

# THE ROLE OF ISPRS IN EDUCATION AND TRAINING WITHIN THE FRAMEWORK OF INTERNATIONAL ORGANIZATIONS

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Commission VI, WG VI/3

**KEY WORDS:** Education, Training, Developing Countries, Earth Observation, Learning

## ABSTRACT:

The history of education and training efforts in ISPRS dates back to the early days of its formation in 1910, when it was realised that education and training were key components of the development of photogrammetry in member countries. Some of the recent achievements of the Commission include the compilation of worldwide data on educational institutions which are teaching the photogrammetry, remote sensing and spatial information sciences, and data of available web sites providing education data and training materials. Other international organisations have realised the importance of education and training in the fields of interest of ISPRS and also are developing programs in education and training. Some of these developments will be described in the paper. They offer ISPRS opportunities to participate and contribute to the worldwide efforts to improve education and training in the spatial information sciences, especially in the less developed and reform countries. Consideration will be given to how ISPRS can cooperate with these programs in the future.

## 1. INTRODUCTION

Since the early days of its formation in 1910, ISPRS has made considerable efforts to contribute to education and training in its technical commission activities. The relevant technical commission was originally responsible for other professional activities, such as dictionaries, bibliographies, and history. However, over recent years these latter activities have been deleted from the work of the commission so that it can concentrate on education and training, and communications or outreach. It has been difficult to attract a large audience into the Working Groups and technical sessions of Commission VI, but the work of the Commission is essential for the future of the Society and the community at large. This is especially so, given the large membership in ISPRS from developing and reform countries. Some of the recent achievements of Technical Commission VI include the compilation of worldwide data on the ISPRS Home Page on educational institutions which are teaching the photogrammetry, remote sensing and spatial information sciences, data of available web sites providing education data and training materials, and guidelines for the preparation of web pages in ISPRS. Constant funds are required to maintain this information. In addition, CATCON, the computer aided teaching competition held at each ISPRS Congress since 1996, has provided a boost to ISPRS resources of teaching software, since these packages are made available to ISPRS membership.

The developments in education and training by other international bodies have also been significant. These include: the Working Group on Education (WGEdu) of Committee for Earth Observation Satellites, (CEOS); Module 1 (on education and training) of the CEOS initiatives following the World Summit on Sustainable Development (WSSD) in 2002; the Capacity Building Committee of the Group on Earth Observation (GEO); the activities of the Joint Board of Geospatial Information Societies; and the International Council for Science (ICSU). They offer ISPRS opportunities to cooperate in the worldwide efforts to improve education and training in the spatial information sciences, especially in the less developed and reform countries. The intention of this paper is to describe developments in education and training in other organisations with interests in

the spatial information sciences and consider how ISPRS can cooperate with these organisations.

## 2. INTERNATIONAL ORGANISATIONS

### 2.1 CEOS WGEdu

In 1999, the CEOS (Committee for Earth Observation Satellites) Plenary established a Working Group on education and training, named WGEdu. The Mission of the WG is:

WGEdu will focus CEOS efforts in education, training and capacity building with the aim of maximising the societal benefits to be derived from the use of Earth observation data, particularly for developing countries.

The Objectives of WGEdu are:

The WGEdu will establish an effective coordination and partnership mechanism among CEOS agencies and institutions offering education and training around the world. The key objective is to facilitate activities that substantially enhance international education, training and capacity building in Earth System Science and the observation techniques, data analysis and interpretation skills required for the use and application of Earth observation data to meet societal needs.

WGEdu has developed a Strategic Plan, a draft implementation plan on principles of satellite data provision in support of Earth observation (EO) training and education, guidelines on availability of and access to data for education and training purposes, and a "discovery portal" [<http://wgedu.ceos.org>], for the provision of the data. The Strategic Plan stated in part:

"Education holds the key to future Earth observation technology development and its applications. Earth observation education and training is an essential element in today's competitive world. Several countries have recognized the lack of specialists, scientists, technologists and engineers as a major impediment in the successful implementation of applications programs. Education and

human resource development is imperative to building capacities with far reaching impacts on the utilisation of space assets and data. Moreover, Earth observation data and applications are an important tool for promoting general sciences and for attracting students to scientific fields of study.

