



INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION
(of UNESCO)

Thirty-seventh Session of the Executive Council
Paris, 23–29 June 2004

Agenda Item: 4.7.2

**A PLAN FOR THE USE OF REMOTE SENSING IN OCEANOGRAPHY
BY DEVELOPING COUNTRIES**

In response to IOC Assembly Resolution XXII-13 “*A Strategy for the Use of Remote Sensing in Oceanography*”, the Secretariat has prepared a plan to improve the use of remote sensing in oceanography by developing countries in pursuit of sustainable development. The plan involves six main elements:

1. Sponsoring attendance of developing country representatives at space-based conferences;
2. Sponsoring courses in remote sensing techniques, for developing countries;
3. Supporting the regional development of remote sensing for IOC programme applications;
4. International coordination of capacity building activities with space agencies;
5. Development of training materials;
6. Raising financial support for capacity building initiatives in remote sensing.

The Executive Council is asked to endorse the plan, and the financial implications expressed in the associated Draft Resolution EC-XXXVII.(4.7.2) (see the corresponding section in the Action Paper).

Introduction

- 1 At its twentieth session, having considered document IOC-XXII/2 Annex 13 “*A Strategy for Remote Sensing*”, and having heard a presentation from Mr Craig Donlon on the UNESCO Bilko Project for learning in remote sensing (based on document IOC/INF-1184), the IOC approved Resolution XXII-13, “*A Strategy for the Use of Remote Sensing in Oceanography*”. The Assembly decided that the IOC Executive Secretary should prepare a comprehensive plan to be presented to the 37th Session of the IOC Executive Council for increasing training in remote sensing, and access to remotely sensed data.
- 2 As part of the Resolution, the Assembly decided on five elements of the proposed plan, namely:
- (i) to organise a series of regional conferences/workshops to bring together specialists in ocean science and remote sensing to establish regional requirements in terms of data access, product development, and training; and
 - (ii) to promote widespread use of appropriate training tools in remote sensing, including among others the UNESCO Bilko Learning Project on Remote Sensing;
 - (iii) \$10,000/year Regular Programme investment in the Bilko Project with extrabudgetary resources and UNESCO cross-cutting project funds to an appropriate level based on evaluation of proposals;
 - (iv) Continuation of \$10,000/year investment in the International Ocean Colour Coordinating Group (IOCCG), based on \$10,000 from Regular Programme funds, supplemented by extrabudgetary resources;
 - (v) \$20,000/year Regular Programme investment in regional workshops/conferences with one per year for one of the following regions: Africa, the Caribbean, Latin America, South East Asia, and the Pacific Islands, starting with Africa in 2004, supplemented by extrabudgetary funds of \$100,000–200,000/year.

The Plan comprises the following elements:

1. Sponsoring attendance of developing country representatives at space-based conferences:

1.1 The IOC will provide co-sponsorship in the form of \$3,000 each for capacity building conferences being organised in 2004 by PORSEC (Pan Ocean Remote Sensing Conference, Concepcion, Chile, Nov. 29–Dec. 3), and by COSPAR (ICSU’S Committee on Space Research, Scientific Assembly, Paris, July 18–25). Similar support will be provided in future years to enable the attendance of participants from developing countries.

2. Sponsoring courses in remote sensing techniques, for developing countries.

2.1 The IOC will continue to support the training programme of the International Ocean Colour Coordinating Group (IOCCG), with a donation of \$10,000 per year, for the provision of annual courses to developing countries in the interpretation of ocean colour data.

2.2 The IOC will continue to use extra-budgetary resources support the training of developing country participants in courses on the use and interpretation of remotely sensed data in various

regions on request and as funds permit. Currently such courses are planned for Indian Ocean GOOS: Fremantle, October 2004; Mombasa, April 2005; Mauritius, 2005; Reunion, 2006), where they are provided by Curtin University of Western Australia. Similarly, the GOOS-AFRICA has planned to use the opportunity offered by the 5th Conference of the African Association of Remote Sensing of the Environment (AARSE) to convene the first Workshop of the Pan-African Coastal and Marine Remote Sensing Steering Committee (PACMaRS), (Nairobi, October 2004).

