MODIS
SCIENCE DATA SUPPORT TEAM
PRESENTATION

November 6, 1992

AGENDA

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ACTION ITEMS:

06/12/92 [Tom Goff, Carroll Hood] Develop separate detailed schedules using Microsoft Project for Level-1A and -1B software design and development. (Refine the use of Microsoft Project so that it becomes a useful tool rather than an action item.) STATUS: Open. Due Date: 07/10/92

07/31/92 [Tom Goff, Ed Masuoka, Al Fleig] Develop the purpose and requirements for a packet simulator. Get more information on the packet simulator being developed by SBRC. (An updated requirements specification was included in the handout on 09/04/92. A copy was provided to Al to take to the Science Team Meeting. Tom arrange a meeting with Ed and Al.) STATUS: Open. Due Date: 09/04/92

10/02/92 [Team] Prepare presentation materials for the MODIS Science Team Meeting. STATUS: Closed. Due Date: 10/16/92

MODIS Airborne Simulator (MAS) Status

Liam E. Gumley
Progress up to 5 November 1992

(1) Software developments

Several small changes were made to the Level-1B production program including:

- Inclusion of sensor weighted, Earth orbit corrected solar spectral irradiances for each channel in the output NetCDF file (to enable conversion of visible/NIR radiances to reflectance),
- Automatic detection of cases where the output scaled 16-bit integer pixel value exceeded 32767, and termination of the program if more than 1000 of these pixels are found (to ensure radiance scaling factors are chosen correctly for each channel),
- Checking of the year, month, and day entered by the user against the day of year encoded in the MAS Level-1A data stream (to ensure that the user is certain of the date of any given Level-1A data set).

These changes were first implemented and tested in the PC version of the program, and then ported to the Iris version. A complete MAS data set was successfully processed with this new version of the code on 11/5/92.

(2) MAS data processing

On 11/4/92 I received a final set of visible/NIR calibration coefficients for the FIRE mission from Tom Arnold (GSFC 913). These include a correction for temperature induced sensitivity changes. I have included this information in the instrument configuration files from FIRE, and am now ready to begin final processing of the FIRE data set. This comprises two engineering/ferry flights, 11 science flights, and three ground calibration runs. One engineering flight was processed on 11/5/92. During the next week I will prepare a table detailing the processing status.

(3) MAS Data User's Guide

During the recent MODIS Science Team Meeting, several people expressed the desire to obtain MAS data in the near future. In order to support these users, I began work on a MAS Data User's Guide, which will cover the following topics:

- Introduction (MAS purpose, Principal Investigators, Contacts),
- MAS specifications (aircraft, scanner, and data characteristics, spectral channels),
- Calibration procedures (visible/NIR using sphere, IR using blackbodies),
- Geolocation procedures (separation into straight line flight tracks, merging of INS data),
- Level-1B data structure (NetCDF format, names and description of contents),
- Obtaining MAS data (who to contact, available media),
- Getting started (how to get NetCDF libraries, sample code to read MAS NetCDF files),
- Appendices (samples of data and metadata).

MODIS Level-2 Processing Shell Design and Development

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Date: October 19 - November 6, 1992

1. MODIS Science Team Meeting

The MODIS Science Team Meeting was held at SBRC, October 27-29, 1992. The algorithm dependency diagram (version 3.0) and the following tables were provided to Team Members in the meeting:

1. Table 1. Input/Output Data Products used in the Algorithm Dependency Diagram (sorted by the product number).
2. Table 2. Input/Output Data Products used in the Algorithm Dependency Diagram (sorted by the investigator's name).
3. Table 3. Proposed Output Data Products (sorted by the investigator's name).
4. Table 4. Level-3 Products List.
5. Table 5. Questions and Suggestions of Data Products.
6. Table 6. Modifications of Input/Output Data (from Ver.1.0 to Ver. 3.0).
7. Table 7. MODIS products required by non-MODIS algorithms.

Currently there are 77 data products (49 at-launch and 28 post-launch). It could be reduced to 56 (40 at-launch and 16 post-launch). On the basis of this algorithm dependency algorithm, each group (atmosphere, ocean, and land) will revise their data flow and relabel their data products. I will update the database and revise this diagram after I have received their responses.

