

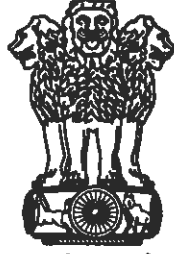
भारत सरकार
अन्तरिक्ष विभाग

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सचिव
SECRETARY

EOS:CEOS:98

December 11, 1998

Dear Colleague,

Sub: 12th CEOS Plenary Minutes

Greetings from India !!!

Please find enclosed a copy of the minutes of the 12th CEOS Plenary meeting – which has been finalised in consultation with the Secretariat. As you will see, there is considerable amount of work ahead and I am sure Dr Tillman Mohr and his team at EUMETSAT, along with the CEOS Secretariat members, will pursue the actions and ensure further achievements for CEOS.

It was a great pleasure meeting most of you at Bangalore during the CEOS Plenary last month. Those of you who missed making it to Bangalore, I am sure that there would be other opportunities for us to meet. To all my CEOS colleagues, a standing invitation to visit us at ISRO anytime, specifically so if you are in this region of the world.

I also take this opportunity to wish you all the very best for the New Year and hope that 1999 will bring to all of you more happiness, prosperity, best of health and satisfaction in all that you pursue.

With best regards,



(K Kasturirangan)

To:

- 1) All CEOS Members and Associates – Principals and Contacts
- 2) Participants of 12th CEOS Plenary

Copy:

CEOS Secretariat - Brent, Leslie, Yukio, Harald, Tillman

**MINUTES OF THE COMMITTEE ON EARTH OBSERVATION SATELLITES (CEOS)
12TH PLENARY MEETING
NOVEMBER 10-12, 1997
BANGALORE, INDIA**

(Background materials for each agenda item have been circulated prior to/at the Plenary and are referred in the minutes as per Agenda)

1) INTRODUCTION

The 12th CEOS Plenary meeting was hosted by the Indian Space Research Organisation (ISRO) at Bangalore, India during November 10-12, 1998. A total of 83 delegates from 18 Members, 13 Associates and 9 other organisations attended the meeting. List of Participants is included as ANNEX-1.

2) INAUGURAL SESSION

A glittering Inauguration Session was organised which started off with a welcome dance, *Swagatham*, in honour for the CEOS delegates. The symbolic inaugural lamp was lit by the Chief Guest, Dr Murli Manohar Joshi, Minister of Human Resource Development and Science & Technology, Government of India and the other dignitaries, including Dr K Kasturirangan, Chairman, ISRO and CEOS Chair; Dr Jean Louis Fellous, previous CEOS Chair; Dr Tillmann Mohr, Incoming CEOS Chair; Dr Brian Embleton, SIT Chair and Mr K R Sridhara Murthy, Director, EOS, ISRO.

Dr Kasturirangan welcomed the participants to the 12th Plenary meeting. He recalled the objectives of CEOS and the excellent work done by the CEOS over the past 14 years. The principle aim of CEOS is to optimise the benefits from space-based observations through effective international coordination. Dr Rangan also mentioned about the central theme of CEOS towards minimisation of unnecessary overlap in Earth observation projects and mentioned that IGOS would be one of the many steps in this direction. He mentioned that CEOS has furthered the IGOS and already the early beginnings of the IGOS Partnership have taken shape. The challenge ahead of CEOS is the implementation of the IGOS and, specifically, the space component strategy. IGOS has helped in bringing together of space and ground observation systems and also the end-users who would utilise the datasets for various applications. He also noted the tasks of the CEOS Working Groups and their potential role for IGOS. He also noted that CEOS has a formidable job in charting its detailed agenda for the coming years.

Dr Murli Manohar Joshi inaugurated the Plenary and addressed the gathering. He emphasised the value of Earth observation technology and its high-level of contribution to the study of our planet and also in developmental activities for the benefit of mankind. He mentioned that the data gathered from Earth observation satellites are now widely used in several important developmental activities such as agriculture, forestry, water resources, urban planning, disaster monitoring and mineral exploration, apart from study of problems of global significance such as global warming and the long term changes in global climate. Dr Joshi mentioned that, thanks to the EO satellites, tremendous awareness has been generated on the effect of human actions on earth's environment. He noted that IGOS, which aims at harmonisation of space based observations with in-situ and ground observations for key applications areas – both at the global and national level, is an extremely important one to pursue and bring together the space agencies as well as all user agencies. He observed that linked to IGOS is the issue of integrated modeling to derive valuable geophysical parameters of the ocean, atmosphere and the land so as to lead to better understanding of the environment. He quoted from the Vedas, Indian scriptures, which

have several verses on the peace in cosmos, stars and the Earth and mentioned that maintaining the quality of our environment must be prime amongst all goals. He exhorted the space community to contribute in this endeavor and re-iterated that the concept of IGOS was a step in the right direction.

Dr Joshi then handed over the "CEOS Gavel" to Dr Rangan signalling the formal beginning of the meeting.

Mr Sridhara Murthy proposed the vote of thanks to the dignitaries and the CEOS delegates.

Dr Joshi formally inaugurated the CEOS Exhibition, which had the participation of:

- ◆ Andhra Pradesh Remote Sensing Applications Centre (APSRAC), India
- ◆ Canada Centre for Remote Sensing (CCRS), Canada
- ◆ Centre National d'Etudes Spatiales (CNES), France
- ◆ Centre for Space Science and Technology Education in Asia and Pacific (CSSTE-AP), India
- ◆ Deutsche Zentrum für Luft- und Raumfahrt (DLR), Germany
- ◆ Disaster Management Support project of CEOS (lead by NOAA)
- ◆ European Space Agency (ESA), Paris
- ◆ Indian National Resources Information Technologies (IN-RIMT), India
- ◆ Indian Space Research Organisation (ISRO), India
- ◆ International Society on Photogrammetry and Remote Sensing (ISPRS), USA
- ◆ National Space Development Agency of Japan (NASDA), Japan
- ◆ National Remote Sensing Agency (NRSA), India
- ◆ Rolta India Limited (ROLTA), India

3) ADOPTION OF AGENDA

Mr Mukund Rao of ISRO introduced the agenda, which had already been circulated with the 1998 CEOS Plenary background materials (**Refer Background Document-1**). He mentioned that a new item - Agenda 14a: GOSSP presentation by John Townshend has now been included. The agenda was formally adopted by the Plenary (**ANNEX-2**).

4) RECORD OF THE 11th CEOS PLENARY

Dr Fellous of CNES gave an overview presentation of the activities of the 11th Plenary held at Toulouse (**Refer Background Document-2**). He mentioned that a total of 84 delegates representing 34 agencies participated in the Plenary. He also recalled the important issues discussed at the 11th Plenary included the overview of the Analysis Group report, the report of the SIT, the concept of IGOS, the action needed for the future of IGOS, the review of activities of the Working Groups, the status of the CEOS databases and affiliates, the relationship with ISPRS and SFCG, development of CEOS Partnerships, etc. The 11th Plenary also considered the activities oriented towards developing countries – specifically the CNES CD-ROM, the developing countries report by EUMETSAT and the ISRO CD-ROM initiative. The Plenary had also technical demonstrations from a number of agencies that helped focus the recent developments. The Plenary had also endorsed the CEOS participation for UNISPACE-III and the focus of its achievements to be done at the Conference.

The Plenary adopted the minutes of the 11th CEOS Plenary.

5) MEMBERSHIP ISSUES

Dr Harald Arend of ESA briefed the Plenary about issues related to the CEOS Membership (**Refer Background Document-3**). He mentioned that the 11th CEOS Plenary had recommended for ISPRS to be invited to join CEOS as an Affiliate. Consequently, CEOS Chair formally invited ISPRS to be an Affiliate.

Dr Arend informed the Plenary that the Satellite Applications Centre (SAC) of the South African Council for Scientific and Industrial Research (CSIR) had applied for CEOS Observer status. Dr Roy Gibson gave a quick overview of the SAC-CSIR activities. Dr Arend mentioned that the Secretariat had carefully examined the issue and found that the SAC-CSIR activities – mainly EO data reception and dissemination, TT&C services and training are significant ground segment activities that support CEOS objectives. The Secretariat, therefore, recommended to the Plenary to favorably consider admitting SAC-CSIR as a CEOS Observer.

