

**Committee on Earth Observations Satellites
Fourth Plenary Meeting**

IV

Sao Jose dos Campos, November 13-14, 1990

The fourth Plenary meeting of the Committee on Earth Observations Satellites (CEOS) was held November 13-14, 1990, hosted by the Brazilian National Space Research Institute (INPE). Representatives were present from INPE, Canada, ESA, EUMETSAT, France, Germany, Italy, Japan, NASA, NOAA, and the UK. Australia and India were unable to attend. A representative from the World Meteorological Organization also participated as a guest. The chairman of the meeting, Mr. Marcio Barbosa, the Director General of INPE, began by welcoming the participants to Brazil on behalf of the Secretary of Science and Technology. He expressed INPE's pleasure in hosting the meeting. He also stated the goal of enhancing the effectiveness of CEOS as a body to promote international coordination in the field of Earth observations.

Review of Agenda, Past Action Items

The proposed agenda was modified and approved. Action items 3.1, 3.2, and 3.3 from the previous CEOS Plenary were for Canada to notify New Zealand and the European Communities of the disbandment of IFEOS and invite them to request observer status; to invite New Zealand and the EC to participate in the 4th CEOS Plenary; and to encourage members who were not present to attend the 4th CEOS Plenary. Dr. Lindberg (Canadian Space Agency) explained that New Zealand wished to apply for observer status, but had not yet done so. All three actions were closed. Consideration of new requests for member and observer status was deferred until after discussion of changes to the Terms of Reference.

MEMBER REPORTS

Brazil

Mr. Barbosa made the Brazilian presentation. He reviewed INPE involvement in CEOS. Initial membership was based on the proposed BRESEX experiment, which was later canceled due to the Challenger accident. Brazil's participation is now based on two ongoing programs, the Complete Brazilian Space Mission (MECB) and the China-Brazil Earth Resources Satellite (CBERS) program. Brazil is active in the Working Group on Data and expects to be able to participate more fully in all CEOS activities in the future.

MECB plans call for two data collecting satellites (DCS) and two remote sensing satellites (RSS). DCS-1 is in the end of Phase D, DCS-2 is in Phase C, and RSS-1 is in Phase B. DCS-1 is planned for launch in March 1992, with proposals for launch received from the PRC, the USSR, and a private American company. The budget, including development of a launch vehicle and near-equatorial launch site in Brazil, is close to \$1 billion (US).

CBERS is a cooperative program with the PRC, with INPE responsible for approximately 30% of the program. CBERS-1 is in Phase C. The program will develop two satellites, with the first scheduled for launch in 1994. Mass will be 1400 KG, EOL 1100 watts, sun-synchronous orbit, 3-axis stabilization. Data will be made available to all interested nations. The satellite will carry a CCD camera, an IR-MSS instrument, and a Wide Field Imager (WFI).

As far as other international cooperation, INPE is supporting an EOS interdisciplinary investigation in cooperation with Washington University. They are also cooperating with NASA in an atmospheric chemistry project (ROCOZ). INPE has proposed an ERS-1 investigation and an ERS-1 ground station is under construction. This station will be upgraded to receive RADARSAT data as well. INPE sponsors a training program with UN-OSAD, ESA, and SELPER. This international fellowship program has trained 29 participants to date. INPE is participating in the ISY world forest watch project in cooperation with the EC/JRC, and they are actively trying to gain other participants in this important project. INPE operates ground stations for Landsat, SPOT, GOES, NOAA, and METEOSAT, as well as a local user terminal for SARSAT/COSPAS.

Canada

Dr. Lindberg (CSA) began the Canadian presentation. He reviewed CSA's mandate and activities. CSA was formed in 1989, incorporating ongoing programs from various agencies. CSA has coordination, advisory and operational roles. CSA is responsible for RADARSAT, various laboratories, the Astronaut program, and the Space Science program. CSA coordinates with other significant space activities outside its responsibility, including meteorological satellite activities of Environment Canada, and the activities of the Canada Centre for Remote Sensing.

Radarsat entered Phase C in January of 1990, with launch scheduled for late 1994. It carries a C-band SAR, with variable swath width and resolution. Canada can be covered in 3 days, an equatorial nation in 7 days. A new company, RADARSAT Inc. (RSI), has been formed to distribute data.

Dr. Sayn Wittgenstein (CCRS) then presented CCRS activities, which are concentrated in ground systems and data processing. CCRS is currently preparing for ERS-1 data utilization and is updating airborne capabilities. Both SAR and Optical applications are emphasized, and CCRS plays a key role in the

Canadian Global Change Program. Canada is participating in 2 EOS investigations and the NASA boreal forest experiment, as well as several ISY programs. Dr. Sayn Wittgenstein offered to make optical disks of airborne SAR data available to participants.

Dr. Revah asked for more information on RADARSAT contributions to global change research, in particular how data would be made available. Dr. Sayn Wittgenstein stated that RADARSAT will be an important tool for monitoring Arctic ice conditions, and for monitoring tropical rejoinings where coverage is not currently adequate. While commercial distribution is the baseline plan, consideration is being given to scientific needs. Dr. Tilford noted that NASA is a partner in Radarsat, and that ice conditions in Antarctica are a research focus for NASA using RADARSAT data.

EUMETSAT

Mr. Morgan made the EUMETSAT presentation. There are currently sixteen member states. EUMETSAT participates in the Global Weather Observation System by operating geostationary satellites. EUMETSAT plans to begin operating a morning polar system in cooperation with NOAA and ESA in the late 1990s. Currently EUMETSAT is operating METEOSAT 4, with two other geostationary satellites operable in orbit. METEOSAT 2 is out of fuel but still operational. METEOSAT 3 is the primary back-up. All systems on METEOSAT 4 are operational, but there have been some anomalies which may eventually cause problems. The METEOSAT transition program is being developed to bridge the gap between the end of the current program in 1995 and the beginning of METEOSAT Second Generation (MSG). MSG Phase A will begin in 1991. ESA will contribute some funding and will procure the satellite on behalf of EUMETSAT. Plans call for the polar system to enter Phase A during 1991 as well, with operations beginning in 1997.

Mr. Morgan reviewed the proposed instrumentation for MSG and described the proposed polar operational service. The operational payload is planned for embarkation on the first ESA polar platform series. Discussions are underway with ESA on reconciling operational and research requirements to ensure reasonable continuity for operational service. One possible plan is to have a smaller back-up meteorological platform derived from the current ESA platform design. Decisions should be reached by the end of 1990. Mr. Barbosa expressed his appreciation to EUMETSAT for their help in the INPE DCS system design.

ESA

Dr. Duchossois made the ESA presentation. He explained that ESA is preparing for the launch of ERS-1, currently scheduled for May 1991, as well as defining a long term plan for Earth observations.

ERS-1 is undergoing final check out procedures. The science program is highly interdisciplinary, with contributions made to environment and climate research, primarily on the role of oceans. International cooperation is an important part of the ERS-1 program, with many agreements reached for direct reception of data from high data rate instruments. ESA will also provide low bit rate data to many nations. ESA is participating in the EC/INPE ISY forest monitoring project, and ERS-1 will be a major European contribution to ISY's 1992 activities.

Moving to the longer term plans of ESA, the overall Earth observation program is centered on four themes: monitoring the environment, monitoring and management of resources, continuing the operational service, and contributing to the understanding of crustal dynamics. Four missions have been proposed: ERS-2, ARISTOTELES, METEOSAT Second Generation, and a polar platform program.

ERS-2 has been approved. It will be an enhanced version of ERS-1, with an upgraded scanning radiometer and a new global ozone instrument. The planned launch date is mid-1994. ARISTOTELES is a mission focussed on mapping of the magnetic and gravity fields of the Earth, along with precise positioning, being planned jointly with NASA. MSG is being developed with EUMETSAT, with launch in 1998. The fourth component of the plan is the Polar Orbit Earth observation Missions (POEM) program, which calls for 2 series of large polar platforms. The first (M) series will focus on ocean and atmosphere, while the second (N) series will be more land oriented.

The M-1 mission is currently in extended Phase A, which will be completed in February 1991, with a preparatory program also underway. Phase C/D should begin at the end of 1991 or in early 1992. An extension of 5 years for the Earth Observation Preparatory Program (EOPP) has been requested. EARTHNET, ESA's ground segment program, is currently acquiring and distributing data from many past and current missions, and will be the basis of future ground system development in Europe. In response to a question about how global data coverage would be obtained, Dr. Duchossois explained that the European platform would use both downlinks of recorded and real-time data and data relay satellites, along with data exchange between the space station partners.

