

# Climate Change Adaptation In Australia & the Pacific

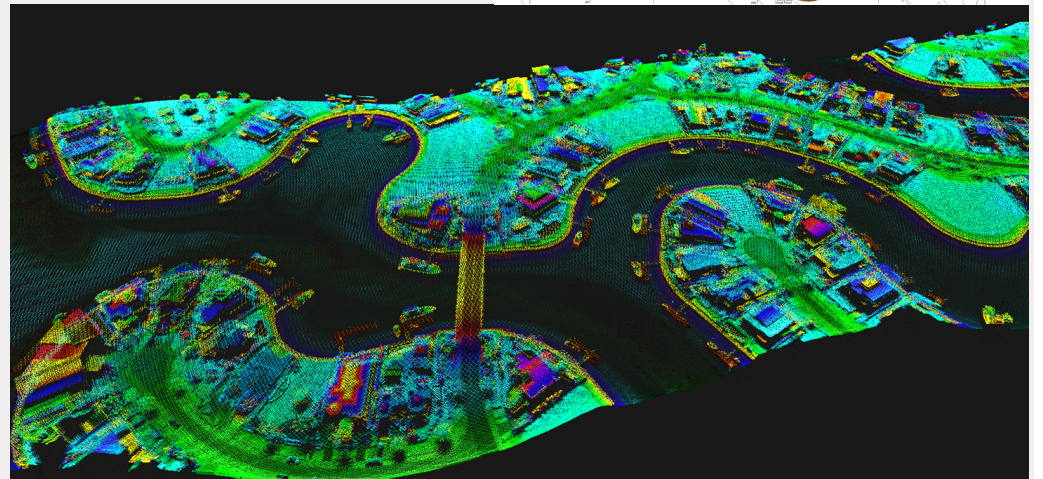
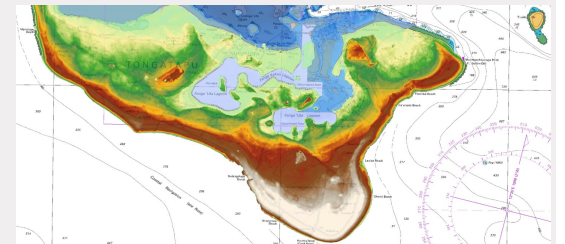
Graeme Kernich, Deputy CEO

Australia & New Zealand  
Cooperative Research Centre for Spatial Information



#### 4. Extension into the Pacific

- Vanuatu
- Papua New Guinea
- Tonga
- Samoa



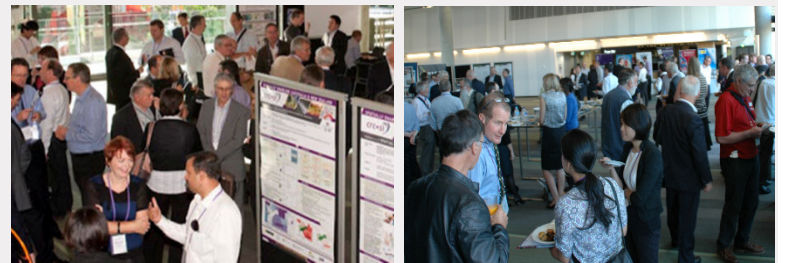
Australia and New Zealand

Overall goal is to accelerate the spatial enablement of Australia & New Zealand

70 Company (48), Government (12), & University (10) Participants

50 projects at any one time (50 completed)

300 in-kind contributors, 35 students, 35 postdocs, numerous subcontractors



Sustainable Urban  
Development

Spatial  
Infrastructures

Automated  
Spatial Info  
Generation

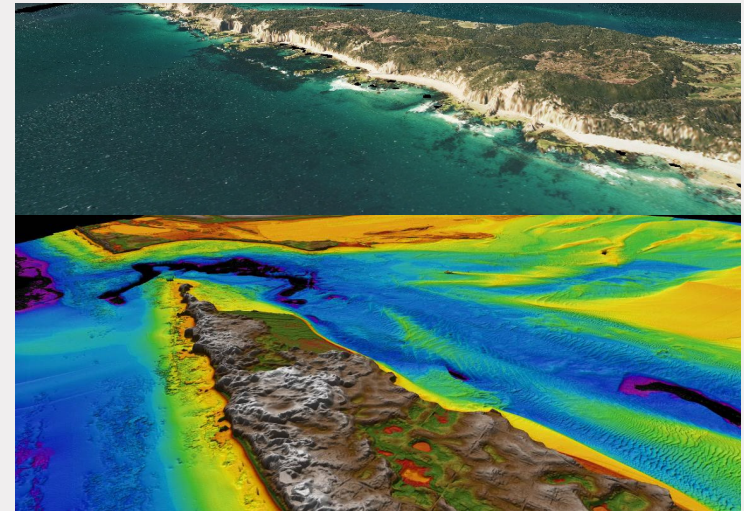
Energy & Utilities

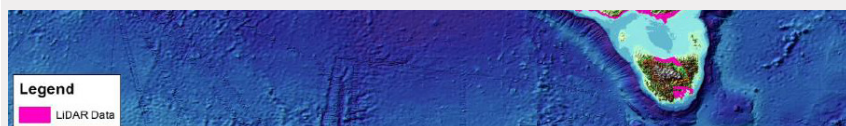
Agriculture, Natural  
Resources, Climate Change



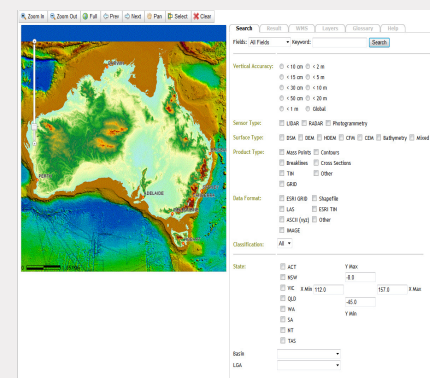
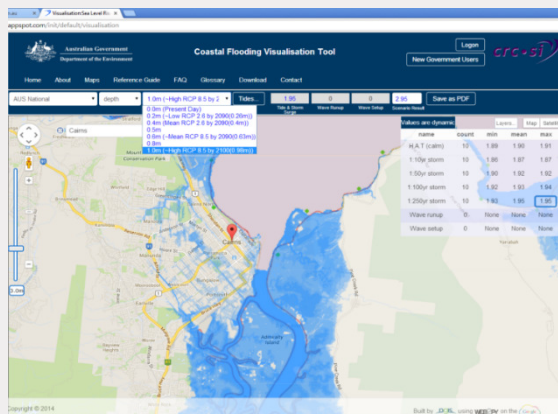
#### government and public

- Developed portal for data and derived products – 300,000 pdf downloads in first 6 months (via Geoscience Australia website)
- Developed online sea-level rise visualisation tool
- National guidelines for collection and processing of data
- 200,000 km<sup>2</sup> of 15cm DEMs covering 80% of Australia's population





Major industry growth, improved quality and reductions in price.