The CEOS strategy for Earth observation education and training is to establish an effective coordination and partnership mechanism among CEOS agencies and institutions offering education and training around the world. The key objective of the strategy is to facilitate activities that substantially enhance international education and training in Earth System Science and the observation techniques, data analysis and interpretation required for its use and application to societal needs.”

### 2.1.1 CEOS – WGEdu - Data Access and Availability

WGEdu identified four categories of data that should be available for user groups for capacity building purposes. These data should be accessible through the “discovery portal”. The four categories of data categories are as follows:

1. **Generically Available Free Data:** This category of data will be a central focus of the “discovery portal”, which will have links to web pages for free data, without duplications. Where necessary, some hints or suggestions will be provided to portal users before they access certain sites where downloading may be difficult.
2. **Case Studies from Space Agency Archives:** Working with the CEOS advisory groups and other experts, the WGEdu hopes to develop five or six “continental super sites” where data from multiple sources would be brought together to create a large case study set of data on select areas of interest to educators (i.e. the Sahel), and be updated on a regular basis.
3. **Archival (Near Real Time) Data Following a Significant Event:** This type of data would be available free or at least costs to applicants who request the information following a significant event (i.e. a hurricane) that occurs in a pre-identified regional hotspot or globally interesting test site. This category of data was identified as a future initiative of WGEdu, but is intended to be implemented in the future.
4. **Archival or Near Real Time Data to Support Professional Development:** This data would be available free or at least cost to applicants who clearly establish their interest in building their operational capabilities. It is important for an institution to be able to develop operational capabilities. There needs to be ground work done in support of the satellite data collection. As well, a GIS infrastructure of other data types needs to be established to support the program. Other considerations to develop a real-time education program also need to be considered such as data ordering, mission planning and fieldwork.

The 7<sup>th</sup> Annual Meeting of WGEdu was held from 19 to 21 April 2006 in Vienna. The main objective of the meeting was to plan the way forward in light of the preparation of the CEOS Implementation Plan for Space-based Observations and its contribution to the capacity building components of the GEOSS 10-year Implementation Plan (described below).

Although the mandate of the Working Group was initially intended for several years, it has taken on increased importance since the World Summit on Sustainable Development WSSD, held in Johannesburg, South Africa in

2002. CEOS determined five Modules, as its response to the outcomes of WSSD:

- Module 1: Education Training and Capacity Building
- Module 2 - Water resources management
- Module 3 - Disaster Management and Conflicts
- Module 4 - Climate Change
- Module 5 - Global mapping, GIS and Land Cover.

### 2.1.2 CEOS WSSD Module 1 - Education Training & Capacity Building

The CEOS Module 1 plans to assist in the provision of a capacity building framework to facilitate its other WSSD Modules in meaningful and relevant training for sustainable development, assist in the establishment of infrastructure for training and partnership, and increase awareness of application and utilization of Earth observation data. WGEdu and the CEOS WSSD Follow-up Program are cooperating and plan to concentrate on several targets for delivery in 2006 and beyond.

A key result of Module 1 has been the establishment of the African Advisory Group (AAG) which provides feedback on concerns, advice, and recommendations on the beneficial use of EO data in Africa. The WGEdu discovery portal, the Africa User forum (EUMETSAT), and TIGER (ESA) are also useful contributions to AAG. The TIGER initiative is to integrate space-based Earth observation satellites and services for water management in Africa.

Close coordination and action is also envisaged within the scope of the ten year implementation plan of GEOSS, where the importance of education, training and capacity building is highlighted as a key target area. AAG and the TIGER program may offer ISPRS opportunities for cooperation particularly for its initiatives in Africa.

