



**Presented at the FIG Working Week 2016,
May 2-6, 2016 in Christchurch, New Zealand**

Improving New Zealand's Geoid Based Datum with Airborne Gravimetry

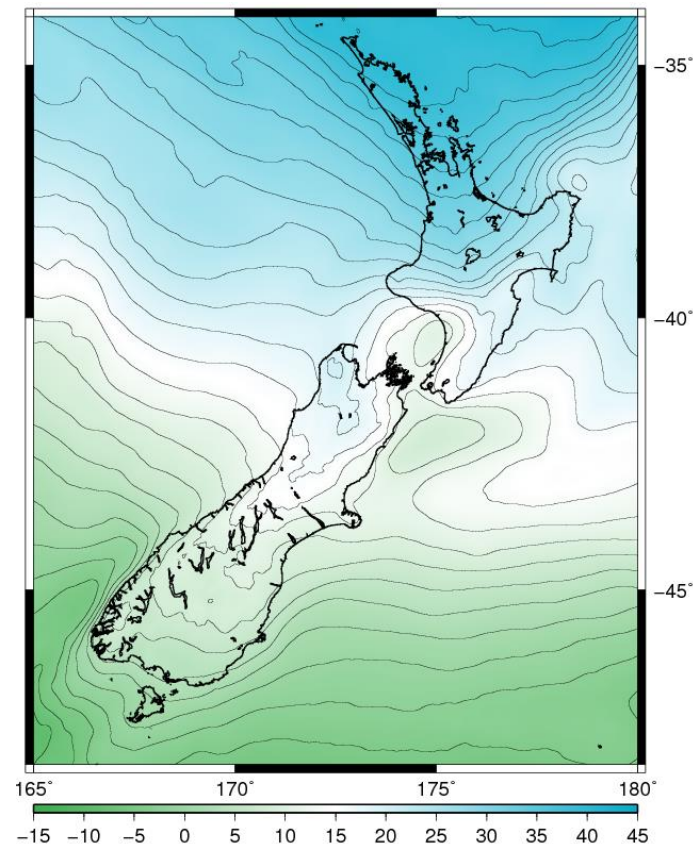
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FIG Working Week Christchurch, New Zealand, 2-6 May 2016



New Zealand Vertical Datum 2009

- First national vertical datum
- Based on NZGeoid2009
- 6 cm nominal accuracy
- 3-15 cm local accuracy
- Need better than 3 cm in developed areas



Accuracy Improvement

- NZGeoid2009 based on existing gravity data
- Irregular and biased locations
- Gap in near-shore areas
- Airborne gravity best solution



Gravity Collection

- Variable flying height
 - 3,300 – 13,500 ft
 - Average 7,000 ft
- Long flight lines
- Limited daylight
- Weather
- Aircraft mechanicals



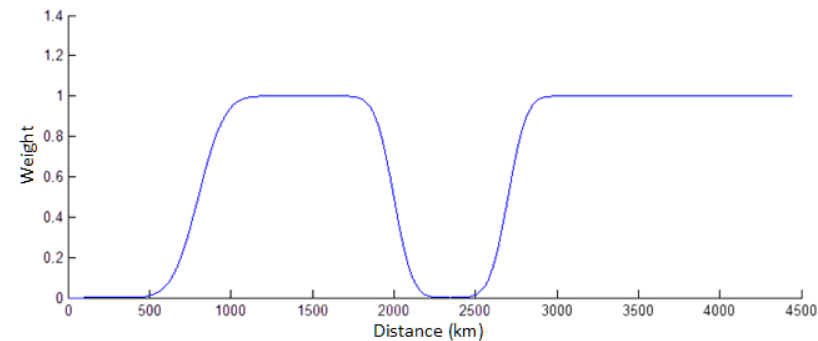
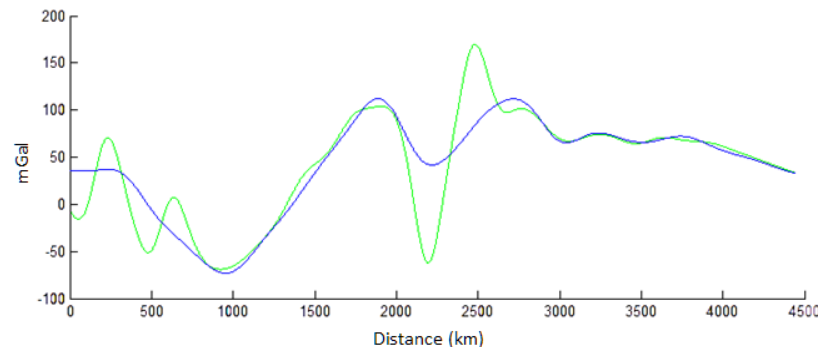
Flight Lines

- 50,000 line km
 - 120 lines
 - 20 tie lines
- Two campaigns
 - August – October 2013
 - February – June 2014
- 75 flights
- 425 flying hours



