

Report on the 13th CEOS Plenary Stockholm, Sweden 10-12 November 1999

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1 Introduction to Australian participation in CEOS

To optimise the benefits of this report, it is useful to briefly summarise the aims and activities that comprise CEOS. The Committee on Earth Observation Satellites (CEOS) has three stated primary objectives:

- to optimise the benefits of space-borne Earth observations through co-operation 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 co-ordination of space-related Earth observation activities, including those related to global change;
- to exchange policy and technical information to encourage complementarity and compatibility among space-borne Earth observation systems currently in service or being developed, and the data received from them; issues of common interest across the spectrum of Earth observation satellite missions will be addressed.

(CEOS, 1998, <http://www.ceos.org/>)

Australia is represented in CEOS activities by CSIRO which is a full Member. This involves participating in the CEOS Working Groups (principally the WG on Information Systems and the WG on Calibration and Validation) and the yearly Plenary. The current contacts for CEOS are:

Activity	Representative	Email
Plenary Delegate	Graham Harris CSIRO Land & Water	Graham.Harris@cbr.clw.csiro.au
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WG on Calibration & Validation (WGCV)	Ian Barton CSIRO Marine Research	Ian.Barton@marine.csiro.au
WG on Information Systems and Services (WGISS)	Mike Clarke CSIRO Mathematical & Information Sciences	Mike.Clarke@cmis.csiro.au

The Working Groups have a number of active sub-groups which are attended by a varying number of people from Australia. Reports on this CEOS activity can be found on the CSIRO EOC Web Page (<http://www.eoc.csiro.au/>) under National and International Representation or directly at:

<http://www.eoc.csiro.au/ceos/>

The next WGISS Meeting will be held in Australia in May, 2000. Interested people should make enquiries of Mike Clarke of CSIRO Mathematical & Information Sciences.

CEOS has, in recent times, been a primary mover in the growing Integrated Global Observing Strategy (IGOS). IGOS involves a group called the IGOS Partners consisting of user agencies and to which CEOS brings the views and inputs of space agencies and satellite data providers. IGOS developments were discussed at length at the Stockholm Plenary. During his time as Head of COSSA, Brian Embleton was a very strong supporter of the IGOS development in the CEOS Forum and is well remembered for his work. The IGOS now has many opportunities and implications for Australia at the working scientist level. Australians (mainly from CSIRO and Australian Bureau of Meteorology at this stage) are playing a significant role in the detailed development of the IGOS.

[Due to the wealth of abbreviations and acronyms involved in CEOS and associated activities, Appendix 1 has an acronym translator for your benefit].

2 CEOS Plenary, 1999

Each year, the Chair of CEOS is changed and the country taking that role hosts the next CEOS Plenary. The 1998/99 year was Chaired by Tilman Mohr of EUMETSAT. EUMETSAT chose to hold the Plenary in Sweden with the cooperation of SNSB and it was held at the Royal Swedish Academy of Engineering Sciences (IVA) in the centre of Stockholm.

The next CEOS Plenary is being chaired by INPE (Brazil) and the Plenary will be held in Brazil at a site to be finally decided.

In opening the Plenary, Tilman Mohr outlined a continuing theme of the meeting. As with all agencies, EUMETSAT wants to know what CEOS involvement in IGOS will deliver to the organizations? The answer seems to be that it will provide a framework for CEOS to respond to the growing pressure for agencies to respond to user needs and political drivers by setting requirements for satellite systems and observation systems that meet these needs in the future.

Both the US and Europe have modified their approaches to earth observation to a Themes based system rather than a Platform & Sensor based approach. This has resulted in the IGOS developing user oriented Themes as its mode of operation.

Specific items that emerged from the year were:

- The IGOS development has helped move the business of the CEOS Members from that of space agencies to space applications;
- The CEOS and IGOS partners together provide the means to link major provider and user agencies in one forum;
- UNISPACE III gave publicity to IGOS and CEOS and highlighted the role of space based data in the IGOS.

The meeting also considered the expansion of the CEOS membership to include Argentina (CONAE) as a full Member and the International Ocean Color Coordinating Group (IOCCG) as an associate. Both applications were accepted. CONAE has an active space program (with a sensor being carried on the EO-1 platform) involving serious earth observation and IOCCG has a significant role to play among IGOS Partners.

With Argentina, South Africa (represented by CSIR), Australia (CSIRO), New Zealand (CRI), Brazil (INPE) and Argentina (CONAE) as members of varying grade in CEOS it offers the possibility of a groups discussing southern hemisphere activities — possibly at the WGISS meeting to be held in Canberra in May, 2000.

