What is GNSS CORS?

FIG References Frame in Practice Seminar

Operational Aspects of GNSS CORS Technical Workshop

Holiday Inn, Suva - Fiji

PGSC Partnership Desk, GEM Division, Pacific Community (SPC)

National Geodesy & GNSS Networks Team, Geoscience Australia

18 September 2018

What does GNSS CORS stands for..

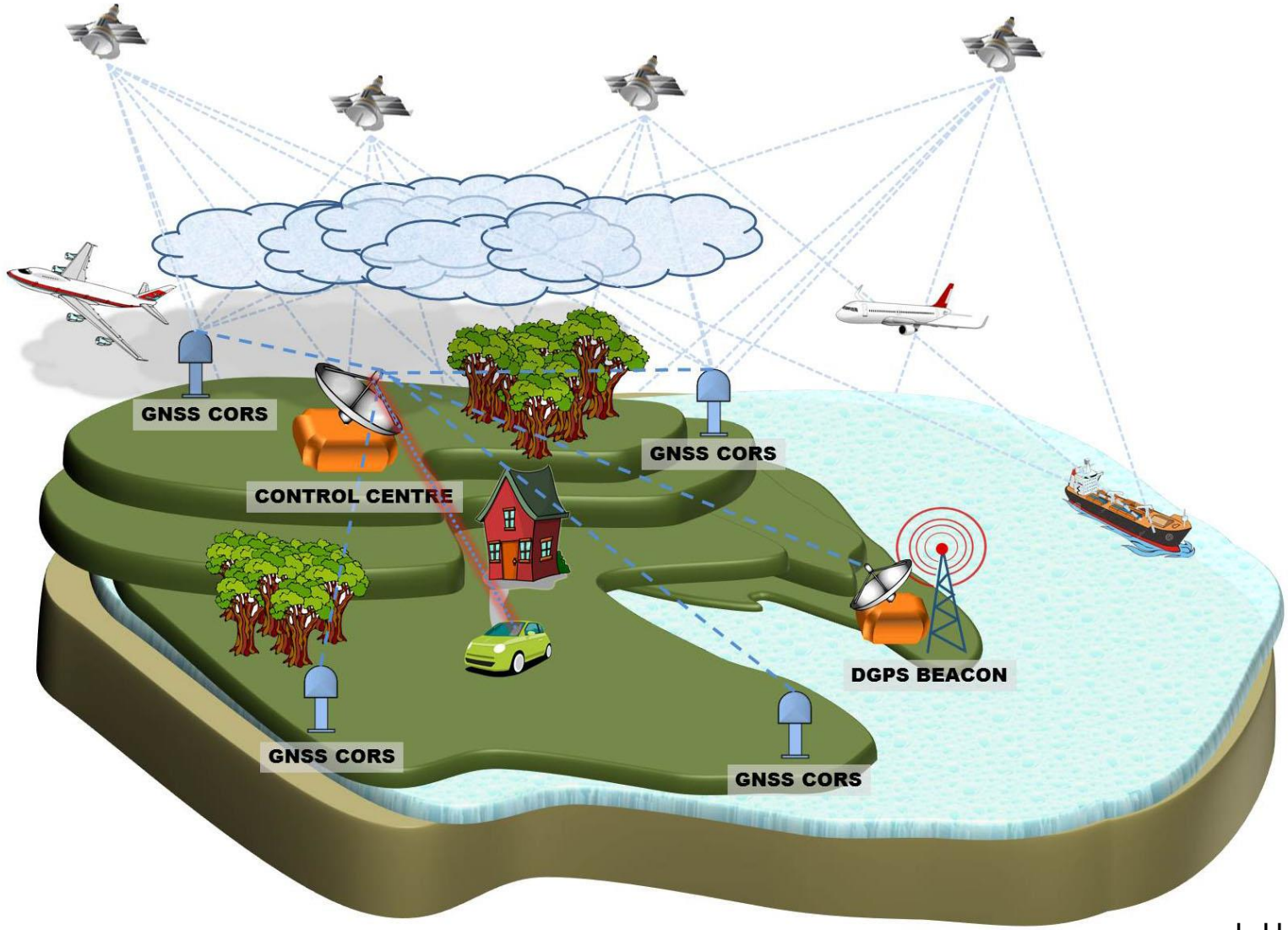
Global **N**avigation **S**atellite **S**ystems (GNSS)

Continuously **O**perating **R**eference **S**tation (CORS)

What is GNSS CORS?

It is a network of permanent geodetic quality GNSS Stations (Geospatial Infrastructure) established on a stable ground that operates continuously to ensure accurate positioning and navigation at a specified time over an internet connection in real time.

