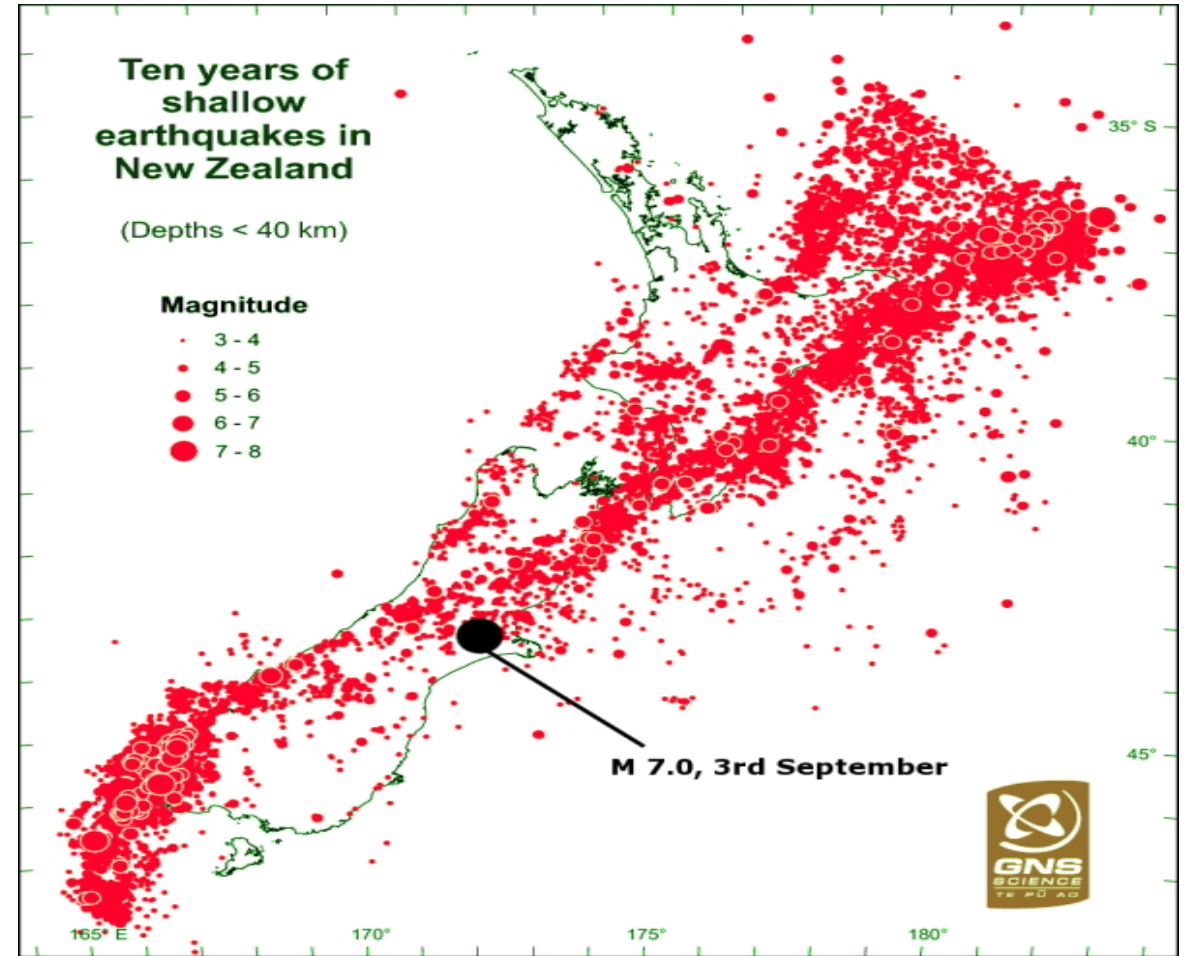
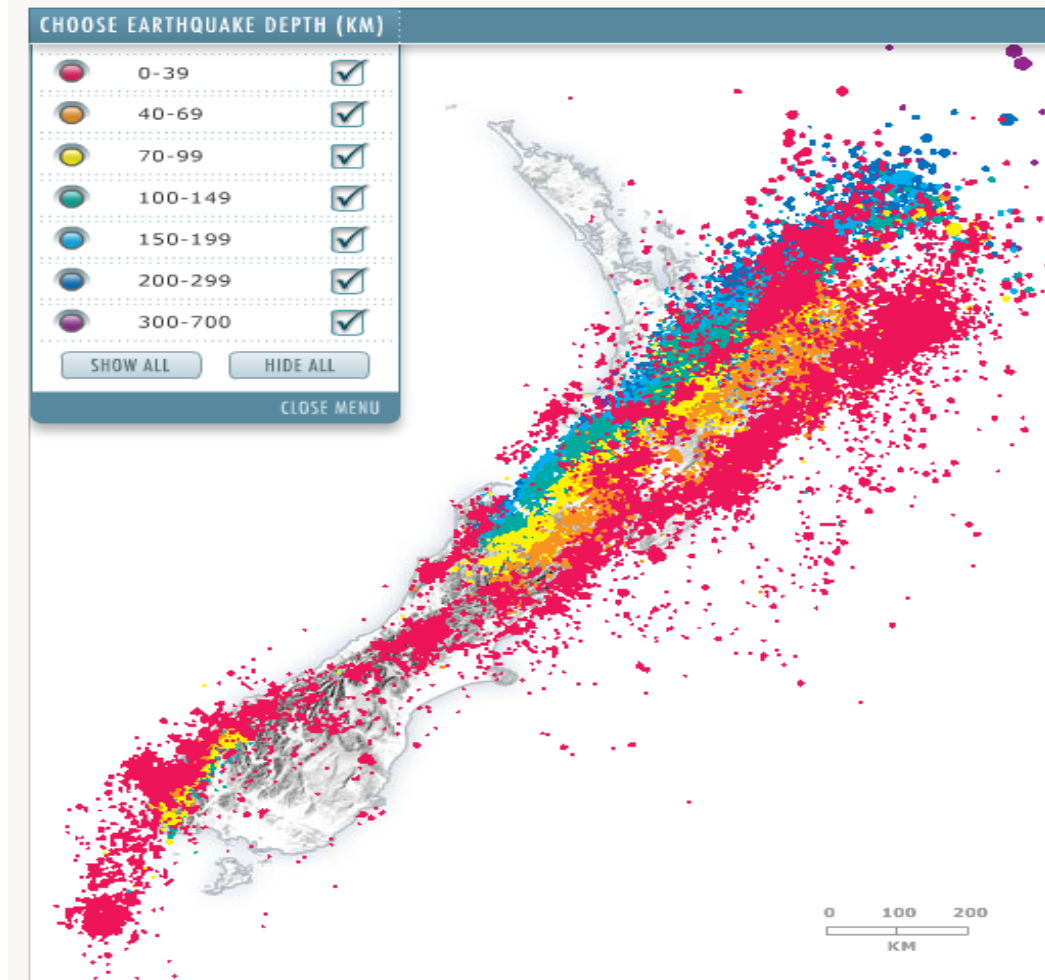


3D GIS and New Zealand's many datums: a beginner's guide (3 key points)

Bruce Robinson
B.Surv
Global Survey

Background





CORAL SEA

NEW CALEDONIA
Noumea

FIJI
Conway Reef

TROPIC OF CAPRICORN

(Fr.)
AUSTRALIA
OCEANIA

Melbourne to Panama 11692 Km.

