



The Earth Observer

An EOS Periodical of Timely News and Events

Vol. 2, No. 1

January 31, 1990

Message from HQ

I am very pleased with the President's budget request for 1991 which includes a "new start" for EOS and Earth Probes. The Mission to Planet Earth is one of NASA's main budget highlights. I am confident that the continuation of the budget process will result in a program that is a major contributor to the U.S. Global Change Program, to our understanding the Earth as a system, and to helping our country and our planet deal with global change in the next century. I want to thank each of you who has participated in this Presidential and Agency initiative.

Shelby Tilford

understand what it takes to carry out a large mission, and now we are getting ready for the long haul. We are creating the architecture and building the infrastructure daily.

The pace is quickening. Those who have joined the effort are destined to change the way our Earth is viewed.

Jerry Soffen

Message from EOS Project

EDITOR'S CORNER

PHASE C/D HERE WE COME!

Well, the EOS Project is now more than half-way through Phase B. The Science Teams are formed; the IWG is organized. The Project has a strong new management in place, and Headquarters has settled into its new organization. The President has requested the prerequisite "new start." The Committee on Earth Sciences of the OSTP has issued its 1991 plan for a billion dollar U.S. Program in Global Change ... and our international partners are planning their complementary polar orbiting missions. We are on a very solid foundation.

EOS is gathering strength. The scientific goals, the resources, the people, and the resolve -- those are the ingredients for success. NASA has led the world in every space venture. We

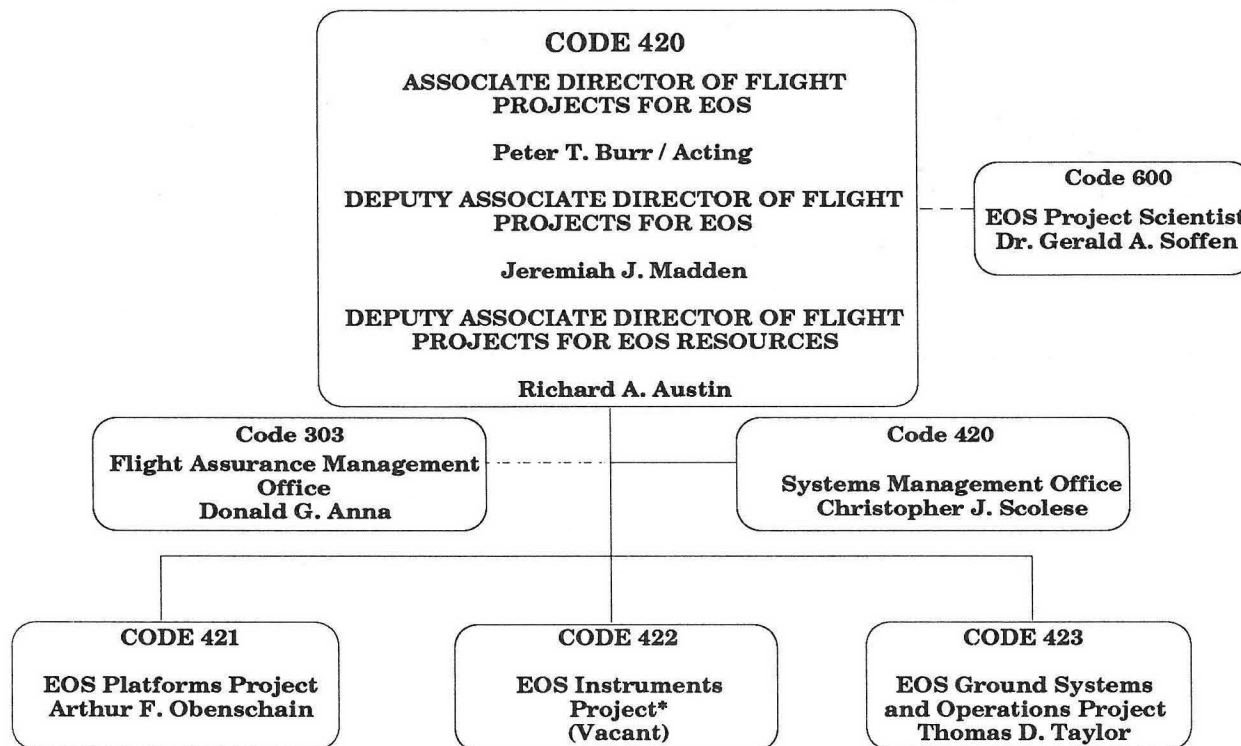
The newly established top-level organizational structure that became effective January 14, 1990, for the Earth Observing System (EOS) Project is shown on page 2. It currently operates as a directorate-level entity (Code 420), allowing proper emphasis to be given to this large GSFC mission. The organization was established to accommodate an FY91 new start to provide proper management for three interrelated elements: platforms, instruments, and ground system and operations. These have been established as division-level projects under the following GSFC codes: Code 421 - Platforms Project; Code 422 - Instruments Project; and Code 423 - Ground System and Operations Project. These are complemented by the EOS Project Science Office, Code 600, and the Flight Assurance Management Office, Code 303.