GNSS CORS Network



http://gnss-integrity.angkasa.gov.my/ab

What is GNSS?

A satellite navigation system with global coverage is termed as **Global Navigation Satellite System** (**GNSS**) that comprises of the United States Global Positioning
System (GPS), Russia's GLONASS, China's BeiDou Navigation Satellite System (BDS) and the European Union's Galileo that provides positioning and navigation solutions at a specified time.

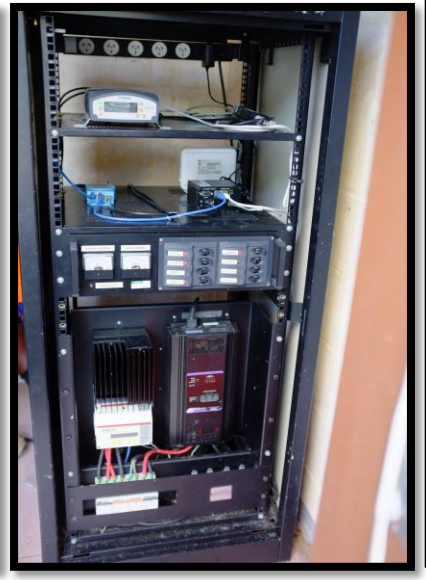
GNSS COR Station

Pacific Community
Communauté du Pacifique

Monument

Antenna

Power



Receiver (Hut)

Communication

GNSS CORS - Requirements

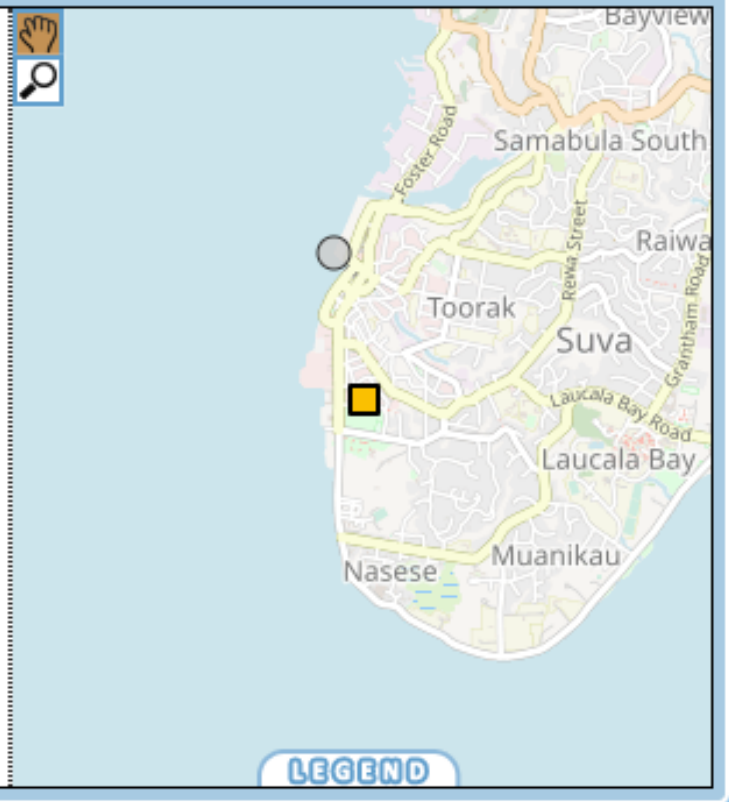
- Foundation
- Monumentation
- Interference
- Power
- Communications
- GNSS Receiver
- GNSS Antenna
- Weather Station
- Coordination
- Site Monitoring
- Data Format
- Reliability
- Metadata

