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GLI Workshop Minutes

November 7 – 10, 2000
Ishikawa Koseinenkin-Kaikan
Kanazawa-city, Ishikawa-prefecture, Japan

Prepared by: TNK Space Corporation & Prime International

Change History

Date	Revision	Changes incorporated
19 November 2000	Original	
21 November 2000	Revision A	Incorporated inputs from Dr. Nakajima, and Mr. Ishido,
2 December 2000	Revision B	Incorporated inputs from Dr. Frouin, Dr. Inoue, and Dr. Aoki.
8 December 2000	Revision C	Incorporated inputs from Mr. Itoh.

Minutes: ADEOS-II GLI Workshop 2000

Prepared by TNK Space Corporation

Session: ADEOS-II GLI Workshop 2000
Room: Kanazawa Koseinenkin- Kaikan
Period: November 7th – November 10th, 2000

Action Items:

Action item #1(Session 8): Add another simulation case, regarding GLI 250-m data coverage, which includes one or two receiving stations in South America.
Action item #2(Session 9): NASDA EOPD will investigate data policy for "registered users" other than PIs. Standing order should not be restricted to PIs. NASDA EOPD will investigate the impact. (Due date: March 2001)
Action item #3(Session 9): NASDA EOC will investigate if NASDA EOC plans to add other media such as DVD. (Due date: March 2001)
Action item #4 (Session 21-3): NASDA will investigate if NASDA can generate MUD from L1A not L1B.(Due date: March 2001)
Action item #5(Session 21-3): NASDA will provide the following items via ftp from its web site: (1) MODIS conversion software, (2) data access tool, (3) user's manual for (1) and (2), and (4) L1B file format description.(Due date: March 2001)
Action item # 6(Session 23-1): Group leaders will send requests for procuring equipment, which will be required for validation, to Dr. Takamura by email.(Due date: December 2000)
Action item #7 (Session 24-2): NASDA will provide general information on EORC web site such as development timeline. (Due date: March 2001)
Action item #8 (Session 24-2): NASDA will build the web site that will serve for PIs to archive validation data. The web site allows PIs to store and retrieve validation data.
Action item #9 (Session 24-2): NASDA will check GSD clear sky radiance.
Action item #10 (Session 24-2 Ocean): NASDA and Cal WG should study PFT results and possibly with additional test resutls for correcting satellite data and predicting magnitude of errors. The results should be reported to the GLI team.
Action item #11(Session 24-2 Land): The Ocean and Land groups will discuss a possibility of extending its algorithm for use over land at day and night.
Action item #12(Session 24-2 Land): Dr. Prata will send a change proposal to NASDA regarding a change of SST scheme for use over the land.
Action item #13(Session 24-2 Land): NASDA and PIs will investigate a feasibility of action item 13 that is shown above.
Action item #14 (Session 24-2): All participants of the GLI workshop will review and comment on the draft minutes.

Recommendations:

(1) PIs and NASDA will investigate a mechanism that should be used for PIs to communicate with NASDA on research algorithms.
(2) (Atmosphere) POLDER data acquisition capability should be added to the GLI Data

Analysis system.

(3) (Atmosphere) NASDA should support scientists in conducting the field campaigns.

(4) (Atmosphere) MUD should be generated not only with standard products, but research products.

(5) An individual or team in NASDA should be identified for in-situ data providers to communicate and exchange data and information. NASDA's contacts are Mr. Mukaida (NASDA) and Dr. Ishizaka (the University of Nagasaki).

(6) NASDA should provide PIs with tools to analyze GLI data.

Agreement:

Dr. Huete agreed to use channels 5, 9, 13, 19, and re-sampled 28 and 29 as alternatives of channels 20, 21, 22, 23, 28, and 29.

Original 250-m and alternate channels

Resolution	Channels					
250 m	20 (Blue)	21 (Green)	22 (Red)	23 (NIR)	28 (MIR)	29 (MIR)
1 km	5 (Blue)	9 (Green)	13 (Red)	19 (NIR)		

Agenda:

Day 1 (November 7, 2000)

1. Opening address (NASDA Dr. Toshihiro Ogawa)

General Status

2. ADEOS-II Program Status (NASDA Mr. Osamu Nishimura)

3. Science Team Activities (CCSR Dr. Teruyuki Nakajima)

4. Science Project Status (NASDA Mr. Yasuyuki Ito)

5. GLI Sensor Development (NASDA Mr. Yoshio Tange)

6. Report on the Status of Saturation (NASDA Mr. Yasuyuki Ito, CCSR Dr. Teruyuki Nakajima)

7. GLI Observation Plan Analysis Report and Ground Data System Developing Status (NASDA Mr. Arata Ikejo)

8. ADEOS-II Mission Operation (GLI-250 m Data Acquisition)(NASDA Ms. Satoko Miura)

9. EOC User Services (NASDA Ms. Tomomi Nio)

10. GLI Standard Higher Algorithm Implementation Status (Fujitsu Limited Mr. Junichi Inoue)

ADEOS-II Science Activity

11. Outline of the latest version of GSS, and applications (SED Dr. Hiroko Sugai)

12. A New Advanced Discrete Model (NADIM) of radiation transfer to simulate GLI measurements (JRC/ SAI Dr. Michael Verstraete)

13. GLI F/O UNDER GCOM (CEReS Dr. Yoshiaki Honda)

Day 2 (November 8, 2000)

14. Common Algorithm Performance/ Evaluation Report (Chairman Mr. Masahiko Kurihara))
14-1 How about status of ATSK1 and ATSK2 algorithms with applications to MODIS data (Dr. Steve Ackerman)
14-2 OATSKD- Data Processing for Level 2A_OA (Dr. Masaru Tairadate)

15. Atmosphere Algorithm Performance/ Evaluation Report (Chairman Dr. Takashi Nakajima)
15-1 ATSK5 (Dr. Teruyuki Nakajima)
15-2 ATSK3_r, ATSK3_p, ATSK3_e (Dr. Takashi Nakajima)
15-3 ATSK16 (Dr. Tamio Takamura)

16. Ocean Algorithm Performance/ Evaluation Report (Chairman Dr. Hiroshi Murakami))
16-1 SST (Dr. Hiroshi Kawamura)
16-2 Atmospheric correction algorithm (Dr. Hajime Fukushima)
16-3 Atmospheric correction algorithm (Neural Network) (Dr. Robert Frouin)
16-4 In-water algorithm (Dr. Brian G. Mitchell)
16-5 In-water algorithm (Neural Network) (Dr. Motiaki Kishino)

17. Land Algorithm Performance/ Evaluation Report (Chairman Dr. Yasushi Mitomi)
17-1 Precise geometric Correction, Question & Answer (Dr. Toshiaki Hashimoto)
17-2 Mosaic, Atmospheric Correction, and Vegetation Index, Question & Answer (Dr. Alfred Huete)

18. Cryosphere Algorithm Performance/ Evaluation Report (Chairman Dr. Masahiro Hori)
18-1 Retrieval of Snow Grain Size and Impurity Using GLI Measurements: Improved Accuracy (Dr. Knut Stamnes)
18-2 Improvement of cryosphere standard products and performance test of cryosphere standard products with MODIS data (Dr. Teruo Aoki)

19. Data Management Working Group Meeting (Chairman Dr. Yoshiaki Honda)

Day 3 (November 9, 2000)
Calibration/ Validation
20. Calibration Session (Chairman Dr. Masahiro Kurihara)
20-1 Pre-flight Calibration and Characterization (Dr. Yasuhiro Senga)
20-2 On-board Calibration (MDS & GLI) (Dr. Nieke Jens)
20-3 Post-launch Calibration Strategy (Dr. Ichiro Asanuma)

21. Validation Session (Chairman Mr. Masahiro Kurihara)
21-1 Overview of Validation Plan (Dr. Tamio Takamura)
21-2 GLI Validation Plans (Dr. Hiroki Kai)
21-3 Match-up data set making Software Generation Program (Dr. Akira Mukaida)
21-4 Overview of Validation Plan on the Science Groups
- *Atmosphere Group (Dr. Teruyuki Nakajima)*
- *Ocean Group (Dr. Joji Ishizaka)*
- *Land Group (Dr. Toshiaki Hashimoto)*
- *Cryosphere Group (Dr. Teruo Aoki)*

21-5 Discussion

22. Algorithm/ Validation Parallel Sessions in each room
22-1 Ocean Group Session (Room HOUO) (Chairman Dr. Joji Ishizaka)

22-2 Land Group Session (Chairman Drs. Toshiaki Hashimoto and Yoshiaki Honda)

22-3 Atmosphere Group Session (Chairman Drs. Teruyuki Nakajima and Tamio Takamura)

22-4 Cryosphere Group Session (Chairman Dr. Teruo Aoki)

Day 4 (November 10, 2000)
23. Summary of Parallel Sessions (Chairman Mr. Yasuyuki Ito)
Algorithm and Validation report from each science group session

24. Conclusions (Results, Action Items) (Mr. Masahiro Kurihara, Dr. Teruyuki Nakajima)

25. Closing Address (Mr. Yasuyuki Ito)

Summary of Major Discussions

Day 1 (November 7, 2000)

1. Opening address (NASDA Dr. Toshihiro Ogawa)

- Dr. Ogawa welcomed delegates to the workshop and to Kanazawa.
- ADEOS-II will be launched on an H-IIA launch vehicle, which is an improved H-II.
- ADEOS-II launch will be delayed by three months to February of 2002.

Questions/ Discussions:

None.

General Status

2. ADEOS-II Program Status (NASDA Mr. Osamu Nishimura)

Mr. Nishimura:

- discussed context of ADEOS-II satellite in EOS program,
- outlined timetable for testing, launch, post-launch testing and data delivery,
- presented two scenarios of ADEOS-II launch delays, which are currently under consideration: Case 1 will see launch of ADEOS-II in February 2002, and Case 2 will see launch in November 2002. NASDA will decide ADEOS-II launch date in November,

Comments/Questions/Discussion:

Nakajima: Why couldn't NASDA find the problem with the FTP before the failure investigation committee found? Presumably the problem was detected much earlier. PIs have not been notified until the committee revealed the problem.

Sobue: The problem was known earlier, but it was believed that the margin of safety was sufficient. After much discussion it turned out that the SAC (Space Activity Committee) could not be convinced by NASDA's explanation that the safety margin was adequate. Therefore the FTP would need to be modified.

3. Science Team Activities (CCSR Dr. Teruyuki Nakajima)

Dr. Nakajima:

- gave an updated status of GLI project,
- discussed GLI products,
- warned of 30% budget cut for GLI science projects, discussed options for addressing the reduced funding including reduction in PI funding and reduction in duplication,
- discussed GLI validation and calibration in context of reduced budget and the level of processing necessary/desirable,
- pointed out problems with receiving 250 m data, suggested following MODIS model for receiving, processing and distributing data.

Comments/Questions/Discussion:

None.

4. Science Project Status (NASDA Mr. Yasuyuki Ito)

Mr. Ito presented the science project status on organization, instruments, cal/val activities.

Comments/Questions/Discussion:
Nakajima: Prof. Honda has already summarized issues on the GLI 250-m data reception. Did NASDA do anything?
Ito: The issue was explained in Kyoto last December at the workshop. The simulation is under way, however, parameters for the simulation need to be defined. As the launch manifest changes, parameters keep changing. If launch manifest changes again, then parameters change again. We are ready to perform detailed simulation using simulation software which was just developed.. This issue will be further discussed tomorrow.

