

May 19, 1993

To: MODIS Team Leader/Vincent V. Salomonson

From: MODIS SDST Consultant/Al Fleig

Subject: Estimate of computer processing required for MODIS

This estimate of the computer processing required for MODIS has been revised from the one presented at the 4/29/93 MODIS Technical Team Meeting. The revisions are: 1) incorporation of the MODIS Calibration Support Team Level 1b processing estimate to replace the previous place holder guess, 2) an improved estimate of the Level 1A processing based on analysis of the geolocation task, 3) Updated estimates for some of the ocean algorithm components, 4) correction of the error in estimating processing for quality control and alteration of the QC percentage to 15%, 5) a note that there is no processing allocation for producing atmospheric profiles in this estimate, and 6) minor editing. The result of all of these changes is to increase this estimate from 3300 MFLOPS to 5000 MFLOPS

Mike King will shortly ask everyone for an update on their processing requirements with a response date probably in June. This is an interim estimate of MODIS processing requirements to provide an early "heads up" for the Project. In response to Dr. King's request we will continue to collect information and endeavoring to obtain a more direct basis for each estimate. Note that at several points in this memo I have rounded sums so that only one significant figure is shown. Even that is specious precision since these numbers are not accurate to 10%.

At present we have responses back from various Science Team Members for 40 of the 68 Level 2 through Level 4 products and for the Level 1a, Level 1b and Classification Masks.

40/68 of Science algorithms	619
scaled assumption for remaining algorithms (619*28/40)	433
Level 1a	<u>150^A</u>
Subtotal	1200

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There was no provision for the production of operational quality control products to support daily assessment of output (assume add 15%) 180

The above does not include adequate exception coding which will be required for operational processing. Assumption, add 50% 690

Adjusted (rounded) subtotal 2100

Note A This includes only minimal ground processing for earth location and assumes that the spacecraft location and attitude and the instrument pointing knowledge are as currently anticipated rather than built to specification. At present neither the Project nor any of the involved contractors will commit to this level of performance. A requirement for continuous ground control point processing could add substantially to this estimate. (Perhaps x10.)

Level 1b

preliminary application of on-board calibrator data	20
simplified (biased) destriping	100
generation of masks and unbiased destriping	1400
invert optical MTF and correct for image "ghost"	<u>1500</u>
Level 1b subtotal	3000

Recommended Interim assessment (rounded) 5000 MFLOPS*

NOTE : At the last IWG meeting the Atmosphere Panel expressed a desire for MODIS to provide some atmospheric profile information. At present there is no MODIS plan to produce profiles and no investigator has volunteered. There is no allocation for processing profiles in this estimate. Producing atmospheric profiles can be very computationally intensive and may add significantly to the MODIS processing requirements.

*NOTE: The actual UARS processing requirement grew by a factor of 20 - 25 from their estimate at this point in the UARS development. We may be smarter than they were (although that is arguable) and we have tried to make some allowance for growth but it would be foolish not to assume that there will be growth in the MODIS requirements.

These estimates are for actual processing done operationally for MODIS. They are based on taking 24 hours of processing to complete 24 hours of data and contain no allowance for any operational constraints or scheduler inefficiencies. They do not include allowance for many factors which the EOSDIS System will want to consider such as:

- any margin other than described above
- any reprocessing
- normal operational redo (failure recovery, not reprocessing)
- code development, test and integration
- machine/operating system maintenance
- scheduler/operating system overhead
- delayed arrival of necessary ancillary data

cc: MAST/Locke Stuart
MCST/John Barker
MODIS Instrument/Richard Weber
SDST/ Ed Masuoka