Melbourne to Auckland 3043 Km.

TASMAN SEA

NEW ZEALAND
North Island
South Island

QUEENSLAND

AUSTRALIA

SOUTH AUSTRALIA
NEW SOUTH WALES

VICTORIA

Tasmania

West Coast
Hobart

Quekhematen
Cladstone
Sydneyberg

Maryborough
Windsore
Gold Coast

Wollongong
New Castle
Sydney

Wollongong
Kama
Ulubula
Catheryn

Wollongong
Wollongong
Wollongong

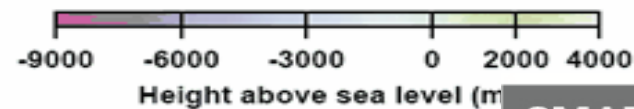
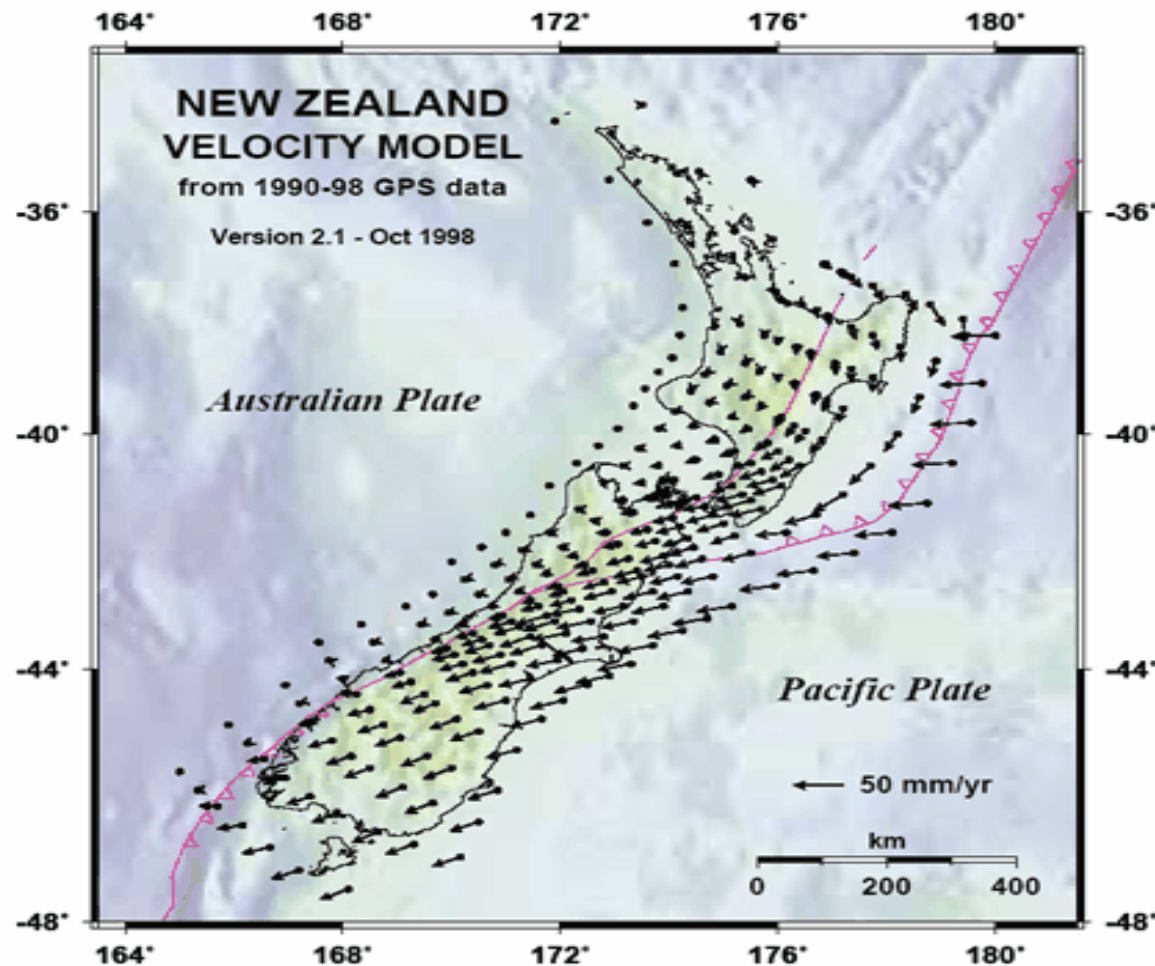
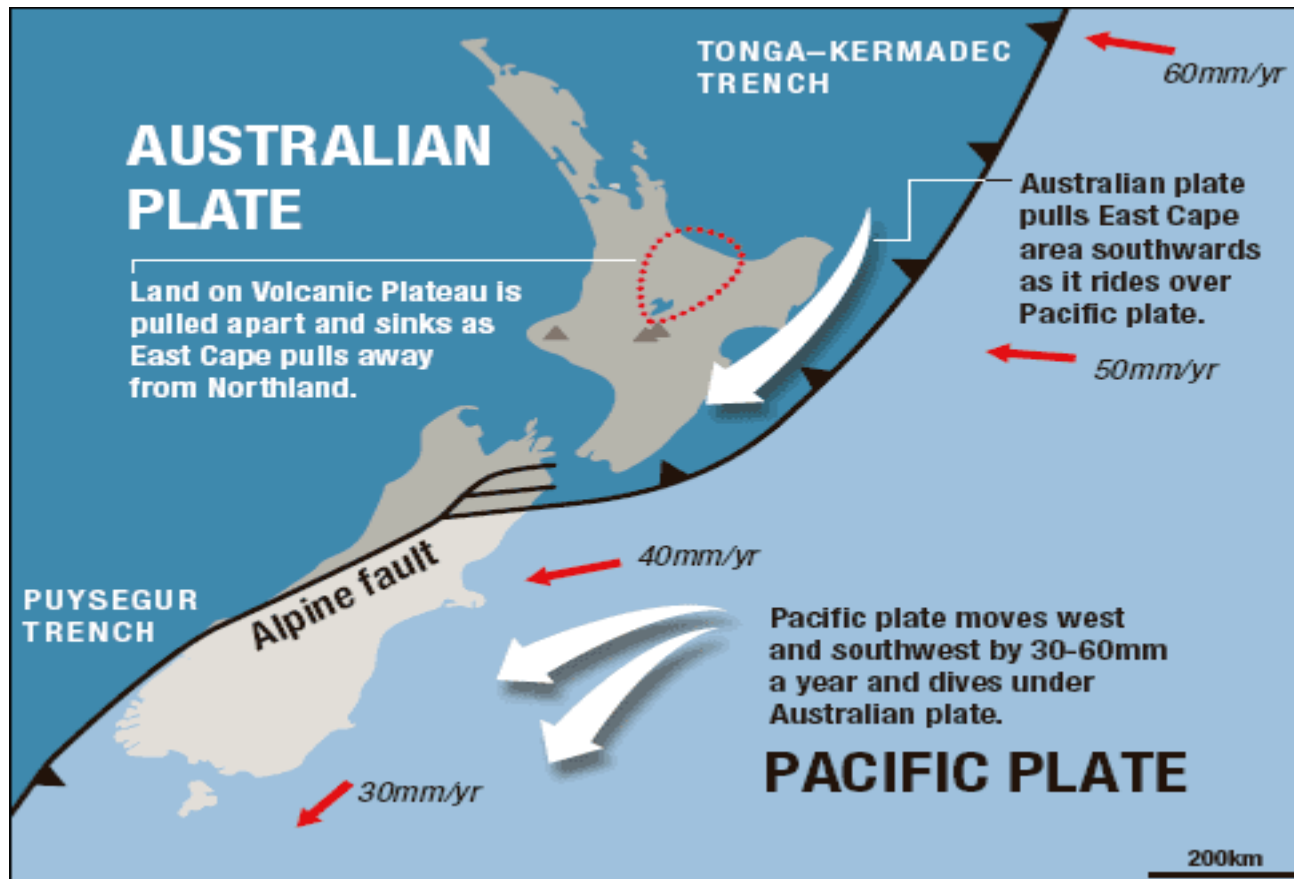
Wollongong
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Background



