United Nations
Office for Outer Space Affairs

United Nations Workshop on GNSS and Related Space Technologies for Urban Sustainability Challenges

Dates: 18-23 November 2024

Online

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Programme at glance

Global navigation satellite systems (GNSS) technologies are now ubiquitous in everyday life: they are incorporated in electronic devices and are used by the public, surveyors, and geoscientists on a regular basis. In developing countries in particular, GNSS applications offer cost-effective solutions that make it possible to foster economic and social development without neglecting the need to preserve the environment, thus promoting sustainable development.

Current GNSS include the Global Positioning System (GPS), the Global Navigation Satellite System (GLONASS), the BeiDou Navigation Satellite System (BDS) and the European Satellite Navigation System (Galileo). There are also two regional systems, the Navigation with Indian Constellation (NavIC) system and the Quasi-Zenith Satellite System (QZSS), as well as various augmentation systems designed to improve one or more GNSS qualities, such as accuracy, robustness, and signal availability.

In addition to GNSS, other space technologies such as Earth Observation (EO) satellites or communication satellites play a pivotal role creating socioeconomic benefits. Earth Observation satellites enable continuous and detailed monitoring of Earth's surface, providing valuable data for environmental protection, resource management, and disaster response. These satellites assist in tracking deforestation, urban sprawl, and changes in agricultural lands, and offer crucial insights for managing water resources and mitigating climate change impacts. Communication satellites, on the other hand, facilitate global connectivity, bridging the digital divide by providing internet access to remote and underserved areas, thus supporting education, telemedicine, and economic development. These technologies, together with GNSS, create a comprehensive toolkit to address various challenges related to sustainable development, ensuring a coordinated and efficient approach towards achieving the 2030 Agenda for Sustainable Development.

To address a wide array of GNSS and related technologies applications for socioeconomic benefits and to focus on initiating pilot projects and strengthening the networking of GNSS-related institutions, a Workshop on GNSS and related space technologies in support of urban sustainability challenges will be held online.

The main objectives of the workshop will be to reinforce the exchange of information between countries and scale up the capacity pursuing the application of GNSS and other space technology solutions; share information on national, regional, and global projects and initiatives, which could benefit regions; and enhance cross-fertilization among those projects and initiatives.

The specific objectives of the workshop will be to introduce GNSS-based technology and other space technologies in support of urban sustainability challenges; promote the greater exchange of actual experiences with specific applications; focus on appropriate GNSS applications projects at the national and/or regional levels; and define recommendations and findings to be forwarded as a contribution to the Office for Outer Space Affairs and the International Committee on Global Navigation Satellite Systems (ICG), particularly, in forging partnerships to strengthen and deliver capacity-building on satellite navigation science and related technologies. This workshop uses the challenges identified in the report entitled: Contribution to the “Space2030” Agenda: EU Space Supporting a World of 8 Billion People

	Day 1	Day 2	Day 3	Day 4	Day 5
Morning	Opening Ceremony High Level Panel	Session 2 - GNSS and other space-based technologies for Urban resilience and smart cities	Session 3 - GNSS and other space-based technologies for Environmental and Climate Change	Session 4 - GNSS and other space-based technologies for Food Security	Session 5 – Water Management
Afternoon	Session 1 - GNSS: update of GNSS systems, data and technologies	Session 2 (cont)	Session 3 (cont)	Session 4 (cont)	Review of the Recommendations Closing Ceremony

Agenda of the Workshop (all times are UTC+1)