France

Dr. Revah (CNES) made the French presentation. France is pursuing a balanced program of activities, including space science, telecommunications, launch vehicles, and Earth observations. Within Earth observations, there are 3 different components: national programs (SPOT), bilateral cooperation in Earth science research, and participation in ESA programs. France is now cooperating

with both NASA and ESA through the provision of instruments to ERS-1 and UARS. Earth radiation budget measurements will be continued through cooperation with the USSR using the SCARABE instrument. CNES is developing the MIRAS, POLDER, and GOMOS instruments. TOPEX/Poseidon is a joint NASA CNES satellite focused on ocean circulation, with France providing both launch and instruments.

France has proposed the GLOBSAT mission to fill the potential gap between already approved programs and the polar platform programs proposed by ESA, NASA and Japan. The GLOBSAT concept focuses on process studies, using validated instrument concepts and no critical technologies, enabling a 1996-1997 launch. GLOBSAT is in Phase A, and is not yet an approved national mission. Two scenarios are under consideration: a one shot mission to precede the European polar platform or a series of missions carrying the operational payload which could be implemented in cooperation with EUMETSAT as part of the ESA polar platform program starting in 1997.

France also has an active applications program centered on the SPOT system. SPOT 2 has been launched, and SPOT 3 will be ready for launch in about a year, if necessary. SPOT follow-on activities focus on maintaining continuity, serving the user community, and increasing international cooperation. Technically, addition of radar and improved resolution are goals. French planning is influenced by IGBP and WCRP scientific objectives. In response to a question from Dr. Harries, Dr. Revah also mentioned a LIDAR project focused on cloud radiation interaction and stated that France is exploring ways to contribute to water cycle studies.

Italy

Dr. Bizzarri (Italian Meteorological Service) made the Italian presentation on behalf of ASI. He covered both national programs and contributions to ESA and EUMETSAT activities. Most Italian activity in Earth observation is through ESA and EUMETSAT. Italy supports all ESA Earth observation programs. Italian participation in POEM includes RA-2, MIMR, MERIS, and SAR and IR sounding if they are embarked. Italy also supports all of the current EUMETSAT programs. Current Italian programs include the LAGEOS 2 geodetic satellite program and a study for a Weather, Environment, and Climate Operational Satellite (WECOS). WECOS is composed mainly of operational and climate monitoring instruments, and is seen as a possible follow-on to POEM-1. Italy is also conducting a preliminary study of a low-altitude, low-inclination satellite as a contribution to the GEWEX.

SAR-X instrument development in cooperation with the FRG continues, with flights planned on the NASA STS in 1993 and 1994. The Advanced Microwave Imaging Radiometer (AMIR) has been assimilated into the ESA MIMR project. National AMIR work is still underway, and Italy is interested in contributing

this instrument to other programs, including the Japanese polar platform if it is moved to a lower inclination orbit. The Infrared Atmospheric Sounding Interferometer (IASI) is being jointly studied with France. The SAFIRE limb sounder is a joint effort with NASA/Langley under consideration for EOS-B.

Japan

Mr. Nakamura (STA) began the Japanese status report. He reviewed the Japanese global change program, which promotes research and study, observation and monitoring, and technology development. Japan has adopted an Action Program to Arrest Global Warming, and based on a report from the Council for Science and Technology, the Prime Minister has established a basic research and development plan. This plan recognizes space-based observation as a unique and important tool for global change studies.

Japan's Earth observations satellite programs include MOS-1 and MOS-1b (currently in orbit), JERS-1 and ADEOS (under development), and JPOP (in planning). During the past year, Japan hosted the third SAFISY meeting, and an experts meeting on use of networks for global change studies. Mr. Haruyama distributed the report from the Kyoto SAFISY meeting. Japan will host the 14th EO-ICWG meeting in December 1990.

Mr. Haruyama, the new Director of Earth Observations for NASDA, then continued the presentation. He discussed development and operations of the GMS weather satellites and the MOS series of ocean monitoring satellites. He then described the JERS-1 program, currently scheduled for launch in February of 1992. Japan recently hosted a large international meeting to discuss various aspects of the JERS-1 program. A SAR is the major instrument on the satellite. An Announcement of Opportunity for use of JERS-1 data has just been released, and Mr. Haruyama encouraged CEOS members to submit proposals in response.

ADEOS has just moved into Phase C/D, with a contract recently awarded. It will carry two NASA instruments and one CNES instrument, along with 2 NASDA sensors, a MITI sensor, and 2 instruments from the Japan Environment Agency. TRMM is currently under discussion with NASA, and a budget proposal is being prepared for submission. JPOP is still being assessed, with various scientific studies underway. As far as ground station activity, Landsat and MOS data are currently received, and JERS-1 facilities are under construction at the Earth Observation Center.

Dr. Hinsman asked about plans for geostationary satellites after GMS-5, and Mr. Haruyama stated that JMA has not yet defined a new series for NASDA to develop. Dr. Bizzarri asked about moving JPOP to low inclination orbit to fulfil scientific objectives that cannot be accomplished as well from polar orbit, such as wind, precipitation, and Earth radiation budget studies. It was explained that

Japan is studying alternatives, and will present several alternative payload and orbital inclination options at the next EO-ICWG meeting.

USA/NASA

Dr. Tilford began the NASA presentation by thanking the representatives of the international community for their support, which has played an important part in enabling NASA to begin 3 major new programs this year: EOS, TRMM, and SeaWiFS. He went on to explain that much time since the last meeting has been spent on developing the US Global Change Research Program, an interagency activity for which EOS will be the centerpiece. He emphasized that while satellites will be very important, the most important part of NASA's planned program will be the data and information system.

Dr. Tilford gave brief updates on current NASA programs being pursued in cooperation with other nations, including UARS, TOPEX/Poseidon, ADEOS, and Radarsat, and SIR-C. He then moved on to EOS, reviewing the EOS instrument selection process and EOS data policy. Data will be available to all users, with distinctions in cost currently mandated by law (which may be changed), and no exclusive period of access. Current plans call for EOS sensors with limited duty cycles to be operated only where demands are identified. All EOS data will be processed in "near-real-time." Dr. Tilford reviewed the EOSDIS schedule for the group. Work on "version 0" of EOSDIS has recently begun, with the goal of beginning operations in 1994.

USA/NOAA

Mr. Koffler made the NOAA presentation. NOAA has also received a substantial budget increase this year. NOAA is now distributing research data for the cost of reproduction only. Current GOES status, future plans, and schedules were described. GOES-I is scheduled for launch in 1992, GOES-J for 1993. The pre-Phase A for GOES N+ has recently begun. NOAA continues to operate the POES system, and future plans were described. NOAA has received approval for its future instruments and afternoon satellites in polar orbit, along with instruments for the planned EUMETSAT/ESA/NOAA morning service. He described the proposed global data flow. Landsat 6 is scheduled for launch in July 1992. No decision has been made yet by the US on future Landsat plans.

United Kingdom

Mr. Pryor, Director of the British National Space Centre, reported that the UK has recently published an Environmental Policy book. The UK wants to be a major cooperative player in Global Change research. A national coordination committee (IACGEC), which includes BNSC, has been formed. BNSC is

contributing instruments to ESA (ERS-1 and 2, Polar Platform), NASA (UARS, and EOS), and EUMETSAT (polar) programs. The UK policy supports two data distribution concepts: commercial value-added efforts aimed at financial self-sufficiency, and low-cost international exchange for scientific research. This requires the scientific users to provide their results in the public domain and establishment of "policing" to prevent leakage through scientific distribution into the commercial arena. Mr. Pryor made the point that no data are "free"--the question is defining which entity is responsible for the costs. The UK has just established the Earth Observation Data Centre, which will be the ERS-1 Processing and Archiving Facility for the UK, and which will also develop commercial applications services. The goal is for this center eventually to become financially self sustaining.

European Communities

Dr. Duchossois (ESA) made the EC/JRC report on behalf of Dr. Klersy, who was unable to attend the meeting. The general objective of the EC program is to evaluate the applications of remote sensing to operational problems in the areas of agriculture, environment, development and fisheries. The EC is involved in performing this function using data from both ESA and European national programs. JRC is also contributing to global change research studies in both continental and marine areas. One marine project involves reprocessing CZCS data at various levels and deriving new products for various users. Other research activities include development of advanced techniques in microwave, imaging spectrometry and laser induced fluorescence. They are also developing new methods of image processing and integration of remote sensing data into geographical information systems. Finally, the Tropical Ecosystem Environmental Sensing by Satellite (TREES) project is being undertaken with ESA's cooperation. This project uses both AVHRR and high resolution data for tropical deforestation assessment.