The Plenary approved the proposal and formally invited SAC-CSIR to become a CEOS Associate (in tune with the decision of the 12th Plenary to re-categorise the membership into 2 categories – namely Members (previously also Members) and Associates (previously CEOS Observers and Affiliates)).

6) CEOS SECRETARIAT REPORT

Mr Mukund Rao of ISRO reviewed the activities of the CEOS Secretariat (**Refer Background Document-4**) over the last one year. He observed that all the 18 action items of the 11th Plenary have been completed and many of them have been included as agenda for the 12th Plenary for further discussion. He also mentioned that the Secretariat activities focused on the development of the guiding principles of IGOS, development of IGOS Partnership, CEOS participation in UNISPACE-III and development of CEOS Membership categories. A proposal was submitted by CEOS to UNISPACE Secretariat for CEOS participation in the Conference. He mentioned that the Secretariat had also supported SIT activities and had participated in SIT meeting held in Paris in March, 1998. The Secretariat had also participated in the 1st IGOS Partnership meeting held in Paris in June, 1998. The Secretariat had prepared a joint proposal with FAO for a one-day international forum on IGOS at UNISPACE-III. The Secretariat had also participated in a number of international conferences and meetings to focus on the CEOS activities and the IGOS Concept - which had created a larger awareness on these aspects amongst the world EO community. The Secretariat had also issued a number of publications in 1998 which included 2 issues of CEOS Newsletter and the brochure on CEOS produced by NASDA, the 1998 CEOS Consolidated Report published by NASA and the updating of the CEOS display by NASA.

The Plenary commended the activities of the Secretariat and congratulated them for effectively furthering the activities of CEOS.

7) IGOS ACTIVITIES

A] IGOS the recent developments and formation of Partnership

Dr Kasturirangan presented on the developments of the IGOS Concept and the IGOS Partnership (**Refer Background Document-5**). He mentioned that the 11th Plenary had recommended that CEOS should develop immediate working level contacts with G3OS and other interested partners towards Partnership for IGOS. Accordingly, CEOS had pursued the further development of the IGOS concept and also formalising the Partnership for IGOS. He observed that the guiding principles document of IGOS had been finalised by the SIT and one of the important aspects identified was the development of the space component

strategy. He also mentioned that the 6 IGOS Projects were reviewed by SIT earlier and needed directives for the future.

Dr Rangan informed the Plenary that a formal IGOS Partnership had been established with the aim of furthering the definition, development and implementation of an IGOS. The IGOS Partnership comprised sponsors of the Global Observing Systems (ICSU, FAO, UNEP, UNESCO-IOC, WMO); Global Observing Systems (GCOS, GOOS, GTOS) Program Offices; Committee on Earth Observation Satellites (CEOS); International Group of Funding Agencies (IGFA); International Geosphere - Biosphere Programme (IGBP) Program Office and the World Climate Research Programme (WCRP) Program Office. The official endorsement of the Partnership had been exchanged via letters by CEOS, IOC, GOOS, GCOS, WCRP and WMO. The remaining agencies are yet to formally indicate their endorsement. Dr Rangan also informed the Plenary of the 1st IGOS Partners meeting wherein the basis for cooperation was formalised and the common portfolio development for IGOS was taken up. The G3OS and the sponsoring bodies had agreed to reinforce and strengthen the role of Global Observing Space Systems Panel (GOSSP) with the role of evaluating the user requirements for an IGOS, assessing the compliance from space and in-situ observation and identification of gaps in observation. The Partnership also decided to participate in the UNISPACE-III Conference by organising a one-day workshop/forum. He also mentioned that the 2nd IGOS Partners meeting was to be held on November 10, 1998 in Bangalore.

Dr Rangan mentioned that the establishment of the IGOS Partnership has helped in putting into right perspective the CEOS goals for IGOS and the links between IGOS Partners. The emergence of the Partnership is a positive indicator of the need of an overarching strategy of the space based and ground based observations to meet the user requirements. He mentioned that CEOS needs to specifically address the space component of IGOS as a top priority. The space component strategy would depend upon the level of commitments that CEOS agencies are ready to make and also a clear-cut definition of the user requirements in the context of IGOS. He emphasised the challenging role that CEOS has to play in the coming days to see the logical implementation of IGOS.

The Plenary expressed satisfaction over the way IGOS has developed and particularly for the Partnership. Some of the members mentioned the need for taking up demonstrative exercises for IGOS. Some other members also noted that the implementation of the IGOS needs more clarity – specifically related to the conduct of the projects.

The Plenary commended the excellent role played by the CEOS Chair, SIT, particularly its Chair, and many others within CEOS in the development of the Partnership and also endorsed the CEOS commitment to the IGOS Partnership.

B] Endorsement of Partnership by IGOS Partners

Dr He Changchui, FAO; Dr Erlich Desa, GOOS; Dr John Townshend, GCOS; Dr Jean-Francois Stuyck-Taillandier, ICSU; Dr Arthur Dahl, UNEP; Dr Hans Teunissen, WCRP; Dr Gerard Szejwach, IGBP and Dr Robert Landis, WMO made statements endorsing the IGOS Partnership and expressed their whole hearted commitment to further IGOS in the coming days. The representatives of IGBP, FAO, UNEP, ICSU, IGFA and GTOS also agreed to follow-up on the communication of the formal endorsement through letters to the other Partners.

C] SIT Report

Dr Brian Embleton, SIT Chair, briefed the Plenary on the activities and accomplishments of SIT (Refer Background Document-7). He reported that a meeting (SIT 3) was held on

25th March 1998 in Paris at which the Guiding Principles of IGOS were formalised following their general endorsement by the Toulouse Plenary. The Principles were designed to provide an understanding of how various agencies, programmes and projects could provide inputs in relation to an IGOS. An outline of the strategic plan for the space component of an IGOS was agreed. Preparations for the meeting with Sponsors and Program Directors of the G3OS were finalised. He mentioned that the status of the current 6 projects was assessed as a basis for seeking space agency commitments to the projects. The projects were also requested to map their attributes onto the template contained in the Guiding Principles. The SIT also agreed that the projects could be analysed collectively to identify the lessons that may be learnt in terms of the future of IGOS.

Dr Embleton advised that SIT held a preparatory meeting with ICSU on 26th March 1998, to plan for the CEOS meeting with the Sponsors and Program Directors of the G3OS, and had reviewed requirements for background papers for the first IGOS Partnership Meeting – including the annex to be exchanged by all partners.

Dr Embleton observed that while CEOS maintains its commitment to the implementation of the space component of IGOS, for the IGOS Partnership, there is a need to continually emphasise the value of projects from which a better understanding of observational requirements are being obtained. The Partnership has the responsibility for the implementation of a comprehensive IGOS, reviewing the status of current IGOS projects, defining new projects and for determining the regime of responsibility for conducting projects.

Dr Embleton also reflected on the future of SIT and felt that the SIT must evolve as a focus group for the space component strategy development. He also indicated that his assignment at the Cooperative Research Centre for Satellite Systems required his dedicated attention and therefore he would be unable to continue as SIT Chair. He requested the Plenary to appoint a new SIT Chair.

The Plenary joined the CEOS Chair in congratulating Dr Embleton for his untiring efforts in developing the IGOS concept and the Partnership. The Plenary noted the commitments of Dr Embleton in his other assignments and thanked him for the services rendered to CEOS.

D] IGOS Projects

Specific presentations were made by the 6 IGOS Projects on the status of their activities and also the future directions planned by them:

- **Long Term Continuity of Stratospheric Ozone Measurements.** Ms Leslie Charles, NASA made a brief presentation on the status of the project (**Refer Background Document-8**) and mentioned that the project is motivated by a need for understanding ozone distributions and addressing possible changes in the surface flux of biologically damaging ultraviolet radiation driven by changes in ozone and also the changes in atmospheric radiative forcing. The project has made an assessment of the observation requirements and a draft report of the project activity – focusing on the ground based measurements of source gases; ground based remote sensing observations of the atmospheric parameters, total column and vertical measurements; balloon based ozone profile measurements and satellite based observation of ozone and trace gases is being prepared. Issues related to the actual requirements of observation and the compliance by satellite measurements, with focus on calibration and validation, will also be covered in the report. The report is expected to be available by summer, 1999.