DAY 1 (10:00-17:30 UTC+1) Monday, 18 November 2024			
Time	Title of Presentation	Speaker	Organisation
11:00-12:00 Opening Ceremony and High Level Panel			
	Chair: Driss El Hadani, Deputy Director UNOOSA		
	Nick Appleyard		Head of Applications and Solutions Department CIC-A, European Space Agency
	Haitham Akah		Head of Space Systems Design & Development Sector, Egyptian Space Agency
	Mohamed A. Ismail		Director of Space and Satellite, Ministry of Communications and Technology, Federal Republic of Somalia
	Moderated discussion on needs, challenges and opportunities in the context of urban sustainability		
12:00-12:00			
12:05-14:00	**Lunch Break**		
14:00 – 15:00 Session 1 – GNSS: update of GNSS systems, data and technologies			
	Chair: UNOOSA		
14:00-14:20	Comparative Analysis of Multi-GNSS Signal Impact on Smartphone and Geodetic Receiver Performance		Devadas Kuna, TiHAN-IIT Hyderabad, India
14:20-14:40	Novel Approach for Observation and Monitoring of GPS Trackers on Earth Utilizing Low Earth Orbit Satellites: Introducing the MRC-100 Satellite Model		Yasir Ahmed Idris Humad, Institute of Space Research and Aerospace (ISRA), Hungary
14:40-15:00	NAVISP – An enabler to support European Competitiveness in the PNT sector		Sanja Bandau, European Space Agency
15:00-15:30	**Coffee Break**		
15:30 – 17:30 Session 1 (cont)– GNSS: update of GNSS systems, data and technologies			
	Chair: UNOOSA		
15:30-15:50	Mapping the Total Electron Content (TEC) Over Ecuador: A Pioneering Study		Ericson D. Lopez, Quito Astronomical Observatory and Physics Department of National Polytechnic School of Ecuador
15:50-16:10	Spanish GNSS Real Time Positioning Service (SPTR)		Jose Manuel Serna Puente, National Geographic Institute, Spain
16:10-16:30	Characterising Total Electron Content Over Malawi Using High-Rate GPS Observations		Robert Galatiya Suya, Malawi University of Business and Applied Sciences
16:30-16:50	Low-cost GNSS receiver's performance during the magnetic storm of May 10th, 2024, over Abidjan, Côte d'Ivoire		Kouadio Olivier Obrou, Universite Felix Houphouet Boigny, Cote d'Ivoire
16:50-17:10	Potential of Compact, Low-Cost GNSS Receiver Modules for PPP in Low Latitude Regions: A Case Study from Lautech GNSS Laboratory, Nigeria		Benjamin Gbenro Ayantunji, Obasanjo Space Centre, NASRDA, Nigeria
17:10	END OF DAY 1		
END OF DAY 1			

DAY 2 (10:00-17:30 UTC+1) Tuesday, 19 November 2024		
10:00-10:30	**Keynote**	

	EU Space: Supporting a World of 8 Billion People – Contribution to the Space2030 Agenda	Reinhard Blasi, European Union Agency for the Space Programme
10:30 – 11:30 Session 2 - GNSS and other space-based technologies for urban resilience and smart cities		
10:30-11:30	**Chair**: UNOOSA	
10:30-10:50	GNSS for Gateless toll gate and dynamic road pricing	Dinesh Manandhar, University of Tokyo
10:50-11:10	Potential of GNSS data for Sustainable Development Goals.	Ana Andries, University of Surrey, United Kingdom
11:10-11:30	Space Geospatial and Indirect GNSS Applications for Sustainable Urban and Rural Communities in Malaysia	Norzailawati Mohd Noor, International Islamic University of Malaysia
11:30-12:30	**Coffee Break**	
12:30 – 13:30 Session 2 (cont)- GNSS and other space-based technologies for Urban resilience and smart cities		
12:30-13:30	**Chair**: UNOOSA	
12:30 - 12:50	Bits & Pixels. Efficiency for a multi-planet society	Alison B Lowndes, NVIDIA
12:50 - 13:10	Water Level Monitoring using GNSS Techniques	Luis Carlos Mabaquiao, University of the Philippines
13:10 - 13:30	Predictive Analysis of Urban Growth of Nakuru City	Claire Muhungi, Kenya Space Agency
13:30 – 14:30 Lunch Break		
14:30 – 16:00 Session 2 (cont) - GNSS and other space-based technologies for Urban resilience and smart cities		
	Chair: UNOOSA	
14:30-14:50	Monsoon Flood Impact and Susceptibility Analysis of Nepal's Most Populous and Capital City Kathmandu	Alison Shilpakar, Antarikchya Pratisthan Nepal
14:50-15:10	Optimal Tourist Capacity: A Balance between Growth and Sustainability	Javier Sergio Del Rio, Universidad de Malaga, Spain
15:10-15:30	Monitoring SDG indicators using Earth Observation for sustainable urban agriculture and development	Shrijwal Adhikari, Amit Ghosh, Food and Agriculture Organization of the United Nations
15:30-16:00	**Keynote** Integrated Applications in the context of Urban Sustainability	Ana Raposo, European Space Agency
16:00-16:30	**Coffee Break**	
16:30 – 17:30	**Session 2 (cont) - GNSS and other space-based technologies for Urban resilience and smart cities**	
16:30-17:30	**Chair**: UNOOSA	
16:30-16:50	Drone-Based GPS Object Localization for Urban and Agricultural Monitoring	Lilia Kiraskoyan, Center of advances software technologies, Russian-Armenian University, Armenia
16:50-17:10	Convergence of GNSS-based trajectories into corridors advances efficiency, operation and planning of the smart city transport infrastructure	Renato Filjar, Krapina University of Applied Sciences, Croatia
17:10-17:30	Geospatial Information Management in Cuba Through the Use of GNSS for Sustainable Development	Rebeca Parada Benavente, National Hydrography and Geodesy Office, Cuba
17:30	END OF DAY 2	
END OF DAY 2		

