

## **MODIS Science Team Semi-Annual Report**

**January – June 1999**

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Contract #: NAS5-31365

### **a) Task Objectives**

During this reporting periods emphasis was given to evaluating output products from the MODAPS tests as available, making changes to the V2 code, developing and testing QA tools and data flows, refining the land production plan, refining the land product validation plans, planning the MODIS fire validation activity in southern Africa, coordinating the EOS Land Validation Program, developing the post launch fire burn scar algorithm, developing new schedules around the impending launch.

We continued to build the collaboration required to conduct the work of developing community consensus algorithms on Fire, Surface Reflectance and Vegetation Indices. The project has developed a number of collaborative activities that are intended to expand the scope of the team members' activities and involve a larger community in MODIS research. Chris Justice participated the Discipline Leaders meetings and whenever possible the weekly Technical Team (TT) Meetings. Dr. Vermote represents the land group at the TT Meetings in Dr. Justice's absence.

In addition, the goals of the MODIS project, the status of the instrument and preliminary results of the research were presented at scientific meetings. Results of the studies undertaken as part of the project are in the process of being written up and submitted for publication.

In agreement with the MODIS Project Scientist, resources from this project continue to support the surface reflectance product. This includes providing shared support for personnel and computer resources with Dr. E. Vermote and the Land Science Data Team at GSFC. A fuller account of this supporting activity performed is outlined in the companion report of Dr. E. Vermote.

## **b) Tasks Accomplished (Data analysis and interpretation)**

### **1. Version 2 Software and QA tools ( L.Giglio)**

Based on experience with AVHRR and simulation results, the MODIS Level 2 fire product code was altered to apply partial detection algorithm at large scan angles. The full algorithm cannot be applied due to complications in computing background pixel statistics. Formerly, no attempt was made to detect fires at these angles, which significantly reduced product coverage. Initial version of three quality assurance (QA) software tools was completed. Two of these are fire product metadata inspection programs which will be run automatically on the metadata of every granule/tile produced. The third tool identifies contiguous regions of fire pixels in product granules and applies simple heuristic rules to these regions. Currently these tools are being tested with AVHRR and VIRS fire products.

Giglio attended 16 MOD09/14 SCF (Science Computing Facility) meetings concerning code status, testing plans, and development of quality assurance (QA) tools for the MODIS surface reflectance and fire products. Giglio prepared and presented a talk outlining the MODIS fire product quality assurance (QA) plan and software QA tools that are currently under development at the May Land Team meeting.

### **2. Uncertainty Analysis**

L. Giglio completed modifications to an AVHRR fire simulation model to represent the MODIS instrument. This was necessary for completing a fire product accuracy statement for the MODIS fire algorithm. The statement is currently being drafted and will be completed shortly. The material generated for this study will be compiled for publication

### **3. EOS Validation (Chris Justice, Bob Swap, Stefania Korontzi)**

#### SAFARI Coordination (Bob Swap)

Much of this reporting period has involved preparation for MODIS validation activities in Southern Africa. SAFARI2K will be the primary region for fire validation. The preparation has included coordination of the Boulder SAFARI 2K meeting chaired by Bob Swap and the Gaborone Regional Planning Meeting (co-chaired by Bob Swap). Presentations were given at the Boulder SAFARI Planning Meeting (May 1999) by Chris Justice and Bob Swap. Representatives from each of the instrument teams were present at that workshop. The purpose of the workshop was to coordinate NASA EOS Validation Activities in SAFARI 2000 with those activities associated with the US and Southern African Experimental Aircraft during the August/September 2000 S2K intensive. Some 60 delegates participated in this workshop.

Research efforts over the last six months related to MODIS validation activities have been focused on developing regional interest and support for MODIS-Terra Validation Activities. Specifically, details concerning the deployment of aerosol sampling equipment as well as sun/sky radiometer instruments within the AERONET network throughout the southern African region have been finalized. The formalization of regional points of contact is also in the final stages of completion. Some of the research effort has been focused on the development of the appropriated points of contact within the region required by the MODLAND group for their SAFARI 2000 related validation activities, especially activities related to fire and burn scar products.

Bob Swap has been working to establish the necessary Memorandums of Understanding (MOU's) between NASA EOS MODIS Validation Activities and the appropriate regional agencies within Southern Africa. In this endeavor, he has been working closely with Dr. Tim Suttles (Raytheon) and Ms. Shari Kamm (NASA Intl Affairs Office). Swap has been on travel within the region both in March and again in July of this year to secure the necessary permissions to enable the US EOS Validation Activities associated with SAFARI 2000 move forward.

Bob Swap has currently been involved with the coordination of the SAFARI

2000 Regional Implementation Workshop that will be held in Gaborone, Botswana, during July 26-30, 1999. This workshop is a follow up to the Boulder workshop and will seek to coordinate the US EOS Validation and Aircraft activities with those activities being conducted in support of SAFARI 2000 by regional scientists. We are anticipating approximately 150 participants for this workshop. Part of my efforts has also been focused on the facilitation of a senior NASA site survey visit in region.