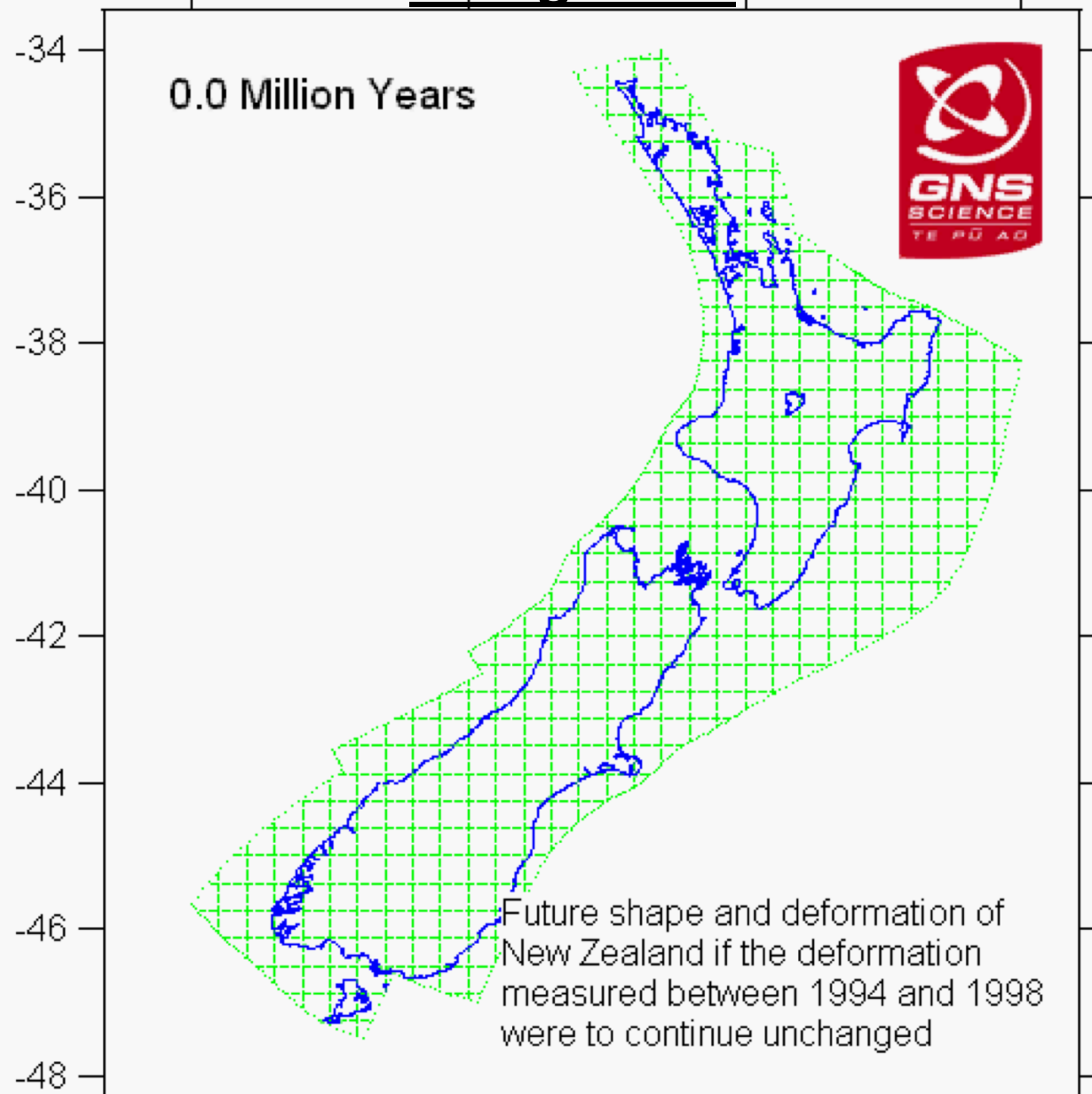
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SMART

