



2333-4

Workshop on Science Applications of GNSS in Developing Countries (11-27 April), followed by the: Seminar on Development and Use of the Ionospheric NeQuick Model (30 April-1 May)

11 April - 1 May, 2012

Opening Ceremony

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Workshop on Science Applications of GNSS in Developing Countries

11 April 2012 – 27 April 2012

ICTP, Trieste, Italy

Seminar on Development and Use of the Ionospheric NeQuick Model
30 April – 1 May



Held in partnership between ICTP and Boston College



GNSS is an enabling technology that can make major contributions to economic growth and societal betterment. GNSS also provides the opportunities for worldwide scientific exploration and collaboration.

Africa's Science and Technology Plan of Action (1) clearly states Africa's commitment to develop and use science and technology for socio-economic transformation and full integration into the world economy.



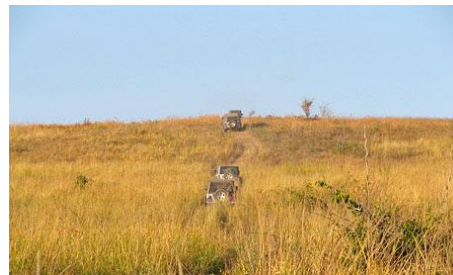
Global Navigation Satellite Systems (GNSS) are a space technology that can help meet that goal.

GNSS Applications

- Increase food security; manage natural resources; wildlife conservation
- Provide efficient emergency location services; disaster relief
- Improve mapping and surveying
- Provide greater precision and safety in land, sea and air navigation
- Scientific research and exploration – space science, earth science, ecology, geology, geography and much more...



