Capacity Building on GNSS in CRASTE-LF for African French Speaking Countries

CRASTE-LF

TUNIS, 19 May 2015

5 Centres affiliated to UN in activities through a World regions:
India (S.E. Asia et le Pacific), Morocco (Africa in French Language), Nigeria (Africa – in English Language), Brazil Campus & Mexico Campus (Latino America & Caribbean) and last one in Jordan (RCSSTE Western Asia).
The CRASTE-LF has been established, on the initiative of the UN-OOSA program on applied of the UN/G.A. Resolutions, in Rabat on October 23, 1998, by 11 African States.

Objectives of the Centre

• To increase knowledge in Space Sciences and Technologies by organizing courses, seminars, workshops, conferences at the Regional level,

• To improve the technical competences 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 tools.

• To Strengthen the Local and Regional Capacities.

• To promote Cooperation between the Developed Countries and States Members as well as among these States.

• To develop expertise in Space Sciences and Technology.
functioning of the Centre

Financial Resources
Members States, Regional and International Institutions, Projects

Human Resources
Experts and Institutions Network, Teachers, Supervisor for projects, ...

CRASTE-LF

Target Public
Academics (Professors,...) Researchers, Engineers, Administrators and Managers

Recovering Sectors
Universities, Research Institutes, Professional and Private Institutes and Administrations
Education Curricula established and Published by UN-OOSA for Regional Centres for Space Science and Technology Education in:
- Remote Sensing & GIS,
- Satellite Communications,
- Satellite Meteorology & GC,
- Space and Atmospheric Science.
Main Courses Programs (2)

Education Curriculum established and published by UN-OOSA for Regional Centres for Space Science and Technology Education in:

- GNSS (Since 2012),
- Space Law
Each Training Session takes place in 2 phases

**Phase I**: 9 to 10 Months or 3 semesters, in Centre, theoretical and practical courses, land study and pilot project ~ 1000 h.

**Phase II**: 12 to 15 Months, achieve the Research Project in their institution.

**End of phase II**: Defense of memoire in Centre (Jury Members are Professors and experts).

Détail of courses in Web Site:

- [www.crastelf.org.ma](http://www.crastelf.org.ma)
- [www.oosa.unvienna.org/SAP/centres/centres.htm](http://www.oosa.unvienna.org/SAP/centres/centres.htm)
- [www.unoosa.org/oosa/SAP/gnss/icg.htm](http://www.unoosa.org/oosa/SAP/gnss/icg.htm)
1) Post-graduate Training on Space Science and Technology

Option : «Global Navigation by Satellite System- GNSS»
The training courses is based on the document entitled "Global navigation satellite systems, education curriculum" prepared by UNOOSA in cooperation with the ICG (International Committee on Global Navigation Satellite Systems).


The training takes into account the characteristics of the region and priorities of the member countries of CRASTE-LF in terms of GNSS applications and qualified human resources needs.
Conduct of Training Courses

Theoretical Teaching

- 690 hours
- 9 Modules
- Courses, supervised work and thematic seminar.

Practical Works

- 200 hours
- Practical Works and projects related to GNSS applications

Pilot Project

- During 12 weeks
- Pilot Project on GNSS

Research Project/ Memoire

- 12 – 15months
- A research project carried out by the candidate in his home country (Institution, ..) on an issue related to GNSS applications.
Curriculum on GNSS

1. Upgrade courses in the Basic Module:
   - Mathematics,
   - Physics,
   - Computer Sciences.

2. Courses topics related to GNSS:
   - Fundamentals of geodesy and surveying,
   - Basic concepts in geodesy and topography,
   - Basics positioning satellite,
   - Study of current and future GNSS systems,
   - Satellite Positioning and Navigation techniques,
   - Receivers and complementary systems.

3. GIS & Mapping:
   - GIS,
   - Mapping,
   - Cartography and Web-Mapping

4. GNSS thematic Applications.
Laboratory experiments, practical Exercises

- Practical work enables the candidates to practice the theoretical concepts learned.

- The practical works will focus on three aspects:
  - handling of GNSS receivers,
  - use of GNSS software,
  - design and development of applications related to the use of GNSS.
The pilot project is an opportunity for the candidate to carry out a comprehensive project in GNSS, from planning to implementation:

- The theme of the pilot project has to be chosen by the candidate.

The following themes are given for information only:

- GNSS and GIS to improve the management of Lands.
- Integration of GNSS signals and mobile telephony.
- Improvement of the positioning by integration of inertial systems.
- GNSS and web-mapping (online tracking of vehicles movement).
- Embedded Application for public services.
- Integration of GNSS and GIS to improve the management of the land heritage.
- GNSS Application for the management of natural resources.
- GNSS Application for disaster relief purposes.

A project report must be submitted by each candidate.
The final step of the Master is to carry out a research project.

Each candidate will have to conduct a thesis in GNSS on a theme corresponding to the needs of his country.

