

TONGA GEODETIC DATUM

The Upgrading of Tonga's Geodetic Reference Frame



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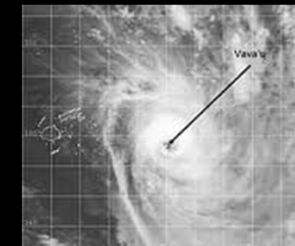
BACKGROUND

- Old Survey records indicated that Surveying and mapping began in the early 1900's.
- Tonga Cadastral Survey Datum (TCSD 57/61)* and the *Tonga Cadastral Survey Grid (TCSG 61)* was introduced and adopted for the cadastral survey of the Kingdom of Tonga from 1957-1961.
- This was established at four island groups, each with its own circuit origin and azimuth determination. These stations were fixed by astronomical observations.
- By Leach and Browne (Registered Surveyors NZ)



CYCLONE RECOVERY AND EMERGENCY MANAGEMENT PROJECT (CREMP) 2005-2008

- CREMP was developed after Cyclone Waka visited Tonga in 2001 leaving US\$48 million cost of damages
- One of the project components, Land Hazards and Information Management was established to *improve the land information resources for preparedness and emergency response capability* for the Government of Tonga.
- In order to produce a modern land information system, a new geodetic datum and map projection had to designed adopting international standards and specifications.



NEW GEODETIC DATUM AND MAP PROJECTION

- A new, national geodetic datum has been created called the Tonga Geodetic Datum (TGD2005), based on international geodetic standards.
 - Geocentric origin
 - GRS80 ellipsoid (= WGS84)
 - Static datum based on ITRF2000 as at 1 Jan 2005
- A new, national map projection has been created called the Tonga Map Grid (TMG), based on international mapping standards.
 - 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
- New topographical maps and international land boundaries will be based on the Tonga Map Grid
- It was developed by BECA consultants NZ



SIGNIFICANCE OF THIS NEW GEODETIC DATUM

- Have a single and modern geodetic reference frame based on international standards
- Relative to any position by GPS/GNSS
- Spatially related society
- Annual maintenance of network improve accuracy of positioning
- it also provides the fundamental framework for georeferencing in GIS databases



Source: <http://slideplayer.com/slide/1518371>



Source: www.slideshare.net/RockyS11/geodesy-basics-for-kentucky-gis

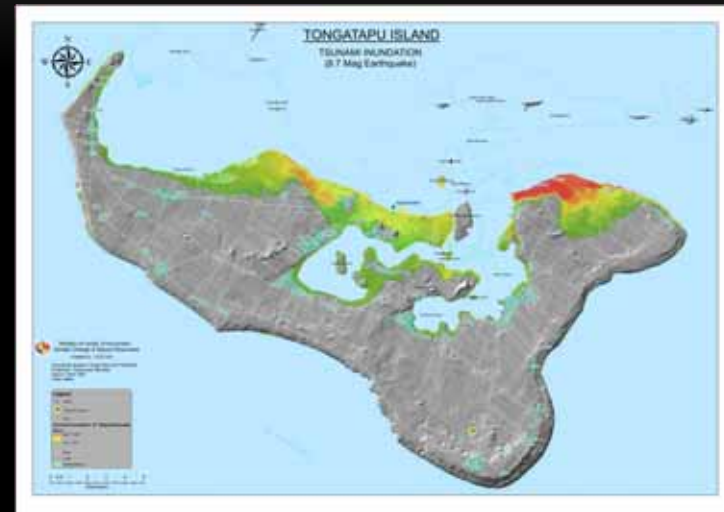


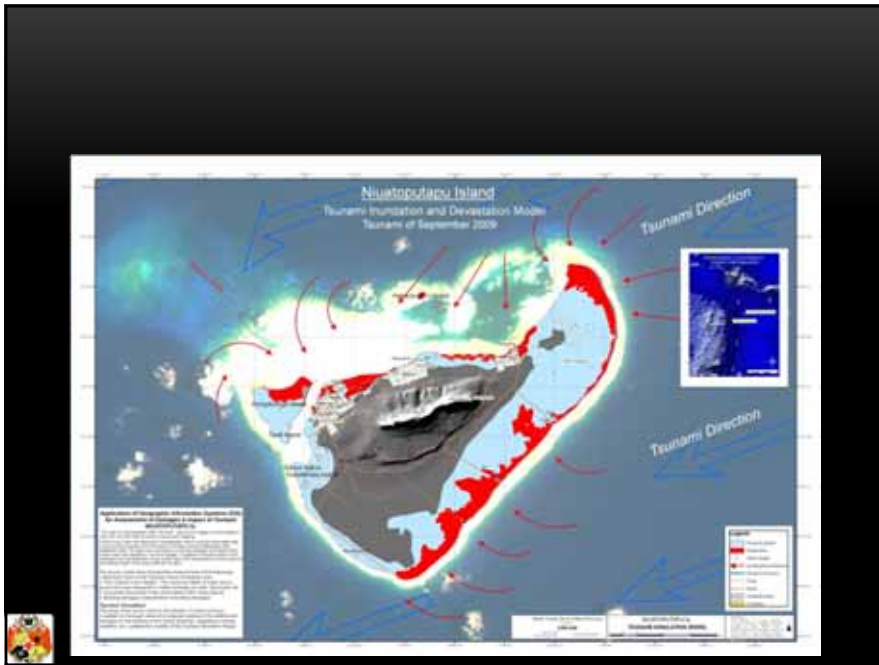
BENEFITS

- Tonga is becoming a *Spatially Connected and Related Country*.
- Everything starts to operate on a single platform of the TGD2005 and the Tonga Map Grid.
- Accurate GIS layers and maps to support decision making.

