UNITED NATIONS
Office for Outer Space Affairs

Workshop on the Applications of Global Navigation Satellite Systems

Organized by the University of the South Pacific and supported by

the United Nations Office for Outer Space Affairs

Co-organized and co-sponsored by the International Committee on Global Navigation Satellite Systems

Hosted by the University of the South Pacific

Suva, Fiji

24 - 28 June 2019

PROGRAMME

Venue: The University of the South Pacific, Laucala Bay Campus	
Monday, 24 June 2019	
09:00 – 10:00	Registration of participants
10:00	**VENUE: Japan Pacific ICT Centre** **Opening and Welcome Remarks**
	Prof. Pal AHLUWALIA, *Vice Chancellor, University of the South Pacific, Fiji*
	Hon. Jone USAMATE, *Minister for Infrastructure, Transport, Disaster Management and Meteorological Services, Fiji*
	Ms. Sharafat GADIMOVA, *United Nations Office for Outer Space Affairs*
	Prof. Sushil KUMAR, *University of the South Pacific, Fiji*
10:30 – 10:50	*Coffee Break*
10:50	**Session 1: Current status and future trends in global navigation satellite systems** *Chairperson : Brett CARTER, Australia* *Rapporteur : Shreya SARKAR, India*
10:50 – 11:10	Global Positioning System (GPS): Status and development, *Jeffrey AUERBACH, United States of America*
11:10 – 11:30	Global Navigation Satellite System (GLONASS): Status and development, *Sergey RYBKIN, Russian Federation*
11:30 – 11:50	Status Update on the European Satellite Navigation System (GALILEO), *Daniel BLONSKI, European Union*
11:50 – 12:10	BeiDou Navigation Satellite System (BDS): Status and Development, *Zeng ZHAOXIAN, China*
12:10	**Session 2: GNSS based applications** *Chairperson: Dinesh MANANDHAR, Japan* *Rapporteur : Balwinder Singh ARORA, Australia*
12:10 – 12:30	Development of precise positioning capabilities in mass market devices, *Matt HIGGINS, Australia*
12:30 – 12:50	Dissemination of real-time and post-mission value added GNSS-data – A Global Operator's Perspective, *Razig NOOR, Australia*
12:50 – 13:10	Concepts of Creating a Geodetic Adjustment, *Ed CARLSON, United States of America*
13:10 – 14:10	*Lunch Break*
14:10	**VENUE : N111 Lecture Theatre** **Session 2: GNSS based applications (continues)** *Chairperson: Louie P. BALICANTA, The Philippines* *Rapporteur : Thayahip THONGTAN, Thailand*

14:10 – 14:30	Bridging the gap between high altitude remote sensing and ground-based survey for marine conservation planning, *Subhash CHAND, New Zealand*
14:30 – 14:50	GNSS receiver autonomous integrity monitoring-based on vector tracking loop, *Farah UZMA, Pakistan*
14:50 – 15:10	Low-cost GNSS receiver system for high-precision GNSS data collection, *Dinesh MANANDHAR, Japan*
15:10 – 15:30	Application of BeiDou in Natural Disaster Emergency Management in China, *Yongfeng LIAO, China*
15:30 – 15:40	Questions and Discussions
15:40 – 16:00	*Coffee Break*
16:00	**Session 3: GNSS applications: National Programmes and projects** *Chairperson: Subhash CHAND, New Zealand* *Rapporteur: Siti Aminah BAHARI, Malaysia*
16:00 – 16:20	GNSS time transfer: Receiver internal delay determination, *Thayathip THONGTAN, Thailand*
16:20 – 16:40	Migration from Fiji Geodetic Datum 1986 (FGD86) to International Terrestrial Reference Frame, *Asakaia TABUA, Fiji*
16:40 – 17:00	Applications of GNSS in Tuvalu, *Faatasi MALOLOGA, Tuvalu*
17:00 – 17:20	The use of GNSS based technology in Vanuatu, *Atishnal CHAND, Vanuatu*
17:20 – 17:40	GNSS applications to make lives better in the Pacific-SkyEye Pacific, *Ebony-Jean TA' AVILI, Samoa*
17:40 – 18:00	The Plan for Development of a Modern Height System for Tonga, *Viliamu FOLAU, Tonga*
18:00	Adjourn
18:30	*Welcome Dinner*
Tuesday, 25 June 2019	
09:00	**VENUE: N111 Lecture Theatre** **Seminar on GNSS Spectrum Protection and Interference Detection and Mitigation** *Moderators: Jeffrey AUERBACH and Daniel BARNES, ICG Working Group S*
	The purpose of the seminar is to highlight the importance of GNSS spectrum protection at the national level and to explain how to reap the benefits of GNSS. Discussions between the ICG experts presenting the material and the workshop participants will also be held.
09:00 – 11:00	**I. Introduction and Overview** **II. Introduction to GNSS**
11:00 – 11:20	*Coffee Break*
11:20 – 13:00	**III. Spectrum Management**
13:00 – 14:00	*Lunch Break*

