



# From the Whole to the Part

## Progress for Tonga's Geodetic Infrastructure

Global, Regional and Local Geodetic Frameworks:  
An essential building block for a better world

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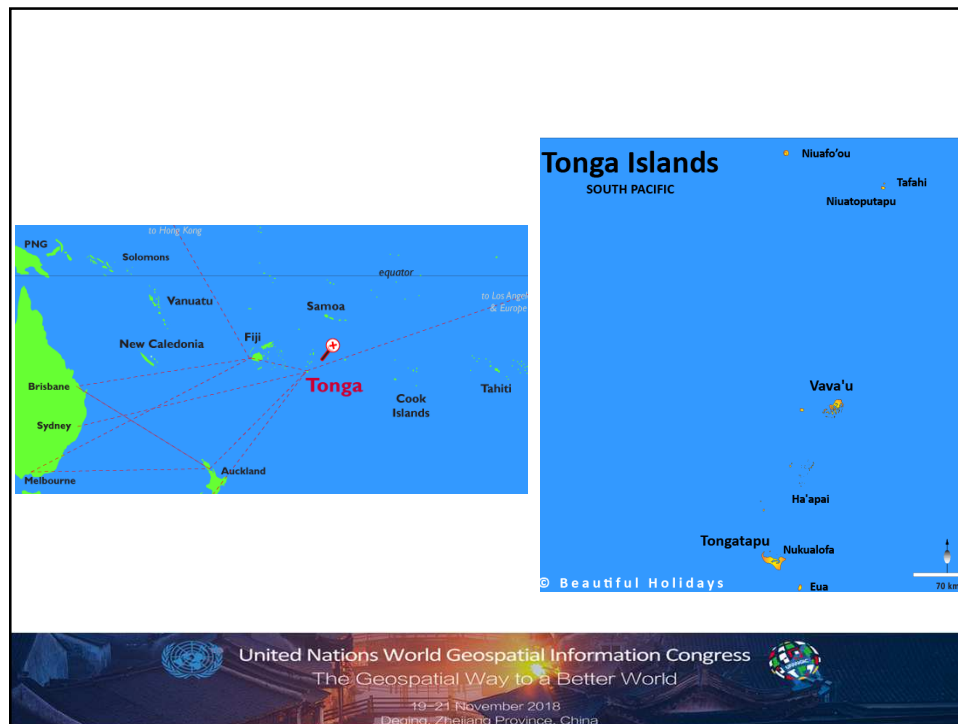


## Focus of my Presentation



- **Current Status of Geodetic infrastructure**
- **The challenges**
- **The engagement**
- **Global to National**
- **The opportunities**





## Tonga's Geodetic Reference Frame

### Tonga Geodetic Datum (TGD2005),

- Geocentric origin
- GRS80 ellipsoid (= WGS84)
- Static datum based on ITRF2000 as at 1 Jan 2005

### Tonga Map Grid (TMG),

- Transverse Mercator
- Reference spheroid = GRS80
- Meridian of origin = 177W
- Latitude of origin = The Equator
- Central meridian scale factor = 0.9996
- False origin = 1,500,000E  
5,000,000N

### Challenges

- Need to review to align with Global Reference Frame
- Human resources & expertise
- CORS
- Equipment
- Legislation
- Lack of recognition by potential users
- Lack of understanding of its significance

