

SEMI-YEARLY REPORT
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Enhanced Land cover and Land Cover Change products from MODIS Algorithm Development and Post Launch Studies

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1. At-launch Land Cover Product.

a. Task Objectives:

The principal objective of this task is to supply a validated at-launch land cover product based on the AVHRR at a resolution of 1 km.

b. Task Progress:

i) We successfully generated a 1 km land cover product to be included with EDC's DISCover product as the MODIS at-launch product.

This product will conform to MOD12 file specifications as much as possible and will contain both the UMD and EDC land cover products. It will be tiled and gridded in the integerized sinusoidal projection and possibly the Goode's Homolosine projection as well.

A final version of the UMD 1km land cover map was completed in March 1998. The meta-data describing the quality of both the EDC 1 km product and our own have been prepared. Validation of our land cover product is being carried out.

We participated in the workshop organized at UCSB on validation of the EDC land cover product.

A final version of the coding for the output of the 1km land cover product is delivered to SDST for use as simulated data.

c. Anticipated Activities During the Next Semi-year:

A paper describing the UMD 1km land cover classification is being prepared for a special issue of the International Journal of Remote Sensing (Hansen, DeFries, Townshend, Sohlberg, Global Land Cover Classification at 1km Spatial Resolution Using A Supervised Decision Tree Approach - IJRS special Issue).

2. Land cover change indicator product.

a) Task objectives

i) Generation of test data sets.

ii) Production and testing of the at-launch change detection algorithm.

iii) Production and testing of post-launch change detection algorithm.

b) Task progress

i) 10 sets of test data were generated and stored with uniform format for testing the change detection algorithms.

ii) Five change detection algorithms have been selected and coded into the MOD44A V2.1 software. These algorithms are: the band1-band2 space partitioning method, the band1-band2 space change vector method, the delta and modified delta space method, the coefficient of variation change detection method and the linear feature change detection method. Off-line Testing of the 5 change detection algorithms against the test data sets has been carried out. The MOD44A (Vegetation Cover Conversion) V2.1 code has been delivered to SDST in March and accepted in April 2.

Two papers describing the land cover change detection algorithms were presented to IGARSS'98 in Seattle (Paper 1: Zhan, Huang, Townshend, Defries, Hansen, Dimiceli, Sohlberg, Hewson-Scardelletti and Tompkins, Land Cover Change Detection with Change Vector in the Red and Near Infrared Reflectance Space - IGARSS'98 Digest, pp.859-861. Paper 2: Hansen, DeFries, Dimiceli, Huang, Sohlberg, Zhan, Townshend, Red and Infrared Space Partitioning for Detecting Land Cover Change - IGARSS'98 Digest, pp. 2512-2514)

iii) All Look-Up Tables required by the 5 change detection algorithms have been completed with AVHRR data with pilot automation procedures. These procedures will be able to take future real MODIS data to automatically refine the Look-Up Tables. Computer codes for automatic generation of the LUTs are being developed and tested.

c) Anticipated Activities during the Next Semi-year

i) 10 more test data set will be created for testing changes of more different landcover types.

ii) Refinements of the LUT generation procedures are anticipated. The texture change detection LUTs will be modified with more detailed thresholds. More testing of the LUTs against the test data sets will be carried on.

A paper describing the generation and the algorithms of the land cover change product is being prepared for a special issue of the International Journal of Remote Sensing (Zhan, Defries, Townshend, Hansen, Huang, Sohlberg, The 250m Global Land Cover Change Product from the Moderate Resolution Imaging Spectroradiometer of NASA's Earth Observing System. -IJRS special issue).

iii) Automation code for generating the LUTs will be examined and refined. Evaluation of the Look-Up Tables of the change detection algorithms will be continued for the refinement of the post-launch MODIS product.

3. Continuous fields of land cover properties

a) Task objectives

Generation of continuous fields of land cover attributes

b) Task progress

Using the AVHRR Pathfinder data as a prototype, we have developed a methodology to provide continuous fields of three types of continuous variables: (i) % bare, % herbaceous and % woody, ii) % deciduous and % evergreen, iii) % needle-leaf and % broadleaf . The methodology for locations of endmembers involves the use of linear regression based on the training data developed at UMD. The method has been applied to AVHRR 1 km data and products for each of the data layers have been generated. We have compared the result to the EDC 1 km classification. We have also applied the method to the the full record of the Pathfinder 8 km AVHRR data set (1982-1994) to test the stability of the methodology and to explore possibilities for using the method to identify interannual variability in land cover. Efforts are underway to assess the results with other regional land cover products such as results from the Landsat Pathfinder Tropical Deforestation Project. In addition, efforts are currently underway to develop code for deriving continuous fields from MODIS data as a post-launch product.

A paper describing the continuous fields of vegetation characteristics at the global scale is submitted to the Journal of Geophysical Research (DeFries, Townshend, Hansen, Continuous Fields of Vegetation Characteristics at the Global Scale - J. Geoph. Res.)

c) Anticipated Activities during the Next Quarter

We plan to assess the accuracy of the prototype AVHRR products for continuous fields based on comparisons with other global and regional land cover products. In addition, we plan to develop code for deriving continuous fields from MODIS data as a post-launch product.

>Preliminary results of our work were presented in March at the GCTE meeting in Barcelona.

A paper about using multiyear AVHRR data for global scale continuous fields of vegetation characteristics is being prepared for the International Journal of Remote Sensing (DeFries, Townshend, Hansen, Continuous Fields of Vegetation Characteristic from global, multiyear AVHRR data - IJRS).