In the meeting the land group distributed a flow chart with eight MODLAND Products. These 8 products are:

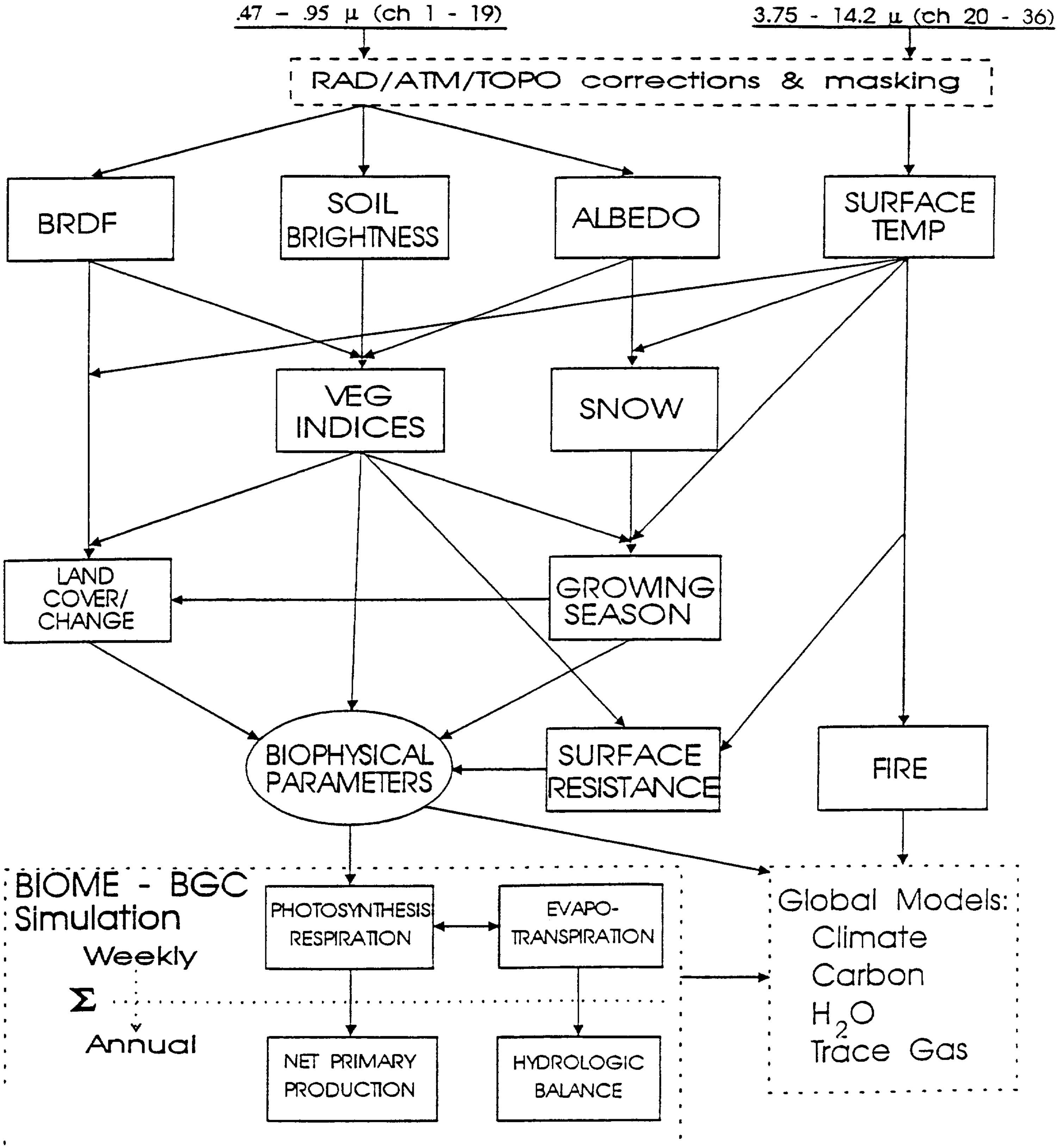
1. Snow/Ice
2. Land cover/change
3. Vegetation Indices
4. Albedo
5. BRDF (Bidirectional Reflectance Distribution Function)
6. Soil brightness
7. Surface temperature
8. FIRE

The assumed inputs include Level-1B data, atmospheric and topographic corrections and masking. BRDF might be also required for some algorithms. The MODIS Land prototype is a subsystem of the MODLAND data production. However, the soil brightness and BRDF that are required for vegetation indices are not included in the prototype. Also, in the prototype the cloud masking, geometry filtering, and noise filtering are executed after the computations of surface temperature, vegetation indices, etc.