The EOS office and associated projects are currently being staffed. More detailed organizational breakdowns will be published in a later issue of this newsletter.

Jeremiah J. Madden

The Earth Observer

Earth Observing System (EOS) Project



*Martin J. Donohoe is the Deputy Project Manager for Instruments

Panel Reports

Atmospheres Panel

The Atmospheres Panel met January 8, 1990, at Goddard Space Flight Center. Over 30 people attended this first major meeting. The meeting's main topic was a discussion of questions directed to the panel by the Payload Advisory Panel, which focused on stratospheric chemistry, tropospheric chemistry, and temperature measurements. The Payload Advisory Panel asked the Atmospheres Panel to look at the possibility of moving HIRDLS (HIRRLS and DLS, now combined) and a CO instrument (MOPITT or TRACER) to EOS A; to look at the difference between the CO instruments MOPITT and TRACER; the scientific need for TES and SWIRLS, which were deleted from the Violet scenario; the role of both stratospheric chemistry instruments, SAFIRE and MLS; and the ESA instrument package.

The meeting began with presentations on AIRS, HIRDLS, and MODIS-N. Despite the large amount

of spectra retrieved by AIRS, its stratospheric temperature capability is not much advanced over the current NOAA system, TOVS. The addition of HIRDLS would add a great deal of temperature information from the tropopause up through the stratosphere and mesosphere. There was also some confusion over how much information AIRS could obtain in the lowest layers. Since so many instruments are relying on AIRS data, many on the panel thought AIRS data products were not very accurately defined, and it wasn't clear why AIRS would need so much spectra. There was also some confusion about what is included in the AMSU package: AMSU A, B and C or only some of these components.

The stratospheric presentations showed that the MLS and SAFIRE instruments, while having unique capabilities, also duplicate many measurements. The point was raised that these stratospheric measurements must be strongly justified, especially after UARS. In other words, the EOS B stratospheric

package should focus on stratospheric problems not attacked by UARS or balloon-aircraft campaigns, and on the minimum measurement set required to monitor the expected changes in stratospheric chemistry. Finally, since so little information was available on the ESA package, the panel couldn't seriously discuss the impact of the ESA instruments.

For long-term ozone trends, there was a general feeling that SAGE III provides the best continuity of ozone measurements (following SAGE I and II), but ozone trend studies by SAGE III are not best made from a polar orbiter since SAGE is a solar occultation instrument. SOLSTICE, which will be on UARS, is the best UV monitor and is also needed to understand ozone trends. Thus, the panel believes SAGE III and SOLSTICE should be flown as soon as possible for continuity of ozone and UV measurements. These instruments should not wait for EOS-B. (SOLSTICE cannot fly on EOS-A because HIMSS blocks its view.)

