The Abdus Salam International Centre for Theoretical Physics

Second Workshop on Satellite Navigation Science and Technology for Africa

Cosponsor(s): Boston College, USA
Organizer(s): Directors: Patricia H. Doherty, Sandro M. Radicella.
Trieste - Italy, 06 - 23 April 2010

Venue: Adriatico Guest House Kastler Lecture Hall

Final programme

WEEK 1 - Basic of GNSS (Room:Adriatico Guest House Kastler Lecture Hall)

6 April 2010

09:00 - 12:00 (Room: Adriatico Guest House (Lower Level 1))
--- Registration/Administrative Formalities ---

12:00 - 14:00 (Room: Adriatico Guest House Cafeteria)
--- Lunch ---

14:00 - 16:00 (Room: Adriatico Guest House Informatics Lab.)
C. Onime / *ICTP, Trieste*
Introduction to the Computer facilities in ICTP and computer languages

Opening Ceremony and Introduction Presentations (Room:Adriatico Guest House Kastler Lecture Hall)

7 April 2010

09:00 - 10:00 **S. Radicella, P. Doherty** / *ICTP., Boston College*
Opening Remarks and Welcome

10:00 - 10:30 (Room: Adriatico Guest House (Terrace))
--- Coffee Break ---

10:30 - 11:15	**P. Doherty** / *Boston College, USA* **Introduction to Satellite Navigation and GPS**
11:15 - 12:00	**B. Arbesser-Rastburg** / *European Space Agency, Noordwijk, The Netherlands* **The European GNSS Program**
12:00 - 12:45	**F. Vespe** / *Italian Space Agency, Matera, Italy* **Earth Observations Using GNSS**
12:45 - 15:00	(Room: Adriatico Guest House Cafeteria) --- Lunch ---
15:00 - 15:30	**Dr. Fernando Quevedo, Dr. Kevin Bedell** / *Director, ICTP, V.P. for Research, Boston College* **Opening Ceremony - Partnership for GNSS Education for Africa**
15:30 - 16:30	**International and National Organization Representatives:** **UNOOSA, European Space Agency, European Union, African Union, Italian Space Agency, Institute of Navigation, Air Force Research Laboratory, FAA, NSF, NASA**
16:30 - 17:00	(Room: Adriatico Guest House (Lower Level 1)) --- Coffee Break ---
17:00 - 18:00	**International and National Organizations Representatives: contd.**
19:30 - 19:30	(Room: Adriatico Guest House Cafeteria) --- Welcome Dinner (Hosted by ICTP and Boston College) ---

GPS Tutorials (Room:Adriatico Guest House Kastler Lecture Hall)

8 April 2010

08:30 - 10:00	**C. Hegarty,** / *MITRE, Bedford, USA* **GPS Space and Control Segments**
10:00 - 10:30	(Room: Adriatico Guest House (Terrace)) --- Coffee Break ---
10:30 - 12:00	**C. Hegarty,** / *MITRE, Bedford, USA* **GPS Coordinate Frames, Time Reference and Orbits**
12:00 - 13:00	**C. Hegarty,** / *MITRE, Bedford, USA* **GPS Measurements and Error Sources**
13:00 - 14:00	(Room: Adriatico Guest House Cafeteria) --- Lunch ---
14:00 - 15:30	**J. Raquet** / *AFIT, Wright Patternson, USA* **Kalman Filtering, Inertial Navigation, High Accuracy GPS**
15:30 - 15:50	(Room: Adriatico Guest House (Lower Level 1)) --- Coffee Break ---
15:50 - 17:30	**J. Raquet** / *AFIT, Wright Patternson, USA* **Differential GPS, Position-Velocity-Time Calculations**

GPS Tutorials, GPS Receivers, Tools for GNSS Research and Education (Room:Adriatico Guest House Kastler Lecture Hall)

9 April 2010

08:30 - 10:30	**J. Raquet** / *AFIT, Wright Patternson, USA* **GNSS Calculations Laboratory**
10:30 - 11:00	(Room: Adriatico Guest House (Terrace)) --- Coffee Break ---
11:00 - 13:00	**P. Ward** / *NavWard Consultants, USA* **GPS Receivers, Receiver Signals, and Principals of Operation**
13:00 - 14:00	(Room: Adriatico Guest House Cafeteria) --- Lunch ---
14:00 - 15:00	**P. Ward** / *NavWard Consultants, USA* **GPS receivers contd.**
15:00 - 15:30	(Room: Adriatico Guest House (Lower Level 1)) --- Coffee Break ---
15:30 - 17:30	**D. Margaria** / *ISMB, Torino, Italy* **Sat-Surf Suite and N-FUELS: Tools for Rapid-Prototyping, Research and Educations in the Field of GNSS**