Federal Republic of Germany

Mr. Schmid (BMV) made the German presentation. He noted the creation of a German Space Agency (DARA) and emphasized the importance of remote sensing. DARA sees a need for balance between research and applications work in their program. Mr. Schmid went on to briefly describe the proposed Atmospheric and Oceanic Research Satellite (ATMOS). It is seen as a gap-filler between the ERS missions and the polar platforms. The satellite will carry the AMAS, MIPAS, SCIAMACHY, and ROSIS instruments.

INTERNATIONAL SATELLITE COORDINATION GROUPS

Earth Observations International Coordination Working Group (EO-ICWG)

Dr. Duchossois described the EO-ICWG and its activities. EO-ICWG was set up in 1986 to coordinate plans and activities related to the development and exploitation of the international system of polar orbiting platforms. Members include ESA, Japan (STA, NASDA, MITI), NASA, and CSA, along with their operational counterparts--EUMETSAT, JMA, NOAA, and AES.

The group considers various technical and policy issues, including orbit configurations; preparation of AO's; harmonization of payload selections; instrument provisioning, calibration and data validation; data management, distribution and exchange; mission and payload operations; and data policy for access and provision of data to users.

EO-ICWG is an informal group with the aim of allowing free exchange of views between participants. Meetings are usually held two or three times per year, rotating locations among members, with the last meeting in Frascati, hosted by ESA. The main outcome of the last meeting was progress in discussions of instrument exchange, calibration/validation plans, mission management, data management, and data policy. Instrument and platform developments were reviewed, along with organization and management issues. The Japanese network initiative was discussed at length.

Mr. Barbosa noted that the group was composed of "data suppliers," and asked how user requirements were taken into consideration. Dr. Duchossois explained that each member represented the interests of their own users. Ms. Shaffer noted that improving communication between data users and suppliers was one of the purposes of enhancing CEOS and inviting users into the group, and that EO-ICWG would take this into account in polar platform program planning.

International Polar-Orbiting Meteorological Satellite Group (IPOMS)

Mr. Koffler (NOAA) presented the results of the last IPOMS meeting in September 1990. The group agreed that the planned polar platform launch scenario met IPOMS requirements, and congratulated NASA on undertaking a 15 year continuous program. The group also agreed to ask NASA to consider increasing the orbital altitude of EOS-A and supported ongoing NASA-NOAA work to provide a mechanism for distributing EOS data of interest to the operational community in "near-real-time." With regard to the ESA polar platform, the group agreed that the platform program should be planned to fulfill the morning operational mission, and urged that the Japanese platform be moved to a lower inclination orbit.

Mr. Koffler then reviewed the reasons for creating IPOMS, and explained some of the valuable services the group provided. IPOMS agreed that once the continuity of the morning payload was assured, the IPOMS objective would be achieved. If program approvals are received in Europe during 1990-91 as anticipated, continuity will be assured, and the next IPOMS meeting would likely be the final meeting. A transition plan will be developed that assures the continuation of valuable IPOMS activities such as information exchange.

Coordination on Geostationary Meteorological Satellites (CGMS) group

Mr. Morgan (EUMETSAT) briefed the group on the Coordination on Geostationary Meteorological Satellites group. He noted that all operators of geostationary satellites were members, along with the PRC and USSR (based on their plans to develop geostationary systems), the WMO, and EC. There have been 18 meetings, with the last one in Geneva hosted by the WMO.

One major achievement has been to informally coordinate location of the satellites and the back-up plans to deal with satellite failures. CGMS helps coordinate collection of data from various in situ locations, including aircraft, balloons, and ships. Another achievement is adoption of a WEFAX standard used by all stations around the world. CGMS has coordinated responses to potential and actual radio interference between operational satellites and other systems such as some of the new mobile satellite systems. Production of products is also coordinated to enable a uniform standard of data supplied to meteorological users. There is currently a proposal to change the name of CGMS and expand its area of consideration to include practical coordination of polar orbiting meteorological satellites.

SUMMARY OF KEY INTERNATIONAL MEETINGS

World Meteorological Organization Executive Council Panel of Experts on Satellites

Dr. Hinsman (WMO) explained that the panel is ongoing, with the purpose of advising the WMO Executive Council. He noted that several Panel members were present at the CEOS Plenary. The Panel's Terms of Reference were presented. Several important recommendations were made at the last meeting:

The definition of a Global Observing System (GOS) space-based sub-system should be expanded to include environmental satellites

The WMO should participate in other international meetings

A database of information on satellite reception equipment should be created.

The next meeting is in March 1991.

International Space Year (ISY) Earth Science Panel

Mr. Brescia (NASA) described the origins of ISY and the themes of ISY activities. ISY activities take place through international organizations, national organizations, public organizations and the Space Agency Forum for International Space Year (SAFISY). He described SAFISY in more detail, noting that there were 28 members and 8 affiliated international organizations. Japan is the current secretariat, and the next meeting will be in Moscow.

In the SAFISY Earth Science and Technology Panel of Experts, there are 12 projects underway. There have been 4 meetings, with the next meeting to be held in Canada during February 1991. The projects fall into three categories: Space Data for Global Change; Global Information System Test; and Global Change Outreach. Each category has specific projects with lead agencies responsible for coordinating the activity. The details of each project are available in the report of the last SAFISY meeting.

ISY Panel on Education and Applications

Dr. Revah described the activities of this group. The last meeting in Deauville centered on two themes: Training in Remote Sensing Applications and Space and Education. The panel is not concerned with scientific problems, nor with training itself, but rather aims to demonstrate the usefulness of training. Dr. Revah described the three sub-themes as Vegetation Resources Monitoring and

Management, Geology and Natural hazards, and Urban and Environmental Planning. These projects are described in the report from the Deauville meeting and in the Kyoto SAFISY report.

Mr. Brescia then briefly described the Education Theme activities. Twenty-eight proposals were considered, some of which were already ongoing, and 18 projects are actually underway.

Experts Meeting on Global Environmental Data Network

Mr. Haruyama presented the results of a meeting hosted by Japan in May 1990 to discuss a Japanese proposal to establish a global environmental data network. The two major topics were creation of an international directory system for global change data and creation and distribution of large scale global data sets. The participants all agreed on the value and utility of this concept. A series of recommendations concerning the development of such a system were adopted and referred to the CEOS Working Group on Data which met during the same week. NASDA presented the results of a survey of existing global data sets, and the participants agreed that a pilot project should be undertaken to test the viability of electronic transfer of data sets. It was agreed to continue discussing the concept, and to recommend that CEOS consider the creation of a new working group on space networks.

Space and the Global Environment Meeting

Dr. Revah described the meeting, organized by France in June 1990. The purpose was to gather space agency heads, scientific and international organizations, and environmental and climate research funding agencies in one place to discuss science requirements and strategies to meet those requirements. The first session focused on international research program needs, the second on descriptions of space programs for the next decade (the 1990s), and the third on conclusions and synthesis. Important results were strong support for the existing and planned space observation systems and a call for special attention to be devoted to data access and use, particularly access for developing countries.

Based on the results of this meeting, France introduced a proposal at the Economic Summit addressing data access and distribution. Italy may take the lead in creation of a center for data accessibility. Dr. Tilford asked if the Italians would comment on the initiative. Dr. Bizzarri stated that the Ministry of Foreign Affairs was very interested in this proposal, and has tasked the Italian Space Agency to study the creation and the proper objectives for such a "world data information center." The two problems are to decide what is lacking, and to harmonize any new initiative with existing initiatives and plans. Dr. Tilford suggested that any planning should be coordinated with the activities of CEOS.

International Group of Funding Agencies (IGFA)

Dr. Tilford explained that this informal group has met twice, most recently in early July in Bonn. Its objective is to take an integrated look at the whole spectrum of global change activity from the viewpoint of funding agencies and available resources. He noted that it was one of the first times that funding agencies outside of the space agencies had examined the whole spectrum of global change research requirements. The group is attempting to begin coordination of national contributions to ensure that all the basic needs are addressed. The group will meet again in February 1991 in the UK, and Dr. Tilford will ensure that the work of CEOS continues to be represented.

International Panel on Climate Change (IPCC) Fourth Plenary

The IPCC met and completed its first assessment report. The report is being mailed out now. Both WMO and UNEP have requested the continuation of IPCC for the purpose of assessments of science, impact studies, and response options related to global change.

