



References Frame in Practice Seminar

Operational Aspects of GNSS CORS

Venue: Lali Room, Holiday Inn, Suva - Fiji

PROGRAM

Tuesday 18th September 2018

08:30 – 8:50 Registration

09:00 – 9:45 Welcome and Opening Remarks

Paserio Samisoni

- Reverend Raki Tigarea – *Lecturer, Pacific Theological College, Suva, Fiji.*
- Dr. Andrew Jones – *Director, Geoscience, Energy & Maritime Division, Pacific Community (SPC), Fiji.*
- Mr. Malakai Finau – *Permanent Secretary, Ministry of Lands and Mineral Resources, Fiji.*
- Ms. Meizyanne Hicks – *Vice Chair, Pacific Geospatial Surveying Council.*

09:45 – 10:30 Presentation 1.1

What is GNSS CORS and how does it work? – Andrick Lal, Geoscience, Energy & Maritime Division - Pacific Community

GNSS CORS is a station with a defined position that uses satellite technology to derive accurate positions for spatial, agriculture, construction, mining, scientific, maritime industries etc. One must have a very reliable internet communications for access to the GNSS CORS.

10:30 – 11:00 Group Photo and Morning Tea

11:00 – 11:45 Presentation 1.2

Rob Sarib

Establishment of GNSS CORS – Paserio Samisoni, Control Section, MLMR

GNSS CORS are integral to implementing modern geospatial infrastructure. This presentation will discuss GNSS CORS development in context of - land acquisition; stakeholder engagement; formalisation of tenure/occupation; procurement; construction; technical installation; site monitoring (physical); plus ongoing maintenance; connection to datum

11:45 – 12:30 Presentation 1.3

GNSS CORS in the Pacific – *Andrick Lal, Geoscience, Energy & Maritime Division - Pacific Community*

In each of all the thirteen pacific island countries, there is at least one (1) GNSS CORS. These GNSS CORS established as part of the South Pacific Sea Level & Climate Monitoring Project from 2001 to 2003 and to maintain these stations, there were challenges but it was for the good benefit as now they are part of the IGS network.

12:30 – 13:30 Lunch

13:30 – 14:00 Presentation 1.4

Edward Carlson

Positioning in the Pacific: Good coordinates for good coordination – *Nicholas Brown, Geoscience Australia*

Geodetic data and spatial information is increasingly being relied upon to find solutions to address social, economic and environmental challenges and ensure sustainable development. In order to meet these challenges, countries need to develop and implement a robust national geodetic framework. This presentation will describe the opportunities provided by cheap and efficient access to precise positioning and how, when combined with accurate coordinate reference frame, used to improve national data management and make informed decisions.

14:00 – 14:45 Presentation 1.5

The Operation, Management and the role of New Zealand's CORS Network – *Paula Gentle, LINZ*

New Zealand's CORS network operated in partnership with GNS Science (GeoNet) and Land Information New Zealand. This presentation will give an overview of the network, its operation and its connection to New Zealand's National Datum. The network also provides a number of products and services that are available for free

14:45 – 15:30 Presentation 1.6

Fiji's Geodetic Datum Modernisation Program and Challenges – *Asakaia Tabua, Surveyor General Fiji*

Modernization of Fiji's Geodetic Datum program aligned to the UN General Assembly resolution on GGRF for sustainable development and Fiji's cabinet decision on 29 August 2015. This presentation will focus on the project progress and some of the challenges.

15:30 – 16:00 Afternoon Tea

16:00 – 16:45 Presentation 1.7

Asakaia Tabua

Tonga's Geodetic Datum Modernisation Strategy – *Viliami Folau, Geodetic Survey Services, Tonga*

The aim for the Modernisation of Tonga's geodetic infrastructure is to ensure requirements are in place for a fully modernized geodetic reference frame. The strategy has three main strategic priorities; 1) Modern geodetic reference frame aligned to the Global Geodetic Reference Frame; 2) Modern height reference frame for the whole of Tonga; and 3) Legal framework to empower geodetic datum modernization-Survey Act. This draft strategy is also accompanied with Action Plans and Implementation Plan

16:45 – 17:30

Summary and Questions / Answers

Panel

18:30 – 21:00 Seminar Dinner @ Café 389, Suva Bowling Club, Fiji.

The Organizers would like to thank and acknowledge the following sponsors for their generous support of this event.

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Wednesday 19th September 2018

09:00 – 09:45 Presentation 2.1

Viliani Folau

How to connect GNSS CORS to ITRF and Geospatial Datasets – Ed Carlson, NOAA

The presentation will discuss how the U.S. National Oceanic & Atmospheric Administration (NOAA), National Geodetic Survey (NGS), 1) Is re-inventing the entire National Spatial Reference System with a release of the modernized reference system in 2022 to meet the user's needs using GPS technology. 2) NGS methods of connecting to the 2022 datum in the future.