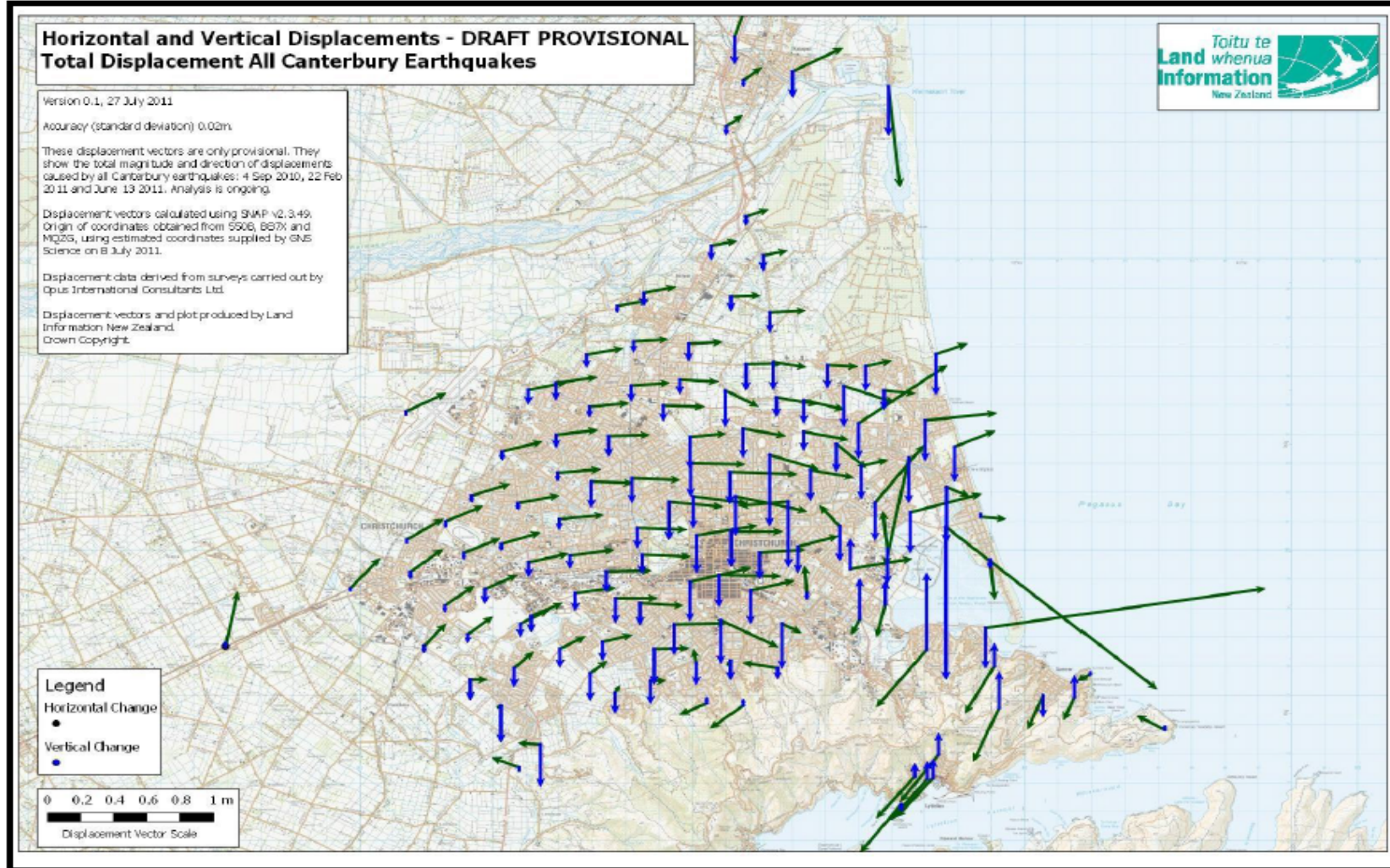


FIX

Background

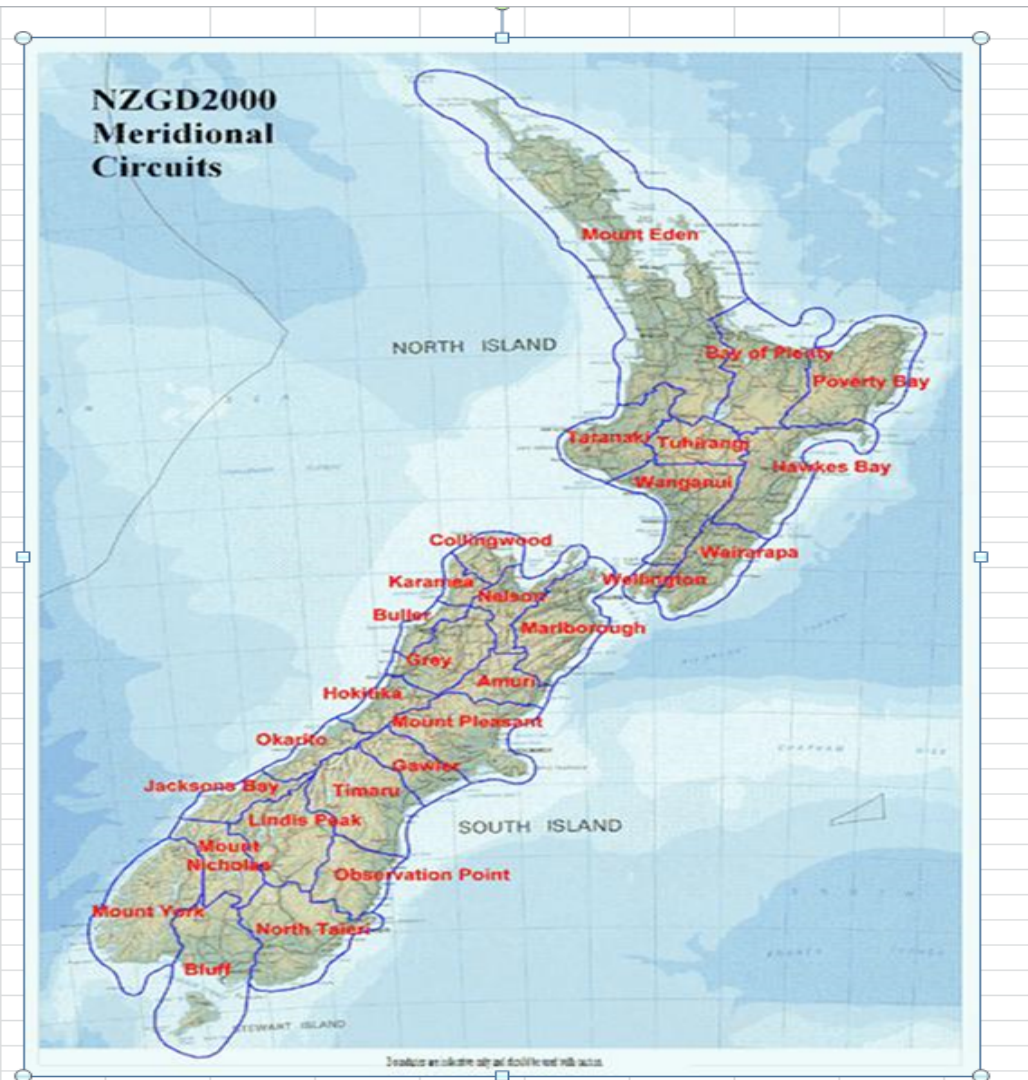


Regional Facts



A SMALL selection of NZ's Datum 2000 Coordinate Systems

	Horizontal	Vertical
1	Mount Eden	One Tree Point
2	Mount Eden	Auckland
3	Mount Eden	Motoriki
4	Bay of Plenty	Motoriki
5	Poverty Bay	Gisborne
6	Taranaki	Motoriki
7	Taranaki	Taranaki
8	Tuhirangi	Motoriki
9	Hawkes bay	Napier
10	Wanganui	Taranaki
11	Wanganui	Motoriki
12	Wanganui	Wellington
13	Wairapa	Napier
14	Wairapa	Wellington
15	Wellington	Wellington
16	Collingwood	Nelson
17	Karamea	Nelson
18	Nelson	Nelson
19	Marlborough	Nelson
20	Marlborough	Lyttleton
21	Buller	Nelson
22	Buller	Lyttleton
23	Grey	Nelson
24	Grey	Lyttleton
25	Hokitika	Lyttleton
26	Amuri	Lyttleton
27	Mount Pleasant	Lyttleton
28	Gawler	Lyttleton
29	Okarito	Lyttleton
30	Timaru	Lyttleton
31	Timaru	Dunedin
32	Jacksons Bay	Dunedin
33	Lindis Peak	Dunedin
34	Observation point	Dunedin
35	Mount Nicollos	Dunedin Bluff
36	Mount York	Dunedin Bluff
37	Bluff	Dunedin Bluff
38	Bluff	Bluff
39	Bluff	Stewart Island
40	North Taieri	Dunedin
41	North Taieri	Dunedin Bluff