Second World Climate Conference (SWCC)

The Second World Climate Conference was organized in two parts: a scientific/technical session and a ministerial conference. Dr. Hinsman distributed the statements from both sessions. A consensus exists among scientists both in the IPCC and at the SWCC that climate change will occur from continued greenhouse gas emissions, and the predicted climate change would place stresses on natural and social systems unprecedented in the past 10,000 years. Without actions to reduce emissions, global warming is predicted to reach 2 to 5 degrees over the next century. The delegates endorsed increased funding to pay for the scientific effort that will be necessary to decrease uncertainty. Creation of a Global Climate Observing System was endorsed, including space based and ground based observing systems, along with the necessary data distribution mechanisms (See page 6 of the Scientific and Technical Portion of the SWCC report for details). The science and technology session endorsed the negotiation of a framework convention on global change, a recommendation which was endorsed by the Ministerial conference.

CEOS TERMS OF REFERENCE

Mr. Koffler presented the NOAA/NASA proposal for changing the terms of reference to enhance the working of CEOS. He began by noting the proliferation of groups and meetings and the clear need to streamline international cooperation in this area. He made the point that cooperation is of benefit to all members, and that global observation from space is an inherently multilateral activity.

The specific changes to make CEOS the primary satellite coordination body were summarized by Mr. Koffler as follows:

Establish specific links to other satellite coordination groups

Invite active participation by international scientific, policy, and intergovernmental bodies

Modify the terms of membership to include a specific requirement to ensure data availability from member programs

Change the name of the group to Committee on Earth and Environmental Observations Satellites to ensure that the operational community is explicitly embraced within the group.

He then reviewed the history and goals of the group, noting that the proposed changes did not alter these goals, but rather would permit more effective pursuit of them. He explained the criteria for membership, observer, and affiliate status as outlined in the U.S. proposal. Logistical and organizational changes were also proposed, including designated member points of contact and annual Plenary meetings.

Mr. Koffler asked for questions and comments from the floor. Mr. Barbosa asked about the role of the working groups in the revised organization. Mr. Koffler stated that the working groups are the key to CEOS success and would continue to be where technical level work was done. Dr. Tilford agreed with this, and furthermore made the point that the importance of both the Plenary and the working groups was likely to increase in the future. Mr. Goldsmith noted that most of the space agencies already were engaged in an intense effort to gain input from user groups, and asked if the proposal was likely to improve this process. He also made the point that an occasional meeting devoted to publicizing the importance of users in space agency planning and space agency global change research activities might be desirable.

Mr. Koffler stated that he saw a need for increased bottom-up definition of systems and that this type of a forum could be a valuable collaborative planning mechanism. Dr. Harries made the point that CEOS was unlikely to replace or

improve individual agency/user relationships. Mr. Koffler stated that it should supplement those relationships. Mr. Morgan suggested that CEOS would benefit from a visible "product" such as a consolidated report. Mr. Marelli stated that the group should consider the fact that data system coordination was the key area where additional contributions could be made by the group, and emphasized the need for concentrating on practical results.

The group discussed the proposed changes and reconsidered CEOS objectives in light of developments since 1984 when the group was created. The results of these discussions was agreement the next day on modified terms of reference, which are attached to these minutes.

CEOS WORKING GROUP ON DATA

The second day began with Mr. Koffler presenting the report of the Working Group on Data, on behalf of Mr. Lauritson (NOAA), WGD chairman. Mr. Koffler described the overall CEOS structure and how the WGD with its subgroups fit with the other proposed working groups. He then summarized WGD results since the last Plenary. There have been 3 meetings of the WGD and several subgroup meetings as well. The near-term focus has continued, with most attention paid to approved and existing missions and instruments as the foundation for enhanced international cooperation in the polar platform era.

The user format subgroups have been restructured. CCRS is chairing an overall group of core experts which will oversee CEOS formats. As specific implementations are proposed, ad-hoc subgroup meetings will be held to focus on specific sensors. Work has continued on a lexicon/data dictionary, which is intended as a testbed for developing a generic data dictionary. A new sub-group on ground to ground networks was established, with NASA as the temporary chair. This sub-group will address requirements for coordination related to the Japanese network initiative among other tasks.

Work has also continued on establishing the Prototype International Directory (PID) as the core of an interoperable catalog system. Copies of the PID have been installed in Europe, the US (NASA and NOAA), and Japan for use and evaluation. A Canadian PID will be installed in 1991. AVHRR data has been identified as a testbed for various WGD activities. A bulletin board has been established on OMNET to facilitate communication between WGD participants, and a set of tutorials have been developed on Standard Formatted Data Units (SFDU's), the CEOS Superstructure, and the Prototype International Directory (PID).

The WGD made three recommendations to the Plenary:

Continue efforts to consolidate Earth observation data management cooperative efforts in the WGD

Establish an ad hoc CEOS Working Group on Space Networks to focus on studying the feasibility of such a group in terms of defining network requirements to exchange Earth observations data from a worldwide standpoint

Recognize the importance of existing network groups, such as SNIP and CCSDS, taking into account Earth observations requirements.

Mr. Morgan asked if there was a WGD consolidated report. As the librarian for the WGD, NOAA stores format documents and software that have been developed, but no single report has been produced. Dr. Harries asked how WGD activity was funded, and the response was that individual agencies funded their own work and compliance was voluntary. Mr. Barbosa stated that the existence of the library was a significant achievement. Mr. Koffler noted that lack of information at the Plenary level was an indication of the need for more frequent Plenary meetings. Ms. Shaffer explained the relationship between CCSDS and WGD, noting the different and complementary nature of the groups. Mr. Morgan asked if the Plenary could ask WGD to compile a report, and the group agreed that this was appropriate and desirable.

CEOS CAL/VAL WORKING GROUP

Dr. Duchossois made the Cal/Val working group report. The WG has not met since the last Plenary. At the Ottawa CEOS Plenary meeting, several recommendations were made. They have been implemented through activities of focused subgroups.

A SAR calibration subgroup was formed and has had several meetings. This group has been active, and has taken advantage of airborne campaigns in Europe, North America, and Australia. Several white papers have been produced, and Dr. Duchossois offered to distribute them to interested members. The group has set up several initiatives specific to various missions. An example is the ERS-1 group (ECISAR) under Mr. Attema from ESTEC, which has been engaged in an intense effort. Test sites have been identified in Australia, Europe, the US and Canada. The group will report to the SAR calibration subgroup in January 1991. Dr. Duchossois stated that the imminent launch of SAR missions was an important factor in stimulating the activity of this group.

Another subgroup on wind/wave geophysical validation was set up in response to CEOS Plenary direction. The focus is on the ERS-1 scatterometer because this is the only scatterometer scheduled for launch in the near future, but the work of the subgroup will serve as a foundation for future scatterometer missions such as ADEOS and the polar platforms. The group has established a detailed validation plan. Test sites have been selected, and CEOS member participation has been an important factor in developing the campaign. There is a strong scientific interest in the validation of this data, as well as strong interest from the operational community.

The radar altimeter subgroup has been less active, but has coordinated activities with a laser tracking network, and coordinated with the TOPEX/Poseidon mission. Another significant Cal/Val activity has been the ongoing development in the EO-ICWG of a Cal/Val "agreement module" which addresses calibration and validation strategy and policy for the polar platform programs.

Dr. Duchossois concluded by noting that Cal/Val is an integral part of a space program and that instrument providers and platform providers both have responsibility for it. It is a costly activity involving development and deployment of facilities and setting up teams for data analysis, and he believes a focused approach is the most efficient way to operate. Success depends on the motivation of people and expertise, funding availability, and availability of manpower.

Dr. Harries asked if a formal working group was required in this area. Ms. Shaffer noted that the group was ad hoc, and that the intention was for each Plenary to assess whether a continuing need existed. Mr. Koffler noted that the Plenary needs a mechanism to make sure Cal/Val is looked after, and also noted the need for a mechanism for Cal/Val requirements to be brought to the attention of a management-level forum. Dr. Harries agreed with this point, stating that interest from a group such as CEOS was helpful to working level scientists. Dr. Bizzarri asked if perhaps a rapporteur focused on this issue might be more effective than having a working group, and Ms. Shaffer noted that the Chairman of the Cal/Val group had served as a de facto rapporteur.

Dr. Lindberg stated that Canada was willing to lead the CEOS effort to continue supporting and promoting coordinated efforts in calibration/validation. Dr. Sayn Wittgenstein offered a set of specific ideas for a Cal/Val "task force" to be led by Canada and asked for comments:

Define new objectives for a Cal/Val working group and respond to the questions raised at this meeting;

Propose specific priorities;

Estimate the need for resources;

Develop a schedule for the Task Force; and

Report to the next Plenary.

It was suggested that the group also needs to estimate a timeframe within which Cal/Val requirements might be met.

It was noted that these points were very similar to the Terms of Reference for the ad hoc Working Group on Cal/Val and that a Canadian lead for the Working Group would move it in the desired direction. It was agreed that Canada assume the lead of the ad hoc Working Group on Cal/Val with the points proposed as its objectives (Action 4.1).

