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**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

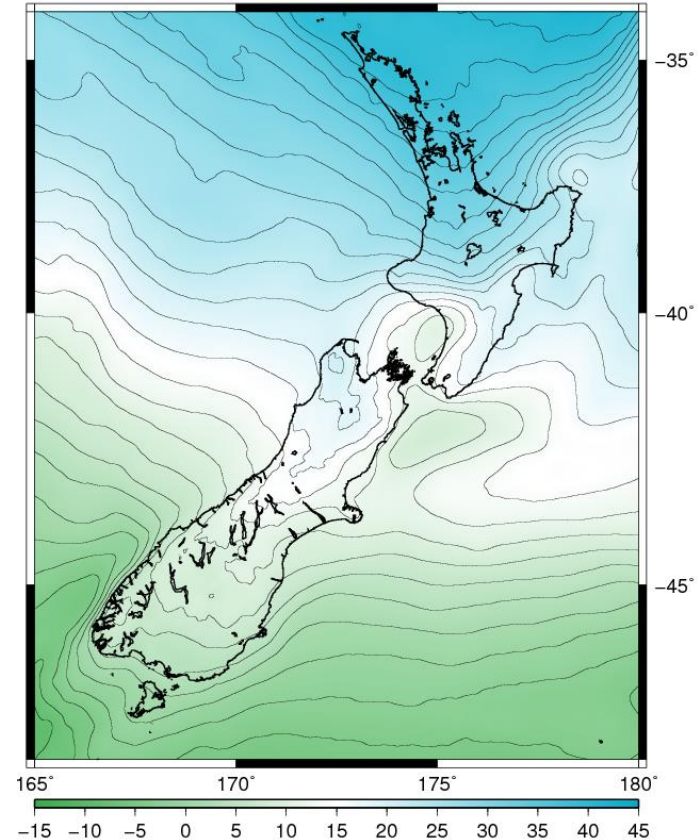
Matt Amos | Acting Deputy Chief Geodesist

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



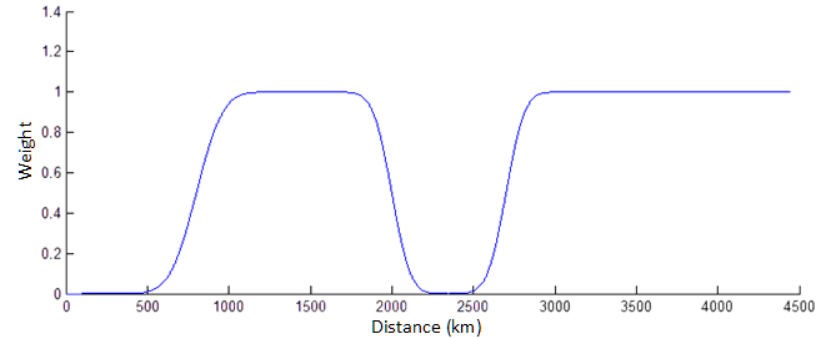
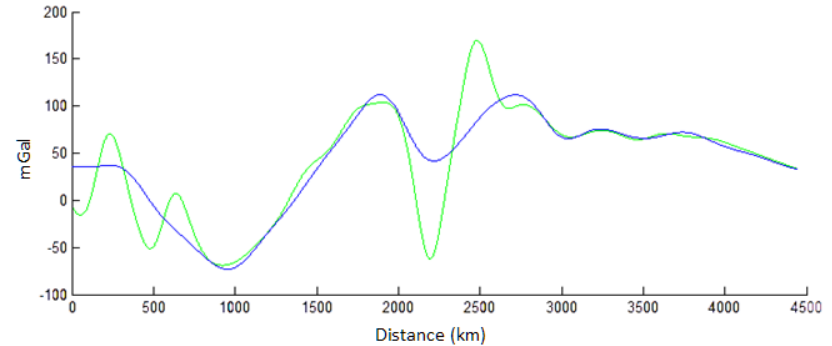
# Flight Lines