3. Supporting the regional development of remote sensing for IOC programme applications.

3.1 IOC will continue to promote the development of access to and training in the use of remotely sensed data in Africa. A plan for Africa has already been developed with the African community, working through GOOS-AFRICA, in the shape of the Regional Ocean Observation and Forecasting System for Africa (ROOFS-AFRICA) Project, which has been adopted at Ministerial and Head of State level as a core project of NEPAD. The ROOFS-AFRICA proposal carries a budget of \$30 million, \$5 million of which is devoted to the remote sensing work package. This GOOS-AFRICA initiative is coordinated by Mr J. Ahanhanzo, the IOC's GOOS-AFRICA Technical Secretary. A remote sensing training workshop is planned, with Bilko experts and remote sensing specialists, for 2005 at an estimated cost of \$20,000 from IOC Regular Programme funds, which will be supplemented with funds from 4.2 below. Actual funding levels will depend on the success of effective funding of the ROOFS-AFRICA proposal to NEPAD by African countries, Partners, and Donors following their commitments at the recent NEPAD International Conference on the Environment Initiative in December 2003 in Algiers. IOC will continue to play an active role for fund mobilisation from bilateral and multilateral sources.

3.2 IOC will continue to provide the Project Manager for the UNESCO Cross-cutting Project on Remote Sensing for Water Resources and Ecosystems in Africa, a proportion of which is devoted to coastal science. The project was funded at \$400,000 from 2000–2002, and is funded at \$210,000 from 2003–2004. This activity involves 50% of the time of Mr J. Ahanhanzo, Technical Secretary of GOOS-AFRICA. The Project funds 50% of his salary. It is expected that the GOOS-AFRICA remote sensing workshop referred to above in 4.1 will meet the needs of the project community, and that some \$20,000 will be available from the Education Sectors Regular Programme budget allocated to this project.

3.3 IOC will work with other regions to develop plans for regional development workshops in remote sensing along the lines of the remote sensing component of the ROOFS-AFRICA project, starting with the Caribbean in 2006, followed by Latin America, South East Asia, and the Pacific Islands. The main goals are (i) to improve access to remotely sensed data and products, and (ii) to train specialists in the use of remotely sensed data in the production of scientifically validated products needed by policy makers and environmental managers, and in the execution of research.

The workshops will bring together representatives of the marine science community, remote sensing specialists, creators of information products based on remotely sensed data (merged with *in situ* data), and users of such products, so as (i) to demonstrate what is available actually or potentially, (ii) to show how such information is currently being used in the region, (iii) to explore what the regional requirements are in terms of technical specifications for remotely sensed data, (iv) to explore what the requirements are for *in situ* measurements necessary for calibrating and validating remotely sensed measurements; and (v) to determine the requirements for training and other forms of capacity building so as to enable the region to make best use of remote sensing technology. For each region the programme will include a system for measuring

programme performance as the basis for improvements and to ensure that activities are followed up to ensure lasting success. \$20,000/year from Regular programme funds will underpin this programme.

Working with each region, through the workshops, IOC will develop standard methodologies for using remotely sensed data in coastal zoning and classification, fisheries management, pollution control, sea-level and storm prediction services, and other topics as appropriate, defined by the regional communities themselves, as the basis for improving services based on remotely sensed data.

4. International coordination of capacity building activities with space agencies and WMO

4.1 IOC will continue its involvement as a member of the Working Group on Education and Training (WGEdu) of the Committee on Earth Observing Satellites (CEOS), which seeks to use the Internet as a means of making available to the wider community access to educational and training materials developed by the different space agencies. It is intended that the WGEdu will launch its website during mid-2004, with an initial population of examples that is expected to grow through the coming years. The cost averages around \$2,000/year for the attendance of IOC staff at WGEdu meetings (much of the work is done by teleconferencing and e-mail).