3 IGOS Reports and Discussions

The CEOS Plenary involved considerable discussion of the progress of the IGOS development as well as a forum for the Partners Meeting. The IGOS Partners met and considered what the plenary prepared. The IGOS Partners are listed in Appendix 2.

The IGOS development (http://nasda.ceos.org/igos_brochure.pdf) is a top-down approach that has been considerably improved and modified by the introduction recently of a Themes based approach to projects and activities. To serve the needs of the themes, the agencies must give more attention to product validation as opposed to sensor calibration and measurement precision.

Current Themes under discussion include:

- Disasters Theme
- Oceans Theme
- Carbon Cycle Theme

These broad Themes are tending to develop sub-Themes such as Terrestrial Carbon and Ocean Carbon in the Carbon Cycle Theme and share sub-Themes — as in the Ocean and Carbon Cycle Themes in this case. There are biological and physical components also emerging in the Oceans Theme. The style and progress is similar to the CSIRO Sector Based Planning process.

The IGOS does not, however, have a pool of funds or support with which to pursue its goals. These must come through the participation of groups able to accomplish the broad goals of the strategy. Forming partnerships and alliances among groups with the capacity and commitment to undertake the Themes is essential if it is to go beyond talk and glossy brochures . The advantages of the IGOS is the participation of Partners (<http://www.igospartners.org/>) that have funds for their outcomes in the same forum as the CEOS members that have the capacity to provide information and skills that can help achieve them.

The role of the existing CEOS working groups in this new environment was discussed as well. These groups are not application oriented like the Themes and do not easily relate to the viewpoints of the IGOS Partners. They are specifically technical and deal with instrument calibration or information systems. There was, however, broad support for them to basically stay that way as they serve an important function in CEOS. Nevertheless, there is clear evidence of change as the WGISS is involved closely in the IGOS and the idea of a Data and Information Management Systems Theme was discussed.

The WGCV has also developed a new Sub-Group on Validation in which product validation is being looked at in much greater detail. Product validation involves, as well as space data, the role of *in situ* data. There was considerable discussion on the place and role of *in situ* data in the CEOS and IGOS activities. John Townshend provided a paper in which he claimed that the land applications were far less well developed in their handling of *in situ* data than the atmosphere and ocean applications. I also strongly supported the development of a Validation Sub-Group and its careful consideration of land based *in situ* data. Due to the specific role of vegetation in the Carbon Cycle Theme, Joseph Cihlar of CCRS suggested a Trees Sub-Theme could be usefully developed. This would presumably

Among the IGOS Themes, Disasters and Oceans seem to be very well developed. In fact, the Oceans Theme is being considered as a test case and will be presented at the Strategic Implementation Team (SIT) meeting in Paris on January 26 and 27. Eric Lindstrom of NOAA has been developing it and it will go through a significant revision by the Paris Meeting to accommodate greater biological and ocean colour input from IOCGG. At this time, CSIRO Marine and the Australian Bureau of Meteorology (BMRC) are involved in developing this Theme (particularly through GODAE). It may be useful for the Australian Ocean Colour Working Group (AOCWG) to specifically discuss its implications.

Finally, there was also a lot of discussion as to who are the users? The involvement of the IGOS Partners has been a major step forward and to the space agencies, the partners are, in a sense, some of their main users. However, the partners are generally not the hands on users. It was interesting that the question of who are the users? even seemed to perplex the representatives of the agencies and IGOS Partners. Top Down and Bottom Up have not yet joined hands it seems.

4 Other Matters

4.1 Education

CEOS has had many activities involving production of material for education. Mukund Rao, the Indian delegate, presented a paper outlining a significant increase in potential CEOS involvement in education and training. He said that education was the key issue in developing countries — where the majority of the environmental problems occur. It is proposed CEOS disseminates material and information as well as case studies and takes an active role in both teaching and training.

There was an extensive discussion that basically involved various groups outlining the well-established mechanisms and programs for teaching and training that are currently in operation. The WMO has 26 regional training institutions and have developed a virtual laboratory for distance training. UN-OOSA provided material on five UN initiatives. NOAA, ESA, ISPRS, IGBP through the START program, the JRC ENRICH program, NASDA support for AIT, China's work with ESCAP, UNEP and ESCAP itself all provided examples of well developed initiatives in this area.

It would seem that coordination and rationalisation is more imperative than a new activity in education and training. However, an ad hoc Working Group has been set up to report to the next plenary on this issue.

