The Royal Center for Remote Sensing space education for a sustainable development

15th UN/IAF Workshop
« Space Education and Capacity Building for Sustainable Development
14-15 October 2005 Kitakyushu, Japan
Main needs for Developing countries in space technologies concerns:

- Capacity building to reinforce local human potential
- Access to earth observation data
- Implication in international space technologies programs
- More sensitizing actions to the capabilities and benefits of the use of space technologies in sustainable development strategies
Difficulties of Space education in developing countries (Africa)

- Lack of space policy in the majority of countries
- Space industry is quasi inexistent to encourage the space training
- Insufficiency of the sensitizing actions towards decision makers to use space technologies in their sustainable development programs.
- Lack of operational activities to support training actions
- The Support for the Regional centers of remote sensing is still insufficient
- Lack of coordination between the centers and institutions of training: duplication of efforts
- Insufficient qualified human resources
- Student’s grants are very limited

The access to space education in developing countries is still limited
- Significant potential of training institutions exists which requires:
  - Coordination between the centers and institutions of training
  - Setting up of long-term of adapted strategies of development of human resources in space technologies
  - Developing of interdisciplinary trainings for the future decision makers and managers of the space activities
  - Multiplication and adaptation of training programs taking into account regional context

- Need of reinforcement of South-South cooperation:
  - Facilities of capacity building and transfer of knowledge from south country to another regarding to cultural, economical, social and geographical similarities
  - Facilities of re-applicability of methods and techniques adapted to regional specificities
Main missions of CRTS:

1. Promotion and integration of Space and Earth observation technologies to meet needs of users and decision makers involved Socio-economic and Development projects at the national level.

   ✓ Operational applications to support strategic decisions

- To answer queries of the high authorities
- To support ministerial departments in various fields:
  - Agricultural statistics and production forecasting
  - Water resources management
  - Forest and pastoral resources assessment
  - Urban and land management
  - Space cartography and geomatics
  - Environment and hazards
  - Geological applications
  - Oceanography, climate and marine resources
Main missions of CRTS:

2. *Coordinate satellite data acquisition and management* to facilitate to all users an easy and rapid access to space and satellite data adapted to their needs and requirements

3. International actions to promote cooperation to ensure Technology transfer and cooperation development

   - *participation to regional and international programs (COPINE, AFRICOVER, RAMSES, LIFE, SMAP, …)*
   - *membership in international associations and committees: COPUOS, COSPAR, ISPRS, IAF, SAF, EURISY,…*
   - *organization of international conferences dedicated to the region*

4. Provision of *training* and education opportunities in Space technologies and carrying out *R&D* actions and programs to *ensure sustainability and capacity building*
CRTS Provides training education opportunities in space technologies:

- to enlarge users community of Space technologies
- To reinforce the existing potentialities
- To ensure decision makers, administrators, youth and general public awareness of the economic and social benefits of space activities
- To integrate Space technologies in sustainable development approaches and methods
To meet these objectives, CRTS:

- Sets up an adapted infrastructures dedicated to high technologies training
- Establishes an annual program and specific modules for initiation or performance enhancement
- Receives participants from the region and in cooperation with regional organizations (ESA, FAO, COSPAR,...)
- Contributes to train trainee-students from universities and engineering schools (PhD,...)
- Participates to Research activities in collaboration with Moroccan and African universities
- Participates to national universities and high schools programs: Providing specialized courses (RS and GIS)
CRTS Remote Sensing Training and R&D experience

CRTS Training centre: infrastructures dedicated to high technologies training

Training center

Adapted infrastructures (classrooms, hardware, software) dedicated to training in the field of space technologies (lectures, practical courses, image processing,..)

Lecture Classroom

2 conference rooms (50 persons)

Hardware/software

2 computer centers (30 PCs and all needed devices)

Specialized documentation centre
Annual program and specific modules for initiation or performance enhancement

Annual training program adapted to users requirements

- 10 to 15 Training Sessions and modules to encourage the use of remote sensing and GIS techniques dedicated to senior executives and young students from different disciplines:
  - Sessions of 1 to 2 weeks
  - Professional: urban managers, geologists, oceanographers,…
  - Decision makers
  - Teachers and Students from universities and engineering schools
Annual program and specific modules for initiation or performance enhancement

Developing methods and space programs at various levels: Various forms to answer various needs

- Basic knowledge sessions for Initiation to Remote Sensing and GIS techniques

- Sessions for the performance enhancement in the field of RS and GIS techniques and their applications

- Specific modules to answer specific users needs and requirements

- Training on specific projects

- Lectures and practical sessions

- Yield Visits
Annual program and specific modules for initiation or performance enhancement

Each Training Session approaches the application of Remote Sensing in particular fields:

- Territorial management
- Urban Planning
- Agriculture and Forestry
- Land cover and land use changes
- Desertification,
- Water resources
- Natural Hazards management
- Coastal areas,
- Oceanography and marine resources,....
### Training program for 2005