The Plenary recognised the value of this project from long term environment point of view and commended the project team for the excellent work done.

- **Upper Air Measurements.** Dr Don Hinsman, WMO briefed the Plenary about the project (**Refer Background Document-9**) which was mainly investigating the possible degradation in Numerical Weather Prediction (NWP) caused by reduction of radiosonde and omega sonde observations of the upper atmosphere. The project finally aims to explore near term mitigation of the degradation with the use of appropriate satellite data and observations. He also mentioned that the reduction in radiosonde observations in 1997 has not been as widespread. The project has also concluded that the need for wind profile, temperature and moisture profiles, of radiosonde accuracy, is very important over land and ocean. He observed that NWP will benefit from the recent microwave enhancements of AMSE in the polar satellites and that NWP would also benefit from high spectral measurements from instruments such as AIRS, IASI, CrSI planned for the 2000.

The Plenary congratulated the team for coming out with very clear user requirements and also an analysis of the compliance from EO.

- **GODAE.** Dr Philippe Courtier, CNES made a presentation on the progress of GODAE project (**Refer Background Document-10**) which aims to demonstrate the practicability and feasibility of the routine, real-time, global ocean data assimilation and prediction. The GODAE has the support of various space agencies and also has initiated the process of finding resources of the project. He mentioned that a workshop was held in Baltimore to discuss the issue of data assimilation. The project has also made a detailed assessment of the requirements of global observation of different ocean parameters – sea-surface topography, salinity, wind field, SST, sea ice cover and ocean color with details of resolution requirements, cycle of repetitivity, time-scales and accuracy. The project emphasised the importance of salinity and the need for space agencies to address measurements of this parameter in the future with appropriate developments in instrumentation/missions.

Dr Arend, ESA commented that the ERS Scatterometer would be considered for extending operations till 2000. The Plenary noted the specific requirement of the project on salinity measurements and the need for addressing technology solutions for this parameter.

- **GOFC.** Dr Frank Ahern, CCRS presented to the Plenary the status of the GOFC project (**Refer Background Document-11**) and mentioned that a large consultative process for planning a strategy to lead to ongoing global observation of forest cover has been completed by the project after discussions with various groups of scientists and professionals. The strategy of the project is to develop and demonstrate operational forest management at regional and global level by developing prototype products including forest cover characteristics and changes, forest fire monitoring and mapping and forest bio-physical process. The project aims to execute prototype projects, develop consensus of algorithms and standardise methodologies for product generation and product validation. GOFC requires the support of the CEOS agencies – mainly to provide essential data for the pilot projects and also for production of derived products. GOFC is also interacting with WGISS and WGCV for addressing and resolving further technical issues in the development and execution of GOFC pilot project.

Dr He, FAO and Dr Szejwach, IGBP commented that considerable amount of work has been done by their agencies and that these efforts could be harmonised for better and faster results of the project. Many members supported the project but noted that there needs to be an assessment of the data acquisition and analysis, which could be of a very high order. The Plenary complimented the project team for the excellent work done.

- **Ocean Biology Measurements.** Mr Tasuku Tanaka, NASDA briefed the Plenary about the IGOS project for long term ocean biology measurements (**Refer Background Document-12**). The project is under the aegis of IOCCG with the basic aim of being able to map the chlorophyll concentration, and index of phytoplankton biomass and also central to understanding ocean bio-geochemistry, coastal zone management, fisheries, harmful algal blooms and mixed layer dynamics. The project has conducted the survey of the requirements for operational ocean colour remote sensing in both oceanic and coastal waters and reports on these are being issued. The project recommended that sufficient number of sensors in orbit till 2005 needs to be ensured to meet operational requirements. Plans beyond 2005 are not well defined and the project intends to address this issue with the different space agencies.

Dr Szejwach, IGBP observed that the project could interface with IGBP-JGOFS as similar work is being planned by them. The Plenary noted the specific requirements of the project for observations of ocean colour beyond 2005.

- **Disaster Management Support.** Ms Helen Wood, NOAA made a brief presentation on the DMS project and its activities (**Refer Background Document-13**). The DMS aims to support natural and technological disaster management on a worldwide basis by fostering improved utilisation of existing and planned EO data. The project had a number of meetings with various organisations in different countries to mobilise support for the project. Hazard teams, including space and user agencies, have been established for drought, earthquake, fire, flooding, oil spill, tropical cyclone and volcanic ash. Specific user requirements and recommendations for improving the ability of current and planned EO systems to meet the DMS requirements are being developed by these hazard teams. Preliminary recommendations were reported in a project progress report that was distributed prior to Plenary. A project information server, to demonstrate timely access to satellite derived data and information products in support of disaster management, has been established by the project.

The Plenary observed that the project is of very high social and political relevance. It was noted that related communications services are required in order for satellite data products to be of greatest benefit. The need for continued user outreach was also emphasised. While the project is not aimed at developing value-added products, many members agreed with the finding that tailored information products for specific hazards are required in order to demonstrate to users the value of Earth observing satellite data for disaster support.

E] GOSSP and Linkages with CEOS

Dr John Townshend of GCOS briefed the Plenary about the recent re-vitalisation of GOSSP (**Refer Background Document-14a**), which is now Chaired by Dr Francis Bretherton, and has members from GOOS, GTOS, GCOS. The GOSSP is sponsored by the G3OS and has other agencies, including CEOS, as Affiliate members. The GOSSP TOR includes maintenance of requirements database, represent interest of global observation requirements and focus issues for improving observing systems. Dr Townshend mentioned

that the scope of GOSSP could be enhanced to include all the IGOS Partners. The GOSSP had its 4th meeting in October, 1998 and focused on the global products required by the Global Observing Systems and tracing them back to the space instruments capabilities. He conveyed the discussion of GOSSP to invite CEOS to the core membership of GOSSP and also other agencies/experts to the GOSSP meeting. He also endorsed the concept of GOSSP working with SIT towards meeting the IGOS requirements.

F] Space Component Strategy

Dr David Williams of EUMETSAT made a presentation to the Plenary on the space component strategy (**Refer Background Document-14**) and the next steps that are required to be taken by CEOS. Considering the IGOS Partnership as the core for the development of an IGOS, the strategy for the space component needs to be addressed at three levels – at the IGOS Partnership level, at the GOSSP level and finally at the SIT level. Dr Williams mentioned that the CEOS participation in the IGOS Partnership needs to be at the highest level so as to further the activities of SIT, GOSSP and IGOS. Representation at this level could be a CEOS delegation led by the CEOS Chair, and including the past and incoming Chairs and the SIT Chair. The CEOS relationship with GOSSP would be to participate in the GOSSP by nominating 2 or 3 experts and forging strong relationship with SIT. CEOS Chair could nominate the CEOS representatives to GOSSP. He also mentioned that the SIT needs to be retained as an adhoc group for one more year with a view to integrate IGOS requirements, coordinate with GOSSP and the individual CEOS agencies for obtaining the necessary commitments for IGOS. SIT could focus on specific themes and also evaluate the present projects vis-à-vis achievements and contribution to the IGOS activities. It is also essential to have agency endorsements/sponsorships for the projects and work out a plan for implementation.

G] IGOS Resolution

Based on the above discussions the Plenary adopted the following resolution:

- ◆ **Re-affirms** CEOS participation in the IGOS Partnership as consistently pursued by CEOS in the last year;
- ◆ **Commends** the excellent contributions made by the CEOS Chair, Strategic Implementation Team (SIT), SIT Organising Committee and many others within CEOS, in developing the concept of an IGOS and working towards the IGOS Partnership;
- ◆ **Recognises** the need to further the progress achieved through SIT, and to continue to contribute at levels consistent with the goals of IGOS;
- ◆ **DECIDES** to:
 1. Endorse, in general, the approach outlined in the EUMETSAT paper presented to Plenary, which identifies the roles of the IGOS Partnership; of GOSSP, through its Sponsors; and of SIT through CEOS, in the implementation and development of the IGOS.
 2. recognise GOSSP as an important contributor to the formulation of requirements for the IGOS.
 3. request the GOSSP Sponsors to agree that GOSSP recommendations be expeditiously transmitted to CEOS.
 4. task the CEOS Chairman to lead a delegation, including the previous and Incoming CEOS Chairs and the SIT Chair to IGOS Partners' meetings.

