

QUARTERLY REPORT  
NASA CONTRACT NAS5-31368  
FOR MODIS TEAM MEMBER STEVEN W. RUNNING  
ASSOC. TEAM MEMBER RAMAKRISHNA R. NEMANI  
SOFTWARE ENGINEER JOSEPH GLASSY  
April 15, 1997

Activities of S W Running - Team Member, Jan-Apr 1997

EOS-IWG

As Chair of the EOS Land Science panel, SWR completed Chapter 7, Land Ecosystems and Hydrology for the EOS Science Plan. The text can be found at:

[http://eosps0.gsfc.nasa.gov/sci\\_plan/chapters.html](http://eosps0.gsfc.nasa.gov/sci_plan/chapters.html)

My central objective now is to organize a logical and efficient validation plan for EOS Land science, of which the MODLAND variables are central.

EOS – US Forest Service Fire Management project

I have worked with the US Forest Service Intermountain Fire Research Lab for the last year to design a plan to incorporate EOS data into a next generation Wildfire Management Plan. These ideas were presented at the EOS-IWG meeting in San Diego in February.

NASA EOS MEETINGS ATTENDED (SWR)

EOS-SEC Meetings February, April 1997

NASA Boreas workshop, March 1997

NASA Interannual Variability workshop, March 1997

EOS IWG Meeting February, 1997

**PUBLICATIONS**

Running, S.W. , Nemani and Glassy. 1997. GLOBAL NET PHOTOSYNTHESIS AND TERRESTRIAL NET PRIMARY PRODUCTIVITY from the EARTH OBSERVING SYSTEM To appear in Methods in Ecosystem Science, edited by Sala, Jackson, Mooney and Howarth, Springer-Verlag New York, Inc.

MODLAND Activities of R. NEMANI

## **WORK ACCOMPLISHED**

### MODIS Algorithms

#### Leaf Area Index/fAPAR

Following our earlier work (to be published in IEEE Trans. Geoscience and Remote Sensing) on the back-up algorithm, we further refined the empirical relationships to account for variations in soil background, view angle, sun angle. Approximately 400 relationships each have been developed for LAI and FPAR for the six biomes. The sun and view angle dependent relationships help in better estimation of LAI and FPAR. Our earlier NDVI based relations have been modified to use SIMPLE RATIO for estimating LAI. The SR based relations are found to be linear over much of the observed range (0-6) of LAI for different biomes.

### Net Primary Production

The Production Efficiency based model is simplified and streamlined to use currently available datasets from DAO. A number of decisions had to be made on the use of several variables produced by the DAO, the most important one being the use of variables produced at 10m instead of 2m height. This decision has significant influence on NPP estimates over low canopies such as grasses and crops. The DAO does not have much confidence on their estimates at 2m height.

## **MEETINGS ATTENDED**

Feb 1997    MODIS/SDST meeting, GSFC/Greenbelt

## **PUBLICATIONS**

Nemani, R.R. and S.W. Running. (1997). Landcover characterization using multi-temporal red, near-IR and thermal-IR data from NOAA/AVHRR. *Ecological Applications* 7(1): 79-90.

Kimball, J., S.W. Running, and R. Nemani. (1997). An improved method for estimating surface humidity from daily minimum temperature. *Agricultural and Forest Meteorology* (in press)

Myneni, R.B., Nemani, R.R., and Running, S.W. (1997). Algorithm for the estimation of global land cover, LAI, and FPAR based on radiative transfer models. *IEEE Trans. Geoscience and Remote Sensing*. (in press).

Activities of J. M. Glassy, MODIS Software Engineer:

## **WORK ACCOMPLISHED**

### MOD15: FPAR/LAI Product

The dominant activity during this period focused on implementing a number of minor code revisions to bring our codes into full compliance with MODIS standards and conventions. In addition, several minor corrections were required to eliminate heap memory leaks from our software operating in the SGI verification environment. Principal challenges included keeping up frequent changes to the evolving EOSDIS core system metadata and HDF-EOS standard. A new version of the Science Data Production Toolkit (SDPTK), version 5.2, was downloaded and successfully built on the IBM RS/6000 AIX 4.1 environment. A new version of the HDF-EOS library, version 2.0, was also downloaded from the eos.hitc.com server and built on the AIX 4.1 environment. The correct functioning of these libraries on this platform is now being evaluated during the summer 1997 period, as part of our routine code development.

### MOD17: PSN/NPP Product

On the MOD17 algorithm, coding towards an in-house version 1.5 generation, as well as the formal V2 generation is progressing. Several design re-evaluations were conducted, for the purpose of assuring the software would run as economically as possible in a potentially resource constrained EOSDIS environment. The first test generation of an HDF-EOS format DAO global surface climatology dataset was downloaded from the DAO during this period, with evaluation of this data now progressing. Problems due to modeled canopy roughness near the surface in the 2-meter family of assimilated fields for near surface temperature and absolute humidity persist in this test data set, requiring us to adopt the use of "nearest equivalent" 10-meter fields which do not suffer from these problems

## **MEETINGS ATTENDED**

MODLAND/SDST Workshop, February 17-21, 1997  
V1 software integration site visit to TLCF, March 29-April 4 1997

## **ON GOING ACTIVITIES**

### Algorithm Development

During the next period we will concentrate on a number of algorithm issues. These include integration of the FPAR, LAI (MOD\_PR15) codes to the new HDF-EOS library, integration of new improvements from team member Ranga Myneni of Boston University, culminating on a V2 delivery for both MOD\_PR15 and MOD\_PR17 codes. Relating to these software development issues is the on-going refinement in our SCF QA plan, as it relates to the MODIS land QA plan as a whole.

### Data Development

Test data development activities in the next period will include producing and testing more realistic, robust MODIS like surface reflectance datasets, that include full instances of conforming ECS metadata, in HDF-EOS format. There are a number of quality verification tasks also to perform, including an on-going assessment of the DAO global daily surface climatology data, and exploring refinements in the way these coarse spatial data are interpolated to the MODIS 1KM integerized sinusoidal (IS) grid.