The Earth Observer

An EOS Periodical of Timely News and Events

Vol. 3, No. 5 July/Aug 1991

EDITOR'S CORNER

This is a frustrating editorial to write, because it will be obsolete by the finish of the EOS IWG meeting in Seattle.

As many of you are aware, both the Senate and House Appropriations bills for FY 1992, which include funding for NASA, have been passed. The conference committee meeting to resolve the differences in these two bills is expected in September, and the final bill will likely require some changes in the implementation of EOS. Congress expects to finish discussions of this bill before the end of October.

The environment for EOS has changed in three ways:

1. The House and Senate markups of the EOS budget are substantially less than the President's submission. It is clear that the EOS configuration must allow for future fiscal uncertainties.
2. Atlas IIA and Titan III rockets might be available for polar launches from the Western Space and Missile Center in the EOS-A timeframe. The pad can possibly be upgraded to accommodate the Atlas IIAS. Atlas IIA and Titan III can launch payloads roughly one-third the size of the EOS-A platform.
3. The use of formation flying to achieve most simultaneity requirements appears viable.

Many decisions will have to be made about EOS implementation in the coming months. It is, therefore, critical that the IWG express clearly the scientific priorities and approach to EOS in the context of the policy questions that our science must address. The science strategy for EOS needs to be refined and put in the context of the science and policy questions that we face. At the IWG meeting in late August, we will focus on the framework for making decisions on EOS priorities. Because of budget constraints and uncertainties, NASA must restructure the EOS mission, and it will need substantial advice from the Payload Panel during this Fall.

Jeff Dozier
EOS Project Scientist

EOS Project Science Office

Some of you may be unaware that Jeff Dozier has a number of people located at or near Goddard Space Flight Center (GSFC) who assist him in his position as the EOS Project Scientist. This group constitutes the Project Science Office (PSO). While Dozier coordinates most of the work with the "outside Goddard" world and GSFC senior management, the PSO coordinates the work directly with the three EOS project offices. Following are some of the people and the activities involved.

Robert Price, Deputy Director of the Goddard Earth Science Directorate, serves as the EOS Project Scientist for Data. He works directly with the EOS Ground Systems and Operations Project to assure

that the science issues are addressed on a day-to-day basis. Price's position as EOSDIS Source Evaluation Board chairman has given him detailed insight into the capabilities that EOSDIS must have to meet the scientific needs for the next decade.

Bruce Guenther serves as the Project Scientist for the Observatory, and interfaces directly with Chris Scolese, Project Manager for the EOS Observatory Project. Guenther also serves on the EOS Calibration and Validation Panel with Moustafa Chahine, and is a member of the Committee on Earth Observations Satellites (CEOS) Calibration and Validation Working Group.

Les Thompson serves as the Project Scientist for the Instruments, and works with Marty Donohoe, Project Manager for the Instruments Project. He knows all of the instrument managers and is aware of the technical issues for each instrument. Thompson is closely monitoring information introducing the idea that the EOS instruments could be made much smaller and still meet the scientific requirements.

For discipline scientific support with the Earth Sciences Directorate, we rely primarily on Darrel Williams for land, Skip Reber for atmospheres, and Antonio Busalacchi for oceans and ice.

Support contractors perform a number of tasks in support of the EOS project. A few are listed below to give you an idea of their individual duties.

ST Systems Corporation (STX) is one of three PSO support contractors. Charlotte Griner, Task Leader, handles all of the coordination and administration. She is managing editor of *The Earth Observer* and maintains both the EOS information and viewgraph libraries. Griner and her staff provide support for EOS booths at scientific conventions and meetings, using exhibits and a variety of EOS-related videos and brochures. She is assisted directly by Debe Tighe and Linda Carter. Renny Greenstone provides scientific support, and is currently acting as the EOS historian to document the development of this large new Earth science initiative. Bill Bandeen provides scientific support and coordinates the details of the aircraft program for our investigators.

Mitch Hobish and Phil Ardanuy of Research and Data Systems Corporation (RDC), provide general scientific support, often in the form of quick turnaround analyses and comparisons. RDC has extensive experience in the scientific analysis of satellite data.