REVIEW OF REMAINING ACTION ITEMS FROM LAST MEETING

Remaining action items from the Third CEOS Plenary were reviewed. Item 3.4 called for transfer of the chair of the Cal/Val group from ESA to another party. This action is closed with the assumption by Canada of Cal/Val working group responsibilities.

Item 3.5 called for EUMETSAT and Australia to designate points of contact for the working groups. The action is closed.

Item 3.6 was for all members to provide Cal/Val point of contact. This action has been revised (Action 4.2) to request all members to provide to Dr. Susan Till (CCRS) the name of the designated point of contact for cal/val before the end of 1990.

CEOS TERMS OF REFERENCE, CONTINUED

The chairman then asked the group to conclude its consideration of the NASA/NOAA proposal to change the Terms of Reference. After discussion of several alternatives, it was agreed that the original group name conveyed the idea that both research and operational interests were involved in observing the Earth and its environment, and thus the original name would be retained:

Committee on Earth Observations Satellites (CEOS).

On the issue of inviting participation from international scientific groups, Mr. Barbosa made the point that the group would need to discuss issues of interest to these groups to stimulate their participation. Ms. Shaffer stated that if CEOS actively fulfilled its own objectives, the scientific groups would be

naturally attracted to attend. Mr. Goldsmith questioned the necessity of a formal arrangement pertaining to international science groups. It was agreed that international groups could be invited to become affiliates when CEOS members felt this would be beneficial.

On the subject of membership, the chairman asked if new members could be invited. Mr. Koffler suggested that the entities wishing to join should request membership, but that the group should not formally invite new members. A question was raised about the word governmental as it applied to membership. Ms. Shaffer explained that commercial operators could not be members, but that they could be invited by members as part of agency delegations and could participate in working groups at the request of agency members.

Members then considered each paragraph of the Terms of Reference. In modifying the Terms of Reference members agreed on four statements:

CEOS will serve as the focal point for international coordination of space-related, Earth observation activities, including those related to global change. Policy and technical issues of common interest related to the whole spectrum of Earth observations satellite missions and data received from such will be addressed.

CEOS interaction with other satellite coordination groups, as well as with international scientific programs (ICSU/IGBP, WCRP) and intergovernmental user organizations (IOC, IPCC, UNEP, WMO), should be strengthened. Changes to the Terms of Reference provide for affiliate status for such organizations and allow their participation, as appropriate, in plenary and working group meetings.

Membership requirements specify that members provide to the international community non-discriminatory and full access to data. Prospective members must request membership. Observers and affiliates will be invited to participate in those capacities. Members and observers will henceforth be cited by governmental agency/entity.

Plenary sessions should be convened at least once a year and other administrative procedures should be undertaken to improve effectiveness within the group.

The agreed modified Terms of Reference are attached. NASA agreed to compile a Consolidated Report on CEOS, including a section on the Working Group on Data (to be prepared by NOAA), a section on the Cal/Val Working Group (to be prepared by ESA), with NASA furnishing an overview discussion of the CEOS Plenary (Action 4.3). The draft report will be circulated to members in time to obtain comments prior to the next Plenary meeting.

MEMBERSHIP

Mr. Barbosa then presented requests he had received for admittance of new members and observers. He read aloud letters from CCRS, Norway, and New Zealand requesting observer status. The applications were approved by consensus of the group, and NASA, as part of the incoming US Secretariat, offered to send notification of the results to the applicants on behalf of CEOS (Action 4.4).

Mr. Morgan suggested that the PRC and USSR be notified of their possible eligibility for membership under the Terms of Reference. Discussion ensued with the result that INPE agreed to apprise the appropriate agencies within these governments of the CEOS Terms of Reference, which include CEOS objectives and membership requirements, should they wish to seek membership (Action 4.5). There was general discussion as to which agencies in each country came into question; the consensus reached was the Academy of Sciences and Hydromet in the USSR and the Chinese Academy of Sciences and the State Meteorological Administration in the PRC.

PLENARY DIRECTION TO THE WORKING GROUPS

The chairman then raised the issue of direction to the working groups. The first item considered was the WGD recommendations to the Plenary. On the subject of a working group on space networks, Mr. Marelli made the point that high level consideration of the network question would be valuable, as long as it focused on ground to ground networks. He suggested that space to space to ground was perhaps more appropriately dealt with in the EO-ICWG, making the point that existing systems were unlikely to be affected. Dr. Tilford emphasized that this issue would increase in importance over the next 5 years, and that space to ground issues would be important for several precursor missions as well as the polar platforms. He also pointed out that despite the fact that technical expertise would have to come from the communications area, the high data rates in Earth science research were likely to be the driver of these systems.

Mr. Haruyama stated that Japan was willing, if desired, to lead the proposed ad hoc Working Group on Space Networks. The group agreed that Japan should, as its first order of business, prepare draft terms of reference for a Working Group on Space Networks and distribute them to Plenary members for consideration and approval (Action 4.6). Japan may convene a meeting of experts to promote preliminary discussions and to assist in carrying out this action.

Mr. Morgan offered a resolution commending the WGD on its accomplishments and requesting the preparation of a consolidated report on decisions and recommendations to date. Members agreed but stated WGD accomplishments should be incorporated into an overall CEOS consolidated report (Action 4.3).

The chairman then asked the group to consider whether the working group structure was adequate for addressing the objectives of the enhanced CEOS Plenary. The group agreed that the structure, as modified, was adequate. Dr. Hinsman asked where data policy and frequency allocations would be discussed. Data policy, it was agreed, was an issue for Plenary consideration. It was agreed that the ad hoc Space Networks Working Group might consider radio frequency allocation within its Terms of Reference.

DATA EXCHANGE PRINCIPLES

Dr. Tilford introduced a draft NASA/NOAA resolution on Data Exchange Principles for consideration by the group. A copy of this paper is attached. These proposals derive from the US success in developing a set of national data exchange principles for global change.

Mr. Barbosa asked who would define "data needed for global change research and monitoring," and Dr. Tilford said he hoped it would be the WCRP and IGBP. Dr. Langham asked how a global change researcher would be defined. Dr. Tilford explained that, in NASA's case, the signing of an EOS research agreement defined a scientist as a global change researcher.

Mr. Pryor stated that he was very appreciative of Dr. Tilford presenting this resolution, and noted that such an important resolution could not be adopted without careful consideration. He further noted that more concentration on details was needed, and that presentation of the resolution should be seen as a starting point or a position paper to stimulate serious international consideration of this issue.

Mr. Marelli also noted the need to move from generalities into practicalities, and the need to be specific on which data was being addressed (both historical and future). Mr. Goldsmith stated that he would also like to use this resolution as a basis for internal discussions, and noted the different priorities that drive the various space programs in their data gathering and the different assumptions they have made.

Dr. Lindberg stated that Canada was not in the position to support such a resolution at this time, and that the proposal would have to be studied. He noted the importance of mission management for scheduled instruments such as the SAR planned for Radarsat.

Dr. Revah noted that data policy was an important issue for France, and that this resolution would provide an excellent basis for continuing discussions.

Mr. Haruyama stated that Japan was just entering into international cooperative arrangements for data gathering, and stated Japan's wish for establishment of an international consensus on data exchange.

Mr. Barbosa suggested that the resolution be attached to the minutes as a draft statement for discussion purposes. He also suggested convening a meeting focused solely on data policy before the next Plenary. It was agreed that NASA would provide a more expanded version of the discussion paper, including definition of terms to the extent possible (Action 4.7). The UK offered to host a special meeting on data exchange principles within the next six months (Action 4.8) to facilitate detailed examination of these important issues. The meeting would require that high level representatives be willing to devote several days to this topic.

OTHER BUSINESS

Ms. Moodie (NOAA) introduced a resolution that noted the call of the Second World Climate Conference for a Global Climate Observing System (GCOS), including space-based and surface-based observing components as well as data communications and other infrastructure, to support climate system monitoring, research, modelling and prediction. The resolution recognized that the members of CEOS are the providers of space-based Earth observations and encouraged the WMO, IOC, WCRP, and ICSU to participate at the next CEOS Plenary meeting and to present their requirements for space-based Earth observations. The group agreed that an invitation to the next plenary meeting should be extended by the incoming secretariat to these organizations but that a resolution was not necessary to accomplish this (Action 4.9).

An action item was agreed in response to the modifications to the Terms of Reference, requiring all members and observers to notify the incoming secretariat by the end of 1990, of at least one point of contact for coordination between meetings and distribution of documents (Action 4.10).

Mr. Morgan offered to distribute CGMS and IPOMS consolidated reports to Plenary members (Action 4.11). The reports provide useful information and may be helpful in drafting a CEOS consolidated report.