Nakajima: What is NASDA policy on developing ground receiving stations. Is NASDA encouraging private enterprise or keeping it in house?
Ishido: I'm the ground segment manager. ADEOS-II ground stations are capable of receiving global data including GLI 1km, AMSR, and SeaWinds. Another capability is to process GLI 250-m data. Priority is placed on global data. We have two categories in data acquisitions. NASDA can use 4 ground stations; Kiruna, 2 NASA stations (Alaska and Wallops), and NASDA EOC. These ground stations can process global data including GLI 1-km data. As GLI 250-m is not global, it is not required that ground stations receive and processe 250-m data. But we will try to acquire 250-m data in response to science requirements. It is important to define priorities to acquire data, which should be included in the data policy that will be released one year after launch. Four X-band stations are now ready for use. We need to discuss availability of data relay satellites such as ESA Artemis and NASDA DRTS as well as ground stations.
Nakajima: You didn't answer my question. The amount of data generated at 250-m exceeds the capacity of NASDA to analyze all data. How about using MODIS style small receivers and letting private enterprise develop receivers that would allow more PIs access to the data?
Ito: This is a matter of program definition and scope. I assume you are talking about MODIS direct broadcasting capability. MODIS DBS and GLI 250-m are designed based on different concepts, and this is not really an option at this stage.
Nakajima: NASDA should obtain sufficient funds.
Shimoda: The data rate of GLI downlink is 60 Mbps, while that of MODIS is 20Mbps. Larger antenna is required to receive data at the higher bit rate. We need a larger antenna for receiving GLI 250-m than MODIS data.

5. GLI Sensor Development (NASDA Mr. Yoshio Tange)
Mr. Tange:
- gave an overview of the GLI sensor status. The GLI sensor is currently under test (PFT: Proto- Flight Test),
- detailed the plan of GLI performance and mission data evaluation test.

Comments/Questions/Discussion:
None.

6. Report on the Status of Saturation (NASDA Mr. Yasuyuki Ito, CCSR Dr. Teruyuki Nakajima)

Mr. Ito presented the GLI saturation issue. A summary follows:

- During PFT, non-linearity was found for some channels. This issue was reported last year at the workshop.
- Due to this problem ocean products cannot be properly produced.
- The problem stems from an inappropriate specification on the maximum allowable input radiance to some channels.
- The launch delay enabled various options, both hardware and software modifications, to be evaluated.
- Options included putting in an iris stop to decrease light reaching the detectors and using alternative channels to obtain similar information. Putting in an iris stop appeared not to be effective. Simulations using alternative channels appeared to be successful. The use of alternate channels was recommended by GLI PI leaders and accepted by the fisheries agencies.
- In June 2000 meeting GLI PI-leaders recommended software modification and use of alternative channels. Hardware modification was ruled out.
- Dr. Nakajima provided a report (hard copy) on this problem.

Comments/Questions/Discussion:

Mitchell: Is the English version of report available?
Ito: Yes, we will provide hard copy, too.

Mitchell: Tables with different channels etc. don't include all channels potentially useful for ocean, need data on 460, 545 nm channels particularly, but need signal to noise ratio; expand the table to include signal to noise ratio and other ocean channels.
Nakajima: Cryosphere will have maybe some small saturation problems. The other channels look good.
Mitchell: Why are the ocean retrievals only on CZCS levels? The in-water algorithm being used should do better than this.
Fukushima: The signal to noise levels on the land bands are not as good.

Barton: Will NASDA supply hard copies of the viewgraphs shown in the presentation that were not included in the handout?
Ito: Yes, we will.

7. GLI Observation Plan Analysis Report and Ground Data System Developing Status (NASDA Mr. Arata Ikejo)

Mr. Ikejo presented the system overview, specification and architecture of GLI low-level and higher-level processing subsystems, and development schedule.

Comments/Questions/Discussion:

Ito: Prof. Nakajima mentioned that EOC has a very limited data processing capability. What data processing capability will you have in place one year after launch?
Ikejo: Currently only 2 processors have been procured for the higher level processing.

These 2 processors can process only 16% of one-day data. We plan to add another processor after launch.
Initially calibrated higher level algorithm is required to precisely estimate the required processing capacity.

Nakajima: How about the processing capacity of level 1 data?
Ikejo: We have 200% of processing ability for level 1 data; 100% for processing real-time data on the same day and another 100% for reprocessing.

Feldman: We learned from SeaWiFS that you will need multiple (i.e., multiple days data processed in one day) reprocessing. I don't see that you have planned to do multiple reprocessing, particularly level 2 and higher reprocessing. Will the system be sized to allow for reprocessing? What is the throughput to process higher level products?
Ikejo: We will have a capability to process one-day worth observation data and reprocessing. This is a minimum performance of the procurement plan. We have an optional idea that enables multiple processing in the plan.

8. ADEOS-II Mission Operation (GLI-250 m Data Acquisition)(NASDA Ms. Satoko Miura)
Ms. Miura presented a result of simulations on GLI-250 m data acquisition. Three scenarios were discussed; case 1 using DRTS-W, ARTEMIS, and four ground stations, case 2 using DRTS-W and four ground stations, and case 3 using four ground stations.

Comments/Questions/Discussion:
Barton: Has NASDA considered having more than 4 ground stations in Northern Hemisphere? Will NASDA explore the opportunity of transmitting 250-m data to more than 4 ground stations? If DRTS is not available, there will be no coverage in Southern Hemisphere.
Ishido: Data transmission is restricted by ground station coverage and on-board resource restrictions such as electric power and data transmission. Thermal constraint is also a factor. As the number of ground stations is not the primary factor to limit 250-m data coverage, adding ground station does not completely solve the issue. We have to use 10 – 15 minutes to acquire global data and the remaining time for receiving GLI 250-m.

Barton: Is electric power the primary on-board restriction?
Ishido: Power and thermal constraints.
Ito: We recently issued a users' survey on 250-m data for the first time asked world wide and second for Japanese PIs. We will request new simulation based on the results of new survey.

Simpson: What is estimated absolute co-registration between GLI 1-km and 250-m data (co-navigated to same gird)? Night time and ocean data of GLI have scientific meaning. One of your assumptions eliminates night time and ocean 250-m data. There is considerable scientific interest in these applications.
Miura: To answer the second question, I want to do new simulation after I get input from

PIs
Ito: If my memory is correct, co-registration is ¼ pixel for 1-km, and 1 pixel for 250-m.
Nakajima: Our PIs are requesting NASDA to take data in nighttime, however, NASDA responded that they couldn't do so because of hardware constraints. NASDA should conduct more tests to better determine limits.

Shimoda: Why can't we obtain any images of South America even though relay satellites exist.
Miura: Absence of ground station is not the only factor. Hardware limitations, direction with respect to DRTS-W should also be considered.
Shimoda: In any case South America will be missed. NASA has receiving stations in South America that would allow coverage. I recommend adding another simulation case, which include one or two receiving stations in South America.

Chairman: We will take Dr. Shimoda's comment as a recommendation that we add one or two station(s) in South America to simulations and see how this affects results.
(In the plenary session on the last day, this item was recorded as action item.)
Action item #1: Add another simulation case, regarding GLI 250-m data coverage, which includes one or two receiving stations in South America.

Nakajima: Two 250-m channels, 1.6 μm and 2.2 μm, will be re-sampled to 2.0km resolution. Will these data be globally received by ground station?
Ishido: Yes, they will. One orbit worth of 1-km data will be stored in the on-board Mission Data Recorder (MDR) and downlinked to four ground stations. This is a baselined operation. 2-km re-sampled data that will be created using GLI 250-m data will, be downlinked with 1-km data. Therefore both 1-km and 2-km data will be globally received.
In the baselined operation, 250-m resolution data will be direct-downlinked using a separate channel from 1-km data. Many limitations exist to receive 250-m resolution data on a global scale.

9. EOC User Services (NASDA Ms. Tomomi Nio)
Ms. Nio presented EOC user services including capabilities of EOIS (NASDA Earth Observation data and Information System)/ DDMS (Data Distribution and Management System), the development status, features of EUS/GUI, and a suite of data products.

Comments/Questions/Discussion:
Barton: With MODIS data many investigators are finding data volumes are very large and would be happy with smaller data size. Will NASDA consider providing standing order on sub-scenes with smaller area such as 100 x 100 km or 200 x 200 km?
Nio: No, we don't plan to support subsetting services. Our priority is to distribute a large amount of data as quickly as possible. EOC used to offer scene-editing services for ADEOS products. As a result, product distribution slowed down and the ordering process became complicated. EOC learned from this lesson and decided not to offer scene-editing services in the ADEOS-II mission.

Nakajima: A service of standing order is available only to PIs. How about registered

users? Registered users should be also allowed.
Nio: DRS is open to anyone including general public and PIs. Before using DRS, users are required registration. The registration is an easy process. However, EUS/GUI is open only to registered PIs, not to general public. The service of standing order is not available to general public, either.

Ito: Who is "registered user"? I don't want to exclude non-PIs.
Nakajima: NASDA should consider another user category such as power users; i.e., non-PIs.
Sobue: It is a matter of resource availability.
Nio: The bottleneck is the distribution capacity of Media Conversion Subsystem (MCS). EOC sized the MCS capacity based on the number of PIs.
Action item #2: NASDA EOPD will investigate data policy for "registered users" other than PIs. Standing order should not be restricted to PIs. NASDA EOPD will investigate the impact. (Due date: March 2001)

Marchand: Data for only 6 months will be available over DRS, does this mean that more than 6 months will be available over EUS?
Nio: Data are staged in DRS for the first 6 months and removed thereafter because of a storage disk limitation. For data older than 6 months, you can order via EUS. EOC retrieves the ordered data from the Data Storage System (DSS) and stages the data on DRS so that you can download the data by ftp from DRS.

Shimoda: Do you plan to provide other kinds of media such as DVD?
Nio: No, we don't. Regarding DVD, there are many different formats in the market such as DVD-R, DVD-R/W, and DVD+RW. DVD drives are not compatible between different formats. Not many users have a DVD drive. For all these reasons, NASDA decided to wait until DVD technology and its market become matured.
Action item #3: NASDA EOC will investigate if NASDA EOC plans to add other media such as DVD. (Closed)

10. GLI Standard Higher Algorithm Implementation Status (Fujitsu Limited Mr. Junichi Inoue)
Mr. Inoue presented GAIT (GLI Algorithm Integration Team) organization/ schedule, progress in this year, and ongoing tests.

Comments/Questions/Discussion:
Simpson: Hardware configuration shows only 512 Mbytes per machine. Processor speed seems very low. RAM is cheap. Adding more RAM would allow software to be RAM resident, which avoids swapping and reduces dead time. The performance, as shown on page 26, would be improved using additional RAM.
Inoue: Thank you for the suggestion.

ADEOS-II Science Activity

11. Outline of the latest version of GSS, and applications (SED Dr. Hiroko Sugai)
Ms. Sugai presented GSS (GLI Signal Simulator) including architecture, algorithms, and inputs and outputs to the simulator.

Comments/Questions/Discussion:
None.

12. A New Advanced Discrete Model (NADIM) of radiation transfer to simulate GLI measurements (JRC/ SAI Dr. Michael Verstraete)
Dr. Verstraete presented concept, inputs, and outputs of the NADIM model. He presented evidence of the performance of this model for analyzing remote sensing data, and showed that it was one of the best tools in the RAMI intercomparison exercise.

Comments/Questions/Discussion:
Stamnes: Will the model work over any type of canopy?
Verstraete: The model should work for all homogenous canopies, but not on heterogeneous canopies. However, heterogeneity depends upon resolution, at 250-m things might be more heterogeneous than at 1-km. Simple forms of heterogeneity can be taken into account by linearization.

Kuji: How is stem incorporated into model?
Verstraete: If you want to simulate a forest that has burned or in winter, need to use either “effective leaf”, or other model

Lynch: (1) How extensive is the Lopex data base? (2) Is it an active/growing database?
Verstraete: (1) It has several hundred types of leaves in it. The leaves are at various stages- green, brown, and yellow. (2) Presently the database is not growing, but it could be added to. Please contact me for further information on data access.

Sumi: How accurately does model agree with real world data?
Verstraete: I have shown the model to be very good, based on comparison with field sensing data such as soy bean field data taken by Dr. Jon Ranson. Also, it was one of the best models in the RAMI model intercomparison campaign.