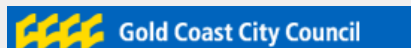




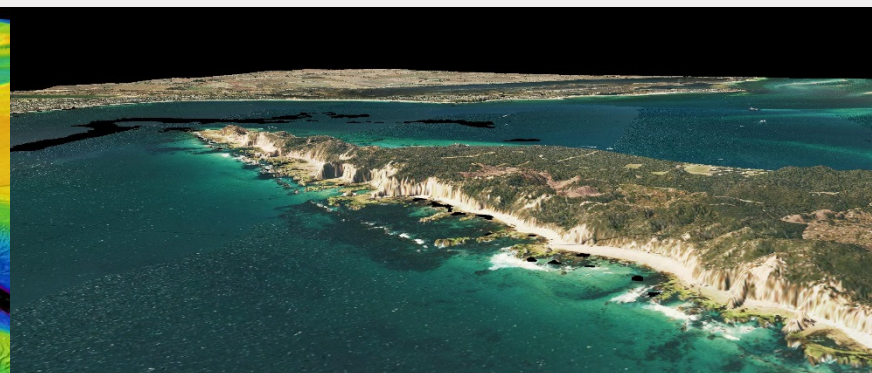
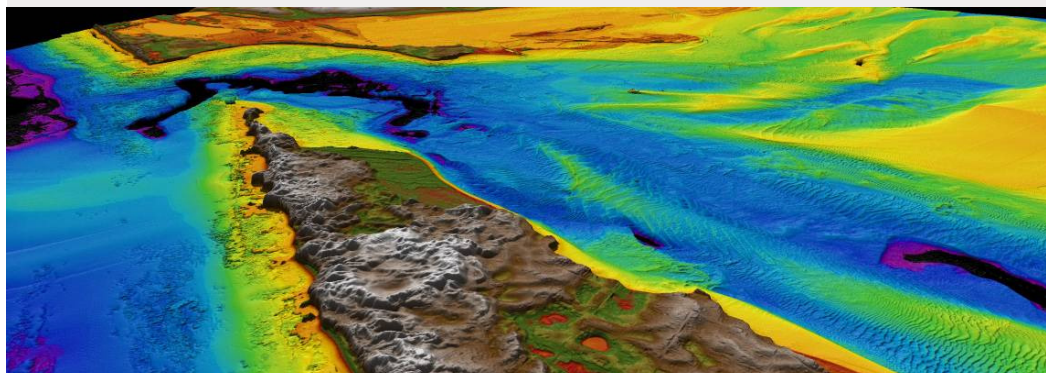
MELBOURNE



Department of Environment and Natural Resources



Sunshine Coast Council



**ICSM LiDAR Acquisition Specifications  
and Tender Template**

**VERSION 1.0, NOVEMBER 2010**

led to a dramatic improvement in data quality, interoperability, reduced investor risk and increased industry efficiency

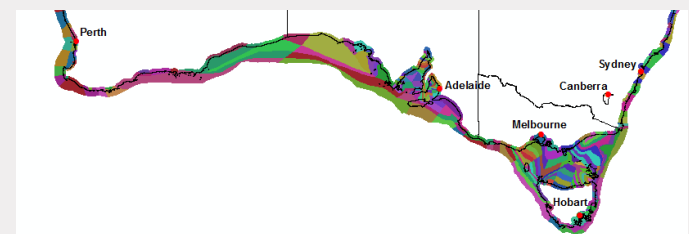
- The Specifications have provided the basis for new automated tools for testing compliance and quality assurance (LiDAR QA)

MHWN	57.83	-0.67
AHD	57.00	0.16
MSL	57.00	0.16
MLWN	56.16	1.00
MHLW	56.16	1.00
MLW	55.67	1.49
MLWS	55.17	1.99
MLLW	55.17	1.99
LAT	54.54	2.62
Ellipsoid (GDA94)	0.00	57.16

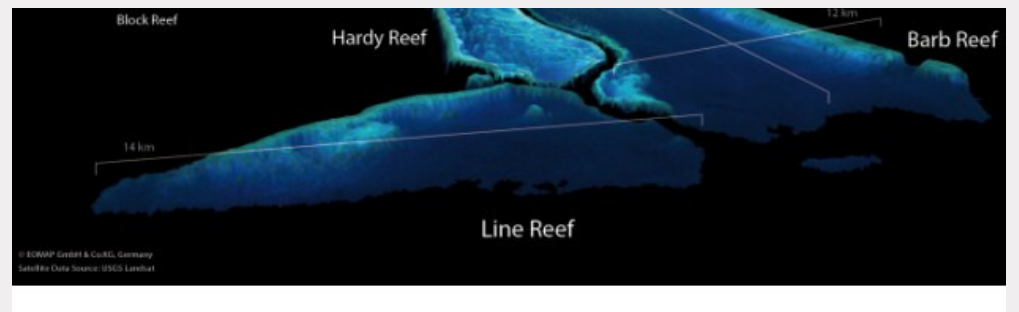
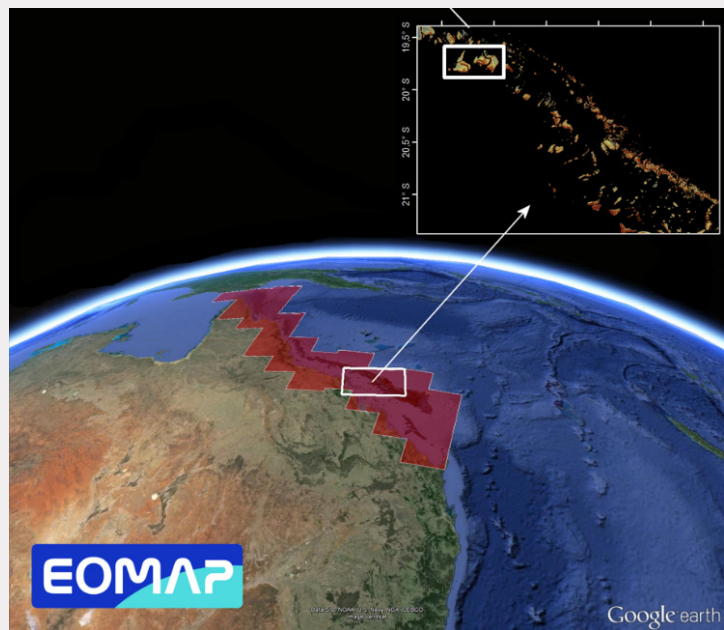
Close

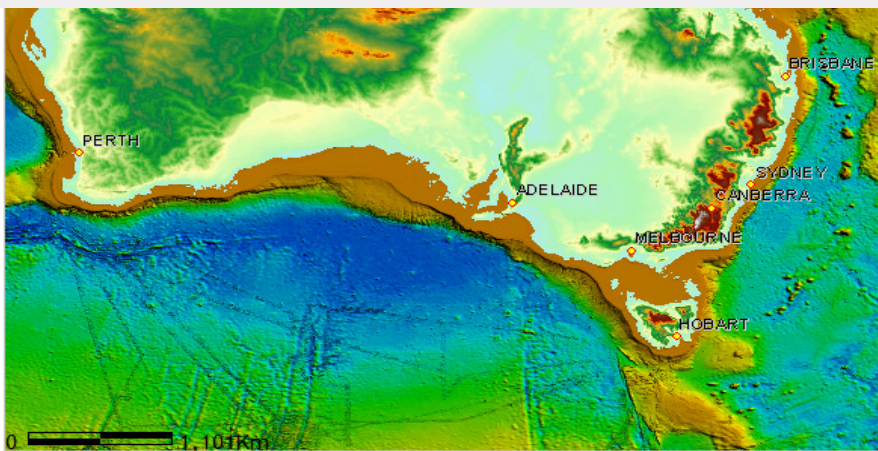
of bathymetry and topographic data

- Tool for flooding, marine, conservation and cadastral applications
- Released mid-2013
- ICSM PCTMSL website hosts the install package