09:45 – 10:30 Presentation 2.2

Introduction to height datum and how to create a modern height datum in the Pacific – Nicholas Brown, Geoscience Australia

There is an increasing reliance on GPS to provide positioning solutions, however heights observed from GPS are not relative to sea level. We need a model to convert between them. In order to make the most of the efficiency and accuracy of GPS, we need a way to convert heights observed from GPS to heights relative to sea level. This presentation will explain the importance of height datum and how they can be developed in the Pacific to improve compatibility with GPS leading to economic, environmental and societal benefits

10:30 – 11:00 Morning Tea

11:00 – 11:30 Presentation 2.3

Noor Raziq

Connecting Fiji's Geospatial Information to Datum via GNSS CORS – Meizyanne Hicks, Geospatial Information Management, Ministry of Lands & Mineral Resources

The reference frame forms the starting point for collection, update, distribution and analysis of geospatial information. Most of Fiji's geospatial information is based on the WGS72 datum, which by international standards, outdated. The benefits of updating reference frame via the GNSS CORS to international standards allows for geospatial information in Fiji to be on par with the rest of the world and paves the way for integration and sharing of data sets for informed planning and decision making to address issues that affects Fiji and its vision for sustainable development in the national, regional and international arena

11:30 – 11:50 Presentation 2.4

GNSS CORS for Topography – Andrick Lal, Geoscience, Energy & Maritime Division - Pacific Community

The GNSS CORS in many ways used as a reference station, one good use, is for the post processing of the kinematic GNSS data.

11:50 – 12:10 Presentation 2.5

GNSS CORS for Hydrography – Salesh Kumar, Geoscience, Energy & Maritime Division - Pacific Community

The GNSS CORS high rate data sets of the South Pacific Regional GNSS Network used to correct the positions of the hydrography survey.

12:10 – 12:30 Presentation 2.6

GNSS CORS for Disaster Management – Zulfikar Begg, Geoscience, Energy & Maritime Division - Pacific Community

In recent years, Pacific region has experienced major tropical cyclones with impacts in a number of countries. GNSS CORS utilized in the acquisition of aerial and topographical datasets post these events.

12:30 – 13:30 Lunch

13:30 – 14:15 Presentation 2.7

Meizyanne Hicks

Dissemination of Real-Time and Post-Mission value added GNSS data – A Global Operator's Perspective- *Dr Noor Raziq, HxGN SmartNet - Australia*

GNSS correction data is the key requirement for high accuracy/high precision positioning applications. This correction data is supplied to end users in real-time or post-mission, in raw form (RTK) or value-added form (NRTK) as per the application requirements. Multiple industry solutions are available to fulfil the correction data requirements of a range of users. In this presentation, various aspects of a flexible, scalable, open and easy-to-use GNSS data dissemination solution is presented consisting of 4500+ CORS stations globally and 625+ stations in Australia

14:15 – 15:30 Presentation 2.8

Critical analysis of GNSS CORS Applications in the Pacific - *Neil Ashcroft, Leica Geosystems*

What is a GNSS CORS system used for? Many varied agencies install GNSS CORS for their specific applications. This presentation highlights the common or critical uses of such infrastructure across the Asia Pacific region, but also upcoming applications that such CORS infrastructure can support. The more applications that use CORS infrastructure allows better financial justification to support the construction and operation of said infrastructure.

15:30 – 16:00 Afternoon Tea

16:00 – 17:00 Presentation 2.9

Neil Ashcroft

Application Demonstrations

Paula Gentle, LINZ

Using SNAP to combine GNSS SINEX and GNSS baseline data and then perform a least squares adjustment to generate coordinates

Dr Noor Raziq, HxGN SmartNet – Australia

HxGN SmartNet – X-POS online GNSS positioning

Nicholas Brown, Geoscience Australia

Worked example of the GDA2020 and AUSGeoid2020 development

Andrick Lal, Pacific Community

RTK Lib, open source GNSS Software for GNSS Solutions

Andrick Lal, Pacific Community

Online Approaches for GNSS CORS for GNSS Online solutions

17:00 – 17:30

Summary and Questions / Answers

Panel

Thursday 20th September 2018

09:00 – 09:30 Presentation 3.1

Paula Gentle

The Importance of Standards and Acceptable Practices for GNSS CORS and Survey Control – Rob Sarib, FIG AP CDN

It is very common nowadays for surveyors and geospatial professionals to use GNSS measurements to survey the control for a project. In most cases, these results in geo-referencing data and determining co-ordinates on a specific datum and to required accuracy. To deliver this efficiently and economically, operators of GNSS CORS, dataset custodians, geospatial and surveying professionals have become more reliant on standards and acceptable practices associated with GNSS CORS and measurement. This presentation will discuss FIG's perspectives on this subject.

