

# Pacific Geospatial and Surveying Council (PGSC)

Mr Vaipo Mataora (Cook Islands), Chair - PGSC

Ms Meizyanne Hicks (Fiji), Vice Chair - PGSC

Supported by: SPC Partnership Desk

Email: [pgsc\\_desk@spc.int](mailto:pgsc_desk@spc.int)

<http://pgsc.gem.spc.int/>



Pacific  
Community  
Communauté  
du Pacifique

Andrick Lal  
Senior Geodetic Surveyor  
Geoscience Energy & Maritime Division - SPC  
SEABED 2030 – 6<sup>th</sup> Pacific Ocean Mapping Meeting  
6<sup>th</sup> November 2024 Nadi – Fiji.



# What is the PGSC?

## Pacific Geospatial & Surveying Council

- **Independent regional body** advancing geospatial and surveying standards and capacity
- Established in the margins of the Pacific GIS/RS User Conference in November 2014
- Governed by the **PGSC Charter**
- Implementing and monitoring progress against the **PGSC Strategy (2017-2027)**
- Supported by **PGSC Partnership Desk** (GEM Division of SPC)
- **Recognised** Nationally, Regionally and Globally



# Mission

Pacific Island survey and geospatial services, including hazard mapping, urban planning, cadastre mapping, hydrography, and other geospatial requirements for sustainable development, are sufficiently resourced to respond to member country priorities.





# United Nations Committee of Experts on Global Geospatial Information Management

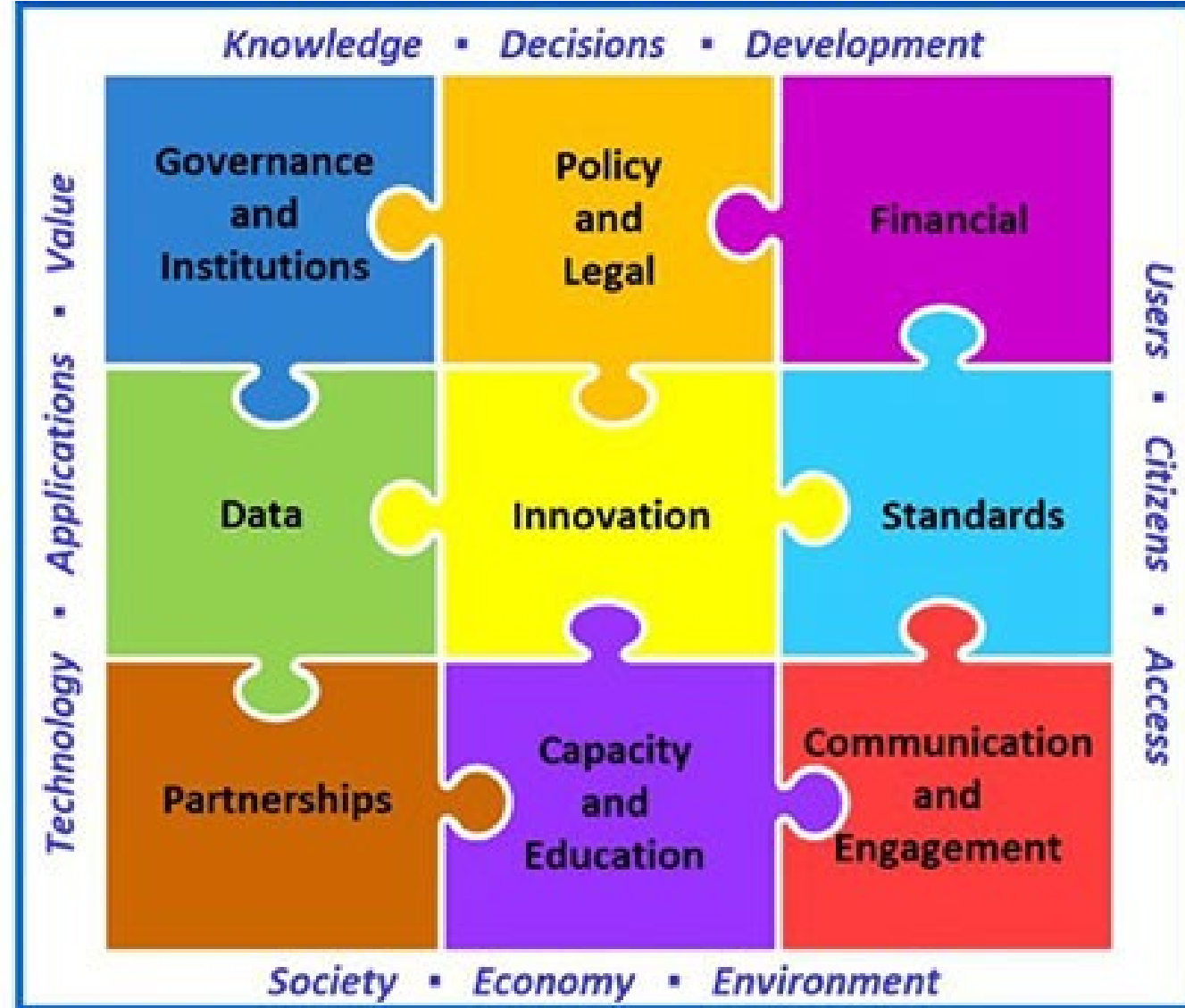


The Integrated Geospatial Information Framework provides a basis and guide for developing, integrating and strengthening geospatial information management.

Governance

Technology

People

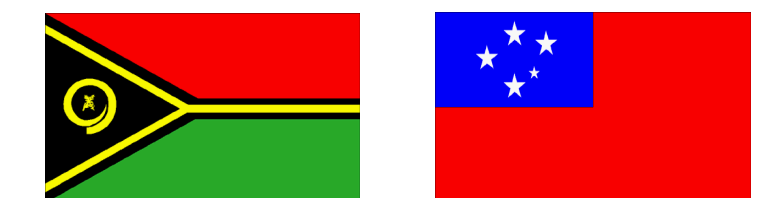
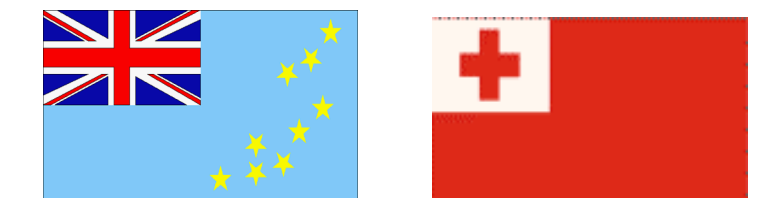
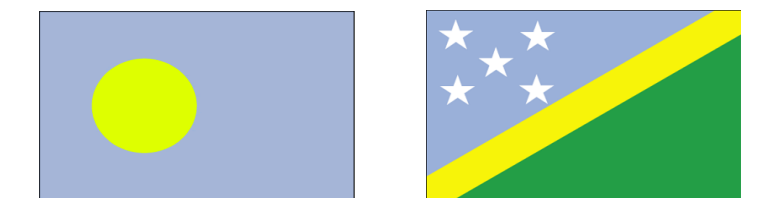
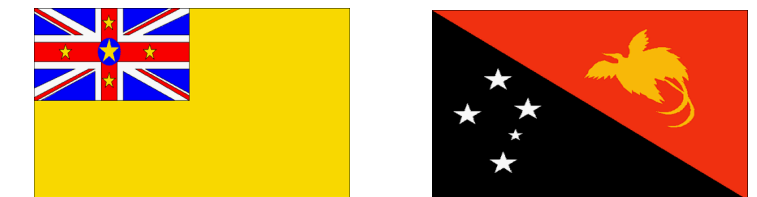
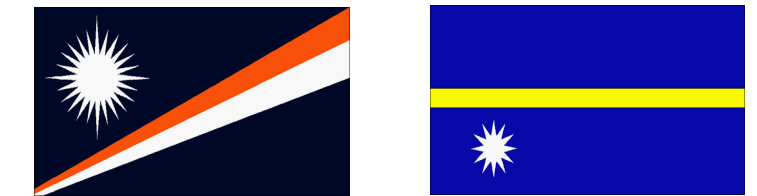
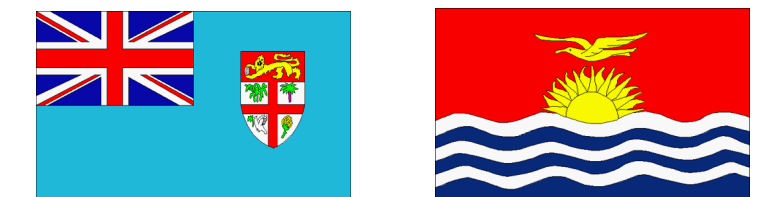
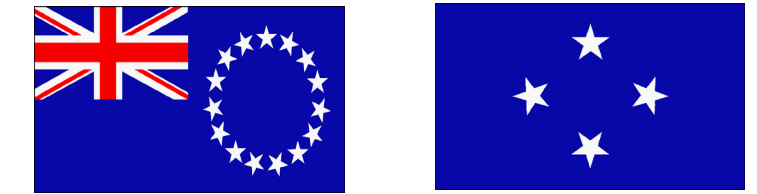


Anchored by 9 Strategic Pathways, the Framework is a mechanism for articulating and demonstrating national leadership in geospatial information, and the capacity to take positive steps.

Sub-committee on Geodesy

Expert Group on Land Administration and Management

Expert Group on Marine Geospatial Information



# Strategic Partnerships

- **Donor** support from AU-DFAT, NZ-MFAT, UN-GGIM
- **Training and capacity support** from Geoscience Australia, LINZ, UN-GGIM-AP, FIG, UKHO, USP, UNOOSA, SPC
- **Equipment and infrastructure** support from GA, SPC
- **MoU** signed with S+SNZ (2018) and SSSi (2019)
- Links with key global and regional frameworks:
  - SDGs, UN-GGIM Roadmap, Sendai Framework, SAMOA Pathway, FRDP, FIG Suva Statement and Christchurch Declaration



Pacific and New Zealand surveying and geospatial professionals join forces for capacity development

10 Apr 2018 | Nuku'Alofa



MoU signed with S+SNZ April 2018



MoU signed with SSSi Aug 2019



# 6<sup>th</sup> PGSC Meeting – Sydney Australia



## PGSC Business Meeting (11<sup>th</sup> December 2023)

- Council Elections
- 5<sup>th</sup> PGSC Meeting Minutes
- PGSC Review of Charter
- Terms of reference: -
  - PGSC Women Network
  - PGSC Young Surveyors Geospatial Network
- PGSC Working Groups
- PIC Country Updates
- PGSC Action Items



# 6<sup>th</sup> PGSC Partners Meeting - 12<sup>th</sup> Dec 2023



## Regional Updates

1. **SPC** Case study on Data Handling & Requirements
2. **SPC** Geospatial & Surveying Activities
3. **Bureau of Meteorology Australia** (COSPPac)
4. **GA** (Geoscience Australia)
5. **GCA** (Geospatial Council Australia)
6. **LINZ** (Land Information New Zealand)
7. **S+SNZ** (Survey and Spatial New Zealand)
8. **AHO** (Australia Hydrographic Office)
9. **SWPHC** (Southwest Pacific Hydrographic Commission)
10. **NIWA** (National Institute of Water & Atmospheric)
11. **GTEWS** (Global Navigation Satellite System Tsunami Early Warning Systems) – IUGG Initiatives
12. **Australian Consulting Surveyors Network**
13. **PIAG** (Pacific Islands Advisory Group – GEO)

## Global Updates

13. **FIG AP CDN** (Asia Pacific Capacity Development Network)
14. **UN GGIM (Working Group on Marine Geospatial Information)**
15. **UN GGIM Sub-committee on Geodesy (SCoG)**
16. **NOAA** (National Oceanic and Atmospheric Administration)
17. **IGS** (International GNSS Service)
18. **IHO** (International Hydrographic Office)
19. **UN GGCE** (Global Geodetic Centre of Excellence)

## Regional Initiatives

20. **Fugro**
21. **IIC Technologies**
22. **Land Equity International**
23. **Aaron Hicks** (under New Zealand Volunteer Scheme)

