Capacity Building - GNSS
CRASTE-LF & IAV HASSAN 2

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OUTLINE

CRASTE-LF Activities related to GNSS

Master - GNSS Established in Morocco

CRASTE-LF

CRASTE-LF

The **CRASTE-LF** has been established in Rabat on October 23, 1998.
Initiative of the UN-OOSA.

Education and training on Space Science and Technology for sustainable development

13 Member States : Algeria, Cameroon, Cape Verde, Central African R., Ivory Coast, D. R. of Congo, Gabon, Morocco, Mauritania, Niger, Senegal, Togo and Tunisia.
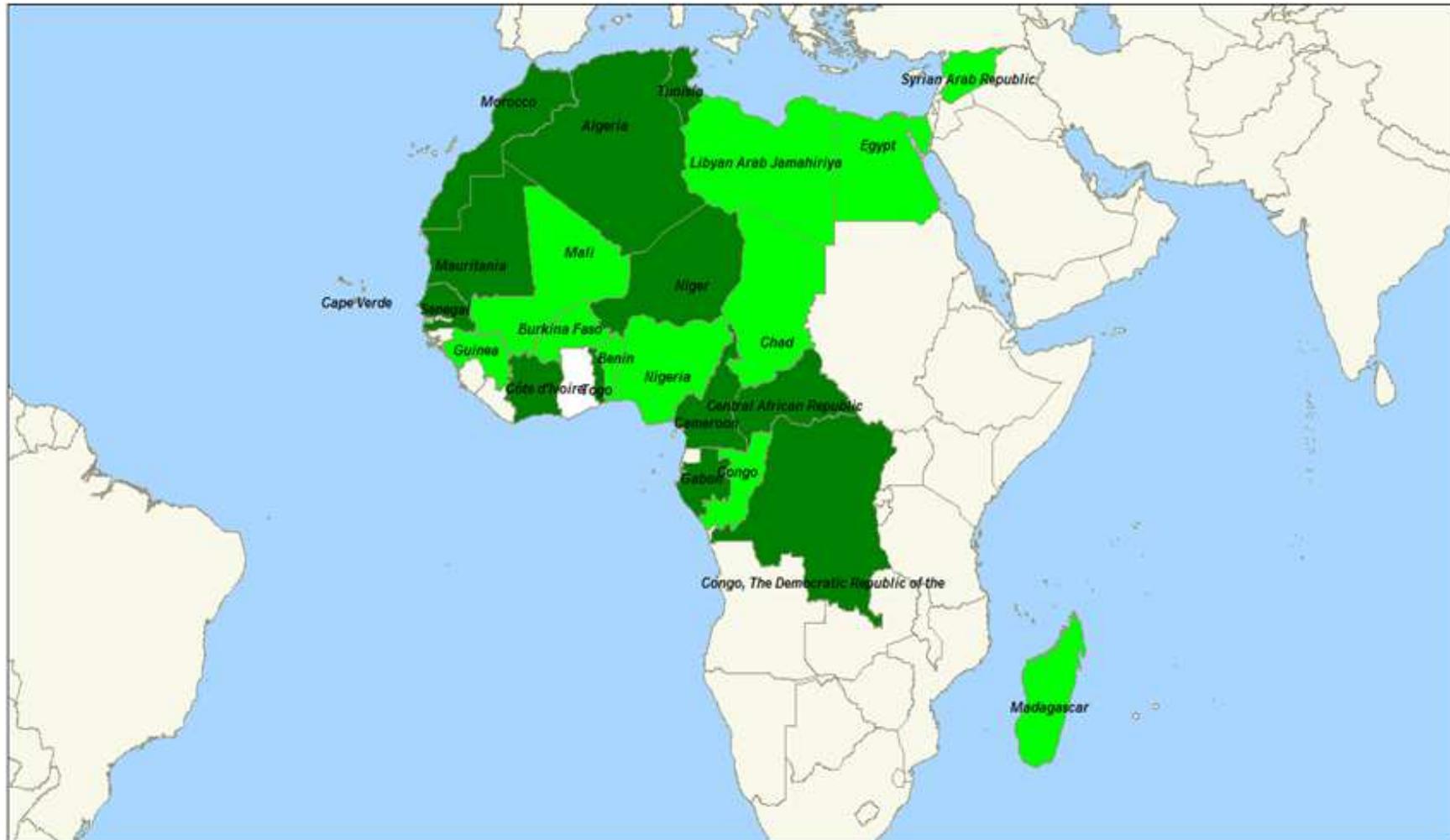
Building of CRASTE-LF
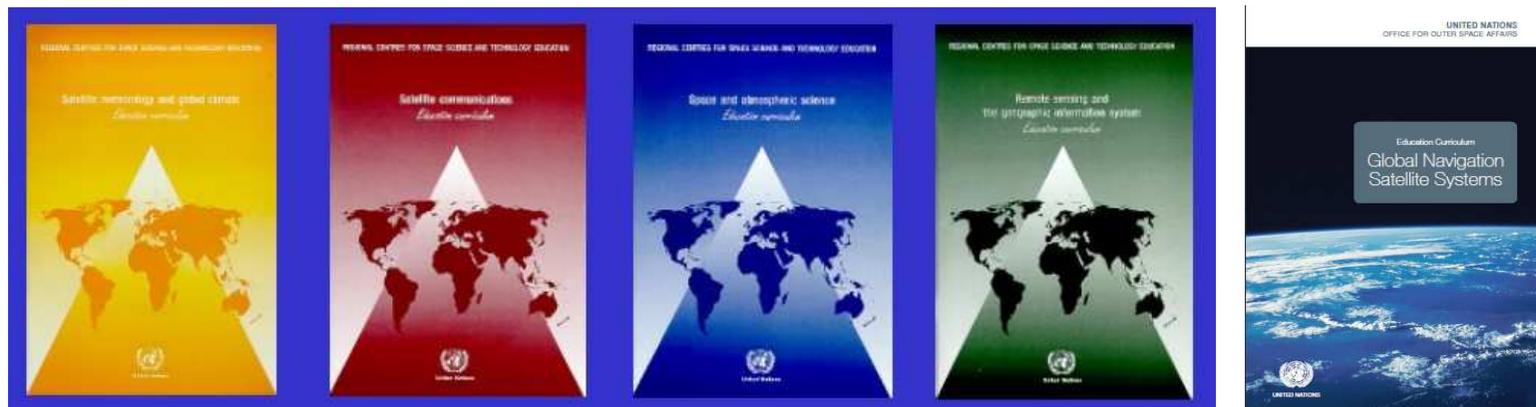
Origine of candidates (1998-2016) CRASTE-LF

