



United Nations/Argentina Workshop on the Applications of Global Navigation Satellite Systems

Organized jointly by the United Nations Office for Outer Space Affairs and
the National Commission for Space Activities (CONAE)

Co-organized and co-sponsored by the European Space Agency (ESA) and the
International Committee on Global Navigation Satellite Systems (ICG)

Hosted by the Teofilo Tabanera Space Center (CETT)

Falda Del Carmen, Cordoba, Argentina

19 - 23 March 2018

PROGRAMME

Venue: Teófilo Tabanera Space Center, Ruta C45, km 8, Falda de Cañete, (5187) Córdoba

Monday, 19 March 2018

09:00 – 10:00 Registration of participants

10:00 – 10:30 Opening and Welcome Remarks

Felix MENICOCCI, *CONAE, Argentina*

Sharafat GADIMOVA, *United Nations Office for Outer Space Affairs*

Rafael Lucas RODRIGUEZ, *European Space Agency*

Keynote

Argentina National Space Activities Commission (CONAE), *Raul KULICHEVSKY, CONAE, Argentina*

10:30 – 11:00 *Coffee Break*

11:00 – 12:00 Session 1: Overview of Global Navigation Satellite Systems in Operation and Development

Chairperson: Jorge DEL RIO VERA, United Nations Office for Outer Space Affairs

Rapporteur: Dinesh MANANDHAR, Japan

11:00 Global Positioning System (GPS): Status and development, *Jeffrey AUERBACH, United States of America*

11:20 Global Navigation Satellite System (GLONASS): Status and development, *Sergey RYBKIN, Russian Federation*

11:40 Status update on the European Satellite Navigation System (GALILEO), *Augusto GONZALEZ, European Commission*

12:00 – 13:00 *Lunch Break*

13:00 – 14:00 Session 1: Overview of Global Navigation Satellite Systems in Operation and Development (continues)

Chairperson: Nada ELLAHOUNY, Egypt

Rapporteur: Ashok DAHAL, Thailand

13:00 GALILEO performance overview, *Rafael Lucas RODRIGUEZ, European Space Agency*

13:20 Construction and development of BeiDou Navigation Satellite System (BDS), *Chunling ZHANG, China*

13:40 – 14:00 International Committee on Global Navigation Satellite Systems, *Sharafat GADIMOVA, United Nations Office for Outer Space Affairs*

14:05 – 15:45 Session 2: GNSS Reference Frames and Reference Station Network

Chairperson: Luiz Paulo SOUTO FORTES, Brazil

Rapporteur: Renato BORGES, Brazil

14:05 Advances in the implementation of the United Nations Resolution on global geodetic reference frame in Argentina, *Claudio BRUNINI, Argentina*

14:25 Supporting GNSS applications in Latin America through SIRGAS reference frame, *Victor CIOCE, Venezuela*

14:45 GNSS infrastructure and services for positioning in Brazil, *Sonia Maria ALVES*

COSTA, Brazil

15:05 Active National Geodetic Network (RGNA) of Paraguay, *Sindulfo COLMAN NUA 'EZ, Paraguay*

15:25 CORS "LatPos" multipurpose State geodetic network, *Janis ZVIRGZDS, Latvia*

15:45 – 16:00 *Coffee Break*

16:00 – 18:00 Session 3: Implementation of GNSS technology

Chairperson: Victor CIOCE, Venezuela

Rapporteur: Narayan DHITAL, Germany

16:00 Initiative for concerted international cooperation on collection of GNSS positioning environment data using low-cost sensors networks, *Nenad SIKIRICA, Croatia*

16:20 Russian-Brazilian SLR and GNSS monitoring stations: operation and recent research activities, *Renato ALVES BORGES, Brazil*

16:40 Hardware in the loop test bed for distributed satellite platform orbit control, *Martin ESPANA, Argentina*

17:00 Development and application of National BeiDou ground augmentation system, *Haoyu LOU, China*

17:20 Assessment of real time relative GNSS positioning based on the Brazilian CORS Network, *Luiz Paulo SOUTO FORTES, Brazil*