# PGSC Working Groups

## Positioning



Supporting countries to modernise their Geodetic Reference Frames and align to the Global model

## Geospatial Policy & Data Management



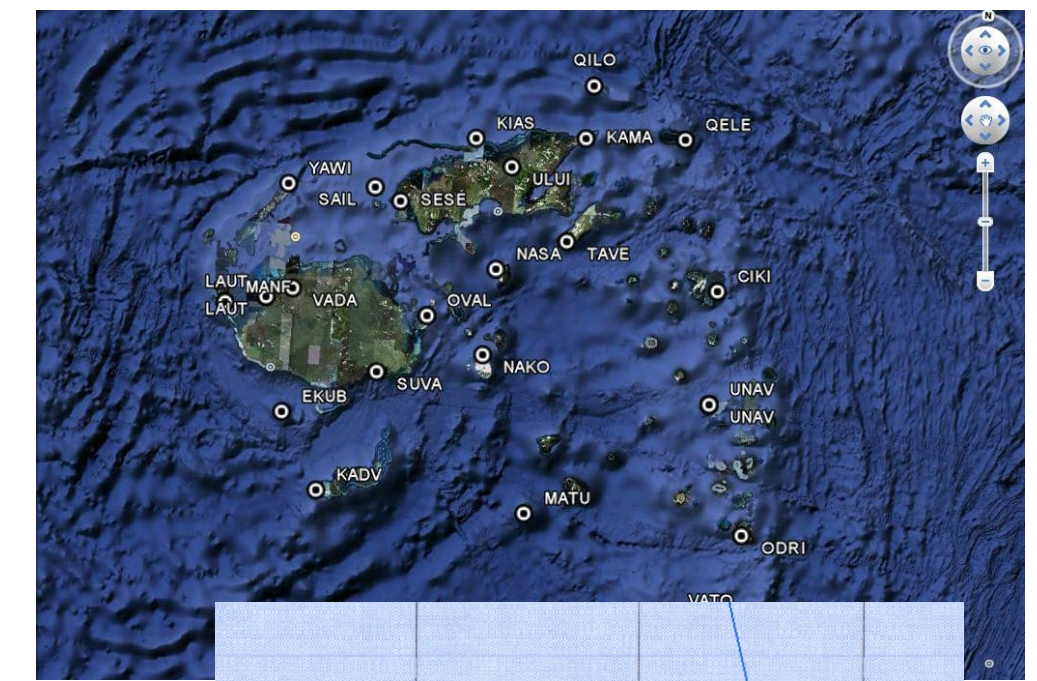
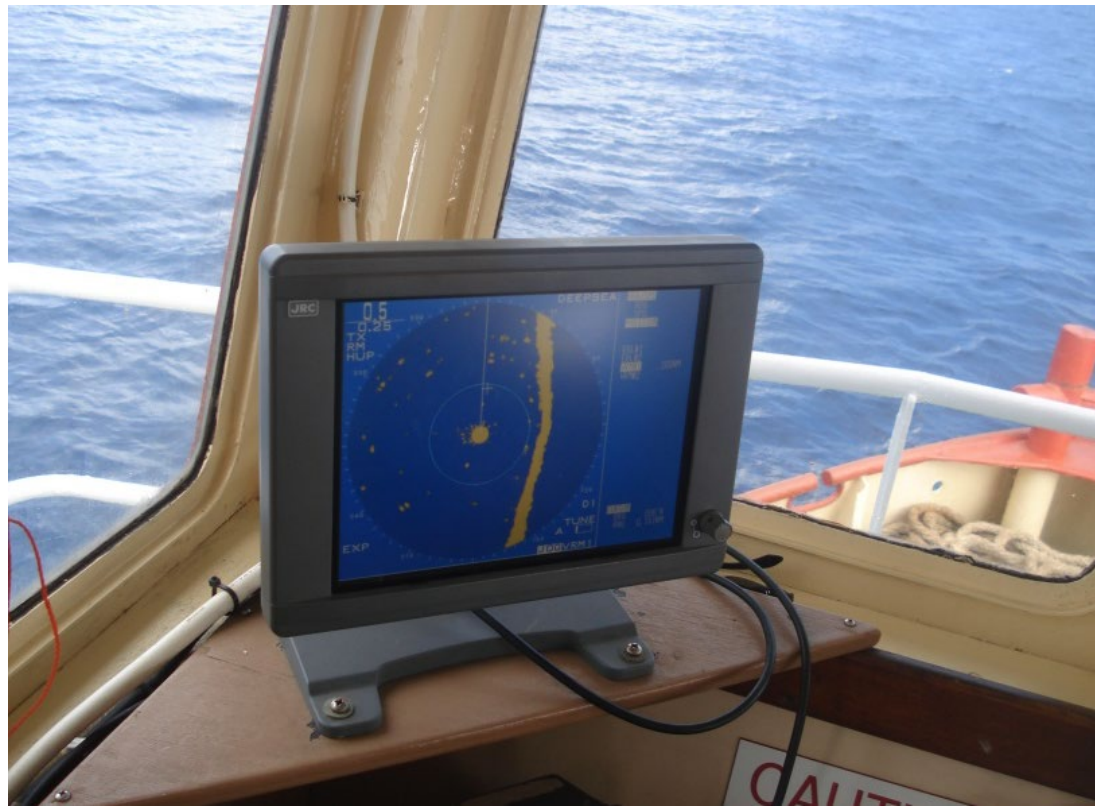
Supporting countries to develop policies and tools for improved geospatial information and data management

## Capacity Building



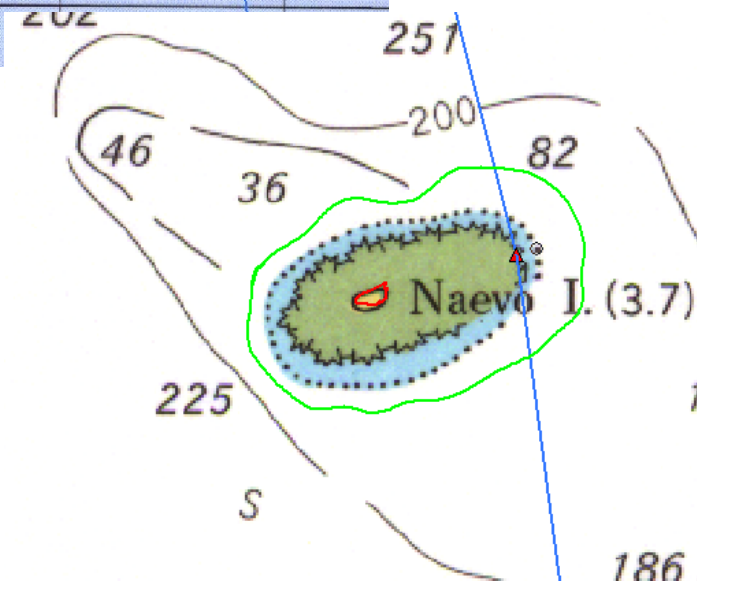
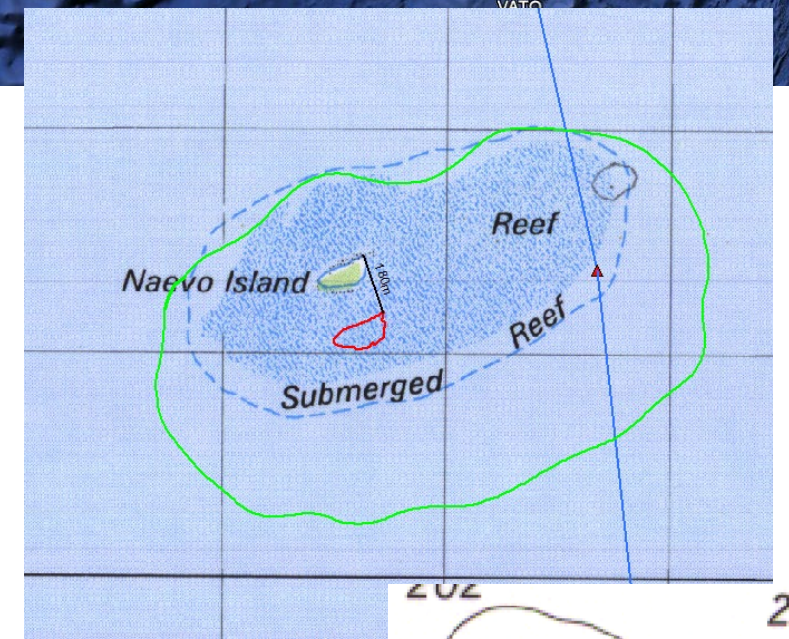
Supporting countries to build existing and future capacity through expanded professional development and educational opportunities

# Positioning



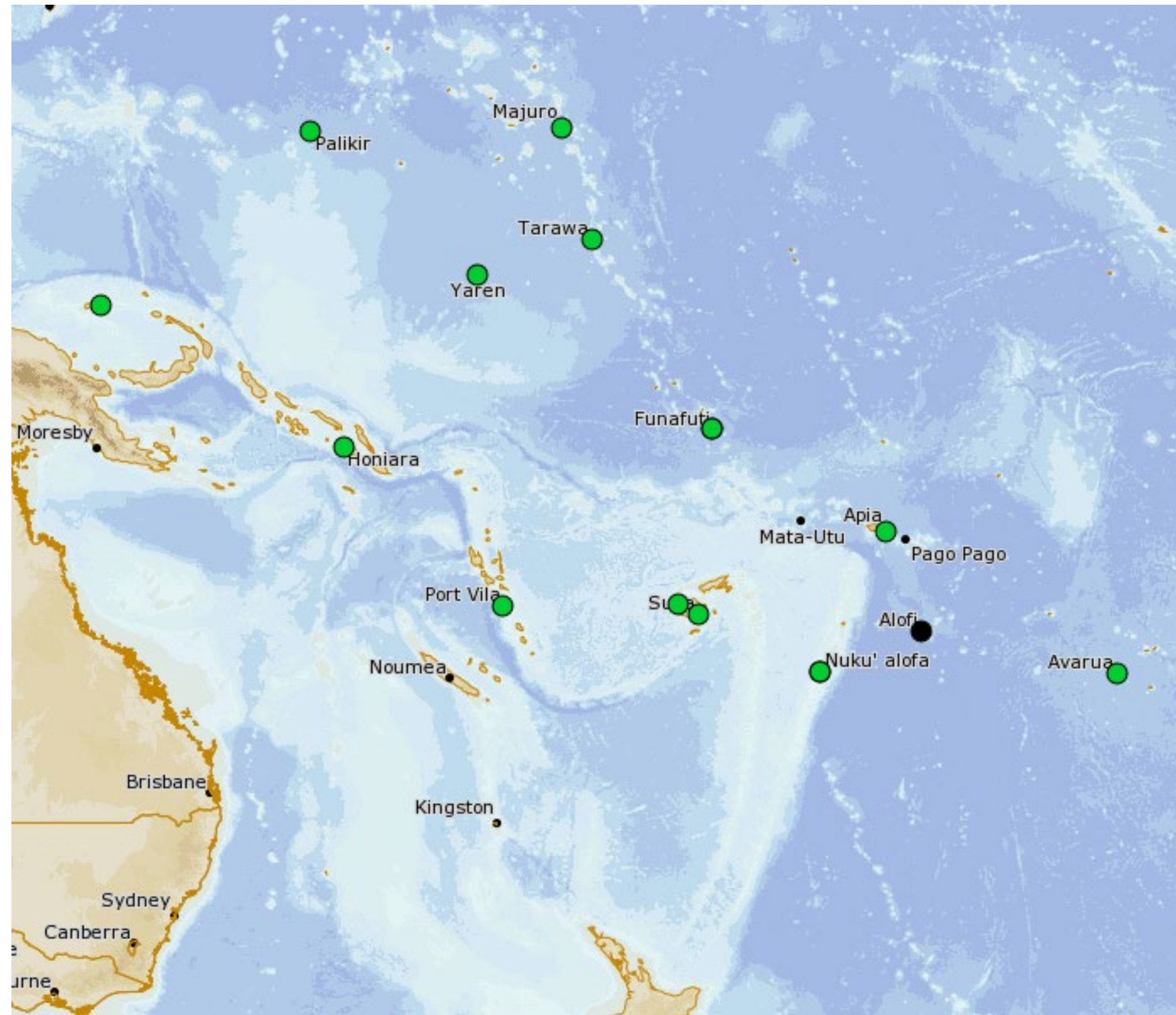
```

=====
FIJI GEODETIC DATUM 2019 - 2020 GNSS OCCUPATION REPORT
=====
STATION NAME: CEVA I RA
4 CHARACTER ID: CEVA
LOCATION: CEVA I RA I SLAND
COUNTRY: FIJI
TYPE OF SURVEY MARK: 20mmx1.220mm STEEL ROD ENCASED BY 30mmx0.5mm ALUMINIUM PIPE IN SITU IN CONCRETE.
ORTHOMETRIC HEIGHT OF SURVEY MARK: (MEAN SEA LEVEL DATUM)
OBSERVATION START DATE/DAY: 09/11/2019
UTC TIME: 2257hrs
OBSERVATION END DATE/DAY: 17/11/2019
UTC TIME: 0007hrs
GNSS RECEIVER TYPE: TRIMBLE
MODEL: TRIMBLE R10
SERIAL NUMBER: 5333441663
FIRMWARE VERSION: 4.81
GNSS ANTENNA TYPE: TRIMBLE
MODEL: TRMR10
SERIAL NUMBER: 5333441663
HEIGHT OF GNSS ANTENNA ABOVE STATION MARK: 1.643m (VERTICAL MEASUREMENT)
DESCRIPTION OF THE POINT ON THE GNSS ANTENNA
THAT THE ANTENNA HEIGHT REFERS TO:
BOTTOM OF QUICK RELEASE
ANTENNA HEIGHT TO ARP - 1.692m
=====
ATTACH ADDITIONAL INFORMATION AND DIAGRAMS THAT MAY BE USEFUL FOR PERSONS PROCESSING THE DATA AND ANALYSING THE RESULTS.
    
```