5. continue the SIT as an ad hoc group during 1999, participation being open to CEOS Members who commit to contribute to IGOS activities.
6. appoint Mr Bob Winokur of NOAA as Chairman of SIT and Dr Jean Louis Fellous of CNES as Vice-Chairman, and to invite them to pursue the SIT activities, using the CEOS Secretariat and any other support the Chairman may consider necessary, and to provide a detailed progress report and recommendations in time for the 13th Plenary.
7. task SIT to:
 - a. implement and develop the IGOS space component, taking into account the need for incremental steps and the use of themes in this work.
 - b. develop appropriate working relations with CEOS Members and IGOS Partners including GOSSP.
 - c. together with the IGOS Partnership, to evaluate the lessons gained from the Pilot Projects and to decide as soon as practicable their future role within IGOS.
8. urge SIT in conjunction with the CEOS Secretariat to review the institutional arrangements for the IGOS implementation and development.
9. ask the CEOS Chairman to ensure that the subject is reviewed at the 13th Plenary in the light of discussions within CEOS and with IGOS Partners during the coming year.

H] Project Resolution

The Plenary also adopted the following resolution in support of the projects.

- ◆ *Notes with satisfaction the report on the six prototype projects and recognises the considerable amount of work which has been devoted to them.*
- ◆ *Requests Project Leaders to convey Plenary's sincere thanks for the efforts of all who contributed.*
- ◆ *Decides in the context of the renewal of SIT and the newly constituted IGOS Partnership, to make the maximum use of work already performed in implementing and developing the space components of IGOS, and a dialogue among the IGOS-P and Project Leaders has been initiated towards this objective.*

8) WORKING GROUP REPORTS

A] WGCV

Dr Alan Belward, WGCV Chair reported to the Plenary the activities of Working Group (**Refer Background Document-16**) in the last one year. The WGCV met once in 1998 but also had organised one adhoc meeting, jointly with WGISS, for IGOS. The four sub-groups of WGCV had also met once in 1998. Dr Belward mentioned that the 11th Plenary actions vis-à-vis focus on validation and calibration, dropping atmospheric chemistry from the microwave sensors subgroup and organising a WGCV adhoc meeting for IGOS Projects have been carefully examined by WGCV and actions have been completed on this. The 14th WGCV meeting was held in July in Tokyo where discussions were held on IGOS project requirements, strategies for calibration and need for instrumented test sites and a special half a day session on Cal/Val of ADEOS and TRMM.

The SAR subgroup has released a data set for radiometric calibration studies and also a report on "Phase Preserving Processing". The microwave sensors subgroup has discussed the inter-calibration of 18 years dataset of MSU, the Cal/Val issues of AMSR to fly on ADEOS-II and EOS PM-1, CMIS for the NPOESS mission, etc. The infrared and visible optical sensor subgroup has adopted the instrumented test sites report and also discussed on the Cal/Val strategies for POLDER, A/ATSR and MERIS. The group has also carried out the inter-comparison of radiometers. The terrain mapping subgroup is preparing the dossier on terrain mapping validation issues. The sub-group is also evaluating the IRS-1C calibration and validation of DEM.

Dr Belward mentioned that a website has been established for communicating information on Cal/Val activities, calendar of events, test sites and instruments dossier, subgroup information, WGCV newsletter, reports and minutes of meeting. The WGCV aims to reach out to a larger group of users interested in WGCV information. Dr Belward mentioned that WGCV also proposes to bring out a slide set/brochure to focus on the activities of WGCV and also generate materials for developing countries outreach.

WGCV has also had discussions with IGOS pilot projects regarding the calibration and validation requirements for the projects. The methodology for DEM validation, scaling and aggregation, GCP usage etc. are areas requiring further attention. WGCV has also felt the need for a larger participation by the Associates so as to incorporate the in-situ and ground measurements into the calibration and validation activities – thus bringing about a better coordination between the data providers and users.

The Plenary endorsed the following WGCV recommendation:

- ◆ **Encourages** CEOS agencies to continue international collaboration in developing calibration data sets and common test sites, and continue to provide data for WGCV experiments.
- ◆ **Encourages** CEOS agencies to maintain and provide access to archives of co-located remote sensing, aircraft and in-situ data collected for cal/val campaigns (where there are specific cases of calibration data not being maintained, the issue will first be brought to the attention of the agency heads and then to CEOS plenary if warranted).
- ◆ **Encourages** CEOS participants to provide the WGCV with WWW links to validation and calibration data so that WGCV can provide pointers to the community (a simple web clearing-house).
- ◆ **Endorses** the proposal of WGCV to continue to organise workshops and ad hoc experts groups to examine cal/val of thematic products. Based on the outcome of these workshops, the issue of creation of WGCV subgroups will be considered. The Plenary further encourages CEOS agencies to nominate participants and support their attendance at these workshops.
- ◆ **Endorses** the WGCV proposal for the need to improve the confidence in SAR radiometric calibration and antenna pattern measurements and encourages the CEOS community to make use of a second calibration site over Greenland, apart from the existing site over Amazonia (area centers at S7, W67).

CEOS Chair and the Plenary Members commended the excellent work done by WGCV and for its efforts and response to IGOS requirements.

B] WGISS

The WGISS Chair, Mr Takashi Moriyama briefed the Plenary on the activities of WGISS (**Refer Background Document-17**) over the last one year. WGISS had met twice in 1998 and its subgroups had also organised one meeting in 1998. Apart from this, WGISS had coordinated with WGCV for an adhoc meeting on IGOS requirements in March, 1998. Mr Moriyama mentioned that WGISS had continued to pursue CEOS strategy for user outreach, involvement and adoption where CEOS agencies, as data providers and users, were the main customers for WGISS outputs. WGISS has also developed a strategy for outreach, involving a promotions plan for achieving greater awareness for WGISS results; a collaborative links plan for improved understanding of the outputs and external liaison and a pilot projects plan to demonstrate outputs for adoption.

Mr Moriyama also mentioned that WGISS has a website and also has published a WGISS Newsletter and other promotional materials for the outreach. WGISS had also plans to participate in the CEOS activities for UNISPACE-III by showcasing some of the WGISS products. WGISS has initiated dialogues with ISPRS, ISO/CCSBS, ISCGM and the commercial sector with a view to collaborating for effective information systems and services to the users. WGISS also targeted the IGOS projects as a medium of spreading the WGISS activities.

Mr Moriyama informed the Plenary the establishment of a CEOS Information Infrastructure (CII), which provides comprehensive and up-to-date online information resources on CEOS for external outreach and internal management. The linkages to the member sites are also to be taken up.

Mr Moriyama mentioned about the adhoc Developing Countries (DC) panel established in 1998 and the special workshop on Promotion and Management of EO data with respect to DC needs held in October, 1998. The workshop had discussed the various issues limiting the usage of EO data in DC – awareness, information policies, lack of facilities and trained manpower, change in technology trends, etc., and had decided to undertake, with UNEP, specific demonstration projects for matching Developing Country requirements. Mr Moriyama also mentioned that CNES produced the third issue (1998 version) of the CEOS CDROM which focussed on education and training specifically in developing countries. The ISRO treatise on CD-ROM was yet another example. The CILS project had also provided major focus to information outreach in developing countries. Mr Moriyama also mentioned about the catalogue interoperability task and requested CEOS agencies to adopt CIP for their current and future data systems.

Mr Moriyama mentioned that Dr Gerard Szejwach, WGISS User Vice-Chair has stepped down after a very effective and successful stint of 3 years and Mr Mick Wilson of UNEP has taken over as the new User Vice-Chair.

The Plenary endorsed the WGISS recommendations:

- ◆ **Endorses** CEOS support to WGISS in identifying and arranging opportunities for WGISS outreach in 1999 - such as at Unispace III
- ◆ **Recognises** the importance of interaction with the commercial sector in the area of ISS, to consider the strategy for increased interaction, and to suggest how this might be realised at the WG level
- ◆ **Encourages** the CEOS agencies involved in IGOS projects to further develop the dialogue on practical support from WGISS

- ◆ **Encourages** CEOS agencies to provide at least a single WWW page dedicated to CEOS information for their user community
 - ◆ apply to register as http://your_name.ceos.org
 - ◆ provide a link back to <http://www.ceos.org>
- ◆ **Encourages** CEOS agencies to apply the results of considerable CEOS efforts in catalogue interoperability by investigating the adoption/adaption of CIP for their current and near future data systems
- ◆ **Commends** the WGISS Five Year Plan to the Plenary and endorses Mick Wilson of UNEP as the User Vice Chair

CEOS Chair and the Plenary Members commended the excellent work done by WGISS for its efforts and response to EO information services requirement.

