

ESA Chairs the Committee on Earth-Observation Satellites (CEOS)

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What is CEOS?

Objectives

The Committee on Earth Observation Satellites (CEOS) was created in 1984 in response to a recommendation from a Panel of Experts on Remote Sensing from Space, under the aegis of the G7 Economic Summit of Industrialised

Today, CEOS has three primary objectives:

- to optimise the benefits of space-borne observations through the cooperation of its members in mission planning and in the development of compatible data products, formats, services, applications and policies
- to aid both its members and the international user community by, inter alia, serving as the focal point for the international coordination of space-related Earth-observation activities, including those relating to global change
- to exchange policy and international 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 also be addressed.

ESA is a founding member of the Committee on Earth Observation Satellites (CEOS) and a permanent member of the CEOS Secretariat. Established in 1984, today CEOS has 23 Members, representing all nations with major Earth-observation programmes, and 20 Associates, who include representatives of the international user community. In November 2001, at its 15th Plenary Meeting in Kyoto, Japan, ESA was elected to chair the Committee. This one-year CEOS Chairmanship is combined with the Co-Chairmanship of the Integrated Global Observing Strategy Partnership (IGOS-P).

CEOS has identified two specific priorities during ESA's Chairmanship, in addition to the overall objective of coordinating Earth-observation missions and activities between the CEOS members. The first is the promotion of sustainable Earth-observation services in support of international policy requirements, such as those arising from the preparation of and follow-up to this year's World Summit on Sustainable Development in Johannesburg (26 August – 4 September), and the second is to develop a long-term strategic plan for CEOS for the next five years.

The individual members of CEOS apply their best efforts to implement CEOS recommendations in their respective Earth-observation programmes.

CEOS is currently revisiting its strategy and ESA has been asked, during its chairmanship, to coordinate the development of a long-term strategic plan for CEOS for the next five years.

Membership

Since its inception, CEOS's membership has grown to encompass all of the World's civil agencies responsible for Earth-observation satellite programmes, along with agencies that receive and process data acquired remotely

Nations Working Group on Growth, Technology and Employment. This Group recognised the multidisciplinary nature of satellite-based Earth observation and the value of coordinating international mission plans. CEOS has since established a broad framework for coordination across all space-borne Earth-observation missions.

from space. At its 1990 Plenary Meeting in Brazil, CEOS extended its outreach to include international user organisations – including scientific, policy and inter-governmental groups such as the World Meteorological Organisation and the global Climate Observing System, which now have Associate status. Governmental organisations that are developing a space segment or have significant ground-segment activities can also become Associates. Currently, CEOS has 23 Member organisations and 20 Associates.

Structure

The central structure of CEOS includes a Plenary Assembly, which meets every twelve months (Fig. 1). The CEOS Secretariat takes care of business between plenary sessions. It is comprised of members of ESA, NASA, NOAA, MEXT/NASDA, and the Working Group Chairs, as well as one member from each of the past, current and future CEOS chair organisations. The Chairmanship of the Plenary rotates every year: INPE in 2000, NASDA/MEXT in 2001, ESA in 2002, NOAA in 2003 and China in 2004.

CEOS Members

Organisation

Country / Countries

ASI	Agenzia Spaziale Italiana	Italy
BNSC	British National Space Centre	United Kingdom
CAST	Chinese Academy of Space Technology	China
CNES	Centre National d'Etudes Spatiales	France
CONAE	Comisión de Actividades Espaciales	Argentina
CSA	Canadian Space Agency	Canada
CSIRO	Commonwealth Scientific and Industrial Research Organisation	Australia
DLR	Deutsches Zentrum für Luft- und Raumfahrt	Germany
EC	European Commission	Austria, Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Luxemburg, Netherlands, Norway, Portugal, Spain, Sweden, United Kingdom
ESA	European Space Agency	Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom
EUMETSAT	European Organisation for the Exploitation of Meteorological Satellites	Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom
INPE	Instituto Nacional de Pesquisas Espaciais	Brazil
ISRO	Indian Space Research Organisation	India
KARI	Korea Aerospace Research Institute	Korea
NASA	National Aeronautics and Space Administration	United States of America
NASDA/MEXT	National Space Development Agency of Japan/ Ministry of Education, Culture, Sports, Science and Technology	Japan
NRSCC	National Remote Sensing Center of China	China
NSAU	National Space Agency of Ukraine	Ukraine
NOAA	National Oceanic and Atmospheric Administration	United States of America
ROSHYDROMET	Russian Federal Service for Hydro-meteorology and Environment Monitoring	Russia
ROSAVIKOSMOS	Russian Aviation and Space Agency	Russia
SNSB	Swedish National Space Board	Sweden
USGS	United States Geological Survey	United States of America