### 2.2 Group on Earth Observation (GEO) and Group on Earth Observation System of Systems (GEOSS) - Committee on Capacity Building

Following the Summit on Earth Observation in Washington in 2003, the Group on Earth Observation (GEO) was formed by agreement at government level for “..timely, quality, long-term, global information as a basis for sound decision making”. Members of GEO will cooperate in the development of Earth observation programs, the GEOSS, as well as operational procedures. A number of committees that will target important implementation issues have been established. One of these committees is on capacity building, to which ISPRS will contribute participants from the Council. The programs of the Committee are currently being developed and they comprise descriptions of work to be performed, outputs and deliverables, milestones, and responsibilities, under the headings of Agriculture, Capacity Building, Disasters, Ecosystems, Health, Outreach, and Water.

#### Objectives of the Committee are:

1. To facilitate Earth observation capacity building activities among GEO Members, in concert with GEO Participating Organizations.
2. To build the capacity of all GEO Members to access, retrieve, analyze, include into appropriate models, and interpret relevant data from global data systems.
3. To build the capacity of all GEO Members to integrate Earth observation data and information with data and information from other sources, improving understanding of problems in order to identify sustainable solutions.

4. Support the GEO in developing a coordinated GEOSS capacity building strategy based on the principles articulated in the GEOSS 10-Year Implementation Plan Reference Document.
5. Recommend strategies for resource mobilization.

**Approach and Functions:**

1. In collaboration with existing capacity building mechanisms of GEO Members and participating organizations, identify priority areas in which Earth observation capacity building would have significant impact and benefit.
2. Examine existing and proposed Earth observation capacity building activities by national governments, participating organizations, and other relevant institutions, and identify mechanisms for leveraging, developing and coordinating Earth observation capacity building initiatives.
3. The Capacity Building Committee will monitor and report to Plenary on the achievement of milestones and deliverables in the implementation of relevant elements of the GEO annual work plans.

The Minutes of the 19th CEOS Plenary state that WSSD Team Leader and Chair of WGEdU have jointly identified to the CEOS Chairs where contributions can be made to the two-year targets of the longer term GEOSS implementation plan. Ongoing WSSD follow-on module activities will then be mapped in more detail to the multi-year targets, largely in coordination with WGEdU. ISPRS has commenced its involvement in the GEOSS Capacity Building Committee, which convened for the first time in March 2006. At the meeting a total of 19 Task Sheets were prepared detailing actions in a number of areas involving Capacity Building under the headings of Agriculture, Capacity, Building, Disasters, Ecosystems, Health, Outreach, Water and Weather. ISPRS is taking the lead role, with The Netherlands in the Task CB-06-01 with the title:

*CB-06-01 - Perform a review of capacity-building initiatives in GEO Members and Participating Organizations, taking into account results of existing surveys, to identify existing and planned capacity-building activities and gaps*

ISPRS is also participating in the following Tasks:

*CB-06-03 - Perform a review of existing education and training initiatives for Earth observation utilization in developing countries, and promulgate the use of best practices in cooperation with specialized UN agencies and other organisations*

*DI-06-12 - Initiate a knowledge-transfer programme to developing countries, to ensure basic capacity to utilize Earth observations for disaster management*

*HE-06-05 - Building on the existing work of WHO, perform an assessment, with emphasis on developing countries, of existing capacities for the integration of Earth observation and health data (in terms of data collection, processing and integration). Identify gaps, and explore funding as well as existing projects to close gaps and build capacity.*

These tasks demonstrate the commitment of GEOSS to developing capabilities in the applications of Earth observation data, especially in developing countries. It is appropriate that ISPRS should also play a role in these activities. At the time of writing the determination of duties associated with these tasks were underway.

