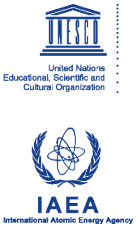




The Abdus Salam
**International Centre
for Theoretical Physics**
50th Anniversary 1964–2014



Training on EGNOS-GNSS in Africa (TREGA)



TREGA: A joint EC-ICTP project

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Premises

Europe-Africa Partnership for SAT-Nav



(from a S. Scarda [EC] presentation at ICTP, 2012)

- Following the first EU-Africa High Level Conference on aviation held in Windhoek in April 2009, a number of areas were addressed for the safe and sustainable development of the growing air services between the EU and Africa and within Africa.
- The 2009 "Communication Partnership between the European Union and Africa- Connecting Africa and Europe: working towards strengthening transport cooperation" aimed to reinforce cooperation in the sector for developing the region, by putting EU experience at the disposal of the African continent.

EC Policies in support to Sat-Nav in Africa



"Second Action Plan (2011-2013) for the Implementation of the Africa-EU Strategic Partnership", adopted at the **Africa-EU Summit** held in Tripoli on 29-30 November 2010, under the "Thematic Partnership on Regional Economic Integration, Trade and Infrastructure"

ICAO Recommendations



- The ICAO has made recommendations for the replacement of non-precision approaches (NPA) by SBAS-based approaches with vertical guidance (APV) for the improvement of safety of aircraft approach operations.
- In assent with ICAO's recommendations, Africa's regional ICAO group agreed on a GNSS Regional Strategy in 2001 which referred to the introduction of SBAS technologies from 2006 onwards.



Project TREGA

TREGA



The **European Commission** has signed a *Contribution Agreement* with **ICTP** to carry out the project **TTraining on EGNOS-GNSS in AAfrica (TREGA)** aimed to provide technical assistance, capacity building and provision and use of a test/simulation platform for the implementation of GNSS/EGNOS in Sub-Saharan Africa.



Appropriateness of ICTP



In the Appropriateness of ICTP note that justified the EC assignment of the project to ICTP it is written:

“The specific knowledge of the institute, and its experience in training people from developing countries, put this organization in a unique position for the participation in the project.”

“It has also organized in the past a series of Workshops on Satellite Navigation Science and Technology for Africa... The focus of the training has been to provide education to African university professors and graduate students on the use of Global Navigation Satellite Systems (GNSS) for social and economic development in Africa.”

Objectives



- ✓ To provide **training** to members of the **EGNOS-Africa Joint Programme Office (JPO)** established by the **“sister” project SAFIR** on different GNSS and EGNOS technologies, service provision and applied legal and regulatory matters.
- ✓ To **select, procure and use a simulation/testing platform** as a preliminary backbone infrastructure for SBAS services in Sub-Saharan Africa.
- ✓ To **train a core number of professionals** to face technical problems related to the specific conditions of Sub-Saharan Africa, making use of the simulation/testing platform. (**training through research**)

The “specific condition” of Sub-Saharan Africa



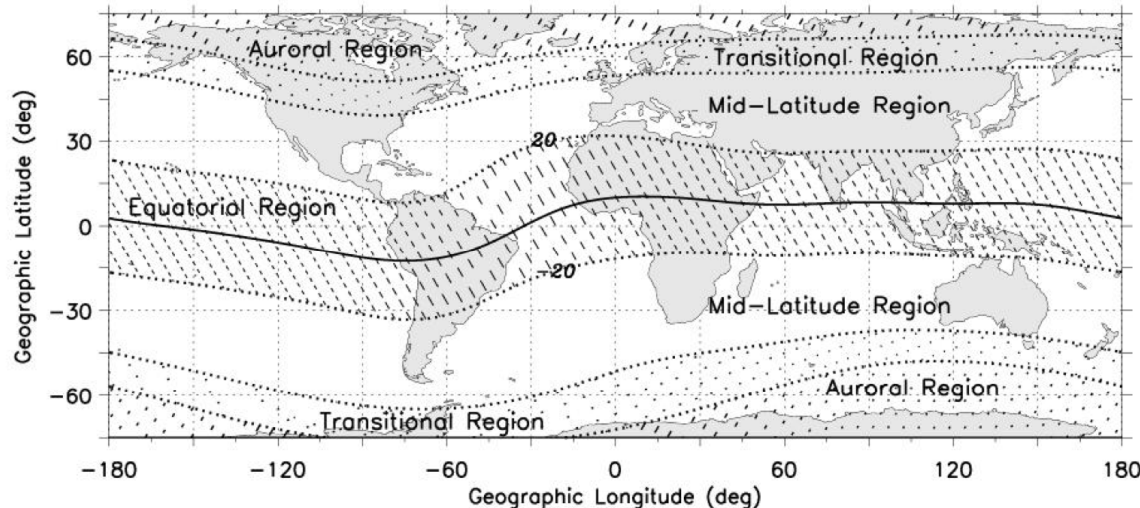
From ICAO: IONOSPHERIC EFFECT ON GNSS AVIATION OPERATIONS, First Meeting of Ionospheric Studies Task Force, Tokyo, February 2012

