15th United Nations/International Astronautical Federation Workshop on

“Space Education and Capacity Building or Sustainable Development”

14 – 15 October 2005, Kita-Kyushu, Japon
The contribution of training on Space Sciences and Technologies for sustainable development in CRASTE-LF

Prof. A. TOUZANI
The contribution of training on Space Sciences and Technologies for sustainable development

• We develop in this communication, the activities of the Centre in **Training** and **How** to contribute to the process of the **Reinforcement** of the **Building Capacities**, at the local level, in the use the Space Technologies in **Sustainable Development**.
The Centre has been established, on the initiative of the OOSA program on applied of the UN/G.A. Resolution, in Rabat on October 23, 1998.

**Thirteen Member States**: Algeria, Cameroon, Cap Verde, Central Africa, Cote d’Ivoire, D. R. of Congo (Zaire), Gabon, Morocco, Mauritania, Niger, Senegal, Togo and Tunisia.
Governing Board

CRASTE-LF

Scientifique Council

Financial Ressources
Members States, OOSA, Regional and International Institutions, Projects

Human Ressources
Experts and Institutions, supervisor for projects, …

Post-Graduat Courses
Training Courses, Scientific animation

Consulting to Member State and Regional Institutions

Collect and Dissemination Information Space
The Objectives of the Centre

- To **increase knowledge** in Space Sciences and Technologies by organizing courses, seminars, workshops, conferences on the Regional level,
- To improve the technical **competence** of the **experts, teachers, decision-makers** and to hold them informed about technical progress.
- To **assist** the countries of the region on the development of endogens capacities in space sciences and technologies.
- To **strengthen** the Local and Regional **Capacities**.
- To promote **cooperation** between the developed countries and States members as well as between these States.
- To develop **expertise** in Space Sciences and Technology.
The Main Courses Programs

- Remote Sensing And Geographic Information Systems,
- Satellite Communications,
- Satellite Meteorology and Global Climate,
- Space and Atmospheric Sciences

Target Public
Academics, Researchers, Engineers, Administrators and Managers

Recovering Sectors
Universities, Research Institutes, Professional and Private Institutes and Administrations
Realized Scientific Activities

💧 FIRST Workshop of Orientation of the scientific activities of the Centre, with the cooperation of the experts from member countries, national centre for space research (CNES - France) and the Canadian Space Agency - on November, 1999

💧 THREE Workshops on Remote Sensing and GIS on April 2000, November 2001 and November 2003

💧 TWO Workshops Satellite Communications on November, 2000 and November, 2002

💧 TWO Workshops Satellite Meteorology and Global Climate on January 2002 and November 2004
Realized Scientific Activities

🌟 International Workshop on “The Rule and the Management of the Spectrum of Frequencies” from 9 to 13 July 2001

🌟 International Conference on "Space Technologies and Telemedicine" on June 26 and 27, 2003

🌟 International Workshop on "RANET Internet Presence Initiative (RIPI)” from 07 to 11 June 2004

🌟 International Workshop on “Landsat data sets for supporting sustainable development in Africa” from 07 to 09 July 2005
Realized Training Courses

🌟 Three training courses in Remote Sensing and GIS, the First started in April, 2000, the Second in November, 2001, the third in November 2003

🌟 Two training courses in Satellite Meteorology and Global Climate in January, 2002, and November 2004

🌟 Two training courses in Satellite Communications, the First in December, 2000, and the Second in November, 2002

🌟 Until Now, 85 Trainees followed courses in the Centre
**Future Activities**

- **Next November 2005, launch** the 4-th training course in Remote Sensing and GIS,

- **Organization** of an International Conference on the Contribution of “Spatial Information on Sustainable Development” the **November 2005**
  (received around 180 papers from 36 different countries)

- **Organization** of a Workshop on Remote Sensing: Data Radar (RadarSat and ERS) and Natural Resources, **July 2005**.

- **Launch** of a third training course in Satellite Communications **November, 2006**.
Postgraduate Courses in Remote Sensing and Geographic Information System

Trainees Profile
- Engineer in Geodesic Sciences
- Diploma of Studies of Photogrammetry
- Engineer of Geographic Works,
- Engineer Agro - Meteorologist
- Engineer Cartographer
- Maitrise in Applied mathematics
- Master in Geography
- Doctorate in Geography
- Doctorate in Physics

41 trainees from:
15 Countries member and no member
20 different institutes.
Postgraduate Courses In Remote Sensing and Geographic Information System

**Activity Hours**

- **Lectures and Practical Exercises**: 684 h
- **Conferences**: 64 h
- **Supervising**: 240 h
- **Scientific Visits**: 24 h

**Total**: 1,012 h

**Teachers Staff**

- 30 Experts from various university and professional institutions or international Organisms.

