

## Quarterly Report

Time Period: for January - March, 1996

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### A) Near-term Objective

1. Validation of LST algorithms
2. To measure spectral BRDF/emissivities of terrestrial materials.
3. Working on LST V1 delivery

### B) Task Progress

1. A new sun-shadow method has been developed. This method will be used to validate the day/night algorithm for retrieving land-surface emissivity and temperature from pairs of daytime and nighttime MODIS TIR data. This sun-shadow method for in-situ measurements of land-surface temperature and emissivity has been validated using spectrometric data of sand, soil, and grass samples. Retrieved band-averaged emissivities in MODIS bands 31 and 32 are compared with laboratory measurement results from integrating sphere. Retrieved surface temperatures are compared with results retrieved by the conventional emissive radiometric method which uses known surface emissivities. The maximum differences in retrieved surface temperature and band-averaged emissivities are less than 0.5 deg. K and 0.015, respectively. A paper on this new method has been submitted to Journal IEEE Trans. on Geoscience and Remote Sensing. This method will be used in future field campaigns for validation of LST algorithms using MAS data and ground-based measurement data.

2. A LST validation plan has been delivered to the MODLAND team leader Dr. Chris Justice.

3. More TIR BRDF and emissivity measurements have been made in laboratory for sand, different soils and vegetation leaves. We are processing data with different TIR BRDF modeling. We are working on writing a series of papers on TIR BRDF and emissivity of natural terrestrial materials.

4. We are making preparations for the field campaign at Mammoth Lakes, CA, scheduled for early April 1996. MAS data and field measurement data will be collected for validation of LST algorithm for snow covers.

5. We are working on MODIS LST V1 HDF specifications and coding.

6. Other activities: attended MODLAND-SDST meeting, Feb. 20-22, Greenbelt, MD; attended EOS-Test Site workshop, March 18-19, Greenbelt, MD; made progress report to the MODIS Project Scientist Dr. Robert Murphy during his site visit on March 28th.

C) Anticipated Activities During the Next Quarter

1. To deliver LST V1 code of the level 2 LST product.
2. Field campaigns with MAS flights over test sites for LST validation.
3. To establish emissivity knowledge base of land-surface materials.

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, in press 1996.

W. Snyder, and Z. Wan, Surface temperature correction for active infrared reflectance measurements, Applied Optics, in press 1996.

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

Z. Wan, W. Snyder, Z.-L. Li, Y. Zhang and Y.-Z. Feng, A sun-shadow method for in-situ measurements of land-surface temperature and emissivity, IEEE Transactions on Geoscience and Remote Sensing, submitted 1996.

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