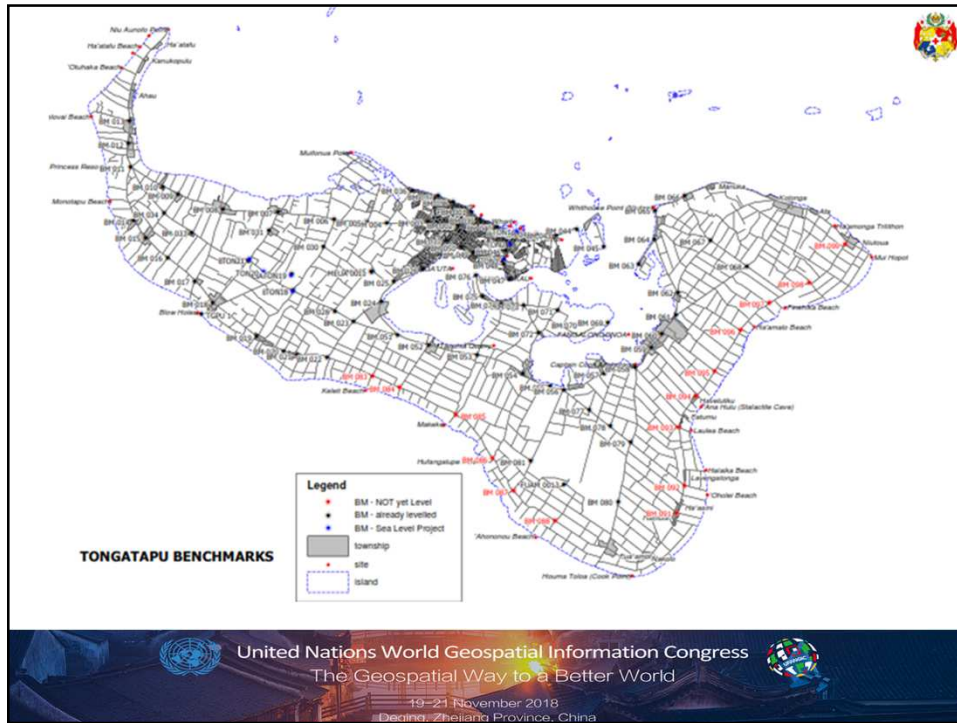




## Tonga's Vertical Reference Frame

- **Current Status**
  - **National Vertical Reference Frame not yet in place**
  - **MSL only on main island-but not complete**
- **Challenges**
  - **Human resources & expertise**
  - **Right technologies**
  - **Lack of recognition at higher level**
  - **Islands are spread out**
  - **Financial difficulties**

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# Global Network

- UN GGIM
- FIG



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# Regional Network

- **UN GGIM AP**



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# Regional Network

- **FIG Capacity Development Network Asia/Pacific (FIG CDN AP)**




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## Sub-regional Network



- **Started 2014**
- **Members: Core members are national geospatial and surveying authorities of Pacific Island countries and territories**



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## Opportunity

- **UN International Seminar on Legal and Policy Framework for Geospatial Information-Tonga, 10-13 April 2018**
- **Climate & Ocean Support Programme for Pacific (COSPPac) Steering Committee & Planning Meeting 5-8 March 2018**



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## • Fourth PGSC Meeting-Tonga 9 April 2018



- Launching of PGSC 10 years Strategy

**Vision**  
Sustainable development in the Pacific Islands region enabled by world-class geospatial information and surveying services.

**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.

**Goals**

- 1 The PGSC enables regional leadership, direction and support for member states to engage stakeholders and the community on geospatial and surveying activities
- 2 Countries across the region adopt a modern Geodetic Reference Frame (GRF) and technology underpinning geospatial systems and applications
- 3 Geospatial and surveying activities at the national and regional level are supported by a diverse and sustainable resource base
- 4 The geospatial and surveying community is self-reliant with a culture supportive of learning innovation and gender equity



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## Geoscience Australia Placement

Geoscience Australia



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# Tonga's Draft Position Strategy


- **Vision:**  
*Improved decision making, prosperity and safety enabled by world-class reference systems, geospatial information and services.*
- **Strategic Priorities:**
  - Modern geodetic references frame align to the global geodetic reference frame.*
  - Modern height reference frame for the whole of Tonga.*
  - Legal framework to empower geodetic datum modernisation*



# Propose CORS Network



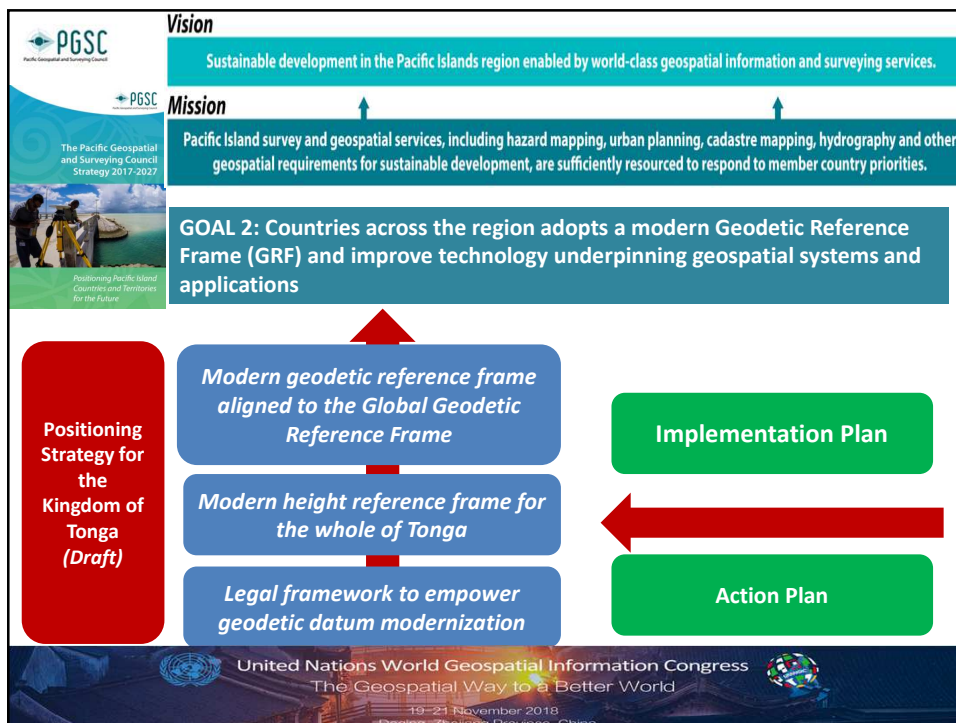




## Other Assistance

- **Sets of GNSS's gifted from Geoscience Australia**
- **Financial support-Government of India-for more geodetic equipments**
- **Land Information New Zealand (LINZ)- Support future work placement from Tonga at LINZ**