4.2 The IOC will continue to promote capacity building through Associate Membership of CEOS, and Membership of the Partnership for an Integrated Global Observing Strategy (IGOS). Recently IOC has helped to develop a set of Principles for Capacity Building that was adopted by CEOS at its Plenary meeting in October 2003. CEOS also agreed to the creation of an African Advisory Group on capacity building in remote sensing. IOC will work with the African Advisory group to promote capacity building in remote sensing in Africa. IOC will also work closely with CEOS through the CEOS WGEdu to help specific space agencies implement the adopted Principles. The cost averages around \$2,000/year for the attendance of IOC staff at IGOS Partners meetings (much of the work is done by teleconferencing and e-mail).

4.3 The IOC will also continue to promote capacity building in remote sensing through its participation in the Capacity Building Working Group of the GEO Process. The Group on Earth Observations (GEO) has been tasked with preparing a 10-year plan for a coordinated approach to global observations in support of sustainable development, which will be presented to Earth Summits in Tokyo in April 2004 and in Brussels in December 2004. The cost averages around \$3,000/year for the attendance of the IOC capacity building representative at key meetings (much of the work is done by teleconferencing and e-mail).

4.4 The IOC will also continue to work closely on remote sensing with the WMO's newly created Space Programme, which is designed to make a contribution to WMO-supported programmes and associated observing systems such as GCOS, WCRP, and JCOMM's implementation of GOOS—through the provision of continuously improved data, products and services, from both operational and R&D satellites, and to facilitate and promote their wider availability and meaningful utilization around the globe. In addition the IOC will continue to benefit indirectly from the WMO Consultative Meetings (with space agencies) on High-level Policy on Satellite Matters, which have now been institutionalised in order to establish more formally the dialogue and participation of environmental satellite agencies in WMO matters. WMO has urged close cooperation with the IOC and other related international organizations to ensure a coordinated and integrated approach to space-based Earth observations. In a like context, WMO and IOC are both members of the Coordinating Group on Meteorological Satellites, which has capacity building as one of its concerns, and which meets annually.

4.5 The IOC will work closely with space agencies through CEOS to investigate how to improve access to real-time or near real-time data. This is likely to involve the development of high-speed links, or dishes to download satellite data; in addition attention will have to be given to the distribution of satellite data to regions around such down-link terminals.

5. Development of training materials and trainers

5.1 The IOC has taken over from the Coastal Regions and Small Islands Platform of UNESCO (SC/HYD/CSI) the task of further developing the UNESCO Bilko computer learning package in remote sensing that was originally developed under the leadership of CSI. Bilko is an already proven system, with the potential capacity to provide a learning and teaching environment that can keep abreast of the rapid pace of developments in Global Ocean Observing System (GOOS) and IOC's Integrated Coastal Area Management Programme (ICAM). However, to achieve that potential requires revision of eight current Bilko lesson modules and finalising one new module (the topics covered are listed in the table below), to incorporate the new, updated software and to accommodate the foreseen training requirements of IOC (e.g. ICAM, IODE, GOOS-AFRICA etc.). In addition we plan to forge interactive links between the Bilko activity and IOC's Ocean Teacher Programme, to foster yet wider use of the Bilko learning modules. The plan requires the Bilko team (whose hub is at Southampton Oceanography Centre (SOC), UK) to demonstrate the effectiveness of new Bilko-based lesson materials to educate non-specialist oceanographers in the use of satellite data, and to establish a thriving user-producer network of teachers and trainers in satellite oceanography across the regional manifestations of GOOS, including an effective feedback and follow-up system that can assure appropriate capacity development. To meet these ends IOC is funding a Bilko Office within the Southampton Oceanography Centre's Laboratory for Satellite Oceanography. The primary focus will be on developing the Bilko Project to serve the needs of GOOS capacity building. This will be complementary to work presently done by the International Institute for Aerospace Survey and Earth Sciences (ITC) to serve the CSI applications of Bilko. The funding is for two years (2004–2005) after which the activity is expected to become self-sustainable with support from Space and Development Agencies. The advantages in using the Bilko Project are that it is already set up, with pre-developed training materials and methodologies and trainers, and can move quickly to meet Member States' needs; the project does not have to be started from scratch. The cost for 2004–2005 is \$37,000/year from Regular Programme funds.

