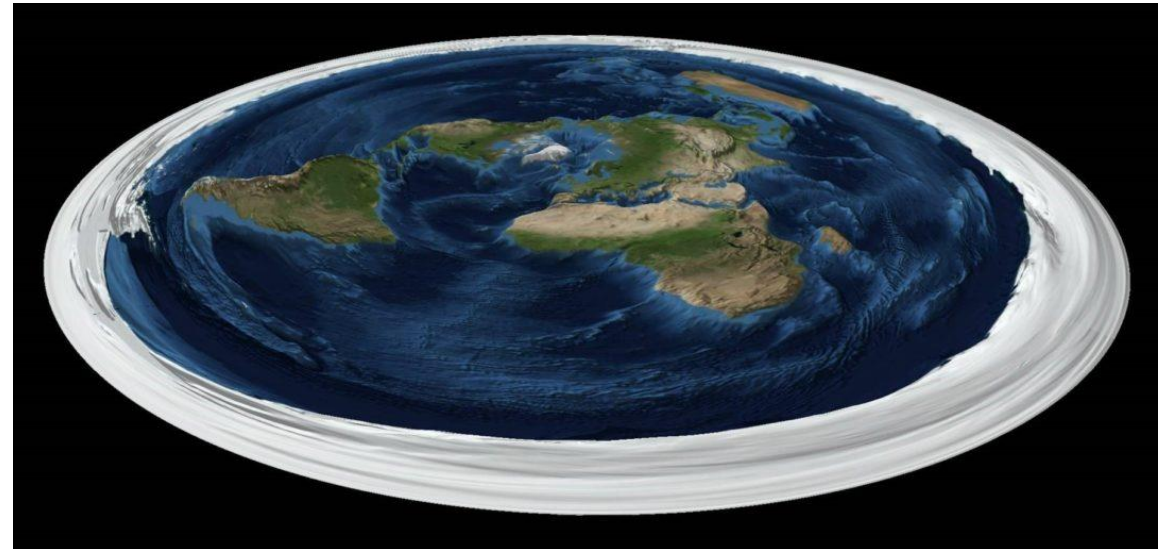Sensors help us gather data (information) and provide this data to a GIS (brain) for further analysis and to help organizations answer questions. With the advent of artificial intelligence, we are now able to model answers to questions, more accurately predicting outcomes to the biggest problems facing the world today.

This is the intelligent nervous system, built on a geospatial infrastructure. GIS and Geospatial infrastructure power the understanding for organizations to make positive change in our global and local communities by helping to create smarter cities and smarter organizations through automation and interoperability. Transformation is now happening in real-time, using geography to bring it all together.

Conference Theme!

How important is the z component to your **Intelligent Nervous System**?

COREL SEA

NEW CALEDONIA
Noumea

FIJI

TROPIC OF CAPRICORN

AUSTRALIA (Fr.)
OCEANIA

Melbourne to Panama 11692 Km.

Melbourne to Auckland 3047 Km.

QUEENSLAND

NEW SOUTH WALES

Canberra

VICTORIA

Sydney
Wollongong
Newcastle
Gold Coast
Brisbane

TASMAN SEA

Sydney
Wollongong
Kiama
Ulladulla
Eden

Melbourne to Auckland 3047 Km.

TASMAN
SEA

C. Maria Van Diemen
Kaitaia
North
Island
Bay of Ple

NEW ZEALAND

Auckland
Hamilton • Rotoru
New Plymouth • Gisbo
Wanganui
Napie
Hutt • Palmer
Nelson • Wellingt
Blenheim Chat
Greymouth
Christchurch
SOUTH
ISLAND
Timaru
Oamaru
Cromwell
Dunedin
Kingston
Invercargill
Stewart I
(N.Z.)
Antipodes Is
(N.Z.)
Bounty Is
(N.Z.)
Auckland Is
(N.Z.)
Campbell I

Historically where do we get the z component from?