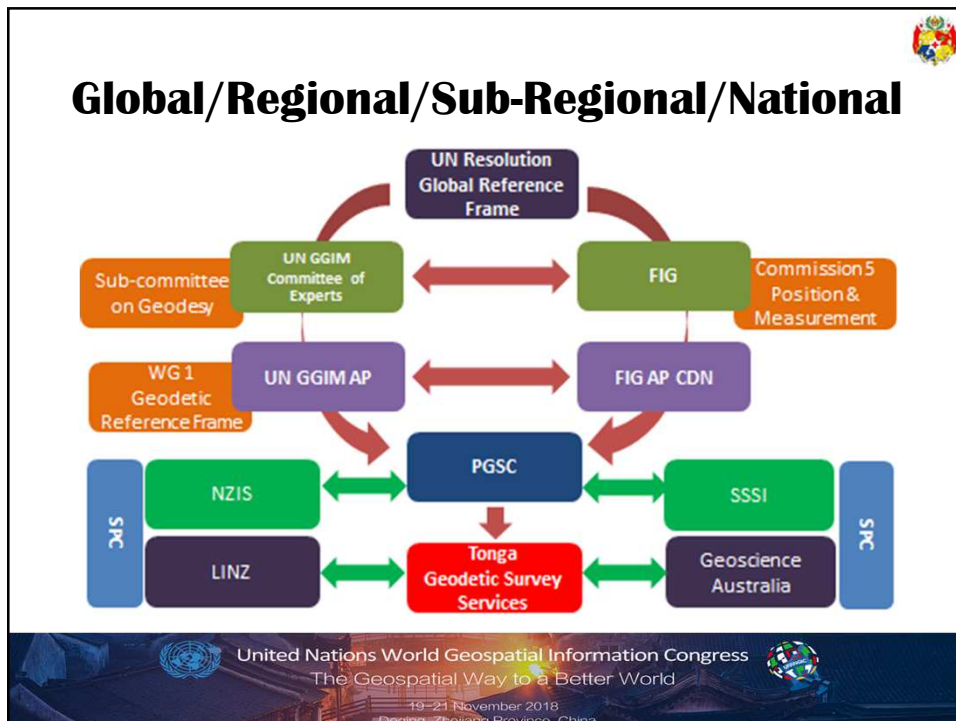
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# PGSC Strategy & SDGs

TITLE	OUTCOMES/PRIORITIES ALIGNED WITH THE STRATEGY
 <p><b>Sustainable Development Goals 2015-2030</b></p>	<ul style="list-style-type: none"> <li>SDG 5 Gender Equality</li> <li>SDG 6 Clean Water and Sanitation</li> <li>SDG 7 Affordable and Clean Energy</li> <li>SDG 8 Decent Work and Economic Growth</li> <li>SDG 9 Industry, Innovation and Infrastructure</li> <li>SDG 11 Sustainable Cities and Communities</li> <li>SDG 12 Responsible Consumption and Production</li> <li>SDG 13 Climate Action Responsible Consumption and Production</li> <li>SDG 14 Life Below Water</li> <li>SDG 15 Life On Land</li> <li>SDG 17 Partnerships for the Goals</li> </ul>

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## Why modernising Geodetic Reference Frame and Height System

- **Community safety**
- **Accurate Topography Maps**
- **Improved Floodplain and Inundation Maps**
- **Real-Time Positions**
- **Smart Transportation-land & sea**
- **Precise Agriculture & Fishing**
- **Coastal Wetland Monitoring**
- **Improved Early Warning for Natural Hazards**
- **Autonomous Navigation**
- **Support development-Building Legislation or Building Codes:**
- **Mitigate risk from storm surge or flooding events and ensure that houses and buildings are set above levels which could be impacted by flood waters**
- **Sea level rise + low-lying islands-Sea level rise & tsunami model**
- **Land use planning**



## Conclusion

- **UN GGIM & Sub-committee on Geodesy to recognise the current status of developing states-Recognise the huge gap between developed countries and SIDS**
- **Lesson learned SIDS to engage with global, regional, sub-regional networks**
- **Tonga's progress to date: Full support of global, regional, & sub-regional networks**