Birch & Davis Associates, Inc. provides logistics support for the Investigator's Working Group (IWG), Science Executive Committee (SEC), and Payload Panel Meetings, coordinated through Debby Critchfield and her assistants, Jan Hostetter and Cathy Freeland.

As manager of the EOS Project Science Office, I work with Dozier in coordinating the various people in the group. The contractors report to me, although they are available to assist in all areas of EOS. As Associate Director of the Earth Sciences Directorate, I am familiar with most of the work that is done at GSFC in the Earth Sciences field, and try to see that the correct people get the information needed to perform their tasks. If you need assistance and do not know whom to call, contact me and I will try to help with a minimum of redirection. The address is NASA/Goddard Space Flight Center, Code 900, Greenbelt, MD 20771, telephone (301) 286-8228, FAX (301) 286-3884, or DZUKOR on GSFCMAIL.

Dot Zukor
EOS Project Science Office Manager

Workshop on Atmospheric Measurements Issues in Understanding Climate Change

A workshop sponsored by the Department of Energy (DOE) and NASA, and co-hosted by the National Center for Atmospheric Research (NCAR), will be held Thursday and Friday, October 31 and November 1, 1991, at the Stapleton Plaza Hotel near the airport in Denver, Colorado. The subject of the meeting will be utilization of the observing systems associated with ARM, NASA Earth Probes, operational satellites, European and Japanese satellites, and EOS, with the intent of *synergistically* answering key questions on decadal-scale changes in the atmospheric component of the global system. (ARM is the DOE's program of Atmospheric Radiation Measurements.)

The meeting will follow parallel meetings of the ARM science team and the CERES team at the same site. Workshop participants will hear reports from representatives of the various components of the observing system and try, through

panel and informal discussions, to arrive at new ways to look at the system as a whole in answering the key questions relating to the hydro-energy cycle, air-sea interactions, and general circulation. The goal of the workshop will be to produce documents which will identify and elucidate to the atmospheric science community the opportunities posed by the new observing systems.

While the meeting has been arranged to take maximal advantage of participation of the teams mentioned, all interested parties are welcome to participate. For further information contact: Gerald R. North, Department of Meteorology, Texas A&M University, College Station, TX 77802, (409) 845-8083, OMNET: G.NORTH. Members of the Executive Committee consist of Gerald North, chair; Robert Cess, Robert Dickinson, David Randall, Graeme Stephens and Kevin Trenberth.

Gerald North
Panel Member

Meetings

GLRS Science Team Meeting

The GLRS Science Team met at GSFC on May 14-15, 1991. Stan Wilson and Jeff Dozier reported on the EOS budgetary evolution and on the Engineering Panel meeting chaired by E. Frieman. They noted that some scenarios for the B-series of instruments have included GLRS, ALT, and GGI together. Bruce Guenther (GSFC) reported on the Calibration Panel meeting.

Various studies are underway to support GLRS development. Jim Abshire (GSFC) reported on the status of a study in progress on effects of atmospheric turbulence. He reported that the development of a Sun workstation laser waveform simulator for the GLRS altimeter mode is near completion.

John McGarry (GSFC) summarized the status of the Wallops T-39 aircraft flights in support of two-color ranging experiments. A total of eight flights is planned around the Goddard Optical Research Facility (GORF), with a flight path chosen to enable examination of azimuthal variations in range correction.

Robert Thomas (HQ) reported that the Greenland aircraft experiments with a laser altimeter have been delayed until August 1991. The aircraft flights will underfly selected ERS-1 groundtracks for direct comparison with another data set, in addition to flight paths in other areas.

Thomas Zagwodzki (GSFC) gave a detailed summary of two-color ranging experiments in progress at GORF, including a discussion of streak camera characteristics. He reported that preliminary two-color ranging measurements have been made to a ground target. Experiments to the Relay Mirror Experiment satellite will be attempted in the next few weeks.

Ken Brown (GSFC) reported that the GLRS contractors (GE and McDonnell-Douglas) have laser breadboards of the instrument, which are expected to be in full operation within a few weeks. Brown and Bernard Seery (GSFC) reported on recent trips made to both contractors to review their status.