**2.3 UN International Training Centres**

The United Nations General Assembly, in December 1990, endorsed the recommendation of the Committee on the Peaceful Uses of Outer Space that:

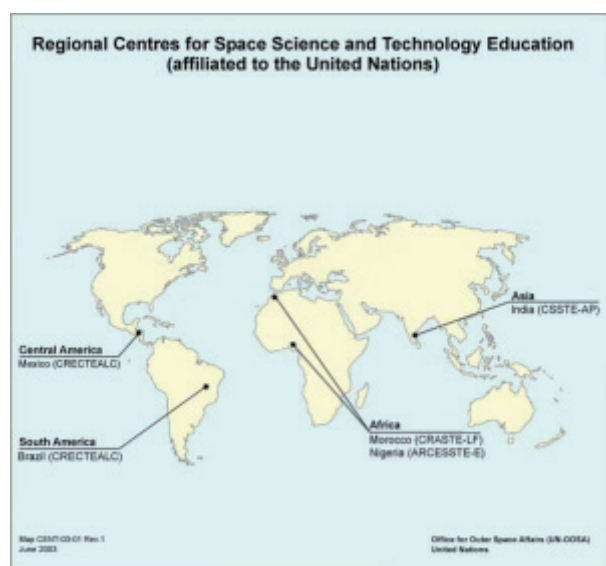
"... the United Nations should lead, with the active support of its specialized agencies and other international organizations, an international effort to establish regional Centres for Space Science and Technology Education in existing national/regional educational institutions in the developing countries."

In 1995, the United Nations General Assembly further endorsed the regional centres initiative and recommended that:

"... these centres be established on the basis of affiliation to the United Nations as early as possible and that such affiliation would provide the centres with the necessary recognition and would strengthen the possibilities of attracting donors and of establishing academic relationships with national and international space-related institutions;."

In order to translate the recommendations of the Committee and the General Assembly into an operational program, the Programme on Space Applications initiated a project aimed at the establishment of regional centres for space science and technology education at existing research and higher education institutions in each region covered by the United Nations Economic Commissions: Africa, Asia and the Pacific, Europe, Latin America and the Caribbean, and Western Asia.

Each centre is conceived as an institution that should offer the best possible education, research and applications programs, opportunities and experience to the participants in all its programs. Thus the principal goal of each centre is the development of the skills and knowledge of university educators and research and applications scientists, through rigorous theory, research, applications, field exercises, and pilot projects in those aspects of space science and technology that can contribute to sustainable development in each country.



**Figure 1. Locations of Current UN Regional Centres**

The initial programs of each centre focuses on:

- (a) remote sensing and geographic information systems;
- (b) meteorological satellite applications;
- (c) satellite communications and geopositioning systems;
- (d) space and atmospheric sciences.

The activities at each centre are undertaken in two major phases. Phase 1 emphasizes the development and enhancement of the knowledge and skills of university educators and research and application scientists in both the physical and natural sciences as well as in analytical disciplines. It is accomplished over a nine-month period as laid out in the curricula of the education program of each centre. Phase 2 focuses on ensuring that the participants make use of the skills and knowledge gained in phase 1 in their pilot projects, which are to be conducted, over a one-year period, in their own countries.

In order for the centres to become model institutions that are respected both within their regions and around the world, they need to meet internationally recognized standards. To promote the achievement of those aims, the United Nations Programme on Space Applications developed a model curricula on the basis of input made by prominent educators participating at the UN/Spain Meeting of Experts on the Development Of Education Curricula for the Centres for Space Science and Technology Education in 1995. This model curricula were published in 1996 and subsequently updated in Frascati, Italy in 2001. Experts who are associated with ISPRS have regularly been involved in the development of these curricula.

ISPRS has developed good contacts with the UN Regional Centres in Latin America and the Caribe (Brazil), Africa (Nigeria) and Asia (India), but links have not been made with the French speaking centre in Morocco. It seems advisable that this should be rectified for future activities of the Commission. As well, the Commission could play a leadership role in the cyclic revision of the curriculum on remote sensing, in cooperation with the UN Office of Outer Space Affairs and other experts.