**Experts Origins**

- Mohammadia Engineers School (Morocco)
- Mohamed V University of Rabat (Morocco)
- Hassan II University of Casablanca (Morocco)
- Centre Royal de Télédétection Spatiale (Morocco)
- Hassan II Agronomic et Vétérinaire Institute (Morocco)
- National Forest Engineers School (Maroc)
- Centre National d’Études Spatiales (France)
- Others Public and Private Institutes.
Pedagogical Support Environment

- Important effort to provide teaching aids and material from experts and teachers.
- Support of institutions partners

Acquisition and Constitution of basic documents.

Equipment Environment

- Personal Computer (1 per trainee)
- Digitizers Table A0 et A3
- Scanner A3
- Plotter A0
- Laser and Color Printer

Software Environment

- Temporary Installation of Software by the teachers and experts (licenses): Urgency of durable solutions (acquisition of licenses) for the constitution of a software library.

Digital Data

- Support of partner institutions

- Necessity of Images and Cartography Data

- Conditions of execution of the research projects in their origin Country
Postgraduate Courses In Remote Sensing and Geographic Information System

Research Projects

1) Contribution of the IKONOS Images to cartography and topography. Application and use on high level these images to elaborate town plans on 1/10 000 scale.

2) Ground Digital Model (MNT) support of the thematic cartography.


4) Contribution of the Remote Sensing and the GIS in the management of the coast between rivers Volta and Mono and update of maps from satellite images.

5) GIS for the management and the development of the irrigation

6) Temporal study of vegetations by Satellite Images in Tunisia
Classification of a Radar ERS-1 image covering the geological structure of a Region in the High Atlas Mountains in Morocco

Contribution of the Remote Sensing and GIS to cartography of the dynamics of the occupation of the ground in Tunisian dry environment

Conception and modeling of a data base from meta-data for the indicators of the desertification stemming from spatial data of Remote Sensing.

Degradation of the environment and problem of organization of a Sahelian region. Contribution of the Remote Sensing in the inventory of the natural resources and in the follow-up of the desertification
Contribution of the GIS in the choice of sites of garbage dumps.

Implementation and contribution of the GIS in the management of forests for a durable development.

Study of the desert sprayers by remote sensing.

Application of the multi-sources remote sensing in the geologic interpretation.

Study of the dynamics of the spatial evolution of the natural resources in zone Soudano - Sahelian zone by Remote Sensing and GIS.

Contribution of the remote sensing and the GIS to cartography and the organization of the Moresque coast (methodological approach).
Use of the GIS and the Remote Sensing for the organization of the space urban area (Case of Yaoundé).

Conception and Modeling of a Geographic Data Base for the management of the RTC (line phone of communications) network.

Geological photo-interpretation and images processing of the mountain Middle Atlas in Morocco.

Contribution of the Remote sensing and GIS to the geological cartography and the mining research - Case of the mine of AOUAM Mountain.
Research Project

During of research projects last minimum 12 months and must be realized in the origin Institution of the trainees
Postgraduate Courses In Remote Sensing and Geographic Information System

The closing ceremony of the theoretical phase of the training postgraduate in Remote sensing and G.I.S. On February 22, 2001, chaired by Mr. Minister of Higher education, President of Governing Board of the CRASTE-LF

Promotion 2000-2001 completely, around the President of Governing Board
International Workshop

Global Sets Data Landsat
For Supporting Sustainable Development In Africa
Organized on July 07 and 09, 2004

This workshop was organized with the collaboration of the:

- UN / OOSA
- Landsat / USAID (USA)

This workshop gathered 41 participants coming from 11 African countries
Workshop Régional
Rabat, du 7 au 9 juillet 2005

Données Globales Landsat * pour Soutenir le Développement Durable en Afrique

* Donation du Gouvernement des États-Unis d'Amérique

Avec l'appui du Bureau des Affaires Spatiales de l'ONU à Vienne et de l'Organisation Islamique pour l'Education, les Sciences et la Culture (UNESCO)
**Postgraduate Courses on Satellite Communications**

**Trainees Profil**

- Engineer on Communications,
- Engineer on Mechanical engineering,
- DEA. on Signal Processing,
- Engineer on Electromechanically,
- DEA on Electronics and
- DEA on Communications
- Bachelor on theoretical Physics
- Engineer Multimedia Designer
- Doctorate on Communications
- Doctorate on Physics (electro-optics)

