



AFRICAN GEODETIC REFERENCE FRAME (AFREF)-NEWSLETTER

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Introduction

In this issue we report on the approval of AU-EU AFREF project, International symposium on GNSS held in Berlin, Workshop on the applications of GNSS for groundwater resource assessment held in South Africa and workshop on monitoring volcanic and seismic hazards in East Africa. We thank Mr. Richard Wonnacott, Prof. Ludwig Combrinck and Dr. Dozie Ezigbalike for their contributions. We appeal for your contributions to be included in the next issues of this newsletter, which is scheduled to come out in May 2009.

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ICG International Committee on
Global Navigation Satellite Systems



The International Symposium on GNSS, Space-Based and Ground-Based Augmentation Systems and Applications

The symposium was held in Berlin, Germany, 11 - 14 November 2008. AFREF Steering Committee was represented by Prof. Ludwig Combrinck. Presentations were given by internationally accepted experts, who came from European, Japan, USA and Africa (Malawi, Nigeria, Zambia, South Africa). The wide spectrum of presentations gave a comprehensive overview of the world-wide activities on the sector of the civil use of satellite navigation. The presentations were given on the following topics:

- Global Navigation Satellite Systems like GPS, GLONASS, GALILEO,
- global, space-based and ground-based GNSS services like EGNOS (Europe), WAAS (USA), QZSS (Japan),
- Regional GNSS reference systems like EUREF (Europe), AFREF (Africa), SIRGAS (Latin America),
- Quality Assurance,

- Public and private services like EUPOS, SAPOS (Germany), LITPOS (Lithuania), SKPOS (Slovak Republic), C-NAV (GB),
- Many kinds of applications, like flood disaster management in Lagos (Nigeria), auto-steering of agricultural machines (Hungary), GNSS-based ground penetration radar (Serbia) etc.

Companies also took the opportunity to present the newest development of technical equipment and data processing software. There were symposium recommendations drawn up at the end of the symposium, one of which specifically was drafted to support AFREF. The recommendations were as follows:

Recommendation 1

Recognizing the present status of Global Navigation

Satellite Systems (GNSS) and the prospects for continued development of a wide variety of applications critical to science, commerce, and infrastructure, the

Symposium participants recommend:

The continuation of forums such as this one; bringing together system providers, geodetic infrastructure providers, end users, and industry.

Furthermore, these forums should be encouraged to discuss and propose specific recommendations for consideration by the International Committee on GNSS (ICG)

Recommendation 2

Recognizing the densification of the ground-based GNSS infrastructure by the EUPOS initiative on the basis of IAG services and Sub-Commissions,

Considering the varied degree of GNSS ground-based reference infrastructure development among different regions of the world,

Noting the need to support the effort of African countries to implement a continental geodetic reference frame,

The Symposium participants

Recommend that the ICG support the development of GNSS ground-based infrastructure in all regions of the world, taking into account the unique conditions present in each region and the need to tailored approaches to implementation.

For more information contact Prof. Ludwig Combrinck (ludwig@hartrao.ac.za). Also see the following websites: <http://www.eupos.org/> ; www.osa.unvienna.org



AUC-EC Project Proposal on AFREF Approved

In December 2007 in Lisbon, the Heads of Governments of Africa Union and the European Union Member States signed the Africa-EU Partnership Agreement and its related Action Plan. In line with the 8th Priority Action and Joint Strategy, endorsed at the AU-EU Summit in December 2007, projects and programmes according to the three Priority Actions were prepared:

- 1) Support the development of an inclusive information society in Africa (with five projects);
- 2) Support Science & Technology capacity building in Africa and implement Africa's Science and Technology Consolidated Plan of Action – (with 12 projects);
- 3) Enhance cooperation on Space applications and technology (with 2 projects).

AFRREF which falls under the Priority Action Plan No.3 was approved. The current approach has been to encourage African countries to install and operate GNSS stations in their countries and submit data to the processing centre(s). However, this approach has led to very limited progress as many countries are not able to meet the initial cost outlay for the installation. The proposal therefore seeks to build on the ongoing activities by mobilizing resources to install at least one permanent station in every African country, establish regional AFREF data processing centres and providing more formal coordination through the structures of the African Union Commission. The proposal will extend on-going activities, maintaining their momentum and ensuring that relevant policies, actors and geodetic infrastructures are in place to support Africa's development.

The four main goals associated with the project are to:

- Establish a network of permanent GPS reference stations that will define the African Reference Frame for practitioners to use for position determination, and forming part of the global geodetic infrastructure. The stations will conform to IGS standards, continuously collecting data and transmitting same to relevant data processing centres.
- Establish a network of regional data processing centres to receive data from stations in their respective regions, process them and transmit the processed data to a designated main data processing and archiving facility.
- Establish a data archiving and dissemination facility to compute parameters for the African Reference Frame and disseminate same continuously to users.
- Compute the parameters of the African Reference Frame.
- Support Countries to align national coordinate systems. to AFREF
- Establish a network of Geodesists sharing lessons and working together to realize the objectives of the AFREF project, extend and densify the network, and continuously compute and disseminate improvements and corrections to the parameters of the African reference frame.