WEEK - 2 Practical Applications : Autonomous Navigation
(Room:Adriatico Guest House Kastler Lecture Hall)

12 April 2010

08:30 - 09:00	**M. Miller** / *USAF & ION, Eglin, USA* **The Institute of Navigation**
09:00 - 10:00	**M. Miller, J. Morton** / *USAF; Miami University, USA* **Autonomous Navigation**
10:00 - 10:30	(Room: Adriatico Guest House (Terrace)) --- Coffee Break ---
10:30 - 12:30	(Room: Adriatico Guest House Informatics Lab.) **C. New, C. Miller** / *AFRL, Eglin: WPAFB, Wright Patterson, USA* **Mini-Urban Challenge (Educational Perspectives)**
12:30 - 13:00	**O. Obrou** / *Univ. de Cocody, Abidjan, Cote d\'Ivoire* **MindStorm Robots in Experimental Courses at de Univ. de Cocody**
13:00 - 14:00	(Room: Adriatico Guest House Cafeteria) --- Lunch ---
14:00 - 15:15	(Room: Adriatico Guest House Informatics Lab.) **M. Miller, J. Morton, C. Miller, C.New** / *USAF; Miami Univ; WPAFB; AFRL., USA* **Robotics Laboratory**
15:15 - 15:30	(Room: Adriatico Guest House (Lower Level 1)) --- Coffee Break ---

15:30 - 17:30 (Room: Adriatico Guest House Informatics Lab.)
M. Miller, J. Morton, C. Miller, C.New / *USAF; Miami Univ; WPAFB; AFRL., USA*
Robotics Laboratory contd.

19:30 - 19:30 (Room: Adriatico Guest House Cafeteria)
--- Official Dinner (Hosted by ICTP and Boston College) ---

AFREF, Mapping and Surveying (Room:Adriatico Guest House Kastler Lecture Hall)

13 April 2010

09:00 - 10:30 **Open Consultations**

10:30 - 11:00 **B. Rabiu** / *Fed. Univ. of Technology, Akure, Nigeria*
Briefs on AFREF and Ionospheric Studies within Equatorial Anomaly using SCINDA GPS

11:00 - 11:30 **O. A. Isioye** / *Ahmad Bello University, Zaria, Nigeria*
Mapping and Surveying using GNSS

11:30 - 12:00 **P. Doherty** / *Boston College, USA*
The Low-latitude Ionosphere Sensor Network (LISN): Initial Campaigns and Implications for an African Network

12:00 - 13:00 **Open Discussion - Benefits of National and International Collaborations**

13:00 - 14:00 (Room: Adriatico Guest House Cafeteria)
--- Lunch ---

14:00 - 15:15 **F. Vespe** / *Italian Space Agency, Matera, Italy*
Atmospheric Characteristics, Gravity Field and Sea Topography Estimation Using GNSS

15:15 - 15:30 --- Coffee Break ---

15:30 - 16:30 **F. Vespe** / *Italian Space Agency, Matera, Italy*
Atmospheric Characteristics, Gravity Field and Sea Topography Estimation Using GNSS contd.

Observations of GeoHazards, Precision Agriculture (Room:Adriatico Guest House Kastler Lecture Hall)

14 April 2010

08:30 - 09:30 **A. Aoudia** / *ICTP, Italy*
GNSS for Earthquake and Volcanic Hazards Oberservations

09:30 - 10:00 **A. Aoudia** / *ICTP, Italy*
The ICTP Africa Geo-Hazard Initiative

10:00 - 10:30 (Room: Adriatico Guest House (Terrace))
--- Coffee Break ---

10:30 - 13:00 **R. Shsani** / *University of Florida, USA*
Precision Agriculture

13:00 - 14:00 (Room: Adriatico Guest House Cafeteria)
--- Lunch ---

14:00 - 15:15 (Room: Adriatico Guest House Informatics Lab.)
Precision Agriculture Laboratory

15:15 - 15:30 (Room: Adriatico Guest House (Lower Level 1))
--- Coffee Break ---

15:30 - 17:00 (Room: Adriatico Guest House Informatics Lab.)
Precision Agriculture Lab. contd.

Marine Navigation, Land Navigation - Geocache Challenge (Room:Adriatico Guest House Kastler Lecture Hall)

15 April 2010

08:30 - 10:00 (Room: Adriatico Guest House Informatics Lab.)
J. Doherty / *Inst. for Defense Analyses, Alexandria, USA*
Marine Navigation

10:00 - 10:30 (Room: Adriatico Guest House (Terrace))
--- Coffee Break ---

10:30 - 11:30 **J. Doherty** / *Inst. For Defense Analyses, Alexandria, USA*
Marine Navigation contd.