9) REPORT ON THE CEOS AND AFFILIATES DATABASE

Mr Don Hinsman of WMO made a brief presentation on the status of the CEOS and Affiliates Database (**Refer Background Document-19**). He noted that the 11th Plenary had agreed for a joint database management/maintenance of the WMO database – which is a collection of the user requirements definition, and the CEOS database – which is mainly a collection of mission parameters of space agencies. Joint WMO/ESA meetings were held in the course of 1998 to undertake the harmonisation of the databases. WMO had received the update information from different space agencies and these have been incorporated into the final version of the common dataset. Apart from this, all Affiliates have also reviewed and updated the requirements as of October, 1998. The quality control evaluation reports have also been rationalised for missing data, un-validated data and inconsistent instrument expected performances. Mr Hinsman informed that WMO has developed software to produce a CD-ROM version of the database and this will be distributed shortly. A database manual has also been updated and this was distributed in October, 1998.

Dr Arend of ESA underlined the good cooperation between WMO and ESA in the harmonisation of the databases and thanked WMO for their considerable efforts in this endeavor.

The CEOS Chair was joined by the Plenary in commending the efforts of WMO in updating and maintaining the databases of the space missions and the user requirements. The Plenary also noted that this is a very valuable resource for the IGOS requirement analysis to be taken up at the next meeting.

10) REPORT ON CEOS PARTNERSHIP AND CEOS TERMS OF REFERENCE

Dr Jean Louis Fellous of CNES made a presentation to the Plenary on the activities of the Partnership task team (**Refer Background Document-20**), set up by CEOS Chair to address the issue of adequacy of current membership criteria and develop interactions with the private sector. Dr Fellous mentioned that the 11th Plenary had recommended that the CEOS Chair commission a small group to address these issues. Accordingly the CEOS Chair set up a task team, led by Dr Fellous, with membership of NOAA, NASA, NASDA, ESA, ISRO and CNES. The task team had contacted the CEOS Members, Affiliates and Observers with a view to get their opinion on the need for re-categorising the CEOS agencies to only 2 categories and also for possible partnership with the private sector.

Dr Fellous mentioned that re-categorising the membership into 2 categories – namely Members (previously also Members) and Associates (previously CEOS Observers and Affiliates), was endorsed by most of the CEOS agencies. This is considered to be the first step in the re-orientation process forging stronger relationships in the light of interagency activities and the development of IGOS.

As far as interaction with the private sector is concerned, Dr Fellous mentioned that the present CEOS agencies feel that the time is still not mature for including the private sector within CEOS. Nevertheless, the CEOS community recognises that the EO commercial sector is a growing and an important issue and support a vigorous interaction of CEOS with the private sector through the medium of joint organisation of special sessions/workshops in major international events and special adhoc meetings for exchange of views and information.

Dr Fellous also mentioned the need for revising the CEOS Terms of Reference to account for the re-categorisation of the Membership and also for adopting the principle of involving the past and the incoming Chairs of CEOS, together with the present Chair, in the Secretariat activities.

Mr Lawrence Fritz of ISPRS suggested that ISPRS would work with CEOS to surface issues identified by industry and CEOS and facilitate discussions to address industry concerns in public forums which intend to foster private/public consensus building. ISPRS recommended the initiation to establish an industry forum. The Plenary agreed to this suggestion.

Mr Taillandier of ICSU suggested that CEOS could participate in the forthcoming World Conference on Science on *Science for the 21st Century – A New Commitment*.

All the members of the Plenary agreed to the re-categorisation and endorsed the suggestion to forge a strong partnership with private sector, as proposed by the task team.

The Plenary adopted the following resolution on the partnership issue:

Membership categories

- ◆ *Takes note that the nature of CEOS agencies relationships is expected to change continuously and CEOS will have to face the reality of new comers entering the arena of EO within the next decade. The membership criteria will have to be reconsidered together with the scope of CEOS activities, which will move more and more from planning to implementation, in particular (but not exclusively) with regard to the development of the IGOS initiative.*
- ◆ *Agrees that, with immediate effect, CEOS should reshape its membership into 2 categories, namely "Members", comprising the current Members; and "Associates", encompassing current Affiliates and Observers;*
- ◆ *Recommends that the CEOS Terms of Reference be modified to reflect the change in Membership categories and the inclusion of the past and Incoming CEOS Chair in the CEOS Secretariat.*

Inclusion of Past-, Incoming- CEOS Chairs in CEOS Secretariat

- ◆ *Agrees for the inclusion of the past and Incoming CEOS Chair in the CEOS Secretariat, which will help in the expeditious conduct of business and also provide continuity;*

Interactions with the private sector

- ◆ **Takes** note that there is at present no recognised body able to represent the views of the growing private sector;
- ◆ **Agrees** that a mechanism should be established to provide a more effective interaction with the private sector;
- ◆ **Adopts**, as a first approach, the following steps :
 - ◆ *Dedicated workshops can be organised on the occasion of major events (such as IAF) bringing together CEOS members and private sector companies ,*
 - ◆ *Meetings can be organised for specific exchange of views and information, for example between the participants of a CEOS sub-group and the commercial companies interested in a particular topic or based in the area of the location of the meeting*
 - ◆ *In order to ensure a minimum of conformity in the management of those meetings, and to keep the Plenary informed, CEOS Secretariat will submit to the Plenary a programme of such events for the forthcoming year.*

The Plenary joined the CEOS Chair in complimenting Dr Fellous and the Task Team for effectively carrying out the study and recommending clear cut actions to the Plenary. The revision of the CEOS Terms of Reference to reflect the recategorisation of Affiliates and Observers into a new category called Associates and the involvement of the previous and incoming CEOS Chair in Secretariat activities was taken up by the Secretariat. The Plenary endorsed the revisions to the Terms of Reference, as was recommended by the Secretariat.

11) REPORT ON UNISPACE-III CONFERENCE**A] Preparatory activities for the UNISPACE-III Conference**

Mr Sergio Camacho of UN-OOSA provided an overview of the preparatory activities for the UNISPACE-III Conference (**Refer Background Document-22**). The Conference is to be held during July 19-30, 1999 at the UN Office at Vienna in the form of a special session of the Committee on the Peaceful Uses of Outer Space (COPUOS). The major aim of the Conference is to promote the use of space technology to assist in the solution of problems of regional and global significance and also to strengthen the capabilities of Member States to apply the technology for developmental activities. Four regional preparatory conferences of UNISPACE-III (three conferences in Malaysia, Chile and Morocco have been already held; the fourth one is to be held in Romania in January, 1999) will focus the major issues and topics to be covered by the provisional agenda of the Conference. The Conference will address Earth and the environment issues, space science and technology, information and global approach, promotion of international cooperation and economic and societal benefits of space. The conference will also host an exhibition, poster sessions, special workshops and lectures by eminent personalities. The conference plans to adopt a Vienna Declaration as a plan of action for further activities.

Mr Camacho mentioned that CEOS would be invited to present its report at the Conference, along with the other agencies like G3OS, WCRP, IGBP and IGOS Partnership agencies. He also mentioned that agencies could plan to participate in exhibition and poster sessions.

The Plenary thanked Mr Camacho for the presentation and also for focusing on CEOS participation.

B] CEOS Participation in UNISPACE-III

Dr David Williams of EUMETSAT made a brief presentation on the CEOS participation in UNISPACE-III (**Refer Background Document-23**). He mentioned that the 11th Plenary had requested the CEOS Chair to prepare for CEOS participation in UNISPACE-III. The CEOS Secretariat had made a proposal and submitted to UN-OOSA in February, 1998. The gist of the proposal included CEOS's participation in the regional preparatory meetings, organisation of a CEOS workshop/symposium at UNISPACE-III Conference, participation in the exhibition and also participation in the Conference. UN-OOSA had welcomed the proposal and invited CEOS for its involvement in UNISPACE-III.