**Sensor Type:** ☐ LiDAR ☐ RADAR ☐ Photogrammetry

**Surface Type:** ☐ DSM ☐ DEM ☐ HDEM ☐ CFM ☐ CEM ☐ Bathymetry ☐ Mixed

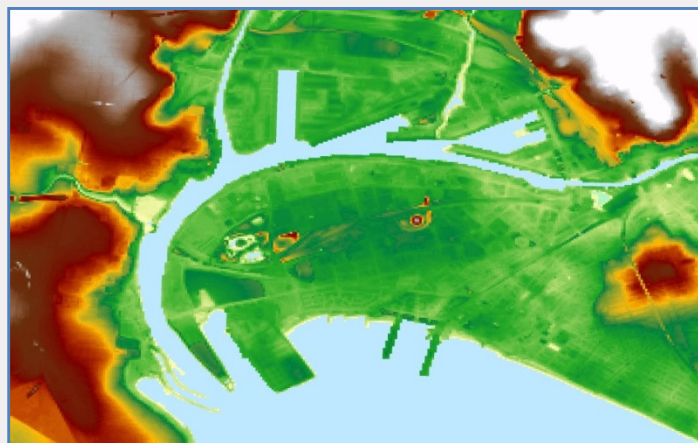
**Product Type:** ☐ Mass Points ☐ Contours  
☐ Breaklines ☐ Cross Sections  
☐ TIN ☐ Other  
☐ GRID

**Data Format:** ☐ ESRI GRID ☐ Shapefile  
☐ LAS ☐ ESRI TIN  
☐ ASCII (xyz) ☐ Other  
☐ IMAGE

**State:** ☐ ACT ☐ NSW ☐ VIC ☐ QLD ☐ WA ☐ SA

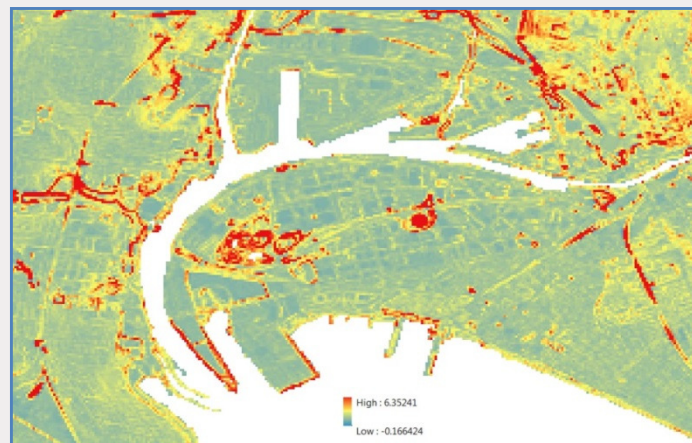
Y Max:   
X Min:  X Max:   
Y Min:

1sec LiDAR DEM

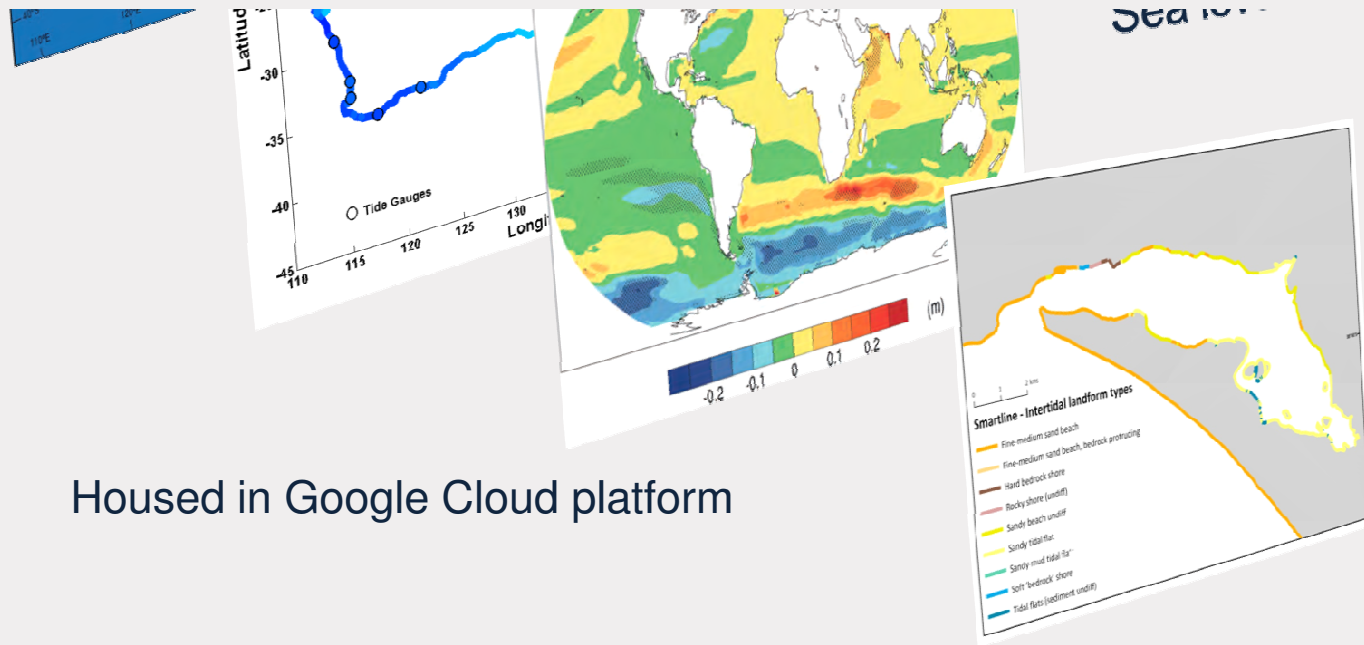


1sec (~25m) LiDAR DEM

1sec LiDAR DEM

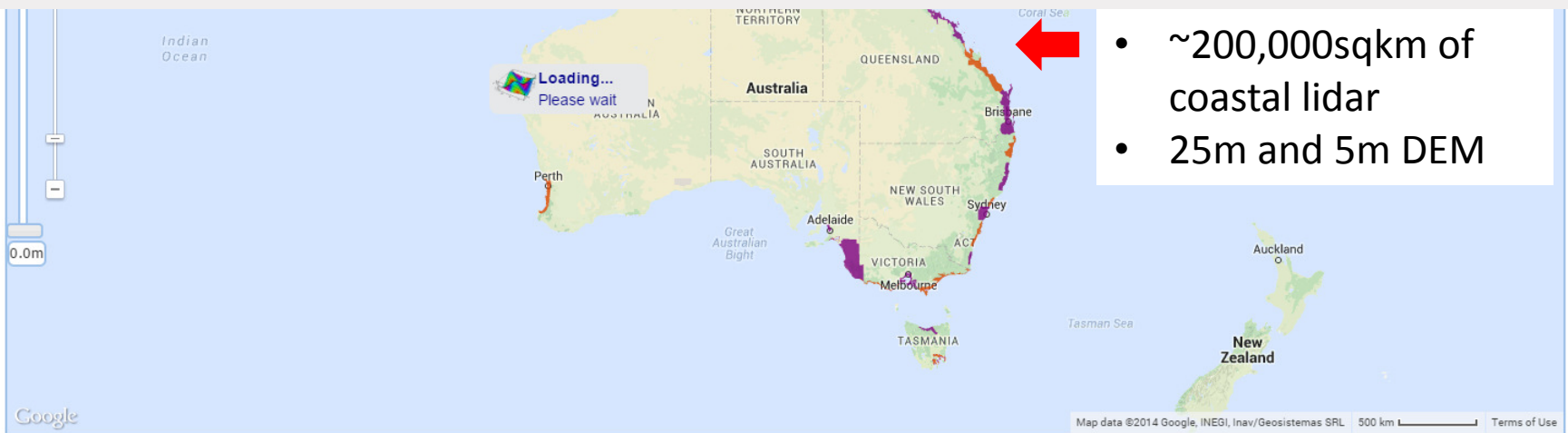


1sec LiDAR DEM Error Surface (std dev)