Miombo Network Fire Meeting Matopos (April 1999) (C. Justice)

Chris Justice and Stefania Korontzi attended the Miombo Network Fire meeting in Matopos, Zimbabwe. The meeting was aimed at developing a link between the SAFARI2K fire validation initiatives and the Miombo network. Chris Justice and David Roy (UMd) involved regional scientists in developing a MODIS burn scar validation plan for southern Africa.

CEOS Calibration and Validation Working Group (Justice)

Chris Justice and Jeff Morisette (UMd) attended the Committee on Earth Observation Satellites (CEOS) Calibration and Validation (Cal/Val) Working group meeting in London and presented the MODIS and EOS Test Site initiatives. The meeting led to the proposal for a CEOS sub-group on Validation. Chris Justice has been working with Jeff Privette to develop a plan for the working group closely linked to EOS Validation Site initiatives.

#### **4. Science Computing Facilities**

**The Justice/ Vermote Joint SCF at GSFC (Bruno Margerin)**

Redesign and reconfiguration of the S.C.F into a operational production system capable of processing in near real time MODIS/LAND Surface reflectance 1 km resolution products (40000 Mbytes/day) from MODIS LEVEL1B 1 km resolution (51590 Mbytes/day) was completed. This includes system network tuning and enhancement, RAID disk storage performances and configuration improvement. Also, to meet this goal, 612 Gbytes of RAID disks and an ATL P3000 11.4 Tbytes DLT library have

been ordered, upgrading RAID disk storage from 660 Gbytes to 1.27 Tbytes and near line storage from 2 Tbytes to 13.4 Tbytes. For reliability and performances issues Legato Networker 5.5 Network Edition has been chosen to replace H.P Omnistorage 2.2 as the software managing near line archiving.

### **The Fire Product QA at UVA (John Owens)**

The UVA group continued installation and testing of system hardware. The systems are operational and seem well proportioned to task of ingesting the QA data stream. IDL/ENVI code was developed to manipulate incoming MODIS fire data stream and produced some automated imagery with fire characteristics. Development of the QA routines is continuing. John Owens secured agreements for data delivery via FTP subscription and continued testing of MEBDOS ordering system. Performance seems acceptable/good, but requires further testing (Y-day testing).

A Fire Monitoring web site was developed to incorporate early MODIS QA data for southern Africa, in support of the SAFARI2K campaign. The site is still under development. Preliminary versions of the data cataloging and retrieval system works. The group continued to explore UVA/UMd/ Goddard collaborative relationships. Tasks are more clearly defined between groups, all parties benefited from exchange of ideas, which will continue. Stefania Korontzi started to develop the science background write up for the MODIS Fire Web Page.

### **Liaison Activities**

Louis Giglio attended the US Fire meeting in Idaho, which was attended by a large number of US fire managers. Justice continues to liaise with the NASA NPP management concerning the desired continuity of MODIS characteristics. Justice briefed the NASA LCLUC team on MODIS developments. Justice continues to liaise with the Terra early products team. Justice is on the planning committee for the CEOS GOFD Fire Workshop to be held at the JRC Ispra, November 2-5.

### **New Publications**

Roy D.P., Giglio L., Kendall J. and Justice C.O. 1999. Multitemporal active-fire based burn scar detection algorithm. *International Journal of Remote Sensing*, 20:1031-1038.

Giglio L., Kendall J. D., Justice C. O. 1999. Evaluation of Global Fire Detection Algorithms Using Simulated AVHRR Infrared Data. *International Journal of Remote Sensing*, 20:1947-1985.

Justice C. 1999. Satellite Fire Monitoring: a status report. IGACTivities, Newsletter, 15, 7-9.

Swap R., Annegarn, H. Scholes, M. and Justice C.O. 1999. SAFARI-2000: A southern African Regional Science Initiative. IGACTivities, Newsletter, 15, 16-18.

Justice C., E. Vermote, J.R.G Townshend, R. DeFries, D.R. Roy, D.K. Hall, V.V. Salomonson, J.L. Privette, G. Riggs, A. Strahler, W. Lucht, R. Myneni, Y Knyazikhin, S. W. Running, R. R. Nemani, Z. Wan, A. Huete, W. van Leeuwen, R. E. Wolfe, L. Giglio, J-P. Muller, P. Lewis, M.J. Barnsley, 1998. The Moderate Resolution Imaging Spectroradiometer (MODIS): land remote sensing for global change research. *Trans. IEEE Geoscience and Remote Sensing* 36, 4, 1228-1249.

Kaufman Y. J., Justice C.O., Flynn L., Kendall J., Prins E., Ward D.E., Menzel P. and Setzer A. 1998. Potential Global Fire Monitoring from EOS-MODIS. *Journal of Geophysical Research*, 103, D24, 32,215-32,238.

### **New Staff**

None