Dr Williams informed the Plenary that on behalf of CEOS, ISRO participated in the regional conference of UNISPACE-III held in Kuala Lumpur (May, 1998) and ESA and NASA/NOAA participated in the Regional Conferences held in Morocco (October, 1998) and Chile (Oct 1998) respectively. Further, UN-OOSA has also assured CEOS of exhibit space and also invited it to make a presentation in the UNISPACE-III Conference.

Dr Williams also informed the Plenary that, consequent to the decision of the IGOS Partners in their first meeting, FAO and CEOS were charged to make a joint proposal for a one-day forum/workshop focusing on IGOS at the UNISPACE-III Conference. Accordingly, the proposal has been finalised by CEOS Chair and FAO and submitted to UN-OOSA. The proposal is to organise a one-day international forum on IGOS on July 28, 1999 at the UNISPACE-III Conference.

C] Discussions and Recommendations

The Plenary unanimously endorsed the initiatives made by the CEOS Chair for CEOS participation in UNISPACE-III and also for the one-day forum for IGOS. The Plenary requested the CEOS Chair and the Secretariat to continue the interaction with UN-OOSA and the IGOS Partners in this regard.

The Plenary adopted the following resolution:

- ◆ *Endorses the proposal made by CEOS to UNISPACE-III for presenting CEOS views at the Regional Conferences; participation in the Exhibition; participation in UNISPACE-III. A small group should be set up for this by the Secretariat to coordinate this activity.*
- ◆ *Endorses the FAO/CEOS proposal for the IGOS Forum and recommend it to be implemented - for which the CEOS delegation to IGOS Partners Meeting can be asked to represent CEOS views*
- ◆ *Recommends that the CEOS Chair makes an overall presentation on behalf of CEOS and ask the Secretariat to pursue the availability of a time slot at UNISPACE III.*

12) REPORT ON SPECTRUM MANAGEMENT COORDINATION

Dr Korehiro Maeda, Chair of CEOS Adhoc Coordination Group on Spectrum Management made a brief presentation on the results of the WRC-97 discussions, preparation for the WRC-2000/future WRC and also on the activities of the SFCG-18 meetings (**Refer Background Document-24**). SFCG-19 will be held in ESTEC during September 8-15, 1999. Dr Maeda mentioned that about 13 frequency bands have been upgraded to primary

status for Earth observation/exploration. Some of the frequencies are limited to geostationary satellite systems. Dr Maeda informed the Plenary that the WRC-2000 will be held during May 8 – June 2, 2000 in Turkey and that the CPM-99 meeting will be held during November 15-26, 1999 in Geneva. The deadline for the CPM report is May 31, 1999. He suggested that the CEOS agencies should urge their national administration to consider making proposals for addressing the spectrum issues for Earth observation requirements. He mentioned that there is a need to make proposals for EESS allocation, upgrading EESS to primary status for certain frequencies and also for making primary allocations in specific spectrum regions. Dr Maeda also informed the Plenary about the specific frequency-wise usage of active and passive frequencies in different regions.

The Plenary thanked Dr Maeda for coordinating the spectrum management activities and also for bringing the focus specific frequency regions requiring primary allocations and upgrading.

Realising the importance of coordinating spectrum resources, the Plenary extended the mandate of the CEOS Adhoc Coordination Group for one more year and requested Dr Maeda to continue to provide leadership to this activity.

The Plenary resolved the following:

- ◆ *Encourages CEOS Members and Associates to advise their national administration to emphasise the utility of spaceborne passive and active sensors.*
- ◆ *Encourages CEOS Members and Associates to urge their national administrations to support or make proposals for WRC-2000, related to Earth observation, as follows :*
 - ◆ *Allocation of space-borne active sensors with 432-438 MHz*
 - ◆ *Worldwide upgrade of space-borne passive sensor with 18.6-18.8 GHz*
 - ◆ *Proper allocation of space-borne passive sensor using spectra over 71 GHz*
- ◆ *CEOS Members and Associates urge each administration to support or make proposals in order that the following items are included clearly in agenda of WRC-2002*
 - ◆ *Upgrade of space-borne passive sensor with 4.2-4.4 GHz*
 - ◆ *Expansion of bandwidth of space-borne active sensor with 5250-5460 MHz*
 - ◆ *Relaxation of footnote constraints for space-borne active sensors*
 - ◆ *Allocation for space-borne passive sensor over 275 GHz*

13) REPORT ON CEOS DEVELOPING COUNTRY ACTIVITIES

Dr David Williams of EUMETSAT presented the report on the DC activities (**Refer Background Document-25**). He mentioned that the 11th CEOS Plenary had requested EUMETSAT to extend the analysis of CEOS DC activities and update the annual report and present it to the 12th Plenary. He mentioned that a questionnaire was circulated to all the CEOS agencies eliciting information on the organisation, policy and resources, potential activities, areas of cooperation and project activities. A large number of CEOS agencies have responded to the questionnaire and have provided valuable inputs on the individual agency programmes for developing countries.

The Plenary congratulated EUMETSAT for the excellent report and also for making the survey. The Plenary noted that the report brings out a wide variety of activities that are being conducted in the DC and also of the support provided by CEOS agencies and thus is a very useful ready reckoner on EO activities in developing countries. Such report would be

very useful for international and intergovernmental meetings like UNISPACE-III. The Plenary, therefore, suggested that the report could form a major document for the UNISPACE-III Conference. As a result CEOS Chair could forward the report to the UNISPACE Secretariat.

14) REPORT ON CILS

Mr Gunter Schreier of DLR made a presentation on the CEOS Information Locator System (**Refer Background Document-26**) and mentioned that CILS is basically an information search and locator service which is now operational in many countries. The CILS is a meta-data database on information related to EO and is compliant with WWW for easy access. The CILS database consists of information on users, projects, datasets, information services, organisations, documents, calendar of events and relevant acronyms. The database is populated by registered users and is replicated in CILS servers in different locations. The CILS network is connected to the UNEP Mercure concept and forms a part of the UNEPNet. He mentioned that the user response to CILS is very positive and that UNEP has a special interest to use CILS as an operational system. The major issue is the connectivity in the different countries for accessing CILS.

The Plenary thanked DLR for the development and operations of CILS and commended the development team. The Plenary also felt that the CILS should be executed at the UNISPACE-III Conference and also in other international fora.

15) ESCAPs MINISTERIAL CONFERENCE

Mr V Jayaraman of ESCAP briefed the Plenary about the forthcoming Ministerial Conference on Space Applications for Sustainable Development in Asia and the Pacific – which is to be held during December 2-8, 1999 in New Delhi (**Refer Background Document-27**). He mentioned that the first Ministerial Conference was held in Beijing in 1994 and had given rise to the ESCAPs programme on Regional Space Applications Programme for Sustainable Development (RESAP). The RESAP was a multilateral programme for promoting the benefits of space technology in Asia Pacific countries. The second Ministerial Conference would mainly address the institutionalisation of a viable, regional cooperative mechanisms for space applications in Asia and Pacific countries – through the mechanism of national capacity building and strengthening regional cooperation. The Conference will address EO systems, spatial data infrastructure, space communication applications, capacity building, education and training and space related industry and services sector. Mr Jayaraman mentioned that the Conference will have an Expo Space-2000 Exhibition apart from a technical symposium. He also mentioned that CEOS could actively participate in the Conference and specifically the exhibition and utilise the opportunity for reaching out to the Asia Pacific countries.

The Plenary thanked Mr Jayaraman for giving the overview of this very important event.

16) SIGNIFICANT EVENTS OF MEMBERS AND ASSOCIATES

The following agencies provided verbal/written reports on the status of their programmes – NASA, EUMETSAT, NOAA, ESA, NASDA, ISRO, ISPRS, CSA, CNES, CSIRO, WMO, FAO, NRSC, DLR, GCOS, and WCRP (**Refer materials circulated at the Plenary**).