Background - GPS CORS

Pacific Community
Communauté du Pacifique

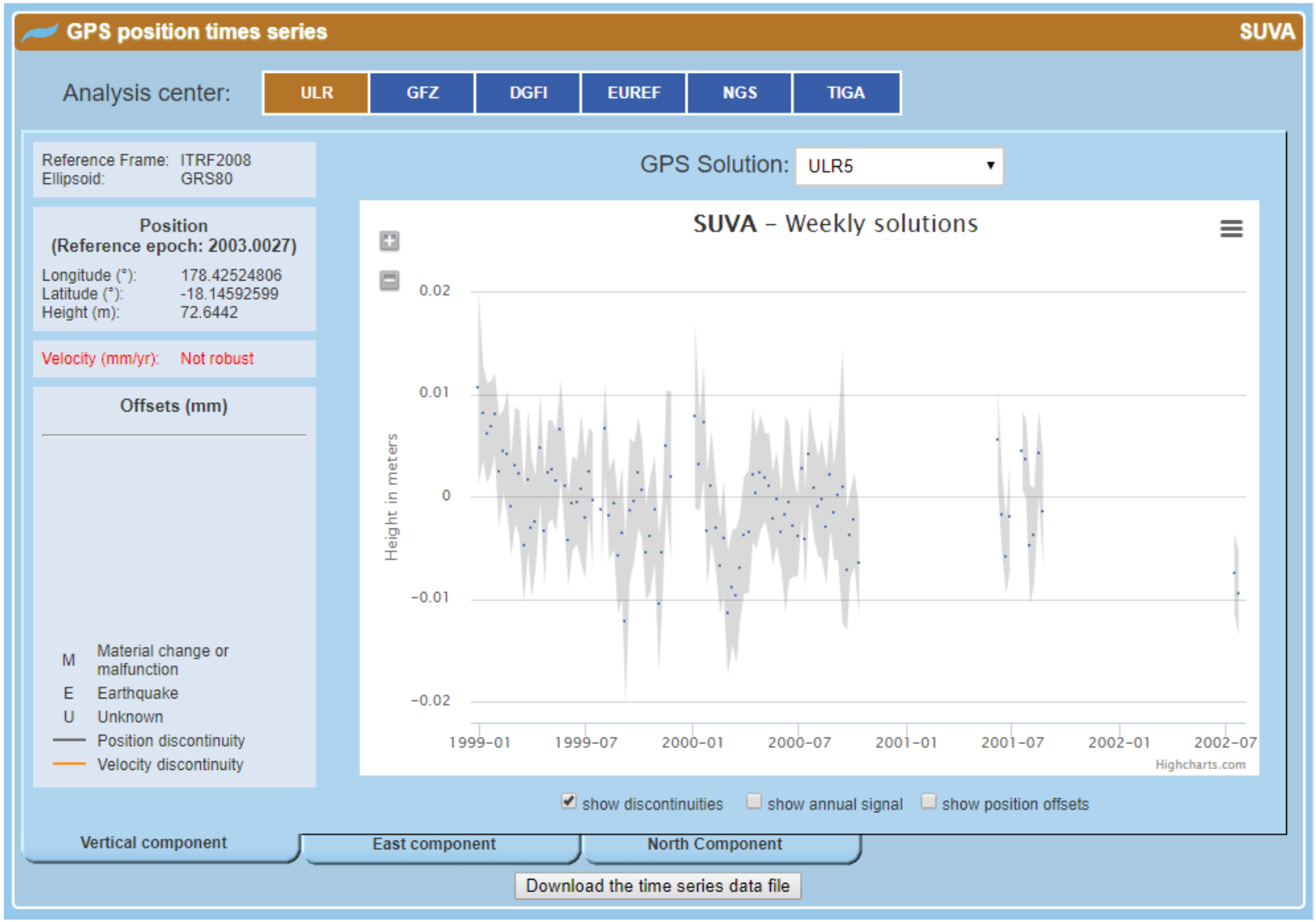
Station summary — SUVA

IGS-type acronym :	SUVA
Latitude :	-18.14590000
Longitude :	178.42520000
Installed date :	1999-01-01
Decommissioned date :	
Country :	FIJI
City :	SUVA
Station status :	No data for 30 days (orange)
Distance to Tide Gauge (m) :	1168
Domes Nr.:	50801S001
Station operator:	Unknown Manage this station
IGS-like station form :	suva_20010501.log (current) View



GPS CORS - SUVA

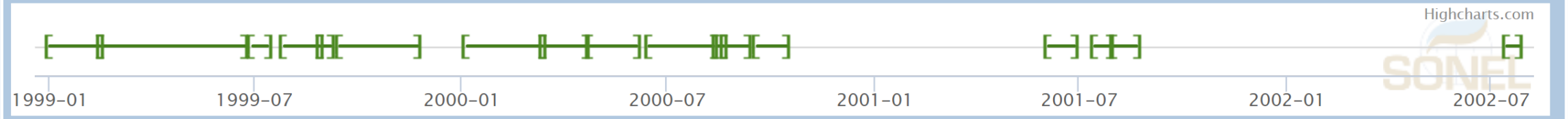
Pacific Community
Communauté du Pacifique



GPS CORS, SUVA

Pacific Community
Communauté du Pacifique

Data available at SONEL — SUVA

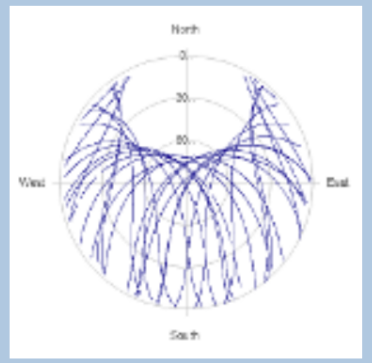


First data : 1999-01-01 (1999-001) -- Latest data : 2002-07-26 (2002-207)

