Quarterly Report

Time Period: for July - September, 1997

Zhengming Wan
University of California at Santa Barbara

Contract Number: NAS5-31370

A) Near-term Objectives

1. To Validate LST algorithms with data collected in field campaigns.

2. To deliver daily V2 LST code to SDST.

B) Task Progress

1. We processed the MAS data and field measurement data collected during the joint US-Japan Cal/Val field campaigns in Railroad Valley, NV, on 23-27 June, 1997. Before processing the MAS data, I used the newly measured spectral response function from the Cooperative Institute for Meteorological Satellite Studies (CIMSS), University of Wisconsin at Madison, in calculations of the look-up tables and coefficients that are needed in the day/night LST algorithm in order to retrieve surface emissivity and temperature more accurately. The quality of both morning and evening MAS images is good. The LST values retrieved from MAS data agree with the LST values measured by the ground-based instruments within 0.6 deg. K, showing that we are approaching the goals of the LST validation: LST uncertainty less than 0.5 deg. K and emissivity uncertainty less than 0.005 in the 10-13 micro spectral region.

2. The V2 LST code for daily level-2 and level-3 LST products was recently delivered to SDST. All new toolkits (HDF4.1r1, MAPI2.2.1, and sdptk5.2v1.00) that are required for the V2 delivery were used. The code was tested with three granule data sets of simulation data, one granule data in day mode, one granule data in night mode, and another in mixed mode. The code determines how many and which land tiles cover with the input granule and generate the level-2 LST product for that granule and level-3 1km and 5km LST products for all thus selected land tiles (up to 11 tiles per granule) in an efficient way (requiring less space and less CPU time).

3. I attended the MODIS IR Bands meeting at CIMSS, University of Wisconsin at Madison, on 11-12 September.

C) Anticipated Activities During the Next Quarter

1. Write LST V2 codes for 8-day and monthly L3 LST products.

2. To improve the calibration accuracy of our TIR instruments.

3. To develop a new validation methodology with the low-level tethered balloon as a platform for IR camera for the spatial variation study of LST at test sites in crop fields, shrub and forest areas where the LST is not so homogeneous.

D) Problems/Corrective Actions (None)

E) Publications

Z. Wan and Z.-L. Li, "A Physics-based algorithm for retrieving land-surface emissivity and temperature from EOS/MODIS data", IEEE Trans. Geoscience and Remote Sensing, vol. 35, no. 4, pp. 980-996, (July) 1997.