SEMI-ANNUAL REPORT

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Enhanced Land cover and Land Cover Change products from MODIS Algorithm Development and Post Launch Studies

by

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1. At-launch Land Cover Product.

a. Task Objectives:

i) 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.

ii) A subsidiary objective is to gain agreement on the classes to be used in the product.

b. Task Progress:

i) As stated in the proposal the expected product for this purpose will be the IGBP-based product based on the global 1 km AVHRR data set being generated at the EROS data Center. We stated that if needed we would be willing to supply a 1km data set based on our own analysis of this data set using training data used for our currently funded 8 km land cover classification project. We believe it is important to supply some sort of 1 km reference data plane as soon as possible, but the EDC/IGBP product will not be available until June of 1997. We therefore accelerated the generation of global monthly composites from the 1 km AVHRR data set as a preliminary to production of a prototype classification which can be provided to the MODIS project.

Discussions were held with a representative of the Boston University land cover team and the lead person of the Pathfinder Global Land Cover Test site initiative on the specification and assembly of a integrated set of land cover test sites.

A place-holder 1 km product was delivered to the project by the end of the reporting period. It was generated using our 8km training sites using a decision tree approach. It is not unanticipated that this is the classification will be used but we wanted to ensure a place-holder was present with all the associated software present so that subsequently all that needs to be changed is the actual data plane itself.

ii) Copies of the legends of the two likely to be available products were circulated to all members of the MODIS team. Several responses were received with indications of changes that would be required. The reality is that currently there are few if any additional resources available to generate a new 1 km product with different classes.

At the MODIS land cover meeting held at Boston University (4th-6th. November) the utility of the IGBP defined classes was discussed between team members. It was agreed that with relatively minor changes the classes would be of considerable value. However there are some additional characteristics required by some of the modelling activities such as type of agriculture and the distinction between C3 an C4 plants which can not current conceivably distinguished on a global scale using AVHRR data.

c. Anticipated Activities During the Next Quarter:

i) Involvement in the 1km land cover validation activities associated with the IGBP-DIS product to ensure maximum value for MODIS.

ii) Preliminary in-house evaluation of the IGBP-DIS land cover product .

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) Code for the production of MODIS data from TM data was obtained from GSFC and was first applied to a pair of Thematic Mapper scenes of southern Bolivia where intense changes in land cover are occurring.

Eight further sets of TM images were assembled and registered to prepare a more comprehensive set of test data sets for testing algorithms; the images were filtered to create simulated MODIS data

ii) A preliminary selection of algorithms were identified. Three were implemented and applied to the Bolivian data. In the first instance we have generated a second image at time t2 in which changes are simulated and the rest of the image is changed to ensue that the basic software is working correctly. The anticipated problems with border pixels were apparent. Also roads which were quite marked on the TM data were much less obvious on the MODIS data although still apparent as linear features. Inclusion of a linear detector may therefore be added as part of the overall change detection algorithm.

Because of concerns about the accuracy of multi-temporal registration of the 250m bands an alternative approach to that originally proposed was developed relying on changes in the spatial properties within a window 2kms in size. This reduces the impact of misregistration yet still considers changes at the 250m pixel size. A trial of the method for the Bolivian scene was quite encouraging in its ability to detect changes in land cover compared with the result obtained from a perfectly registered simulation.

iii) No work was carried out on this sub-task

c) Anticipated Activities during the Next Quarter

i) Substantial differences between the images occur due to atmospheric effects; also some show quite marked differences due to phenological differences. Attempts will be made to collect improved data sets.

ii) Development of change detection algorithms will continue including a linear detection procedure.

iii) No work is anticipated on this sub-task.

3. Continuous fields of land cover properties.

a) Task objectives

Generation of continuous fields of land cover attributes

b) Task progress

High resolution data were analyzed to provide a data set to calibrate and validate the continuous fields.

Using AVHRR data we have investigated the location of end-members for three different types of continuous variables (i) % bare, % herbaceous and % woody, ii) % deciduous and % evergreen, iii) % needle-leaf and % broadleaf. No products have been created as yet.

c) Anticipated Activities during the Next Quarter

Creation of prototype products of the types listed under (b) to form part of the at-launch product depicting land cover.

OTHER DEVELOPMENTS

During the first reporting quarter a considerable amount of time was spent in detailed negotiation of the contract, the hiring of personnel and the ordering of equipment. By the end of this quarter all of these tasks were nearing completion and by the middle of October period we were fully staffed and the main computing equipment had been delivered. By November the latter was fully operational.