14:00	**Technical tour/City tour**
18:00	Adjourn
Wednesday, 26 June 2019	
09:00	**VENUE: N111 Lecture Theatre** **Seminar on GNSS Spectrum Protection and Interference Detection and Mitigation (continues)** *Moderators: Jeffrey AUERBACH and Daniel BARNES, ICG Working Group S*
09:00 – 11:00	**IV. Spectrum Protection**
11:00 – 11:20	*Coffee Break*
11:20 – 13:00	**V. Interference Detection and Mitigation** **VI. Summary/Interactive discussions**
13:00 – 14:00	*Lunch Break*
14:00	**Session 4: Space Weather** *Chairperson: Ebony-Jean TA'AVILI, Samoa* *Rapporteur: Sein MIN, Myanmar*
14:00 – 14:20	Monitoring and mitigating space weather effects for GNSS applications, *Balwinder Singh ARORA, Australia*
14:20 – 14:40	On the predictability of Equatorial Plasma Bubbles for GNSS users, *Brett CARTER, Australia*
14:40 – 15:00	Simulating Ionospheric mitigation on GNSS-based application, *Slamet SUPRIADI, Indonesia*
15:00 – 15:20	Modelling the ionospheric TEC over Malaysia using SCHA, *Siti Aminah BAHARI, Malaysia*
15:20 – 15:40	Ionospheric Scintillation of GNSS signals: Impacts and mitigation, *KEITH GROVES, United States of America*
15:40 – 16:00	Ionospheric response to Space Weather Events in March 2013 and 2015 and their Comparison with Similar Strength Storms of July 2012 and June 2015, *Sushil KUMAR, The University of the South Pacific, Fiji*
16:00 – 16:20	*Coffee Break*
16:20	**Session 5: Geodetic Reference Networks** *Chairperson: Viliamu FOLAU, Tonga* *Rapporteur: Tion URIAM, Kiribati*
16:20 – 16:40	Transitioning to the United States 2022 National Coordinate System Without Getting Left Behind, *Ed CARLSON, United States of America*
16:40 – 17:00	Updating Fiji's Maritime Survey ITRF 2005 to ITRF 2014, *Vasiti SOKO, Fiji*
17:00 – 17:20	National geodetic reference frame of Myanmar, *Sein MIN, Myanmar*

17:20 – 17:40	Linking the different coordinate systems in the Philippines using GNSS, *Louie BALICANTA, the Philippines*
17:40 – 18:00	SW maps for low cost GNSS receiver systems, *Dinesh MANADHAR on behalf of Avinab MALLA, Nepal*
18:00	Adjourn
Thursday, 27 June 2019	
09:00	**VENUE: Australia Pacific Lecture Theatre (092-001)** **Panel Discussion: Sustainability and Modernisation of GNSS CORS and Geospatial Infrastructure through Capacity Development** *Moderators: John DAWSON, UN GGIM AP WG1, Allison CRADDOCK, IGS and Robert SARIB, FIG Asia Pacific Capacity Development Network*
	The purpose is to provide the Pacific community with information in relation to importance of "planning" and its link to the "why, what and how" of developing "long term" capability with respect to GNSS CORS and Geospatial Infrastructure and related activities.
09:00 – 11:00	▪ "Why, what and how" of GNSS CORS and Geospatial Infrastructure, *John DAWSON, UN GGIM AP WG1 – Geodetic Reference Frames* ▪ Purpose and value of the UN / World Bank - Integrated Geospatial Information Framework, and the Sustainable Development Goals wrt GNSS CORS and Geospatial Infrastructure, *Allison CRADDOCK, UN Subcommittee on Geodesy - Education, Training and Capacity Building* ▪ Perspectives on business / operational / action plans for the sustainability of GNSS CORS and Geospatial Infrastructure, *Rob SARIB, FIG Asia Pacific Capacity Development Network* ▪ Case study of the regional strategy Position the Pacific for the Future - Pacific Geospatial Surveying Council, *Andrick LAL, PGSC and Pacific Community*
11:00 – 11:20	*Coffee Break*
11:20	**Panel Discussion: Sustainability and Modernisation of GNSS CORS and Geospatial Infrastructure through Capacity Development (continues)** *Moderators: John DAWSON, UN GGIM AP WG1, Allison CRADDOCK, IGS and Robert SARIB, FIG Asia Pacific Capacity Development Network*
11:20 – 13:00	▪ Examine case studies from Tonga, *Sosefo KAITAPU,* and Fiji, *Asakaia TABUA, Surveyor – General* ▪ Verify the capacity challenges, immediate needs and goals to develop GNSS and Geospatial infrastructure capability ▪ Examine the importance of GNSS CORS and Geospatial infrastructure in the Pacific ▪ Develop mechanisms to support regional collaboration