Levelling Datum
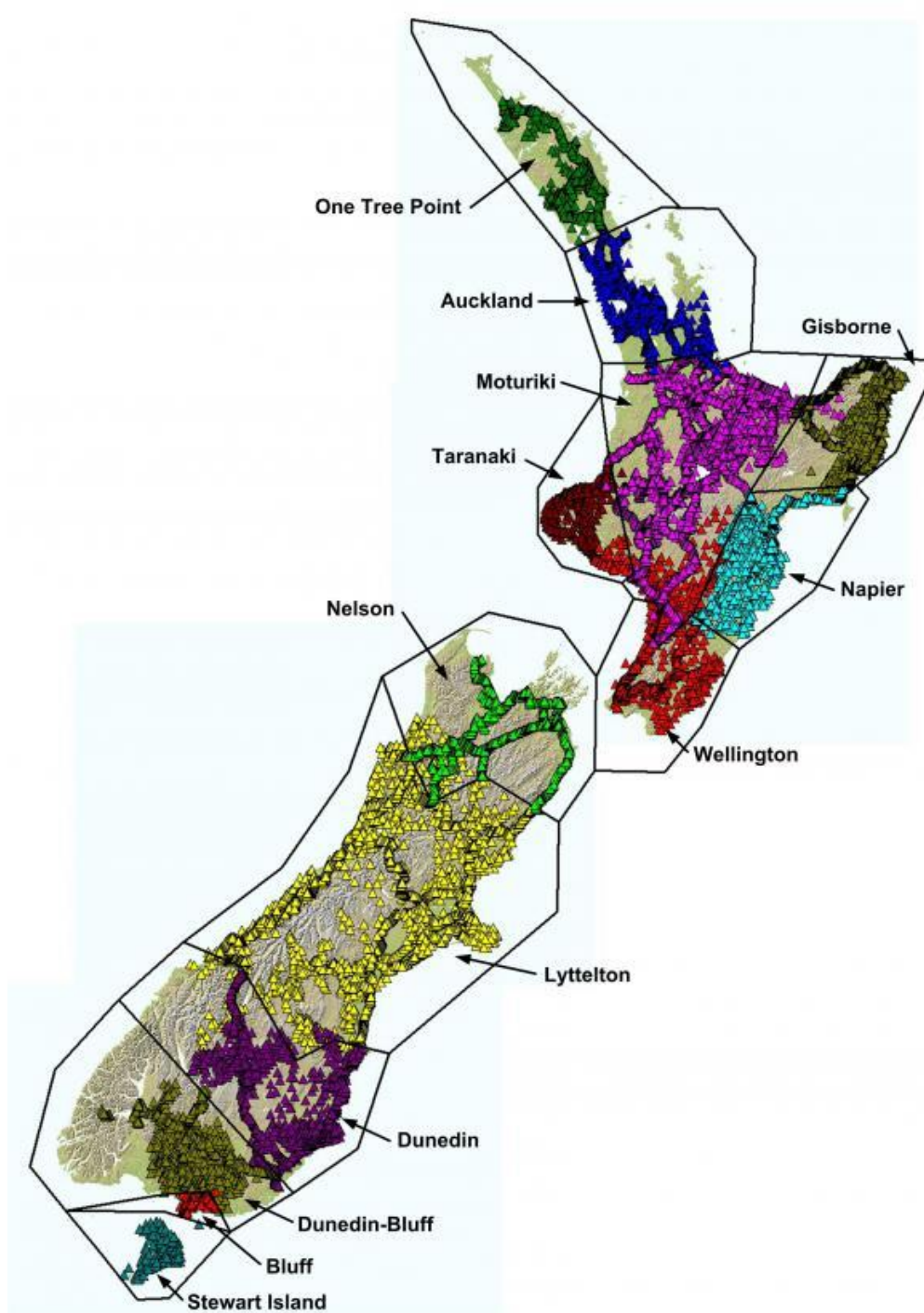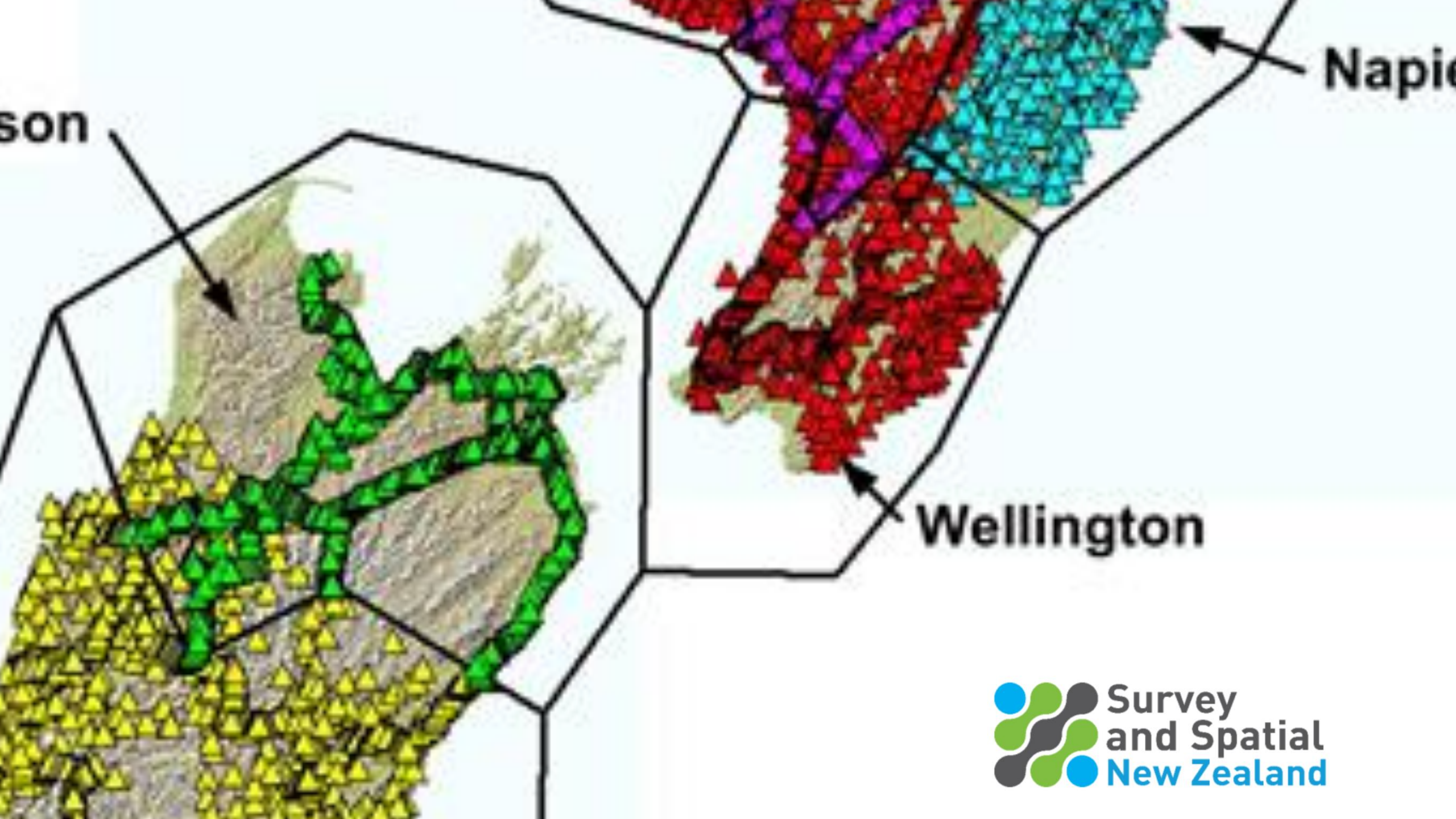
son