Tom Strikwerda, Applied Physics Laboratory, gave a summary of star trackers/cameras. He summarized satellite experiments in development and noted that the ultimate accuracy may be limited by the star catalog accuracy (which will improve with Hipparchos and Space Telescope). Current instrument operation at the few arcsecond level has been demonstrated in ground-based tests. Satellite experiments are scheduled.

Bob Schutz, University of Texas, summarized the GLRS error budget, including the requirements for both attitude and ephemeris. Consideration was given to both real-time and post-processing requirements. Details will be published in a forthcoming report.

Steven Cohen (GSFC) presented an update on geodetic simulations of the GLRS ranging component. These simulations include more restrictive ground-based targets and more representative error models.

The team extensively discussed preparation of a Science Management Plan and preparation of Execution Phase proposals. The Science Management Plan is expected in the Fall.

The next GLRS meeting will be held in the October-November period.

Bob Schutz
GLRS Team Leader

EOS Working Groups Meet at Langley Research Center

A joint session of the EOS Mission Operations Working Group (EMOWG), the Ground System Integration Working Group (GSIWG), and the Science Operations Working Group (SOWG) was held at the Langley Research Center (LaRC) in Hampton, Virginia, on June 25-27, 1991. The EMOWG, GSIWG, and SOWG are working groups chartered under the EOS Ground System and Operations Project (GSOP) headed by Tom Taylor, GSFC Code 423.

Sidney Pauls, LaRC Associate Director, welcomed the attendees. Tom Taylor, GSOP Project Manager, discussed the current status and schedule of the Ground System activities, including the EOS Data and Information System, Core System (ECS) procurement. (Note: The ECS Request For Proposal package was released on schedule, on July 1, 1991).

Angie Kelly, EOS Mission Operations Manager (MOM), summarized the meeting goals and the issues to be addressed by each of the three working groups. Kelly also restated the basic mission operations philosophy, "EOS Flies for Science." She then reviewed mission operations from a science team/user perspective. Joe Gitelman, Ground System Integration Manager, gave an update of the ground system architecture, including the science data processing function for the two EOS instruments (CERES and LIS) that fly on the Tropical Rainfall Measuring Mission (TRMM), and the NASA Science Internet (NSI) role within the EOSDIS.

Planning and scheduling splinter session: (l. to r.) Bill Weaver, Carol Miller, Susan Borutzki, Curt Schroeder, John Barker, Larry Hovland.

Sol Broder, Science Operations Manager (SOM), provided an introduction to the newly created SOWG. (Note: Since the meeting, the SOWG has been renamed the Data Processing Working Group (DPWG) to be chaired jointly by Sol Broder and Rich Bredeson, Science Software Manager.)

The meeting featured presentations from the GSFC Project Science Office (provided by John Barker and Al Fleig), and presentations on the following instruments: Stick Scatterometer (STIKSCAT) science overview, Mike Freilich, JPL; Lightning Imaging Sensor (LIS), Hugh Christian, MSFC; Moderate Resolution Imaging Spectrometer (MODIS), John Barker; and Active Cavity Radiometer Irradiance Monitor (ACRIM), Jim Kaufman, JPL. An overview presentation on the Earth Observing Scanning Polarimeter (EOSP) was provided by Larry Travis, Goddard Institute for Space Studies, although he was not able to attend.

Other presentations dealt with mission operations and ground system topics: preliminary EOS-A1 nominal timeline, testing concepts, Space Network Control Center update, NASCOM update, international interfaces, Deep Space Network operations concept, platform update/CCDS Principal Network and its operational implications, and software management and Tool-kits. Splinter sessions dealt with science operations, testing, planning and scheduling, flight operations, prototyping plans, realtime/quicklook data requirements, etc. Open issues regarding instrument-to-ground-system interface were again discussed. LaRC personnel provided demonstrations of flight simulator and data display/browse systems.

Bill Weaver and Larry Brumfield, both with the LaRC CERES Project, coordinated the arrangements for the meeting, which was held in accordance with ECS procurement guidelines. Karen McDonald, ECS Contracting Officer, was in attendance. Presentation material from the meeting is available at the GSFC EOS Library. Call Heidi Wood, (301) 286-5641.