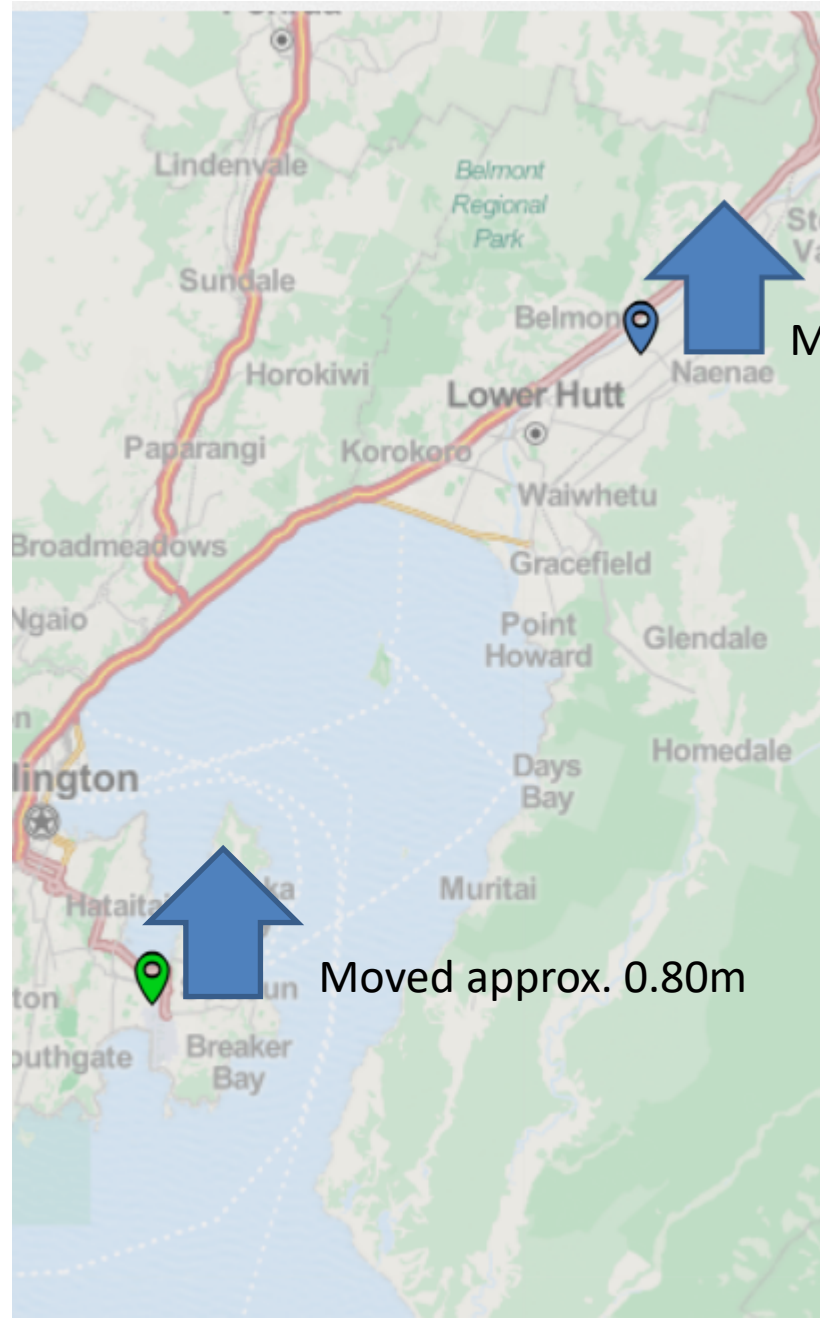


Datum 200 definition:

Coordinate for a feature as it was in the year 2000

Therefore a calculated distance between coordinates may not reflect the true distance

Since 2000 on the Horizontal Datum



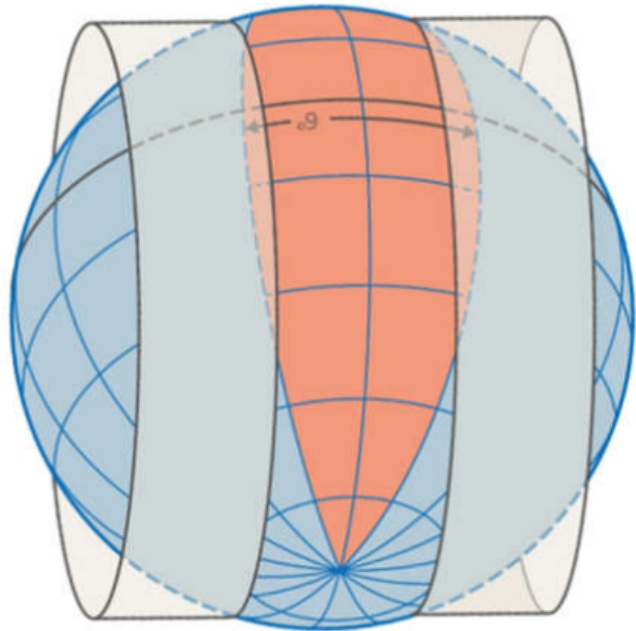
Moved approx. 0.75m

Moved approx. 0.80m



A position (feature) has 2 dates that are important

1. The captured date.
2. The date of the datum it is referenced from (what is the “reference frame” this has come from). Is it really a datum 2000 coordinate



NZTM 2000 the “National” Datum

Transverse Mercator Projection (as are all Meridional circuits)