17) PRESENTATION OF EO TREATISE CD-ROM BY ISRO

Mr Mukund Rao made a brief presentation of the initiative taken up by ISRO to focus the value (**Refer Background Document-29**) and benefits of EO technology by chronicling various applications from different parts of the world. He mentioned that the CD-ROM is a

multimedia presentation material that includes text, images, graphics, video and audio elements for the different case studies. A total of 30 case studies had been received from 11 agencies – out of which 24 of them have been included in the present version of the CD-ROM. Each application demonstrates how value/benefit has been derived by using EO data and also the changes that have happened on the Earth's surface. He mentioned that one copy of the CD-ROM could be provided to each agency for preview and comments/suggestions, if any, could be sent to ISRO. The comments could be sent before December 31, 1998 after which ISRO would finalise the CD and publish it for wide distribution (including CEOS agencies).

A 15 minutes preview of the ISRO CD-ROM, including the EO montage and 3 case studies was shown to the Plenary members.

The Plenary appreciated and congratulated ISRO for the EO treatise and also for having coordinated the activity to focus the CEOS agencies achievements of the value and benefit of using EO technology. The Plenary suggested that the ISRO CD-ROM be widely distributed to raise awareness of CEOS activities and also focus on the benefits of EO technology.

18) PLENARY ACTION ITEMS

Mr Mukund Rao reviewed a list of 19 action items emerging from the discussions in the 12th Plenary, which were endorsed by the Plenary. The list of action items is included as ANNEX-2.

19) CEOS PLANNING FOR NEXT 3 YEARS

Dr Tillmann Mohr of EUMETSAT confirmed that EUMETSAT, the 1999 CEOS Chair, would be hosting the 13th CEOS Plenary, in coordination with the Swedish National Board, at Stockholm between November 10-12, 1999. Dr Tillmann mentioned that IGOS is the top priority of CEOS in 1999. Progress can be made in IGOS by encouraging Members to make meaningful increments to existing programmes, such as the WMO Global Observing Programme, rather than setting our sights on completely new enterprises. This is a fine opportunity to cement relations with the international programmes, and to prove the real contributions that the space agencies can make. The Working Groups must continue effectively with their work. Further efforts are needed to interact with the commercial sector. They should be encouraged to organise itself so as to interface more consistently with CEOS and its working Groups. UNISPACE III is a major event and we must ensure that there is a worthy contribution of CEOS. Within CEOS, he mentioned that, he would like see Members increase the practical relevance of CEOS work, and then to press for its acceptance and implementation. He also mentioned that he would like to apply the "three Chairman concept" that has been agreed by Plenary, as a means of ensuring that CEOS does not lose momentum between Plenary meetings. Finally, EUMETSAT at the next Plenary will bring forward a proposal setting out a vision for CEOS over the next next 3-5 years.

Mr Paulo Serra of INPE confirmed that INPE would Chair CEOS in 2000 and would make necessary arrangements to host the 14th CEOS Plenary.

Mr Satoru Yanagishima of STA/NASDA suggested to the Plenary that NASDA would be happy to Chair CEOS in 2001 and also host the 15th CEOS Plenary. The Plenary thanked STA/NASDA for offering to Chair CEOS in 2001 and agreed to the proposal.

20) CLOSING

Mr Mukund Rao thanked the Plenary participants for their contributions and for also allowing him to obtain a rich and varied experience of coordinating the CEOS activities on behalf of ISRO. He specifically thanked Dr Kasturirangan for giving him this opportunity to coordinate the CEOS activities and also for the support and guidance provided in the conduct of the CEOS activities in 1998. He also thanked the Secretariat members for their valuable support and ever-available guidance. The support of the EOS Programme Office, including its Director, and the ISRO Headquarters for the excellent arrangements for the Plenary was applauded by all the participants.

Dr Tillmann Mohr was "annointed" in a traditional Indian manner and was handed over the "CEOS gavel" by Dr Kasturirangan – signifying his taking over as the CEOS Chair.

Dr Kasturirangan, in his closing remarks, thanked the CEOS Members and Associates for their unstinted support in furthering the CEOS activities in the past year. He mentioned that the value of CEOS was its participants that made the Committee a vibrant and effective forum. He also thanked the IGOS Partners for having given the opportunity of leading the 2nd meeting and also for their cooperation and guidance. He made specific mention of Dr Lisa Shaffer and Dr Brian Embleton, both of whom had made major contributions and will be missed as they leave the CEOS family. He also thanked Dr Fellous for support and help in conduct of the CEOS activities. He mentioned about the excellent performance of the Secretariat Members and their effective means of coordination – through emails, telecons and meetings for furthering the activities of CEOS. He also had a word of praise for ISRO for having coordinated the CEOS activities and for the efficient arrangements for the Plenary. With a final stroke of the CEOS gavel, Dr Kasturirangan closed the meeting.

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ANNEX – 1: 12th CEOS PLENARY - PARTICIPANTS LIST

British National Space Centre (BNSC)

DAVIS Derek
BRIGGS Stephen

Canada Centre for Remote Sensing (CCRS)

SHAW Edryd
AHERN Frank

Canadian Space Agency (CSA)

JHA Virendra

Centre National d'Etudes Spatiales (CNES)

FELLOUS Jean-Louis
FOURNY-DELLOYE Dominique
COURTIER Philippe
MARTHON Gilbert

Cooperative Research Centre for Satellite Systems (CRCSS)

EMBLETON Brian

Commonwealth Scientific and Industrial Research Organization (CSIRO)

HARRIS Graham
JUPP David

Deutsches Zentrum für Luft- und Raumfahrt (DLR)

LIEBIG Volker
SCHREIER Gunter
LANGNER Arndt

European Commission (EC)

BELWARD Alan

European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT)

MOHR Tillmann
WILLIAMS David
GIBSON Roy
INGLIS Ken

European Space Agency (ESA)

SOUTHWOOD David
AREND Harald

Food and Agriculture Organization (FAO)

CHANGCHUI He

Global Climate Observing System (GCOS)

TOWNSHEND John

Global Ocean Observing System (GOOS/IOC)

ERLICH Desa

International Council of Scientific Unions (ICSU)

STUYCK-TAILLANDIER Jean-François

International Geosphere Biosphere Programme - Data Information System (IGBP-DIS)

SZEJWACH Gérard

International Group of Funding Agencies (IGFA)

SPENCE Thomas

Institutos Nacional de Pesquisas Espaciais (INPE)

SERRA Paulo Roberto Martins

International Society for Photogrammetry and Remote Sensing (ISPRS)

FRITZ Lawrence W.

Indian Space Research Organisation (ISRO)

KASTURIRANGAN Krishnaswamy

SRIDHARAMURTHY KR

RAO Mukund

RAO DP

GOPALAN AKS

GOEL PS

NAVALGUND RR

KALYANRAMAN S

JAIRAM Hebbar

Japan Meteorological Agency (JMA)

SUGIMOTO Kiyooki

Ministry of International Trade and Industry (MITI)

INOUE Mitsuo

MIYAZAKI Yoshinori

National Aeronautics and Space Administration (NASA)

ASRAR Ghassem

CHARLES Leslie

National Space Development Agency of Japan (NASDA)

MORIYAMA Takashi

MAEDA Korehiro

DOSHO Hirohiko

WARD Stephen

TANAKA Tasuku

KISSHU Yoko

MISAWA Kazuko

National Oceanic and Atmospheric Administration (NOAA)

SMITH Brent
WOOD Helen
RAO PK

National Remote Sensing Center of China (NRSC)

DONGFENG Luo
XU Jianmin
CHEN Xiuman

Norwegian Space Centre (NSC)

SKAAR Rolf

Science and Technology Agency of Japan (STA)

TAKEDA Hiroyuki
YANAGISHIMA Satoru

Swedish National Space Board (SNSB)

BORG Claes-Göran
TRESCHOW Marianne

United Nations Environmental Programs (UNEP)

DAHL Arthur

United Nations Economic and Social Commission for Asia and the Pacific (UN-ESCAP)

JAYARAMAN V

United Nations Office of Outer Space Affairs (UN-OOSA)

CAMACHO Sergio

US Geological Survey (USGS)

THOMPSON RJ

World Climate Research Program (WCRP)

TEUNISSEN Hans W.