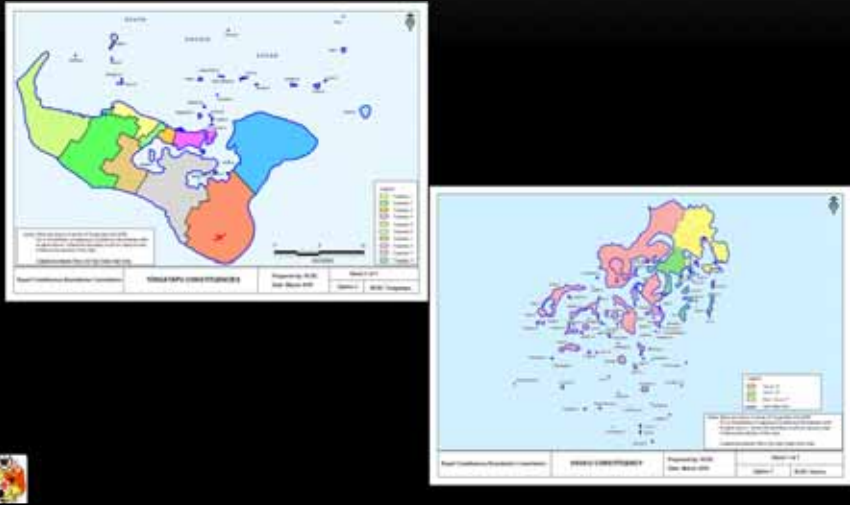


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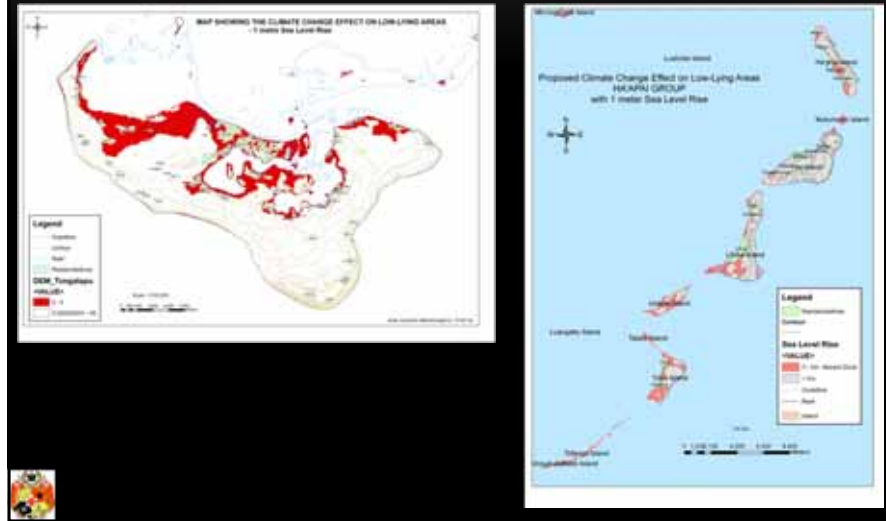




ELECTION CONSTITUENCIES BOUNDARIES



CLIMATE CHANGE EFFECTS ON LOW LYING AREAS



CHALLENGES FACED

- Lack of experience in Geodesy and Geodetic Network Maintenance.
- Lack of fund for annual maintenance and densification of geodetic network.
- Lack of understanding of the significance of a single and upgraded geodetic network from government and decision makers.
- Not enough surveyors in the ministry.
- Inadequate equipment and software for geodetic work.



THE PROGRESS SINCE ITS DEVELOPMENT

- Since the development of the TGD2005, there has not been any real progress made in maintaining, updating and densification of our network.
- Progress made since the **FIG SIDS Symposium in 2013**, and the creation of the **Pacific Geospatial and Surveying Council** in 2014.
- The ministry's Corporate Plan 2015/2019 reflects the importance of the Geodetic Network in one of its Outputs: **"An efficient and effective system of Survey, Mapping and Subdivisional Design of Land for Tonga to facilitate socio-economic development based on a global, updated and accurate geodetic network."**



- The Ministry's Budget for year 2015/2016 has prioritised surveying allowing TOP\$150,000.00.
- Geodetic Network Maintenance Plan:
 - Procuring new sets GNSS, Total Stations and software by December 2015 or first half of 2016 under the FAO funded *Integrated Land and Agro-Ecosystem Management Systems Project for Tonga*
 - Have a technical assistance by early 2016 Geodetic Consultant



MALO 'AUPITO