Figure 1. The delegates to the 15th CEOS Plenary, which took place in Kyoto, Japan, on 6/7 November 2001

CEOS Associates

Organisation

Country / Organisation

CCRS	Canada Centre for Remote Sensing	Canada
CRI	Crown Research Institute	New Zealand
CSIR	Satellite Applications Centre (SAC)/ Council for Scientific and Industrial Research	South Africa
ESCAP	Economic and Social Commission of Asia and the Pacific	UN
FAO	Food and Agriculture Organization	UN
GCOS	Global Climate Observing System	International Programme
GISTDA	Geo-Informatics and Space Technology Development Agency	Thailand
GOOS	Global Ocean Observing System	International Programme
GTOS	Global Terrestrial Observing System	International Programme
ICSU	International Council for Science Unions	International Programme
IGBP	International Geosphere-Biosphere Programme	International Programme
IOC	Inter-governmental Oceanographic Commission	UNESCO
IOCCG	International Ocean Colour Coordinating Group	International Programme
ISPRS	International Society for Photogrammetry and Remote Sensing	International Programme
NRSC	Norwegian Space Centre	Norway
OSTC	Federal Office for Scientific, Technical and Cultural Affairs	Belgium
UNEP	United Nations Environment Programme	UN
UNOOSA	United Nations Office of Outer Space Affairs	UN
WCRP	World Climate Research Programme	International Programme
WMO	World Meteorological Organisation	UN

CEOS develops many of its activities through a number of Working Groups.

Working Groups

Working Group on Calibration and Validation (WGCV), and its subgroups

The Working Group on Calibration and Validation (WGCV) was established in 1984. It resulted from the recognition that calibration and validation activities should play a key role in all satellite Earth-observation missions to ensure a clear and quantitative understanding of the data that they generate. The goal of the WGCV is to promote international co-operation in the calibration of data from space-borne sensors and in the validation of associated geophysical parameters and derived products. The WGCV comprises six sub-groups: (i) Infrared and Visible Optical Sensors, (ii) Microwave Sensors, (iii) Synthetic Aperture Radar, (iv) Land Product Validation, (v) Terrain Mapping, and (vi) Atmospheric Chemistry.

The WGCV's activities are described in a three-year work plan approved by the CEOS Plenary and comprise technical work and workshops of subgroups, a calibration/validation dossier, pilot projects and the organisation of WGCV meetings. Recently, the focus has intensified on the validation of geophysical parameters and derived products to support the CEOS involvement in developing IGOS. WGCV outreach is ensured through the WGCV newsletter, a new web-site (<http://www.wgcvceos.org>) and publications from subgroup workshops (e.g. ESA SP-450).

Working Group on Information Systems and Services (WGISS), and its subgroups

WGISS has the goal of coordinating and standardising Earth-observation data management and services. The group addresses the needs of data providers by assisting them in improving the efficiency of their operations and maximising the utilisation and benefits of the EO data that they gather, and in supporting data and information users by providing simpler and wider access to the resources that they acquire. WGISS is currently supported by three subgroups, dealing with access, data and networks.

WGISS places great emphasis on the use of demonstration projects involving user groups to solve the critical interoperability issues associated with the achievement of global services. WGISS has both developed a number of tools and services and contributed to the development of standards to assist access to and use of Earth-observation data resources available on-line.

Ad-hoc Working Group on Disaster Management Support (DMSG)

The aim of the Ad-hoc DMSG is to develop and refine recommendations for the application of satellite data to natural and man-made disasters. Particular emphasis is placed on working closely with space agencies, international and regional organisations, and commercial organisations, on the implementation of these recommendations. The continuation of the Ad-hoc DMSG has been renewed on an annual basis and will conclude its activities at the 16th CEOS Plenary in November 2002.

Ad-hoc Working Group on Education (WGEdu)

The goal of the WGEdu is to promote access to and use of Earth-observation data and services for a wide community of existing and potential users. Particular emphasis is put on servicing the education and training needs of developing countries. A three-year strategy was adopted at the last CEOS Plenary in November 2001. To highlight the importance of training activities in Earth observation, the WGEdu plans to organise an 'Education and Training Summit' in conjunction with the next CEOS Plenary in November 2002 at ESRIN in Frascati (I).