11:30 - 12:00 **G. Seemala, S. Delay** / *Boston College, USA*
GNSS TEC Data Processing

12:00 - 13:00 **L. Ciraolo, K. Alazo** / *IFAC- ICTP*
TEC Calib. Techniques: Single-station estimation of arc offsets

13:00 - 14:00 (Room: Adriatico Guest House Cafeteria)
--- Lunch ---

14:00 - 15:15 (Room: Adriatico Guest House Informatics Lab.)
C. Fonda, G. Seemala, S. Delay / *ICTP., Boston College*
Navigation Using Hand Held Receivers

15:15 - 15:30 (Room: Adriatico Guest House (Lower Level 1))
--- Coffee Break ---

15:30 - 17:30 **C, Fonda, G. Seemala, S. Delay** / *ICTP., Boston College*
Land Navigation contd. - The Geocache Challenge

Worldwide Ionsphere, GNSS Processing Techniques (Room:Adriatico Guest House Kastler Lecture Hall)

16 April 2010

08:30 - 09:00 **S. Radicella, P. Doherty** / *ARPL/ICTP, Boston College, USA*
Open Discussion

09:00 - 10:00 **P. Doherty** / *Boston College, USA*
The Worldwide Ionosphere and Effects on GNSS

10:00 - 10:30 (Room: Adriatico Guest House (Terrace))
--- Coffee Break ---

10:30 - 12:00 (Room: Adriatico Guest House Informatics Lab.)
G. Ciraolo, K. Alazo / *IFAC, ICTP*
TEC Calibration Laboratory

12:00 - 13:00 (Room: Adriatico Guest House Informatics Lab.)
G. Seemala, S. Delay
Open TEC Data Processing & Calibration Laboratory

13:00 - 14:00 (Room: Adriatico Guest House Cafeteria)
--- Lunch ---

14:00 - 15:15 (Room: Adriatico Guest House Informatics Lab.)
D. Matsakis / *UNSO, Washington, USA*
Introduction to Clocks, GPS time, Precise Time Applications

15:15 - 15:30 (Room: Adriatico Guest House (Lower Level 1))
--- Coffee Break ---

15:30 - 17:00 **D. Matsakis** / *UNSO, Washington, USA*
Introduction to Clocks, GPS time, Precise Time Applications contd.

WEEK 3 - Scientific Exploration with GNSS : Space Weather, Ionospheric Modeling, Scintillation (Room:Adriatico Guest House Kastler Lecture Hall)

19 April 2010

08:30 - 09:30 **J. Doherty** / *IDA, Alexandria, USA*
The FAA's Wide Area Augmentation System (WAAS)

09:30 - 10:15 **P. Doherty** / *Boston College, USA*
Introduction to Space Weather

10:30 - 11:00 (Room: Adriatico Guest House (Terrace))
--- Coffee Break ---

11:00 - 12:00 **S. Radicella** / *ARPL/ICTP, Italy*
Ionospheric Modeling

12:00 - 13:00 **B. Nava** / *ARPL/ICTP, Italy*
Ionospheric Model Adaptation to Experimental Data

13:00 - 14:30 (Room: Adriatico Guest House Cafeteria)
--- Lunch ---

14:00 - 15:15 **N. Zernov** / *Univ. of St. Petersburg, Russian Federation*
Theory of Propagation of Radio-Waves through Ionospheric Irregularities: Ionospheric Scintillations

14:30 - 15:30 **C. Valladares** / *Boston College, USA*
Sensing Space Weather with Distributed Oberservatories

15:30 - 16:00 (Room: Adriatico Guest House (Lower Level 1))
--- Coffee Break ---

16:00 - 16:30 **Discussion on Program Changes due to Travel Problems for Lecturers**

19:30 - 22:00 --- Women's Dinner ---

Scintillation, Space Weather Laboratory (Room:Adriatico Guest House Kastler Lecture Hall)

20 April 2010

08:30 - 09:00 **V. Chukwuma** / *Olabisi Onabanjo University, Nigeria*
EGY Update

09:00 - 09:30 **P. McGrath** / *TWAS, Trieste*
The Euro-Africa-ICT Project: Policy Dialogues and Strengthened Cooperation with Sub-Saharan Africa

09:30 - 10:30 **C. Valladares** / *Boston College, USA*
Scintillation Phenomena and its Effects on GNSS

10:30 - 11:00 (Room: Adriatico Guest House (Terrace))
--- Coffee Break ---

11:00 - 12:00 **B. Forte** / *Univ. of Nova Gorica, Slovenia*
Estimating the effects of Ionospheric Scintillation on Satellite Based Augmentation Systems (SBAS) at low latitudes

