ESA Alcantara Initiative

Ionospheric ground based monitoring network in low-latitude regions: AFRICA

Executive Summary

Study team members: S.M. Radicella[1], B. Nava[1], Y.Migoya-Orue[1], A.B. Rabiu[2], O.K. Obrou[3]

Research centre(s): [1]ICTP-T/ICT4D, [2]National Space Research and Development Agency, Abuja, Nigeria, [3]University of Cocody, Abidjan, Cote d'Ivoire.

ESA study manager Roberto Prieto-Cerdeira

Alcantara Study Reference No.: 12/AXX

Study Type: Competence Survey

Contract Number: 4000106576/12/F/MOS

Picture:

Figure 1 MAP OF RESPONSES OF THE QUESTIONNAIRE

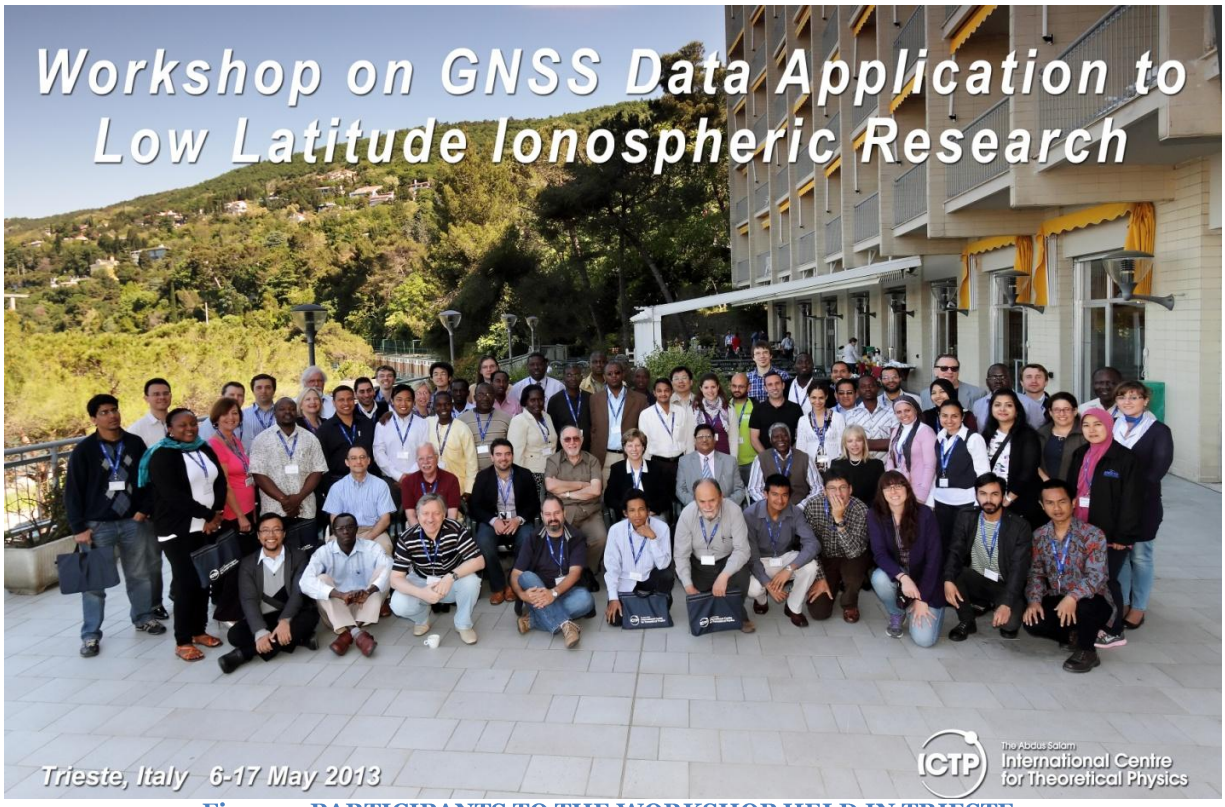

Figure 2 PARTICIPANTS TO THE WORKSHOP HELD IN TRIESTE

Motivation:

To improve the understanding, characterization, monitoring and forecasting of the ionosphere in Equatorial Africa in order to benefit users from Global Navigation Satellite Services (GNSS), Satellite Telecommunications, scientific research and other applications.

Methodology:

An improved knowledge of the low latitude ionosphere would help to address mitigation techniques for ionospheric effects on GNSS positioning applications.

In the last years, new sets of data have become available from several instruments installed in Africa. For that reason, an exhaustive Survey of the existing institutions involved in ionospheric sensing is expected to make possible improvements in the understanding of unique phenomena that occur in that region.

The Survey addressed to these goals:

- Identify continental, regional, national and local institutions in Africa that host or could host the installation of ionospheric sensors in suitable ground stations and/or that could take advantage of the exploitation of data.
- Interact with existing networks to exchange data with interested institutions in the region.
- Identify possible final users.

It was considered essential to involve African scientists linked to ICTP, active in their continent and with good knowledge about the academic and scientific institutions in Africa.

Results:

- The scientific links of ICTP team with international and national institutions interested in African ionosphere and GNSS science and applications permitted to achieve the goals proposed in the present Competence Survey.
- The involvement of African scientists that performed a series of on-site survey was considered a key element in the development of the project.
- The answers to the questionnaire provide useful indications regarding the current situation of the ionospheric scientists, instruments and networks involved in ionospheric and/or GNSS studies.
- A concrete Research Plan that could lead to a future Pilot Project has been designed, as well as a list of existing and proposed locations for stations useful to carry it out.

Highlights:

Through the on-site visits and the analysis of the questionnaire performed, it has been identified the importance of pursuing a regional scientific integration on ionospheric monitoring and study within the African continent. A Research Plan to investigate the behavior of gradients and electron density variability in the Equatorial Ionospheric Anomaly (EIA) trough region in the African sector has been proposed.