CRASTE-LF
Education Programmes

- Remote Sensing and Geographic Information Systems

- Satellite Communications

- Satellite Meteorology and Global Climate

- Space and Atmospheric Sciences

- *Global Navigation Satellite Systems*

Education Curricula established and Published by UN-OOSA

Training Course on GNSS

"Satellite Navigation and Location Based Services", **28 September – 24 October 2009**, with participation of **35 trainees** from **19** Countries & from **32** different organizations and supervised by **10** experts.

Trainees supervised by METIS project team attending the demonstration at Mohamed V Airport, Casablanca , Morocco.

Regional Training Workshop

24 trainees from **07 African countries**

- Datums : Ellipsoid, Geoid.
- Coordinate Reference Systems
- Cartographic Projections
- Satellite Orbits.
- Navigation Signal.
- Errors and Precision.
- Positionning Techniques.
- Laboratories.

« **Global Navigation and Based Services on Satellite Positioning** »
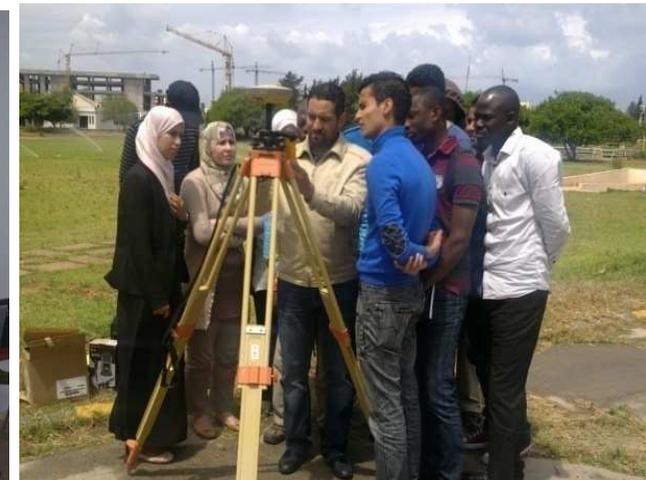*Lomé, Republic of Togo, 3 - 7 October 2011*

Master on GNSS

Post Graduate Training courses on GNSS :

▪ 1st SESSION : Nov. 2013 – Aug 2015, 12 trainees from 6 member Countries & 8 different institutions.