4.2 The Private Sector and CEOS

The growing role and importance of the private sector poses some difficulties for CEOS and for the private sector as well. There has been a meeting between various groups to explore how CEOS could make better contact. The ISPRS is an associate member to help address this lack of direct interaction.

The idea of industry forums that report to CEOS was favoured and also the Working Groups were encouraged to engage the private sector and act as a means for their views and activities to have input into CEOS Plenary Meetings.

ISPRS (<http://www.p.igp.ethz.ch/isprs/isprs.html>) Larry Fritz and John Trinder were present for ISPRS, and described their policy advisory committee aimed at harnessing the industry. The problem is that the industry is not well defined relative to government. Some groups are not clearly one or the other! The July 16-23 ISPRS Meeting in Amsterdam will include a Dialogue Forum specifically on this question and delegates were urged to attend.

The advent of Space Imaging's Ikonos (<http://www.spaceimaging.com/>) has changed things irrevocably. In this case, satellite, data and products are all generated by the private sector. NOAA and NASDA both reported greater involvement of private sector groups in future activities. Peter Churchill pointed out the importance of the changes for WGISS. If the work on standardisation and Catalogue Interoperability is to be useful then private sector groups as well as traditional agencies must also adopt it. The same applies for Calibration and Validation issues.

However, the ESA delegate noted that CEOS decisions must be above suspicion which means CEOS will either have to be open to all groups or else deal with representative Trade Organizations rather than individual companies. This question has been put on the agenda for the next Plenary.

4.3 Working Group Reports

The working group reports had some important messages. One was that the agencies at Plenary often do not know what the WGs are doing. Tilman Mohr attended a WGISS meeting and was the first Chairman to do this. His enthusiasm and interest indicated that it was worth doing again.

As reported before, the WGCV (<http://wgcv.ceos.org/>) is forming a new Sub-group on Validation. This has come about under Alan Belward's leadership which will be completing in one year. A new Chair of WGCV is needed.

In addition, an ad hoc Working Group has been formed to look closely at Traceability and Standards and intended to engage the national standards groups — especially radiation standards. The WGCV will be meeting at Bangalore in February 2000 and at NOAA, Washington in October 2000. It is intended to hold this meeting in parallel with the general meeting.

Australia should/must be involved in both the new sub-Group on Validation and in the Ad hoc working group. Interest and ideas will be sought in the near future.

WGISS has been extremely active (<http://wgiss.ceos.org/>) and has developed its Catalogue Interoperability Protocol (CIP) as well as engaged both industry and standards (eg ISO TC-211). There is considerable scope for continuing interactions between Australian, regional and global Spatial Data Initiatives and the CEOS WGISS. The next WGISS meeting will be held in Canberra in May, 2000 and it will be an excellent opportunity to take advantage of the WGISS. In addition, there will be an important symposium on regional spatial data issues and their implications for earth observation.

There was a demonstration of GOIN and high bandwidth transmission at the Plenary. There were also demonstrations of the DIAL software and its use in data management (<http://dial.gsfc.nasa.gov/>). It is clear that in the Asia-Pacific region there has already been a lot of activity that should be coordinated and used rather than re-developed. This issue was to be taken to the UN-ESCAP meeting in New Delhi the following week.

4.4 Significant events

Some significant events are listed as follows:

- ISRO have successfully launched and tested an Ocean Colour satellite and its data will be made available under an Announcement of Opportunity that is now released.
- ESA announced that ENVISAT will be launched at the beginning of 2001 and that they have developed a Living Planet Program under which future funding will be released. (ENVISAT has a major Australian involvement in AATSR).
- Canada has assured funding for Radarsat-2 to be launched in 2002. The Canadian CEONET is an example of information management that WGISS should consider. The Canadian report mentioned their discussions with ARIES (Australia) and NEMO for Hyperspectral applications.
- ASI announced they were working on a Hyperspectral sensor as part of the payload for their current satellite development.
- China showed examples of high quality data from the Fengyun 1c (FY 1c) which has AVHRR and Ocean Colour bands available, China and Brazil have launched the CBERS which has three cameras and 250m pixels.
- NASDA announced that they and JMA would launch MDSAT the following week. (Unfortunately, this has subsequently been unsuccessful due to failure of the H-IIA launcher. This is the same launch vehicle that is intended for use with ADEOS-2 and Fedsat). There is a re-structuring taking place but SDA will continue.
- NOAA/NESDIS announced GOES-L will go up in January 2000 and that NPOESS is progressing. They showed great DMSP (night time) images of the world and differentiated Lights, Gas, Fishing and Fires.
- The EC announced that the next call for projects under Capability of Earth Observation Data is in the period 15 November 1999 to 15 February 2000.