Click on the timeline to display detailed calendar

Quality plots on RINEX files — SUVA

Observations & tracking performance



Satellite tracking

Royal Observatory of Belgium

Plots generated using software developed with the EPN team at ROB

Co-located instruments — SUVA

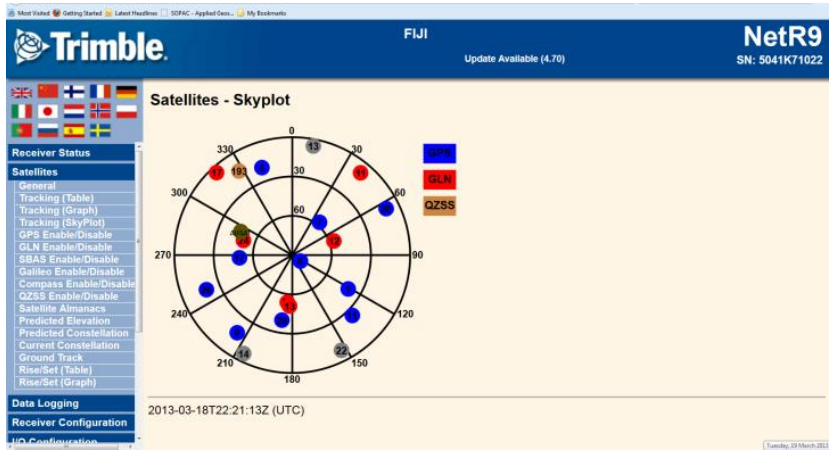
Tide gauge : SUVA-A ***(SUVTG)***

GNSS CORS - LAUT

Established in November 2002; Supported by Survey Department - Fiji

Index of /geodesy-outgoing/gnss/data/

Name	Size	Date Modified
[parent directory]		
campaign/		5/16/13, 12:00:00 AM
Creative_Commons_Copyright_Authorisation.txt	748 B	11/15/12, 12:00:00 AM
daily/		6/2/16, 1:38:00 AM
GA_NTRIPCaster_Info.txt	3.6 kB	1/18/13, 12:00:00 AM
GNSS_data_Readme.txt	4.7 kB	11/4/12, 1:00:00 AM
highrate/		1/1/16, 12:17:00 AM
hourly/		6/2/16, 1:36:00 AM
sprgn/		6/2/16, 1:42:00 AM



ftp://ftp.ga.gov.au/geodesy-outgoing/gnss/data/
http://auscors.ga.gov.au/status/
http://www.ga.gov.au/scientific-topics/positioning-navigation/geodesy/gnss-networks

Types of GNSS CORS

Types of GNSS CORS

Pacific Community
Communauté du Pacifique

Types of GNSS CORS

Types of GNSS CORS

Tier 1 GNSS CORS;

High stability monuments for geoscientific research and global reference frame definition.

Tier 2 GNSS CORS;

High stability monuments for the national geodetic agencies to define and maintain national geodetic reference frames. These sites form the primary national GNSS network. Tier 1 CORS sites are generally a subset of these Tier 2 stations, providing a link between the national geodetic datum and the ITRF

Tier 3 GNSS CORS;

Stable monuments established by national, state, territory governments and/or commercial agencies for the densification of the national CORS network but often supporting real-time positioning applications. These stations generally operate in, and provide access to, the datum rather than define it.

Why GNSS CORS??

- GNSS CORS network is aligned to International Terrestrial Reference Frame ITRF) that includes WGS84, which is the Global Geodetic Reference Frame (GGRF)
- The GGRF underpins the global coordinate system which allows us to know where we and things on the Earth are
- The GGRF requires a well distributed global infrastructure of observatories
- Countries access the GGRF through regional and national GNSS CORS networks

GLOBAL GEODETIC REFERENCE FRAME

Pacific Community
Communauté du Pacifique

The UN-GGIM Roadmap…

In February 2015 the UN General Assembly adopted the resolution “A Global Geodetic Reference Frame for Sustainable Development” - the first resolution recognizing the importance of a globally-coordinated approach to geodesy.