More information on the implementation plan will be known in the next few months

1st workshop on “Development and Application of Global Navigation Satellite Systems (GNSS) Methodology for Groundwater Resource Assessment” Held in South Africa

Umvoto Africa (Pty) Ltd and the Hermanus Magnetic Observatory co-hosted a one day GNSS workshop at the Observatory on 16 January 2009. This was the first workshop in a series of three workshops that will be held under the project on “Development and Application of Global Navigational Satellite Systems(GNSS) Methodology for Groundwater Resource Assessment.” The theme for the workshop was “Science of Geodetic Monitoring of the Hydrological Cycle.” This theme was selected because Umvoto, together with the Chief Directorate of Surveys and Mapping and the Hermanus Municipality, have installed three permanent GNSS receivers all within 5 km of the observatory to monitor ground motion that may arise from the pumping of water from an aquifer close to the coastal town of Hermanus which is approximately 120 km East of Cape Town. The workshop was also aimed at building capacity in methodology development and application of GNSS to the measurement of a deforming earth, and their application also to the understanding of the Earth's hydrosphere, atmosphere and ionosphere.

There were 8 speakers on the programme who presented papers on the following topics:

- An introduction to GNSS;
- Measuring the deforming Earth;
- TrigNet GNSS infrastructure in South Africa and AFREF;
- How rigid is a rigid plate? Geodetic constraints from TrigNet in South Africa;
- Ionospheric applications of GPS in South Africa;
- South African Weather Service use of satellite altimetry (and SAR) and precipitable; water vapour trends and GPS meteorology in South Africa;
- Review of applications of space geodesy in hydrogeology; and
- Instrumenting and monitoring the Gateway Wellfield, Hermanus, for geodetic monitoring of aquifer storage.

The presentations and discussions were followed by a visit to the Gateway Wellfield. The workshop was attended by about 50 people representing the South African Department of Water Affairs, the Water Research Council, the Chief Directorate: Surveys and Mapping, the Hermanus Municipality, the International GNSS Service and others. For more information please contact Richard Wonnacott (rwonnacott@sl.wcape.gov.za)

Workshop on Evaluating, Monitoring and Communicating Volcanic and Seismic Hazards in East Africa, to be held in Italy 17 - 28 August 2009

The Abdus Salam International Centre for Theoretical Physics is organizing a two-week Workshop on **Evaluating, Monitoring and Communicating Volcanic and Seismic Hazards in East Africa** to be held from August 17th to 28th, 2009, in Trieste, Italy. The workshop is co-sponsored by the US National Science Foundation, the UNAVCO, the IASPEI and the IAVCEI.

The past few years have seen an unprecedented range of volcanic and seismic activity in the East African Rift, which has focused the attention of scientists and local communities on geohazards. In 2002, a volcanic eruption in the Congo destroyed 25% of the city of Goma and forced the evacuation of 500,000 people; an exceptional rifting episode in the Afar region of Ethiopia has been ongoing since September 2005; a magnitude 7.0 earthquake struck Mozambique in 2006; a rifting event occurred at Lake Natron in Tanzania in July 2007.

Results of initial investigations into these events suggest that activity is set to continue at a high rate over the

coming years, and have highlighted an urgent need to build capacity in modern methods for evaluation, monitoring and communication of volcanic and seismic hazards in East Africa. In this two-week-long capacity-building workshop we will train participants from sub-Saharan Africa and surroundings, and build on a fledgling network of scientists that was established during a meeting on Active Volcanism and Continental Rifting that was held in Luxembourg in November 2007.

The workshop is composed of two weeks. The first will include invited lectures, contributed papers and panel discussions, while the second will include hands-on training sessions. The workshop will address each of the following topics:

1. Evaluating volcanic and seismic hazards
2. Monitoring volcanoes and seismic zones
3. Modelling of volcanic and tectonic phenomena
4. Communicating hazards

The goals of the workshop are to establish a new initiative for cooperation in East Africa, to design programs to comprehensively evaluate and monitor the time and length scales of plate boundary and volcanic deformation, and to develop networks for exchange of ideas and expertise.

Presentations by participants on their specific area of research are welcome. If you wish to make a presentation, please include the title and a one-page abstract together with the application form.

PARTICIPATION

Scientists and post-graduate fellows from all countries that are members of the United Nations, UNESCO or IAEA may attend the activity. As it will be conducted in English, participants should have an adequate working knowledge of that language.

Limited funds are available for some participants, who are nationals of, and working in, a developing country, and who are not more than 45 years old. Such support is available only for those who attend the entire activity. There is no registration fee.

HOW TO APPLY FOR PARTICIPATION

The application form can be accessed at the activity website <http://agenda.ictp.it/smr.php?2053>. For more information contact smr2053@ictp.it <http://www.ictp.it/>