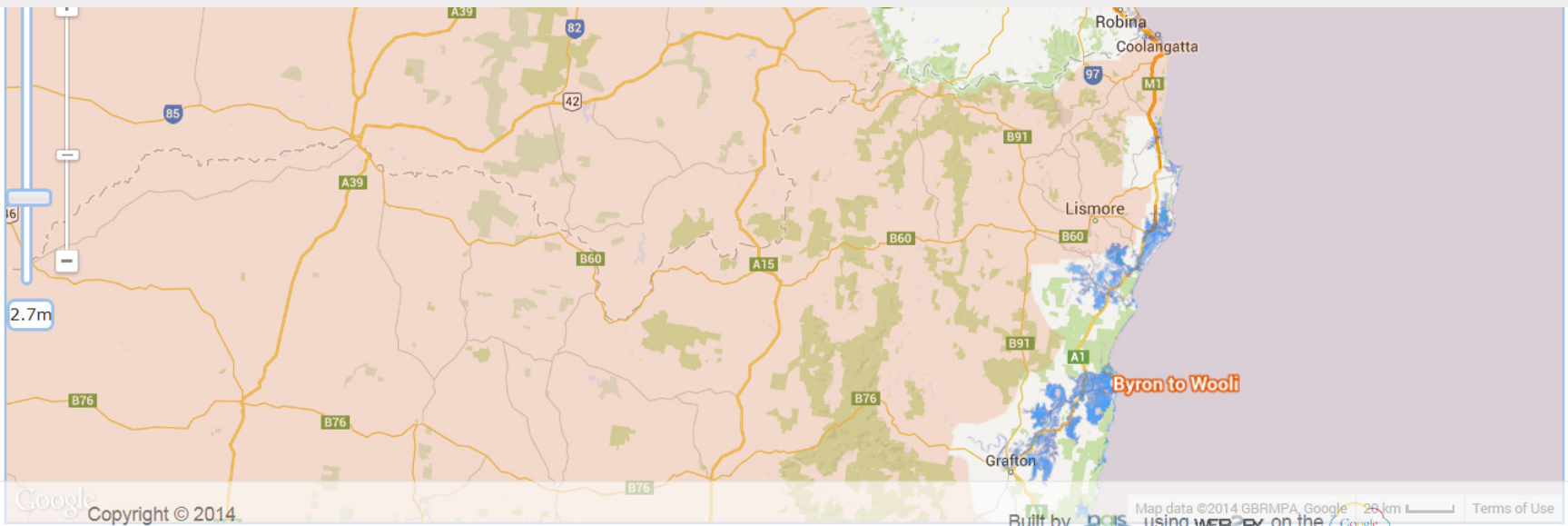


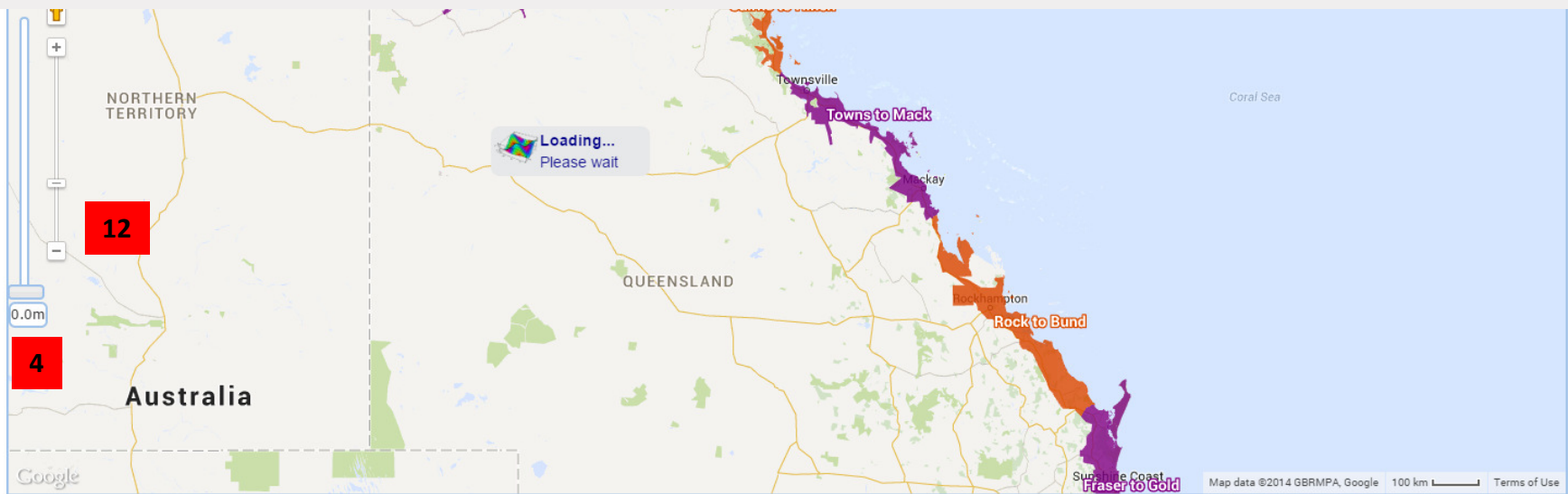
Housed in Google Cloud platform

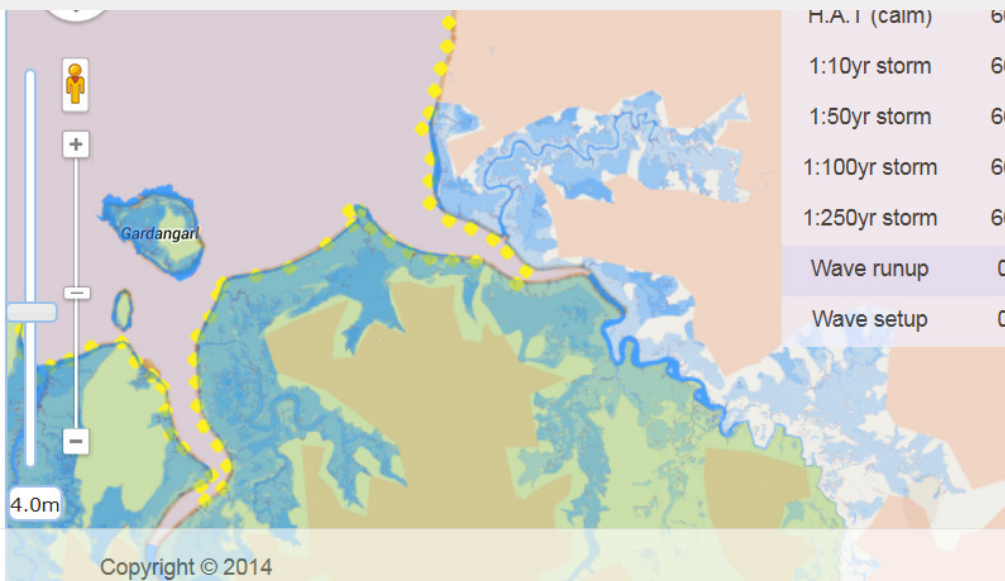
Erodibility







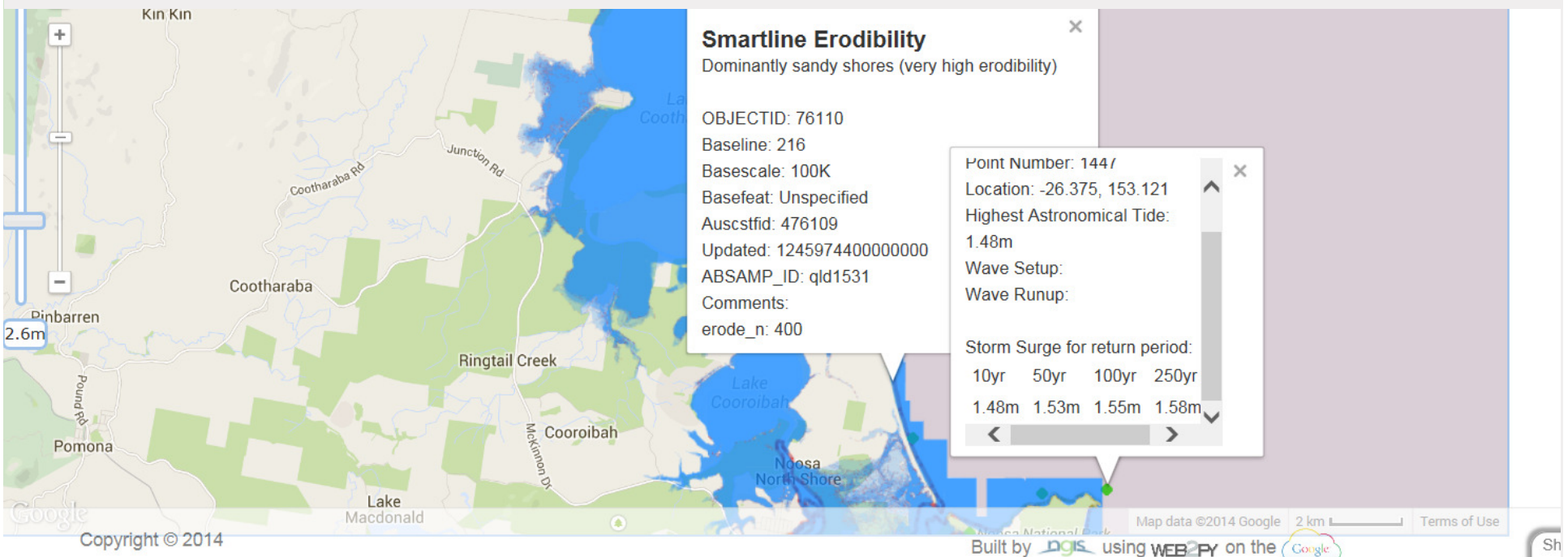


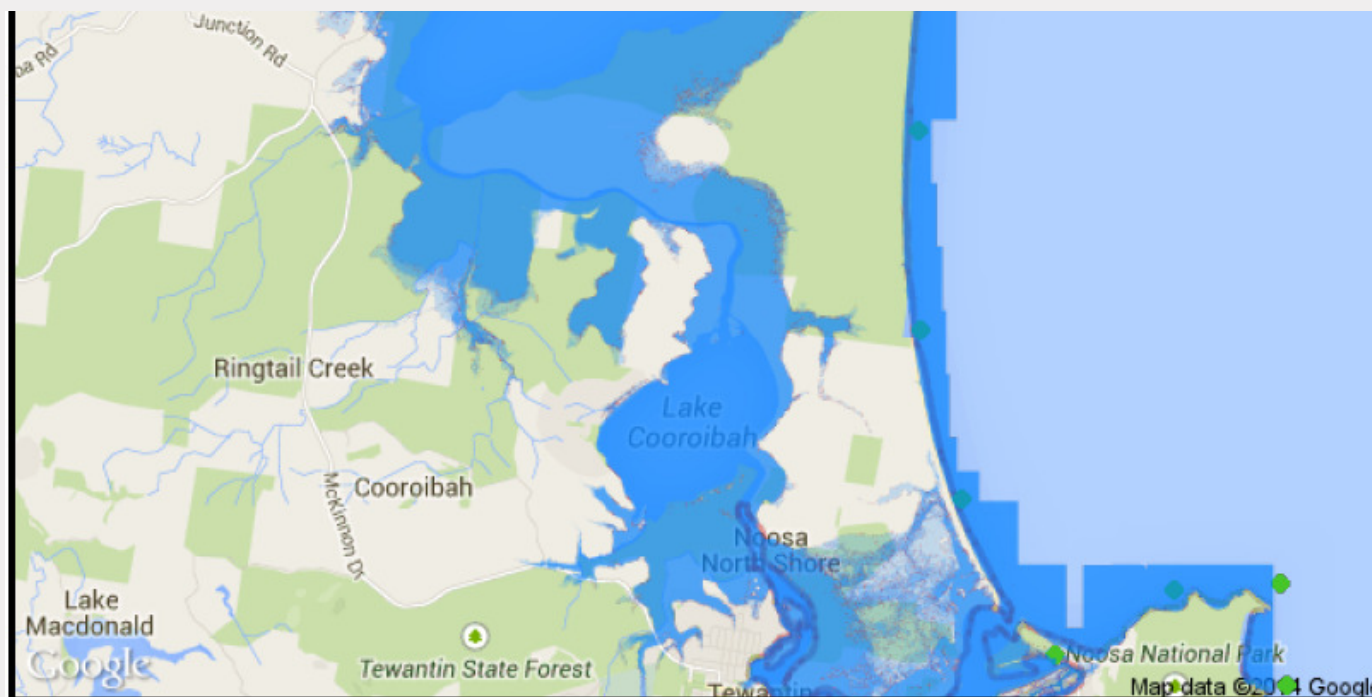


H.A.1 (calm)	66	2.17	2.80	2.92	
1:10yr storm	66	2.13	2.76	2.89	
1:50yr storm	66	2.17	2.80	2.94	off
1:100yr storm	66	2.18	2.81	2.95	
1:250yr storm	66	2.20	2.83	2.96	
Wave runup	0	None	None	None	off
Wave setup	0	None	None	None	off

Copyright © 2014

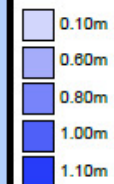
Built by [dgis](#) using [WEB2PY](#) on the [Google](#)



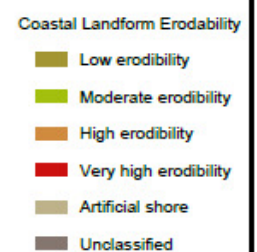


astronomical tide (HAT) and/or storm tide height of 1.60m resulting in an inundation level of 2.60m AHD. The map has been developed using a high resolution digital elevation model derived from LIDAR and a bucket-fill inundation modelling approach. Please refer to [www.vistool.com.au](http://www.vistool.com.au) for more information.