The DPWG will meet in October. Contact Sol Broder at (301) 286-7088 or Rich Bredeson at (301) 286-9338. The schedule for the next EMOWG/GSIWG meeting will be based on the ECS schedule. Contact Angie Kelly at (301) 286-7726, or Joe Gitelman at (301) 286-7055.

Angie Kelly
Mission Operations Manager

Release of EOS Data Products Report Version 1.0

A report titled *Earth Observing System Output Data Products and Input Requirements - Version 1.0* is being distributed to EOS Principal Investigators by the Science Processing Support Office (SPSO) at GSFC. The SPSO serves as a liaison between the EOSDIS Project and the scientific user community. It works in cooperation with the EOS/EOSDIS Project Scientists and the EOS investigators to compile, analyze, and review requirements for science data processing. The SPSO also maintains and disseminates requirements information and provides a single point-of-contact for access to this information throughout the planning, implementation, and operational phases of the EOSDIS.

Two earlier versions of the SPSO documents were distributed for review by the EOS investigators in August 1990 and April 1991. The current release is a revised and expanded version of the SPSO report released in April 1991. The SPSO report, consisting of Volumes I and II, presents the latest information on EOS output data products and input requirements for 30 EOS instruments and 29 Interdisciplinary Science (IDS) Investigators. It contains information on characteristics of over 2,400 EOS output and input data products and 200 non-EOS data sets required by EOS investigators.

The report is based on the information compiled and synthesized by the SPSO since March 1989. Information on EOS data products was obtained from a number of sources. The "Silver Bullet" data product lists, compiled by Vincent Salomonson (for Facility Instruments), Jim Russell (for Principal Investigator Instruments) and JoBea Way (for Interdisciplinary Investigators) were compiled and updated, based on the Phase C/D proposals, Conceptual Design and Cost Review presentations by instrument teams, and comments from investigators. Information on MODIS-N/T data products and input requirements was provided by the MODIS Science Processing Support Team managed by Al Fleig of GSFC. Non-EOS input requirements, originally compiled from the Announcement of Opportunity proposals, were revised based on the SPSO input data surveys.

A common format was adopted to enable cross comparison of Interdisciplinary Investigators' input requirements with proposed output data products from EOS instruments. The attributes of the common format consist of those describing the measurement (product name, units, and category), source of information (type, source, and investigator), characteristics of the data product (resolution, coverage, and accuracy), and attributes that describe the input requirements (required channels, ancillary, and correlative input data). Four product-naming fields were used to standardize product names, group similar data products, and allow linkage to the Master Directory (MD) parameter keywords used in Directory Interchange Format.

A complete list of output and input data products sorted by product number is presented in Volume I of the SPSO report. Separate output data product lists for instrument teams and IDS investigators are also presented. In an effort to identify unique EOS data products, similar data products are grouped together and a list of product group names, containing the corresponding MD parameter keywords, is presented. Volume I also describes the methodology and assumptions used in the EOSDIS baseline requirement analysis. In addition, the SPSO analyses of storage requirements, processing load, and data traffic flow estimates for EOS-A1 instruments are presented.

Volume II of the report is devoted to the SPSO analyses of IDS investigators' input requirements. For each investigator, input requirements were analyzed and matching best/alternative EOS data products were identified by comparing characteristics of input and output data products. A best-match data product is defined as an EOS data product that closely matches input requirements in terms of product definition, accuracy, temporal resolution, and spatial resolution/coverage. An alternative-match data product is a data product that meets the input requirements to a lesser degree. Results of the analysis were presented in two separate appendices: one listed by IDS investigator and the other by instrument. Volume II also contains information on IDS investigators' input requirements which cannot be met by EOS instruments.

The analyses presented in the SPSO report are preliminary; many details of the EOS project will change over the course of the EOS mission. The SPSO at GSFC plans to release an updated version of the report on an annual or semi-annual basis as new information becomes available.

