Quarterly Report

Time Period: for July - September, 1994

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A) Near-term Objective

1. To develop new LST algorithms in response to review comments for the
version 1 of LST ATBD.

2. To prepare beta-2 delivery of the MODIS LST product.

B) Task Progress

1. In response to the review comments to the version 1 of LST ATBD, I made a more aggressive investigation into the land-surface emissivity problem. In the original LST ATBD, land-surface emissivity was a post- launch parameter. For consistency and better accuracy of LST, I decided to change both land-surface temperature and emissivity to at-launch parameters. All MODIS VNIR and TIR channels, and DEM will be used in spatial and spectral analysis to find areas where there is no significant variation in pixel surface elevations and atmosphere is horizontally uniform and to search pixels which belong to same land-cover types in these areas. Then the band differential brightness temperatures ratio could be used to make atmospheric corrections to retrieve the land-surface temperature and band emissivity ratios. A more complicated look-up table method is developed to simultaneously retrieve land-surface temperature and band emissivities, and the atmospheric column water vapor from simulated MODIS data in multiple TIR channels. These simulated data are given by accurate radiative transfer simulations for a series of surface temperature and emissivity conditions under a seasonal and regional averaged atmospheric condition with variable column water vapor. Simulation data show that these two methods are very promising. Sensitivity studies and testing with AVHRR and TOVS data are under way.

2. One of the two new LST algorithms mentioned above is being included in the software package to be prepared for LST Beta-2 delivery.

C) Anticipated Activities During the Next Quarter

1. To make intensive sensitivity studies and real data tests of the new LST algorithms.

2. To make beta-2 delivery.
3. To submit revised LST ATBD.