**26 trainees from:**
- **9 countries**
- and **13 different institutes**
Postgraduate Courses on Satellite Communications

Lectures and Practically Exercises: **583 h**
Conferences: **211 h**
Supervising: **210 h**
Scientific visits: **40 h**
Total: **1,044 h**

**27 Experts** from various university and professional institutions or international Organisms.

**Experts Origins**
- École Mohammadia d’Ingénieurs (Maroc)
- Faculté des Sciences de Rabat (Maroc),
- Institut National des Postes et Télécommunications (Maroc),
- Centre Royal de Télédétection Spatiale (Maroc),
- Institut Agronomique et Vétérinaire Hassan II (Maroc)
- Centre National d’Études Spatiales (France).
Preliminary study on the functioning of antennae Radar

Study of Global Star System

Interconnection of the Cameroon Cities by VSAT network.

Contribution of the Satellite Radar images to the littoral cartography and the prevention of the pollution by hydrocarbons

Given Numbers and extending of the Centrafrique Communications network by Satellite TELCASAT.

Study of the transmission systems of data by satellites.

Study of the Eutelsat system

Interest of VSAT systems for Niger and Senegal.

Architecture of a VSAT system in the particular case of the rural telephony, the teleeducation and the telemedicine.
Research Projects

- Use of the VSAT network for the improvement of the System of the meteorological data transmission in Senegal,
- Economic planning of a Segment Ground for the transmission of Images by way of Satellites
- Realization of a software of balance of satellite connection " Numerical Transmissions ",
- Location: Follow-up of vehicles by GPS AND GSM,
- Conception of a Micro Satellite: CVSAT,
- Conception of a System of Educational Television by Satellite,
- Feasibility study of a Moroccan geostationary satellite of Communications.
Postgraduate Courses on Satellite Communications

Promotion 2000-2001 completely
Postgraduate courses on Satellite Communications

International Workshop/Rule and Management of Spectrum of Frequencies

19 participants

- Trainees from CRASTE-LF (13 persons from 6 States)
- MOROCCO (6 persons from the Moroccan Radio Television, the Institute National Communications and National Meteorology Department),
- TCHAD (2 persons from Tchadian Office of Communications Regulation)
- SENEGAL (Multinational High School of Communications).

Program:

- Objectives of the Management of the spectrum
- International and National Rules of the spectrum
- Process of Planning the Spectrum
- International announcement (earth services, BR IFIC, spaces services)
- International coordination
- Control of the spectrum and computerization of the management of the spectrum
- Delivery of licenses: case of Morocco
- Assignment of frequencies: practical exercise.
- Demonstration on the WinBASMS software
International Conference

Space Technologies and Telemedicine  June 26 and 27, 2003

This Conference was organized with the collaboration of the Faculty of Medicine and Pharmacy Mohamed V University of Rabat

With active support of:

UN/OOSA,
ESA
ASC – CSA (Canada),
CNES - MEDES (France),
OMS,
ISESCO,
EUTELSAT,
CNRST (Morocco).
International Conference

Space Technologies and Telemedicine

**Attendance**: 130 participants from member and non-member countries of the CRASTE-LF and 6 experts from the International Space Agencies

**Program**: Elaborated collectively with the implied experts and with the support of participating organizations

- Objectives of Telemedicine,
- The Contribution of Space Technologies to Telemedicine,
- European, Canadian and French Projects and their Experiences,
- African Experiences,
- Presentation of Projects Models in Telemedicine,
- Connection a live between the Conference and the Canadian and Italian hospitals
- Role of the African Bank of Development (BAD) in financing of projects on Health
Trainees Profiles

- Meteorological Engineer,
- Mechanical Engineer,
- Forest Engineer,
- DEA on Signal Processing
- Computers Engineer,
- D.E.A. on Environment,
- DEA en Communication
- Doctorate d’Etat on Es Sciences Physiques

18 Trainees from:
8 member Countries and
10 Differences Institutes
Postgraduate Courses on Satellite Meteorology and Global Climate

Lectures and Practically Exercises: 589 h
Conferences: 39 h
Supervising: 300 h
Scientific Visits: 24 h
Total: 957 h

Teachers Staff

26 Experts from differences institutes (universities, professionals or internationals Organisms.

Experts Origins

- Engineers School (EMI, ENFI, IAV Hassan II of MOROCCO)
- Universities (FSR, IS, FSC) of OROCCO),
- Centre Royal de Télédétection Spatiale (MOROCCO),
- Meteorological National Department (MOROCCO)
- National Meteorological of Algeria (ALGERIE)
- National Meteorological of Tunisia (TUNISIA)
- EUMETSAT_EAMAC (NIGER)
International Workshop