Napie

Wellington

Survey
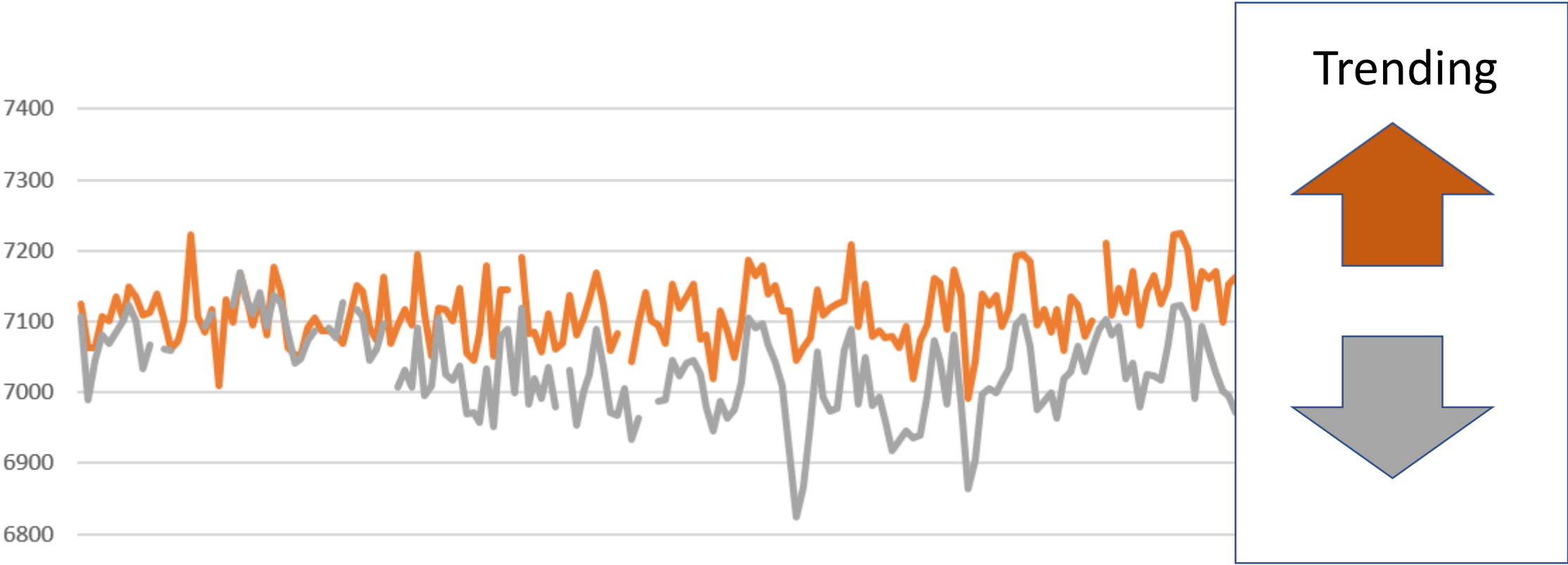and Spatial
New Zealand

Tide Gauge

Levelling Datum

Trending

Survey and Spatial New Zealand

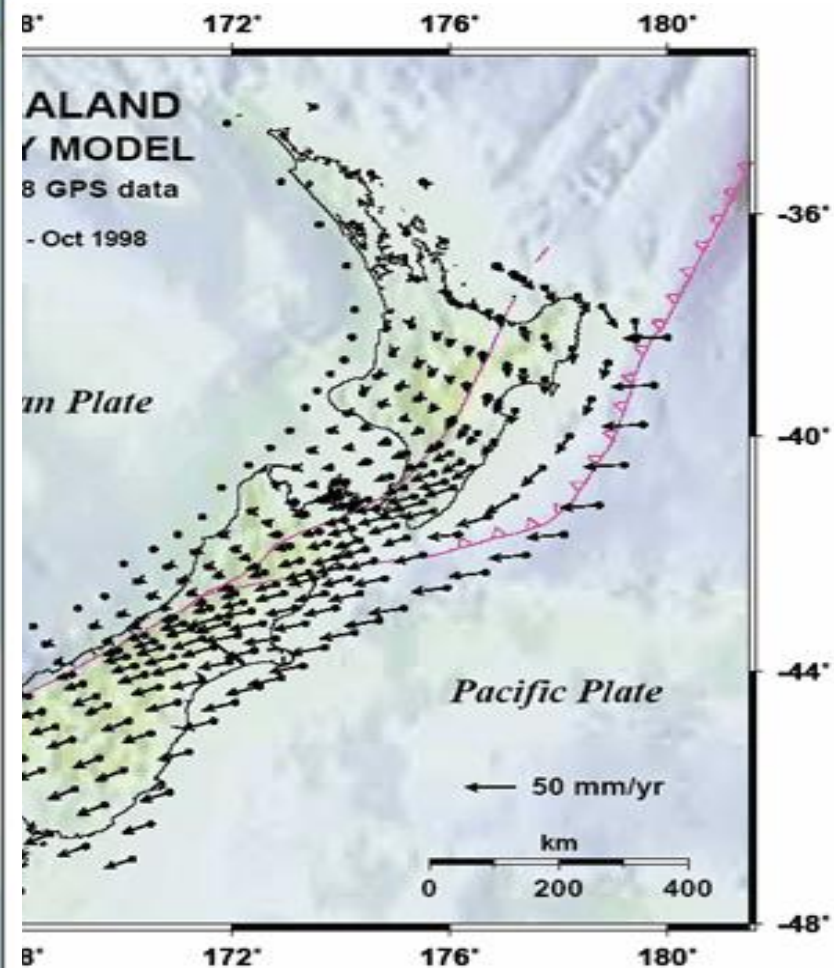# How good is your z-component?... Really

- Tide based heights not nationally consistent.

AUSTRALIAN
PLATE

Land on Volcanic P
pulled apart and si
East Cape pulls aw
from Northland.

PUYSEGUR