As per UN Resolution A/69/L.53

In the Pacific…Australia, Fiji, New Zealand, Papua New Guinea, Samoa, Solomon Islands, Tuvalu, Vanuatu

UN-GGIM
GLOBAL GEOSPATIAL INFORMATION MANAGEMENT

FIG

Australian Government
Geoscience Australia

United Kingdom Hydrographic Office

NOAA
National Oceanic and Atmospheric Administration
U.S. Department of Commerce

Land Information New Zealand
Toitū te whenua

SSSI

NZIS

Pacific Community
Communauté du Pacifique

United Nations A/69/L.53
General Assembly
Distr.: Limited
18 February 2015
Original: English

Sixty-ninth session
Agenda item 9
Report of the Economic and Social Council

Argentina, Australia, Belgium, Brazil, Bulgaria, Canada, China, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Ethiopia, Fiji, Finland, France, Georgia, Germany, Greece, Hungary, Ireland, Jamaica, Japan, Lithuania, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Papua New Guinea, Philippines, Poland, Portugal, Republic of Korea, Samoa, Slovenia, Solomon Islands, Spain, Sweden, Tunisia, Tuvalu, United Kingdom and Great Britain and Northern Ireland, United States of America and Vanuatu: draft resolution

A global geodetic reference frame for sustainable development

The General Assembly,

Reaffirming the purposes and principles of the Charter of the United Nations,

Reaffirming also its resolution 54/68 of 6 December 1999, in which the Assembly endorsed the resolution entitled “The Space Millennium: Vienna Declaration on Space and Human Development”,[1] which included, inter alia, key actions to improve the efficiency and security of transport, search and rescue, geodesy and other activities by promoting the enhancement of, universal access to and compatibility of space-based navigation and positioning systems, including Global Navigation Satellite systems,

Reaffirming further its resolution 57/253 of 20 December 2002, in which it endorsed the Plan of Implementation of the World Summit on Sustainable Development,[2] and means of implementation, which included, inter alia, strengthening cooperation and coordination among global observing systems and research programmes for integrated global observations, taking into account the need for building capacity and sharing of data from ground-based observations, satellite remote sensing and other sources among all countries,

[1] Adopted by the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III), held in Vienna from 19 to 30 July 1999 (see A/CONF.184/6, chap. I, resolution 1).

[2] *Report of the World Summit on Sustainable Development, Johannesburg, South Africa, 26 August–4 September 2002* (United Nations publication, Sales No. E.03.II.A.1 and corrigendum, chap. I, resolution 2, annex).

15-02265 (E) 190215

Please recycle

Newsletter 03 | UN-GGIM – Global Geodetic Reference Frame Working Group

Will reduce flood losses

The Global Geodetic Reference Frame is key element in a project aiming to develop integrated flood management for the Pacific.

Flood preparedness

Topography model

Seamlessly with a Reference Frame

Geospatial capacity building

Observing global change

UN-GGIM | United Nations Initiative on Global Geospatial Information Management | ggim.un.org

Newsletter February 2016 06 | UN-GGIM – Global Geodetic Reference Frame Working Group

UN RESOLUTION

Significant benefits to the study of our changing planet

The UN General Assembly resolution “A Global Geodetic Reference Frame for sustainable development” adopted in February 2015 has been an eye-opener for society to the understanding of the importance of global geodesy.