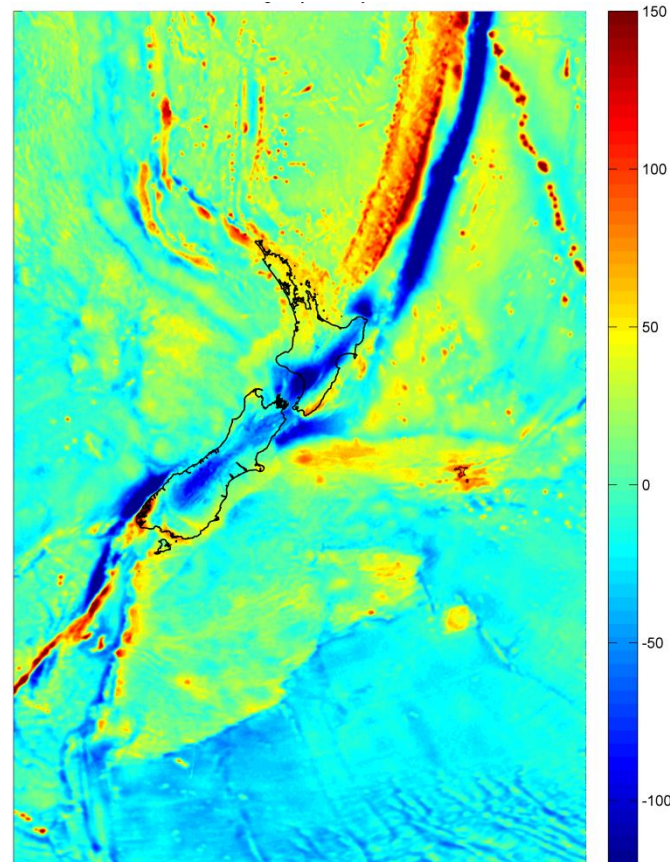
Data Cleaning

- Gravimeter subject to turbulence
- Cleaning process
 - 120 second filter
 - EGM2008 visual comparison
 - 0/1 weighting
- 6.7% of data excluded



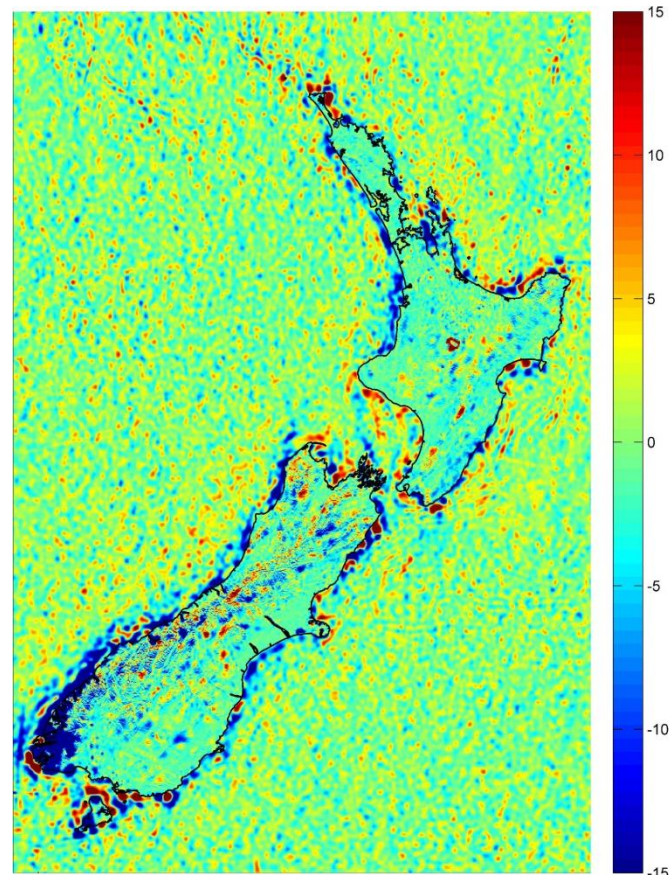
Combined Gravity

- Least square collocation used to combine:
 - Airborne gravity
 - Terrestrial observations
 - Ship track data
 - Satellite altimetry



Combined Gravity

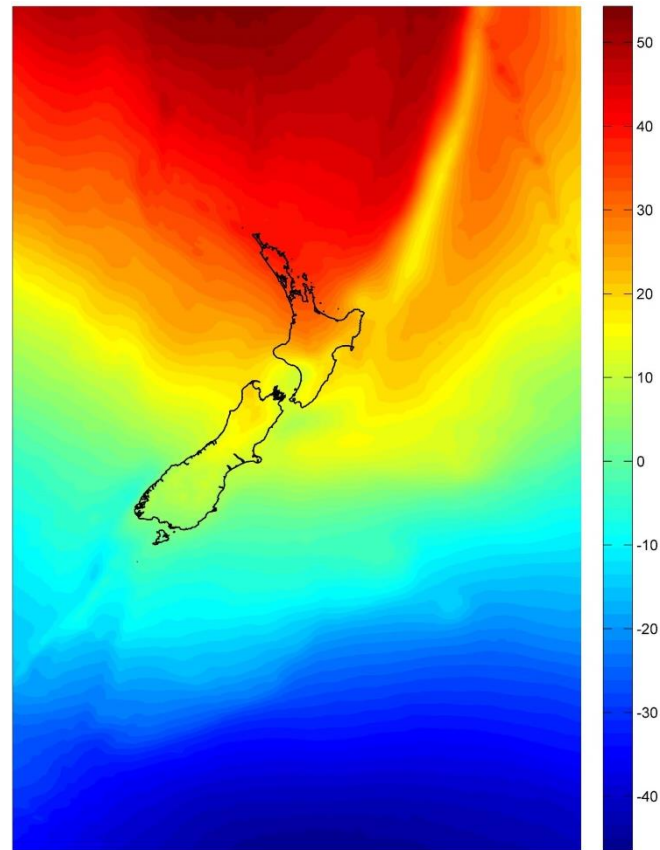
- Difference between 2009 and 2016 gravity fields
- Improvement in near shore and mountainous areas



NZGeoid2016

- Almost achieved 3cm goal in urban areas
- Likely to improve with test data cleaning

	AKL	WLG	CHC	Urban	NZ
# pts	123	169	125	417	1442
2009	3.4	5.2	5.1	4.7	5.4
2016	3.4	3.8	2.0	3.1	3.8



NZVD2016

- To be published in June 2016
- Based on NZGeoid2016
- 3 cm nominal accuracy
- Transformation surfaces to local datums





Questions?