A presentation by the SWIRLS team indicated that SWIRLS wind measurements are very important for studying stratospheric dynamics and understanding stratospheric chemistry measurements. It will not be duplicated by the ESA DWS instrument since DWS has a data gap from 35-65 kilometers and is daylight only in the stratosphere. XIE will also provide particle flux information not obtained by UARS and is an important part of the stratospheric package.

In the troposphere, presentations by both the MOPITT and TRACER teams showed that these instruments can obtain several levels of CO data. MOPITT's retrievals were improved by additional temperature information. TRACER can use N₂O data to determine cloud contamination and also measures the methane column. However, both instruments would benefit from coincident cloud information. TES is the only instrument which can get ozone in the troposphere; and there was a general belief that TES meets the minimum requirements for a good tropospheric chemistry package, namely measurements of CO, O₃, H₂O, clouds, NO_y, SO₂, and UV.

The Atmospheres Panel believes that the EOS mission will be significantly compromised without tropospheric trace gas measurements of the kind provided by TES. There is sufficient urgency to this issue that the panel believes the CO instruments should be moved to EOS A. (If HIRDLS is also moved to A,

tropospheric ozone may be estimated by using HIRDLS to get stratospheric ozone and subtracting it from TOMS total ozone. This might do until TES is ready.)

During the open discussion period, Jim Spinhirne pointed out that the laser altimeter from GLRS could be used on EOS A. The altimetric portion of GLRS uses much less power than the complete GLRS since the ranging is not used, and it would allow accurate measurement of ice sheet thickness, thin cirrus, cloud height and spacecraft altitude. Spinhirne asked the panel to ask the Project Office to look at this idea.

The next Atmospheres Panel meeting will be held March 19 at Goddard Space Flight Center. Discussion will focus on tropospheric instruments, climate and hydrology.

Mark R. Schoeberl, Chairperson

Biogeochemistry Panel _____

The Biogeochemistry Panel met January 11-12, 1990, in Fort Collins, Colorado. Attendance was good with most of the disciplinary areas (oceans, atmospheres, biosphere) represented. The panel drafted an initial charter and spent most of its time on the following recommendations to the Payload Panel. Recommendations concerning EOS science are also listed below.

The Biogeochemistry Panel will meet again during the summer to consider several issues. These will include the development of a focus for biosphere-tropospheric chemistry studies within EOS, the coordination of field studies, pre-launch, and the need for ongoing field measurements for calibration and validation.

Instrument Recommendations:

1. The Biogeochemistry Panel believes HIRIS is critical to the EOS program in marine and terrestrial biogeochemistry. Both the spatial and spectral attributes of HIRIS are critical.
2. The Biogeochemistry Panel believes adding TRACER/MOPITT to Platform A would substantially improve EOS's ability to address atmosphere/biosphere interactions. We believe

Panel Reports (Continued)

TRACER's capability to detect methane will be a significant advantage.

3. The Biogeochemistry Panel believes studies of biogeochemistry and links between the atmosphere and biosphere would best be served by flying Platforms A and B together to maximize synergism, especially to address transfer between the atmosphere and ocean, and between the boundary layer and free troposphere. The limited resolution of the diurnal cycle and the small number of accessible parameters gained by a MODIS on B were not perceived as offering sufficient advantages to the program as a whole to be worth the sacrifice of synergism.
4. TES offers the potential to significantly improve analyses of biosphere/atmosphere interactions, especially in the critical area of tropospheric ozone. We strongly support TES's inclusion on Platform B.
5. The GLRS altimeter has several attributes that are interesting to the biogeochemistry community, including its ability to sense forest canopy structure and to determine the vertical distribution of aerosols for studies of transport. If resources permit, we support its inclusion in EOS.
6. SAR will contribute significantly to EOS goals, and we believe it is important that SAR be developed and flown in an orbit that allows synergism between SAR and EOS optical sensors.