5 Conclusions

The Stockholm Plenary saw a continuation of the developments noted by Graham Harris in his report following Bangalore last year. That is, the shift from space agencies to applications agencies — or at least the use of applications as the drivers for planning space activities in earth observation — has continued.

The CEOS Working Groups and the IGOS Themes have achieved a good balance of activities and represent distinct and important roles for CEOS and for the earth observation community. Applications demand access to quality data and that requires both WGs. However, the new sub-group of the WGCV on Validation represents a significant development of the group and a major step to bridging between the important technical issues of calibration and sensor validation to those that are of concern to end users and the IGOS Themes. These involve accuracy, consistency, standards and relevance.

Australia should keep involved in this forum. There is no need for it to be a CSIRO only activity. CSIRO is the Member and supports its scientists to participate. However, there is every reason for the involvement to be much wider than CSIRO. As was recorded above,

the WGISS will be meeting next in Canberra in May, 2000 and interested people should make enquires of Mike Clarke of CSIRO Mathematical & Information Sciences. A report on activities in earth observation and associated space activities in Australia was submitted to CEOS and it is available on the EOC web site (<http://www.eoc.csiro.au/ceos/>).

The user demands and political drivers that are changing the way CEOS acts are a good change and are resulting in a greater focus on applications and end use. However, the strong commitment to the scientific role of the Working Groups is also welcome. At the Plenary, the dangers of complete domination by user demands and political drivers were brought home to us by the Dinner being held at the Vassa Museum. The Vassa was a huge war vessel that was commissioned by the King of Sweden in the 1500 s. We sat at dinner under its huge bulk. It had been re-floated and preserved from the place it sank on the first time it sailed out of the harbour. The extensive user specifications (eg number and type of guns, ornate carvings of the King etc) and political drivers (the King) had resulted in a ship that was unable to stay upright. The engineers were aware of the problems but could not get the message to the King. User requirements and political drivers clearly should not be allowed to over-ride excellence in science and engineering.

Finally, I am of the conclusion that there is a great opportunity for the southern hemisphere to host meetings in the period November to March. Short length of day and cold winds surely cannot compete with a warm climate?!

6 Appendix 1: Acronyms & Abbreviations

Acronym/Abbreviation	Full Name
ASI	Agenzia Spaziale Italiano (Italian Space Agency)
CBERS	China/Brazil Earth Resources Satellite
CEONET	Canadian Earth Observation Network
CEOS	Committee on Earth Observation Satellites
CONAE	
CRI	Crown Research Institute (New Zealand)
DIAL	Data and Information Access Link (GSFC software)
EC	European Community
ENVISAT	
EUMETSAT	European Organization for the Exploitation of Meteorological Satellites
GODAE	Global Ocean Data Assimilation Experiment
GOIN	
IGOS	Integrated Global Observing Strategy
IGBP	International Geosphere and Biosphere Program
INPE	Instituto Nacional de Pesquisas Espaciais (Brazil Space Agency)
IOCCG	International Ocean Colour Coordinating Group
ISPRS	International Society for Photogrammetry and Remote Sensing
ISRO	Indian Space Research Organization
JMA	Japanese Meteorology Agency
MDSAT	Multi-functional Transport Satellite (JMA, Japan)
NASDA	National Space Development Agency (Japan)
NESDIS	National Environmental Satellite Data and Information service (NOAA)
NOAA	National Oceanic and Atmospheric Administration
SNSB	Swedish National Space Board
STA	Science & Technology Agency (NASDA, Japan)
START	The global change SysTEM for Analysis, Research and Training
UN-OOSA	United Nations Office of Outer Space Affairs
WGCV	Working Group on Calibration and Validation
WGISS	Working Group on Information Systems and Services
WMO	World Meteorological Organization

7 Appendix 2: IGOS Partners

Partner	Acronym/Abbreviation
Committee on Earth Observation Satellites	CEOS
UN Food and Agriculture Organization	FAO
International Council of Scientific Unions	ICSU
United Nations Environment Program	UNEP
Intergovernmental Oceanographic Commission	IOC-UNESCO
United Nations Education, Science and Cultural Organisation	UNESCO
World Metrological Organization	WMO
International Geosphere-Biosphere Program	IGBP
World Climate Research Program	WCRP
International Group of Funding Agencies	IGFA
Global Terrestrial Observing System	GTOS
Global Climate Observing System	GCOS
Global Ocean Observing System	GOOS
International Ocean Colour Coordinating Group	IOCCG