Wildlife Conservation



Land Navigation



Precision Farming



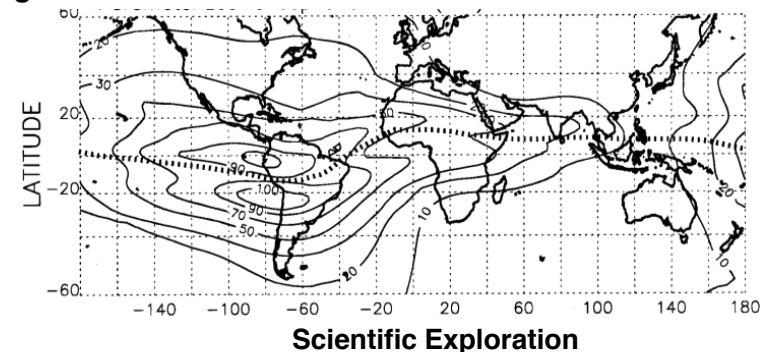
Water Navigation



Air Navigation

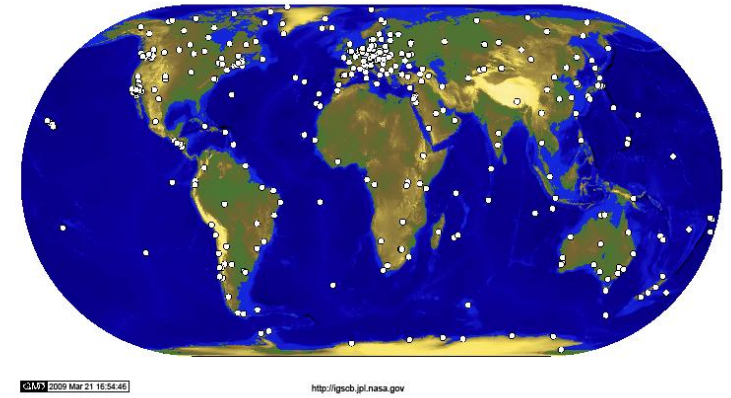


Disaster Relief

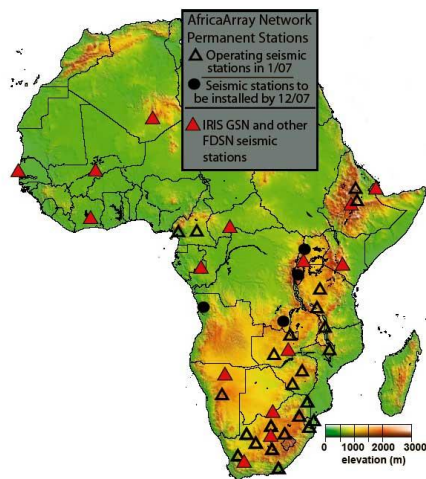


Scientific Exploration

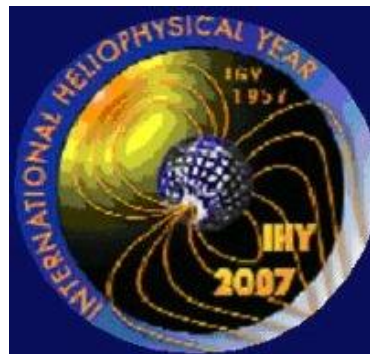
Benefits of GNSS for Worldwide Development have been recognized!



International GNSS Service



Africa Array – Seismic Stations



IHY-UNBSSI

Africa, India 2007, 2009