EOS Science Recommendations:

1. The Biogeochemistry Panel believes ground and airborne missions for algorithm development and sensor calibration are crucial to EOS's success. We will provide specific recommendations after further discussion.
2. The Biogeochemistry Panel recommends additional support be provided to initiate and coordinate activity in the area of atmosphere-biosphere interactions, especially in the area of trace gases. This should be discussed by the Science Executive Committee (SEC) and presented to the Investigators Working Group (IWG) for discussion.

Dave Schimel, Chairperson

Calibration/Data Product Validation Advisory Panel _____

This panel met on December 19, 1989, at Goddard Space Flight Center. Panel membership includes Instrument Investigators (Facility Team Leaders and Principal Investigators) or their appointed representatives from each instrument investigation, as well as Interdisciplinary Principal Investigators or their selected representatives. Dr. Moustafa Chahine, AIRS Facility Team Leader, is the designated panel chairperson. The panel represents, and reports to, the Investigators Working Group.

The scope of the panel, as identified in its charter, is to have overview of all U.S. EOS instruments on all platforms, and non-U.S. instruments on EOS platforms. The technical scope of the panel covers the end-to-end data products of EOS and includes the following:

1. Instrument calibration and instrument cross-calibration before launch and in orbit.
2. Validation of data products using in-situ measurements and field experiments.
3. Insuring long-term stability of the data products to meet the requirements of the EOS disciplinary and interdisciplinary investigations.

Moustafa Chahine, Chairperson

Facility Instruments Panel _____

The Facility Instruments Panel, V. V. Salomonson, chairperson, has predominantly conducted business and developed information using electronic mail, facsimile machines, and express mail.

Much of the recent activity has focused on developing inputs for the EOS Payload Advisory Panel (Berrien Moore, chairperson). Each Facility Instrument Team Leader developed statements of the essential contribution made by his/her instrument to questions of global change (i.e., "golden questions"), indications of essential and contributing roles in the priority areas identified by the Committee on Earth Sciences, and a list of products to be provided by the instrument

with attendant estimates of accuracy. A report consisting of inputs from all the Facility Instrument Teams was compiled and delivered at the first Payload Advisory Panel meeting in New Hampshire.

The ongoing activity is now focusing on each Facility Team's further reviewing its list of data products. These data products are to be limited to those that each team, and identified scientists in particular, has high confidence can be provided to the scientific community, with useful accuracy, early in the EOS mission. Identification and description of products that will be further developed over the lifetime of the EOS mission is deferred until later. The Facility Instruments Panel is working and will continue to work with the Principal Investigator (PI) Instrument Panel (Jim Russell and Jim Drummond, chairpersons) to provide a total list of high-confidence products that will be compared to a list of input requirements generated by the Interdisciplinary Investigator Panel (JoBea Way, chairperson).

The report containing results from the Facility Instruments Panel's efforts was delivered to the Payload Advisory Panel at its second meeting late in January 1990.

Facility Instruments Panel Contributors:

V. V. Salomonson, chairperson (MODIS); A. Goetz/D. Vane (HIRIS); C. Elachi (SAR); A. Kahle (ITIR/TIGER); L. Fu (ALT); W. Baker (LAWS); S. Cohen (GLRS); and M. Chahine (AIRS/AMSU).

V. V. Salomonson, Chairperson

Principal Investigator (PI) Instrument Panel _____

The PI Instrument Panel is developing a detailed set of tables describing the measurement capabilities of each instrument. The information will include the parameters measured, spectral region used, altitude range, spatial resolution, temporal resolution, latitude coverage, and estimated accuracy. The lists will include only "direct" measurements (i.e., they will not include derived quantities such as winds from temperature observations) and those measurements that will withstand the scrutiny of peer review.

The goal of this activity is to provide a conservative list of measurements that can be relied upon in formulating science scenarios and in developing payload recommendations. Tables describing any interdependency of one experiment on another and science synergisms are also being developed.

Jim Russell, Chairperson

Modeling Panel _____

The Modeling Panel, under the leadership of its current chairperson, Robert Dickinson, had its first meeting the evening of December 4, 1989, at the Fall AGU Meeting.