DAY 3 (10:00-17:00 UTC+1) Wednesday, 20 November 2024

10:00 – 11:00 Session 3 - GNSS and other space-based technologies for Environmental and Climate Change		
10:00-11:00	**Chair**: UNOOSA	
10:00-10:20	The value of spaceborne observations for the IPCC	Robert Vautard, Co-Chair Working Group I, International Panel on Climate Change (IPCC)
10:40-11:00	Rapid Flood Mapping Using Open Access Earth Observation Data and Google Earth Engine	Atijosan Abimbola, Cooperative Information Network, NASRDA, Nigeria
11:00-11:30	**Coffee Break**	
11:30 – 12:30 Session 3 - GNSS and other space-based technologies for Environmental and Climate Change		
11:30-1230	**Chair**: UNOOSA	
11:30-11:50	UN-SPIDER	Lorant Czaran (TBC), United Nations Office for Outer Space Affairs
11:50-12:10	GEO Global Heat Resilience Service	Martyn Clark, GEO Secretariat
12:10-12:30	Space for Climate Observatory	Markus Woltran, United Nations Office for Outer Space Affairs
12:30-12:50	Integrated applications for Environmental and Climate Change	Ana Raposo, European Space Agency
12:50 – 14:30 Lunch Break		
14:30 – 15:30 Session 3 - GNSS and other space-based technologies for Environmental and Climate Change		
14:30-15:30	**Chair**: UNOOSA	
14:30-14:50	CEOS Working on Climate	Wenying Su, CEOS WG Climate/National Aeronautics and Space Administration, United States
14:50-15:10	Drought Assessment and Prediction Using Time Series Models- Case Study Jordan	Nivin Hasan, Royal Jordanian Geographic Centre and Beihang University.
15:10-15:30	Early Warnings for All (EW4ALL) Initiative: The Role of Space Technologies	Muhibuddin Usamah, World Meteorological Organization
15:30-16:00	**Coffee Break**	
16:00 – 17:00	**Session 3 - GNSS and other space-based technologies for Environmental and Climate Change**	
	Chair: UNOOSA	
16:00-16:20	The Copernicus Climate Change Service	Chris Stewart, European Center for Medium Weather Forecast
16:20-16:40	EOTEC DevNet: A community for fostering collaboration on EO capacity building and tools	Fabiola Yepez-Rincon, Earth Observation Training, Education and Development Network (EOTEC DevNet)
16:40-17:00	EUMETSAT's contribution to weather and climate monitoring, with a focus on capacity building	Mark Higgins, European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT)
17:00	END OF DAY 3	