AGU Chapman Conference - Addis Ababa December 2012

Workshop Goals

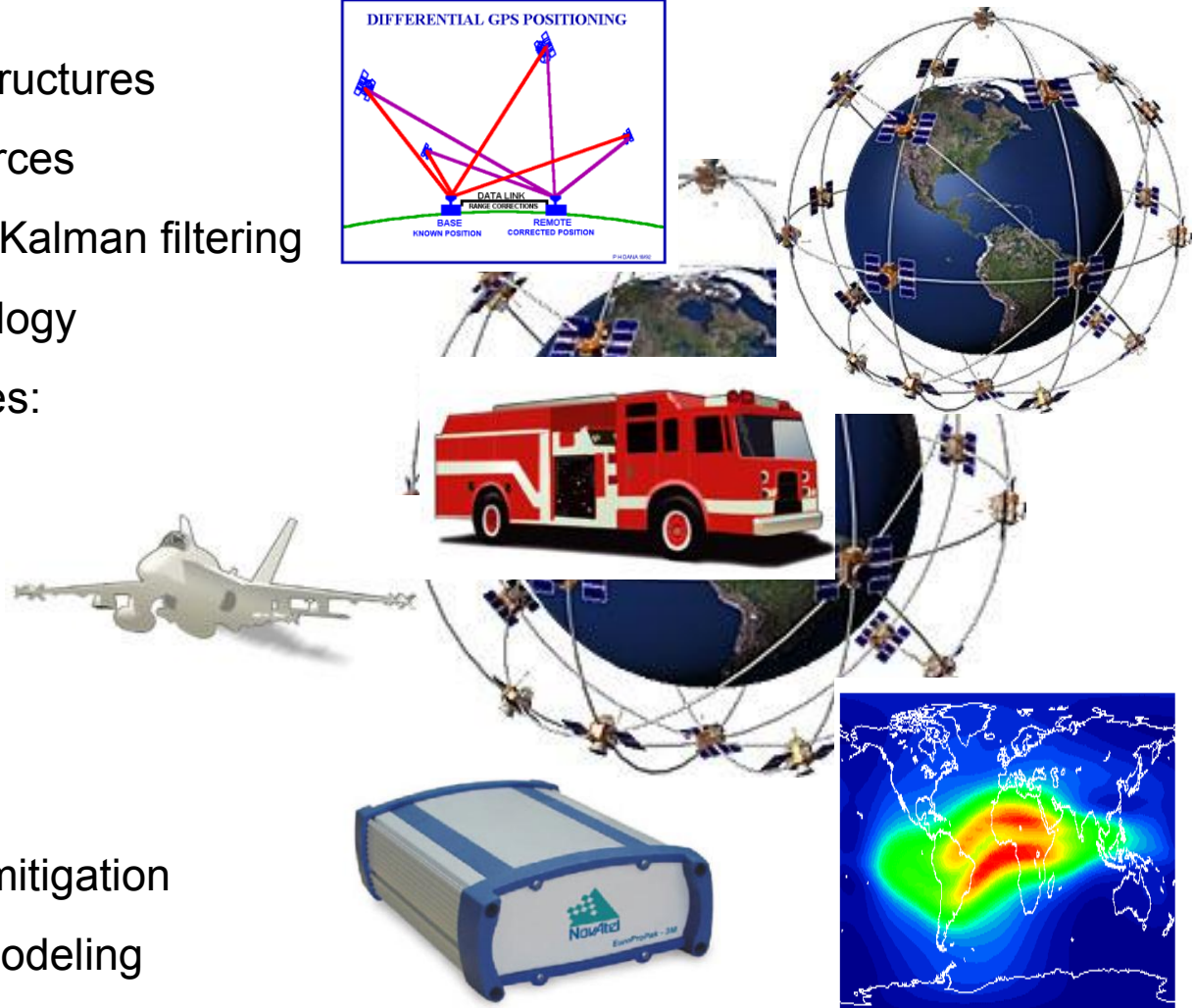
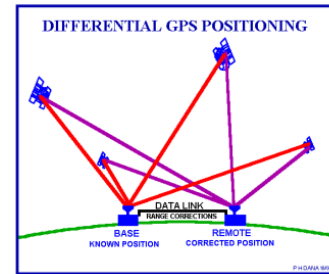
- To provide GNSS education at the University level
- To help build a knowledgeable GNSS workforce in developing countries
- To encourage the use of GNSS for societal and economic development and environmental protection
- To build GNSS infrastructure
- To establish Space Weather studies
- To establish international scientific collaborations