RANET Internet Presence Initiative
Organized on June 07 and 11, 2004

This workshop was organized with the collaboration of the:

- National Meteorology of Morocco,
- National Oceanographic Atmosphere Administration (NOAA - USA)

This workshop gathered about Sixty participants from 15 different countries
Postgraduate Courses on Satellite Meteorology and Global Climate

Researches Projects

- Seasonal and monthly forecast of the hunting-sand in the Algerian South.
- Problem of the forests fires in Morocco: influence of meteorological parameters.
- The desertification in Morocco: contribution of satellite NOAA - AVHRR Images.
- Study of the distribution of electromagnetic waves in the various atmospheric layers.
- Contribution of the NOAA / AVHRR Images and the GIS in the follow-up and the cartography of the forested zones in Morocco.
- Impact of the changing climate and adaptation of the statistical approach to seasonal forecasts to Niger.
- Recognition of convective systems of Meso-level by satellite images.
Besides courses, the Trainees participated in workshops and conferences organized by the specialized institutes in Space Sciences and technologies.
Reports

and

Recommendations
Organization and in progress of the activities of training

- Trainings graduation highly appreciated and the 9 months is an optimal duration.

- Required means for the follow-up of the progress of the research project, up to now 23 Thesis have been realized and presented, and many others couldn’t be presented now because of lack of financial means.

- The Presentation in CRASTE-LF needs to foresee practical and financial means.

- To diversify the modes of development the knowledge by organizing the workshops, meeting, and conferences on targeted questions, because necessities in knowledge are common to all countries of the region. These modes have to be of limited duration, so as not to overload the trainees.
Program of Training

- Necessity to update the programs in the context of use of space technologies in Africa (to emphasize cartographic problems and of availability or update of data, specific environmental problems, Stations of satellite mobile reception typical VSAT, …)

- To approach the techniques of Tele-Education, Telemedicine, Teleconference…

- Common-Module must be adapted to the initial profiles of the candidates for the training because of the disparity of candidatures.

- The introduction of the elements of legal training is strongly wished (Legal Database, Space Law, Rule, …).
Reports and Recommendations

Documents and software environment

- Acquisition of the **Software packages** and the **Data** are expansive (not favoring training).
- The **specialized equipments** cost (image processing Workstation, GPS, radio station, Meteorological station, analyzer of frequencies, ...)
- **Basic documentation** (minimal library to be assured) little available, which means that the Centre needs to strengthen of educational resources.
**Documents and software environment**

- Absence of links and access to **suited data bases** (documentaries, data images, cartographic maps, statistical data, meteorological data, ...), in particular from Organizations in relation with the United Nations (UNESCO, FAO, OMM, ...).

- **Required to help in the intensification of the potential of training and research** for the Centre and to encourage the appeal to Teleconference by the use of the New Information Technologies.
**Training Concerns**

To create a context favorable to the realization of the research projects in 2-nd phase of training.

Support for the actions of help in the mobility of the trainees of the CRASTE-LF (additional practical trainings) or the experts engaged in the actions of training or research piloted by the CRASTE-LF.
Reports and Recommendations

Training Supervising

- Widely assured by the staffs of institutions Centre partners in Morocco

- Financial obstacles for the mobilization and the valorization of regional competence (travel expenses and charge of the experts), major working orientation of the CRASTE-LF, in the perspective of creation of a network of competence, to limit the migration of the experts and develop regional cooperation, ...

- The Contribution of the international Cooperation remains very limited
Reports and Recommendation

Finances

- The covering of the contributions of member countries remains unpredictable!

- The donations from international or national Agency have been limited.

- The trainees benefit from scholarships of the Moroccan Agency of International Cooperation

- Travel ticket are financed on endowment of the UN/OOSA (Ticket plane are very Expensive in Africa, Specially since two years)

- The trainees benefit from conditions of University facilities.
Thank you for your attention
CRASTE-LF : des Activités Variées

- **Juillet 2001** : Workshop International sur le thème “Régulation et Gestion du spectre de fréquences”

- **Juin 2003**
  Workshop International sur "Technologies Spatiales et Télémédecine" avec le soutien de OOSA, ESA, Agence Spatiale Canadienne, CNES (France), ISESCO, Eutelsat, OMS, ...

- **Juillet 2004** : Atelier de Formation sur RIPI (Ranet Internet Presence Initiative) à la demande de NOAA – USA.