The SPSO welcomes any comments from the scientific user community on the report and wishes to

express special appreciation to those who have provided valuable suggestions for enhancements to this document. If you have any comments or would like to have a copy of the SPSO report, please contact: Yun-Chi Lu, Code 936, NASA/GSFC, Greenbelt, MD 20771, (301) 286-4093, YLU/GSFCMAIL

Yun-Chi Lu
SPSO Manager

Canadian Ice Working Group Meets

Editor's Note: *The Earth Observer* recently received a set of summary charts elaborating the results of a meeting of the Canadian Ice Working Group (CIWG) in Toronto, Canada on March 7, 1991. The meeting was held at the Institute for Space and Terrestrial Science (ISTS) Headquarters at York University, Toronto, Ontario.

The paper is entitled *Science Issues Relating to Marine Aspects of the Cryosphere: Implications for Remote Sensing*. Co-authors of the paper are David G. Barber, Michael J. Manore, Thomas A. Agnew, Harold Welch, Eric D. Soulis, and Ellsworth F. LeDrew. With the permission of the authors, we are summarizing the thoughts presented in the paper for the benefit of our readers in the Earth science remote-sensing community. Readers desiring more information may contact David Barber at the Earth Observations Laboratory, ISTS, University of Waterloo, Waterloo, Ont. N2L 3G1. Telephone: 519-885-1211, ext. 2689.

The object of the meeting was to establish the requirements for information on cryospheric processes in the arctic marine ecosystem that could be met by remote sensing. The results of the meeting were then to be used as "design targets" in development of follow-on proposals to Canada's RADARSAT and in development of "SMALL-SAT" technologies within Canada by engineering companies participating in the CIWG meeting.

A long list of cryospheric variables was developed and a science context was given for each. Requirements for spatial and temporal resolution were given as well. ("Science context" was simply explained as being "why" the measurement was wanted.) The resulting collection of information ran to 13 pages and so is not appropriate for presentation here, but a partial list of the variables is as follows: ice concentrations, floe size distribution, ice thickness, snow thickness, ice classes, snow density, ice surface roughness, wind velocity, ice topography, temperature (air-ice-water interfaces), etc.

Examples of "science context," in the case of ice concentrations were: (1) ice strength for dynamic models; penetrability for tactical navigation leading to a requirement for 10 m pixels and >1 km swath every six hours; (2) strategic navigation information requiring 1 km resolution and six-hour to one-day repeats; (3) marine mammal distributions with a 10 m resolution lower limit.

The tables often contained "summary notes" giving further insight into the need to have the variables measured in the manner specified. For example, the summary notes for ice concentrations read that "ice concentration is an important variable for most ocean-ice-atmosphere-related research....Small floes (about 100 m^2) are used as walrus haulouts. Larger scale concentrations may determine whale and seal distributions."

The authors' conclusions are presented verbatim below:

> "Although neither inclusive nor exhaustive we believe our list of cryospheric variables represents a good overview of the type and range of parameters required for measurement and monitoring of ocean-ice-atmosphere related processes in the arctic. We also conclude that remote sensing, in various regions of the electromagnetic spectrum, can provide useful information on geophysical aspects of the perennial ice cover. The major difficulties/issues which lie ahead include:
>
> - "Remote sensing surface validation programs are required to confirm the electromagnetic interactions at a variety of frequencies and at various spatial and temporal resolutions.

- "Research is required to determine the most effective means of using remote sensing data in arctic system models.
- "An effective information system is a prerequisite to establishing a broad, productive user base of arctic remote sensing data. Non-remote sensing specialists, who are experts in their particular arctic research, should be consulted when establishing this system.
- "Catastrophic events (and 'good' years) often drive success and failure of arctic populations, more so than at lower latitudes. The utility of temporal records is considerable and should be thoroughly evaluated in hindcasting and forecasting studies of arctic processes. We consider temporal scales of interannual to inter-decadal important within the context of this exercise.
- "Many of the variables are highly interrelated. We have not attempted to separate out uniqueness or redundancy in our assessment of the science objectives. Efforts will be required to prioritize and more objectively assess the complementary nature of the numerous variables required.
- "We have devised the science objectives independent of our working knowledge of what is currently available from remote sensing. These objectives represent optimal conditions, and should be revisited as advances in remote sensing technology arise.
- "Development of future sensor technologies must continue to be done in close coordination with the variable types, ranges, precisions and accuracies required by arctic researchers
- "Costs associated with obtaining remote sensing data sets for some applications may be prohibitive if a philosophy of cost recovery is implemented across all research disciplines. In particular, interannual analyses will become prohibitive given current research funding levels. The assessment of a general public good within various research categories must be assessed and the funding levels set accordingly."