13:00 – 14:00	*Lunch Break*
14:00	**Special Technical Session: Standards and Interoperability of Precise Point Positioning Services** *Moderators: Suelynn CHOY and Daniel BLONSKI (on behalf of the ICG Working Groups D, B and S)*
14:00 – 14:10	Opening remarks
14:10 – 14:30	Multisystem GNSS receivers for high-precision applications with using global high-precision service, *Andrey VEITSEL, Russian Federation*
14:30 – 14:50	Status and prospects of the Russian PPP System for high-precision determination of Navigation and Ephemeris-time Information, *Vladimir PASYNKOV, Russian Federation*
14:50 – 15:10	PPP activity updates and plans of QZSS, *Kyohei AKIYAMA, Japan*
15:10 – 15:30	Recent Activity of International Standardization for High-Accuracy GNSS Correction Service, *Rui HIROKAWA, Japan*
15:40 – 16:00	*Coffee Break*
16:00	**Special Technical Session: Standards and Interoperability of Precise Point Positioning Services (continues)** *Moderators: Suelynn CHOY and Daniel BLONSKI (on behalf of the ICG Working Groups D, B and S)*
16:00 – 16:20	Galileo Status and High Accuracy, *Daniel BLONSKI, European Union*
16:20 – 16:40	Technical Issues for GNSS PPP Interoperability, *Daniel BLONSKI, European Union*
16:40 – 17:00	Development of BDS and Study of PPP Timing, *Rui TU, China*
17:00 – 17:20	The Australian SBAS Program: Progress and Motivation for a PPP Service, *Simon REYNOLDS, Australia*
17:20 – 17:40	On the interoperability of GNSS clock and bias products for precise point positioning with ambiguity resolution, *Simon BANVILLE, Canada*
17:40 – 18:00	GNSS Precise (Point) Positioning: Where to from here ? *Suelynn CHOY, Australia*
18:00	Adjourn
Friday, 28 June 2019 **(<u>In parallel):</u> CLOSED SESSION: ICG Members Only –Discussion and preparation of potential draft recommendation(s) to ICG-14 @ Bangalore and actions** **VENUE: USP ICT Videoconference Room 2**	
09:00	**VENUE: Australia Pacific Lecture Theatre (092-001)** **Session 6: Capacity building and International/National experiences in the use and implementation of GNSS technologies** *Chairperson: Atishnal CHAND, Vanuatu* *Rapporteur: Dinesh MANANDHAR, Japan*

09:00 – 09:20	Capacity Building of GNSS Education in China and its enlightenment, *Jung GUIFEI, China*
09:20 - 09:40	GNSS and the Pacific Community, *Andrick LAL, South Pacific Community, Fiji*
09:40 – 10:00	GNSS activities in Mongolia, *Ochirkhuyag LKHAMJAV, Mongolia*
10:00 - 10:20	GLONASS: Present and Future, *Shreya SARKAR, India*
10:20 – 10:40	Angola-Russia cooperation in the development of GNSS monitoring ground station: capacity Building for Angolan Specialists, *Amaro Francisco Alberto JOAO and Solana Gracierre da Costa FERREIRA, Angola*
10:40 – 11:00	Development and application of national Beidou ground-based augmentation system, *Haoyu LOU, China*
11:00 – 11:20	Kirbati Maritime Boundaries Project, *Tion URIAM, Kiribati*
11:20 – 11:40	The USP Bachelor of Geospatial Science – Capacity Building and Community Engagement using GNSS, *Nick ROLLINGS, Fiji*
11:40 – 12:40	**Discussion Session** *Moderators: Sharafat GADIMOVA, United Nations Office for Outer Space Affairs and Sushil KUMAR, The University of the South Pacific, Fiji* ▪ *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).*
12:40 – 13:00	**Concluding Remarks** ▪ *Concluding remarks by the sessions co-chairs/moderators* ▪ *Sharafat GADIMOVA, United Nations Office for Outer Space Affairs* ▪ *Sushil KUMAR, The University of the South Pacific, Fiji*
13:00 – 14:00	*Lunch Break*