<table>
<thead>
<tr>
<th>MODULE</th>
<th>name</th>
<th>Topic</th>
<th>duration</th>
<th>period</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RS</td>
<td>Initiation to remote sensing</td>
<td>5 days</td>
<td>31 January – 04 February 2005</td>
</tr>
<tr>
<td>2</td>
<td>AT1</td>
<td>Remote sensing : High and very high resolution for territorial and coastal areas management</td>
<td>5 days</td>
<td>28 February - 04 Marsh 2005</td>
</tr>
<tr>
<td>3</td>
<td>AT2</td>
<td>GIS for territorial and coastal areas management</td>
<td>5 days</td>
<td>04 – 08 April 2005</td>
</tr>
<tr>
<td>4</td>
<td>RADAR</td>
<td>Radar imagery : concepts and applications</td>
<td>3 days</td>
<td>04 – 06 May 2005</td>
</tr>
<tr>
<td>5</td>
<td>BV</td>
<td>RS and GIS for the integrated management of basins versants (environnement, agriculture, water resources...)</td>
<td>5 days</td>
<td>23 – 27 May 2005</td>
</tr>
<tr>
<td>6</td>
<td>ISBAR</td>
<td>Low resolution space imagery for vegetation monitoring geology and , la geology et le water balance</td>
<td>3 days</td>
<td>15 – 17 June 2005</td>
</tr>
<tr>
<td>7</td>
<td>COSPAR</td>
<td>Space oceanography</td>
<td>10 days</td>
<td>19 – 30 September 2005</td>
</tr>
<tr>
<td>8</td>
<td>GIS I</td>
<td>Initiation to GIS</td>
<td>5 days</td>
<td>14 – 18 November 2005</td>
</tr>
<tr>
<td>9</td>
<td>GPS -SIG</td>
<td>Use GPS integrated to GIS</td>
<td>3 days</td>
<td>28 – 30 November 2005</td>
</tr>
<tr>
<td>10</td>
<td>INTERNET - SIG</td>
<td>Interactive mapping on the Web</td>
<td>2 days</td>
<td>05 – 06 December 2005</td>
</tr>
<tr>
<td>11</td>
<td>GIS II</td>
<td>GIS Improvement</td>
<td>5 days</td>
<td>19 – 23 December 2005</td>
</tr>
</tbody>
</table>
Specific training programs in cooperation with regional organizations

- Developing training actions in collaboration with regional and international organization (French cooperation, space agencies (ESA, CNES) FAO, UNDP, COSPAR,...) :
  - To make available experts for CRTS training sessions
  - To Set up specific training sessions and workshops dedicated to sub-region: African participants

Example:
- International Space Law Workshop (June 2006) in collaboration with ESCL (European Centre of Space Law)
  - Session of training and sensitizing of users on the fundamental principles and regulation of space activities
Example of Cooperation Action: COSPAR Workshop program of capacity building Workshops

- COSPAR Workshop on “the ocean remote sensing: a tool of ocean science and operational oceanography”:
  - From 19 to 30 October 2005 (CRTS, Morocco)
  - Regional Workshop for African Oceanographers (26 participants from 11 countries): PhD and Post-docs students, faculty lecturers from governmental institutions working in any area of ocean research

Objectives:
- Encouraging and developing the use of ocean remote sensing and associated *in situ* data by scientists in the African region
- Relating to existing research and potential applications in the region: ocean currents, surface winds and waves, air-sea fluxes, marine biology, etc.
- Enhancing the possibilities for trainees future works

Program based on lectures, Practical sessions and realization of mini-projects:

Continued actions:
- Trainee-groups defined regional projects to be conducted and realized by all participants in order to:
  - facilitate African cooperation:
  - participate more fully in the work of the international research community
  - set up an African network of oceanographers
**CRTS Space training activities:**
an overview of training statistics from 1999 to 2004

813 participants (1993-2004)

**Increasing tendency of the participants in CRTS training programs**

From 74 in 1999 to 107 participants in 2004
CRTS Space training activities: an overview of training statistics from 1999 to 2004

Distribution of participants according to different sessions
Developing Research and Development actions and programmes in collaboration with national and international universities and regional centres

- Reception of trainee-students from national and African universities and engineering schools

- Specific classrooms, hardware and software for students research works

- Co-training of PhD thesis

- Developing remote sensing methodologies and applications in various fields: Agriculture, urban planning, oceanography, desertification,…
Recommendations

Encouraging space technologies capacity building by:

- Facilitating and supporting the exchange of experts between the centers and specialized agencies of southern countries
- Contributing to training actions initiated by southern countries to meet their needs according to their priorities
- Supporting training actions in the framework of regional projects
- Funding students and trainees from southern countries
- Setting up information change networks
- Improving and facilitating the access to the existing institutions in the region in the field of space technologies
- Institutionalization of training actions