12:00 - 13:00 **R. Caton, B. Heruska** / *AFRL, Hansom, USA*
Update on SCINDA Activities in Africa and Around the Globe
(Presented by R. Babatunde and P. Doherty)

13:00 - 14:00 (Room: Adriatico Guest House Cafeteria)
--- Lunch ---

14:00 - 14:30 **O. Obrou** / *Univ. de Cocody, Abidjan, Cote d\'Ivoire*
Study of Ionospheric Scintillation occurrence with a SCINDA GPS receiver over Abidjan

14:30 - 15:30 (Room: Adriatico Guest House Informatics Lab.)
Space Weather Laboratory - access, process, analyze storm data

15:30 - 16:00 (Room: Adriatico Guest House (Lower Level 1))
--- Coffee Break ---

16:00 - 17:30 (Room: Adriatico Guest House Informatics Lab.)
R. Caton, B. Heruska / *AFRL, Hansom, USA*
SCINDA-GPS Demonstration Laboratory

16:00 - 17:30 (Room: Adriatico Guest House Informatics Lab.)
Space Weather Laboratory contd.

Tropospheric Measurements, Participant Presentations and MindStorm Lab. (Room:Adriatico Guest House Kastler Lecture Hall)

21 April 2010

08:30 - 09:30 **E. Yizengaw** / *Boston College, USA*
Space Weather and the Ionosphere
(Presented by C. Valladares and P. Doherty)

09:30 - 10:30 **R. Notarpietro** / *Politecnico di Torino, Italy*
Tropospheric measurements using GNSS Radio Occultation observations

10:30 - 11:00 (Room: Adriatico Guest House (Terrace))
--- Coffee Break ---

11:00 - 12:00 **B. Nava** / *ARPL/ICTP, Italy*
Electron density profiles using GNSS Radio Occultation Observations

12:00 - 12:30 **B. Twinamasiko, F. D'Ujanga** / *Makerere University, Uganda*
SCINDA Set-Up and Measurements at Makerere University

12:30 - 13:00 **O. Obrou** / *Univ. de Cocody, Abidjan, Cote D'Ivoire*
Status of Africa Geophysics Society

13:00 - 14:00 (Room: Adriatico Guest House Cafeteria)
--- Lunch ---

14:00 - 15:15 (Room: Adriatico Guest House Informatics Lab.)
MindStorm Laboratory - Part 2

15:30 - 16:00 (Room: Adriatico Guest House (Lower Level 1))
--- Coffee Break ---

16:00 - 17:15 (Room: Adriatico Guest House Informatics Lab.)
MindStorm Laboratroy Contd.

19:30 - 19:30 (Room: Adriatico Guest House Cafeteria)
--- Final Dinner hosted by ICTP and Boston College ---

Space Weather Effects, Participants Presentations (Room:Adriatico Guest House Kastler Lecture Hall)

22 April 2010

08:30 - 11:30 **Administrative affairs**

12:00 - 12:30 **V. Chukwuma** / *Olabisi Onabanjo University, Nigeria*
Ionospheric Pre-Storm Phenomenon

12:30 - 13:00 **J. Adeniyi** / *University of Ilorin, Nigeria*
April 2010 Geomagnetic Storm-Measurements from Ilorin

13:00 - 14:00 (Room: Adriatico Guest House Cafeteria)
--- Lunch ---

14:00 - 14:30 **L. Amaeshi** / *University of Lagos, Nigeria*
TEC and Scintillation Using GPS at Lagos

14:30 - 15:00 (Room: Adriatico Guest House Informatics Lab.)
S. Magdaleno
Automatic Detection of Ionospheric Depletions

15:00 - 15:30 **J. Uwamohoro** / *Kigali Institute of Education, Kigali, Rwanda*
Geoeffectiveness of CMEs During Solar Cycle, 23

15:30 - 16:00 (Room: Adriatico Guest House (Lower Level 1))
--- Coffee Break ---

16:00 - 16:30 **V. Munyaburanga** / *National Univ. of Rwanda, Butare, Rwanda*
GNSS Status in Rwanda

16:30 - 17:00 **M. Kawesha** / *University of Zambia, Lusaka, Zambia*
Space Mission Comedy to TEC Calibration

Open Discussions and Closing Ceremony (Room:Adriatico Guest House Kastler Lecture Hall)

23 April 2010

09:00 - 09:30 **P. Doherty** / *Boston College, USA*
Space Weather Effects on WAAS

09:30 - 10:30 **S. Radicella, P. Doherty** / *ICTP., Boston College*
Open Discussion: The Future: Where do we go from here?

10:30 - 11:00 (Room: Adriatico Guest House (Terrace))
--- Coffee Break ---

11:00 - 12:00 **Closing Ceremony: Distribution of Certificates of Participation**