Project – the ball onto the cylinder

NZTM 2000

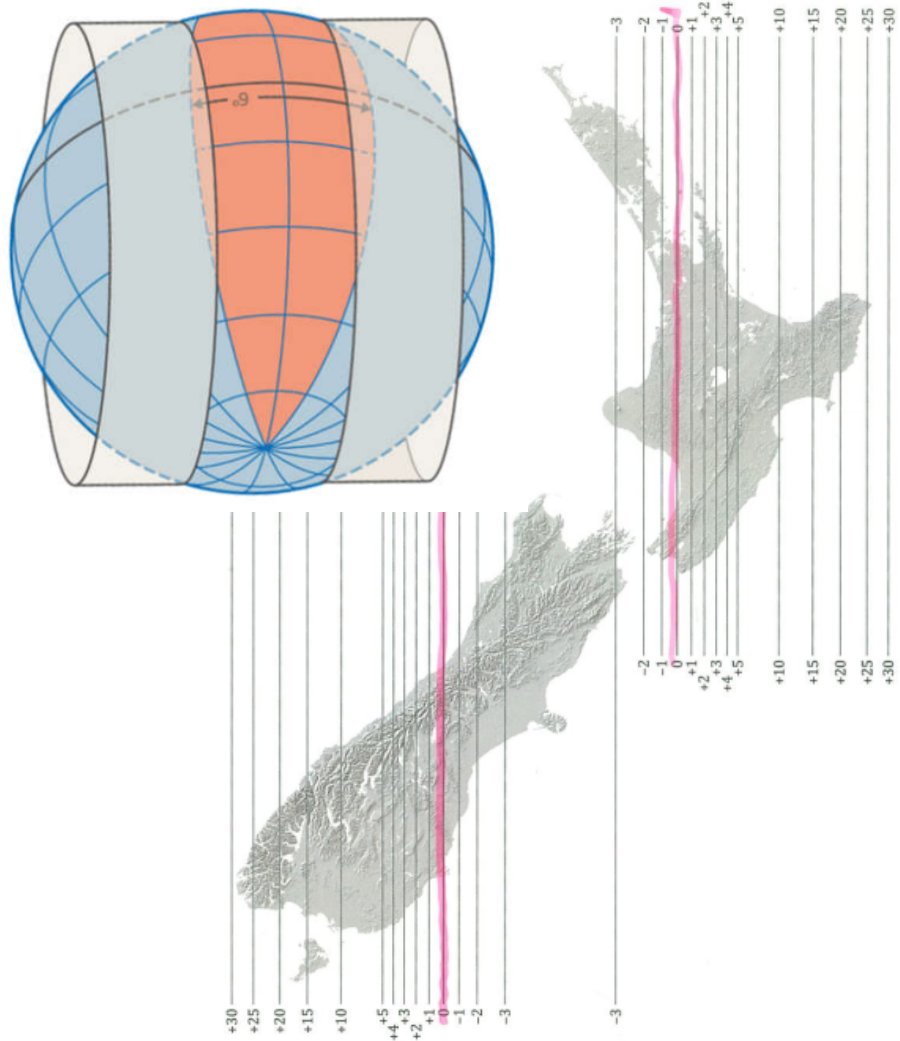
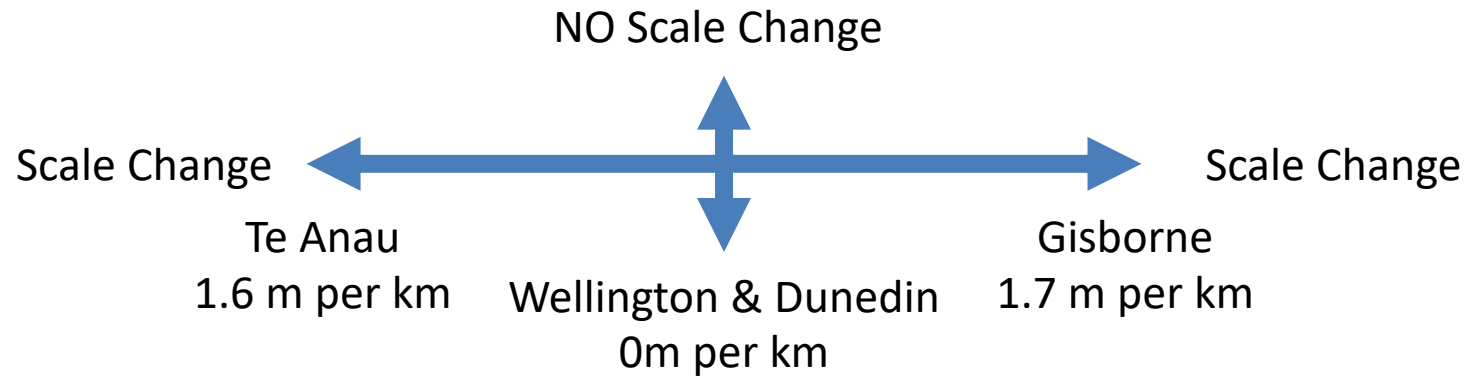
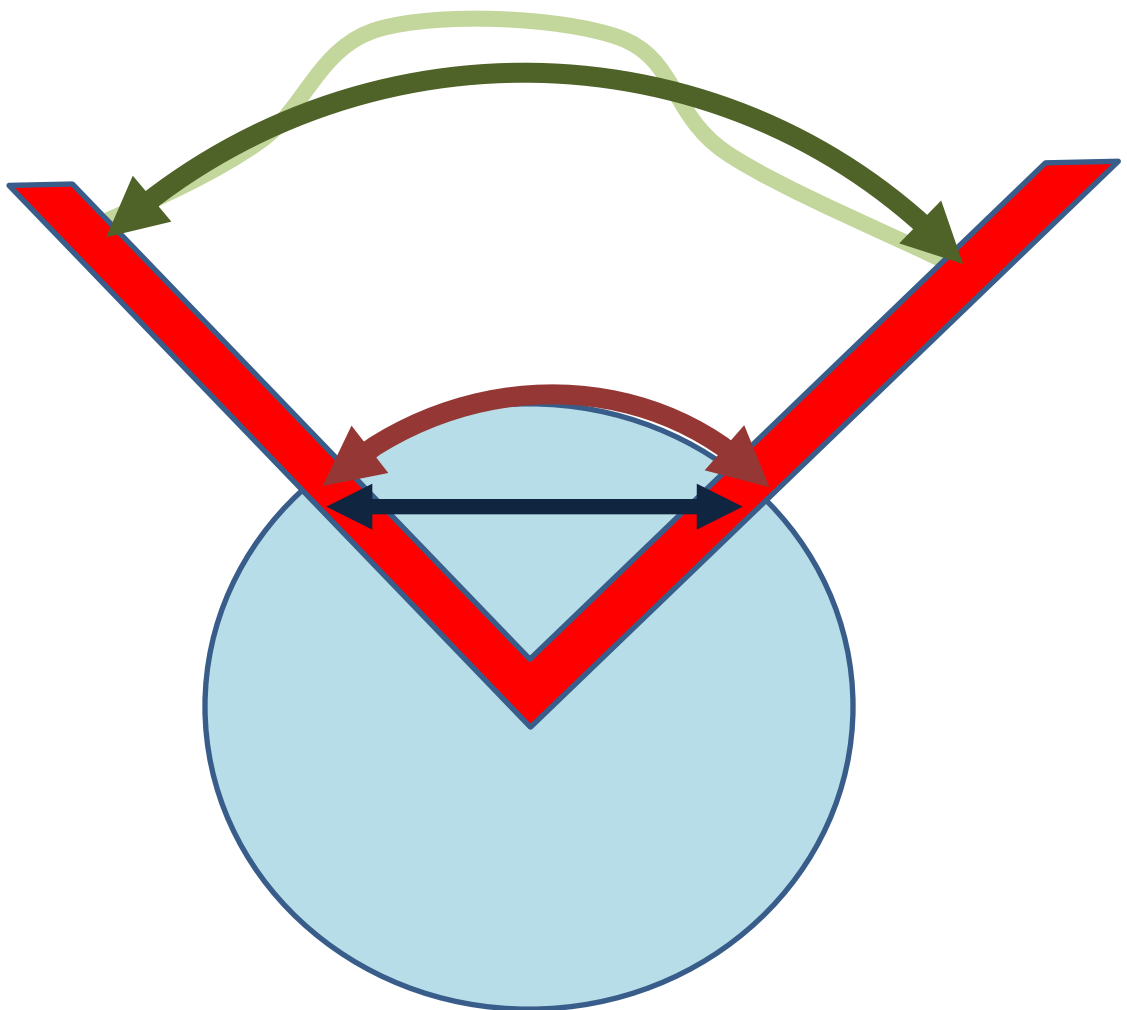


Figure 27. Curves of equal scale error of the New Zealand Transverse Mercator 2000 projection; scale error in units of 10^{-4} (100 mm / 1 km). Source: LINZ, 2001.