World Meteorological Organization (WMO)

HINSMAN Don
LANDIS Robert
ROESLI Hanspeter

EXHIBITION/DEMONSTRATION COORDINATORS

APSRAC

KSS Prasad
DVJ Sastry

CSSTE-AP

SK Saha

INRIMT

VR Hegde
KR Jayaraj

ISRO

S Adiga
PG Diwakar
Manjula VB
ML Ramachandra
BK Ranganath

NDC

B Harikumar
A Jayaseelan

ROLTA

Arvind NR
Koutilya

ANNEX-2: ACTION ITEMS OF 12TH CEOS PLENARY

Action No.	Action Items
12/1	CEOS Chair to formally write to CEOS Members and Associates about the Membership categories and indicate the automatic re-categorisation of the existing Affiliates/Observers as Associates.
12/2	CEOS Chair to invite SAC, CSIR to be a CEOS Associate and inform them of the Plenary decision.
12/3	UNEP, IGFA, ICSU, IGBP, FAO and GTOS are invited to respond to the CEOS Chair's request and communicate their endorsement for the IGOS Partnership
12/4	CEOS Chair to lead a delegation, including the previous and the Incoming CEOS Chair and the SIT Chair to forthcoming IGOS Partners meetings
12/5	CEOS Chair to communicate to Mr Bob Winokur of NOAA and Dr Jean Louis Fellous of CNES the Plenary decision to invite them as Chair and Vice-Chair of SIT, respectively.
12/6	SIT to: <ul style="list-style-type: none"> a) Implement and develop the IGOS space component, taking into account the need for incremental steps and the use of themes in this work b) Develop appropriate working relations with CEOS members and IGOS Partners including GOSSP c) Together with the IGOS Partnership and their Task Force established for this purpose, evaluate the lessons gained from the pilot projects and to decide as soon as practicable their future role within IGOS
12/7	CEOS Members and Associates to send to WGCV details of URLs to the Cal/Val related web sites.
12/8	CEOS Secretariat to identify opportunities for WGISS outreach in 1999 (such as at UNISPACE-III)
12/9	CEOS Secretariat to further explore mechanisms for effective interaction with the private sector and identify a programme of events for 1999. In this activity, WGISS could also be involved.

Action No.	Action Items
12/10	CEOS Members and Associates to apply the results of the Catalogue Interoperability by investigating the adoption of the CIP for their current and future data systems.
12/11	CEOS Chair to write to the outgoing and incoming CEOS Chairs about their inclusion in the CEOS Secretariat
12/12	ISPRS to coordinate with the CEOS Secretariat for the conduct of private industry forum activities.
12/13	CEOS Chair to coordinate the participation of CEOS in the UNISPACE - III Conference - specifically the presentations, exhibition and in the 1-day International IGOS Forum being organised by IGOS-Partners.
12/14	CEOS Chair to forward the EUMETSAT Developing Country report to UNISPACE Secretariat as an input from CEOS towards spreading the benefit of EO towards Developing Countries.
12/15	CEOS Members and Associates are encouraged to coordinate with their national administration towards preparing proposals for WRC-2000 for protection of frequencies for active and passive sensing.
12/16	CEOS Members and Associates to coordinate with their national administration towards submitting agenda for WRC-2002 for upgrade, expansion and allocation of specific frequencies for EO.
12/17	CEOS Secretariat to consider CEOS representation at the 2 nd ESCAP Ministerial Conference on Space Applications for Sustainable Development in Asia and the Pacific.
12/18	CEOS Members and Associates to review the ISRO EOS Treatise CD and provide comments/suggestions/additional materials (before December 31, 1998) to ISRO.
12/19	CEOS Secretariat to consider the suggestion of ICSU for appropriate participation in the World Conference in Science - <i>Science for the 21st Century - A New Commitment</i>

HIGHLIGHTS OF 12TH CEOS PLENARY MEETING

- **The 12th Plenary Meeting of the Committee on Earth Observation Satellites (CEOS) was held November 10-12, in Bangalore, India, hosted by the Indian Space Research Organization (ISRO). The NOAA delegation was led by Helen M. Wood, Chief, NESDIS Office of Satellite Data Processing and Distribution, and included P. Krishna Rao, NESDIS Chief Scientist, and D. Brent Smith, Chief, NESDIS International and Interagency Affairs.**
- **The Plenary continued the Integrated Global Observing Strategy (IGOS) Strategic Implementation Team (SIT) as an ad hoc group for the upcoming year, appointing Robert M. Winokur, NOAA AA for Satellite and Information Services, as SIT Chairman. (Mr. Winokur, in sending regrets for not being able to come to Bangalore, had indicated his willingness to serve in this capacity and his suggestion that SIT meet in mid-January.) Jean-Louis Fellous, Director of Earth Observation at the French National Space Centre (CNES) was appointed SIT Vice-Chair.**
- **SIT was tasked to implement and develop the IGOS space component, working together with the IGOS Partnership (CEOS and intergovernmental user organizations) to evaluate the lessons learned from the six IGOS pilot projects, and to decide their future role within IGOS, as well as the guidelines for initiating new IGOS activities.**
- **A side meeting of the IGOS Partnership confirmed the need for greater IGOS outreach and visibility; tasked the preparation of an IGOS consolidated strategy document with space and in-situ components; formed a task force to define guidelines and mechanisms for IGOS activity definition and consideration by Partners; and formed a small liaison group to track action items and prepare future Partners Meetings.**
- **CEOS Affiliates and Observers were recategorized as CEOS Associates; hencefore there will be two categories of CEOS participants--Members and Associates.**
- **The CEOS Secretariat was tasked to further explore mechanisms for effective interaction with the private sector and to develop a plan for workshops/meetings for fostering dialogue with private industry.**
- **CEOS Members and Associates were encouraged to coordinate with their own national governments proposals for protection of frequencies for Earth Observation in connection with upcoming World Radio Conference frequency allocation meetings.**
- **ISRO issued a review copy of an Earth Observations Treatise CD-ROM that includes the night lights of the world and other NOAA-developed applications. CNES issued an updated 1998 version of its educational CD-ROM, Resources in Earth Observation.**
- **Tillmann Mohr of EUMETSAT took over as the incoming CEOS Chair. EUMETSAT and the Swedish National Space Board will host the 13th Plenary in November 1999 in Stockholm. EUMETSAT as CEOS Chair will coordinate CEOS participation in the July 1999 UNISPACE-III Conference to be held in Vienna.**

IGOS Resolution

The 12th CEOS Plenary:

Re-affirms CEOS participation in the IGOS Partnership as consistently pursued by CEOS in the last year

Commends the excellent contributions made by the CEOS Chair, Strategic Implementation Team (SIT), SIT Organising Committee and many others within CEOS, in developing the concept of an IGOS and working towards the IGOS Partnership.

Recognises the need to further the progress achieved through SIT, and to continue to contribute at levels consistent with the goals of IGOS.

and DECIDES to

1. endorse in general the approach outlined in the EUMETSAT paper presented to Plenary, which identifies the roles of the IGOS Partnership; of GOSSP, through its Sponsors; and of SIT through CEOS, in the implementation and development of the IGOS.
2. recognise GOSSP as an important contributor to the formulation of requirements for the IGOS.
3. request the GOSSP Sponsors to agree that GOSSP recommendations be expeditiously transmitted to CEOS.
4. task the CEOS Chairman to lead a delegation, including the previous and next CEOS chairs and the SIT Chairman, to IGOS Partners' meetings.
5. continue the SIT as an ad hoc group during 1999, participation being open to CEOS Members who commit to contribute to IGOS activities.
6. appoint Mr Bob Winokur of NOAA as Chairman of SIT and Mr Jean-Louis Fellous of CNES as Vice-Chairman, and to invite them to pursue the SIT activities, using the CEOS Secretariat and any other support the Chairman may consider necessary, and to provide a detailed progress report and recommendations in time for the 13th Plenary.
7. task SIT to
 - a. Implement and develop the IGOS space component, taking into account the need for incremental steps and the use of themes in this work.
 - b. Develop appropriate working relations with CEOS Members and IGOS Partners including GOSSP.
 - c. Together with the IGOS Partnership, to evaluate the lessons gained from the Pilot Projects and to decide as soon as practicable their future role within IGOS.
8. urge SIT in conjunction with the CEOS Secretariat to review the institutional arrangements for the IGOS implementation and development.
9. ask the CEOS Chairman to ensure that the subject is reviewed at the 13th Plenary in the light of discussions within CEOS and with IGOS Partners during the coming year.