#### Flooding



#### Virtual Tide Gauges



Scale = 1:97117



Developed with the support of the Australian Government Department of the Environment  
© Commonwealth of Australia 2014

Map data ©2014 Google





- Developing a initial coastal risk assessment reports for all survey areas

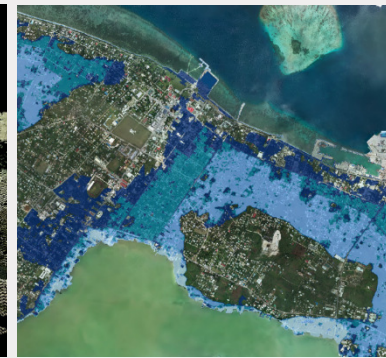
Significant insights and lessons for future programs



Port Vila, Vanuatu  
LiDAR DSM and Aerial Photography



Vanimo, Papua New Guinea  
Coloured LiDAR Point Cloud



Nuku'alofa, Tonga  
Highest Tide 2090

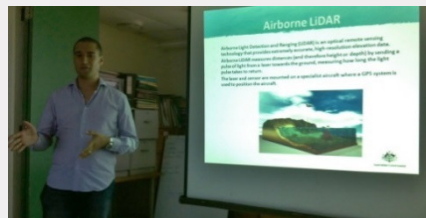


## Capacity Building



Peter Woodgate

## Data Awareness



Nathan Quadros, CRCSI

## Communication





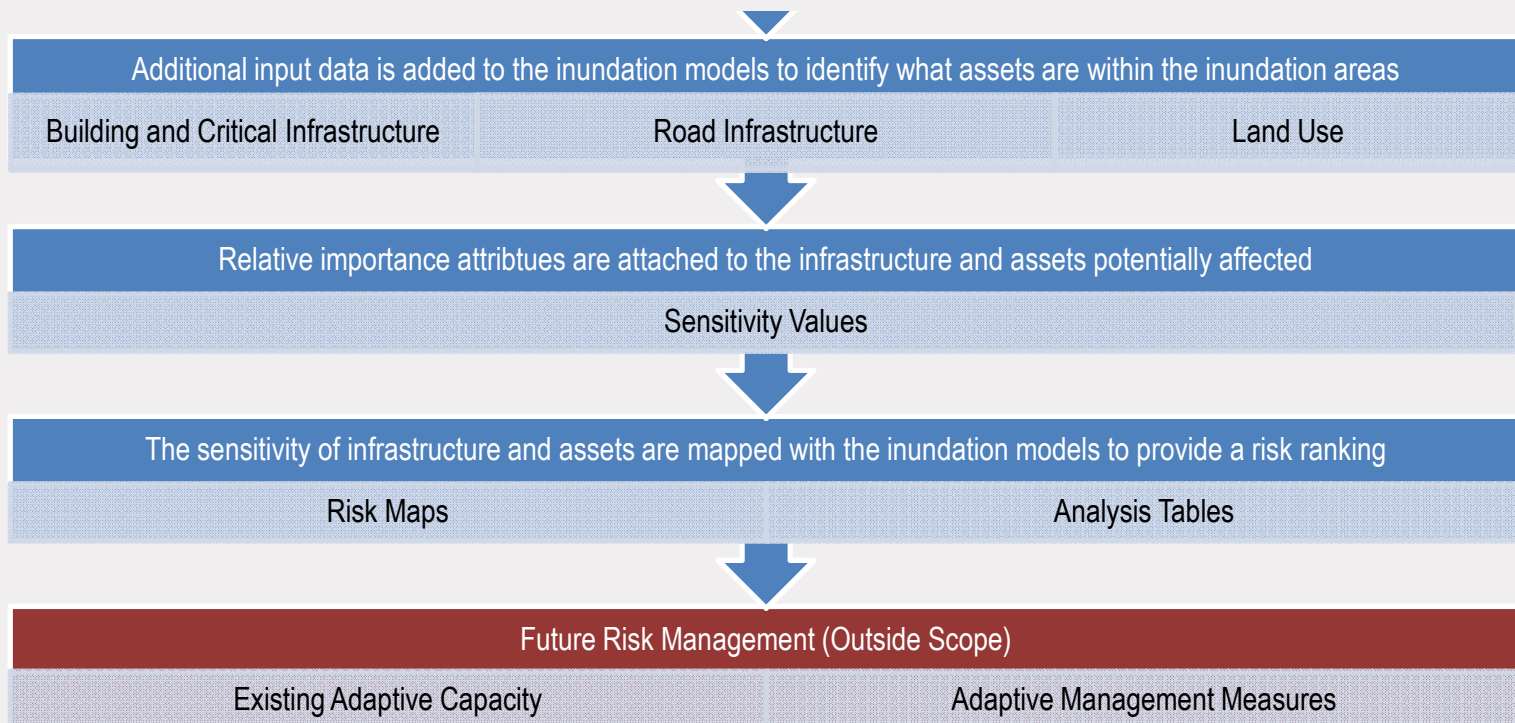
University of PNG Remote Sensing



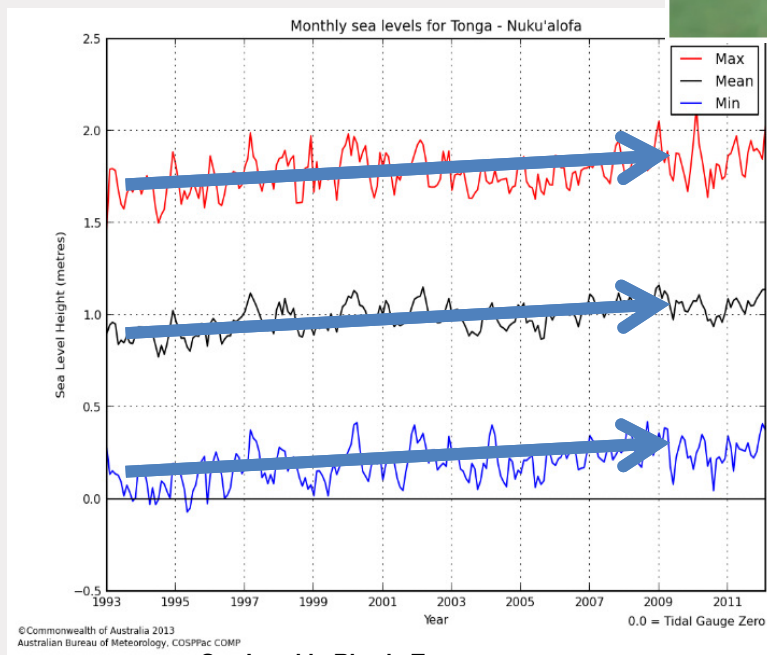
Risk Assessment Workshop in Tonga



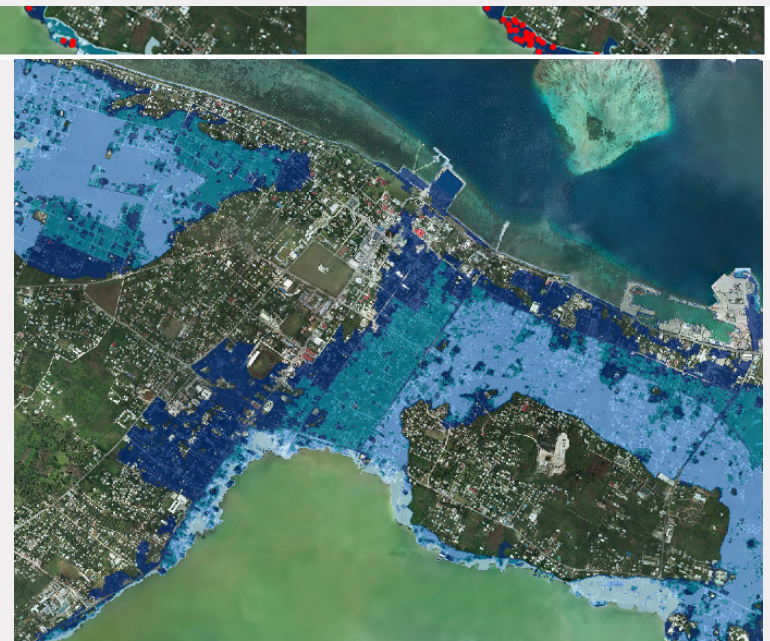
LiDAR Briefing and Awareness Session in Vanuatu