Simpson: A soy field is a fairly dense type of vegetation. What would happen over heterogeneous surface?
Verstraete: The key question is whether the heterogeneity is radiatively relevant at the scale and resolution of the observation. All land surfaces are heterogeneous, but at the resolution of 1km2, many surfaces will appear homogeneous. We are currently working on detecting and handling heterogeneity over land surfaces.

13. GLI F/O UNDER GCOM (CEReS Dr. Yoshiaki Honda)
Dr. Honda presented the plan of GLI follow-on mission, which will be flown on-board GCOM satellite.

Comments/Questions/Discussion:
Nakajima: You deleted two more channels at the last moment: why? What about water vapor channel, not a lot of usage, but it should be very useful. I want to have a comment from Dr. Ackerman on the water vapor channel.
Honda: No one argued in favor of keeping these channels, we could put them back if someone has a good reason.
Nakajima: It is easier to leave it in and then take it out later.
Frouin: We need directional data to make the most of the polarization data. GLI doesn't provide angular information.
Honda: That's the case with GLI. But SGLI will provide angular information.

Nakajima: We need a detailed simulation, but we expect to get information about land aerosols, if needed we can do it. We have 1-km resolution, POLDER is 8 km if we have the polarization data as well then this would give us new information
Verstraete: The whole point of the polarization is that things are much better with multi-directional data. You mentioned that you have two cameras pointing backwards and forwards, do they saturate over land?
Honda: Yes, they will get saturated.
Nakajima: I am in favor of having the directional capability. NASDA says that adding directional capability will produce too much new data and that the 25-degree tilt is not sufficient to give the directional capability.
Verstraete: Why will the data volume increase by adding pointing capability?
Nakajima: There are channels that can be used for repointing, however, the repointing angle is not enough.

Day 2 (November 8, 2000)

14. Common Algorithm Performance/Evaluation Report (Chairman Mr. Masahiko Kurihara))
14-1 How about status of ATSK1 and ATSK2 algorithms with applications to MODIS data (Dr. Steve Ackerman)
Dr. Ackerman presented cloud mask, methods, and current status of ATSK1 and ATSK2 including the following topics.

- The various algorithms used to determine the presence and type of clouds in GLI data.
- GLI cloud map file is 16 bits in length.
- Sub-sample 1.6 μm channel.
- The validation of these methods using trial data from MAS (MODIS Airborne simulation), LIDAR and other sources
- Overall ability to tag clouds appeared good, but there are still some problems with bias on one side of the scan path and calibration of the daytime clear sky brightness temperature.
- On-going activities including access to and use of MODIS data in validating GLI
- Commented on uses of 7.3 and 7.5 μm channels, indicated that there is information in these channels, but suggested that correlation between these two channels is very strong.

- Wisconsin can receive GLI direct broadcast data if available.

Comments/Questions/Discussion:
Simpson: (1) RMS noise in channel appears to be affecting the cloud mask in cold regions e.g., your Antarctic example. (2) Phase issue should be improved using near infrared channels but there are noise issues.
Ackerman: (1) Good point. Strips etc. do appear in the mask, especially in cold regions due to calibration. (2) Agree. Near infrared would help ice v.s. water cloud separation. But the noise in these channels may be an issue.

Nakajima: (1) Is it useful to use the difference between 3.7micron and 11 micron channels for cloud detection over snow/ice surface? (2) The same question but for use of 1.3 microns.
Ackerman: (1) It cannot be used well for thick cloud during winter. (2) It is not as useful for Antarctica in summer, which is of high elevation without much water vapor.

Lynch: Apart from the sun-glint tests, do you include the geometry of the measurement to set the cloud test thresholds?
Ackerman: No. But we have coded the geometry into the tests. We have not used this yet.

Lynch: While you didn't specifically speak on cloud phase, could you comment on whether you believe you have sufficient information to classify phase given that the spectral bands do not sample phase information as well as they might.
Ackerman: Yes, there are some differences but we have done some work on this and I will show an example. We can do a reasonable job of separating high ice cloud from low water cloud and can pick up contrails as well.

Igarashi: How will you evaluate the throughput of the standard data product processing during the pre-operational phase? Could you define the strategy and the plan of evaluation and tune-up of the software? In most of the presentations and documents on algorithm and software, there were no indications on this issue. However, there are explanation of results of retrieval performance. (These are questions documented in the questionnaire sheet, and were not discussed at the meeting.)

14-2 OATSKD- Data Processing for Level 2A_OA (Dr. Masaru Tairadate)
Dr. Tairadate presented OATSKD definition, Level-2A_OA product, OATSKD revision, sample images of Level-2A_OA, and performance.

Comments/Questions/Discussion:
None.

15. Atmosphere Algorithm Performance/ Evaluation Report (Chairman Dr. Teruyuki Nakajima)
15-1 ATSK5 (Dr. Teruyuki Nakajima)

Dr. Nakajima presented ATSK5 including the following points.

- Use of AVHRR parameters are validated.
- Operational algorithms.
- Four-channel method is effective to retrieve key aerosol properties.

Comments/Questions/Discussion:

Prata: Can you say whether ice particles are absorbing or non-absorbing in the blue wavelengths? Can ice be confused in the retrieval?
Nakajima: At UV wavelengths ice may be a little absorbing. At 430 nm this may not be the case. We will check.

Ackerman: The geolocation data is recorded at reduced resolution in the Level 1B files produced by GLICNV code. Will NASDA provide an interpolation algorithm to geolocate all 1-km Level 1B data?
Inoue: EORC will provide "EOC Toolkit" to PIs without any user's manual. "EOC Toolkit" supports an interpolation of geolocation and scan geometry.

Ackerman: (1) Do the output files produced by GLICNV program represent the output files that will be produced operationally? (2) Can we have documentation on the units, scale factors, and offsets for radiance data in the Level 1B files produced by GLICNV?
Inoue: There are some differences between reformatted GLI L1B and operational L1B. Calibration, telemetry, and other satellite status data are not included in reformatted L1B. However, image, geo-location, scan-geometry, and observation time data are the same. EORC will soon release "Level-1B File Specification" document.

Ackerman: For the dust cases you stated that you may have to change the index of refraction. Do you assume the dust is spheres?
Nakajima: Yes, Mie theory is used. Improvements are expected when going from the two channels to four-channel algorithm.

Verstraete: The algorithm and results shown so far apply to ocean. Are there plans to retrieve aerosol properties over land?
Nakajima: Oceanic algorithms can be extended and applied to dark surface over land (deep vegetation) so that can be done.

15-2 ATSK3_r, ATSK3_p, ATSK3_e (Dr. Takashi Nakajima)

- Dr. Nakajima presented ATSK3_r and ATSK3_p including overview, input/output files, program architecture, development status, and future plans.
- Dr. Nakajima presented ATSK3_e including retrieval flow chart and performance.

Comments/Questions/Discussion:

Ackerman: Have you compared your retrieval to MODIS retrieval?
Nakajima: Not yet.

15-3 ATSK16 (Dr. Tamio Takamura)

- Dr. Takamura presented the concept of ATSK16.
- Dr. Okada further explained ATSK16 including functions, flow chart, scene test using channels 35 and 36.

Comments/Questions/Discussion:

Nakajima: Do you archive the inhomogeneous index? Or just use it for classification from 10 categories?

Okada: Yes, we archive it.

Nakajima: The cloud-overlapping problem is most important in getting surface radiation. I want you to get overlapping information from statistic study and classify into stratus cloud and cirrus cloud, we want to know what is overlapping in two types, if you give us numbers independently we can't do it. How can we determine cloud overlapping in atmosphere?

Ito: I'd like to clarify question: is your question regarding specifications of the algorithm or regarding future research?

Nakajima: Prof. Takamura has an algorithm for getting surface radiation budget. His group has a method for getting overlapping degree for each cloud type. This should be classified as research algorithm development.

16. Ocean Algorithm Performance/ Evaluation Report (Chairman Dr. Hiroshi Murakami)

16-1 SST (Dr. Hiroshi Kawamura)

Dr. Kawamura presented GLI bulk SST including flow chart for cloud detection, comparison between MODIS and GLI, test results of GLI bulk SST using MODIS data, and accuracy of retrieval.

Comments/Questions/Discussion:

Nakajima: Are you using your own cloud-screening algorithm?

Kawamura: We have our own cloud-screening algorithm. We compare GLI screening and our cloud screening algorithm.

Nakajima: You have some differences in tropical region from our results. Is this due to use of 2.6-micron channel?

Kawamura: Just the atmospheric parameters are used, once we tune parameters should be better

16-2 Atmospheric correction algorithm (Dr. Hajime Fukushima)

Dr. Fukushima presented OTSK1 algorithm including key specifications, validation/ performance test, of OTSK1a code, and low saturation/ alternative band algorithm.

Comments/Questions/Discussion:

Frouin: Do you expect problems of discontinuity due to switching between algorithms?

Fukushima: Yes, we do. The only measure we are planning to address this is to set a flag in the data to indicate that the alternative bands were used.

Nakajima: What is the implementation plan for the alternative algorithm? I suggest that the alternative algorithm be run in parallel with the standard algorithm in order to eliminate the expected discontinuity in the products from alternative and standard algorithms.
Fukushima: We will discuss this issue further in the ocean group meeting.

Mitchell: GLI has unique 380-nm band. This could be used as a constraint of aerosol model because Lsat (380) will be dominated by Rayleigh and Rayleigh- aerosol. Have you considered exploiting 380 in this way?
Fukushima: I'm interested in using 380, but I don't think it is possible for launch code but we will consider this for a research algorithm.

16-3 Atmospheric correction algorithm (Neural Network) (Dr. Robert Frouin)
Dr. Frouin presented an atmospheric correction algorithm using neural network (multi-layered perceptrons) including input, output, architecture, training set, basic algorithm, alternative algorithm, comparison between simulation and actual data.

Comments/Questions/Discussion:
Simpson: How are you determining convergence when doing training? What criteria are you using?
Frouin: Training is done with the typical back-propagation scheme. I try to minimize the cost-function.

Isaka: The convergence and performance of MNN depend very much on the independence of input vector. Did you check the independency between your input vector components? Or did you do some preprocessing of you input vector?
Frouin: Pre-processing input data is an important step to realize efficient training of neural network. The principal component analysis is an elegant way to prepare mutually independent input-vector components. However, we did not perform such pre-processing of input vector at the present state of our study. We wanted to see presently whether such processing is needed or not for the training of neural network.
Isaka: Comment on the advantage of MNN: The important point of MNN application for remote sensing is it enables us to decouple the inverse model from the corresponding direct model. Accordingly, the MNN can be used to retrieve physical parameters, which are not initially in the direct model.

Stamnes: Could you describe the advantages of the neural network scheme compared to other optimization techniques?
Frouin: Once you have neural net trained, it goes very fast compared to other methods. So this is very good for satellite remote sensing. It is robust and less sensitive to noise and allows you to invert readily
Isaka: The advantage of neural net approach is that we can decouple direct and inverse model. Other optimization schemes don't do this

16-4 In-water algorithm (Dr. Brian G. Mitchell)
Dr. Mitchell does not think that he has adequate data on alternative band characteristics to determine if they will be satisfactory for in-water algorithm use.

Comments/Questions/Discussion:
None.

16-5 In-water algorithm (Neural Network) (Dr. Motiaki Kishino)
Dr. Kishino presented the in-water algorithm using neural network including NN-training flow, radiative transfer model, absorption coefficients, backscattering coefficients, and use of neural network.

Comments/Questions/Discussion:
Frouin: You used random noise in your training set, but actual noise (resulting from imperfect atmospheric correction) may be correlated spectrally. It would be more realistic to add spectrally correlated noise in the training set.
Kishino: I agree, but we don't know the spectral structure of the noise.
Frouin: You could assume that there is correlation between noise at different bands

Mitchell: you showed neural network trained with one data set could reproduce another data set generated by the same model, have you tried real data?
Kishino: It is very important. Some data were validated using our model, but not enough data.