# Pacific Sea Level & Geodetic Monitoring Stations

1. Cook Islands
2. Federated States of Micronesia
3. Fiji - Lautoka
4. Fiji - Suva
5. Kiribati
6. Marshall Islands
7. Niue
8. Nauru
9. Papua New Guinea
10. Samoa
11. Solomon Islands
12. Tonga
13. Tuvalu
14. Vanuatu



Began in 1991 as an Australian response to concerns raised by the member countries of the South Pacific Forum over the potential impacts of global warming on climate and sea levels in the Pacific.

Australia has been supporting 13 Pacific Island countries (PICs) to measure, record and analyse long-term sea level and land motion for over 25 years. This is known as the Pacific Sea Level and Geodetic Monitoring (PSLGM) project funded by Australian Aid under the Climate and Oceans Support Program in the Pacific (COSPPac).

The sea level data is collected continuously at one or two tide gauges and land motion data is collected continuously at one or two Global Navigation Satellite System (GNSS) stations in each of the 13 PICs.

Primary goal “to generate an accurate record of variance in long-term sea level for the Pacific and to establish methods to make [these] data readily available and usable by Pacific Island Countries



Climate and Oceans Support  
Program in the Pacific

# Pacific Sea Level & Geodetic Monitoring Stations



## Vertical motion of Pacific Island tide gauges (2023)

Combined analysis from GNSS and levelling

GEOSCIENCE AUSTRALIA  
RECORD 2024/09

N. J. Brown<sup>1</sup>, A. Lal<sup>2</sup>, S. Masoumi<sup>1</sup>, S. McClusky<sup>1</sup>, A.R. Riddell<sup>1</sup> and G. Hu<sup>1</sup>

1. Geoscience Australia
2. Pacific Community (SPC).

<http://pid.geoscience.gov.au/dataset/ga/148937>

*GNSS COR station in Nuku'alofa, Tonga.*



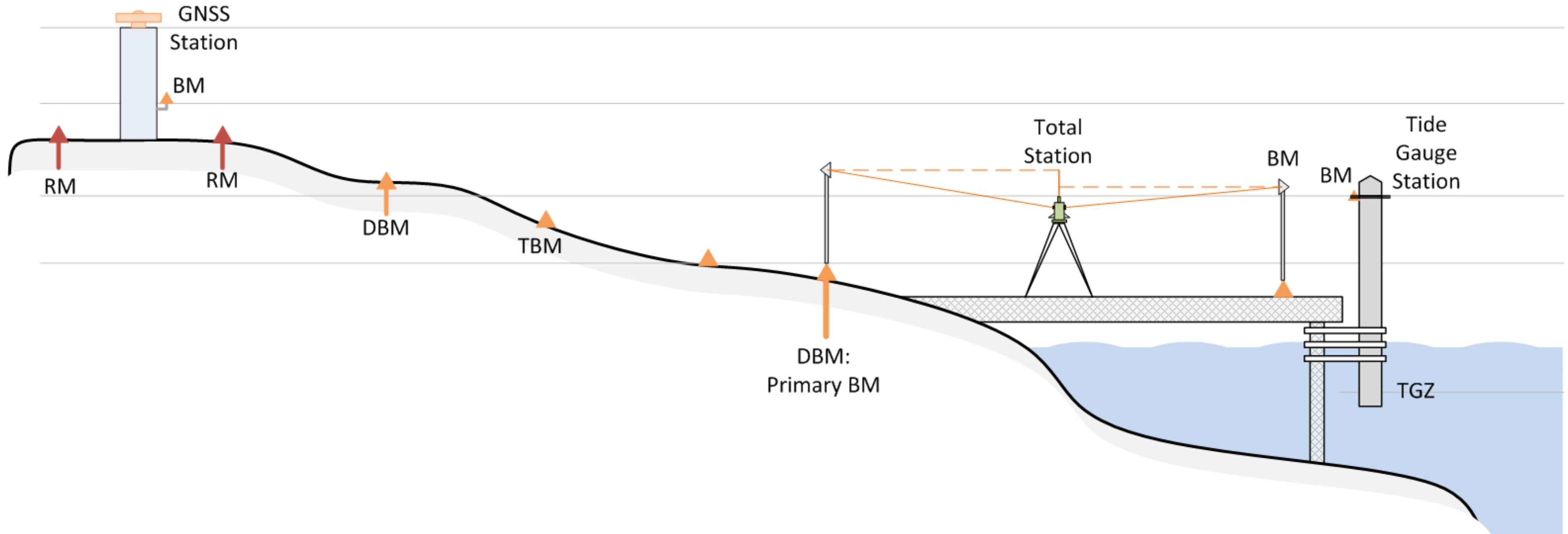
*Radar Tide Gauge Station in Nuku'alofa, Tonga.*



This Record provides an update on vertical motion of Pacific Island tide gauges results presented in Brown et al, 2020. Since 2020, staff from Geoscience Australia and the Pacific Community (SPC) have continued to observe and analyse Global Navigation Satellite System (GNSS) data and levelling data to extend the time series of land monitoring data



# Pacific Sea Level & Geodetic Monitoring Stations



***Levelling is undertaken every 18 months to compute the difference in height between the GNSS Site and the Tide Gauge. The orange triangles represent the stable survey marks in the ground. Observations are made between each of the survey marks and added together to compute the difference in height between the GNSS Site and the Tide Gauge***



# Pacific Sea Level & Geodetic Monitoring Stations



<https://ecat.ga.gov.au/geonetwork/srv/eng/catalog.search#/metadata/146976>

## Pacific Sea Level and Geodetic Monitoring Project: Levelling & GNSS Monitoring Survey Report

Tarawa, Kiribati, December 2019

GEOSCIENCE AUSTRALIA  
RECORD 2022/24

A.Lal<sup>1</sup>, V.Rattan<sup>1</sup>, M.Kalouniviti<sup>1</sup>, Z. Begg<sup>1</sup>, N.J. Brown<sup>2</sup>, B.R.Thomas<sup>2</sup>



1. Pacific Community (SPC), Suva, Fiji  
2. Geoscience Australia, Canberra, Australia

### 3.1.1 PSLGMP Vertical Reference Frame Wiring Diagram

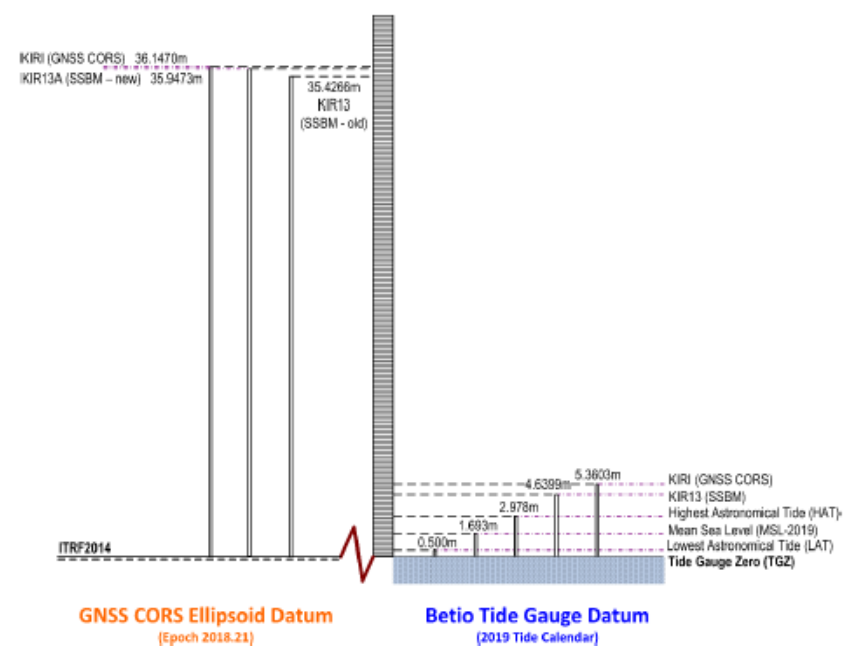


Figure 3.1 Wiring diagram depicting the offsets between surveyed marks. The left-hand side shows the height of the GNSS CORS pillar (KIRI), SEAFRAME sensor reference benchmark (old height; KIR13), SEAFRAME sensor reference benchmark (new height; KIR13A) with respect to the International Terrestrial Reference Frame 2014 at epoch 2018.21. The right-hand side shows the height of KIRI, KIR13, and tidal datums with respect to tide gauge zero. For more information on tidal datums, please refer to [Pacific Sea Level and Geodetic Monitoring Project File information and instructions \(bom.gov.au\)](#)

Table 0.1 Comparison of results with 2018 results.