09:30 – 10:15 Presentation 3.2

Concepts of Creating a Geodetic Adjustment – Ed Carlson, NOAA

The presentation will discuss NGS's method of doing a GPS network to include project lay out, observations, data processing, analysis of baselines, and adjustments.

10:15 – 10:45 Morning Tea

10:45 – 12:00 Presentation 3.3

Nicholas Brown

Legislative Challenges for Geodetic Datum and Infrastructure GNSS CORS – Rob Sarib, FIG AP CDN

Implementing a new geodetic datum has many facets, which an agency must consider. One of those is the development of legislation, related policies and guidelines associated with geodetic datum and associated infrastructure such as GNSS CORS. This presentation will explore these in context of fundamental geospatial datasets, capacity building and the challenges faced by an agency and the professional surveyor.

12:00 – 13:00 Lunch

13:00 – 13:30 Workshop 3.4

Panel

The Way Forward?

13:30 – 14:30 Workshop 3.5

Seminar Summary and Resolution

14:30 – 14:45 Closing Ceremony

14:45 – 15:00 Afternoon Tea

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15:15 – 16:30 Inauguration Ceremony Mead Road, Nabua, Suva.

Commission Suva Global Navigation Satellite System (GNSS) Continuous Operating Reference Station (CORS)

The proceedings of this function will take place at the newly established GNSS CORS Site in the compounds of Mineral Resources Department, at Mead Road Nabua, Suva.

Transport provided to travel to the Site; those with their own can travel.

The Organizers would like to thank and acknowledge the following sponsors for their generous support of this event.

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Presenter Profiles



Malakai Finau, Permanent Secretary for Ministry of Lands & Mineral Resources, Fiji.

Mr. Malakai Finau is originally from Kabara with maternal link to Moturiki, Fiji. Started his career as a Technical Officer at Mineral Resources Department on 21 July 1987. He rose through the ranks and promoted to the post of Director Mineral Resources on 25 November 2010 before appointed as Permanent Secretary for Lands and Mineral Resources in December 2015. He holds graduate and postgraduate qualifications in Applied Geology and Business Administration. His hobbies are community work, socializing and rugby administration.



Edward E. Carlson, National Geodetic Survey - Honolulu, Hawaii

Mr. Edward Carlson is a geodesist with the National Geodetic Survey (NGS) and for the last 16 years has served as the geodetic advisor for the Pacific Region. In his 46 years of in geodetic surveying, he is experienced in planning, surveying, processing, and adjusting survey control projects using the Global Positioning System (GPS).

As the Pacific Region Geodetic Advisor is a liaison between NGS and the Pacific to guide and assist in the regions geodetic, charting, surveying, remote sensing, and land information system programs. He provides technical advice and training to federal, state, county, city, and local users in planning and coordinating field surveys, providing quality assurance, and assisting in preparing data for inclusion into the National Spatial Reference System. Also, he serves as a primary contact for relating user needs to NGS and NOAA plus transferring new technical developments to local users.



Nicholas Brown, National Geodesy Section Leader - Positioning and Community Safety Division, Geoscience Australia

Mr. Nicholas Brown from Geoscience Australia is the Director of National Geodesy and Chair of the Permanent Committee on Geodesy. Nicholas is responsible for the development and refinement of the national coordinate reference frame, absolute gravimetry program, InSAR program and national geodesy products including geoid models. Nicholas has a Bachelor of Applied Science in Geomatics from RMIT and a Masters in Geophysics (Space Geodesy) from ANU.



Dr. Noor Raziq, GNSS Network Manager HxGN SmartNet – Australia

Dr. Noor Raziq is responsible for the business development, operation and coordination of HxGN SmartNet business in Australia. He has a PhD in Geomatics from the University of Melbourne and BSc (Hons) in Civil Engineering. He has worked in GNSS research and development in Australia and in Project Management overseas.



Robert Sarib, Director Survey; Surveyor General, Northern Territory Government of Australia

Mr. Rob Sarib has been an active member of the FIG since 2002, and is now Chair of the FIG Asia Pacific Capacity Development Network. Rob is presently a Board member of Surveying and Spatial Sciences Institute; a member of the Inter-governmental Committee on Survey and Mapping – Australia; and member of the Council of Reciprocal Surveying Boards Australia and New Zealand.