17. Land Algorithm Performance/ Evaluation Report (Chairman Dr. Yasushi Mitomi)
17-1 Precise geometric Correction, Question & Answer (Dr. Toshiaki Hashimoto)
Dr. Hashimoto presented an approach for precise geometric correction.

Comments/Questions/Discussion:
Nakajima: Is this a research algorithm?
Hashimoto: Yes.

Igarashi: Yesterday, Prof. Shimoda pointed out that the necessity of a feasibility study on 250-m data reception in the South America. I hope that you will have scientific discussions on the rationale of 250-m data utilization as well as the technical possibility, because direct reception needs new ground stations or improvement of existing stations. From the carbon cycle viewpoint, the observation of tropical rain forests by 250-m resolution is important for reducing uncertainty.

17-2 Mosaicking, Atmospheric Correction, and Vegetation Index, Question & Answer (Dr. Alfred Huete)
Dr. Huete presented an approach for mosaicking, atmospheric correction, and vegetation

index.

Comments/Questions/Discussion:
Nakajima: I suggest that you collaborate with Dr. Verstraete and incorporate his physical BRDF model. This will be useful for constructing BRDF climatology and a remote sensing method.
Huete: We will consider.

Nakajima: It will be necessary to limit azimuthal angle or take a difference in two-channel radiance to reduce shadow effects on the snow surface.
Stamnes: I will study.

Mitomi: In future work, will it be possible to correct the water vapor absorption for channel 27?
Stamnes: It will be possible for other bands, but not channel 27.

Ito: You said that verification is not possible because of resource limitation or investment. What have you discussed with GAIT as to the future plan?
Huete: As we couldn't find anything better, we chose to run on MODIS data. To test a whole product, atmosphere part, still a lot more verification should be done against other models and against known sites.

Igarashi: In the EVI, are the coefficients L, C1, and C2 thought to be improved considering BRDF using observed data in various satellite zenith angles and solar zenith angles without priori given database of ground-based measured BRDF?

Mitomi: Is it possible to correct water vapor absorption for channel 27?
Huete: Was channel 27 something that cryosphere wanted to correct? What are we correcting for? It depends upon what channel 27 is intended for.

18. Cryosphere Algorithm Performance/ Evaluation Report (Chairman Dr. Masahiro Hori)
18-1 Retrieval of Snow Grain Size and Impurity Using GLI Measurements: Improved Accuracy (Dr. Knut Stamnes)
Dr. Stamnes presented the snow grain size and impurity retrieval algorithm including the following points.

- This algorithm is very simple and uses only two channels; channels 5 and 19.
- Comparison between old and new algorithms.
- Improvement in speed and accuracy
- Unsolved challenging issues in atmospheric correction.
- Two methods of computing aerosol properties.

Comments/Questions/Discussion:
Aoki: Is accuracy of new method improved over current method?
Stamnes: We have eliminated uncertainty of linear interpolation and get a better treatment of azimuthal problem

Nakajima: I think shadow is an important source of error. Do you limit azimuthal angles to eliminate shadows on snow surface?
Stamnes: We haven't tried to apply to real data yet. Using CDAS environment, we are doing all corrections in CDAS environment. We are simulating GLI such that we are correctly coupling snow surface to atmosphere.
Nakajima: My guess is that we have to use coupling and can use two channels to get around shadow

18-2 Performance test of cryosphere standard algorithms with MODIS data (Dr. Masahiko Hori)
Dr. Hori presented the performance test results of two standard algorithms. MODIS data were used for the tests.

Comments/Questions/Discussion:
Ackerman: The comparison image between the two cloud detection algorithms is very interesting. It would be useful to see when the two approaches agree and disagree. Be sure to use the latest MODIS calibration algorithm.
Hori: Yes, we will look at doing this investigation.

18-3 Improvement of cryosphere standard products and performance test of cryosphere standard products with MODIS data (Dr. Teruo Aoki)
Dr. Aoki presented an approach of improving cryosphere standard products.

Comments/Questions/Discussion:
None.

19. Data Management Working Group Meeting (Chairman Dr. Yoshiaki Honda)
19.1 MODIS reformat tool (Dr. Junichi Inoue)
Dr. Inoue presented the MODIS reformat tool including the following topics.

- As MODIS is similar to GLI, MODIS data can be used as test data for testing GLI.
- Schedule.
- Functions of the tool.
- Mapping between GLI and MODIS products.
- Parameter file.
- Dr. Ackerman's question was answered as to Level 1B file specification.

Comments/Questions/Discussion:
Contact Mr. Kurihara if you want the tool.

Fukushima: Will you provide the source code of the tool?
Inoue: Yes, we will.

19.2 Observation request & data service (Mr. Yasuyuki Ito)
Mr. Ito presented the ADEOS-II mission operation scenario, GLI data requesting process, science user service flow, and science user support desk.

Comments/Questions/Discussion:
Feldman: Could you explain how you tilt GLI?
Murakami: We will define land or ocean tilt change point at the center of the swath. Small seas are treated as land and small lands are treated as sea.
Honda: We will point to the nadir just 10 days in each season.

Verstraete: Are the atmospheric correction and cloud detection algorithms which were presented earlier in this workshop, valid when tilted?
Ackerman: The atmospheric correction might work better when tilted away from the sun-glint.
Simpson: It will depend on being optimized or not optimized for tilt.

Marchand: The geo-locating will be affected by tilting. Is the GLI software able to handle this? Also terrain altitude must be considered, when tilting.

Honda: SeaWiFS data might include tilted data. I would like to get some SeaWiFS data and study the issue using the data.
Nakajima: This issue should be discussed at the land group meeting.

Day 3 (November 9, 2000)

Calibration/ Validation
20. Calibration Session (Chairman Dr. Masahiro Kurihara)
20-1 Pre-flight Calibration and Characterization (Dr. Yasuhiro Senga)
Dr. Senga presented principle, configuration, and result of pre-flight calibration.

Comments/Questions/Discussion:
Nakajima: Can we reproduce the polarization dependence of the GLI system from the witness measurement of scan angle dependence of mirror and the polarization angle dependence of the GLI system?
Senga: We have each component test data, however, cannot have enough confidence on theoretical values of synthetic results.

Nieke: (1) You are using many sensors for your ground. Is a cross calibration with GLI calibration source planned? (2) Do you plan any high-altitude measurements for your Sun photometers?
Senga: (1) We are using individual calibration for all sensors; i.e., sky photometers, etc. No cross-calibration with GLI calibration source is planned. (2) No high-altitude calibration is planned for the Sun photometer.

20-2 On-board Calibration (MOS-IRS) (Dr. Jens Nieke)

Dr. Nieke presented on-board calibration of MOS-IRS and comparison between MOS-IRS and GLI.

Comments/Questions/Discussion:
Fukushima: What is the physical process that caused the increase in sensitivity of MOS-1B?
Nieke: We are not sure about this physical process.
Fukushima: Did you assume any degradation of the internal lamp?
Jens: We started this kind of calibration in mid 1980's and are comfortable about the lamp characteristics. Based on our experiences in the laboratory of turning on and off the lamp many times, we considered that the lamp output is stable.

20-3 Post-launch Calibration Strategy (Dr. Ichiro Asanuma)
Dr. Asanuma presented an approach for post-launch calibration using internal lamps and solar diffused lights.

Comments/Questions/Discussion:
Nakajima: Do you plan to generate higher level products using vicarious calibration data?
Asanuma: Yes, I do.

Ito: The current cal/val plan defines vicarious calibration as a validation activity, not calibration. Results of vicarious calibration will not be reflected in level 1 processing. Do you propose to change the definition recognizing the current arrangement?
Asanuma: I understand the arrangement and don't intend to change the definition.

Nakajima: Decision on AVIRIS flight is a significant issue. The timing of the decision will be affected by the budget cycle. When do you plan to make the decision?
Ito: Considering the launch date, AVIRIS flight would be in Japanese Fiscal Year 2002, which starts on April 1st, 2002. Therefore we have enough time before making the decision.

Nakajima: I want to see well-designed vicarious calibration activities.
Asanuma: I agree.

Ikejo: (Please fill in here.)
Asanuma: Thank you for the suggestion.

Fukushima: (1) Are you negative on calibration using other satellites? (2) From the viewpoint of vicarious calibration, isn't it important to compare some satellite (GLI) – derived parameters such as normalized water-leaving radiance with those of other satellites?
Asanuma: (1) In terms of calibration, comparing with other satellite is not reliable. (2) Yes.

Simpson: How will you handle thermal calibration?
Asanuma: I will use two temperature points; blackbody and deep space.

Simpson: (1) Could you comment on how the thermal calibration will be done? (2) Will you track and record to the telemetry data set the temperature of the thermal detectors. (3) I agree with the previous speaker that you are dismissing cross calibration with other satellites too easily. Our experience with the cross calibration of ATSR and GMS-5 has overcome several problems with GMP-5 VISSR's 11 and 12 channels. I will send you a reprint.
Asanuma: (1) On-board bolometer – 5 thermistors.
Tange:(2) Yes, we measure the temperature of the detectors and will transmit this data in the GLI telemetry data stream.
Asanuma: (3) Thank you.

Shimoda: Is it possible to rotate (pitch maneuver) the satellite for conducting lunar calibration?
Tanaka/Tange: We will investigate if it is possible.

21. Validation Session (Chairman Mr. Masahiro Kurihara)
21-1 Overview of Validation Plan (Dr. Tamio Takamura)
Dr. Takamura presented the overview of GLI validation plan for each discipline group and the status of AMSS.

Comments/Questions/Discussion:
None.

21-2 GLI Validation Plans (Dr. Hiroki Kai)
Dr. Kai presented the GLI validation plan including the process to establish the validation plan, preparatory activities, data acquisition plan, match-up data set, analysis and report, evaluation, use of validation results, and issues.

Comments/Questions/Discussion:
None.

21-3 Match-up data set making Software Generation Program (Dr. Akira Mukaida)
Dr. Mukaida presented the plan for GLI standard product validation including use of match-up data set, L1B MUD generation and processing, policy of data/ software distribution, and issues.

Comments/Questions/Discussion:
Feldman: Will you process all L1B after calibration?
Mukaida: Yes, we will.
Feldman: I would strongly suggest that the MUD files be Level 1A and not Level 1B

because every time the calibration is updated, you will need to re-create the entire MUD data set. For SeaWiFS, we extract the MUD at Level 1A and have a Level 1A to Level 1B step before we process to Level 2. This is a very efficient method we have learned.
Mukaida: Thank you for the suggestion.
Action item #4: NASDA will investigate if NASDA can generate MUD from L1A not L1B.(Due date: March 2001)

Barton: The preparation of an FTP and Web site is a valuable step forward, however, is a difficult and complicated task. Can you give some timelines for this preparation?
Mukaida: No details available at the moment.
Barton: I would like to suggest you to check ESA's web site on ENVISAT.
Mukaida: Thank you for the suggestion. I will check the web site.
Action item #5: NASDA will provide the following items via ftp from its web site: (1) MODIS conversion software, (2) data access tool, (3) user's manual for (1) and (2), and (4) L1B file format description.(Due date: March 2001)

Nakajima: You said that some of Japanese governmental agencies do not provide MUD.
Mukaida: Those agencies, including the Japan Fishery Agency, will provide data to NASDA, but not any third parties.

Nakajima: Will EORC receive L1A and L1B from EOC for creating MUD?
Mukaida: We plan to receive L1B, but don't know about L1A.
Nakajima: What is the mechanism for EOC to send L1A to EORC?
Mukaida: I don't know.
Nakajima: Dr. Shimada plans to receive L1A, not L1B.
Mukaida: Dr. Shimada will use L1A for checking data quality.