TRENCH

Alpine fa

30(

AUSTRALIAN PLATE

Alpine Fault

Hikurangi Trough

PACIFIC PLATE

200 km

35°S
40°S
45°S

165°E   170°E   175°E   180°

Depth (km)
0 15 30 50 100 200 400 600

ALAND
Y MODEL
8 GPS data
- Oct 1998

an Plate

Pacific Plate

50 mm/yr

km
0   200   400

-36°
-40°
-44°
-48°

172°   176°   180°

Survey
and Spatial
New Zealand
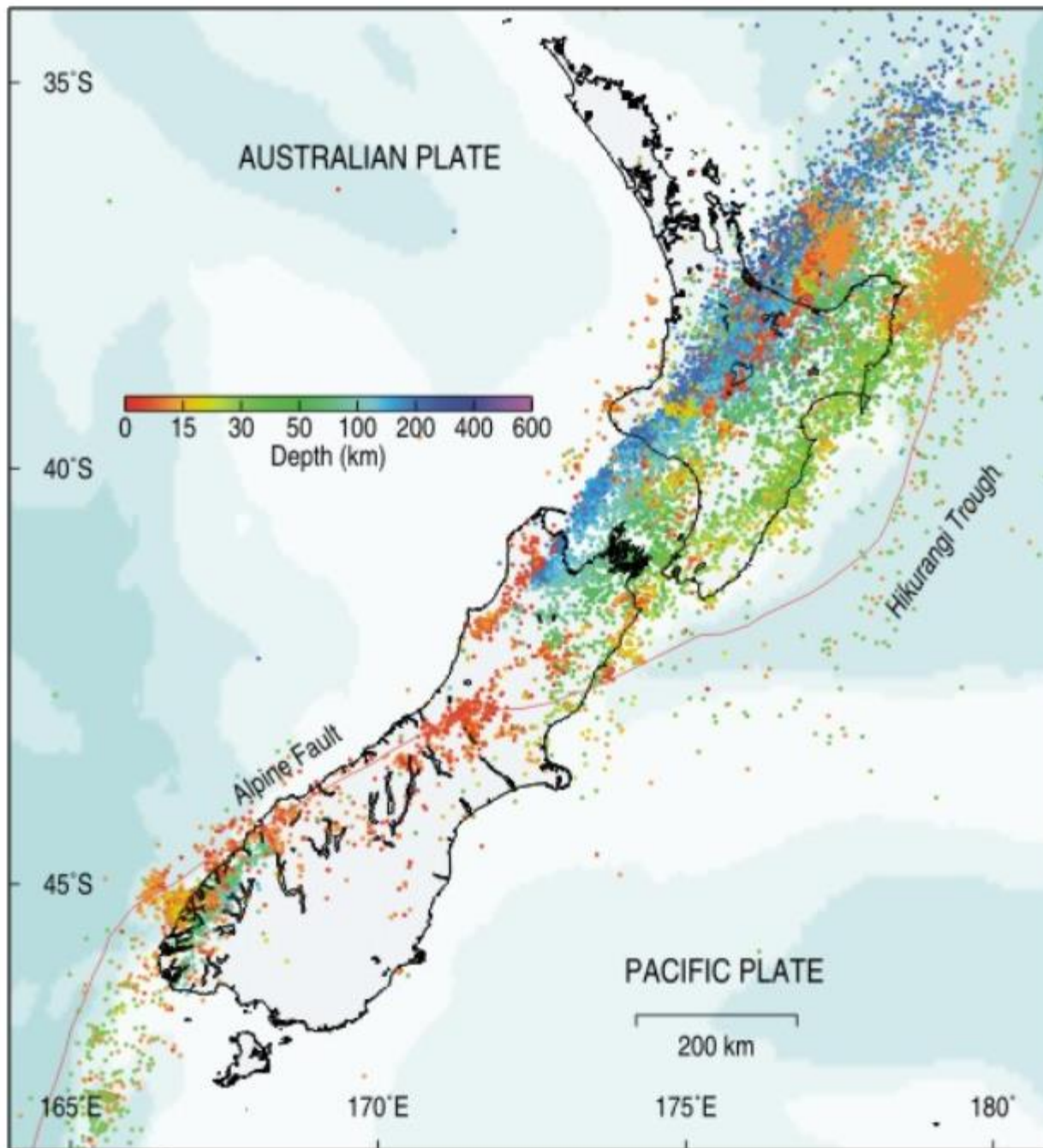
Levelling Datum

