proceedings IGARSS'96, pp. 2095-2097, 1996.

Z. Wan and Z.-L. Li, A physics-based algorithm for retrieving land-surface emissivity and temperature from EOS/MODIS data, IEEE Transactions on Geoscience and Remote Sensing, revised 1996.