The full results of the CIWG meeting will be published in a forthcoming issue of the Canadian Journal of Remote Sensing. A follow-on CIWG meeting, where design considerations will be emphasized, is currently scheduled for October in Halifax, Nova Scotia.

Meeting attendees were: Tom Agnew, Dave Barber, Ric Cox, Greg Crocker, Ben Danielewicz, Ellsworth LeDrew, Marlon Lewis, Chuck Livingstone, Anthony Luscombe, George MacFarlane, Mike Manore, Marie-Jose Montpetit, Ven Neralla,Bruce Ramsay, Irene Rubenstein, Mohamed Sayed, Ric Soulis, Ian Stirling, Charles Tang, Ken Tanner, Buster Welch, and Harold Zwick. Written contributions: Simon Prinsenburg, and Pierre Richard.

THE EARTH OBSERVER

The Earth Observer is published by the EOS Project Science Office, Code 900, NASA/Goddard Space Flight Center, Greenbelt, MD 20771, telephone (301) 286-3411, FAX (301) 286-3884. Correspondence may be directed to Charlotte Griner at the above address. Articles, contributions to the meeting calendar, and suggestions are welcomed. Contributions to the meeting calendar should contain location, person to contact, and telephone number. Deadline for all submissions is the 20th of each month. To subscribe to *The Earth Observer*, or to change your mailing address, please call (301) 513-1613, or write to the address above.

Upper Atmosphere Research Satellite

Here are excerpts of remarks made by Robert J. McNeal, UARS Program Scientist, at a UARS press briefing on August 15, 1991. UARS is of special interest to our Earth Observing community as a predecessor to EOS.

"On September 12, NASA will launch the Upper Atmosphere Research Satellite (UARS) and begin a new era of study of the global environment... We must deal with a whole new class of environmental problems where the arena is the entire planet; the time required for solutions can span several human generations; and the costs of corrective actions can be enormous.

"Development of strategies for solving these problems requires global data sets on the Earth as a system that can only be collected from space. In response to this need, NASA has designed Mission to Planet Earth, a long term, multi-satellite program to study our own planet from space and gather the needed data.

"UARS is the first satellite in that program. It will observe the Earth's upper atmosphere with a focus on the stratosphere, the location of the Earth's protective ozone layer. Concern about the depletion of this layer by manmade chlorofluorocarbons (CFC's) has risen sharply in the last few years with the appearance of the Antarctic ozone hole and new evidence from trends analysis for a 5% depletion of ozone at mid-latitudes during the last decade...

"Clearly, improved models of ozone depletion will be of great value to policymakers in dealing with the complex ozone depletion problem. UARS will provide the global data base for those improved models. In so doing it will contribute directly to understanding of a critical environmental problem, and it will lead to a tremendous increase in our knowledge of what is essentially a new frontier in experimental space science — our own Earth's upper atmosphere.

"UARS will be by far the largest satellite ever flown for atmospheric research. The payload consists of 10 instruments, which make their measurements independently but make up essentially a single large and well-integrated experiment to study atmospheric chemistry, dynamics, and energy inputs...

"The chemical composition measurements of UARS will provide us with pictures very much like those [from TOMS] **but resolved in altitude**. We will see the three-dimensional structure of the ozone hole, and (in fact) ozone around the globe. We will also have three-dimensional maps of the chemical species that control ozone concentration and of the wind fields that move ozone around. We will also have simultaneous data on the solar and energetic particle inputs that are the drivers for all atmospheric processes.

"The UARS program has recognized from its beginning the great importance of timely data analysis and theoretical studies. Ten theoretical principal investigators were selected at the same time as the nine experiments. In addition, many of the instrument teams have theoretical co-investigators. Plans are in place for very rapid data analysis. All of the data will be accessible, as soon as it is processed, to the entire team.

"Key data products will be available for early public release in view of the extraordinary public interest in stratospheric ozone depletion.