How good is your z-component? … Really

- Tide based heights not nationally consistent.
- Earthquakes, natural motion, cause local variations

GPS **A**

Topography

B

H **h**

X **x**

N

Ellipsoid

Geoid

Oceans

① H – X = ?

② h – x = ?

Survey
and Spatial
New Zealand

GPS **A**

Topography

H **h**

B

N

X **X**

Ellipsoid

Geoid

Oceans

← **Equipotential surface (gravity the same)**

1 **H − X = ?**

Survey and Spatial New Zealand
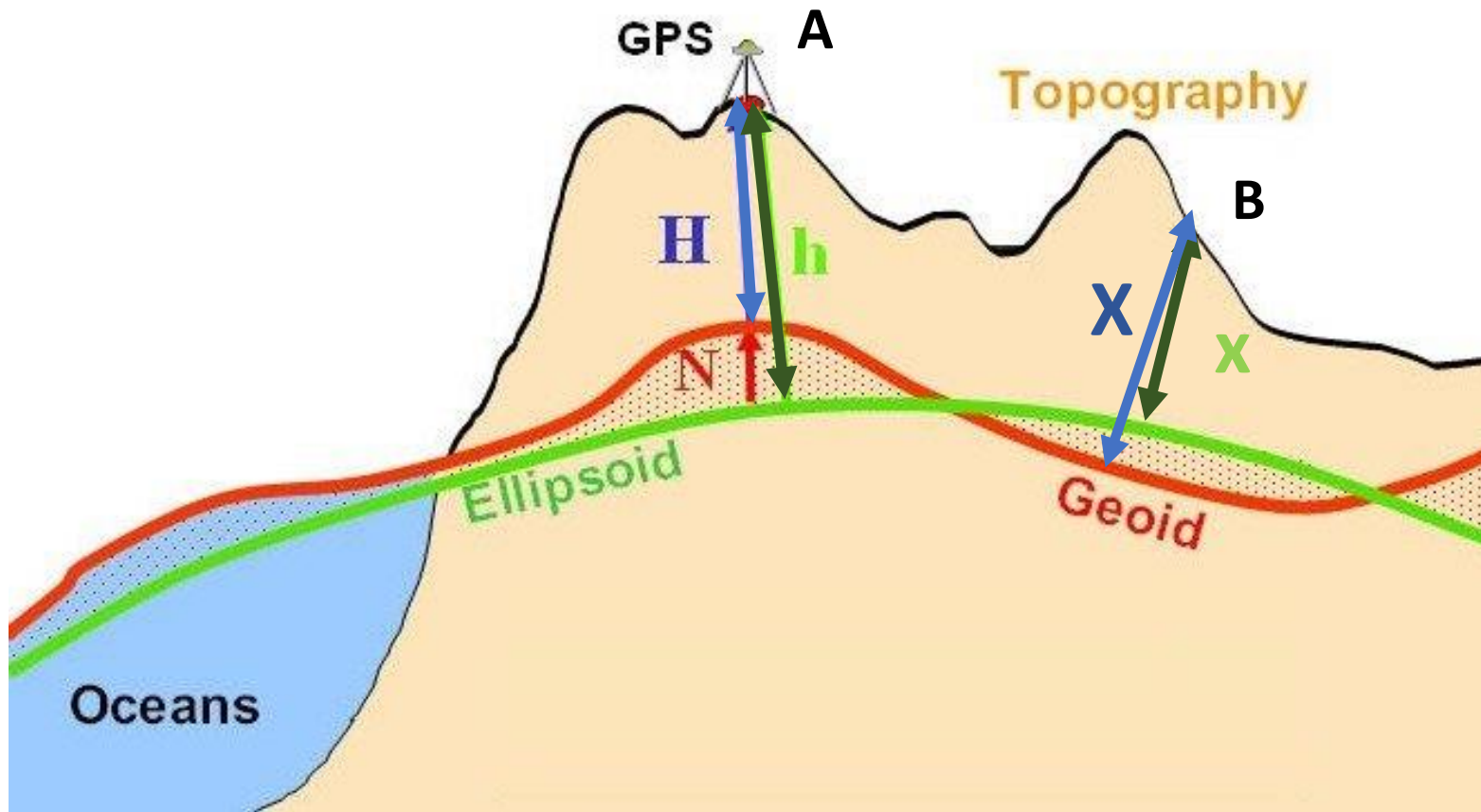
How good is your z-component? ... Really