Time and Place of Next Meetings

It was agreed that the US (NASA and NOAA) will host the next CEOS Plenary in November 1991 in the US. The group accepted Mr. Pryor's offer for the UK to host the 1992 CEOS Plenary and Mr. Haruyama's offer for Japan to host the 1993 Plenary meeting.

The Working Group on Data will meet in April 1991 in the Washington area hosted by NASA, then in October 1991 in Toulouse, hosted by France.

Acknowledgements

The Plenary congratulated the working groups on their performance.

On behalf of the all the participants, Dr. Tilford thanked INPE for their hospitality and congratulated them on their performance as chair and secretariat of the CEOS Plenary meeting.

Mr. Barbosa thanked both the participants and his staff for all their hard work.

The meeting was adjourned.

Action Items CEOS Fourth Plenary

4.1 Canada will chair the ad hoc Working Group on Sensor Calibration and Geophysical Validation, and will undertake six tasks:

Define new objectives for a Cal/Val working group and respond to the questions raised at this meeting;

Propose specific priorities;

Estimate a time frame within which Cal/Val requirements might be met;

Estimate the need for resources;

Develop a schedule for the Working Group; and

Report to the next Plenary.

4.2 All members to provide to Dr. Susan Till, CCRS, the name of the designated point of contact for cal/val before the end of 1990.

4.3 NASA to compile a Consolidated Report on CEOS and circulate it to members in time to obtain comments prior to the next Plenary meeting.

4.3(a) NOAA to prepare a section on the Working Group on Data and provide it to NASA by May 1, 1991.

4.3(b) ESA to prepare a section on the Cal/Val Working Group, and provide it to NASA by March 1, 1991.

Each section should include all major accomplishments, decisions and recommendations developed by the Working Group and endorsed by the Plenary.

4.4 NASA, on behalf of the incoming secretariat, to inform CCRS, Norwegian Space Center, and New Zealand Department of Scientific and Industrial Research of the approval of their observer status in CEOS and to notify them of the CEOS Plenary meeting results.

4.5 INPE to send letters to the Academy of Sciences (AS-USSR) and the State Committee for Hydrometeorology (HYDROMET) in the USSR and the Chinese Academy of Sciences (CAS) and the State Meteorological Administration (SMA) in the PRC to convey the CEOS Terms of Reference, which include CEOS objectives and membership requirements.

4.6 Japan to prepare draft terms of reference for the Working Group on Space Networks and distribute them to Plenary members for consideration and approval. Japan may convene a meeting of experts to promote preliminary discussions and to assist in carrying out this action.

4.7 NASA and NOAA to provide a more expanded version of the data exchange principles resolution in the form of a discussion paper with terms defined to the extent possible and distribute to members by January 31, 1991.

4.8 UK to convene a special high level meeting on the data exchange principles within six months of the Fourth CEOS Plenary (i.e., by May 1991).

4.9 The incoming secretariat to issue an invitation to the WMO, ICSU, IOC, and WCRP to participate in the next CEOS Plenary to present their requirements for a Global Climate Observing System.

4.10 All members and observers to notify NOAA (Ms. Linda Moodie) before the end of 1990 of at least one point of contact for coordination between meetings and distribution of documents, as well as points of contact for the Plenary, WGD and Cal/Val.

4.11 Mr. Morgan to distribute CGMS and IPOMS consolidated reports to Plenary members.

4.12 As incoming secretariat, NASA and NOAA will develop a format for agency status reports, and circulate it in draft for agency comments. The resulting agreed format will be distributed to members three months prior to the next Plenary meeting. Members must provide information in the agreed format to the US representative no later than 45 days prior to the meeting. The secretariat will compile the results and present a consolidated status report at the next Plenary.

**TERMS OF REFERENCE
OF THE
COMMITTEE ON EARTH OBSERVATIONS SATELLITES**

**Adopted September 25, 1984
Washington, D.C.**

**Amended November 11, 1986
Frascati, Italy**

**Amended April 5, 1989
Ottawa, Canada**

**Amended November 14, 1990
Sao Jose dos Campos, Brazil**

TERMS OF REFERENCE
OF THE
COMMITTEE ON EARTH OBSERVATIONS SATELLITES

PREAMBLE

Remote sensing from space has evolved from an early period of limited satellite programs to a point where distinctions among existing missions result from the technology employed, rather than from the disciplines served in system operations. In the future, a number of international and national space-borne Earth observations systems will operate simultaneously and support both interdisciplinary and international activities.

The organization of international cooperation in space-borne Earth observations systems also is evolving, from mission-specific reviews to the interdisciplinary coordination of multi-mission programs. Beginning with the first Multilateral Meeting on Remote Sensing - held in Ottawa on May 8-9, 1980, and attended by agency representatives from Canada, the European Space Agency, France, India, Japan, and the United States of America - current and potential operators of Earth observations systems have met several times to discuss the means by which mutually beneficial cooperation and coordination could be achieved in both the near and longer term. As a result of these gatherings, the recent past has seen the creation of the Coordination on Land Observation Satellites (CLOS) by agency representatives from France, Japan, and the United States of America in Paris on November 13-14, 1980; the initiation of the Coordination on Ocean Remote Sensing Satellites (CORSS) in Paris on May 10-11, 1982, through the efforts of agency representatives from the European Space Agency and Japan; and the second Multilateral Meeting on Remote Sensing, held in Paris on May 12-13, 1982, and attended by agency representatives from France, Canada, the European Space Agency, India, Japan, and the United States of America.

This framework of initial discussion and cooperation has enhanced the utility of space-borne Earth observations data to users worldwide, has encouraged the coordination of program plans among space-borne Earth observations system operators, and has fostered international receptivity to and acceptance of space-borne Earth observations system activities and applications.

Consequently, the assembled representatives of international and national space-borne Earth observations systems:

AWARE of the overlap of space-borne Earth observations mission objectives and of the interdisciplinary applications of remotely sensed data;

RECOGNIZING the advantages of ongoing communication and cooperation among space-borne Earth observations system operators; and

DESIRING to promote the international growth and potential benefits of space-borne observations of the Earth;

have affirmed the value of the activities described above and have agreed to coordinate informally their current and planned systems for Earth observations from space through the organization of a Committee on Earth Observations Satellites (CEOS).

Cooperation in the development and management of remote sensing and associated data management programs can be of benefit to operators of space-borne Earth observations systems and to users of Earth observations data. Redundancy among systems and the utility of data can be optimized through the appropriate coordination of complementary and compatible space and ground segments, data management practices and products, and Earth observations systems research and development.

CEOS will not supersede current or potential agreements by members. Participation in the activities of CEOS will not be construed as being binding upon space-borne Earth observations system operators, or as restricting their right to develop and manage Earth observations systems according to their needs.

OBJECTIVES

CEOS has three primary objectives:

To optimize the benefits of space-borne Earth observations through cooperation of its members in mission planning and in the development of compatible data products, formats, services, applications, and policies.

To aid both its members and the international user community by, inter alia serving as the focal point for international coordination of space-related, Earth observations activities, including those related to global change.

To exchange policy and technical information to encourage complementarity and compatibility among space-borne Earth observations systems currently in service or development, and the data received from them. Issues of common interest across the spectrum of Earth observations satellite missions will be addressed.

Individual members of CEOS will use their best efforts to implement CEOS recommendations in their respective Earth observations programs.

PARTICIPANTS

Members:

Governmental organizations which are international or national in nature and are responsible for a civil space-borne, Earth observations program currently operating, or at least in Phase-B or equivalent of system development, will be eligible for membership in CEOS. Members must have a continuing activity in

space-borne Earth observations, intended to operate and provide non-discriminatory and full access to data which will be made available to the international community. The addition of members will be with the consensus of current members of CEOS. Requests for membership should be addressed to the chairman of the next scheduled CEOS plenary session. Such requests will be considered by the members at that meeting.

Observers:

Governmental organizations, which are international or national in nature and currently have a civil, space-segment activity in Phase-A/pre-Phase-A or equivalent of system development, or a significant ground-segment activity that support CEOS objectives, may be invited to participate in the status of Observer. Addition of Observers will be by consensus of existing members. Observers may participate in CEOS plenary and working group discussions and have their views included in reports; however, approval by observers will not be required to establish consensus.

Affiliates:

CEOS will establish links to other existing satellite coordination groups and to scientific or governmental bodies, which are international in nature and currently have a significant programmatic activity that supports CEOS objectives, by inviting them to become formally affiliated with CEOS. Affiliates may participate, as appropriate, in the CEOS Plenary and working group meetings and have their views included in reports; however, approval by affiliates will not be required to establish consensus. The autonomy of both the affiliated organizations and the respective national and international Earth observations programs will remain intact. Membership in CEOS does not automatically assume membership in the respective affiliated organizations. Addition of affiliates will be by consensus of existing members.