Program Overview

Instructors – Worldwide Experts in GNSS from the US, Canada, Europe, Africa

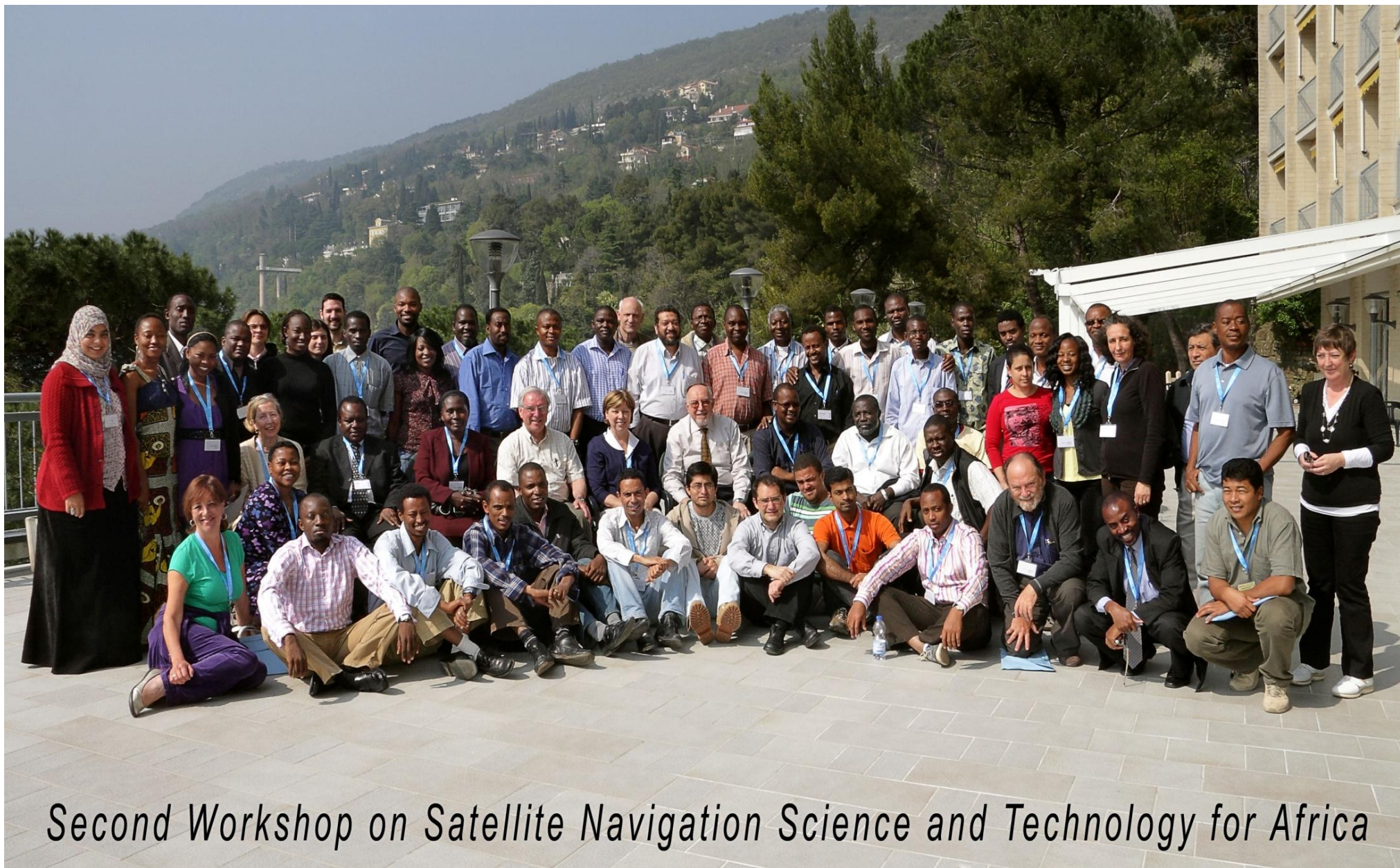
- Basics of GNSS
 - System architecture, signal structures
 - Measurements and Error sources
 - Solving for position and time, Kalman filtering
 - Receiver and antenna technology
- State of the art GNSS Technologies:
 - Disaster monitoring/relief
 - Road applications
 - Remote Sensing
 - Aviation
- Scientific Exploration
 - Atmospheric monitoring and mitigation
 - Ionospheric monitoring and modeling
 - Space weather studies
 - Data processing and analysis laboratories



Data processing/analysis



50 Participants from 11 African Countries



60+ Participants from 16 African Countries
Argentina and Slovenia also represented

Workshops Spawned Sustainable Developments

- Regional Meetings Sponsored by African Nations
 - Nigerian National Universities Commission and the Minister of Science and Technology (November 2009)
 - Cairo University and the Arab Academy for Science and Marine Technology (January 2010)
 - University of Nairobi and the Ministry for Science in Kenya (July 2010)
 - Ethiopian GNSS Space Science Workshop (November 2010)
- 6 Dual-Frequency GPS Receivers Deployed
 - Nigeria, Kenya, Uganda, Egypt – many more needed
- 2 Ionosonde Stations in Development
 - Addis Ababa, Ethiopia – nearly operational
 - Maseno, Kenya – to be installed in June
- Potential for Incoherent Scatter Radar (AMISR) Development in the next few years
- Many international collaborations have begun

Summary

- International partnership established between ICTP and BC
 - To encourage the use of GNSS for socio-economic benefits and scientific exploration
- 1st and 2nd Workshops held in 2009 and 2010 were successful
 - 23 Mar – 09 April 2009; 50 participants; 9 countries
 - 6 – 23 April 2010; 60 participants; 18 countries
- Sustainable Developments Resulted
 - Regional interests
 - Smaller regional workshops
 - Building infrastructure
 - Developing scientific collaborations
- 3rd Workshop Extending to other developing countries
 - ICTP 11-27 April 2012
 - 75 participants (+25 lecturers); 36 countries
- Thanks to sponsors, lecturers and participants



We sincerely thank our sponsors for their generosity