Ground

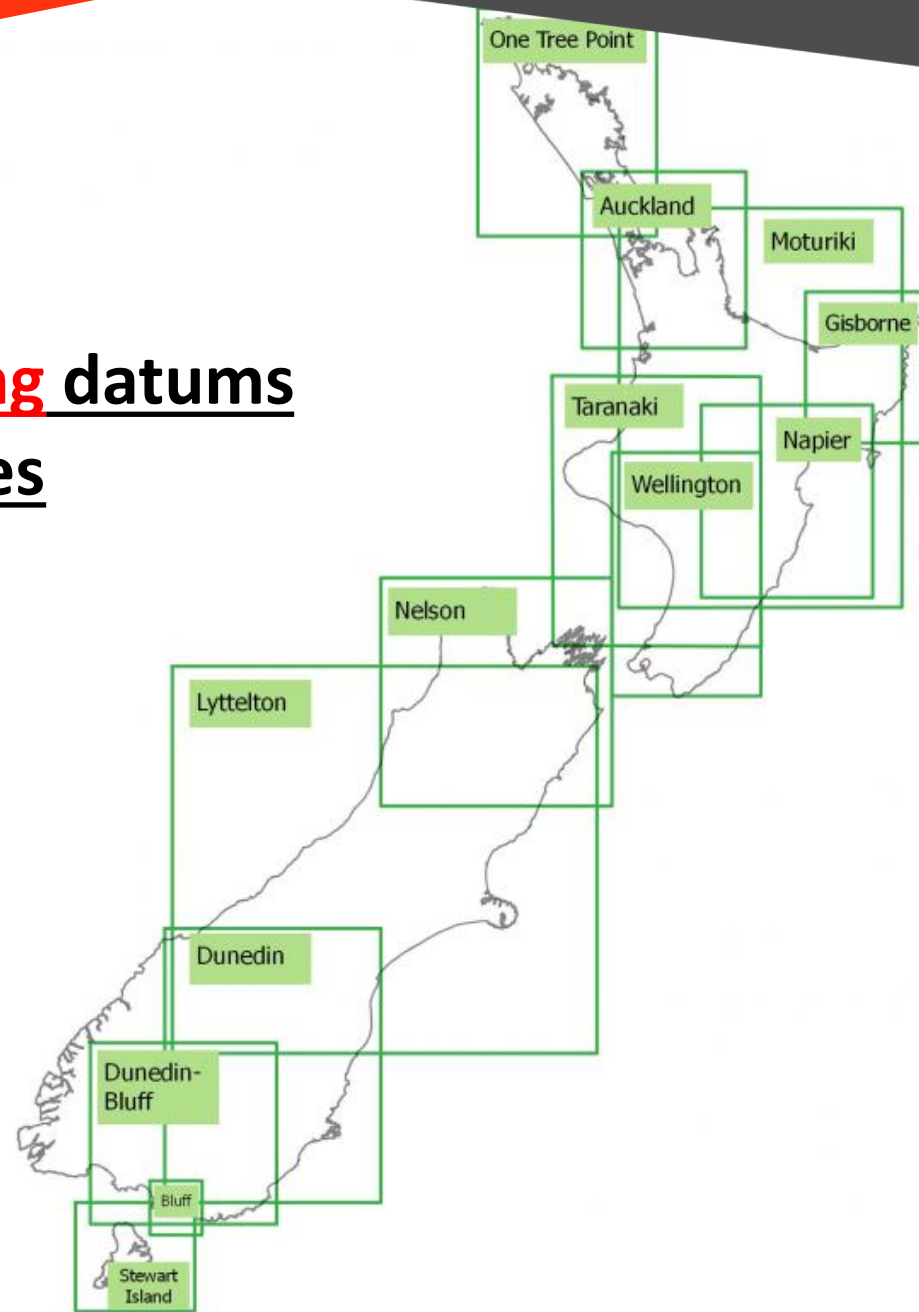
Spheroid/Geoid

Grid



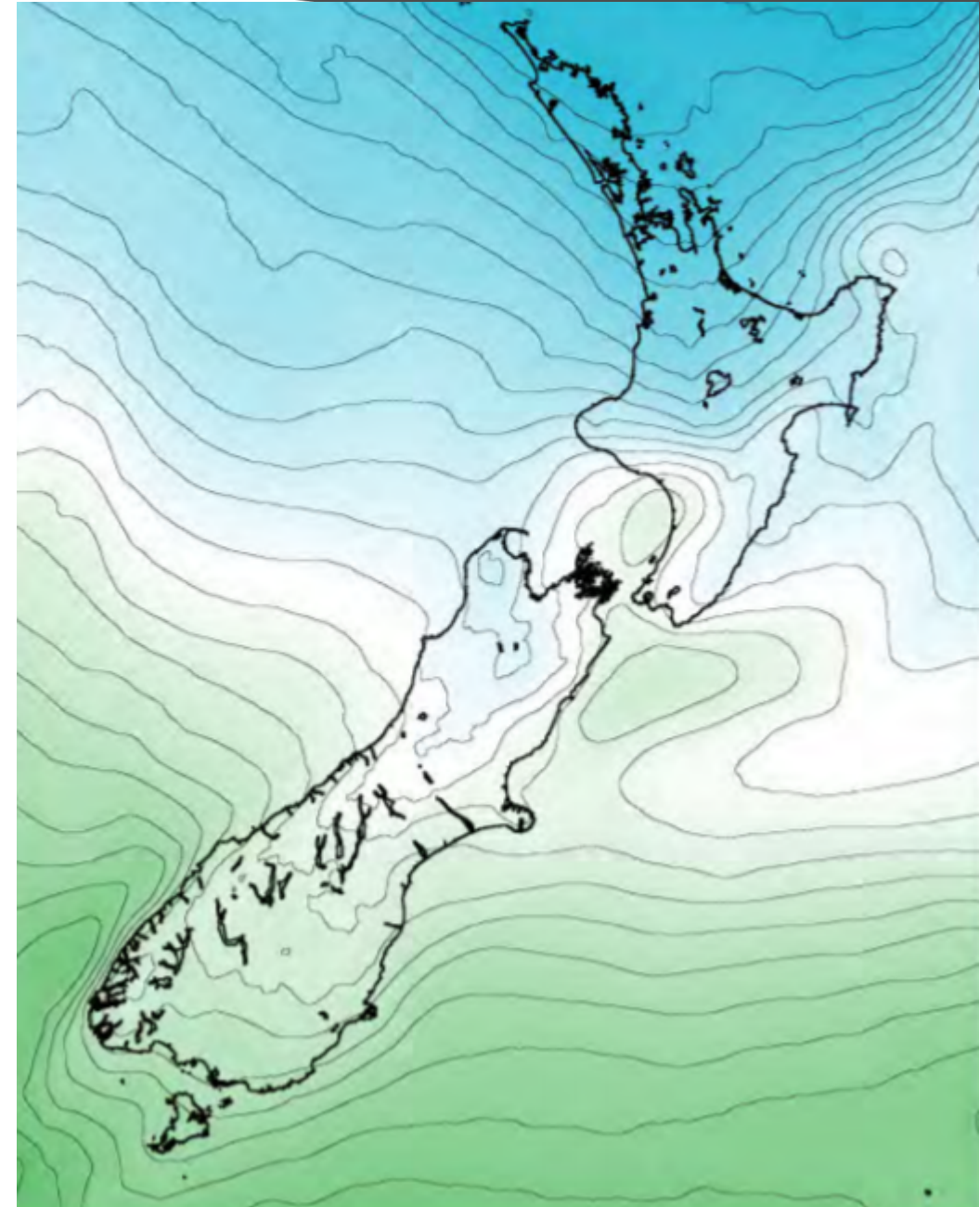
Scale changes East – West (not North South)
Are horizontal distances Grid, Ground, or spheroidal