COOPERATIVE ACTIVITIES

CEOS members will exchange technical information on and pursue the potential for coordination of space and ground segments. Such coordination could include discussions on current and future mission parameters, sensor capabilities and intercalibration, and data and telemetry downlink characteristics. In addition, Earth observations systems coordination within CEOS could address issues of ground station technical compatibility for back-up satellite tracking, command and control, and sensor and telemetry data reception.

CEOS members will investigate the means for increasing data utility and cost-effectiveness, for both operators and users. CEOS activity could include the coordination of data acquisition, sampling, and pre-processing methodologies; the standardization of data formats where appropriate; the increase in compatibility of data archives; and the enhancement of user access to CEOS member data bases, information products, and services. CEOS members will seek to assure

that the user community is made aware of the satellite programs of members and encourage discussions between the users and the relevant satellite system operators, as necessary.

CEOS members will present their plans for emerging satellite remote sensing technologies and programs and will discuss appropriate approaches for the coordination of future systems. CEOS members will address current developments and future directions and opportunities in Earth observations from space, including free-flying spacecraft, mission-specific instruments flown on space transportation systems, and the placement of instruments on space platforms.

ORGANIZATION AND PROCEDURES

CEOS will convene once every year in plenary session. Each member will designate a point of contact for coordination between meetings. CEOS meetings will be organized and chaired by the designated host organization. The designated host organization will provide secretariat services for the upcoming plenary session, distribute minutes of that meeting, and report on any follow-on activities at the next plenary session. At each meeting of CEOS, the time, place and host for at least the next two meetings will be established. A list of members, affiliates, and observers and the dates they were accepted will be updated as appropriate, included as Appendix A to the Terms of Reference, and distributed with the minutes after each meeting.

CEOS also may establish, as mutually agreed, and on an ad hoc basis, special temporary Working Groups to investigate specific areas of interest, cooperation, and coordination and to report at subsequent plenary meetings. Continuation of each ad hoc Working Group requires confirmation at each plenary session. Conclusions resulting from CEOS plenary sessions, or the findings and recommendations of ad hoc CEOS Working Groups, will be acted upon at the discretion of each CEOS member.

CEOS may establish, as mutually agreed, standing Working Groups where an ad hoc status is deemed insufficient. More permanent status may be required to ensure long-term continuity of work in certain areas where the magnitude and complexity of the task is not suitable to short-term solutions. These standing Working Groups shall continue without requiring specific confirmation by the plenary. The chairman of each such group shall report at each CEOS plenary session on the group's accomplishments and future plans. If the consensus of the plenary is that such a group is no longer required, the plenary may discontinue the group. In the absence of such a decision, however, the standing Working Group shall continue. Representatives from all CEOS members are invited to participate in all Working Groups.

CEOS will replace the Multilateral Meeting on Remote Sensing, the CLOS, and the CORSS. During the development of and action on CEOS activities, the member agencies of CEOS will follow the example of the successful international technical and programmatic cooperation achieved by the Coordination on Geostationary Meteorological Satellites. CEOS members also will consider the issues, concepts, and conclusions arrived at in previous gatherings of the

Multilateral Meeting on Remote Sensing, CLOS, and CORSS, and will address current and future activities of space-borne Earth observing systems.

CEOS will consider and may make recommendations and agree on actions to promote appropriate coordination across satellite coordination groups and national and international satellite programs. Furthermore, CEOS encourages its members to maintain communication as appropriate with other groups and organizations involved in space-borne Earth observations activities and applications through the relevant channels within their respective governments.

ADOPTION AND AMENDMENT

These Terms of Reference were adopted at the September 24-25, 1984, meeting of CEOS and were amended by consensus at the second meeting of CEOS, held in ESRIN, Frascati 10-12 November, 1986. Additional amendments were made at the third meeting of CEOS in Ottawa, Canada, 4-5 April, 1989, and at the fourth meeting in Sao Jose dos Campos, Brazil, 13-14 November, 1990. They may be further amended by consensus of the members.

APPENDIX A

MEMBERS

<u>Organization</u>	<u>Location</u>	<u>Date of Membership</u>
Canadian Space Agency	Canada	1984
Centre National d'Etudes Spatiales	France	1984
European Space Agency	Europe	1984
Indian Space Research Organization	India	1984
Instituto Nacional de Pesquisas Espaciais	Brazil	1984
Science and Technology Agency	Japan	1984
National Aeronautics and Space Administration	U.S.	1984
National Oceanic and Atmospheric Administration	U.S.	1984
British National Space Centre	U.K.	1986
Agenzia Spaziale Italiana	Italy	1986
Deutsche Agentur fuer Raumfahrtangelegenheiten	Germany	1986
CSIRO Office of Space Science and Applications	Australia	1989
European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT)	Europe	1989

OBSERVERS

Norwegian Space Centre	Norway	1990
Canada Centre for Remote Sensing	Canada	1990
Department of Scientific and Industrial Research	New Zealand	1990

NASA

EARTH SCIENCE & APPLICATIONS DIVISION

Draft Resolution on Data Exchange Principles

RECOGNIZING that the members of CEOS are actively involved in supporting global change research and monitoring efforts of the international scientific community

AWARE that success in global change research and monitoring requires a continuing commitment to the establishment, maintenance, validation, description, accessibility, and distribution of high-quality long-term data sets, many of which rely on spaceborne observations

ANTICIPATING the potential benefits of compatible policies and mechanisms for data exchange in obtaining access to global data



Draft Resolution on Data Exchange Principles

CEOS members endorse the following principles and agree to work toward implementing them to the fullest extent possible:

Preservation of all data needed for long-term global change research and monitoring is required. For each and every global change data parameter, there should be at least one explicitly designated archive. Procedures and criteria for setting priorities for data acquisition, retention, and purging should be developed by participating agencies.

Data archives should include easily accessible information about the data holdings, including quality assessments, supporting ancillary information, and guidance and aids for locating and obtaining the data.

International standards, including those generated by the CEOS Working Group on Data, should be used to the greatest extent possible for media and for processing and communication of global data sets.

Data should be provided at the lowest possible cost to global change researchers in the interest of full and open access to data. Agencies should act to streamline administrative arrangements for exchanging data among researchers.

For those programs in which selected principal investigators have initial periods of exclusive data use, data should be made openly available as soon as they become widely useful. In each case, the funding agency should explicitly define the duration of any exclusive use period.



MEETING SUMMARY
Committee on Earth Observations Satellites
November 13-14, 1990

The fourth plenary meeting of the Committee on Earth Observations Satellites (CEOS) was held November 13-14, 1990, in San Jose dos Campos, Brazil, hosted by the Brazilian National Institute for Space Research (INPE). Participants included representatives from Brazil (INPE), Canada (CSA, CCRS), ESA, EUMETSAT, Germany (DARA), France (CNES), Italy (ASI), Japan (STA, NASDA, ERSDAC), NASA, NOAA, and the United Kingdom (BNSC). Australia (CSIRO) and India (ISRO) were unable to attend. New Zealand (DSIR) and Norway (NSC) were accepted into observer status although neither was in attendance. A representative from the World Meteorological Organization also participated as a guest.

MEETING HIGHLIGHTS:

- The CEOS Terms of Reference were revised to enhance the group's effectiveness, particularly in the context of coordinating space-based elements of the global change research effort. Members agreed that CEOS will serve as the focal point for international coordination of space-related, Earth observation activities, including those related to global change. Policy and technical issues of common interest related to the whole spectrum of Earth observations satellite missions and data received from such will be addressed.
- To this end, a NOAA/NASA initiative to strengthen CEOS interaction with other satellite coordination groups, as well as with international scientific programs (ICSU/IGBP, WCRP) and intergovernmental user organizations (IOC, IPCC, UNEP, WMO), was endorsed. Changes to the Terms of Reference provide for affiliate status for such organizations and allow their participation, as appropriate, in plenary and working group meetings. CEOS will invite the WMO, IOC, ICSU, and the WCRP to attend the next Plenary meeting to present requirements for the World Climate Observing System endorsed by the Second World Climate Conference. CEOS will work with these organizations to ensure that the space-borne programs of its members are implemented with these requirements in mind.
- In addition, membership requirements were amended to specify that members provide non-discriminatory and full access to data that will be made available to the international community. Prospective members must address requests for membership to the secretariat for the next scheduled plenary meeting. It was agreed that Brazil would disseminate the new Terms of Reference, which include CEOS objectives and membership requirements, to Hydromet and the Academy of

Sciences in the USSR, as well as to the State Meteorological Administration and Academy of Sciences in the PRC.

