



**United Nations**  
Office for Outer Space Affairs



## **United Nations/Finland Workshop on the Applications of Global Navigation Satellite Systems**

Organized jointly by

**The United Nations Office for Outer Space Affairs and  
The National Land Survey of Finland**

Hosted by

**The Finnish Geospatial Research Institute of  
the National Land Survey of Finland, FGI-NLS**

**Helsinki, Finland  
23 - 26 October 2023**

**PROGRAMME**

Co-organized and co-sponsored by



ILMATIETEEN LAITOS  
METEOROLOGISKA INSTITUTET  
FINNISH METEOROLOGICAL INSTITUTE



Vaasan yliopisto  
UNIVERSITY OF VAASA



Supported by



*Venue: Scandic Park Helsinki, Mannerheimintie 46*

**Monday, 23 October 2023**

08:30 – 09:00 *Registration (Scandic Park Helsinki) and Coffee*

**09:00 Opening and Welcome Remarks**

- *Sanna KAASALAINEN, NLS-FGI, Finland and Heidi KUUSNIEMI, Uni Vaasa & NLS-FGI, Finland*
- *Pasi PATRIKAINEN, National Land Survey of Finland*
- *Sharafat GADIMOVA, United Nations Office for Outer Space Affairs*

**09:15 Keynote addresses: Setting the tone**

09:15 *Rodrigo da COSTA, European Union Agency for the Space Programme*

09:35 *Taruanne LINDEVALL, Ministry of Transport and Communications, Finland*

**09:55 Session 1: Current and planned global navigation satellite systems and satellite-based augmentation systems**

*Chairperson: Heidi KUUSNIEMI, Finland*

*Rapporteur: Mario MORENO, Germany*

09:55 *Global Positioning System (GPS) Program Update, Robert WRAY, United States*

10:15 *BeiDou Navigation Satellite System (BDS) Update and Development, Xiaochun LU, China*

10:35 *GPS and Galileo Signal Authentication Using Quasi-Zenith Satellite Systems (QZSS) Signal, Dinesh MANANDHAR, Japan*

10:55 *NavIC and GAGAN systems update, Ramarao G., India*

11:05 *NavIC Applications, Kalpesh B., India*

11:15 – 11:30 *Coffee Break*

**11:30 Session 2: Current and planned global navigation satellite systems and satellite-based augmentation systems (continued)**

*Chairperson: Renato FILJAR, Croatia*

*Rapporteur: Shweta N. SHAH, India*

11:30 *BDS High Accuracy Service of BDS Public Service Platform, Shuo LIU, China*

11:50 *S2VSE – System and Service Volume Simulation Environment, Sebastian BERNHARDT and Florian Georg EISELBRECHER, Germany*

12:10 *NavIC – Reflectometry Receiver Development for Remote Sensing Applications, Bushra ANSARI, India*

12:30 *Korea Positioning System (KPS) and the Korean Augmentation Satellite System (KASS) Update, Jongsun AN, Republic of Korea*

12:50 *Update on Augmented Navigation for Africa, Lasisi Salami LAWAL, Nigeria*

13:10 – 14:10 *Lunch Break*

**14:10** **Session 3: Applications of global navigation satellite systems: Case studies**

*Chairperson: Zolzaya LKHAMSUREN, Mongolia*

*Rapporteur: Lasisi Salami LAWAL, Nigeria*

14:10 Spaceborne Use of GNSS for Climate Variable Sensing, *Kimmo RAUTIAINEN, Finland*

14:30 Contribution of GNSS to Stability Monitoring of Engineering Structures: The Case Study of Beni Haroun Dam in Algeria, *Hicham DEKKICHE, Sofiane KHELIFA, Walid BOUAOULA, Younes Ahmed BETCHIM, Algeria*

14:50 On the development of Multi-Instrument Arrays for Ionospheric Studies over West Africa to Support the Implementation of SBAS, *Olivier OBROU, Ivory Coast*

15:10 – 15:30 *Coffee Break*

**15:30** **Session 4: GNSS-based data**

*Chairperson: Donnie T. MANCERA, The Philippines*

*Rapporteur: Malla AVINAB, Nepal*

15:30 Novel uses of multiband GNSS data for meteorology, *Svante HENRIKSSON, Finland*

15:50 Airplane Trajectory Reconstruction and Analysis Using GNSS-Based ADS-B Data: What to Do with the Open Access Data Using Open-Source Software, *Renato FILJAR, Croatia*

16:10 A Low-Cost Product (prototype) for ADSB Big Data Analysis, *Narayan DHITAL, Germany*