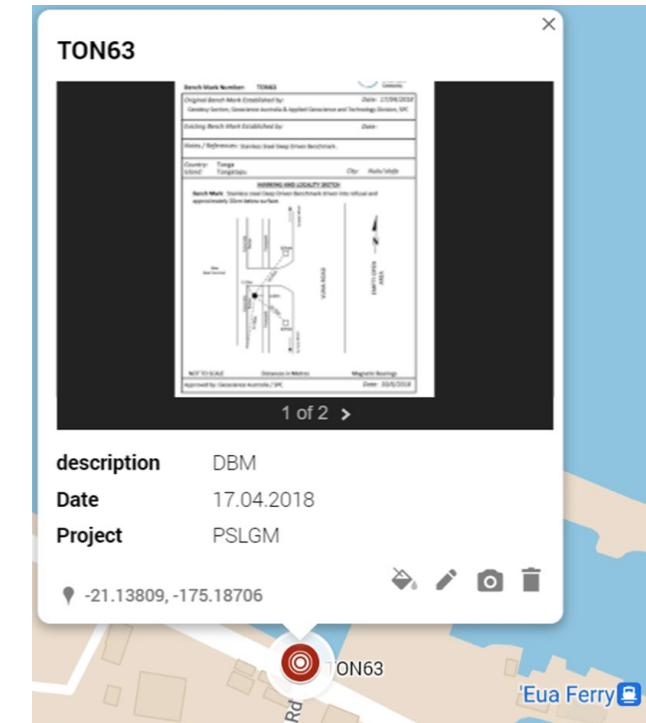
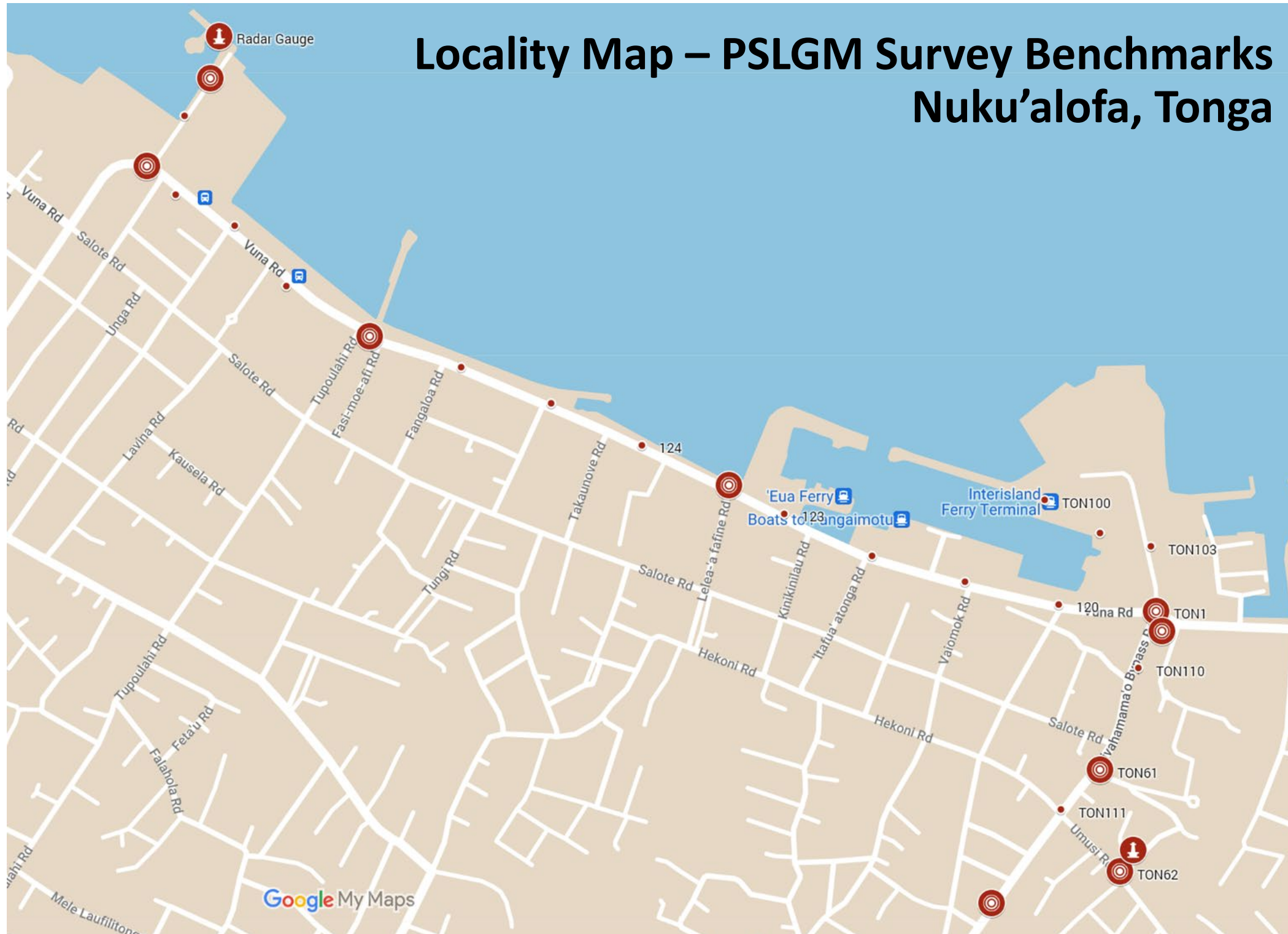
PT ID	Reference ^H (m)	2019.94 Value (m)	Difference
KIR1BM - KIR1	-0.8802	-0.8840	0.0038
KIR1 - TG Plaque BM (KIR12)	0.6871	0.6911	0.0040
KIR1 - TG ref pin (KIR13)	1.0999	1.1085	0.0086
KIR12 - KIR13	0.4128	0.4154	0.0026
KIRI - TG Plaque	-1.1360	-1.1359	-0.0002
KIRI - TG BM	-0.7232	-0.7204	-0.0028
KIRI - TGZ	-5.3533	-5.3505	-0.0028

Table 0.2 List of height differences from KIR1BM to primary benchmarks, and conversion to TGZ & ITRF2014.

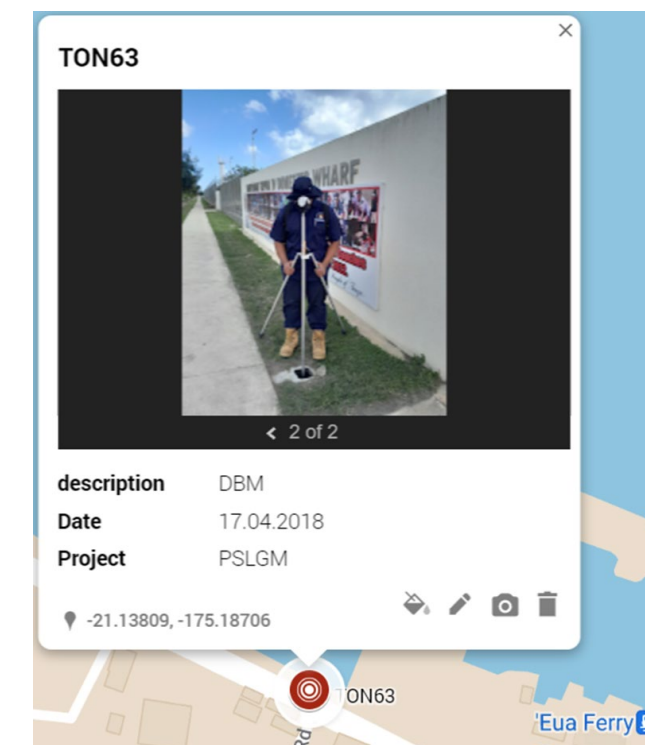
PT ID	Reference RL (m)	2019.94 Value (m)	Difference	TGZ	ITRF2014
KIR1BM	0.0000	0.0000	0.0000	4.4174	35.2041
KIR3	-0.8477	-0.8482	-0.0006	3.5692	34.3559
KIR47	-1.1176	-1.1172	0.0004	3.3002	34.0869
KIR2	-1.2299	-1.2319	-0.0020	3.1856	33.9722
KIR46	-1.0333	-1.0344	-0.0011	3.3831	34.1697
KIR1	-0.8802	-0.8840	-0.0038	3.5334	34.3201
KIR49	-0.3900	-0.3924	-0.0024	4.0250	34.8117
KIR12	-0.1931	-0.1930	0.0002	4.2245	35.0112
KIR13	0.2197	0.2225	0.0028	4.6399	35.4266
RM1	-0.8756	-0.8757	-0.0001	3.5417	34.3284
RM2	-0.9129	-0.9129	0.0000	3.5045	34.2912
RM3	-0.8978	-0.8978	0.0000	3.5197	34.3063
KIRI	0.9429	0.9429	0.0000	5.3603	36.1470
KIR13A		0.7432		5.1606	35.9473
TGZ	-4.4104	-4.4076	0.0028	0.0098	30.7965

# Geodetic Survey Benchmarks Database

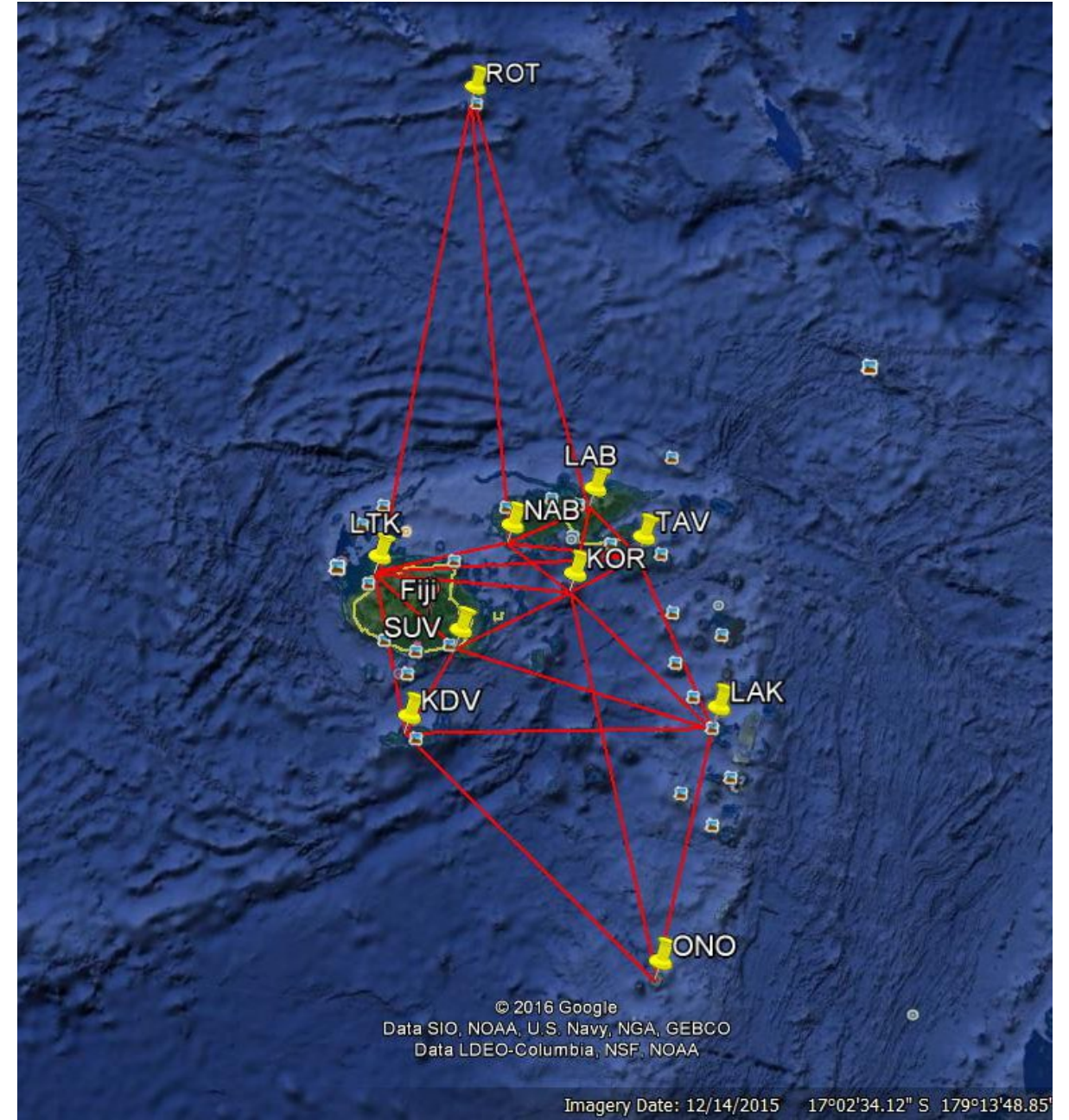
## Locality Map – PSLGM Survey Benchmarks Nuku'alofa, Tonga