March 24-26 MODIS Science Team Meeting

ACTION ITEMS

1. *Stuart*: Obtain a clear definition of SCI versus SCF funds from Carol Arkwright and EOS Project and forward to the MODIS Team as soon as possible. [Status: ??]
2. *Guenther*: Compile a list of already ongoing test site efforts and report to the Team {when?} on what georeferenced databases are available. [Status: ??]
3. *SBRC*: Report on calibration testing over hot targets at the next MODIS Science Team Meeting. [Status: ??]
4. *Herring*: Revise the MODIS Data Products flow diagrams for each discipline group and forward them to Salomonson prior to the IWG. [Status: Done]
5. *MODIS Discipline Group Leaders*: Produce a MODIS At-Launch Data Products List that details each product name, investigator, and accuracy prior to the IWG. [Status: Done]
6. *MODIS Science Team Members*: Tie your data products to instrument specifications {due date?}. [Status: Open]
7. *MODIS Science Team Members*: Generate an ATBD that describes the physics, mathematics, and computer program considerations behind your algorithms by July 30, 1993. [Status: Open]
8. *MODIS Science Team Members*: Forward your calibration requirements to MCST {due date?}. [Status: Open]
9. *MODIS Discipline Group Leaders*: Identify someone as soon as possible with whom MCST can work in order to relate the instrument to group products. [Status: Open]
10. *MODIS Science Team Members*: Let SDST know as soon as possible whom you plan to have validate your output products. [Status: Open]
11. *MODIS Science Team Members*: Report on the following to SDST as soon as possible:
 - What do you really plan to put out for a product (Do you have anything SDST can use to scale its processing requirements estimate?);
 - Review SDST's *Level 1A System Requirements Document* and forward comments/input back to SDST;
 - Indicate what sort of simulated data you want and when you want it;
 - Indicate who SDST should contact with questions/concerns regarding Team members' software development? (Also, indicate whether you want SDST to conduct a seminar to assist you in software development.) [Status: Open]
12. *MODIS Science Team Members*: Deliver your code to SDST by Jan. 1, 1994. [Status: Open]
13. *Herring*: Obtain information on how to access the EOSDIS electronic bulletin board and forward to the Science Team as soon as possible. [Status: Open]
14. *Calibration Discipline Group*: Review the preflight solar-based calibration of SeaWiFS and the implications for MODIS; [Status: Open]
15. *Calibration Discipline Group*: Review MCST's plans for MODIS calibration; [Status: Open]
16. *Calibration Discipline Group*: Offer some preliminary suggestions for combining multiple data sets; [Status: Open] and

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17. *Calibration Discipline Group*: Analyze the stability of the SRCA for a duty cycle of greater than 20 percent to ensure that it is operationally capable. [Status: Open]
18. *Kaufman and Menzel*: Discuss possible channel configurations for using MAS to conduct the SCAR experiments and report any decisions to Ken Brown. [Status: Done]
19. *MCST*: Carry forward to the Project the recommendation that SBRC perform thermal analysis of the operation of the SRCA for duty cycles greater than 20 percent. It is desired by MCST that an extensive checkout of the SRCA be performed following launch to ensure its operability and stability. [Status: Open]
20. *MCST*: Carry forward to the Project the recommendation that SBRC examine the possibility of using the solar diffuser on every orbit. Use of the solar diffuser every orbit for a period of time following launch will ensure a rapid and complete transfer of the calibration of the SRCA to the solar diffuser and will minimize the chances of component failure affecting the calibration transfer. [Status: Open]
21. *MCST*: Carry forward to the Project the request that a contamination monitor be flown. Information from the contamination monitor will be extremely valuable in determining the operating times at which contamination will be minimized. [Status: Open]
22. *MODIS Discipline Groups*: Provide to MCST the specific radiometric, spectral, and geometric requirements placed on MODIS performance by your data products.
23. *Barker & Slater*: provide Guenther information on (1) how the calibration methodology will be used in generating the MODIS Level 1 algorithm, (2) the MODIS Calibration Plan, and (3) the MODIS peer calibration review process. [Status: Open]
24. *MODLAND*: Coordinate through the AM Platform Scientist to hold an albedo product meeting with other instrument scientists (e.g., CERES and MISR). [Status: Open]
25. *MCST*: Townsend recommended giving a complete end-to-end system analysis to maximize the efficiency of expenditures improving geometric and calibration accuracy. [Status: Open]
26. *Running*: Send a representative to the BOREAS meeting. [Status: Open]

Tentative selection of MAS Bands for BOREAS

Center (um)	Width (um)	Radiometry (bits)	Feature
0.547	0.043	8	green peak
0.664	0.055	8	chlorophyll
0.745	0.040	8	NIR plateau
0.786	0.040	8	NIR plateau
0.834	0.042	8	NIR plateau
0.875	0.041	8	aerosols
0.945	0.043	8	water vapor
1.623	0.057	8	pollutants
2.142	0.047	8	mid-IR water
4.050	0.150	8	
11.002	0.448	8	surf temp
12.032	0.447	8	surf temp

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