Implement open geodetic datasharing

Defining sea baselines

Geospatial capacity building

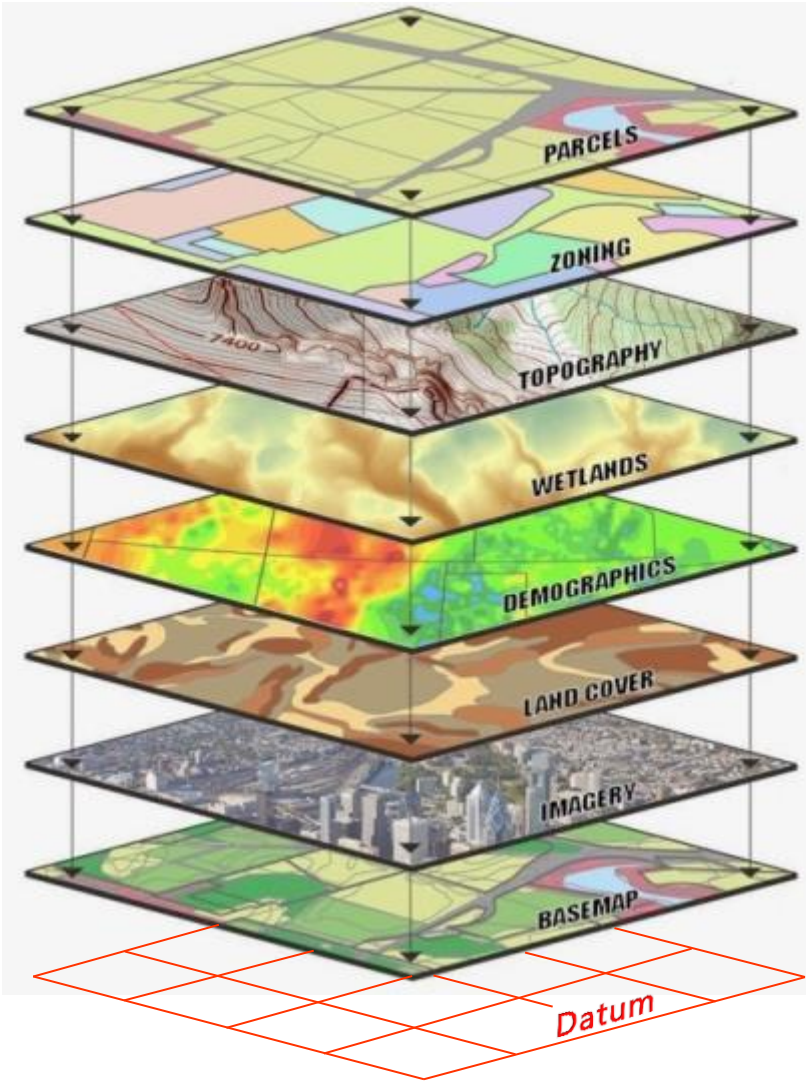
Joint efforts on networks

Observing global change

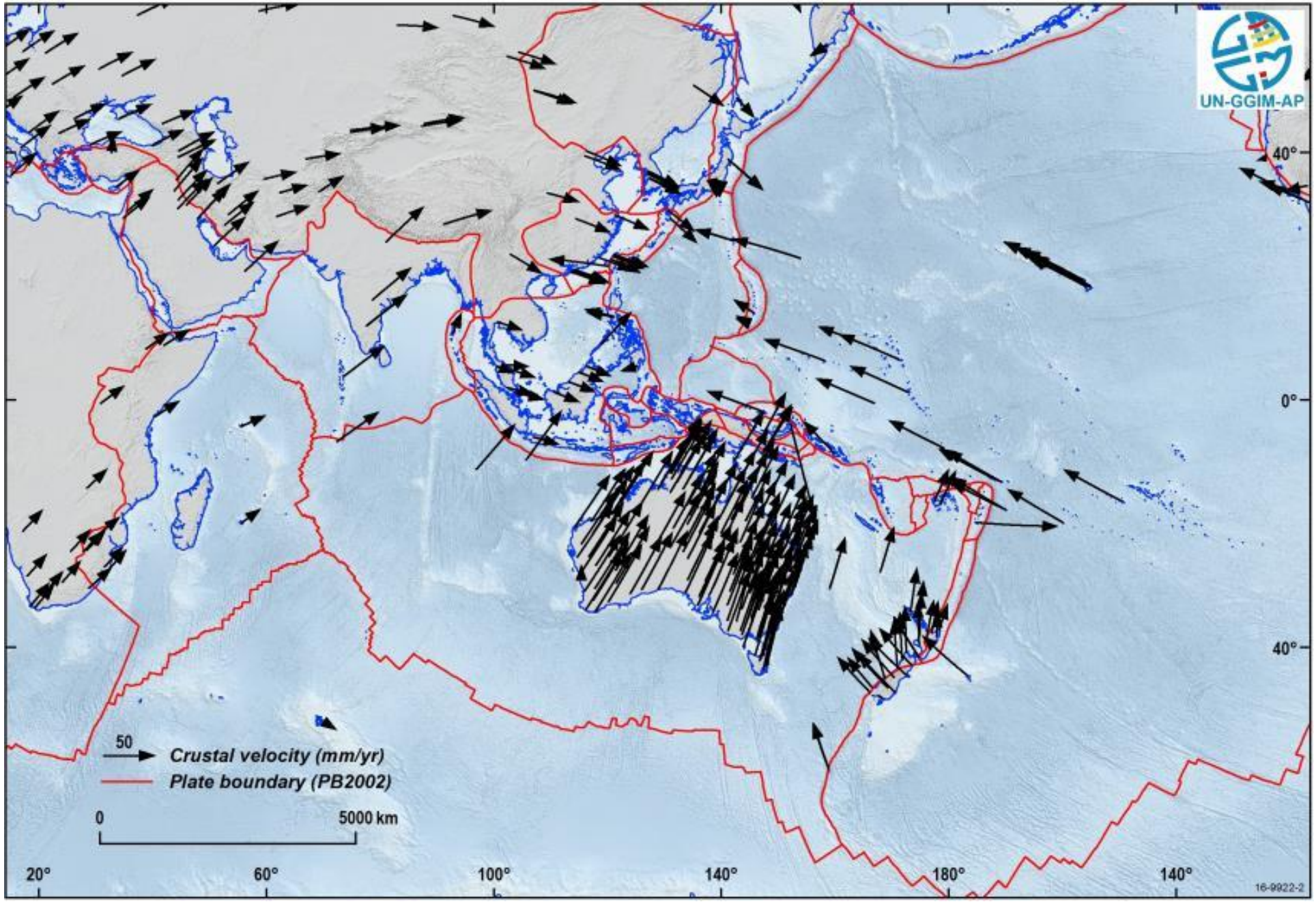
UN-GGIM | United Nations Committee of Experts on Global Geospatial Information Management | ggim.un.org