Training on Beidou

International Institute for GNSS Education, Beijing China, *July 2014*.

Workshop on Space Weather & GNSS

Training Workshop on "Space Weather & GNSS Applications" , Feb 2015 with participation of **29** trainees from **13** Countries & **11** different institutes supervised by **8** experts.
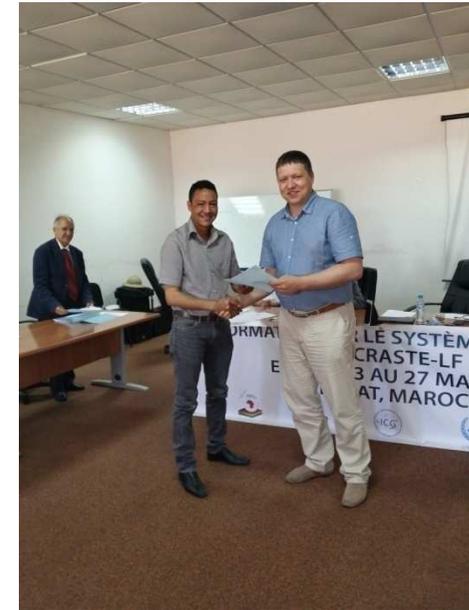
Training on Glonass

"Joint-Stock Company : Information Satellite Systems - Reshetnev ", *mai 2016*.

Master - GNSS
CRASTE-LF & IAV Hassan 2

▪ From October 2016 to July 2018.

▪ Master recognized by the Ministry of High Education & Scientific Research.

▪ Beginning In IAV Hassan 2, Rabat .

▪ Participation of Academic Directors, Professors, Students, and Engineers from private and public sectors.

Candidates from Six Countries :

✓ Morocco,

✓ Tunisia,

✓ Cameroun,

✓ Togo,

✓ Niger,

✓ Central Africa

Master - GNSS
CRASTE-LF & IAV Hassan 2

- The programme is based on the *"**Global Navigation Satellite Systems, Education Curriculum** "*(December 2012)" prepared by the International Committee on Global Navigation Satellite Systems (UNOOSA).

- This Master in GNSS is recommended to candidates graduated in electronic engineering, telecommunication Engineering, civil engineering, forestry, geomatics and geographic sciences, mathematics and physical sciences.

Master - GNSS
CRASTE-LF & IAV Hassan 2

The Master program in GNSS is divided into four parts:

- **Lessons organized in 17 modules**.

  ➢ Lectures, tutorials, Thematic seminars, Laboratory experiments, Practical activities and projects related to the applications of GNSS.

- **A GNSS project** realized in 6 weeks.

- **One year project** conducted by each candidate in his country on an issue related to the GNSS applications. The research project will lead to the development of a thesis document that will be presented in the CRASTE-LF centre.

Modules of the programme

- The Master program starts first with upgrading modules in the fundamental areas:

  – Mathematics, Computer sciences, Electronics, Orbital Mechanics.

- It addresses then topics related to areas of GNSS:

  – Geometric Geodesy, Physical Geodesy, Signal Structure & Transmission, Antennas & Receivers, GNSS systems, Satellite Positioning Techniques, Complementary navigations systems, GNSS applications, Space weather.

- Data management and data representation :

  – Geographic Information Systems, Mapping, web-mapping, Project Management.

- Thematic seminars:

  – Aviation, Agriculture, Navigation, Civil engineering, Natural Resources management, Geodesy and surveying, Mapping, legal aspects, space weather, Land Delimitation, GNSS Spectrum Protection and Interference Detection and Mitigation.

Candidates (session 1 & 2)

Countries

- Algeria,
- Cameroun,
- Ivory-Cost,
- Morocco,
- Tunisia,
- Senegal,
- Cenral Africa,
- Niger,
- Togo.

Background

- Agriculture
- Military
- High Education
- Mapping and Surveying
- Research and Innovation
- Transportation and Logistics
- Energy

Recommendations

- Long term trainings, In-depth high-level training.

- Encourage international and regional Partnership between universities and public/private organizations and industry.

- Information dissemination about GNSS technology, training and education possibilities.