"A large correlative measurements program will be carried out along with UARS and will include ground-based, balloon, rocket, and shuttle-based instruments. There will be cooperating, major U.S. and European aircraft and balloon campaigns during the winter of 1991-1992 aimed at detailed process studies of arctic ozone to look for indications of large ozone depletion like that seen in the Antarctic."

LETTERS TO THE EDITOR

To the Editor:

We read with interest your account of the March 26-27, 1991 SAGE III team meeting in Vol. 3, No. 4 of *The Earth Observer*. We were puzzled to see that, in comparison with GOMOS, GOME, SCIAMACHY, and ILAS, it was concluded that "SAGE III will be the only instrument capable of characterizing aerosols below 20 km, and the only one of these instruments that can provide vertical profile data (of important gases) to at least the mid-troposphere".

As investigators on SCIAMACHY (and GOME) we wish to point out that SCIAMACHY, in its occultation mode, is at least equally capable of making such measurements. As we were not present at the SAGE III team meeting, we have no way of knowing how the above conclusions were obtained, but wish to take the opportunity to point out the characteristics of the SCIAMACHY instrument that are relevant to such comparisons. The SCIAMACHY spectral range includes, in addition to continuous wavelength coverage from 240 to 1700 nm, two shortwave infrared bands in the SWIR at 1940-2040 nm and 2265-2380 nm. SCIAMACHY measurements are made at moderately high spectral resolution (0.2 to 1.4 nm). with a spatial resolution corresponding to 1.2 km at the earth's limb. It can thus match the range of both gas and aerosol measurements made by SAGE III below 20 km.

In the troposphere there is a relatively high probability that, in the occultation geometry below 15 km, clouds may obstruct the view. Therefore, in our studies of the accuracy of parameter retrieval from SCIAMACHY measurements in the occultation geometry, our pronouncements were restricted to 15 km and above. The intention to retrieve trace gas and aerosol abundances from tangent heights below 15 km in the absence of obstruction by cloud measurements was, however, expressed. We are pleased to find that the SAGE III team has concluded that measurements below 15 km are indeed possible.

It is planned to launch SCIAMACHY on the European Space Agency's POEM-1 platform. POEM-1 has a planned polar orbit, so that global coverage in occultation will be comparable to NASA's polar-orbiting platforms (SCIAMACHY is also under study for German and French polar-orbiting atmospheric satellites, providing this coverage at an earlier timeframe than that planned for EOS-B and POEM-1).

Sincerely yours,

Dr. Kelly Chance
Harvard-Smithsonian Ctr. for Astrophysics

Dr. John P. Burrows
Atmospheric Chemistry Division,
Max Planck Institute for Chemistry

Dear Kelly and John:

This letter is in response to your July 24, 1991 letter to the Editor of The Earth Observer, and to give you directly the reasons for the statements in The Earth Observer, Volume 3, No. 4, regarding SCIAMACHY's capability to measure aerosols and gases below 20 km in solar occultation. Based on your presentations and other written materials on SCIAMACHY, it is our understanding that your horizontal (left-right) field-of-view is of the order of 2°. Because of this large field-of-view, we feel your attenuation measurements will have a strong aerosol forward scattering component contained within them which will make interpretation very difficult. Heavy aerosol loading and clouds will further exacerbate interpretation. In addition, the large field-of-view will greatly lower the probability of tropospheric penetration. SAM II and SAGE I have circular fields-of-view of approximately 0.5 arc min, while SAGE II's field-of-view is 0.5 arc min vertically by 2.5 arc min horizontally. It is this small field-of-view that allows a high probability of tropospheric penetration.

I will be happy to discuss this with you, or to provide any of our SAM II and SAGE experiences which will help in your design of SCIAMACHY.

M. P. McCormick
Principal Investigator, SAGE III

Global Change Meetings

October 6-11 — *NATO Advanced Research Workshop on the Atmospheric Methane Cycle: Sources, Sinks, Distributions and Role in Global Change*, Portland, Oregon. Contact the Workshop Director: Prof. M. A. K. Khalil, Oregon Graduate Institute, Beaverton, Oregon 97006; phone (503) 690-1078; FAX (503) 690-1029.