5.2 Presently the Bilko ensemble of modules presents us with a good range of usable application products, since it has had the benefits of many years of user feedback to bring it to its present state. However, considering the rapid changes that both computers and application tools undergo, the IOC will regularly re-examine the best options for its capacity building programmes.

5.3 It is proposed to develop a Visiting Scientists Programme for specialists from developing countries to stay at SOC for about 6-9 months so as to be fully involved in the conceptualisation, development and upgrading of the BILKO materials as an integral part of the BILKO Technical team. In doing so, they can learn how to develop from A to Z the modules for their own regions, and they would later be able to teach the whole process of the BILKO development to their students. They will become creators and developers rather than being only "Users and Consumers" of the materials. The budget for this Visiting Scientists Programme is \$20,000/year by region starting with Africa in 2005.

5.4 These newly trained experts from specific developing regions would then be given responsibilities to lead the development of the teaching and training materials based on the key

priority topics for their region, for example, fisheries for the BCLME¹/GCLME², or coastal erosion for the Guinea Current Large Marine Ecosystem or El Niño Trends for the Caribbean and Pacific region. The budget for the development of regional training materials is \$10,000/year by region.

6. Raising financial support for capacity building initiatives in remote sensing

IOC's resources for remote sensing initiatives in support of capacity building are treated as leverage for attracting extra-budgetary funding to sustain the programme. To that end, proposals will be developed (as for ROOFS-AFRICA) to obtain resources necessary to carry out local and regional remote sensing capacity building activities, making full use of joint projects involving donors, regional partners, North-South and South-South linkages.

BILKO THEMATIC MODULES INCLUDED IN THE WORKPLAN

Module	Title	Reference
1 (DOS)	Some Marine Applications of Satellite and Airborne Remote Sensing. A Computer-based Learning Module.	MARINF/70. Unesco, Paris. 1989. 90 pp.
2 (DOS)	Applications of Marine Image Data. Second Computer-based Learning Module.	MARINF/81. Unesco, Paris. 1991. 85 pp.
3 (DOS)	Applications of Marine and Coastal Image Data from Satellite, Airborne and <i>In-situ</i> Sensors. Third Computer-based Learning Module.	MARINF/83. Unesco, Paris. 1992. 101 pp.
4 (DOS)	Applications of Marine and Coastal Image Data from Satellite, Airborne and <i>In-situ</i> Sensors. Fourth Computer-based Learning Module.	MARINF/90. Unesco, Paris. 1993. 102 pp. (Also available in Russian)
5 (DOS)	Aplicaciones de Datos de Imagen Costeros y Marinos provenientes de Satelites, Aviones y Sensores <i>in situ</i> . Quinto Modulo de Aprendizaje sobre Base Informatica.	MARINF/96. Unesco, Paris. 1994. 141 pp.
5 (DOS)	Applications of Marine and Coastal Image Data from Satellite, Airborne and <i>In-situ</i> Sensors. Fifth Computer-based Learning Module.	MARINF/96. Unesco, Paris. 1996. 110 pp.
6 (WIN)	The first Bilko for Windows: An experimental module	CD-ROM available together with all other modules from the UNESCO Bilko project office on request
7 (WIN)	Applications of Satellite and Airborne image data to coastal management	CD-ROM available together with all other modules from the UNESCO Bilko project office on request

¹ Benguela Current Large Marine Ecosystem

² Guinea Current Large Marine Ecosystem

Module	Title	Reference
8 (WIN)	Applications of remote sensing to fisheries management	CD-ROM available together with all other modules from the UNESCO Bilko Project office on request
9 (WIN)	Applications of remote sensing to coastal erosion	In preparation expected mid 2003. Contact Dr Tjeerd Hobma (hobma@itc.nl)