Relationships with IGOS-P and SIT

IGOS and IGOS-P

CEOS has embraced the concept of an Integrated Global Observing Strategy (IGOS), primarily to fulfil its own set of objectives and to derive greater benefit from both already operating and planned observing systems. IGOS intends to unite the major satellite and ground-based systems for global environmental observations of the atmosphere, oceans, land and life.

Today, the IGOS Partnership (IGOS-P) has 14 Members, from both the supply and demand sides. CEOS is one of the Members of IGOS-P. To underline the importance of space observations as part of an integrated global observing system, CEOS is providing one of the two Co-Chairs of IGOS. IGOS-P Plenary Meetings are scheduled once per year, normally around end-May/early-June, and are hosted by one of the two Co-Chairs. The 9th IGOS Plenary Meeting is scheduled for 31 May 2002, at UNESCO in Paris. UNESCO and ESA are the Co-Chairs of IGOS-P for 2002.

Strategic Implementation Team

In order to prepare the IGOS issues on the CEOS side, the Strategic Implementation Team (SIT) was established in 1996 to assess the maturity of CEOS demonstration projects for transition to IGOS themes, which require some commitment in terms of resources from space

agencies in support of agreed themes. As an ad-hoc group, the SIT's mandate has been renewed annually. The SIT played an important role in shaping the development of the IGOS Partnership in 1998, and it has provided the necessary forum for senior members of space agencies to engage in the CEOS process. SIT was confirmed as a permanent group at the CEOS Plenary 2001, with a revised mandate to focus on the interfacing of CEOS with IGOS-P.

Eumetsat is chairing the SIT for a period of two years, from November 2001 to November 2003.

Implementation of IGOS through 'themes'

With a view to broadening IGOS to include the observing activities of all partners, the 'themes' concept was developed to provide a more coherent focus for its definition and implementation activities. Both IGOS-P and CEOS endorsed the theme approach.

The themes have been debated at length in the SIT. The Global Ocean Data Assimilation Experiment (GODAE) and the Global Observation of Forest Cover (GOFC) project, which were in the original list of CEOS/SIT projects, are already providing concrete results. The GOFC WGISS Test Facility, which was demonstrated at the CEOS Plenary 2001, is based largely on web-based data-access tools developed by ESA.

ESA is involved in all of the above projects, experiments and theme preparations.

ESA's involvement in CEOS

Objectives of ESA's involvement

ESA's involvement in CEOS is driven by five main objectives, derived from the objectives of the Committee itself:

– *Mission co-ordination:* ESA wants to ensure that its current and planned missions are well co-ordinated with those of other space agencies around the World. This includes the space as well as the ground segment. Through CEOS, ESA is in a good position to learn about the upcoming Earth-observation missions of other space agencies at an early (planning) stage. CEOS has frequently served as a forum where ideas have been exchanged informally, resulting in separate, sometimes bi-lateral agreements thereafter (e.g. GCOM/SWIFT between NASDA and ESA).

– *Standardisation:* ESA is interested in exchanging information on current data access and distribution standards in order to allow a seamless exchange of data between its own missions and those of other space agencies. This task, which is extremely important for

users from the scientific, commercial and public sectors, aims at facilitating and promoting a wider use of Earth-observation data. ESA, together with partners from other European organisations and its own Member States, has been very active in establishing common data-exchange and data-access formats. One example is the CEOS Catalogue Interoperability Protocol (CIP), which was co-led by ESA and the European Commission, and which serves as the basis of today's main Earth-observation catalogue interoperability protocols.

– *Sensor calibration, validation and inter-comparison:* ESA has a need to calibrate, validate and compare data from its own missions and sensors with those of other, sometimes similar or related sensors. This facilitates the access and exchange of data from various Earth-observation missions for scientists and commercial users alike. Again, this enables a flexible and wider use of ESA's data, thereby contributing significantly to the development of sustainable Earth-observation-based information services. Good examples are several major sensor calibration and validation experiments, which have been carried out in the (active and passive) microwave, optical and infrared domains in support of ESA's ERS sensors, as well as preparatory experiments in support of Envisat's new suite of sensors. A new subgroup on atmospheric chemistry has been adopted within the WGCV, which is of particular relevance for the calibration, validation and inter-comparison of sensors onboard Envisat.