- Tide based heights not nationally consistent.
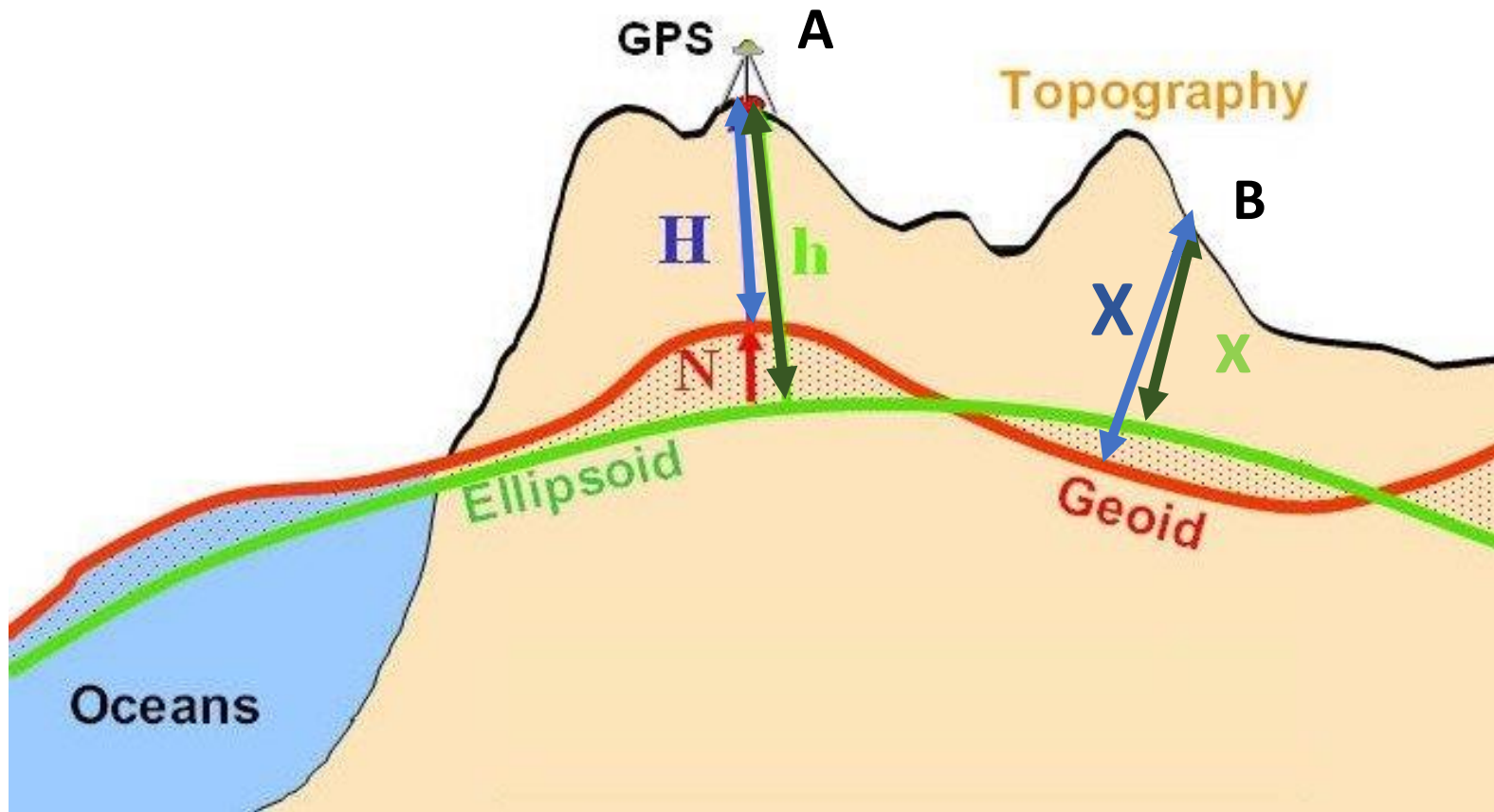- Earthquakes, natural