Through the use of 4-D assimilation systems, models will play a key role in the synthesis of EOS instrument data into data sets needed by the scientific community. Furthermore, the comprehensive models needed for projecting global change require globally distributed data for validation, boundary conditions, and process description. The data are best obtained from EOS and other satellite systems.

The Modeling Panel will determine what global change models will look like in the era of EOS, what the largest sources of uncertainty will be, and how EOS can contribute needed process understanding and key global data sets. It will also coordinate the planning of 4-D assimilation systems, the requirements for computational resources, and act as a forum for consideration of modeling questions relevant to the activities of the other EOS panels.

Robert Dickinson, Chairperson

Particles, Fields and Radiation Panel _____

The panel met during the Investigators Working Group (IWG) meeting in Pasadena. Current activity includes intercommunication of science objectives and examining the synergisms among ourselves and with other disciplines on EOS.

Upon examining the potential capabilities of the complement of instruments selected for EOS, it seems

Panel Reports (Continued)

likely that the functions of the SEM are largely duplicated by other instruments.

The next meeting will probably be held during the spring AGU with panel members corresponding by mail until then.

Bob Langel for
Rod Heelis, Chairperson

Solid Earth Panel

The Solid Earth Panel was established by the Investigators Working Group (IWG) at its last meeting. Membership on the panel was solicited from all IWG members and could include their co-investigators and other interested parties. To date, 17 investigators representing IDS, principal investigator instrument, and facility instrument investigations have volunteered to serve on the panel.

The panel is compiling lists of key scientific objectives called silver bullets, the measurement requirements derived from those objectives (accuracies, spatial and temporal resolution, coverage, etc.), and assessing the relevant instruments. Silver bullets have been received on crustal deformation, geomagnetic fields, volcanology, tectonic-climate interactions, sea level change (both contemporary and geologic time scales), desertification, and erosion.

Panel Members:

Steven Cohen, acting chairperson, Diane Evans; Alex Goetz; Brad Hager; Bryan Isacks; Anne Kahle; Robert Langel; Bill Melbourne; Peter Mougini-Mark; Frank Palluconi; Larry Rowan; David Salstein; Gerald Schaber; C. K. Shum; Mark Torrence; Clark Wilson; and Thomas Yunck.

Steven Cohen, Chairperson

Payload Advisory Panel

The second meeting of the IWG Payload Advisory Panel was held January 23-24, 1990. The principal results of the meeting are as follows:

1. Berrien Moore, Payload Advisory Panel chairperson, is preparing a letter to Dr. Fisk that will contain the Payload Panel's recommendation regarding the EOS-A payload. The consensus at the meeting was to add HIRDLS, EOSP, MOPITT/TRACER, and STIKSCAT to EOS-A, if feasible, and to consider adding TES to EOS-B. The letter will probably request that the Project evaluate the above modification to the VIOLET EOS-A payload and the use of a solid state altimeter (this action should really go to the ALT PI). Additionally, the panel may recommend that the AMSU-A and -B sounding channels be incorporated into HIMMS; this action will require resolution with the AIRS and HIMSS teams. A recommendation on the EOS-B payload will be made prior to the EOS-B selection in September 1991.
2. The Payload Advisory Panel would like to maintain a continuing role in resolving accommodation conflicts and priorities.
3. It was agreed that Payload Advisory Panel members would be provided copies of the instrument data books assembled by the EOS Instruments Project, with any updates resulting from the CDCRs.
4. The Payload Advisory Panel expressed an interest in attending the CDCRs. It was agreed that members could attend as long as the party attending did not have a competing instrument concept.
5. The panel is beginning to evaluate whether the measurements that the instruments make are required and/or necessary to obtain the desired data. This was an underlying consideration at the meeting and is likely to be the topic of the next meeting.

The next meeting is scheduled for either April or late July.