Nakajima: I would like MUD to be provided to contact person of each validation group.
Mukaida: We will do if data become available.

Nakajima: Will you post MUD on a web site so that users can easily access?
Mukaida: Yes, this is our plan. However, as the volume of SST MUD is enormous, we cannot provide SST MUD via Internet.

21-4 Overview of Validation Plan on the Science Groups
21-4-1 Atmosphere Group (Dr. Teruyuki Nakajima)
Dr. Nakajima summarized the issues on validation plans, which arose last year at the last workshop.

Comments/Questions/Discussion:
Shimoda: Do you use ARM and AERONET in GLI-ATMOS?
Nakajima: Yes, SKYNET is used for Asia.

Stamnes: (1) Will single scattering albedo and optical depth for aerosols be obtained as a function of wavelength over land, ocean and snow surfaces? (2) Will the dependence on

composition be determined, and will the dependence on humidity be determined?
Nakajima: (1) Yes, from i-skyradiometer and chemical analysis, better accuracy over snow.

Nieke: Is it planned to make a cross calibration of ground sensors and GLI using the same calibration source?
Nakajima: No.

Nieke: Is vicarious calibration possible without AVIRIS?
Nakajima: Yes. For low reflectance, i-skyradiometer and surface leaving radiometer are used. For high reflectance such as dessert and snow, a relative calibration with deep convective clouds is used.

Nieke: Do you use high altitude measurements for calibrating your Sun photometers?
Nakajima: No.

Simpson: Will atmospheric validation measurements be available on-line via the network?
Nakajima: Yes, as well as model data, etc. Some exercise will be done in APEX experiments in the university community. This must be reflected to NASDA's system.

Barton: Drifting buoy network was good for OCTS SST validation. However, GLI is a better instrument and can give SST to better than 0.5 K. The care is needed in validation using buoys. Ship measurements are required and skin and bulk temperatures need validation. SST experts meeting in Italy confirmed that skin and bulk SST are required as standard products.
Nakajima: Are skin and bulk SST standard products?
Barton: Both should be standard products as confirmed by meeting of experts in Italy last week.

Simpson: Is the temperature of IR detectors monitored?
Tanaka/Tange: The temperature of TMIR focal plane is monitored and the temperature is controlled by cooler within ±0.1 K/20 minutes. The temperature data will be sent with mission data.

Nakajima: What is the plan for the profiling buoy? Is there any plan to put it on Yamato Bank?
Saino: The place is not determined yet. The buoy is in the beginning phase of development. I want to be conservative in the initial development. The prototype buoy system will be made in the middle of 2002, and the field testing will follow. The development for data retrieval will hopefully be started in 2003.

21-4-2 Ocean Group (Dr. Joji Ishizaka)
Dr. Ishizaka presented the validation plan that the ocean group will implement.

Comments/Questions/Discussion:
Barton:
Ishizaka:

Mitchell: You recommend Lwn ± 100%, but CHLA ±50%. To get CHLA ±50%, don't you require Lwn better than ± 100%?
Ishizaka: GLI wants to do better job in turbid water and this is a challenge. Perhaps Lwn better than 100% is needed.

Nakajima: What is YBOM value?
Mitchell: YBOM was valuable. MOBY clear water site is not satisfactory. We need strategy for good time series of an accurate Lwn. We may have to consider new technology.

21-4-3 Land Group (Dr. Toshiaki Hashimoto)
Dr. Hashimoto presented the validation plan that the land group will implement. We will discuss details this afternoon.

Comments/Questions/Discussion:
None.

21-4-4 Cryosphere Group (Dr. Teruo Aoki)
Dr. Aoki presented the validation plan that the cryosphere group will implement.

Comments/Questions/Discussion:
Shimoda: (Please fill in here.)
Aoki: (Please fill in here.)

21-5 Discussion
Mr. Ito presented the budget situation. A summary follows.
- JFY 2001 NASDA budget will be cut by 30 %.
- EORC ADEOS-II Science Project budget will also be cut by 30 %. Other projects will suffer more budget cut.
- Priorities are placed on the standard algorithm/ software and initial cal/val activities.
- We need to discuss the best way to use budget for ADEOS-II science activities.
- If necessary, we will decrease the number of standard algorithms.

Mr. Ito responded to a question on L1A that was raised earlier this morning.
- Processing and archiving systems at EOC are ready.
- On-line data transfer system between EOC and EORC is ready.
- In principle, EORC will get needed data.

22. Algorithm/ Validation Parallel Sessions in each room
22-1 Ocean Group Session (Room HOUO) (Chairman Dr. Joji Ishizaka)
Comments/Questions/Discussion:
Barton: The idea of group is to take data from a ??? to get 10 km resolution data and produce a near real time product.
Lynch: Are you blending data knowing … or are you not yet at that point
Frouin: How can you take this input…???
Barton: There are/should be three products: bulk temperature, skin temperature and subskin temperature (some mm into ocean). This is how we can take account of diurnal variation.
Kawamura: This will allow us to take diurnal variation into account, but this is a research product.
Mitchell: I want global autonomous data. We have integrated optical system. On biogeochemical side, we must be aware of fact that we are about 5/10 years behind physical sciences. New technologies are going to give us new opportunities to give accelerated deployment

Frouin: In presentation yesterday you showed MODIS data comparison, at low latitude you have a lot of difference – is this a concern? Need correction?
Kawamura: Our test of GLI using MODIS, if necessary to product, could tune algorithm. Problems with (1) Atmosphere – this is an algorithm problem (2) early version of MODIS data, not calibrated, better data may give a better result.
Barton: There are spectral differences if ADHR data apply 11 coefficients for 9 wavelengths, this gives subtle differences
Lynch: MODIS thermal bands are not well characterized or calibrated.
Hoepffner: Combine microwave and IR data, skin temperature affected the same way?
Kawamura: We maybe need regional and global products. For regional products we need more skin temperature data, [which would give] diurnal heating information
Kopelevich: What is the spatial resolution of data?
Kawamura: Combine data with 1km, 10 km and 50-km resolution to give 1-km resolution.
Barton: Microwave measures bulk temperature not skin temperature, IR measures skin temperature, need to be careful distinguishing which temperature is being used.
Mitchell: Global HHR data is not at full resolution.
Kawamura: If we use HHR, full resolution only in local area….
Mitchell: MODIS will collect global data at 1 km. But [for GLI] would have a problem. NASDA says full resolution global data would fill up disk drive, but disk drives are cheap.
Kawamura: 1-km global data would be a burden for agencies.
Frouin: We need SST and Chlorophyll combined.
Kawamura: Altimeter, SST, and ??? are needed for large scale. SST and Ocean color are needed for small scale.
Barton?? The GODAE products are L4. Product from GLI is SST
Kawamura: We need recommendation.

Mitchell: We can get science from lots of wavelengths and lots of satellites. ADEOS-II is

a single platform.
Kawamura: We can get highly accurate skin temperature and bulk temperature. We want to increase coverage and reliability.

Dr. Fukushima:
Listed 3 problems that needed to be addressed: saturation, polarization and reflectance

Comment/Questions/Discussion:
Regarding thermal band issue:
Senga: Additional tests are difficult. We can not do any additional tests for thermal bands
Barton: If required?
Senga: We have preflight test data. We would need a special chamber to do the tests.
Barton: Did you see any problems?
Senga: We did not measure angle dependence of [thermal band].
Barton: You have a two-sided mirror which you will characterize after launch, don't you?
Senga: I have only witness sample data
Frouin: What is the witness sample?
Senga: It is a small sample; 1-2 inches.
Barton: Has non-linearity of the detectors been measured?
Senga: Yes.
Frouin: Have you checked witness sample against real system?
Senga: We have Nadir data. We can only compare Nadir.
Frouin: We will try to synthesize response using witness sample.
Barton: What angles was polarization measured at?
Senga: Nadir, -20^{o} and +20^{o} from real sample.
Frouin: The mirrors are one reason for polarization There could be other elements in optics.
Feldman: Are you going to be doing more measurements?
Senga: It is difficult. We have a huge number of unanalyzed preflight data sets, e.g. changed polarization each 10 degrees, have full data sets for each channel.
Feldman: If over next few months new measurements are required, is there time/money to do this?
Senga: There is some possibility. Time is restricted. Tests need to be finished by March 2001. If there is a push to do it, it can be considered.
Feldman: I can suggest that you or I you run measurements by SeaWiFS and MODIS teams to see if they suggest anything.
Senga: We need to do so ASAP. December ???
Asanuma: Where there is a PFT in this table, this test is/is not completed. The smaller scan of GLI may make the scan dependency easier to measure.
Mitchell: Is there more detailed report in English available?
Ito: No. What exists [in English] is what was presented at Kyoto.
Feldman: I propose that Dr. Yamamoto take PFT report with him during his stay at GSFC, in order to discuss with SeaWiFS/MODIS calibration experts.
Ito: Thank you for the offer. I will arrange to take action to arrange NASDA internally.

Mitchell: Concerning planned new tests on S/NR, at what radiance levels will this be done? Will you report radiance from the integrating sphere at which S/N was taken?
Senga & Asanuma: We have data at a large number of radiance for each channel.
Fukushima: We will communicate with NASDA sensor team and request them to give us a better S/N prediction.
Mitchell: It is not clear that land channels will have adequate S/N for ocean use. I'm still concerned about use of alternate channels.
Frouin: We need more measurements where channels become non-linear.
Lynch: More measurements won't solve polarization problem. We will have to do this with software.
Frouin: I am willing to look at formula in more detail. Perhaps you can send me more complete data. I can have a look and make recommendations.
Lynch: MODIS went through this 4 years ago.
Fukushima: Is there any suggestion of stray light problem in ocean color band? We don't know stray light characteristics.
Asanuma: Stray light measurements have been already done.
Ito: I don't want to discourage discussion, but the reality is that even if the launch is delayed to Feb 2002, there will be no more time for testing. Only January-March 2001 is the allowed period. Most of this is slated for checking GLI mounting. So we need comments now.
Fukushima: Maybe recommendations are need to focus on priorities, and [leave everything else] post launch. What characteristics should be studied?
Lynch: Full response v.s. scan angle in all channels. Is witness sample stored in the same environments as the instrument?
Ito: Witness will be stored after measurements.
Lynch: How about optical cross talk?
Ito: Done.
Barton: Is tilt still an issue or will it happen?
Fukushima: It was discussed negotiated and settled, I am satisfied.
Feldman: A MODIS problem when over MOBY: most data is useless due to sun-glint, will GLI be tilted over MOBY?
Mitchell: Where does tilt switch over?
Fukushima: This is an issue for flight operations.

Dr. Asanuma
Dr. Asanuma suggested changes in post-launch calibration procedures and asked for recommendations

Comments/Questions/Discussion:
Barton: Cross calibrate with MODIS and AATSR for thermal channels.
Mitchell: I'm worried about only doing one set of calibrations. I would like to suggest a couple of calibration cycles.
Frouin: Solar calibration can be used to check for detector degradation.
Asanuma: We don't have absolute calibration.
Frouin: Cross correlate with POLDER.

Feldman: We will have a lot of instrument artifacts. MODIS still has problems after 12 months. Expect 6-12 months before all calibrations look reasonable. With SeaWiFS we did real solar diffusion calibration on the ground, then compared with in space.
Mitchell/Asanuma/Others: GLI is too big to do this.
Feldman: We need to start collaboration with SeaWiFS and MODIS now to help once GLI is up. MODIS is still trying to get rid of artifacts. We did this [type of collaboration] with MOSS to do MOSS/SeaWiFS intercomparison. We did OCTS/POLDER comparison. If NASDA chooses to work closely with SYMBIOS, way is open.
Asanuma: This is something for GAIT group to look at.
Mitchell: We need to sort out artifact/calibration issues before products are shipped. We need to keep applications algorithms downstream of the calibration issues.
Feldman: We need cross calibration at Level 1/radiance levels not at higher level.
Frouin: Are you doing this with EORC?
Asanuma: It can be done with other NASDA divisions.
Mitchell: SYMBOIS has mandate that includes cross platform comparison. NASDA could benefit from this.
Lynch: Two Japanese PIs are on SYMBIOS team so this is entirely possible.