17:40 High-Precision position service as a public service, *Zhijun GUAN, China*

18:00 Adjourn

Tuesday, 20 March 2018

09:00 – 10:30 Session 4: Seminar on GNSS Spectrum Protection and Interference Detection and Mitigation

10:30 – 10:45 *Coffee Break*

10:45 – 12:00 Technical tour: CETT facilities

12:00 – 13:00 *Lunch Break*

13:00 – 15:00 Session 5: Seminar on GNSS Spectrum Protection and Interference Detection and Mitigation

15:00 – 15:15 *Coffee Break*

15:15 – 16:15 Session 5: Seminar on GNSS Spectrum Protection and Interference Detection and Mitigation (continues)

16:15 *Cultural programme*

18:00 *Welcome Dinner*

Wednesday, 21 March 2018

09:00 – 11:00 Session 6: Seminar on GNSS Spectrum Protection and Interference Detection and Mitigation

11:00 – 11:15 *Coffee Break*

11:15 – 12:30 Session 7: Seminar on GNSS Spectrum Protection and Interference Detection and Mitigation

12:30 – 13:30 *Lunch Break*

13:30 – 14:50 Session 8: GNSS applications

Chairperson: Jānis ZVIRGZDS, Latvia

Rapporteur: Jesús Roberto ROMERO RUIZ, Mexico

13:30 Areas of opportunity for GNSS applications in large-scale projects in Mexico, *Andres CRUZ Y CORRO, Mexico*

13:50 BeiDou high-precision positioning applications in the high speed rail industry, *Jin WANG, China*

14:10 Use and application of GNSS in the implementation of navigation based on performance in Ecuador, *Enrique DAVALOS CARDENAS, Ecuador*

14:30 Dangers of Spoofing and anti-spoofing solutions, *Dinesh MANANDHAR, Japan*

14:50 – 15:15 *Coffee Break*

**15:15 – 17:30 Discussion Session 1 (Working groups sessions in parallel):
Recommendations/Proposals**

Organization of Work: Ms. Sharafat GADIMOVA and Jorge DEL RIO VERA, United Nations Office for Outer Space Affairs, and Stanislav MAKARCHUK, CONAE, Argentina

- European GNSS and Copernicus: Supporting the sustainable development goals, *Jorge DEL RIO VERA, United Nations Office for Outer Space Affairs*
- Progress Report on GNSS and SLR projects, *Stan MAKARCHUK, CONAE, Argentina and Claudio BRUNINI, AGGO, Argentina*
- *International/Regional collaboration opportunities that could be established in order to promote the use of enabling space technologies, and the workshop follow-up projects/initiatives;*
- *Requirements of implementing, mechanisms and resources for developing of partnerships and networks;*
- *Type and level of training required for addressing enabling space technologies and their applications;*
- *Next steps (proposals for future workshops/training courses).*

Working Group 1: Capacity Building and Institutional Strengthening

Moderator: Sharafat GADIMOVA, United Nations Office for Outer Space Affairs

Working Group 2: Geodetic Reference Network

Moderator: Stanislav MAKARCHUK, CONAE, Argentina

Working Group 3: Specific global navigation satellite systems applications

Moderator: Jorge DEL RIO VERA, United Nations Office for Outer Space Affairs

17:30 *Adjourn*

Thursday, 22 March 2018

09:00 – 11:00 Session 9: Space weather

Chairperson: Sonia Maria ALVES COSTA, Brazil

Rapporteur: Enrique DÁVALOS, Ecuador

09:00 Monitoring ionospheric perturbations during solar energetic events using GNSS data, *Victor Hugo MENDEZ BEDOLLA, Mexico*