Paula Gentle, Senior Geodesist, Land Information New Zealand (LINZ)

Ms. Paula Gentle is responsible for the LINZ PositionZ CORS network and is involved in many geodetic related activities including the LINZ GNSS data archive project, local tie surveys between space geodesy infrastructure and GNSS campaigns for deformation monitoring. Paula has a Bachelor of Surveying (BSurv) from University of Otago and has just completed a Graduate Diploma in Science majoring in Geophysics (GDipSc) from Victoria University of Wellington



Neil Ashcroft, Manager, Asia Pacific Reference Station and Monitoring Segment Program for Leica Geosystems Technologies Pte Ltd

Prior to joining Leica Geosystems in 1999, Mr. Neil Ashcroft worked as a Tunnel surveyor for two large railway projects in UK and one in Singapore. Since he has been with Leica Geosystems he has a technical support role for supporting Total Stations, GNSS, Laser Scanners, Reference Station and Monitoring solutions. He graduated in 1987 with a BSc in Surveying and Mapping Sciences from UK.



Asakaia Tabua, Surveyor General, Ministry of Lands & Mineral Resources, Fiji

Mr. Asakaia Tabua is originally from Naitasiri, Fiji, he started his career as a Technical Assistant at Lands Department in 2004. He rose through the ranks from Technical Assistant to Principal Surveyor before promoted to the post of Surveyor General in early 2018. He holds diploma in Geomatics and postgraduate qualifications in Land Management. Proven experience in all aspects of Geodetic Surveying with a very good knowledge of control survey specifications and standards; involved in many geodetic surveying throughout Fiji; been the Secretary for the Fiji Surveyors Registration Board and member of the UN-GGIM Sub-Committee on Geodesy since 2017.



Meizyanne Hicks, Acting Director Geospatial Information Management, Ministry of Lands and Mineral Resources, Fiji

Ms. Meizyanne Hicks is originally from Namosi and joined the Aerial Survey Section as a Technical Assistant in 1997. She rose through the ranks and is currently the Acting Director Geospatial Information Management. She holds a Diploma in GIS, Bachelor's Degree in Land Use Planning and Geography and Graduate Certificate in Management and Public Administration. She has been working 1:50000 scaled National Mapping Project, other large-scale mapping for government and non-government agencies, purchase and distribution of multi spectral satellite imagery to FGIC member agencies and the acquisition of the UAV System for the Ministry. She is currently the Vice Chair for the PGSC.



Viliami Tani Ma'ake Folau, Geodetic Survey Services, Surveying Division, Ministry of Lands and Natural Resources

Mr. Viliami Folau started working in the Survey & Geodesy Division for the Ministry of Lands & Survey in 1996. Mostly working in Cadastral Surveys until 2006 when GNSS was introduced and Geodetic Survey was part of my role not officially but as a hobby. He is head of the Geodetic Survey Services of the Ministry since July 2018.

Graduated with Diploma in Geomatics from USP 2010, Bachelor of Arts in Land Use Planning and Real Estate from USP in 2012, MA Design (Urban) Queensland University of Technology, 2014..



Andrick Lal, Senior Geodetic Surveyor, Pacific Community (SPC)

Mr. Andrick Lal, originally from Suva, based at the Geoscience Energy and Maritime Division of Pacific Community, in Suva, Fiji. He has been involved in projects such as Pacific Sea Level & Geodetic Monitoring Project and the Regional Maritime Boundaries Project for more than fifteen (15) years in the thirteen (13) Pacific Island Countries and its territories supporting a range of thematic areas, which includes geoscience, maritime, hydrography, geodetic surveys using technologies such as Total Station, GNSS & unmanned aerial systems. His background is in surveying and geographical information system. Andrick provides support for the SPC Pacific Geospatial & Surveying Partnership Desk.



Zulfikar Begg, Ocean Science Officer, Pacific Community (SPC)

Mr. Zulfikar Begg, originally from RakiRaki, based at the Geoscience Energy and Maritime Division of Pacific Community, in Suva, Fiji. He has been involved with projects on a range of thematic areas, which include oceanography, hydrography, geodetic, application of unmanned aerial systems and post disaster assessments.

Zulfikar has Bachelor of Science in Environment Science with emphasis in Earth Science and Masters of Science in Marine Science, from the University of the South Pacific.



Saleshe Kumar, Hydrographic Surveyor, Pacific Community (SPC)

Mr. Saleshe Kumar, originally from Labasa, based at the Geoscience Energy and Maritime Division of Pacific Community, in Suva, Fiji. He is looking after the Pacific Regional Navigation Initiative (PRNI) project and also looks after the technical assessments of the Safety of Navigation projects in the thirteen Pacific Island countries and its territories.

He has been involved with other projects on a range of thematic areas, which include oceanography, hydrography, geodetic, application of unmanned aerial systems and post disaster assessments.

Saleshe has Bachelor of Science with emphasis in Earth Science and Post Graduate in Environmental Science, from the University of the South Pacific. He also holds an IHO Cat B certification in nautical charting and military hydrography. He also holds the International Association of Lighthouse Authorities (IALA) level 1 Aids to Navigation manager certification.