2. MAS Level-2 Prototype

In addition to updating the database and the algorithm dependency diagram, I keep studying the NCSA HDF Calling Interfaces and Utilities that are required in the MAS Level-2 prototype. Also I need to set up the prototype running environment on the HP workstation soon.

EOS/MODIS
MODLAND PRODUCTS



Presented by the MODIS Land Team at the MODIS Science Team Meeting, October, 1992

MODIS Level-1 Earth Navigation

Paul A. Hubanks
06 November 1992

I met with Dave Diner of JPL at the MODIS Science Team Meeting, Santa Barbara to discuss geolocation. He is one of the people involved with geolocation of MISR instrument data. They are currently in the conceptual stage. Their current plan is to inherit several JPL geolocation software modules from earlier missions and adapt them for use with MISR. The topographic correction portion of the software will have to be developed. He was also concerned with the relatively poor state of current DEM's. He felt that the DEM generated from MODIS will be a marked improvement. With their incorporation into the terrain correction software (after launch), earth location errors will be reduced.

Dave was also working on a geolocation error budget for MISR and preliminary calculations were showing estimated geolocation errors of about 80 to 100 meters for the nadir camera (250meter resolution), and 300 to 400 meters for the high-angle view camera . We agreed to open channels for a sharing of information and techniques.

Dave also said they did not want to use any interactive geometric rectification routines (similar to those used for AVHRR) to systematically correct pointing errors. I believe that with the pointing errors, some portion of that will be static (e.g., deformation of the platform during launch). This could be corrected in one shot. Of the remaining dynamic error, some will be systematic (e.g., periodic heating and cooling of the platform as it moves from sun to shadow) and some not (e.g., jitter). The systematic part could be corrected through the use of models. The rectification routines could then be periodically used to correct the non-systematic part of the dynamic error.

I have sorted through some of the USGS/AVHRR geolocation software and have isolated the geometric rectification routines. They currently reside in a sub-directory on the LTP/VAX system. A brief listing is given below:

BLATLONG.C- calculate the sub-satellite point in geocentric coordinates from the orbital elements.
BROUWCORRECT.C - convert the mean orbital elements into osculating elements.
BROUWER.C - Propagate the orbital elements from epoch to the time of interest.
CORRECTVIEW.C - corrects the satellite's roll and pitch due to the satellite looking down to the geodetic surface not the geocentric.
C_BFORWARD.C - given a line/sample in a satellite scene calculate the geodetic latitude/longitude.
C_BINVERSE.C - inverse of above.
C_DAYNITE.C - calculate the solar zenith angle at a specific point.
C_GETORB.C - calculate the orbit number, equatorial crossing and the direction of the pass.
C_LL2LS.C - For a given line and sample in the satellite image calculate the latitude and longitude of the point.

C_LS2LL.C - inverse of above.
C_READEPHEM.C - Read the ephemeris information.
C_SETEPHEM.C - Convert the ASCII ephemeris into a predetermined structure.
C_SUNPOS.C - Get the sun position (lat/long) as a function of time.
DKEPLR.C - Solves Keplers equation to find the true anomaly given the mean anomaly.
ELRATES.C - Change original ephemeris data into units that the model needs, also calculates the rates of change for the elements.
SATATT.C - Get the satellite attitude corrections.
SECSINCEPOCH.C - Calculate the number of seconds from the latest epoch ephemeris to the time of interest.
MAKE_GRID.C - Creates a geometric mapping grid file, mapping from one map projection to another.
OUTFRAME.C - Calculates a set of coefficients mapping from space image coordinates to space projection coordinates.
RECTIFY.C - Creates a geometric mapping grid file which specifies an image projection change.