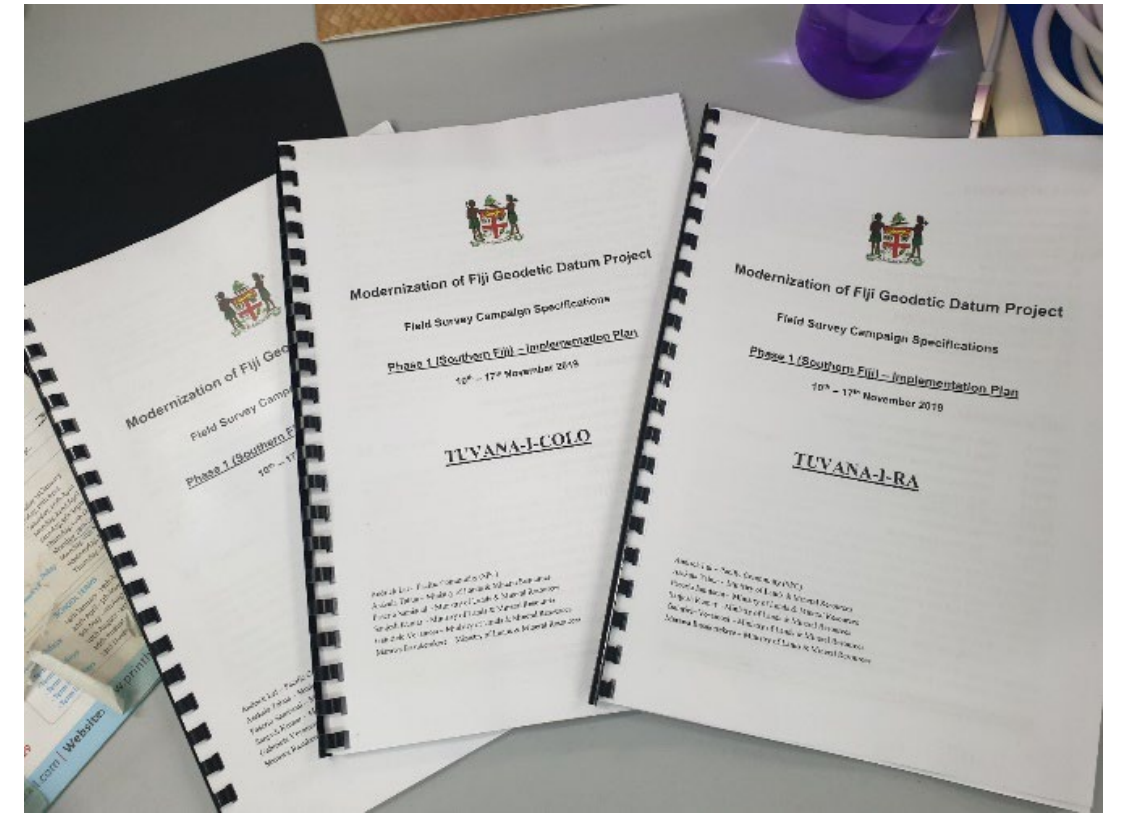
Locality Diagram



Locality Photograph



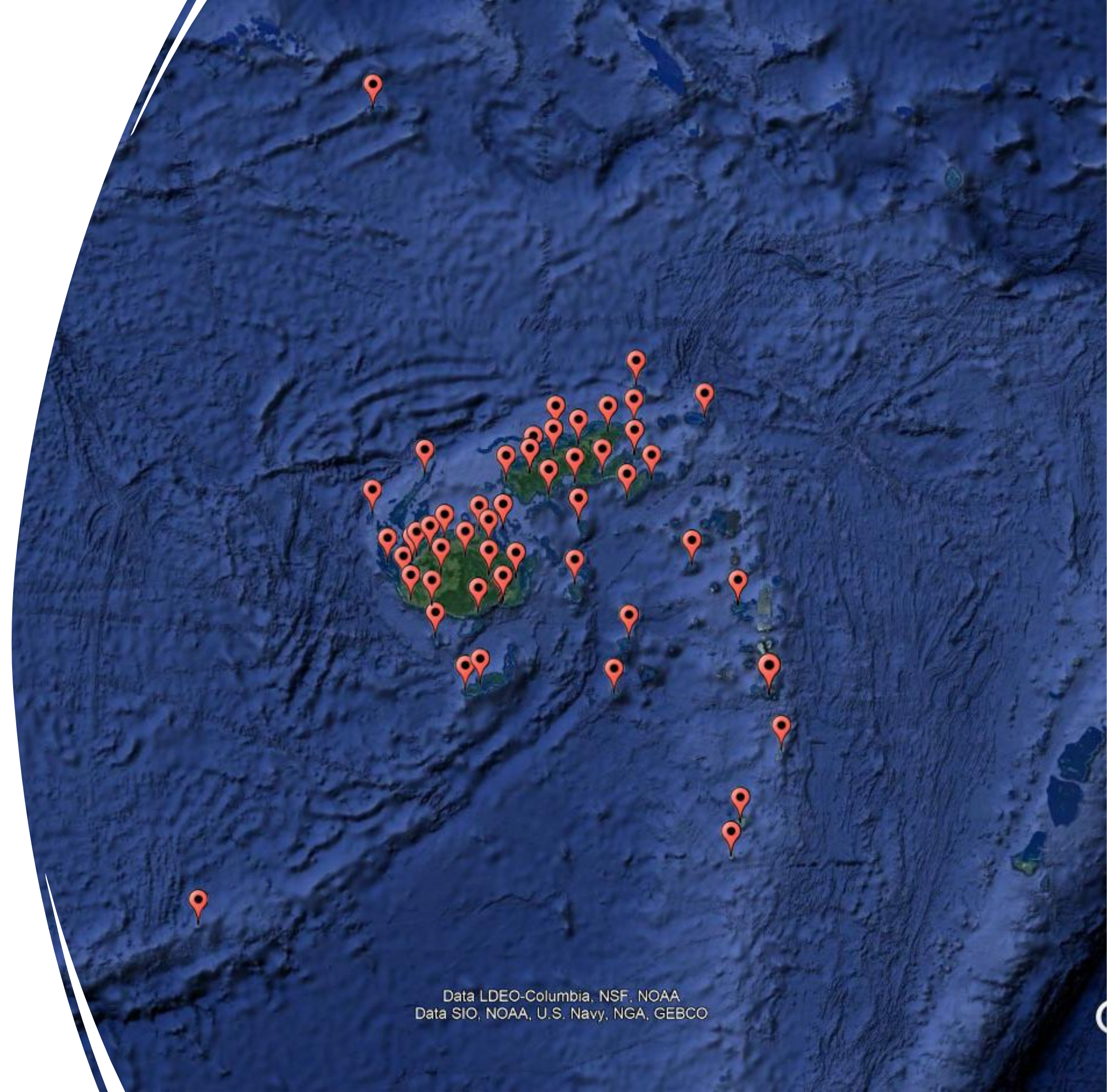
# The Geodetic Infrastructure



# Geodetic Survey Operations

# Geodetic Survey Campaign

- **Three Phases**
  - 10-16 November 2019
  - 7-15 December 2019
  - 26 January – 2 February 2020
- **GNSS Static Occupations**
  - 51 Stations – 7 days
  - 104 Stations – 6 hours
  - 43 Stations – 1 hour
- **Survey Personnel**
  - 65 (Surveyors/ Technicians/ Survey Assistant/ Casuals)
- **Survey Equipment**
  - Trimble (16) and Leica (11)
- **Transportation**
  - Naval Vessels/ Local Ferries/ Vehicles

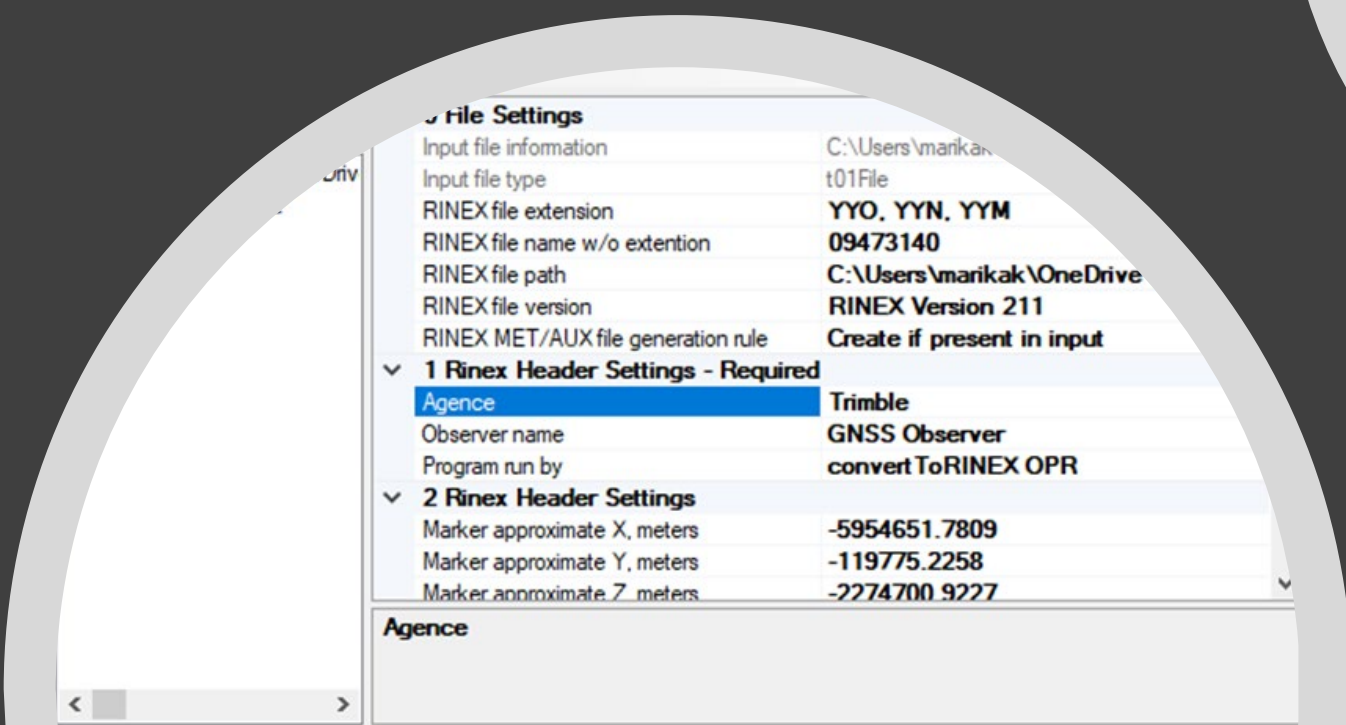
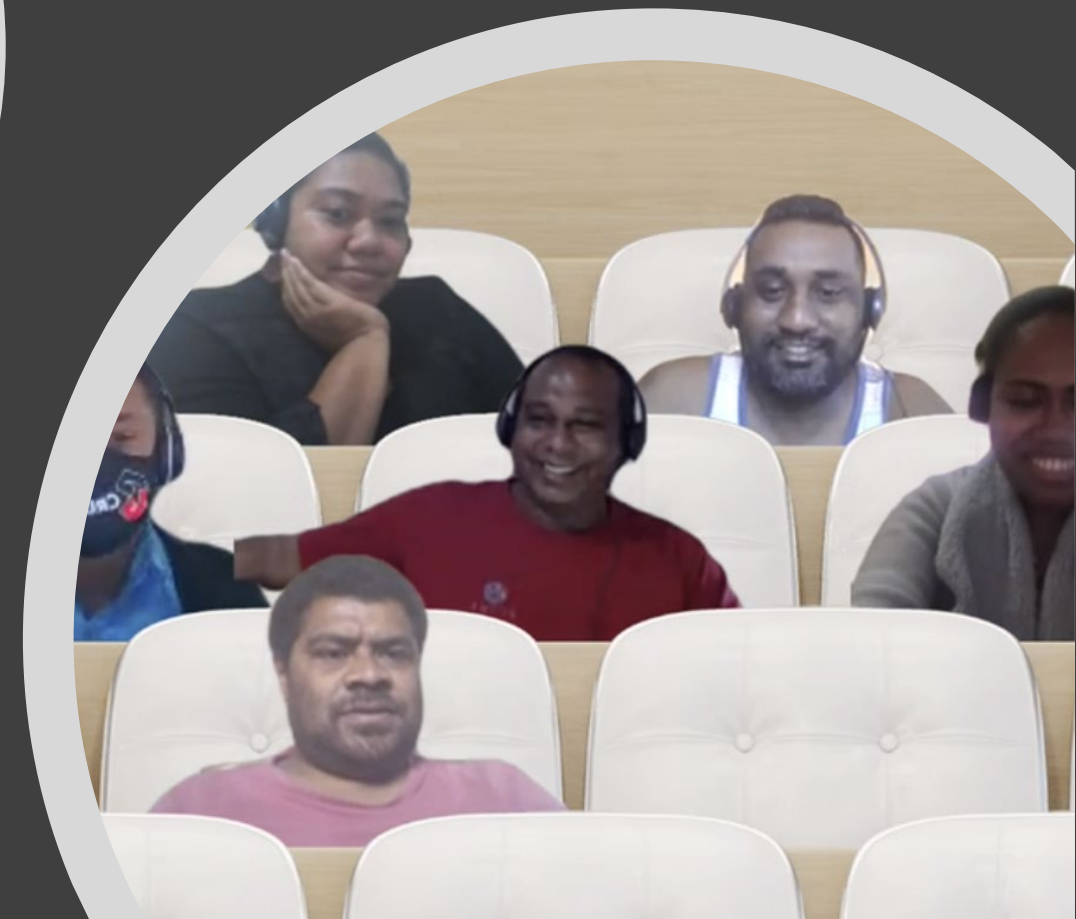
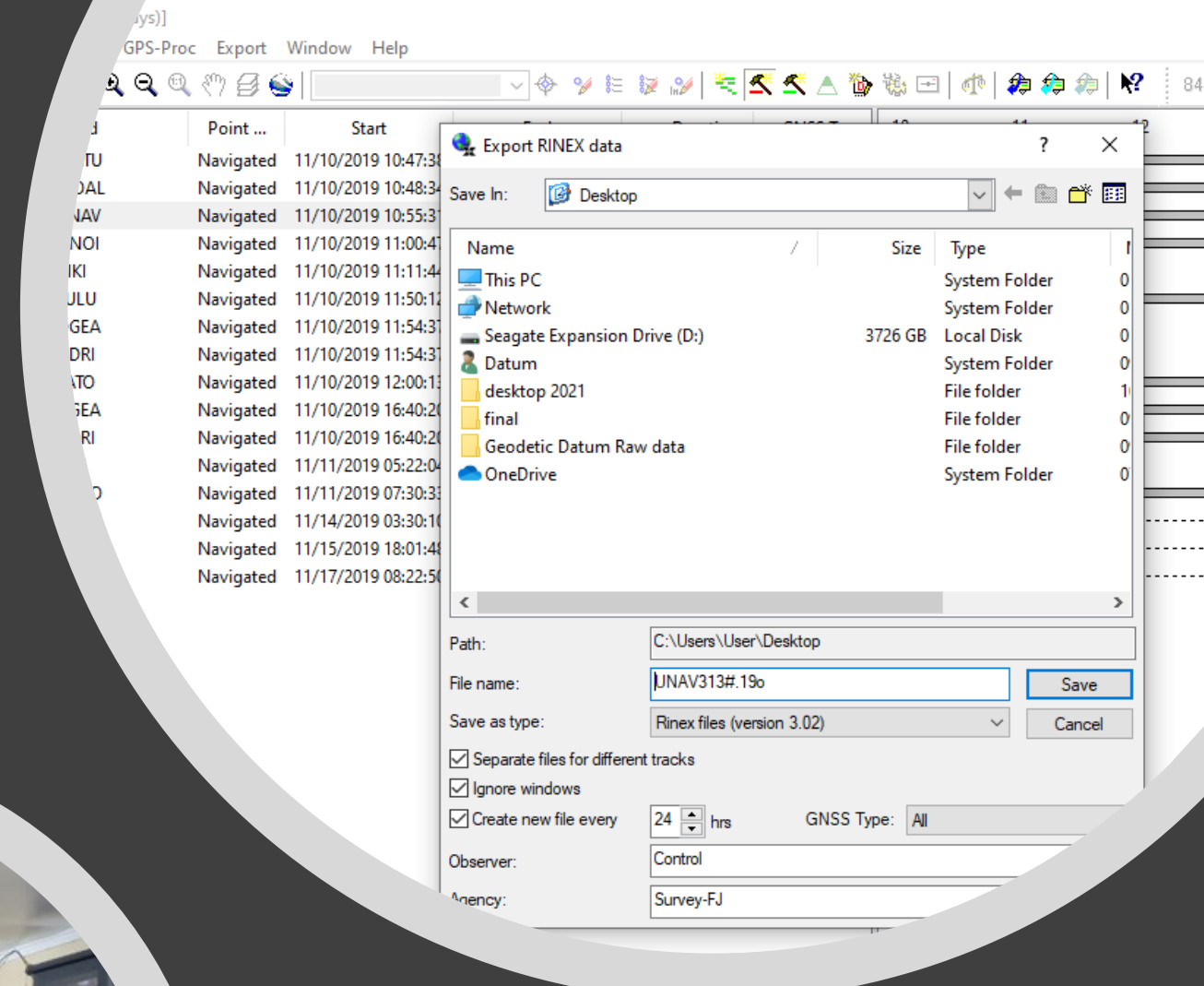