Regional **Levelling** datums
...and there issues





Vertical Datum 16 not a levelling datum but a GRAVITATIONAL datum

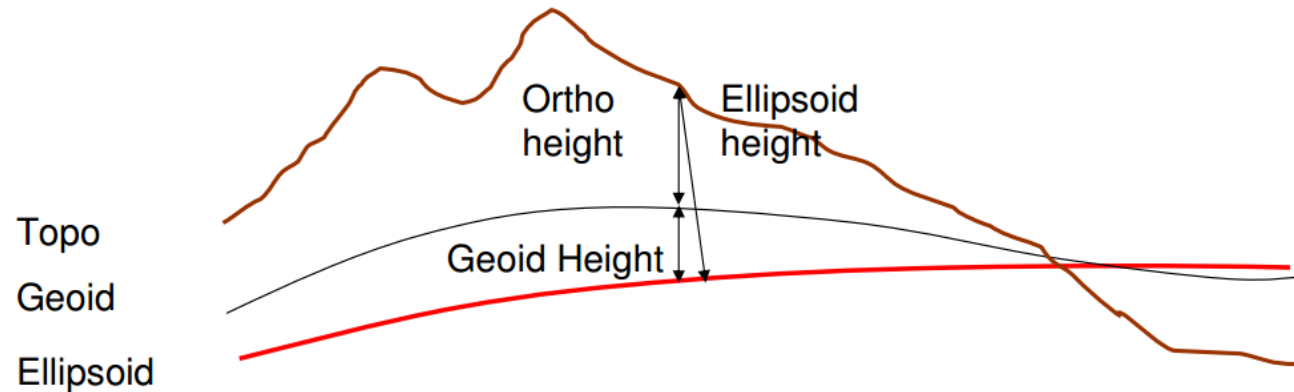


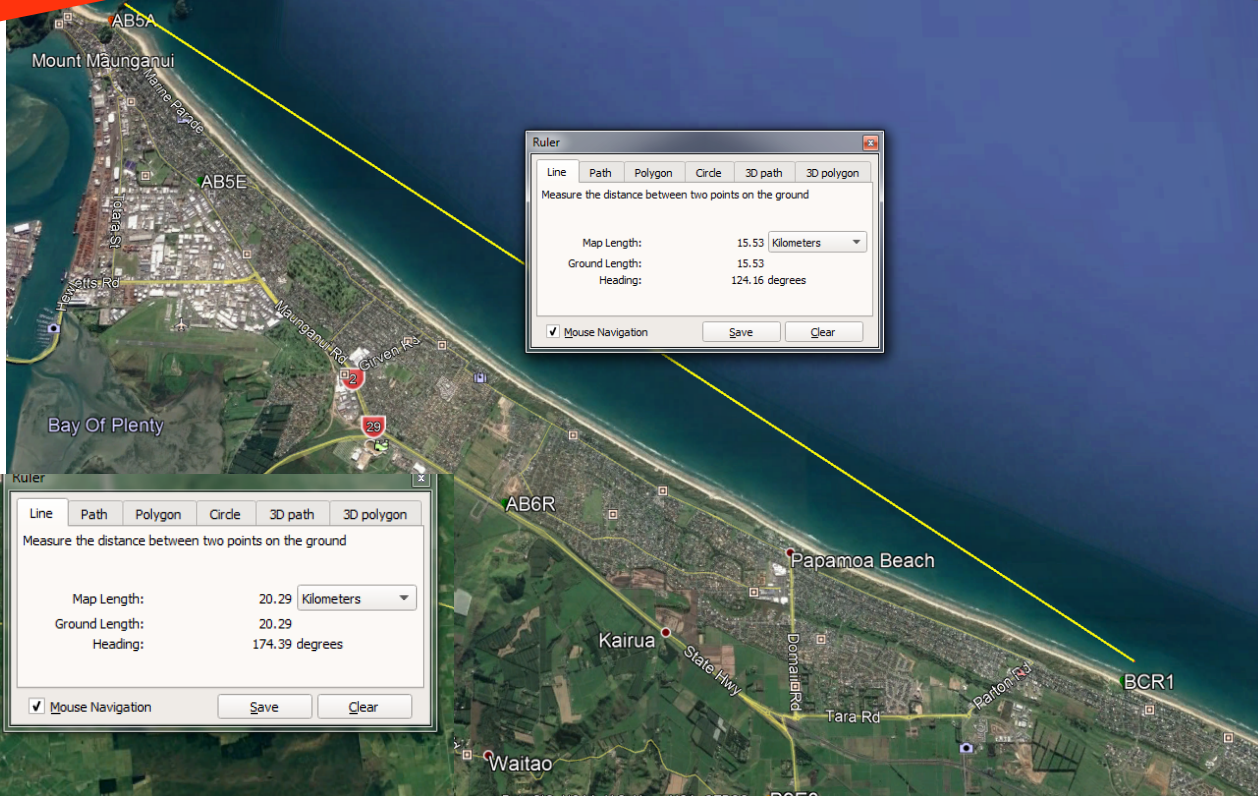
GPS (GNSS) and the height datum

Ellipsoid, Geoid, Topography

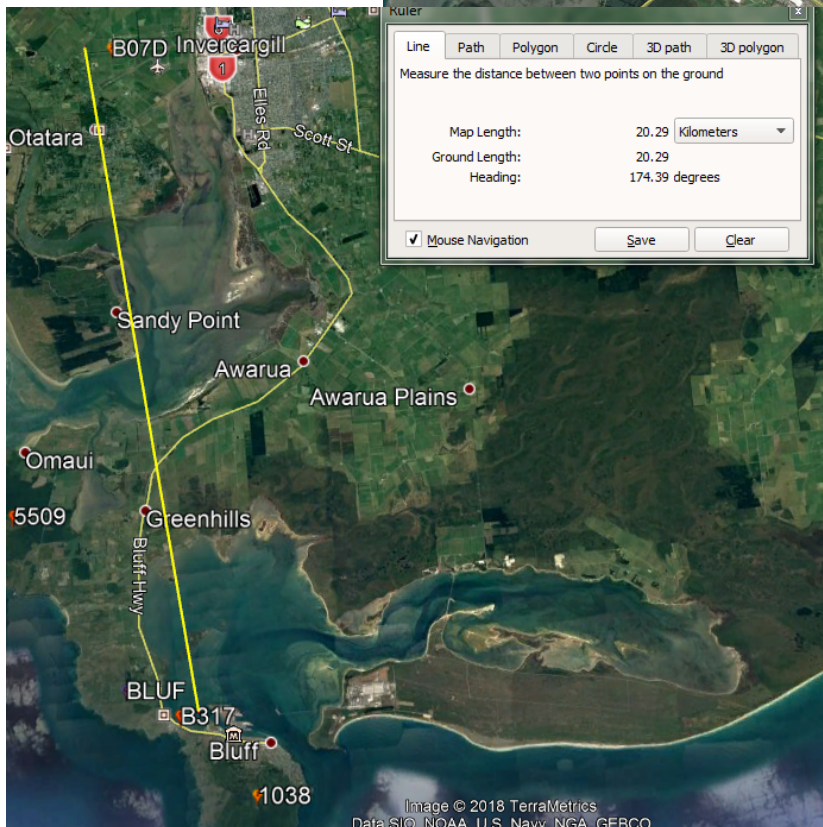
$$h = H + N$$

GNSS = MSL + Separation





Difference is Ellip height 2.66m
 Difference in Geoid ht 2.12
 15km
Ellip greater by 0.54



Difference is Ellip height 5.41m
 Difference in Geoid ht 5.91
 20km
Geoid greater by 0.50

What is the rule of thumb????



What Datum is the bench Mark

GPS (GNSS) heights differences are
NOT true height differences

Concluding summary



1

Distances aren't what they used to be



2

Scale between 2 points depends on the direction



3

Water flows on the Geoid not the Ellipsoidal

Any Questions?

bruce@globalsurvey.co.nz