16:30 – 17:00 **Summary and Interactive Discussions**

*Moderator: Sharafat GADIMOVA, UNOOSA*

*Rapporteur: Haris HARALAMBOUS, Cyprus*

17:00 *Adjourn*

**19:00-20:00** **Helsinki city reception**

**Tuesday, 24 October 2023**

**09:00** **Session 5: Low-Earth Orbit Positioning, Navigation and Timing (LEO-PNT)**

*Chairperson: Heidi KUUSNIEMI, Finland*

*Rapporteur: Thayathip THONGTAN, Thailand*

09:00 **Keynote:** FutureNAV In-Orbit Demonstrator - a First Step Towards a European LEO-PNT component, *Miguel CORDERO LIMON, European Space Agency*

09:30 Space-based Signals of Opportunity - an Opportunity to Resiliency (INCUBATE consortium), *Jaakko YLIAHO, Finland*

09:50 Design of payload and satellite for low Earth orbit mega-constellations, *MAYANK, Finland*

10:10 CENTISPACE System Experimental Satellites PPP Application Test, *Qiangwen YANG, Xiaodong DU and Long YANG; China*

10:30	GPS Type Tracker Based on LoRa Transmission for Small Satellites, <i>Yasir Ahmed Idris HUMAD, Hungary</i>
10:50	Building a national Timing Grid of Ireland – Lessons Learned, <i>Zdenek CHALOUPKA, Ireland</i>
11:10 – 11:30	<i>Coffee Break</i>
<b>11:30</b>	<b>Session 6: Resilient Positioning, Navigation and Timing (PNT)</b> <i>Chairpersons: Sanna KAASALAINEN and Martta-Kaisa OLKKONEN, Finland</i> <i>Rapporteur: Yasir Ahmed Idris HUMAD, Hungary</i>
11:30	<i>Resilience and Security of Geospatial Data for Critical Infrastructure, Zahidul BHUIYAN, Finland</i>
11:50	<i>Advanced Machine Learning for Anomaly Detection and Jammer Localization, Laura RUOTSALAINEN, Finland</i>
12:10	<i>National time and time services, Thomas FORDELL, Finland</i>
12:30	<i>Techniques for resilient time provision and GNSS spoofer/jammer eraser, Ondrej DANIEL HULD, Finland</i>
12:50 – 14:00	<i>Lunch Break</i>
<b>14:00</b>	<b>Session 7: Resilient Positioning, Navigation and Timing (PNT) (continued)</b> <i>Chairperson: Zahidul BHUIYAN, Finland</i> <i>Rapporteur: Olivier OBROU, Ivory Coast</i>
14:00	<i>The Threat of GNSS Jamming and Interference, Aiden MORRISON, Norway</i>
14:20	<i>Assured GNSS – Attacks and Countermeasures, Stefan SÖDERHOLM, Finland</i>
14:40	<i>GNSS Time and Frequency Transfers and Receiver Calibrations: Plans and Implementations, Thayathip THONGTAN, Thailand</i>
15:00	<i>Classifying GNSS Signals in Terrestrial Environments Using Deep Learning, Shweta N. SHAH, India</i>
15:20 – 15:40	<i>Coffee Break</i>
<b>15:40</b>	<b>Session 8: Applications of GNSS: National Programmes and Projects</b> <i>Chairperson: Christine AMORY-MAZAUDIER, France</i> <i>Rapporteur: Sharafat GADIMOVA, Office for Outer Space Affairs</i>
15:40	<i>GNSS Efficient Management and Collaboration with Private and Public Partnerships in a Pilot Project, Zolzaya LKHAMSUREN, Mongolia</i>
16:00	<i>LAO Satellite Development, Vithaya SAYVISITH, Lao PDR</i>
16:20	<i>LOS in Surface Deformation Mapping: A Case Study on the Kingdom of Bahrain, Mohamed ELHAG, Saudi Arabia</i>
16:40	<i>Integration of GNSS Receivers with External Environmental Sensors for Mobile Air Monitoring Applications, Lin YOLA, Indonesia</i>
17:00	<i>Adjourn</i>

### Wednesday, 25 October 2023

#### 09:00 **Session 9: GNSS Technology**

*Chairperson: Dinesh MANANDHAR, Japan*

*Rapporteur: Vithaya SAYVISITH, Lao PDR*

09:00 **Keynote:** Positioning technologies and Location Innovation HUB, *Antti JAKOBSSON, Finland*

09:30 Smart Port as a Service and GNSS, *Karno TENOVUO, Awake.AI, Finland*

09:50 The Key Role of GNSS in Logistics and Supply Chain Management Applications, *Ahm SHAMSUZZOHA, Finland*

10:10 Introduction to Metsähovi Geodetic Research Station, *Hannu KOIVULA, Finland*

10:30 Low-Cost GNSS Receiver System for Multi-Purpose Applications, *Malla AVINAB, Nepal*

10:50 Using GNSS in Validating the Philippine Geoid Model, *Donnie T. MANCERA, Ronaldo C. GATCHALIAN, and Aila Leana T. SAMPANA, The Philippines*