motion, cause local variations
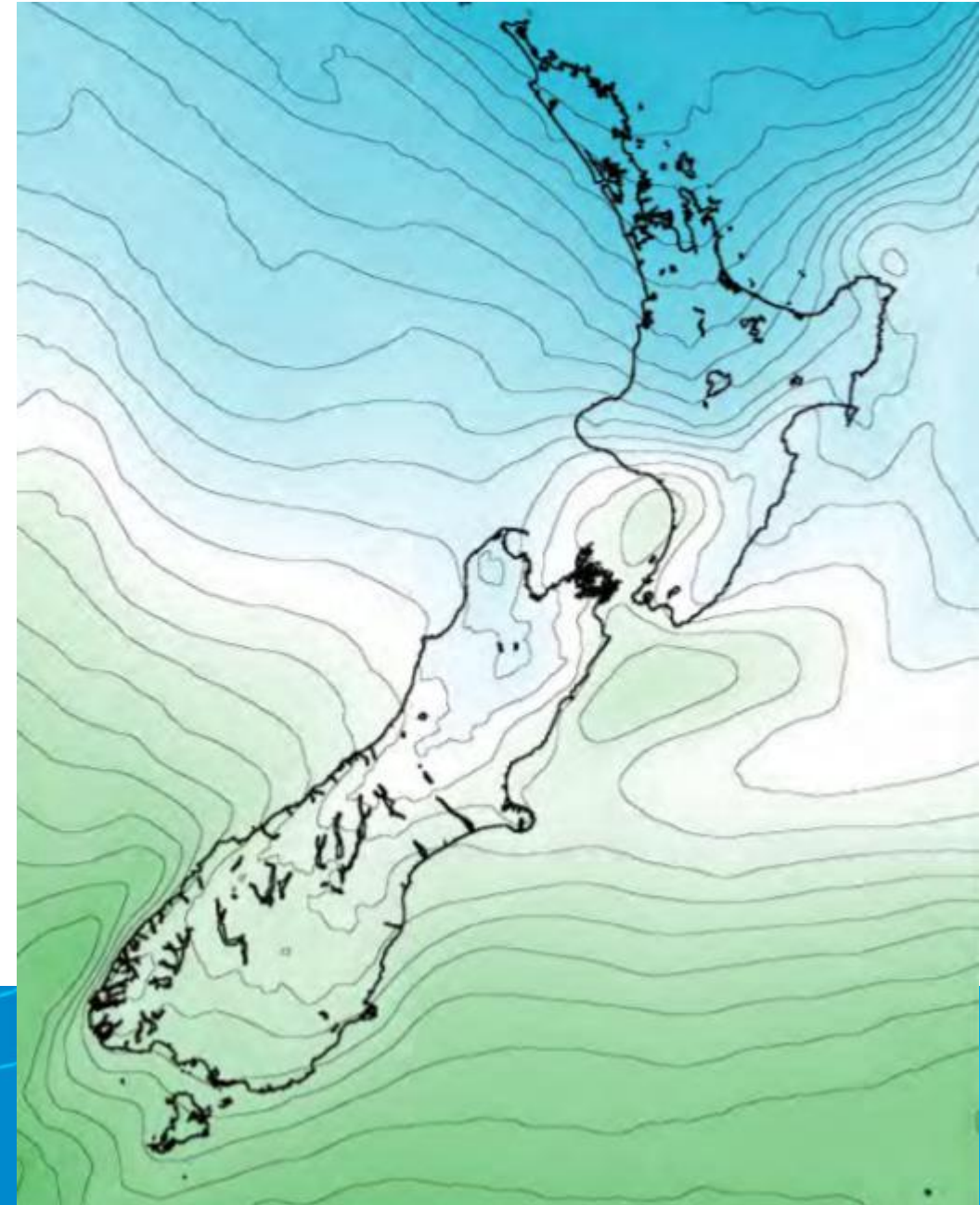
Requirements for a reliable z component