– *International co-ordination:* Through its participation in CEOS, ESA acts as a focal point for its members in the international co-ordination of space-related Earth-observation activities. Examples include the presence of CEOS in international user communities or organisations, such as in IGOS, in the global observing systems (G3OS), or, more importantly for the future, in the UN Framework Convention on Climate Change (UNFCCC) at its Committee of Parties (COP), the World Summit on Sustainable Development (WSSD) or similar committees and forums.

– *Development of sustainable EO services:* ESA has, like other space agencies, expressed an interest in developing long-term, sustainable information services based on Earth-observation data. The monitoring of the implementation of the Kyoto Protocol is but one of the many examples at stake. ESA, in concert with its international partners, will work at the policy as well as the technical level to achieve this goal, which is also one of the guiding principles of GMES.

ESA's support to the CEOS process

ESA contributes to CEOS by playing an active role in the CEOS Plenary and Secretariat. It is one of the three permanent members of the Secretariat (the others are NOAA/NASA and NASDA/MEXT), which works through frequently held formal meetings (approx. one every two months, mostly via teleconferencing) to discuss and harmonise the various issues at stake. Informal correspondence is exchanged on a daily basis in making progress between these meetings.

In addition to the work of the Secretariat, a large amount of technical work is carried out in the Working Groups. ESA currently holds the chair of the Working Group on Calibration and Validation (WGCV) for a period of three years, and has an active representation in the Working Group on Information Systems and Services (WGISS), as well as the ad-hoc Working Groups on Disaster Management (DMSG) and Education (WGEdu). In addition, ESA representatives lead several sub-groups within the WGCV and WGISS. ESA has also hosted and/or organised several of the CEOS Working Groups and their sub-groups (e.g. the WGCV Plenary in July 2001 and the WGISS-14 Subgroup meeting in April 2002, both at ESRI).

ESA, together with CNES and CSA, has established the 'Charter on Disaster Management', which co-ordinates the (operational) provision of space data in the event of natural or man-made disasters. CEOS has invited other members to join the Charter, some of whom have already joined or expressed interest (i.e. NOAA, NASDA, etc.).

CEOS and the World Summit on Sustainable Development

The World Summit on Sustainable Development (WSSD) is being organised by the United Nations from 26 August to 4 September 2002 in Johannesburg, South Africa, with representation at Head of State level.

The CEOS member organisations have requested that this event become the main

focus of CEOS during ESA's Chairmanship in order to support one of its main goals, namely the development of long-term, sustainable EO-based information services for the international user community. Earth observation has been proven to be an efficient tool for monitoring the state of the global environment, which is one of the leading themes of the Earth Summit. Hence ESA will take this opportunity to advance these objectives, in close cooperation with its Member States, its European partners, the CEOS partners and IGOS.

CEOS presented a statement at the recent 2nd Preparatory Committee Meeting (PrepCom II) of the WSSD held in January/February 2002 in New York, whereby the national delegates were invited to:

1. ACKNOWLEDGE the high importance of Earth observation from satellites for the provision of operational services and information in support of sustainable development.
2. RECOGNISE the progress made in the capability and responsiveness of Earth observation since the Rio Earth Summit in 1992.
3. ENCOURAGE the space organisations, through their member states, to ensure the long-term continuity of Earth-observation systems, which are of relevance to sustainable development – using appropriate mechanisms to achieve this goal.
4. RECOGNISE the potential benefits of partnership with CEOS, as the international forum responsible for the coordination of international needs for space-based Earth-observation data and information in support of international treaties and conventions relating to sustainable development; this includes, in particular, the activities arising from the World Summit on Sustainable Development.
5. ENCOURAGE an intense dialogue between decision makers involved in the follow-up of the outcome of the WSSD (representing the demand side) and the international Earth-observation community (representing the supply side) in order to ensure that Earth observation can best be put at the service of sustainable development.

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The aim is that information retrieved from Earth observation should be recognised as a key information source in support of sustainable development.

CEOS Plenary 2002

The concluding event of ESA's CEOS Chairmanship, the next CEOS Plenary, will be

organised at ESRIN Frascati (I), from 19 to 21 November 2002. It will be accompanied by an 'Education and Training Summit' as well as a 'WSSD follow-up event', which will be open to a wider audience including high-level decision makers. At this 16th CEOS Plenary, ESA will hand over the Chair to the next incumbent, NOAA.