Dr. Barton:
Dr. Barton discussed a plan to do ground validation around Australia using radiometers. He defined various sea surface temperatures.

Comments/Questions/Discussion:
Mitchell: When you are doing continuous sampling on ferries, how did you get bulk temperature?
Barton: Using thermistors on boat.
Frouin: Your wind speed effect explains some of the scatter you see.
Barton: Noise is high. Maybe due to cloud effects.
Asanuma: How much does a good radiometer cost?
Barton: It costs US$20,000-30, 000. But you need to be careful about sea spray and rain.
Lynch: Part of noise may be due to patches of cooling water which slide exposing underlying hot water.

Dr. Murakami: Development of Alternative Band algorithms for Ocean Color

Comments/Questions/Discussion:
Mitchell: The 678-nm channel is not a good choice as you will have chlorophyll fluorescence, especially at high concentration. In general you should focus on getting water leaving radiance correct first, worry about product algorithms later.
Barton: Where do we get matchups- how about SeaWiFS?
Mitchell: Not much out of MODIS.
Feldman: Don't worry about doing matchups [with MODIS] until MODIS gets calibration right to give good water leaving radiance.
Frouin: did you look at 710-nm band?
Fukushima: The goal is to establish working algorithm by March.

Mitchell: SeaWiFS and OCTS used forward-looking top of atmosphere corrections. We could generate lots of models including aerosols and ocean turbidity. We found algorithms were pretty constant. It was calibrations that changed post-launch. MODIS data is not yet ready to use as model.
Lynch: Also look at scatter and noise correlation in your data.
Feldman: What is the target for product? We need data for saturated region. CZCS is a target, at present seems that factor of 2 is the target.
Ishizaka: This seems like a reasonable target.
Barton: Is there some value in doing theoretical studies using model rather than MODIS?
Mitchell: Land channel S/N is much better than 660-nm channel on CSCS. We need a target which is better than CZCS.
Feldman: Two algorithms might be a real problem computationally, so better to use one.

Recommendation: that after March, development and improvement of alternate band algorithm continue.

Dr. Ishizaka: Algorithm Issues
Comments/Questions/Discussion:
Frouin: Whitecap correction is ready to go.
Fukushima: It is now a human resource issue.
Frouin: Like the glint problem, we need information about aerosol correction.
Mitchell: Is the second iteration with aerosol correction?
Frouin: Yes, the second iteration will use aerosol results from the first iteration. Do we need to generate a PAR product such as with SeaWiFS?
Mitchell: If we have standard product, then we need to validate it.
Feldman: Primary production sounds like a research product not a standard product.
Mitchell: Square-root chlorophyll does better than models. Why not use this?
Saino: With decreasing NASDA budget it will be unlikely to have primary product included as a standard product. It is better for research community to do it themselves. NASDA has a program to use satellites to validate primary production data.
Mitchell: No extra money needs to go into cal/val plan to validate PAR, unlike primary production, which needs more validation.

Recommendation: that primary production be added as standard product (K490 dropped?)

Dr. Ishizaka went through checklist of action items from Kyoto meeting
Comments/Questions/Discussion:
Kopelevich: [Dr. Kopelevich described GSD.]
Murakami: [Dr. Murakami discussed provenance of GSD.]
Kopelevich: So you did not measure or match-up data.
Murakami: Correct.
Kopelevich: it seems to me it would be better to use matchup data and set to give a_{TOA} and A_{wm}.
Mitchell: The models are OK and will let you get reasonable water leaving radiance,

propagated to top of atmosphere then run sensitivity analysis.
Kopelevich: How about wind speeds, etc?
Mitchell: Input wind speed etc.

Dr. Ishizaka: status of CDOM which was raised at Kyoto
Comments/Questions/Discussion:
Mitchell: CDOM problems;(1) not independent of chlorophyll, and semi-empirical inverse models don't work. Water leaving radiance at short wavelengths is good enough to get independent values. (2) 300 nm or 440 nm reported doesn't make much difference as users scale according to taste. In terms of validation 440 nm is more difficult to measure. 300 nm is better S/N.
Recommendation: Regarding CDOM retrieval of all ocean color bands is required. Neural nets or other inverse model should be pursued for future algorithms which will require better values for water leaving radiance at short wavelength

Mitchell: Use 380 nm as a restraint for force atmosphere models to behave.

Discussion concerning validation issues:
Mitchell: How useful was AVIRIS to OCTS? How about SeaWiFS?
Feldman: AVIRIS data was +10% one run, -10% next run. This included NIR channel.
Mitchell: It didn't have a lot of in-water match-up. There was a lot of sun-glint.
Fukushima: AVIRIS is not useful.
Frouin: We need to do calibration in NIR bands. In principle AVIRIS is good for this.

Recommendation: AVIRIS is not needed

Mitchell: Concerning cruises it is dangerous to tie cruise to particular dates, as any slippage of launch date and cruise is wasted. We need to first define what you need cruise for. With MOBY data we can get good start (provided MOBY program continues). With 4 or 5 people on board we can get 90% of needed data. [I] have SYMBIOS funding Robert [Frouin] and I can get 70% of needed data from CalCOFI.

Frouin: A dedicated cruise is better.
Mitchell: CalCOFI is one of a couple of cruises needed. Plus we might not get clear skies. Talk to Mexico, which is flexible and cost effective for cruise off Baja. Another possibility is to hire 50ft boat out of Cabo St. Luca for 2 weeks. It costs 800-1000 US$/day. A small team can get necessary data. It is important to define necessary data.
Ito: There are on- going discussions with NASA & NOAA concerning access to MOBY.
Frouin: There will be an optical buoy deployed 14 km off France in Mediterranean for MERIS. It should be up before GLI (contact David Antoine).
JRC platform (Venis Tower).
Mitchell: "LEO" site run by Rutgers (contact Oscar Schoefield) data access is pretty open. What about Y-BOM?
Ishizaka: Y-BOM is expensive. It is cheaper to put sensors above water on someone else platform.
Mitchell: I recommend Y-BOM if resources are available. But check alternatives

carefully for quality of data.
Feldman: SYMBIOS can help. I want to work with in situ work. I want collaboration to allow matchup data. I will swap MOBY data for GLI data and work on calibrations

Recommendation: Communications between in situ data providers and NASDA

Dr. Mitchell presented ARGOS type drift floater
$15,000 US to get 150 profiles which is $100/profile or about $300 per matchup. ARGOS will put out thousands of these instruments and could put optics on now. ARGOS has pretty good accuracy and could go to GPS to improve it.

Discussion on how to integrate PI activities
Mitchell: We need to define a minimum set of observations, consistency and quality for validation data and systematize data formats given to NASDA.
Frouin: I would measure water leaving radiance & aerosol. I can give this to NASDA and want them to have NASDA crunch data to get vicarious calibration.
Mitchell: I want to be specified in advance so that software can be run immediately after data taken. Inward data flow needs to be controlled by NASDA or central PI.
Hoepffner: The contact person is important. We had a lot of turnover with OCTS. Person needs to be knowledgeable.
Neike: It is not just to measure in situ data. We need errors, which are then propagated and then need to tune algorithm.
Frouin: If you are doing measurements, you need this. Other possibility is to give GLI data to PI and let them do it. However, this is not very efficient.
Mitchell: SYMBIOS is a good example of how this works. Different PIs have different strengths. Require a few good people at NASDA who can take care of calibration.
Feldman: SYMBIOS protocols was just published.
Asanuma: I support this idea.
Feldman: The way it works in SYMBIOS and SeaWiFS, two people collect all data. It goes into database, where it is available for all matchups. The development took most of the effort, then only needs two people to run.
Asanuma: SeaWiFS team announced they will work on local vegetation. So this framework will be….
Mitchell: Functionality is important. It needs to centralize. But PIs are not interested in giving up control of data.
Feldman: Important thing is in situ data collection needs to be carefully integrated with data extraction. We can't have people cutting and pasting data. We have experience and can tell you what we learned.

Feldman: Does NASDA plan to make software to process GLI data from L1 → L2 available to the PIs?
Mitchell: Dr. Nakajima made a strong request for broadcasting GLI data.
Fukushima: NASDA will provide L1 to L2 conversion algorithm and source code to PIs. Regarding L1 → L2 software and code for SGI environments, there are no resources to support software at PI site.
Mitchell: I can't expect NASDA to produce everything you are going to need. We need

to move product now. But also let PI get at low-level data and tools to let PI's innovate.
Lynch: We need the source code and documentation.
Feldman: The documentation is in Japanese!

Recommendation: Software and documentation should be available to PIs

22-2 Land Group Session (Chairman Drs. Toshiaki Hashimoto and Yoshiaki Honda)
22-2-1 Land group algorithm (Chairman: Dr. Toshiaki Hashimoto)
22-2-2-1 Land Cover Classification using GLI 250-m data (Dr. N.D.Duong)
Dr. Duong presented an approach for land cover classification using GLI 250m data. A summary follows.

- The target of the research is to develop an algorithm for land cover and vegetation distribution classification using the GLI data.
- Efforts have been made to improve the automated classification capability.
- A remote sensing based land cover classification system has been made. With auxiliary information, the database has become more useful.
- Data will be taken every 3 months to update land cover mapping.
- Master image of Vietnam has been established using about 75 images of MOS-1 and TM. Master image will be used for geometric corrections when GLI 250-m becomes available.
- The field photo database has been established and will be used, linked with the Mater image, for validation of land classification.
- Only a single date data is available. It is urgent to obtain multi-temporal data such as MODIS to test and validate the classification algorithm.
- In the future field inspection of proposed validation site in Vietnam will be performed. The site should be ecological and homogeneous.

Comments/Questions/Discussion:
Verstraete: (1) How sensitive is your classification algorithm to atmospheric correction? (2) Given that no good atmospheric correction algorithm will be implemented, what is the impact on the applicability of the algorithm? (3) The between-scene variations in the reference image are representative of what will be seen with GLI, but they are larger than within-scene variation, so the proper correction of atmospheric and angular effects will be very important.
Duong: The classification algorithm is based on graphical analysis of spectral reflectance curve, which does not use much statistical computation. The classification is done by pre-defined standard one of certain land cover category. The internal structure of the curve is more important than its absolute value.
The Master image has been constructed not for classification but for precise geometric correction of future GLI data and linkage among various auxiliary data necessary for vegetation classification.

Huete: How many land cover classifications do you have?
Duong: Approximately 30 categories for single date image. Over 12 months we will be able to create practical land cover map, which reflects seasonal change of vegetation

cover.

Huete: Will the 250-m data channels (20, 21, 22, and 23) be provided on an operational basis – re-sampled as with channels 28 and 29?
Umezawa: I will answer the question later. -→ This issue was covered in session 22-2-2-4 250-m data (Dr. Huete).

22-2-2-2 Development Topographic Correction Algorithms for ADEOS-II GLI Data (Dr. C.M. Trotter)
Dr. Trotter presented the status of developing topographic correction algorithms. A summary follows.

- Objectives of the research include to verify the accuracy, create a look-up table
- The basic theory for topographical correction was presented.
- A model for topographic correction has been developed.
- Simulations have been conducted to evaluate effects of ρ/p_H of hotspot magnitude, leaf angle distribution, wavelength, leaf area index, sun zenith angle.
- Results of simulations indicate that the topographic correction appears to be reasonably independent of variations in hotspot magnitude, leaf angle distribution, and leaf area index.
- The look-up table for correction of the ration for topographic variation can be based on the variables of wavelength and incident angle.
- Questions on look-up table were raised for NASDA to consider.
- There will come opportunities for measuring Carbon uptake by remote sensing.