GNSS CORS Context & Purpose

- Therefore in geodetic context - GNSS CORS forms an integral component of the nation's geospatial infrastructure.
- The primary purpose of GNSS CORS is to collect data to measure and monitor the land movement so that the reference frame and datum can be defined, improved, and maintained for geoscience and spatial datasets.
- GNSS CORS also supports applications such as infrastructure projects, asset management, resource and emergency management, machine guidance, intelligent transport systems, precision agriculture and environmental research.



Crustal velocities of Asia and the Pacific



Pacific Community
Communauté du Pacifique

IGS INTERNATIONAL GNSS SERVICE

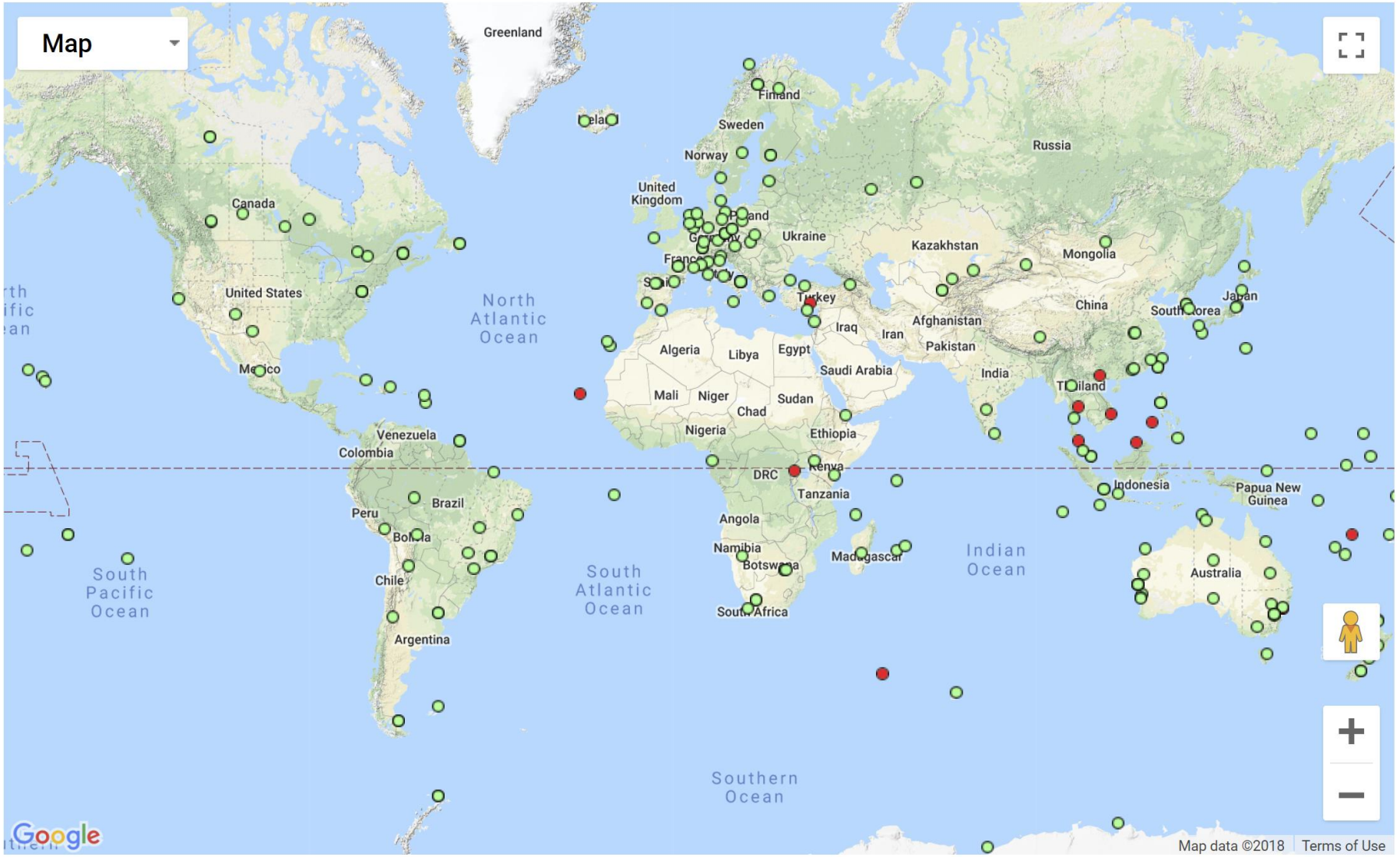
Network Products Working Groups Resources About Search