- 09:20 Space weather and conventional weather for civil aviation in low latitude, *Jorge GARCIA VILLALOBOS, Peru*
- 09:40 Response of total electron content (TEC) at Brazilian low latitude to the occurrence of correlating interaction region and high speed streams during low solar activity, *Claudia CANDIDO, Brazil*
- 10:00 Monitoring of space weather using GNSS at the Space Weather Monitoring Center (SWMC), *Nada ELLAHOUNY, Egypt*
- 10:20 Space weather observatory: Facilities for the space navigation, *Edgar GUEVARA, Peru*
- 10:40 NeQuick model overview, *Yenca MIGOYA-ORUE, Italy*
- 11:00 – 11:20 *Coffee Break*
- 11:20 – 12:00 Session 10: Capacity building, education and training in the field of GNSS**
- Chairperson: Victor Hugo MENDEZ BEDOLLA, Mexico*
Rapporteur: Claudia Maria NICOLI CANDIDO, Brazil
- 11:20 Capacity building activities at CRECTEALC, *Jerjes Molina BLANCAS, Mexico*
- 11:40 GNSS technologies integrated to high altitude balloon payloads and other research applications as a tool for STEAM education in Paraguay, *Alejandro ROMAN, Paraguay*
- 12:00 – 13:00 *Lunch Break*
- 13:00 – 14:00 Session 10: Capacity building, education and training in the field of GNSS (continues)**
- Chairperson: Victor Hugo MENDEZ BEDOLLA, Mexico*
Rapporteur: Claudia Maria NICOLI CANDIDO, Brazil
- 13:00 Instrumentation and capacity building for space weather activities: The Mexican experience, *Jesus Roberto ROMERO RUIZ, Mexico*
- 13:20 CRASTE-LF's contribution in GNSS capacity building in African French-speaking countries, *Anas EMRAN, Morocco*
- 13:40 – 14:00 Training activities on GNSS science and applications: The ICTP - Boston College partnership, *Yenca MIGOYA-ORUE, Italy*
- 14:05 – 15:45 Session 11: International and regional experiences of the use and implementation of GNSS technologies**
- Chairperson: Armengol TORRES, Spain*
Rapporteur: Yenca MIGOYA-ORUE, Italy
- 14:05 Training on GNSS and space weather in Africa in the framework of a North-South scientific network GIRGEA, *Christine AMORY, France*
- 14:25 GICGNSS: A university data and post-processing hub for GNSS, *Ashok DAHAL, Thailand*
- 14:45 National regulations fixed service satellite/GNSS - Paraguayan Space Agency, *Hebe ROMERO TALAVERA, Paraguay*
- 15:05 GNSS low-cost high-accuracy receiver (L-CHAR), *Dinesh MANANDHAR, Japan*
- 15:25 The applications of BDS in the field of transportation, *Hongyang LU, China*
- 15:45 – 16:00 *Coffee Break*

16:00 – 17:20 Session 12: GNSS applications: National Programmes

Chairperson: Nenad SIKIRICA, Croatia

Rapporteur: Hebe Luisa ROMERO TALAVERA, Paraguay

- 16:00 GNSS education and promotional opportunities. A vision from Spain, *Armengol TORRES, Spain*
- 16:20 Challenges of GNSS in Mexico, *Jose Javier ROCH, Mexico*
- 16:40 Genesis of the Paraguayan Space Agency, a historical review, *Liduvino VIELMAN D, Paraguay*
- 17:00 GNSS Applications in Turkey, *Ozgur GUNDOGAN, Turkey*
- 17:20 Q&A
- 17:30 Adjourn

Friday, 23 March 2018

- 09:00 – 09:30 **Discussion Session 2 (Working Groups sessions in parallel):**
- *Drafting of discussion sessions reports/presentations*
- 09:30 – 11:00 **Discussion Session 3: Round table to finalize the recommendations and observations**
- *Summary report of the working groups sessions: presentation of proposals and recommendations consolidated at the discussion sessions*
- 11:00 – 11:30 **Concluding Remarks**
- *Sharafat GADIMOVA and Jorge DEL RIO VERA, United Nations Office for Outer Space Affairs*
- *Rafael Lucas RODRIGUEZ, European Space Agency*
- *Felix MENICOCCHI, CONAE, Argentina*