Comments/Questions/Discussion:
Verstraete: Did you look at uniform leaf area distribution to set up the canopy model? GLI has a large footprint and there are so many species, so a uniform distribution may be more appropriate.
Trotter: We were trying to test the effect on the reflectance ratio of the wider possible range in LAD (Leaf Angle Distribution), so we have simulated the most extreme cases, mainly planophile (flat leaves) and erectophile (upright leaves), also several LADs in between. So we did not simulate a uniform LAD, but we will try it shortly.

22-2-2-3 Estimation of Forest Biomass and Net Primary Productivity (NPP) (Dr. Yoshio Awaya)
Dr. Awaya presented an approach to estimate forest biomass and net primary productivity. Topics include:

- Flow of estimation.
- Data used for the estimation.
- Estimation results before and after eruption of Mt. Pinatubo.
- Accuracy of the estimation.
- Comparison of NPP among various estimation models.

Dr. Awaya also presented the result of field experiments, in which he collected validation

data.

Comments/Questions/Discussion:
Verstraete: Contrary to popular opinion, the relationship between NDVI and biophysical variables such as FAPAR, LAI, etc. are not linear. They saturate at high vegetation amount. When you analyze GLI data, you should use EVI or some other better index than NDVI.
Awaya: I'm aware many people say so. However, our data indicate good linearity.

22-2-2-4 Thermal Composite Product (Dr. Honda)
The group discussed a request from the Cryosphere group for thermal composite product. After a length discussion, the group agreed to recommend as follows:

Recommendation by the land group:
Land group will use a single algorithm to generate thermal composite products per the following assumptions.

- Use visible criteria.
- Use the same pixel for visible and thermal.
- Use 5 thermal channels.
- Check with SST researchers on possible use of SST algorithm.

22-2-2-4 250-m data (Dr. Huete)
Dr. Huete summarized the issue as follows.

- The original 250-m channels (20, 21, 22, and 23) have been deleted.
- Channels 28 and 29 will be re-sampled to 2km. Re-sampled data will further processed to 1km resolution.
- Channel 19 does not saturate.

Dr. Huete agreed to use channels 5, 9, 13, 19, and re-sampled 28 and 29 as alternatives of channels 20, 21, 22, 23, 28, and 29.

Original 250-m and alternate channels

Wavelength	Channels					
60-110 nm	20 (Blue)	21 (Green)	22 (Red)	23 (NIR)	28 (MIR)	29 (MIR)
- 20 nm	5 (Blue)	9 (Green)	13 (Red)	19 (NIR)		

22-2-2 Validation Plan for Standard Products (Chairman: Dr. Yoshiaki Honda)
22-2-2-1 Validation Plan for Standard Products (Dr. A. Huete)
Dr. Huete presented his validation plan.

Comments/Questions/Discussion:
Prata: How important is the vertical structure package?
Huete: (Please fill in here.)

Prata: What about water vapor and ozone?
Huete: Good question.

Prata: Water vapor and temperature can be measured by radiosonde.
Honda: I normally don't use radiosonde. We may be able to use them.

Prata: You can measure water vapor by sun photometer. TOMS data can be used for ozone.

Muramatsu: Can we have water vapor data from the atmospheric group?
Honda: It is difficult to measure water vapor profile.

Verstraete: I don't think a single validation can provide good validation of GLI. We need a number of different approaches.
Huete: I agree.

Verstraete: It is also useful to use other instruments that fly near ADEOS-II (inter-instrument calibration) and to compare GLI products to those generated by such other instruments.

22-2-2-2 Calibration and Validation activities at Australian land site (Dr. F. Prata)
Dr. Prata presented his validation plan.

Comments/Questions/Discussion:
None.

22-2-2-3 CEOS CV WG New validation equipment in Mongolia site (Dr. Y. Honda)
Dr. Honda presented CEOS global land validation core sites and validation instruments that will be used in Mongolia.

Comments/Questions/Discussion:
Verstraete: How far away can the robot arm reach?
Honda: It can reach as far as 3m, which is enough for us because we just scan grass.
Verstraete: Can you measure leaf orientation distribution with the robot arm?

Verstraete: What is the pointing accuracy of the laser?
Honda: It is 0.1 mm.

Verstraete: You need as few as 3 points to reconstruct a leaf orientation.
Honda: The measurement station also includes a video. With the video, we can take image, however, need to develop software if we can to recognize leaves.

Verstraete: Can you operate the robot arm in a manual mode so that we can manually point the robot arm?

Honda: No, there is no manual mode.

22-2-2-4 SeaWiFS images (Dr. Verstraete)
Dr. Verstraete showed SeaWiFS images processed with an optimized vegetation index similar to the one developed for GLI as a research project. On the posters shown during the meeting, the black dots represent missing data or areas not corresponding to vegetation, such as snow, ice, or clouds. In the case of SeaWiFS data, our algorithm can use either LAC or GAC data, but when the latter is used, the measured values are assigned to the actual pixel observed, rather than to the whole 4 x 4 pixel area, as usually done. So our products are more faithful to reality.

22-2-3 Discussion on Validation Plan for Land Products
(1) Site distribution:
- CEOS Cal/Val site: The land group can use some of the sites that are selected by CEOS. There are 13 sites in Southeast Asia.
- South hemisphere (due to launch timing): 3 sites where Dr. Prata has selected. Hay site is already selected by CEOS. This group is also interested in a dessert area.

(2) Parameters to be measured for cal/val:
Surface reflectance

(3) Validation accuracy and product accuracy
Validation will establish the GLI accuracy, which automatically determines the product accuracy.

(4) Priorities of standard products
As the land group has only 3 standard products, the group agreed to place the same high priority on these 3 products.

(5) What is the definition of validation?
Validation is to establish the error of the sensor.

(6) Site location and rational
The group agreed to use the validation core sites that have been selected by CEOS.

(7) Upscale
What does “upscale” mean? Once a validation result is extended to a

22-3 Atmosphere Group Session (Chair: Dr. Teruyuki Nakajima/Mr. Tamio Nakamura)
(This part of minutes was prepared by the Prime International.)

(1). Mr. M. Kuji:
Cloud issues (i.e. retrieval of geometrical parameters and cloud detection over Antarctica) were presented as follows:

- Status: Algorithm refinement (using Yamanouchi Diagram, etc.)/Validation Activities
- Future look: AMSS data analysis/ADEOS data analysis

Comments/Questions/Discussions:
Isaka: At what spatial scale did you estimate the mean and standard deviation of your temperature difference? You did not mention it.
Kuji: They were estimated over a zone of 64X64 (60x 60?) pixels.

(2). Prof. H. Isaka:
Prof. Isaka talked about inhomogeneous cloud parameters retrieval by neural approach - its use and remaining problems such as the need of database.

Comments/Questions/Discussions:
Marchand: This approach is very interesting.
1) It would be good to show your result vs. IPA.
2) Also, you must consider cloud top variability.
Isaka: 1) We have looked at this for reflectance. I will send you the result.
2) We will do this.

Nakajima: 1) 250m statistics is enough for L2A?
2) Cloud particle radiance 1.6, 2.2, 3.7μm needed for inhomogeneous cloud retrieval?
Isaka: 1) Checking now. Want to propose.
2) Yes

(3). Ms. R. Pinker:
Ms. Pinker discussed activity on validation of aerosols and surface albedo. She stressed the importance of surface albedo observation in total short wave, as well as in PAR and NIR and their derivation from satellites. The GLI is very well suited to do so. These parameters are important for detection of climate change, and important elements of the surface radiation budget (SRB).

Comments/Questions/Discussions:
Marchand: 1) What spectral bands do you use?
2) Have you been in contact with Patrick Minnis about calibration?
3) How do you get your albedos from satellites?
Pinker: 1) PAR, total SW and near IR (NIR) starting from 695 nm.
2) Yes, but different calibrations do not agree well.
3) We derive our own albedo from the GOES satellite, in the framework of GCIP activity.
Kuji: Does spatial resolution difference between satellite pixel (~1km) and in situ ground observations (one point) affect the comparison?
Pinker: Yes, it is difficult to compare ground observations with satellite values. Usually, satellite values are lower than ground observations, because they average over shadows. Aircraft measurements can help to resolve this kind of discrepancy, and the scaling-up issue.

(4). Mr. I. Lensky:
New physical insight to BTD (Brightness Temperature Difference) to cloud/rain was presented. His analysis covered the difference of cloud: daytime/nighttime, continental/maritime, young/old, etc.

Comments/Questions/Discussions:
Isaka: (Comments) 1) You mentioned the maritime clouds from which the precipitation is triggered only by microphysical processes. I do not see any other process than microphysical process which can contribute to the precipitation formation. We wanted a conservative delineation, so analyzed these maritime clouds.
(Comments) 2) You discussed the transformation of precipitating cloud into non precipitating clouds over Eastern Mediterranean Sea. But, what you show is the regional variation of cloud types, and not the transformation. The air mass is the same: air coming from the west over Mediterranean Sea, and we relate the different cloud types to the aerosols.
Nakajima: Standard products which you can use at this moment have only one pixels for 5 by 5. Do you need more pixels to apply for your algorithm?
Lensky: yes.

(5). Ms. S. Mukai:
Ms. Mukai explained the process and method of the aerosol and cloud retrieval, and stressed that combination of GLI and Polder is useful for the purpose. She also introduced validation site in Wakayama.

Comments/Questions/Discussions:
Nakajima: What is the use of GLI infrared data in your algorithm?
Mukai: For water screening and also (?).
Guillemet: Can you specify in the conclusion what you call "geometrical properties of clouds"?
Mukai: "Altitude of cloud top and bottom or depth of cloud" is derived by using Polder - pressure data and/or OCTS/GLI - temperature data.
Isaka: You showed world wide distribution of effective radius. Is it the mean effective radius? In that case, how is the world wide distribution of standard deviation of effective radius?
Mukai: These results are only preliminary. So, we did not calculate the standard deviation.

(6). Dr. B. Wang:
The instruments (sunphotometer, pyrometer, etc) for ground-based observation and the observation strategy, etc. in Beijing were presented by Dr. Wang.

Comments/Questions/Discussions:
None

(7).Dr. R. Tipping:
Dr. Tipping talked about some molecular aspects of water vapor that includes nitrogen,

oxygen, etc.: collision, absorption and interaction of molecule.

Comments/Questions/Discussions:
None

(8).Prof. S. Ohta:
The scattering and absorption coefficient of aerosols was calculated based on the observation at Fukue-jima and survey cruises including by the ship “Mirai”. And three types of aerosol were collected and their chemical components were analyzed.

Comments/Questions/Discussions:
Isaka: 1) Do you have measurement of radar concentration aboard your ship?
2) Did you calculate back-trajectories?
Ohta: 1) No.
2) We did not calculate them, because meteorological observations were not available in that region. But, we are studying to calculate back-trajectories.

(9). Free Discussion (Chair: Dr. Teruyuki Nakajima)

22.4 Cryosphere Group Meeting (Chair: Dr. Teruo Aoki (MRI))
(This part of minutes was prepared by Dr. Aoki.)

GLI / Cryosphere group meeting (parallel session in GLI Work shop, November 7-10, 2000 in Kanazawa) was held on November 9, 2000. The subjects discussed were algorithm improvement, Cal / Val plan, MODIS data, GLI / L1 data, GLI / 250 m channel data and so on. The attendants have recognized that the further algorithm improvements and their validation experiments are important. Regarding the issue of 30% budget cut from NASDA due to the failure of H-II Rocket launch, it was agreed that we should emphasize our obtained products and propose the new products to NASDA.

22.4.1. Algorithm Improvements

22.4.1.1 "Snow in forest" and "Nilas" There is a possibility to classify the snow cover on the forest floor using NDSI (Saito and Yamazaki, 1999). Nilas is also possible to detect as the very thin nilas and relatively thicker nilas using the visible reflectance and brightness temperature. These products should be categorized as the research products.