Pacific Community
Communauté du Pacifique

Network

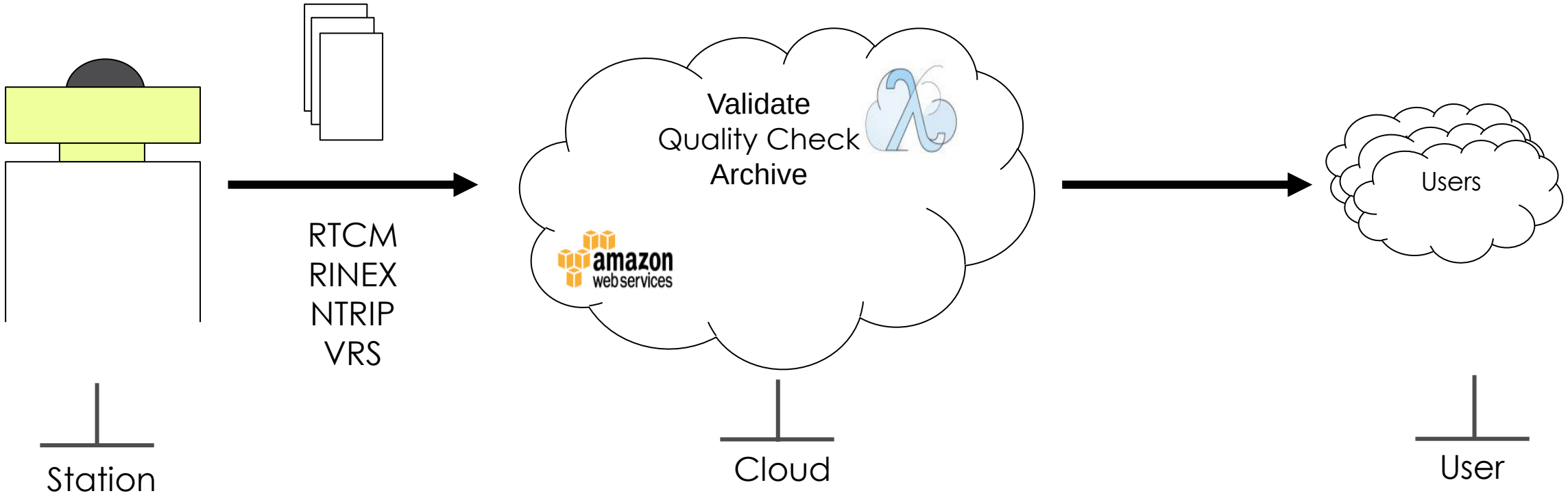
http://www.igs.org/network?network=multi-GNSS

Information



Accessibility – Data Centre in the Cloud

Provide access to a true and complete GNSS data archive to users at local, national, regional and international level.



Users & Projects of GNSS CORS

Pacific Community
Communauté du Pacifique

IGS INTERNATIONAL GNSS SERVICE

Australian Government
Geoscience Australia

...?

Australian Government
Bureau of Meteorology

IGN
INSTITUT NATIONAL
DE L'INFORMATION
GÉOGRAPHIQUE
ET FORESTIÈRE

UCAR
UNIVERSITY CORPORATION FOR ATMOSPHERIC RESEARCH

JAXA Japan Aerospace Exploration Agency

GNSS CORS Commission – 20th September 2018

MEMORANDUM OF UNDERSTANDING
BETWEEN
THE PACIFIC COMMUNITY (SPC)
&
THE MINERAL RESOURCES DEPARTMENT OF THE MINISTRY OF LANDS AND MINERAL RESOURCES
ON BEHALF OF THE GOVERNMENT OF THE REPUBLIC OF FIJI

PREAMBLE

The Pacific Community hereinafter referred to as 'SPC' and the Mineral Resources Department hereinafter referred to as 'MRD' of the Ministry of Lands and Mineral Resources for and on behalf of the Government of the Republic of Fiji, share a commitment to establish a Continuous Operating Reference Station (CORS) located at the old Wind Turbine in the Drilling Compound of the MRD located on the corner of Maddocks Road and Mead Road in Nabua.

PGSC
Pacific Geospatial and Surveying Council

Australian Government
Geoscience Australia

Pacific Community
Communauté du Pacifique

Questions?

Vinaka