“For APV [Approach Procedures with Vertical Guidance] operations, ionospheric delay corrections and associated integrity bounds must be obtained from a SBAS. SBAS is capable of broadcasting ionospheric integrity bounds that are sufficiently small to ensure a high availability of APV service in mid- and high-latitude regions. However, the availability of APV service may be reduced or even severely limited in relatively rare occasions (roughly 1% of the time) due to disturbances caused by a severe ionospheric storm.”



The “specific condition” of Sub-Saharan Africa (cont.)

“APV service is also conceptually possible in low-latitude regions; however, the **variability and unique phenomena of the equatorial ionosphere** present a very difficult challenge to ensuring the integrity of the ionospheric corrections without causing frequent interruptions of APV service (i.e., frequent, and perhaps even daily, interruptions of service in the local evening hours during years near the peak of the solar cycle).”



Training strategy



- ✓ Intensive all-included training of the core team of the **JPO** concentrated in two sessions.
- ✓ Extensive (22 months) high-level technical training (*training through research*) of two African and one European professionals with the utilization of the simulation/testing platform acquired by the Project.

Acquired platform



- ✓ **magicSBAS** is the “Testing Platform/Software Simulation” of TREGA Project.
- ✓ This platform is able to simulate a SBAS system providing service at any area in the globe. It includes the following modules:
 - Raw Data Generator (EETES)
 - AZ2IET (Nequick model)
 - Real-time and post-processing SBAS message generators (magicSBAS-RT, magicSBAS-PS)
 - Two performance analysis modules called Eclayr and magicGEMINI

Intensive all-included training



The intensive all-included training was concentrated in two sessions carried out at ICTP.

- ✓ The first session was dedicated to **Space projects management** and **Legal/regulatory Aspects**, lasting 3 (three) weeks plus two Seminar days.
- ✓ The second session was dedicated to **Technical Training on GNSS Systems and Applications** and **Service Provision, User Support and Promotion of EGNOS use in Africa**, lasting 8 (eight) weeks, including stages of the trainees in European Institutions.

Intensive all-included training (cont.)



Space projects management and **Technical Training on GNSS Systems and Applications** was covered by the **Istituto Superiore Mario Boella** of Turin, Italy with participation of the **ICTP** staff in this last module.



Legal/regulatory Aspects and **Service Provision, User Support and Promotion of EGNOS use in Africa** modules was covered by **Pildo Labs.** of Barcelona, Spain



Extensive technical training



- ✓ A TREGA Laboratory was created for the training through research of two African professionals with the use of the testing/simulation platform.
- ✓ They are becoming proficient in several aspects of satellite navigation peculiar to the possible operation of a SBAS in the African low latitude region.
- ✓ The team of trainees is completed with an European professional that should subsequently become the technical liaison between the JPO and other European experts.
- ✓ The work of the TREGA Laboratory is directed by an ICTP researcher with the guidance of T/ICT4D experts.
- ✓ **Results of the work done will be presented in this workshop.**





Thank you for your attention