Data LDEO-Columbia, NSF, NOAA  
Data SIO, NOAA, U.S. Navy, NGA, GEBCO

# Geodetic Survey Data Preparations Capacity

- Data Storage
- Data Downloading
- Data Conversion
- Data format
- GNSS Occupation Summary
- Locality Diagrams
- Field Survey Sheets
- Data Source
- Check and verify meta data


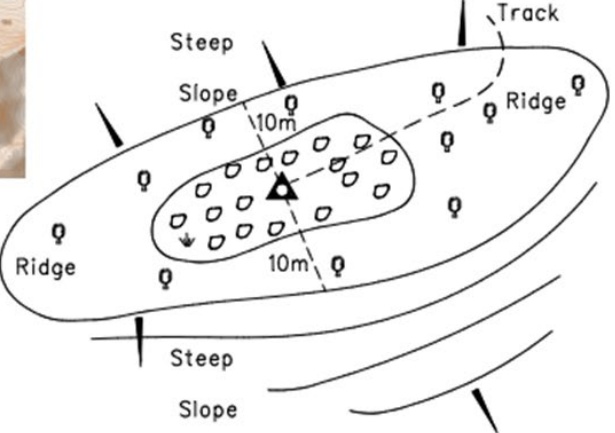

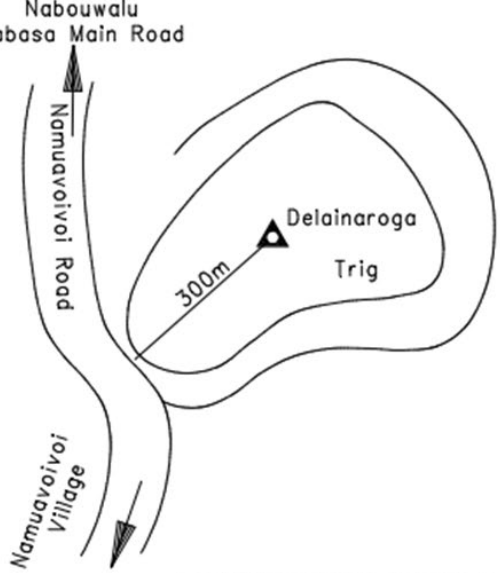
VITI LEVU & SURROUNDING ISLANDS			
Latitude	Longitude	MSL Ht	Latitude
18 08 35.28307 S	178 26 24.43342 E	68.57	18 8 35.279 S
17 51 36.91470 S	178 36 31.20563 E	1.889	18 14 53.483 S
18 30 55.011 S	177 38 49.063 E	8.8	18 30 54.9704 S
18 09 16.64688 S	177 36 48.24271 E	329.58	18 9 16.6462 S
18 05 31.25589 S	177 21 56.39777 E	237.96	18 5 31.2558 S
17 49 34.2528 S	178 17 31.57718 E	149.83	17 49 34.2502 S
17 41 6.58906 S	178 31 10.58872 E	628.56	17 41 6.5862 S
17 40 16.05061 S	178 48 32.17230 E	625.69	17 40 16.0561 S
17 47 29.46092 S	177 43 52.85371 E	888.75	17 47 29.4610 S
17 52 41.52648 S	177 17 3.54343 E	228.99	17 52 41.5269 S
		1323	17 36 53.1252 S
17 29 15.05356 S	178 17 44.70744 E	481.58	17 29 15.0519 S
17 19 41.52831 S	178 11 8.27595 E	203.2	17 19 41.5257 S
17 18 58.29670 S	178 27 58.66570 E	31.78	17 17 11.6775 S
17 25 14.49082 S	177 46 43.06777 E	368.67	17 25 14.4907 S
		480.4	17 32 39.0999 S
		64.83	17 40 19.381 S
		1.49	
		65.5	16 4



# Geodetic Survey Data Preparations

Fiji Geodetic Stations Survey Campaign Metadata												
Station ID	Station Name	Occupation Period	Interval	Receiver Type	Antenna Type	Rinex Version	Vertical Ht (m)	Rinex Height	Antenna Method	Firmware	Checked By	Field Operators
LAUT	Lautoka	Continuous	1sec	SEPT POLARXS	JAVRINGANT_DM	5.2.0			ARP			GA
SUV1	Suva	Continuous	1sec	Trimble NetRS	TRM55971.00	4.19			ARP			SPC
LABC	Labasa	Continuous	1sec	VNET10T-D	HI-TARGET AT-53501	3.02			ARP	CJ00		CONTROL
NABC	Nabouwalu	Continuous	1sec	HI-TARGET VNET10T-D	HITAT33501(HITS)	3.02			ARP	CJ00		CONTROL
TAVC	Taveuni	Continuous	1sec	HI-TARGET VNET10T-D	HITAT33501(HITS)	3.02			ARP	CJ00		CONTROL
KORC	Koro	Continuous	1sec	Leica GR50	Leica AR20	3.02			ARP	4.11.606		CONTROL
LAKC	Lakeba	Continuous	1sec	Leica GR50	Leica AR20	3.02			ARP	4.11.606		CONTROL
ONOC	Ono-i-Lau	Continuous	1sec	Leica GR50	Leica AR20	3.02			ARP	4.11.606		CONTROL
KADC	Kadavu	Continuous	1sec	Leica GR50	Leica AR20	3.02			ARP	4.11.606		CONTROL
ROTC	Rotuma	Continuous	1sec	Leica GR51	Leica AR21	3.02			ARP	4.11.606		CONTROL
CEVA	Ceva-i-ra	7 DAYS	1sec	TRIMBLE R10	TRMR10	3.02	1.642	1.692	Bottom of Notch	4.81	MT&MR	Poate
BUKE	Delainabukelevu (Kadavu)	7 DAYS	30sec	TRIMBLE NET R9	TRM557971.0	3.02	1.978	1.934	Bottom of Notch	5.37	MT&MR	Sakumeni
NAKO	Nakorowaro (Gau)	7 DAYS	30sec	LEICA GS10	LEIAS10	3.02	1.265	1.625	Hook height	5.05	MT&MR	Sisa
OALA	Korokoli (Moala)	7 DAYS	10sec	LEICA GPS 1200	LEIAX1202	2.11	1.404	1.764	Hook height	4.0	MT&MR	Navitalai
UNAV	Lakeba(GPS - Yadrana)	7 DAYS	1sec	LEICA GS16	LEIGS16	3.02	1.38	1.740	Hook height	8.0	MT&MR	Jesoni
CIKI	Cikobia-i-lau	7 DAYS	15sec	LEICA GS10	LEIAS10	3.02	1.333	1.693	Hook height	5.05	MT&MR	Gabriele
LULU	Cokalulu (Cicia)	7 DAYS	10sec	TRIMBLE NET R9	TRM557971.0	3.02	1.751	1.707	Bottom of Notch	4.85	MT&MR	Daniel
MTKU	Matuku	7 DAYS	30sec	LEICA GPS 1200	LEIAX1202	2.11	1.263	1.623	Hook height	4.0	MT&MR	William C
OGEA	Ogea Driki	7 DAYS	30sec	LEICA GPS 1200	LEIAX1202	2.11	1.185	1.545	Hook height	4.0	MT&MR	Livi
VATO	Vatoua	7 DAYS	30sec	LEICA GPS 1200	LEIAX1202	2.11	1.272	1.632	Hook height	4.0	MT&MR	Niko