- Nationally consistent.
- Repeatable – or change measureable

Vertical Datum 16
not a levelling datum but a GRAVITATIONAL datum

- Nationally consistent.
- Repeatable – or change measurable

MARK IDENTIFICATION

Code:	**WGTT**	
Name:	**Wellington Tide Gauge**	
	Te Papa	
Alternatives:	**50208S004**	

Country:	**New Zealand**
Land District:	**Wellington**
Topo50 sheet:	**BQ31**
NZTM:	**5427469.850**
	1749178.420

NZGD 2000 COORDINATES

Order: **2**

Latitude:	**41° 17' 25.58206" S**
Longitude:	**174° 46' 53.74435" E**
Ellipsoidal height (m):	**42.973**

Authorised: **21-Dec-2018**

Reference: **CORS Update (Constrained to PositioNZ stations DefMod v20180701 ITRF2008@2018-01-01)**

[Historical values](#)

Circuit	Northing (m)	Easting (m)	Scale Factor	Convergence	
Wairarapa Circuit 2000	**759085.153**	**327490.624**	**1.0000647**	**-0° 34' 16"**	[Historical values](#)
Wellington Circuit 2000	**801185.176**	**400436.143**	**1.0000000**	**+0° 00' 12"**	[Historical values](#)

ORTHOMETRIC HEIGHTS

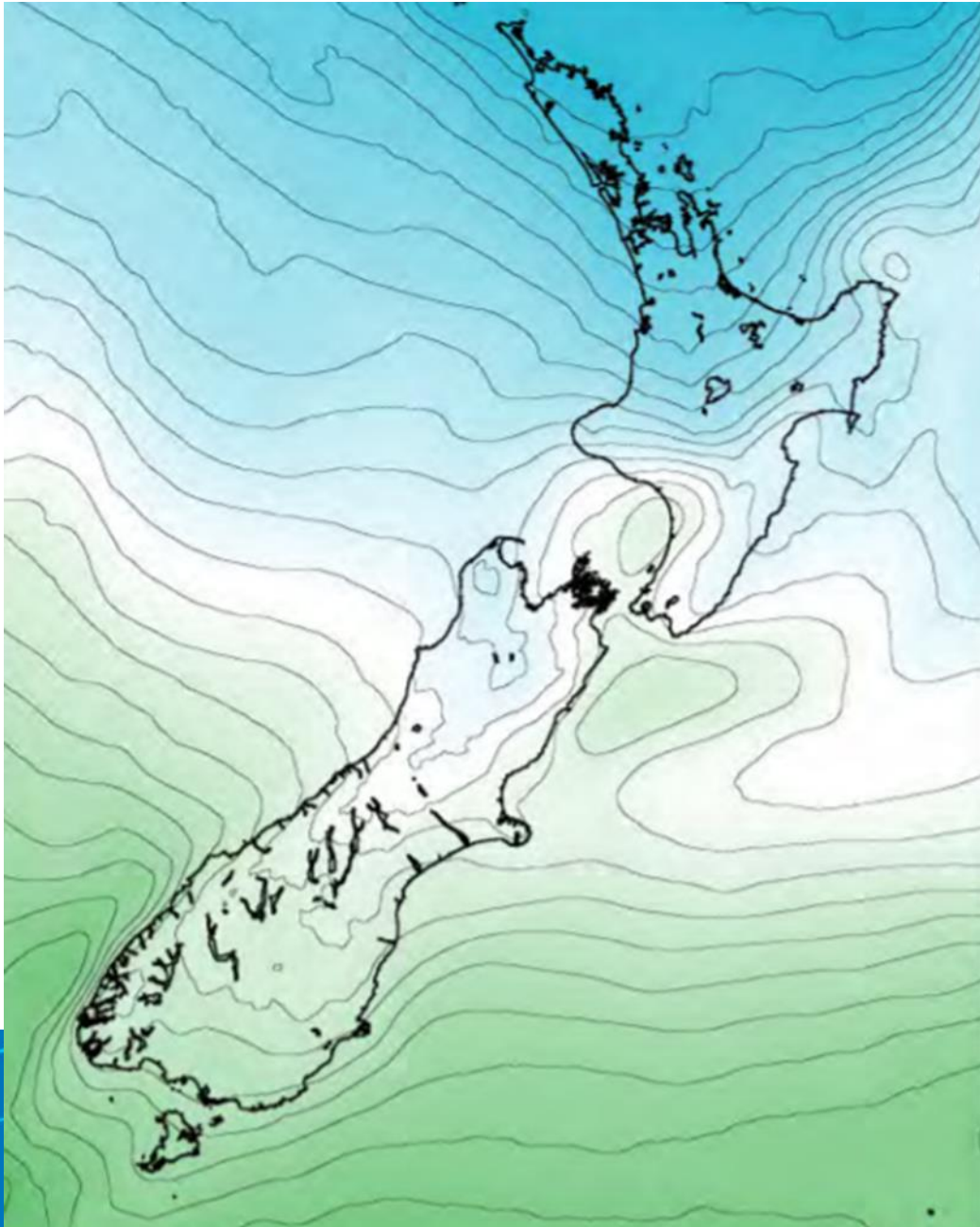| Height datum	Height (m)	Order	Calculation Date	Reference
New Zealand Vertical Datum 2016	**29.9310**	**1V**	**30-Nov-2018**	**Height verified in National Geodetic Adjustment. Last used observation Oct 2017**

Gravitational Datum

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Survey and Spatial New Zealand

Some typical questions on VD16

- Is it sea level?

  NO – but sea level can be measured from VD16

- Can it be used with GPS/GNSS?

  YES – GNSS measures Ellipsoid value and we know the offset between the ellipsoid and VD16 across the entire country and surrounding sea floor

- What about earthquakes?

  Large earthquakes like Chrsitchurch and Kaikora have minimal effect on the gravity, hence VD 16can be seen as a resilant datum

- Are SOME Organisation using VD16 now?

  YES

Your Questions?