The research project has duration of 12 to 15 months and will lead to the development of a thesis document that will be presented in the CRASTE-LF.
Realized Training Courses on GNSS (1)

1 training Short courses on “Satellite Navigation and Location Based Services”, 28 September – 24 October 2009, with participation of 35 trainees from 19 Countries & from 32 different institutes supervised by 10 experts.
The contribution by the demonstration of the use of EGNOS organized under the METIS project team in partnership with ONDA at the Mohamed V Airport in Casablanca and which trainees had attended is a real example of support for capacity building, indeed:

- this training has seen the participation of stakeholders,
- The awareness of the use of GNSS and augmented systems for development,
- the development of Human Resources in the use of GNSS services,
- the benefit of African countries through the transfer of these technologies,
- support for training course by the assistance of expertise and equipments,
Realized Training Courses GNSS (3)

1 Post Graduate training courses on GNSS, Nov. 2013 – Aug 2015
12 trainees from 6 member Countries & 8 different institutes

The trainees supervised by four Experts from International Institute for GNSS Education of Beijing China,

Chinese donation of the instruments on BEIDOU
Training Workshop on “Space Weather & GNSS Applications”, Feb 2015 with participation of 29 trainees from 13 Countries & 11 different institutes supervised by 8 teachers.
2) Post-graduate Training on Space Science and Technology

Option:
Remote Sensing & GIS,
Satellite Communications,
Satellite Meteorology & Global Climate.
Realized Training Courses


230 trainees from 19 member and non member Countries & 27 different institutes.


54 trainees from 10 member Countries &16 different institutes.


33 trainees from 10 member Countries &10 different institutes.

1 training courses on GNSS, Nov. 2013

12 trainees from 6 member Countries & 8 different institutes
Étudiants de la 8ème promotion Master Télédétection -SIG

1ère Promotion accréditée de Master STE/T-SIG & MSCM

Photo de la promotion en présence des conférenciers

Etudiants de la 8ème promotion Master Télédétection -SIG

Photo of 1st Session GNSS 2013 – 2014
Trainees Profiles

**R.S. and G.I.S**

- Engineer in Geodesic Sciences
- Engineer in topography
- Engineer in Agro meteorology
- Engineer in Cartography
- Master in Applied mathematics
- Master in Geography
- Doctorate in Geography
- Doctorate in Physics

**S.M.G.C.**

- Engineer in Meteorology,
- Mechanical Engineer,
- Forest Engineer,
- Master in Signal Processing
- Computer Engineer,
- Master on Environment,
- Master en Communication
- Doctorate d'état on Sciences Physiques

**S.C. & GNSS**

- Engineer on Communications,
- Engineer on Mechanical engineering,
- Master on Signal Processing,
- Engineer on Electromechanically,
- Master on Electronics and
- Master on Communications
- Bachelor on theoretical Physics
- Engineer Multimedia Designer
- Doctorate on Communications
- Doctorate on Physics (electro-optics),
- Teachers & researchers,
- Professionals

**Countries:** Morocco, Algeria, Tunisia, Mauritania, Senegal, Niger, Chad, Ivory Coast, Togo, Cameroon, Cape Verde, R.D. Congo, Central Africa, Gabon, Syria, Madagascar, Mali, Benin, Burkina Faso, R. of Congo
Research Projects for prepare the memoire of Master Degree in Space Sciences et Technologies cover almost all the applications: 1) Mapping, Urban, Agriculture, Geology, Water and Natural Resource Management, Ecology, forest, desert progress, Coast Management, migration of populations, etc…

2) Communications, Image reception, Ground Station reception, Telemedicine, Television reception via Satellite, Tele Education, Micro Satellite, Study of the European satellite navigation system Galileo and compared to the GPS system etc..

3) Climate Change Model, Desert Progress, Forest Fire, Epidemiology Vectors, Health, etc…
October 2007
International Conference « Climate Change & Adaptation in Africa – role of space technology

November 2008
international Workshop “The Spatial tool for disaster management and emergency situations in Africa”

June 2010
international workshop on Space Law
Workshop of Launching of ROACC Network "

Launch of the African Network of Experts on the Earth Observation and Climate Change.

Ouagadougou, Burkina Faso

November 2010

Regional Workshop" Creation of the Network and its application for scientific purposes in Africa”

establishment of the African Network on Earth Observation and Climate Change

Lome - Republic of Togo, June 2010
International Conference on Geospatial Information, effects and impacts of the CC in Africa
Rabat from 30/11 to 02/12 2011
Training workshop and plenary Conference in Cameroon
Photo of participants in Workshop organized in Cameroon
Summary Education in CRASTE-LF

Until now, more than **330 trainees** followed postgraduate courses in the **CRASTE-LF from 20 countries**

and, **Up 100 Master Diploma** in Space Sciences and Technology have been delivered by the Centre in various fields.

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**Scientific Animation**

Until now, more than **1600 experts** from over **50 countries** from Africa, Europe, Middle East and North America attended different Conferences and Workshops organized by the Centre in each fields in Space Technologies
Next training and activities

Launch of Accredited Post-Graduate training:


- 20th session on SCT, option GNSS, September 2016.

- Will be Organize 3 workshops on use Earth Observation Cameroon (Nov. 2015) and 2 in Morocco (Feb. and Sept. 2015).
Success stories

• 330 trainees

• Professionals become a part in the higher management in their institutions

• Up 90% go back to their home countries (original institution or others)

• Themes of research projects in connection with local problematic

• In many cases, the trainees generated new activities related to space technology in their country (courses in local universities: trainers, projects, …) : snow ball effect

• Creation of an Expert Network through the all Africa

• Substantial contribution in rising the awareness of the utility of space technologies for development.
THANK YOU FOR YOUR ATTENTION

www.crastelf.org.ma