22.4.1.2 Vertical profile of snow grain size

Vertical profile of snow grain size could be retrieved using several NIR channels. This product should be categorized as a research product.

22.4.1.3 Snow BRDF

Snow BRDF is very important for the accuracy of products. It is necessary to develop the BRDF model using nonspherical ice particles or using the empirical method. This is a research product.

22.4.1.4 Aerosols over snow and ice

Aerosol correction is very important for the accuracy of all cryosphere products. We continue to examine the method to correct the aerosol effects.

22.4.1.5 Surface temperature and surface albedo

These products are very important for the climate studies. However, to retrieve these parameters it is necessary that the properties of emissivity and BRDF at the snow and ice surface are well understood. Optical measurements of the emissivity and BRDF will be made using FTIR and VIS / NIR spectrometer, respectively in the validation experiments. These products are the future standard products, although these are research products on the present stage.

22.4.2. Cal / Val plan

22.4.2.1 Antarctica

Two members are going to Antarctica during November 2002 - March 2004. In this period Dr. Hori will organize the GLI / Cryosphere group.

22.4.2.2 Alaska

Barrow is the best site because of large homogeneous snow surface. The atmospheric information could be obtained from ARM and CMDL. Field experiment will start from 2002.

22.4.2.3 Hokkaido

AMSS measurement will be made in February 2001. We discussed the possibility of inviting the US scientists to this experiment. Validation experiment for algorithms will be made every winter.

22.4.3. MODIS data

MODIS data will be used to check the performance of algorithm and accuracy of products. Accuracy

of the products will be validated by the comparison between MODIS and reformatted GLI data.

22.4.4. L1B data

All data are necessary for L1B data.

22.4.5. 250m data

22.4.5.1 Antarctica:

NIPR (National Institute of Polar Research) will receive the GLI / 250m data at Syowa Station from January 2002 (or 2003). However, the direct transmission data from GLI will be very limited. MODIS data will be valuable instead of GLI / 250m data. A possibility of the direct receiving of MODIS data at Syowa Station is considered by NIPR.

22.4.5.2 Other regions:

GLI / 250m data will be received at Fairbanks for arctic region.

22.4.6. Questions from a chief scientist

Question: Is algorithm flow OK? => Answer: No problem

Question: Is snow and ice extent a standard product? => Answer: Yes (CTSK1)

22.4.7. Accuracy and priority of standard products

Accuracy and priority of standard products are revised.

	---------- Accuracy ----------		Priority
	Validation	Product	
Cloud detection over snow	3 %	5 %	1
Snow and ice extent	3 %	5 %	1
Snow grain size	10 %	20 %	2
Snow Impurities	20 %	30 %	3

* Categories 1. Indispensable for minimum success, 2. Important, 3. Possible, 4. Research

22.4.8. Validation experiment

Measurement	Parameter	Instrument
(*In situ* / Optical method)		
Spectral albedo	Upward and Downward flux	Spectrometer (0.35 - 2.5 um)
Spectral BRDF	Radiance	Spectrometer (0.35 - 2.5 um)
Emissivity	Brightness temperature	FTIR (2 - 5, 8 - 14 um)
(*In situ* / Glaciological method)		
Microphotograph	Size distribution of snow grains	Macro camera
Snow pit work	Snow temperature, Snow density,	Snow pit work tools
	Snow layer structure,	
	Snow grain size and Snow type	
Snow sampling	=> Laboratory measurement	
(Laboratory / for snow impurities)		
Filtering	=> Weight measurement	Filtering tools
Weight	Mass fraction of impurities	Balance
Electron micrograph	Size distribution	Electron micrograph
Transmittance and reflectance of sample filter		
	Refractive index	Spectrometer (0.35 - 2.5 um)

22.4.9. Attendants

Teruo Aoki	Meteorological Research Institute	teaoki@mri-jma.go.jp
Masahiro Hori	NASDA/EORC	hori@eorc.nasda.go.jp
Knut Stamnes	Stevens Institute of Technology	kstamnes@stevens-tech.edu
Jim J. Simpson	Scripps Institution of Oceanography	
	UC, San Diego	jsimpson@ucsd.edu
Hiroki Kai	Remote Sensing Technology Center	kai@restec.or.jp
Yukinori Nakajima	Remote Sensing Technology Center	ynakaji@restec.or.jp
Akihiko Shinozaki	Space Engineering Development Co. Ltd.	sinozaki.akihiko@sed-c.co.jp

22.4.10. Reference

Saito, A. and T. Yamazaki, 1999: Characteristics of spectral reflectance for vegetation ground surfaces with snow-cover; Vegetation indices and snow indices, *J. Japan Soc. Hydrol. Water Resour.*, **12**, 28-38, (in Japanese with English abstract).

Day 4 (November 10, 2000)

23. Summary of Parallel Sessions (Chairman Mr. Yasuyuki Ito)
Algorithm and Validation report from each science group session
23-1 Atmosphere Group (Dr. Nakajima)
Dr. Nakajima summarized a result of Atmosphere Group meeting.

Comments/Questions/Discussion:
Prata: Considering that a goal of the atmosphere group is to do surface radiation budget validation, what do you think about a stronger collaboration between the atmosphere and land groups? The land group will measure surface fluxes.
Nakajima: yes, I agree that there is an opportunity for collaboration at land sites. Also, I want to stress the importance of the bright desert sites, especially in Australia.

Lynch: You discussed the cloud aerosol interaction in the Asian region. Was any consideration given to the cloud in Sahara dust interaction?
Nakajima: The Sahara region we see characterized generally by low cloud. There may be an issue in the high cloud situation. Rather, contract between Japan area and tropical western pacific region is important to measure.

Ito: Regarding funding to purchase validation equipment, as is often the case, we need to wait until very late in the Japanese fiscal year. I would like the researchers to put together requests for procuring validation equipment.
Nakajima: I understand and would like all group leaders to send requests for procuring validation equipment to Mr. Ito by email.
Action item # 6(Session 23-1): Group leaders will send requests for procuring equipment, which will be required for validation, to Dr. Takamura by email.(Due date: December 2000)
NASDA will provide general information on EORC web site such as development timeline. (Due date: March 2001)

Ito: Operation budget for the next Japanese fiscal year will decrease.

23-2 Ocean Group (Dr. Ishizaka)
Dr. Nakajima summarized a result of Atmosphere Group meeting.

Comments/Questions/Discussion:
Nakajima: Will you use the GMS data?

Ishizaka: Yes, we plan to use GMS data.
Takamura: GMS SST can observe the diurnal cycle of SST variation. To examine the Bulk-skin problem associated with the diurnal cycle, we consider the GMS sensor is quite useful.

Lynch: I make a comment on K490 in Greg Mitchell's absence even though I can't claim to speak for him. His point was that while K490 is just a multiplied time Chla in case I waters, it is not so simple when we go to case II waters and account for CDOM and suspended solids. It may be a useful product because we can measure it directly in the field.
Fukushima: This is true but presently the algorithm for K490 is directly correlated with Chla and we do not have a case II algorithm or product.

Fukushima: From the viewpoint of the algorithm scientist, I understand that the only possibility we have is to implement PAR. I would suggest rewriting the implementation as "NASDA and PI team should study the possibility of implementing PAR as a standard product."

Only possibility is PAR. As Mr. Ito pointed, it is not well defined. I would like to propose to rewrite. NASDA to study PAR as standard.

Recommend to delete K490 and study adding a new standard product
PAR is not a product. It's a parameter. CSM and NEM are products.

Ito: Post-launch calibration working group is discussing this issue. There are actions for NASDA and Prof. Senga.

Ito: 3rd point, we are not performing in-situ calibration. Mr. Mukaida of RESTEC, explained what we are doing now. I assign Mr. Mukaida as a point of contact. Please coordinate.

23-3 Land Group (Drs. Hashimoto and Honda)
Dr. Hashimoto summarized

Comments/Questions/Discussion:
Nakajima: Mosaicking: Please explain the daytime and nighttime algorithms.
Hashimoto/Honda: (1) Daytime: Visible + Thermal could screen. (2) Nighttime: Thermal data -→ SST

Nakajima: Do you use Dr. Duong's site in Vietnam?
Hashimoto/Honda: Yes.

Prata: Thermal data at night is the same. We don't introduce any new algorithms.

Nakajima: Do you need AVIRIS?

Honda: Yes, Dr. Huete does, but with NASA's flight.

Barton: Why don't land group generate a daytime land surface temperature as well as nighttime?.
Prata: This was discussed at land meeting and Fujitsu advised that computing time and data storage was a problem. However, Fujitsu have agreed to look at this possibility. By 2002 better computers and storage may allow the production of LST for both day and night using the SST algorithms.

23-4 Cryosphere Group (Dr. Aoki)
Dr. Aoki summarized a result of Cryosphere Group meeting.

Comments/Questions/Discussion:
Nakajima: What is your feeling of vicarious calibration using high reflectance surface?
Aoki: It's impossible to do in Japan. A possibility is high in Antarctica.

Nakajima: Do you calculate TOA.
Aoki: Yes.
Nakajima: We will have some indication

Nakajima: What is an impact to put a receiving station in Antarctica?
Aoki: We will have a big impact. Thermal and electric power.
Ito: We conducted a simulation without assuming data relay satellite support.
Nakajima: You have to pay huge amount of money to ESA (if you use Artemis). Is it possible for NASDA?
Ito: It is free for NASDA to use ESA's Artemis if NASDA launched the Artemis.

Barton: Can you please clarify the direct broadcast situation to foreign ground stations?
Ito: Local 250-m data will be downlinked to foreign stations following agreement through MOU (or similar). No 1km-data will be direct broadcast – but 1 6km-product will be direct broadcast to the fishing industry and others. Other global data will be downlinked to only the central station.

24. Conclusions (Results, Action Items) (Mr. Masahiro Kurihara, Dr. Teruyuki Nakajima)
24-1 Status of Previous Action Items (Mr. Kurihara)
The status of previous action items were updated.

24-2 New Action Items (NASDA Mr. Kurihara)
New action items from this week were identified. The following items were confirmed in this session. A complete list of action item is shown on page 1 of this minutes.

Action item #7: NASDA will provide general information on EORC web site such as development timeline. (Due date: March 2001)
Action item #8: NASDA will build the web site that will serve for PIs to archive validation

data. The web site allows PIs to store and retrieve validation data.
Action item #9: NASDA will check GSD clear sky radiance.
Action item #10: NASDA and Cal WG should study PFT results and possibly with additional test resutls for correcting satellite data and predicting magnitude of errors. The results should be reported to the GLI team.
Action item #11: The Ocean and Land groups will discuss a possibility of extending its algorithm for use over land at day and night.
Action item #12: Dr. Prata will send a change proposal to NASDA regarding a change of SST scheme for use over the land.
Action item #13: NASDA and PIs will investigate a feasibility of action item 13 that is shown above.
Action item #14: All participants of the GLI workshop will review and comment on the draft minutes.

24-3 Recommendations (NASDA Mr. Kurihara)
Based on the workshop, 6 recommendations were identified as follows. The same list is also shown on page 1.

(1) PIs and NASDA will investigate a mechanism that should be used for PIs to communicate with NASDA on research algorithms.
(2) (Atmosphere) POLDER data acquisition capability should be added to the GLI Data Analysis system.
(3) (Atmosphere) NASDA should support scientists in conducting the field campaigns.
(4) (Atmosphere) MUD should be generated not only with standard products, but research products.
(5) An individual or team in NASDA should be identified for in-situ data providers to communicate and exchange data and information. NASDA's contacts are Mr. Mukaida (NASDA) and Dr. Ishizaka (the University of Nagasaki).
(6) NASDA should provide PIs with tools to analyze GLI data.

25. Closing Address (Mr. Ito)
Mr. Ito thanked all participants for hard work toward the success of the workshop.