END OF DAY 3

DAY 4 (10:00-17:10 UTC+1) Thursday, 21 November 2024

10:00 – 11:00 Session 4 - GNSS and other space-based technologies for Food Security		
10:00	**Chair**: UNOOSA	
10:00-10:20	GEOGLAM - EO based Global Agricultural Monitoring	Sven Gilliams, GEOGLAM
10:20-10:40	Exploring Changes in Nepal's Chure: A Two-Decade Analysis of Land Utilization Using Landsat Images	Sujan Tyata, Antarikchya Pratisthan Nepal
10:40-11:00	Legal Framework for GNSS and Space-based Technologies in Enhancing Food Security: International, National and Ethical Dimensions	Anwesha Pathak, LawSikho & Skill Arbitrage, India
11:00-11:30	**Coffee Break**	
11:30 – 12:30 Session 4 (cont) - GNSS and other space-based technologies for Food Security		
11:30-12:30	**Chair**: UNOOSA	
11:30-11:50	Applications of the PAZ radar satellite for emergency and security	Ainhoa Mendizabal, Hisdesat
11:50-12:10	Leveraging GNSS Reflectometry for Sustainable Agriculture and Water Resources Management in Africa	Hoda Awny, Egyptian Space Agency
12:10-12:30	EO Colleague – Earth Observation for Sustainable Development	Robert Eckart, EO College, Friedrich-Schiller-University Jena, Germany
12:30 – 14:00 Lunch Break		
14:00 – 15:20 Session 4 (cont) - GNSS and other space-based technologies for Food Security		
	Chair: UNOOSA	
14:00-14:20	EnMAP's contributions to food security through hyperspectral Earth observation	Vera Krieger, German Space Agency at DLR
14:20-14:40	Affordable precision farming technologies for small to mid-scale farmers in Tanzania using GNSS technology and EO data	Musa Mishamo, Rada 360 Limited
14:40-15:00	Rwanda's Progress and Initiatives in GNSS and Space-Based Technologies: Enhancing Transportation, Environmental Sustainability, and Water Management.	Lise Kabarere/Valentine Mukanyandwi, Rwanda Space Achrisgency
15:00-15:20	Integrating GNSS and Satellite Data for Sustainable Habitat Management in Tunisia	Karem Saad, National Engineering School of Sfax, Tunisia
15:20-15:50	**Coffee Break**	
15:50 – 16:50	**Session 4 (cont) - GNSS and other space-based technologies for Food Security**	
	Chair: UNOOSA	
15:50-16:10	Leveraging space technologies for crop monitoring and food security: challenges and opportunities	Dario Spiller, Filippo Sarvia, Rashed Jalal, Food and Agriculture Organization of the United Nations
16:10-16:30	Landsat for Food Security	Chris Barnes, United States Geological Survey
16:30	END OF DAY 4	
END OF DAY 4		

DAY 5 (10:00-17:00 UTC+1) Friday, 22 November 2024

10:00 – 11:00 Session 5 – GNSS and other space-based technologies for Water Management		
	Chair: UNOOSA	
10:00-10:20	Space4Water Project	Nina Kickinger, United Nations Office for Outer Space Affairs
10:20-10:40	Using InSAR Ground Movement Information to Improve Hydrogeological Knowledge	Carolina Guardiola Albert, Spanish Geological and Miner National Center
11:00-11:30	**Coffee Break**	
11:30 – 12:30 Session 5 – GNSS and other space-based technologies for Water Management (cont.)		
	Chair: UNOOSA	
11:30 - 11:50	Satellite monitoring to support sustainable agricultural water management	Timothy Foster, University of Manchester
11:50 - 12:10	The effect of Meteorological Drought on Crop Yield in the North of Bank Region, Gambia	Momodou J. A. Senghore, National Early Warning and Response Mechanism Coordinating Centre
12:10 – 12:30	Flood Detection with SAR: A Review of Techniques and Datasets	Donato Amitrano, Italian Aerospace Research Centre
12:30 – 14:00 Lunch Break		
14:00 – 15:00 Session 5 – GNSS and other space-based technologies for Water Management (cont.)		
	Chair: UNOOSA	
14:00-14:20	EU Space for water management	Chiara Solimini, European Union Agency for the Space Programme
14:20-14:40	GPS-Enhanced Drone Imaging: Stitching and Change Detection Analysis	Vahagn Melkoyan, Russian-Armenian University, Center of Advances Software Technologies
14:40-15:00	Enhancing Climate Resilience in Ecuador: Integrating Satellite and Sensor Data for Real-Time Hydrological Forecasting	Carlos Eduardo Cardenas Fonseca, National Institute of Hydrology and Meteorology
15:00-15:40	**Coffee Break**	
15:40 – 16:00	**Session 5 – GNSS and other space-based technologies for Water Management (cont.)**	
	Chair: UNOOSA	
15:40-16:00	Lake and reservoir volume variations in South America from radar altimetry, ICESat/ICESat-2 laser altimetry, and GRACE/GRACE-FO time-variable gravity	Claudia Carabajal, SSAI., Inc. @ National Aeronautics and Space Administration, Goddard Space Flight Center, United States
16:00-16:20	Space-time monitoring of water quality in a eutrophic reservoir using SENTINEL-2 data - A case study of San Roque, Argentina	Alba German, Mario Gulich Institute, CONAE-UNC, Argentina
16:20-16:50	Solutions from space: supporting food security through Earth observations	Mary Mitkish, NASA Harvest Consortium, United States.
16:50-17 :00	Workshop Wrap-Up	
17:00	**End of the Workshop**	
END OF THE WORKSHOP		