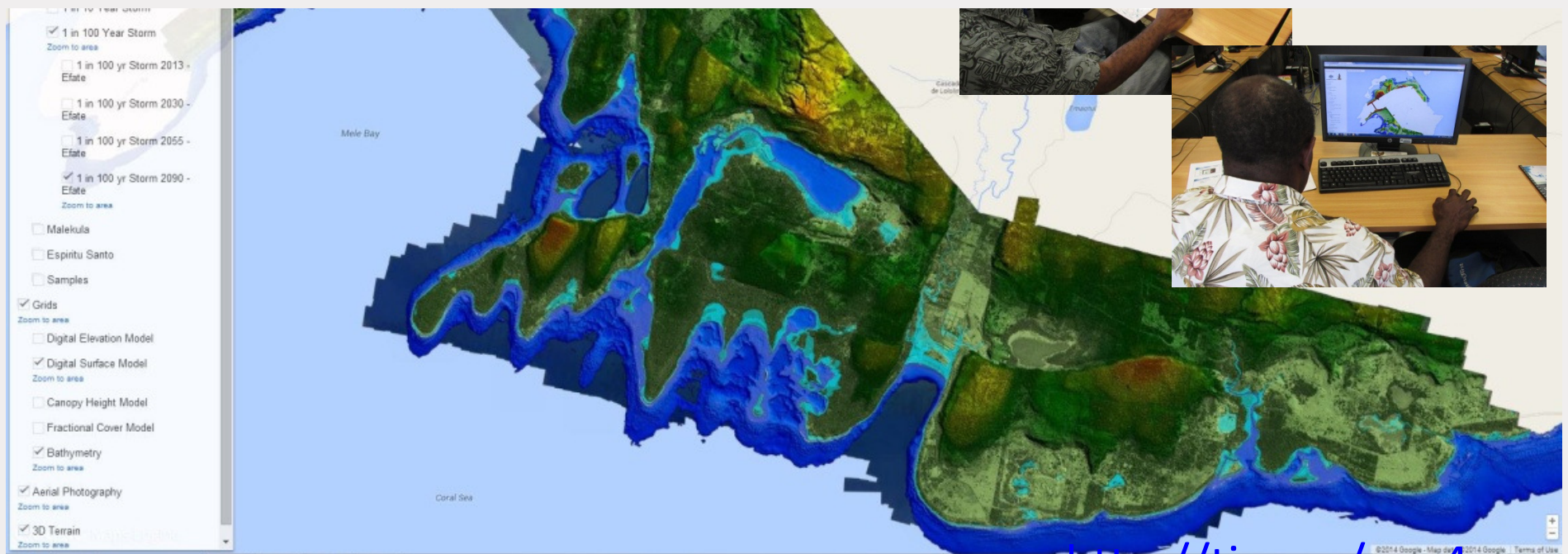


**Sea Level in Rise in Tonga**



**Flood Modelling in Nuku'alofa 2090**





<http://tiny.cc/pex4ox>



Australian Government

[Reset to default view](#)

☐ Schools

☒ Inundation Models

[Zoom to area](#)

☐ Efate Lagoon

☐ Mele

☒ Luganville

[Zoom to area](#)

☒ 1 in 10yr Storm - 2013

[Zoom to area](#)

☒ 1 in 10yr Storm - 2090

[Zoom to area](#)

☒ Grids

[Zoom to area](#)

☐ Digital Elevation Model

☒ Digital Surface Model

[Zoom to area](#)

☐ Canopy Height Model

☐ Fractional Cover Model

☒ Bathymetry

[Zoom to area](#)

☒ Aerial Photography

[Zoom to area](#)

☒ 3D Terrain

[Zoom to area](#)





# White House Launch of the Climate Data Initiative



**White House Climate Data Initiative Launch**

The White House - 4,798 videos

4,094

Like

About Share Add to

<https://www.youtube.com/watch?v=pfe5oRdsCp0>

**Vanuatu Globe**

The Vanuatu high resolution elevation data (LiDAR) surveys were a partnership between the Vanuatu and Australian Governments, with funding from Australia's Pacific-Australia Climate Change Science and Adaptation Planning (PACCSAP) program.

**Australian Government**

Reset to default view

☐ Schools

☒ Inundation Models

Zoom to area

☒ Efate Lagoon

Zoom to area

☒ HAT - 2013

Zoom to area

☒ HAT - 2090

Zoom to area

☐ Mele

☐ Luganville

☐ Grids

☒ Aerial Photography

Zoom to area

☒ 3D Terrain

Zoom to area

Google Maps Engine

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Image © 2014 DataGlobe  
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Imagery Date: 2/19/2014 17°41'34.41"S 168°16'02.07"E elev. 2.1 eye alt. 997 ft

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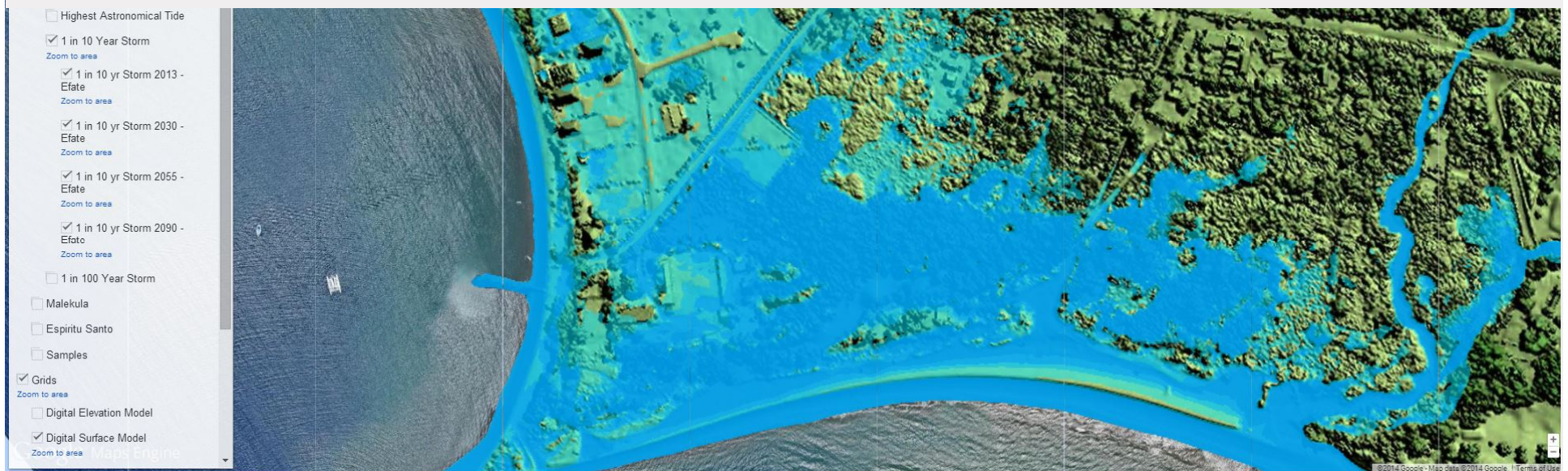
- Zoom to area
- ☒ HAT 2013 - Efate  
[Zoom to area](#)
  - ☐ HAT 2030 - Efate
  - ☐ HAT 2055 - Efate
  - ☐ HAT 2090 - Efate
  - ☐ 1 in 10 Year Storm
  - ☐ 1 in 100 Year Storm
  - ☐ Malekula
  - ☐ Espiritu Santo
  - ☐ Samples
  - ☐ Grids
  - ☒ Aerial Photography  
[Zoom to area](#)
  - ☒ 3D Terrain  
[Zoom to area](#)