Station ID	Start time	Duration	Campaign	File Name	RINEX Version	Ant Height	Ant Method	Ant Manufacturer	A
CEVA	10/11/19 1200hrs UTC	7days	Phase 1	16633153.19o 16633133.19o 16633140.19o 16633201.19o	3.02	1.692	BQR	Trimble	T
BUKE	10/11/19 1200hrs UTC	7days	Phase 1	42703140.19o 42703150.19o 42703160.19o 42703170.19o 42703180.19o 42703190.19o 42703200.19o	3.02	1.934	BON	Trimble	T 2 2
NAKO	10/11/19 1200hrs UTC	7days	Phase 1	NAKO3140.19o	3.02	1.625	Hook Height	Leica	L
OALA	10/11/19 1200hrs UTC	7days	Phase 1	MOAL3130.19o	2.11	1.764	Hook Height	Leica	L
UNAV	10/11/19 1200hrs UTC	7days	Phase 1	UNAV3140.19o UNAV3130.19o	3.02	1.74	Hook Height	Leica	L
CIKI	10/11/19 1200hrs UTC	7days	Phase 1	CIKI3130.19o	3.02	1.693	Hook Height	Leica	L
LULU	10/11/19 1200hrs UTC	7days	Phase 1	LULU.19o	3.02	1.707	BON	Trimble	T 2 2
MTKU	10/11/19 1200hrs UTC	7days	Phase 1	MATU3130.19o	2.11	1.623	Hook Height	Leica	L
OGEA	10/11/19 1200hrs UTC	7days	Phase 1	OGEA3130.19o	2.11	1.545	Hook Height	Leica	L

COUNTRY: FIJI ISLAND: VANUA LEVU PROVINCE: MACUATA	MINISTRY OF LANDS & MINERAL RESOURCE CONTROL SECTION	POINT ID: BULE DATE: 26-01-20 LDP: FJ133
		
 <p style="text-align: center;">Locality Diagram Not To Scale</p>		
COUNTRY: FIJI ISLAND: VANUA LEVU PROVINCE: BUA	MINISTRY OF LANDS & MINERAL RESOURCE CONTROL SECTION	POINT ID: ROGA DATE: 26-01-20 LDP: FJ134
		
 <p style="text-align: center;">Locality Diagram Not To Scale</p>		

=====

FIJI GEODETIC DATUM 2019 - 2020 GNSS OCCUPATION REPORT

=====

STATION NAME: CEVA I RA

4 CHARACTER ID: CEVA

LOCATION: CEVA I RA I SLAND

COUNTRY: FIJI

TYPE OF SURVEY MARK: 20mmx1.220mm STEEL ROD ENCASED BY 30mmx0.5mm ALUMINIUM PIPE IN SITU IN CONCRETE.

ORTHOMETRIC HEIGHT OF SURVEY MARK:  
(MEAN SEA LEVEL DATUM)

OBSERVATION START DATE/DAY: 09/11/2019

UTC TIME: 2257hrs

OBSERVATION END DATE/DAY: 17/11/2019

UTC TIME: 0007hrs

GNSS RECEIVER TYPE: TRIMBLE

=====

MODEL: TRIMBLE R10

SERIAL NUMBER: 5333441663

FIRMWARE VERSION: 4.81

GNSS ANTENNA TYPE: TRIMBLE

=====

MODEL: TRMR10

SERIAL NUMBER: 5333441663

HEIGHT OF GNSS ANTENNA ABOVE STATION MARK: 1.643m  
(VERTICAL MEASUREMENT)

DESCRIPTION OF THE POINT ON THE GNSS ANTENNA  
THAT THE ANTENNA HEIGHT REFERS TO:

BOTTOM OF QUICK RELEASE

ANTENNA HEIGHT TO ARP - 1.692m

ATTACH ADDITIONAL INFORMATION AND DIAGRAMS THAT MAY BE USEFUL FOR PERSONS PROCESSING THE DATA AND ANALYSING THE RESULTS.

# Data Release Report



## Fiji Geodetic Datum Surveys



PACIFIC COMMUNITY  
DATA RELEASE REPORT No. 7/2022

A. Lal<sup>1</sup>, V. Rattan<sup>1</sup>, M. Kalouniviti<sup>1</sup>, A. Tabua<sup>2</sup>, S. Kumar<sup>2</sup>, G. Vosamosi<sup>2</sup>,  
M. Cabemaiwai<sup>2</sup>, M. Tamata<sup>2</sup>



Produced by the Pacific Community (SPC)  
Suva Regional Office  
Private Mail Bag - Suva - Fiji  
Telephone: +687 26 20 00  
Email: [spc@spc.int](mailto:spc@spc.int)  
Website: [www.spc.int](http://www.spc.int)  
© Pacific Community (SPC) 2021

<sup>1</sup> Oceans and Maritime Programme, Geoscience Energy & Maritime (GEM) Division, Pacific Community (SPC), Suva, Fiji  
<sup>2</sup> Control Section, Ministry of Lands & Mineral Resources, Government of Fiji



# Geospatial Policy & Data Management



## Australian Geospatial Reference System Compendium

**Standard for the Australian Survey Control Network**

**Special Publication 1**

Version 2.2

Intergovernmental Committee on Surveying and Mapping (ICSM)  
Geodesy Working Group (GWG)  
7 December 2020

Intergovernmental Committee on Surveying and Mapping  
Geodesy Working Group  
16 August 2022

## Guidelines

## Data Centre



Australian Government  
Geoscience Australia

Positioning  
Australia

Global Navigation Satellite System Data Centre

### About

The Geoscience Australia GNSS Data Centre archives and distributes Global Navigation Satellite System (GNSS) data and products derived from a network of continuously operating GNSS reference stations across the Asia-Pacific region. Through this data centre GA actively supports the International GNSS Service (IGS) and the Asia-Pacific Reference Frame (APREF) project as a regional data centre.

To learn more about the GNSS network or access the various datasets available, click on the links below.



### Network

View a map showing the status of the GNSS reference stations that contribute data to Geoscience Australia.



### Data

Download RINEX data files that can be used to post-process GNSS data.



### Streaming

Connect to a correction stream from a GNSS reference station that can be used to obtain high-accuracy positioning information in real-time.



### AUSPOS

Post-process GPS data to obtain a precise coordinate using Geoscience Australia's online GPS processing service.



### Metadata

View metadata associated with a GNSS reference station.



### Documents

A list of user guides and technical specifications produced by Geoscience Australia.



## INTEGRATED GEOSPATIAL INFORMATION FRAMEWORK

A STRATEGIC GUIDE TO DEVELOP AND STRENGTHEN NATIONAL GEOSPATIAL INFORMATION MANAGEMENT

## Geospatial Policy & Framework

## Standards

# Capacity Building



# Communications & Community



Home > Updates from SPC > Web Stories

## Mapping our Pacific Geospatial Future

Suva | 21 June 2022 |



Imagine a world without maps. It's hard to do. Humans are born map-makers, instinctively looking for landmarks, making sense of patterns, and forming connections when we venture beyond our known environment.

For this reason, geospatial science may be one of the most important fields of study you have ever heard of. Geospatial information is location information. At its simplest, this can be topographical information found on a map. But you can also add in layers of location-tagged data, to show changes or trends, for example, in land use, population density, vaccine distribution, or coral reef health over time.

"If you look at Fiji's national development plan, there are so many areas where geospatial information comes in. There are calls for..."



## Pacific Geospatial and Surveying Council

Public group · 1.3K members

<https://www.facebook.com/groups/3998884766792177/>

### Feature

modernisation programs in CAPs, there are also other initiatives that will require assistance, such as:

- Revision of legislation of the Native Lands Act, and relevant Survey legislation to align with Tuvalu's RGP and CAP aspirations; and
- Upgrading of Tuvalu's Navigation Charts, to assist commercial shipping and cruise liners to navigate Tuvalu's waters safely, thus improve the trade and tourism industry once the COVID-19 influences have subsided.

**Embracing challenges through Partnerships, Pacific Geospatial & Surveying Council (PGSC) and the Pacific Community (SPC)**  
By **Andrick Lal, Senior Geodetic Surveyor**

In November 2014, a group of Pacific regional surveying and geospatial experts met in the margins of the annual Pacific Geospatial Information Systems and Remote Sensing (GIRSIS) User Conference in Suva, Fiji. It was at this meeting that the PGSC was first conceived and a charter governing its mission and objectives was developed. In addition, the Pacific Community (SPC) established the Pacific Geospatial and Surveying Partnership Desk to provide secretariat services and support the PGSC in achieving its goals and objectives.

Briefly, the PGSC, is an independent regional advisory body that provides a forum for Pacific Island geospatial information and survey authorities to discuss and address regional challenges. The PGSC aims to collaborate with regional and international organisations, associations, educational institutions and technical groups to support progress on national, regional and global development objectives for sustainable development in the Pacific enabled by world-class geospatial information and survey services.

The 14 country members of the PGSC subscribe that geospatial information underpins the majority of economic and sustainable development activities in the world today. The services provided by Pacific Island geospatial scientists and surveyors contribute to the security and well-being of Pacific people, supporting numerous industries and sectors. These include natural resource management, civil engineering, climate change adaptation, disaster risk reduction, transport, land ownership, health, and agriculture to name a few.

The SPC is the principal scientific and technical organisation in the Pacific region, proudly supporting development since 1947. From a geodetic modernisation perspective, the SPC Geodetic Survey Team delivers professional advice and services to the PICTs. This primarily involves provision of instrumentation, onsite technical guidance or support on numerous field survey operations or techniques, processing and management of geospatial data, geospatial datums and positioning matters, GNSS base stations, GNSS measurements for survey control, monitoring, cadastral or geospatial activities, and precision leveling monitoring surveys, including assisting with tide gauge measurements for the Pacific Sea Level & Monitoring Project in the Pacific.

Partnerships are critical to the successful implementation of the Pacific Geospatial and Surveying Council Strategy 2017-2027. The responsibilities of regional surveyors and geospatial managers frequently correspond to broader initiatives, which all contribute towards achievement of United Nations Sustainable Development Goals. The PGSC relies upon collaboration, and is an important contributor towards sustaining a GGRF and global efforts to improve positioning and geospatial information management.

The goals of the PGSC, the Partnership Desk and SPC are focused on:

- Positioning
- Geospatial Policy & Data Management
- Capacity Building

Since 2014 the PGSC, Partnership Desk, SPC and development partners such as the International Association of Geodesy (IAGG), IAGG/IGAR, UN Office of Outer Space Affairs, FIG and neighbouring GSOs, have cooperated to enhance and engage the geospatial and surveying community in the PICTs. This has been achieved through supporting, organising and hosting various activities in the region such as seminars, workshops, capacity development events, and meetings, as well as online forums and webinars on identified geospatial or geospatial topics and challenges.

Recently, in August 2020, the 5th Pacific Geospatial and Surveying Council (PGSC) meeting was held virtually from the 11th to 14th and 25th August 2020, and was hosted by the SPC in Suva, Fiji. There were almost 200 attendees each day, to participate in virtual panel discussions on presentations from international experts, regional partners and PGSC members. The meeting, like previous ones, was an opportunity for the PGSC members and partners to report, collaborate and plan on leadership, standards and technology, sustainability and capacity development, in line with the PGSC Strategy 2017-2027. Please refer to the web location for the article regarding this meeting Pacific calls for Integrated Geospatial Information Management, and meeting proceedings.

Since 2014 the PGSC, Partnership Desk, SPC and development partners such as the International Association of Geodesy (IAGG), IAGG/IGAR, UN Office of Outer Space Affairs, FIG and neighbouring GSOs, have cooperated to enhance and engage the geospatial and surveying community in the PICTs. This has been achieved through supporting, organising and hosting various activities in the region such as seminars, workshops, capacity development events, and meetings, as well as online forums and webinars on identified geospatial or geospatial topics and challenges.

To achieve a modernised datum, Fiji has embraced the challenges and identified the action required to migrate from a local datum to a GGRF, such as the International Terrestrial Reference Frame (ITRF). Presently, the ITRF, and/or its subset Asia Pacific Reference Frame (APRF), is the frame adopted by many PICTs to realise their nation's geospatial datum, primarily because of its reliability, accuracy and accessibility. As such, Fiji's Cabinet Memorandum – "Modernizing Fiji's Geospatial Datum" was strategically aligned to the 2015 UN General Assembly Resolution on the GGRF, in August 2015. This mandate is to modernise their geospatial datum, also set the roadmap for the integration, interoperability and management of geospatial information and systems at the local, national, regional and global level.

