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

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What does GNSS CORS stands for.

**Global Navigation Satellite Systems (GNSS)**

**Continuously Operating Reference Station (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.
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

- 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

#### Station summary

<table>
<thead>
<tr>
<th>IGS-type acronym:</th>
<th>SUVA</th>
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</thead>
<tbody>
<tr>
<td>Latitude:</td>
<td>-18.14590000</td>
</tr>
<tr>
<td>Longitude:</td>
<td>178.42520000</td>
</tr>
<tr>
<td>Installed date:</td>
<td>1999-01-01</td>
</tr>
<tr>
<td>Decommissioned date:</td>
<td></td>
</tr>
<tr>
<td>Country:</td>
<td>FIJI</td>
</tr>
<tr>
<td>City:</td>
<td>SUVA</td>
</tr>
<tr>
<td>Station status:</td>
<td>No data for 30 days (orange)</td>
</tr>
<tr>
<td>Distance to Tide Gauge (m):</td>
<td>1158</td>
</tr>
<tr>
<td>Domes Nr.:</td>
<td>508015001</td>
</tr>
<tr>
<td>Station operator:</td>
<td>Unknown</td>
</tr>
<tr>
<td>IGS-like station form:</td>
<td>suva_20010501.log (current) View</td>
</tr>
</tbody>
</table>

[Map of Suva with GPS CORS station location]
GPS CORS, SUVA

Data available at SONEL


Click on the timeline to display detailed calendar

Quality plots on RINEX files

Observations & tracking performance

Satellite tracking

Plots generated using software developed with the EPN team at ROB

Co-located instruments

Tide gauge: SUVA-A (SUVT6)
GNSS CORS - LAUT

Established in November 2002; Supported by Survey Department

Types of GNSS CORS
Types of GNSS CORS
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

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
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
Network

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

Vinaka