- The plenary endorsed progress reported by the CEOS Working Group on Data involving data product format standardization, implementation of an international prototype directory system, and creation of a subgroup on ground-based networks for data exchange.
- Japan offered to chair a new ad hoc Working Group on Space Networks. As its first order of business, Japan will develop Terms of Reference, which must be approved by Plenary members. This Working Group would focus on space-to-space and space-to-ground networks; its tasks could include coordination of user requirements for such networks, review of the use of satellites to fulfill those requirements, and consideration of radio frequency allocation concerns.
- Canada, as the new Chair of the ad hoc Cal/Val Working Group, agreed to refocus and expand the work of this group. Activities will include defining new objectives for the working group, attempting to set specific priorities, estimating a time frame within which cal/val measurements might take place, estimating the need for resources, developing a schedule for the working group, and reporting to the next plenary session.
- NOAA and NASA proposed a data policy resolution to define data exchange principles. This proposal will be expanded into a discussion paper and will be the subject of a special meeting of CEOS members to be hosted by the UK within the next six months.
- A consolidated report of CEOS accomplishments, decisions, and recommendations, including those of the Working Groups on Data and Cal/Val, will be prepared and distributed for comment prior to the next plenary meeting.
- Reports on key international meetings and developments, as well as reports on the activities of other satellite coordination groups (EO-ICWG, IPOMS, CGMS) and updates of member programs, were presented.
- Members agreed to meet at least once a year in plenary session and took other administrative decisions to improve effectiveness within the group. The organization hosting a plenary meeting will serve as the secretariat for the period preceding the meeting, will compile program status information from all members in advance, and will present a consolidated status report at the plenary. As the incoming secretariat, NASA and NOAA will develop and distribute for comment a draft format for agency status reports, so the

consensus format can be provided to members three months before the next plenary.

- Because the newly formed Canadian Space Agency (CSA) has program and funding responsibility for RADARSAT, the Canadian delegation requested that CSA be the Canadian member in CEOS and that the Canada Centre for Remote Sensing (CCRS) be an observer.
- New Zealand (Department of Scientific and Industrial Research) and Norway (Norwegian Space Centre) were accepted as observers. Prospective observers and affiliates will be invited in the future.
- Members and observers will henceforth be cited by governmental agency/entity.
- All members and observers should notify Linda Moodie, on behalf of the incoming secretariat, before the end of 1990 of at least one point of contact for coordination between plenary meetings and distribution of documents, as well as the points of contact for the Working Groups on Data and Cal/Val.
- The name of the Committee on Earth Observations Satellites was not changed, as had been proposed.

UPCOMING MEETINGS:

<u>Plenary</u>	--	US (NOAA and NASA) United Kingdom Japan	November 1991 1992 1993
<u>WG on Data</u>	--	NASA CNES	April 1991 October 1991



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL ENVIRONMENTAL SATELLITE, DATA,
AND INFORMATION SERVICE
Washington, D.C. 20233

DEC 7 1990

MEMORANDUM FOR: The Record

FROM: Russell Koffler *Russ*
Deputy Assistant Administrator for Satellite
and Information Services

Linda Moodie *Linda*
International Affairs Specialist

SUBJECT: Trip Report for Fourth Plenary Meeting of
Committee on Earth Observations Satellites

The fourth plenary meeting of the Committee on Earth Observations Satellites (CEOS) was held November 13-14, 1990, in Sao Jose dos Campos, Brazil, hosted by the Brazilian National Institute for Space Research (INPE). On November 12 INPE conducted a tour of its facilities and described its work on monitoring deforestation in the Amazon region. Participants included representatives from Brazil (INPE), Canada (CSA, CCRS), ESA, EUMETSAT, Germany (DARA), France (CNES), Italy (ASI), Japan (STA, NASDA, ERSDAC), NASA, NOAA, and the United Kingdom (BNSC). Australia (CSIRO) and India (ISRO) were unable to attend. New Zealand (DSIR) and Norway (NSC) were accepted into observer status although neither was in attendance. A representative from the World Meteorological Organization also participated as a guest.

MEETING HIGHLIGHTS:

- The CEOS Terms of Reference were revised to enhance the group's effectiveness, particularly in the context of coordinating space-based elements of the global change research effort. Members agreed that CEOS will serve as the focal point for international coordination of space-related, Earth observation activities, including those related to global change. Policy and technical issues of common interest related to the whole spectrum of Earth observations satellite missions and data received from such will be addressed.
- To this end, a NOAA/NASA initiative to strengthen CEOS interaction with other satellite coordination groups, as well as with international scientific programs (ICSU/IGBP, WCRP) and intergovernmental user organizations (IOC, IPCC, UNEP, WMO), was endorsed. Changes to the Terms of Reference provide for affiliate status for such organizations and



allow their participation, as appropriate, in plenary and working group meetings. CEOS will invite the WMO, IOC, ICSU, and the WCRP to attend the next Plenary meeting to present requirements for the World Climate Observing System endorsed by the Second World Climate Conference. CEOS will work with these organizations to ensure that the space-borne programs of its members are implemented with these requirements in mind.

- In addition, membership requirements were amended to specify that members provide non-discriminatory and full access to data that will be made available to the international community. Prospective members must address requests for membership to the secretariat for the next scheduled plenary meeting. It was agreed that Brazil would disseminate the new Terms of Reference, which include CEOS objectives and membership requirements, to Hydromet and the Academy of Sciences in the USSR, as well as to the State Meteorological Administration and Academy of Sciences in the PRC.
- The plenary endorsed progress reported by the CEOS Working Group on Data involving data product format standardization, implementation of an international prototype directory system, and creation of a subgroup on ground-based networks for data exchange.
- Japan offered to chair a new ad hoc Working Group on Space Networks. As its first order of business, Japan will develop Terms of Reference, which must be approved by Plenary members. This Working Group would focus on space-to-space and space-to-ground networks; its tasks could include coordination of user requirements for such networks, review of the use of satellites to fulfill those requirements, and consideration of radio frequency allocation concerns.
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UPCOMING MEETINGS:

<u>Plenary</u>	--	US (NOAA and NASA)	November 1991
		United Kingdom	1992
		Japan	1993

SIDE DISCUSSIONS:

- Russ Koffler and Shelby Tilford (NASA) met with Bizzarro Bizzarri regarding the Italian/French initiative to establish an international environmental data center. They discussed with him the work already undertaken through CEOS, the Japanese proposal for a worldwide network, and the need to incorporate the Italian/French proposal within existing initiatives.
- Russ Koffler delivered to Phil Goldsmith of ESA a letter reaffirming NOAA's intent to provide NOAA operational instruments to the European platform on a schedule consistent with ESA's plans. Goldsmith was pleased with the letter, a copy of which was shared with John Morgan of EUMETSAT.
- Russ Koffler also discussed with the ESA delegation a draft letter that attempts to resolve some of the issues surrounding the draft NOAA/ESA MOU through which NOAA hopes to obtain ERS-1 low bit rate data. ESA also answered a number of technical questions on ERS-1 that NOAA put forward.
- Linda Moodie discussed with John Morgan a draft charter for the Coordination on Geostationary Meteorological Satellites (CGMS) group. Although there was no consensus on a key objective regarding availability of operational meteorological satellite data at CEOS, this item was resolved in post-CEOS discussions with EUMETSAT.
- Linda Moodie discussed with Isaac Revah the European Geospace Center for Satellite, Cartography Data. Although supported by CNES, SPOT Image, and others, the center is largely a creature of the French National Geographic Institute.

CC:
A - J. Knauss
DA - J. Wilson
DUS - G. Castle
DAS - C. Blondin
DAS - T. Laughlin
CS - S. Earle
R/E - V. Derr
R/CAR - M. Hall
E - T. Pyke
E/SO - L. Heacock
E/SP - H. Wood
E/SP - J. Koeppen
E/RA - K. Rao
E/RAX4 - J. Sherman
E/RA1 - G. Ohring
E/OSD - J. Hussey
E/OSD1 - S. Schneider
E/OSD1 - B. Needham
E/OSD5 - W. Callicott
E/CC - K. Hadeen
E/CCx1 - K. Davidson
E/CC2 - T. Karl
E/CC6 - L. Lauritson
E/OC - G. Withee
E/OCx7 - G. Barton
E/GC - M. Chinnery
E/IA - B. Smith
E/IA - L. Enomoto
E/IA - B. Howard
E/IA - R. Masters
E/IA - C. Wooldridge
E/IA - C. Cripps
E/IA - J. Schiro-Zavela
Space Commerce - S. Pace