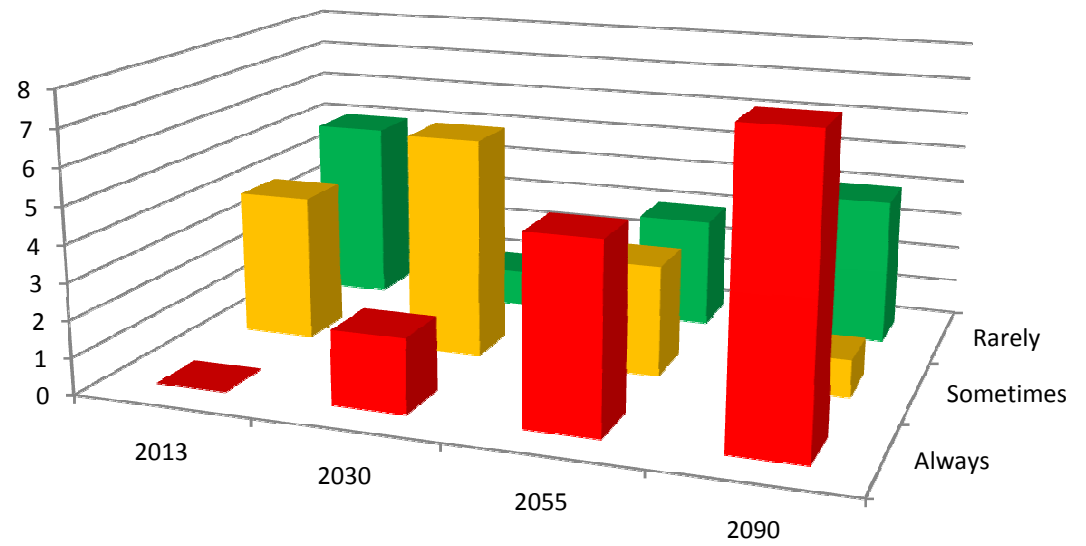
Google Maps Engine

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Slight Rise to Mobile





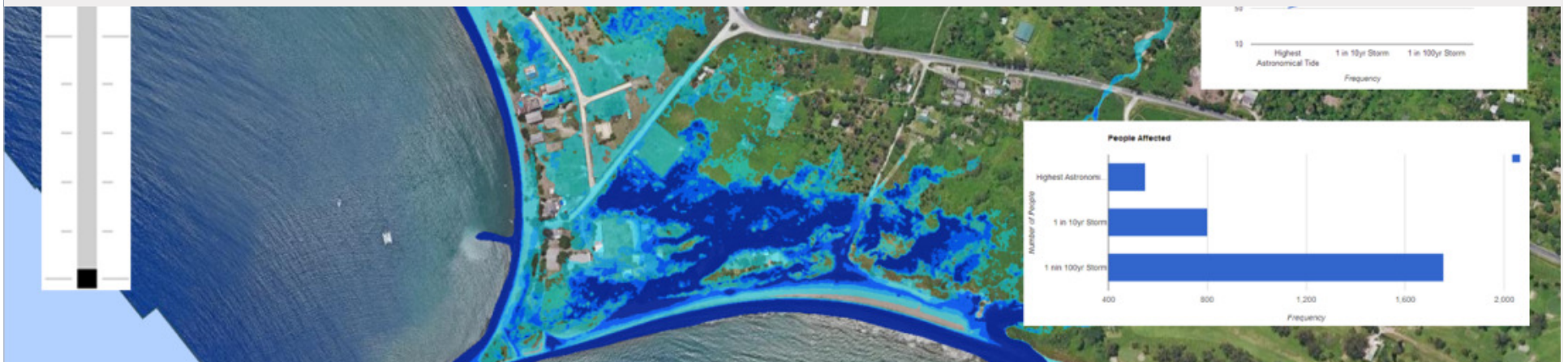
#### Notes on Inundation Frequency:

**Always:** This is the largest predictable astronomical tide event, being Highest Astronomical Tide (HAT). HAT, or levels close to HAT, occur approximately annually.

**Sometimes:** This combines large (spring tides) with notable storm surge conditions, of approximately 0.5 to 0.6m. Storm surges of this magnitude were recorded at Port Vila in February 2010 (BoM and CSIRO, 2011).

**Rarely:** This considers extreme storm surge, effectively equivalent to the 'worst on record' conditions. At Vanuatu, this equates to the 1987 conditions when Cyclone Uma passed through Vanuatu, producing a storm surge of about 2 metres (on top of mean sea level).

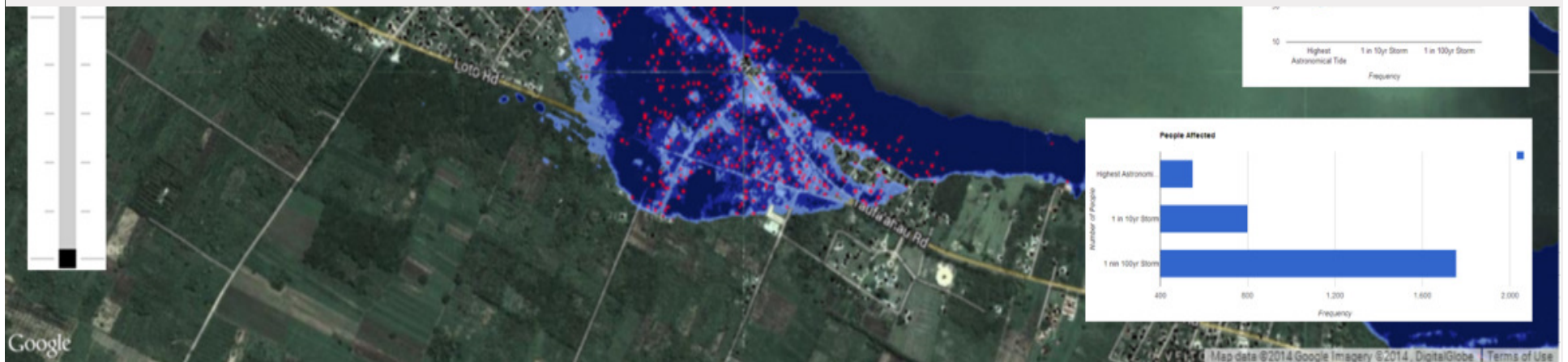




*Storage, analysis and visualisation on a single platform*

Simple, on-line, on-demand Risk Assessment Tools

Fill the gap between simple viewers and complex models



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