Chris Scolese and Marty Donohoe for
Berrien Moore, Chairperson

Addendum:

According to an early draft letter to Dr. Fisk, the Payload Panel will strongly recommend that SAR fly

Global Change Meetings

Feb. 23	Earth System Dynamics: The Determination and Interpretation of the Global Angular Momentum Budget Using the Earth Observing System, Jet Propulsion Laboratory (JPL), Byron Tapley. Contact Elizabeth Smith, (818) 354-9474.
Mar. 12-13	Modeling the Physics, Biology and Chemistry of the Upper Ocean and its Interaction with the Atmosphere, London. Contact M.J.R. Fasham, Institute of Oceanographic Sciences, Surrey, U.K.
Mar. 19-23	Global Biomass Burning: Atmospheric, Climatic and Biospheric Implications, Williamsburg, VA. Contact Joel Levine, (804) 865-2187.
Mar. 28-30	3rd CERES Science Team Meeting, Langley Research Center, Hampton, VA. Contact Jim Youngblood, (804) 864-4509.
Apr. 10-12	Global Warming - A Call for International Coordination, Chicago. Contact: Sinyan Shen, SUPCON International, Woodbridge, IL
Apr. 24-27	International Conference on the Climate Impact of Solar Variability, Goddard Space Flight Center (GSFC). Contact Kenneth Schatten, (301) 286-3831.
May 29- June 1	AGU Spring Meeting, Baltimore
June 19-23	4th CERES Science Team Meeting (tentative). Contact Jim Youngblood, (804) 864-4509.

in conjunction with Platform A. Also, the panel thinks TRMM should be launched in the Platform A time frame for precipitation measurements. Consideration should be given to moving SWIRLS to Platform B and, possibly, ALT should fly as an Earth Probe mission.

Dr. Moore reported on his panel's activity at the SEC meeting January 30, and *The Earth Observer* will reflect his report in the next issue.

Renny Greenstone

Physical Climate and Hydrology Panel

The EOS Science Panel on Physical Climate and Hydrology held a meeting during the American Geophysical Union annual convention. The panel approved the charter and produced an outline for a position paper on science priorities and data needs. The science priorities center on three themes: long-term consistent measurements of key variables, critical process studies, and requirements for improved predictive models. The outline has been submitted to the full panel by mail.

The next meeting is to be held February 5 during the American Meteorological Society meeting. There will be discussions and task assignments to complete the science priorities document.

Eric Barron, Chairperson

Acknowledgment

The new EOS logo was designed by the General Electric Astro Division, Princeton, NJ, and is being used with its permission.

The Earth Observer is a monthly publication of the EOS Project Science Office, Code 600, NASA/Goddard Space Flight Center, Greenbelt, MD 20771, telephone (301) 286-8228, FAX (301) 286-3884. Correspondence may be directed to 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 entries is the 20th of each month.

The Earth Observer

EOS Science Meetings - 1990

	Monday	Tuesday	Wednesday	Thursday	Friday	Sat/Sun
			← MODIS Team Meeting, GSFC →			3 4
			← Tropospheric Chemistry Workshop, Pasadena, CA →			
			← AIRS Team Meeting, Camp Springs, MD →			
F E B R U A R Y	Physical Climate and Hydrology Panel, Anaheim, CA ← GLRS Team Meeting, GSFC →		7	8	9	10 11
				← POD/MD Panel, Austin, TX →		
	12		14	15	16	17 18
			← EOSDIS Final System Design Review, GSFC →			
				Oceans Panel, New Orleans AGU/ASLO Panel, New Orleans		
	19	20	21	22	23	24 25
	26	27	28	1	2	3 4
			← HIRIS Team Meeting, Pasadena, CA →			
M A R C H	5	6	7	8	9	10 11
	12	13	14	15	16	17 18
	19	20	21	22	23	24 25
			← IWG Meeting, New Carrollton, MD →			
	26	27	28	29	30	31 1
	2	3	4	5	6	7 8
A P R I L	9	10	11	12	13	14 15
	16	17	18	19	20	21 22
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	30					

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