October 21-24 — International Conference on Global Change: Its Mitigation Through Improved Production and Utilization of Energy, Los Alamos National Laboratory, Los Alamos, New Mexico. Contact Dr. Robert Glasser at (505) 664-5808; FAX (505) 665-3107.

October 22-23 — Third Annual Conference: *Earth Observations and Global Change Decision Making: A National Partnership*, National Press Club, Washington, D.C. Contact Dr. Robert H. Rogers, ERIM, Box 8618, Ann Arbor, Michigan 48107-8618; phone (313) 994-1200, extension 3234; FAX (313) 994-5123.

Oct 31-Nov 1 — *Workshop on Atmospheric Measurement Issues in Understanding Climate Change*, Denver, Colorado. Contact G. North (409) 845-8083, Omnet: G.NORTH

November18-22 — *The Global Change Research Program: Requirements, Technologies, and Opportunities*, University of California, Los Angeles. Contact J. Rosati (213) 813-7062.

December 2-6 — World Conference on the Chemistry of the Atmosphere: Its Impact on Global Change, Baltimore, Maryland. Contact, CHEMRAWN VII, Secretariat, c/o American Chemical Society, 1155 16th Street N. W., Room 205, Washington, D. C.; phone (202) 872-6286, FAX (202)872-6128.

December 9-13 — American Geophysical Union, San Francisco, California; phone (202) 462-6910, Ext. 238

1992

January 5-10 — Third Symposium on Global Change Studies, sponsored by the American Meteorological Society, Atlanta, Georgia. Contact Eric J. Barron at (814) 865-1619; FAX (814) 865-3191; Omnet: E.BARRON.

January 14-16 — Center for Global Change Science, Massachusetts Institute of Technology Symposium: *The World at Risk: Natural Hazards and Climate Change*, Cambridge, Massachusetts. Contact Anne Slinn, (617) 253-4902; FAX (617) 253-0354.

January 27-31 — 1992 Ocean Sciences Meeting, American Geophysical Union, New Orleans, Louisiana. Contact Eileen E. Hofmann, Old Dominion University, Department of Oceanography, Norfolk, Virginia 23529; phone (804) 683-5334; FAX (804) 683-5303; Omnet: E..Hofmann.

February 16-17 — Marine Technology Society, *Down to Earth Oceanography*, a workshop for teachers, administrators and science coordinators, Catalina Island Marine Science Center. Contact Sam Kelly (714) 758-3338.

August 2-14 — XVII Congress of the International Society for Photogrammetry and Remote Sensing (ISPRS), Washington, D.C. Concurrent to the ISPRS Congress, two other meetings will be held nearby: the ASPRS and the American Congress on Surveying and Mapping (ACSM) will conduct a conference on Global Change; the International Geographical Union will convene its 27th International Geographical Congress (IGC) during the second week. For more information contact XVII ISPRS Congress Secretariat, P. O. Box 7147, Reston, Virginia 22091.

Future EOS Science Meetings

Fall 1991 — EOS Oceans Panel Topical Science Meeting on Air/Sea Interactions. Contact Mark Abbott, (503) 737-4045.

December 4-6 — EO-ICWG Meeting, Montreal, Canada. Contact Dixon Butler, (202) 453-8522.

January 15-17 — HIRIS Team Meeting, Boulder, Colorado. Contact Alex Goetz, (303) 492-5086.

EOS SCIENCE MEETINGS FOR SEPT/OCT 1991

SEPT / OCT

Monday	Tuesday	Wednesday	Thursday	Friday	Sat/Sun
2	3	4	5	6	7 8
9 TES Team Meeting Pasadena, CA ←	10	11	12	13	14 15
16	17	18	19	20	21 22
23	24 ← EOS Calibration Panel, Baltimore, MD	25	26	27 →	28 29
30	1 ← MODIS Team Meeting, GSFC, Greenbelt, MD	2	3	4 →	5 6
7	8	9	10	11	12 13
14 SAR Team Meeting Munich, Germany	15	16	17	18	19 20
21 ← Payload Panel Meeting Easton, MD →	22 ← ALT Team Meeting, CNES HQ's, Paris, France	23	24	25 →	26 27
28 ←	29 CERES Team Meeting Denver, CO →	30	31 ← Atmospheric Topical Science Workshop, Denver, CO →		

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