#### 2.4 Joint Board of Geospatial Information Societies [www.fig.net/jbgis](http://www.fig.net/jbgis)

The Joint Board of Geospatial Information Societies (JBGIS), which was established in 2003, is a coalition of leading international geospatial societies, which can speak on behalf of the geospatial profession at the international level, especially to the United Nations and other global stakeholders. A further goal is to coordinate activities within the geospatial society and organizations. The current members of the JB GIS are IAG (International Association of Geodesy), ICA (International Cartographic association), FIG (International Federation of Surveyors), IHO (International Hydrographic Organisation), IMTA (International Map Traders Association), ISCGM (International Steering Committee for Global Mapping) and ISPRS. The JBGIS can appoint ad hoc committees for certain projects and important topics. Normally these committees shall have clear goals and are normally appointed for a limited time period.

The JBGIS ad hoc committee on Capacity Building in Africa was formed in 2005 with the following terms of reference:

- Collect and maintain information of meetings on capacity building in the geospatial area in Africa held by any organisation.

- Review the information and advise members of the Joint Board of opportunities for collaboration and for organisation of events and of potential duplication of effort.
- Establish and maintain an email network of interested individuals and organisations who can contribute to information on activities and any problems.
- Advise the Joint Board on any problems or potential problems which could be reduced by members of the Board.

The Joint Board's ability to play an active role in capacity building in Africa is dependent on their limited funds. However, the cooperative efforts of all bodies will lead to greater efficiencies in addressing the needs of the region. In the area of Earth observation, there would be advantages in cooperating with other bodies that are planning to contribute to capacity building in Africa, such as CEOS WGEdu, AAG and GEO.

#### 2.5 International Council for Science (ICSU)

In 2002, ICSU decided to establish Regional Offices in Africa, the Arab Region, Asia and the Pacific and Latin America and the Caribbean. Their goals are to enhance participation of scientists and scientific organizations from the region in ICSU's research and policy activities; and to enable ICSU to play a more effective role in strengthening science within the context of regional priorities and building capacity through South-South and North-South collaboration. A decision has been taken to open the first Regional Office in Africa in Pretoria, South Africa, where the host will be the National Research Foundation. The Vision of the Regional Office is:

- Excellence in science is to be linked to policy making and to the sustainable socio-economic development in Africa.
- Equitable access to scientific data and information; and establishment of scientific capacity that may be used to contribute to the production of new scientific knowledge for the sustainable benefit of society.

The Mission is:

In order to strengthen international science for the benefit of society, ICSU mobilizes the knowledge and resources of the international science community to:

- Identify and address major issues of importance to science and society;
- Identify and address major issues of importance to science and society;
- Facilitate interaction amongst scientists across all disciplines and from all countries;
- Promote the participation of all scientists-regardless of race, citizenship, language, political stance, or gender-in international scientific endeavour;
- Provide independent, authoritative advice to stimulate constructive dialogue between the scientific community and governments, civil society, and the private sector.

While ISPRS is a member of ICSU, the aims of the Regional Offices are more directed to broad outcomes in science and therefore it is unlikely have benefits for ISPRS's education and training objectives in the short term.

#### 3. Discussion and Conclusions

Each of the organisations described in this paper is developing programs in education, training, and capacity building for specific purposes. However, there is considerable overlap in

the overall goals of many of the organisations, particularly between the CEOS WGEdu, the CEOS Capacity Building Module 1, and the capacity building aims of GEOSS. ISPRS is participating in all three of these organisations, being an associate of CEOS and a participating organisation in GEO. The most advanced of these organisations is CEOS WGEdu, but ISPRS has made limited contributions recently to this WG, primarily due to the difficulties of participating in the teleconferences. Some solution to this problem should be found to enable ISPRS to play a more significant role the activities of CEOS WGEdu. In the future, the provision of the discovery portal, the cooperation of space agencies to provide sets of data, and its education programs, will be of significant advantage to the activities of ISPRS Commission VI in education and training. As well, members of the Commission

should be able to assist the operations of the WGEdu, by providing course materials and web based teaching materials. Developments in most of these organisations are ongoing and updates will be provided at the Symposium.

#### **4. References**

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