Prior to modernisation, Fiji's geospatial datum was based on the World Geodetic System 1972 (WGS72) and comprised of a network of triangulation and trilateration observations, which interconnected the main and outermost islands. The adjustment and propagation of coordinates for the datum were significantly impacted by survey inaccessibilities and produced survey uncertainties in the order of several decimetres. Despite this, WGS72 met Fiji's needs for a period of time, however today this reference frame and the accuracy of the co-ordinates can no longer satisfy the requirements of modern-day geospatial demands such as applications, such as marine positioning, and autonomous vehicles. Also, with the advent of accurate geospatial data being readily available, rapid technological changes, geospatial trends and digital disruption, the management of the datum is more complex and challenging. With this in mind, the Fiji government saw the establishment of a modern geospatial infrastructure and datum as a pathway to bridging the gap. The government also acknowledged the necessity to build the capacity and capabilities of its people to ensure a sustainable geospatial reference frame for the future.

Briefly, datum modernisation started with the construction of eight (8) GNSS CORS across Fiji. These stations complemented two (2) GNSS CORS managed by Geoscience Australia and the SPC. Soon after the construction of the GNSS CORS, survey teams were deployed to carry out reconnaissance and identification of existing 'passive' geospatial control stations (GCSs), that would be connected to the GNSS CORS, and form the fiducial observations for the geospatial network adjustment.

In order for this geospatial field campaign to be successful, collaboration and assistance with the Fiji Hydrographic Office, Fiji Navy, SPC, PGSC and Partnership Desk was necessary. The campaign involved more than 500 survey personnel and included a three-day workshop in the operation of GNSS survey equipment. This training and capacity building for the survey personnel was facilitated by the SPC and Partnership Desk in October 2019.

The field campaign involved the occupation of 164 GCSs with GNSS receivers, and level order trigonometric stations, which were originally observed in the early 1980s. Observations on first order trigonometric geospatial stations were primarily on the islands of Viti Levu and Vanua Levu, as well as the Maritime Islands. Other observations were taken to selected parcels, and standard survey marks to major towns and cities.

A substantial amount of the GNSS survey data acquired during the field survey campaign will be used to validate the position of Fiji's existing geospatial datum and the determination of a new geospatial datum aligned to the ITRF/GGRF. The GNSS data will subsequently be integrated with the Pacific GNSS CORS Network for the computation of the new transformation parameters, and be the primary network adjustment of Fiji.

Geospatial Survey Stations occupied in Field Survey Campaign.

### Modern Geodetic Infrastructure – Key to Consistency and Efficiency

By **Sanjesh Kumar, Senior Surveyor, Asakia Tabua, Surveyor-General Fiji**

Fiji is highly vulnerable to natural disasters such as cyclones, coastal inundation and flooding due to climate change and subsequent sea level rise. These natural events affect the food security, livelihoods, infrastructure, health, housing and livelihoods of more than 800,000 Fijians. It is therefore critical for Fiji to mitigate the influence of natural disasters and climate change. Surveyors can alleviate this impact by applying their skills to disaster preparedness, building resilience, quantifying the environmental and social changes, and providing qualitative analysis. The keys to monitoring and measuring such changes are access to reliable satellite positioning technology, high resolution and accurate geospatial data and information. Underpinning these activities, Fiji recognised the need and importance of a consistent, comprehensive and modernised geospatial reference frame, and positioning network.

Recently, in August 2020, the 5th Pacific Geospatial and Surveying Council (PGSC) meeting was held virtually from the 11th to 14th and 25th August 2020, and was hosted by the SPC in Suva, Fiji. There were almost 200 attendees each day, to participate in virtual panel discussions on presentations from international experts, regional partners and PGSC members. The meeting, like previous ones, was an opportunity for the PGSC members and partners to report, collaborate and plan on leadership, standards and technology, sustainability and capacity development, in line with the PGSC Strategy 2017-2027. Please refer to the web location for the article regarding this meeting Pacific calls for Integrated Geospatial Information Management, and meeting proceedings.

Since 2014 the PGSC, Partnership Desk, SPC and development partners such as the International Association of Geodesy (IAGG), IAGG/IGAR, UN Office of Outer Space Affairs, FIG and neighbouring GSOs, have cooperated to enhance and engage the geospatial and surveying community in the PICTs. This has been achieved through supporting, organising and hosting various activities in the region such as seminars, workshops, capacity development events, and meetings, as well as online forums and webinars on identified geospatial or geospatial topics and challenges.

To achieve a modernised datum, Fiji has embraced the challenges and identified the action required to migrate from a local datum to a GGRF, such as the International Terrestrial Reference Frame (ITRF). Presently, the ITRF, and/or its subset Asia Pacific Reference Frame (APRF), is the frame adopted by many PICTs to realise their nation's geospatial datum, primarily because of its reliability, accuracy and accessibility. As such, Fiji's Cabinet Memorandum – "Modernizing Fiji's Geospatial Datum" was strategically aligned to the 2015 UN General Assembly Resolution on the GGRF, in August 2015. This mandate is to modernise their geospatial datum, also set the roadmap for the integration, interoperability and management of geospatial information and systems at the local, national, regional and global level.

Prior to modernisation, Fiji's geospatial datum was based on the World Geodetic System 1972 (WGS72) and comprised of a network of triangulation and trilateration observations, which interconnected the main and outermost islands. The adjustment and propagation of coordinates for the datum were significantly impacted by survey inaccessibilities and produced survey uncertainties in the order of several decimetres. Despite this, WGS72 met Fiji's needs for a period of time, however today this reference frame and the accuracy of the co-ordinates can no longer satisfy the requirements of modern-day geospatial demands such as applications, such as marine positioning, and autonomous vehicles. Also, with the advent of accurate geospatial data being readily available, rapid technological changes, geospatial trends and digital disruption, the management of the datum is more complex and challenging. With this in mind, the Fiji government saw the establishment of a modern geospatial infrastructure and datum as a pathway to bridging the gap. The government also acknowledged the necessity to build the capacity and capabilities of its people to ensure a sustainable geospatial reference frame for the future.

Briefly, datum modernisation started with the construction of eight (8) GNSS CORS across Fiji. These stations complemented two (2) GNSS CORS managed by Geoscience Australia and the SPC. Soon after the construction of the GNSS CORS, survey teams were

### GNSS CORS Station in Labasa, Suva, Fiji

Identified the action required to migrate from a local datum to a GGRF, such as the International Terrestrial Reference Frame (ITRF). Presently, the ITRF, and/or its subset Asia Pacific Reference Frame (APRF), is the frame adopted by many PICTs to realise their nation's geospatial datum, primarily because of its reliability, accuracy and accessibility. As such, Fiji's Cabinet Memorandum – "Modernizing Fiji's Geospatial Datum" was strategically aligned to the 2015 UN General Assembly Resolution on the GGRF, in August 2015. This mandate is to modernise their geospatial datum, also set the roadmap for the integration, interoperability and management of geospatial information and systems at the local, national, regional and global level.

Prior to modernisation, Fiji's geospatial datum was based on the World Geodetic System 1972 (WGS72) and comprised of a network of triangulation and trilateration observations, which interconnected the main and outermost islands. The adjustment and propagation of coordinates for the datum were significantly impacted by survey inaccessibilities and produced survey uncertainties in the order of several decimetres. Despite this, WGS72 met Fiji's needs for a period of time, however today this reference frame and the accuracy of the co-ordinates can no longer satisfy the requirements of modern-day geospatial demands such as applications, such as marine positioning, and autonomous vehicles. Also, with the advent of accurate geospatial data being readily available, rapid technological changes, geospatial trends and digital disruption, the management of the datum is more complex and challenging. With this in mind, the Fiji government saw the establishment of a modern geospatial infrastructure and datum as a pathway to bridging the gap. The government also acknowledged the necessity to build the capacity and capabilities of its people to ensure a sustainable geospatial reference frame for the future.

Briefly, datum modernisation started with the construction of eight (8) GNSS CORS across Fiji. These stations complemented two (2) GNSS CORS managed by Geoscience Australia and the SPC. Soon after the construction of the GNSS CORS, survey teams were

### GNSS CORS Station in Labasa, Suva, Fiji

Identified the action required to migrate from a local datum to a GGRF, such as the International Terrestrial Reference Frame (ITRF). Presently, the ITRF, and/or its subset Asia Pacific Reference Frame (APRF), is the frame adopted by many PICTs to realise their nation's geospatial datum, primarily because of its reliability, accuracy and accessibility. As such, Fiji's Cabinet Memorandum – "Modernizing Fiji's Geospatial Datum" was strategically aligned to the 2015 UN General Assembly Resolution on the GGRF, in August 2015. This mandate is to modernise their geospatial datum, also set the roadmap for the integration, interoperability and management of geospatial information and systems at the local, national, regional and global level.

Prior to modernisation, Fiji's geospatial datum was based on the World Geodetic System 1972 (WGS72) and comprised of a network of triangulation and trilateration observations, which interconnected the main and outermost islands. The adjustment and propagation of coordinates for the datum were significantly impacted by survey inaccessibilities and produced survey uncertainties in the order of several decimetres. Despite this, WGS72 met Fiji's needs for a period of time, however today this reference frame and the accuracy of the co-ordinates can no longer satisfy the requirements of modern-day geospatial demands such as applications, such as marine positioning, and autonomous vehicles. Also, with the advent of accurate geospatial data being readily available, rapid technological changes, geospatial trends and digital disruption, the management of the datum is more complex and challenging. With this in mind, the Fiji government saw the establishment of a modern geospatial infrastructure and datum as a pathway to bridging the gap. The government also acknowledged the necessity to build the capacity and capabilities of its people to ensure a sustainable geospatial reference frame for the future.

Briefly, datum modernisation started with the construction of eight (8) GNSS CORS across Fiji. These stations complemented two (2) GNSS CORS managed by Geoscience Australia and the SPC. Soon after the construction of the GNSS CORS, survey teams were

### GNSS CORS Station in Labasa, Suva, Fiji

Identified the action required to migrate from a local datum to a GGRF, such as the International Terrestrial Reference Frame (ITRF). Presently, the ITRF, and/or its subset Asia Pacific Reference Frame (APRF), is the frame adopted by many PICTs to realise their nation's geospatial datum, primarily because of its reliability, accuracy and accessibility. As such, Fiji's Cabinet Memorandum – "Modernizing Fiji's Geospatial Datum" was strategically aligned to the 2015 UN General Assembly Resolution on the GGRF, in August 2015. This mandate is to modernise their geospatial datum, also set the roadmap for the integration, interoperability and management of geospatial information and systems at the local, national, regional and global level.

Prior to modernisation, Fiji's geospatial datum was based on the World Geodetic System 1972 (WGS72) and comprised of a network of triangulation and trilateration observations, which interconnected the main and outermost islands. The adjustment and propagation of coordinates for the datum were significantly impacted by survey inaccessibilities and produced survey uncertainties in the order of several decimetres. Despite this, WGS72 met Fiji's needs for a period of time, however today this reference frame and the accuracy of the co-ordinates can no longer satisfy the requirements of modern-day geospatial demands such as applications, such as marine positioning, and autonomous vehicles. Also, with the advent of accurate geospatial data being readily available, rapid technological changes, geospatial trends and digital disruption, the management of the datum is more complex and challenging. With this in mind, the Fiji government saw the establishment of a modern geospatial infrastructure and datum as a pathway to bridging the gap. The government also acknowledged the necessity to build the capacity and capabilities of its people to ensure a sustainable geospatial reference frame for the future.

Briefly, datum modernisation started with the construction of eight (8) GNSS CORS across Fiji. These stations complemented two (2) GNSS CORS managed by Geoscience Australia and the SPC. Soon after the construction of the GNSS CORS, survey teams were

### Five Squares Proudly Supporting GLOBAL SURVEYORS DAY in Fiji 21st March

Sponsored by Fiji Institute of Surveyors and Ministry of Lands & Mineral Resources

20 position February/March 2021

www.pacificgeospatial.org.au 21

# PGSC Capacity



- PGSC Coordinator – SPC Partnership Desk
- PGSC Communications – SPC Partnership Desk
- Regional Positioning – GNSS & Tide Gauge for PICs

Thank you