11:10 – 11:30 *Coffee Break*

#### 11:30 **Session 10: National experiences in the use of GNSS technology**

*Chairperson: Lin YOLA, Indonesia*

*Rapporteur: Bushra ANSARI, India*

11:30 Potentialities identified by the Mexican Space Agency for the Use of GNSS applications in Aviation, Agriculture and Other Sectors in Mexico, *Antonio de Jesús SERRANO ARELLANO, Mexico*

11:50 LEO-PNT as a New System for Satellite-based Navigation, *Fabricio Dos Santos PROL, Finland*

12:10 – 13:30 *Lunch Break*

#### 13:30 **Visit to Metsähovi Geodetic Research Station**

15:30 – 15:50 *Coffee Break at Metsähovi by NNF – the Nordic Institute of Navigation*

#### 15:50 **Visit to Metsähovi Geodetic Research Station**

17:00 *Adjourn*

### Thursday, 26 October 2023

#### 09:00 **Session 11: Space weather impact on GNSS navigation and related services**

*Chairperson: Tiera LAITINEN, Finland*

*Rapporteur: Zipporah Njeri MARGARET, Kenya*

09:00 Welcome and introduction, *Tiera LAITINEN, Finland*

09:10 **Keynote:** Observation and real-time analysis of space weather effects on GNSS through GNSS measurements, *Jens BERDERMANN, Germany*

- 09:40 ESA space weather system for GNSS applications, *Juha-Pekka LUNTAMA, European Space Agency*
- 10:00 The arctic space weather demonstrator in the European accelerators programme, *Kirsti KAURISTIE, Finland*
- 10:20 Ionospheric space weather monitoring and its applications on GNSS, *Qi LIU, China*
- 10:40 Bridging the Gap: Advancing Space Weather Services for Aviation in Egypt, *Abdalla Shaker ABDALLA, Egypt*
- 11:00 – 11:20 *Coffee Break*

**11:20 Session 12: Space weather impact on GNSS navigation and related services (continued)**

*Chairperson: Tiera LAITINEN, Finland*  
*Rapporteur: Mohamed ELHAG, Saudi Arabia*

- 11:20 *(virtual)* Aviation GNSS users' view, *Klaus SIEVERS, Germany*
- 11:40 IGS Ionosphere Working Group Cooperation with IRI – Provision of GNSS Products to Gambit Database, *Andrzej KRANKOWSKI, Poland*
- 12:00 Use case demonstration on the Swigpad API service for creating GNSS performance indicator maps, *Elias HIRVONEN, Finland*
- 12:20 GNSS Related Activities to Ionospheric and Tropospheric Studies in Cyprus, *Haris HARALAMBOUS, Cyprus*
- 12:40 – 13:40 *Lunch Break*

**13:40 Session 13: GNSS in the service of space weather monitoring and research**

*Chairperson: Qi LIU, China*  
*Rapporteur: Antonio de Jesús SERRANO ARELLANO, Mexico*

- 13:40 GNSS: a useful tool to study the impact of solar activity at Earth, *Nicolas BERGEOT, Belgium*
- 14:00 Role of GNSS in the Space Weather Research, *Christine AMORY-MAZAUDIER, France*
- 14:20 Model-Based Analysis of Ionospheric Effects in Grazing Angle Reflectometry from Space, *Mario MORENO, Germany*
- 14:40 Ionospheric 3D imaging with Tomoscand, *Johannes NORBERG, Finland*
- 15:00 – 15:20 *Coffee Break*

**15:20 Session 14: GNSS in the service of space weather monitoring and research (continued)**

*Chairperson: Andrzej KRANKOWSKI, Poland*  
*Rapporteur: Abdalla Shaker ABDALLA, Egypt*

- 15:20 Low-Cost GNSS Receiver System for Space Weather: Comparison of results from low-cost vs. high-end receivers, *Dinesh MANANDHAR, Japan*
- 15:40 Operational Space Weather Programme in Kenya: Space Weather Monitoring and Forecasting Using GNSS Receiver Data and Magnetometer Data, *Zipporah Njeri MARGARET, Kenya*

16:00

GNSS Signal Spoofing Tests, *Dinesh MANANDHAR, Japan*

**16:20**

**Summary and Concluding Remarks**

*Moderators: Sharafat GADIMOVA, United Nations Office for Outer Space Affairs and Sanna KAASALAINEN, NLS-FGI, Finland*

*Rapporteurs: Hicham DEKKICHE, Algeria and Bekhruz MIRZAEV, Uzbekistan*

- *International/Regional collaboration opportunities that could be established in order to promote the use of GNSS technology, and the workshop follow-up projects/initiatives (if any);*
- *Requirements of implementing, mechanisms and resources for developing of partnerships and networks (regional/international);*
- *Type and level of training required for addressing GNSS and their applications;*
- *Next steps (proposals for future workshops/training courses).*

17:00

Adjourn