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



# Data Cleaning

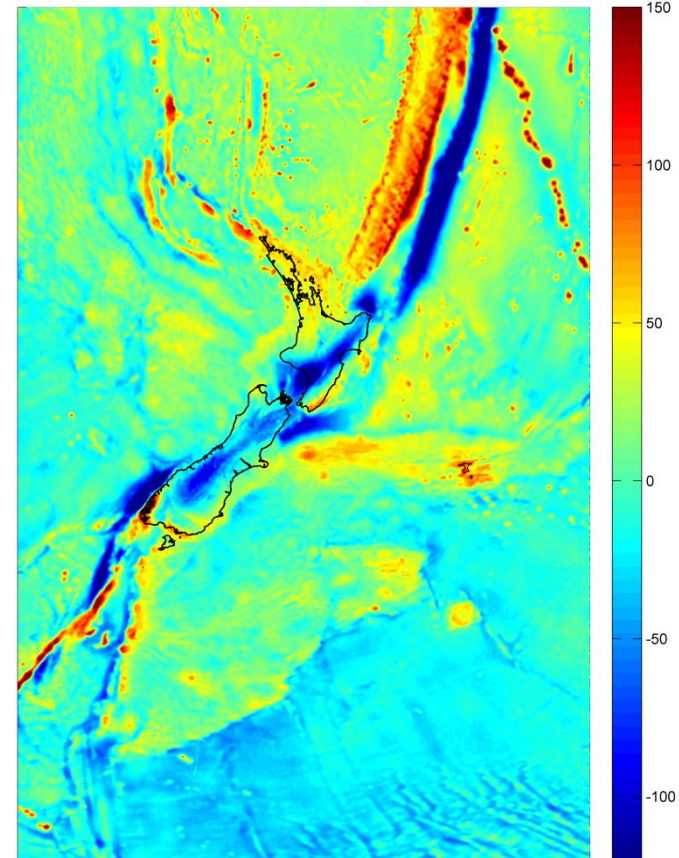
- Gravimeter subject to turbulence
- Cleaning process
  - 120 second filter
  - EGM2008 visual comparison
  - 0/1 weighting
- 6.7% of data excluded





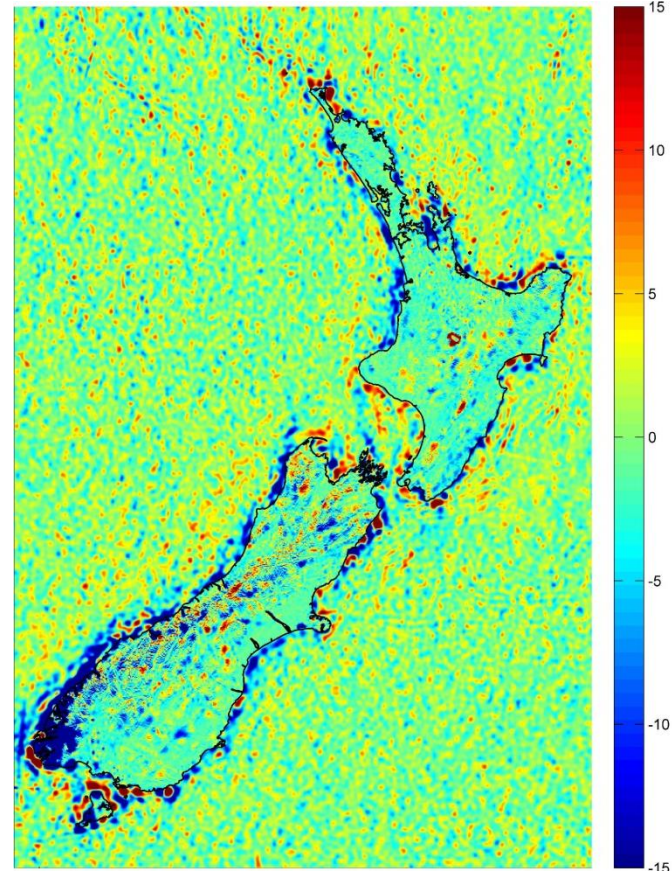
# Combined Gravity

- 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

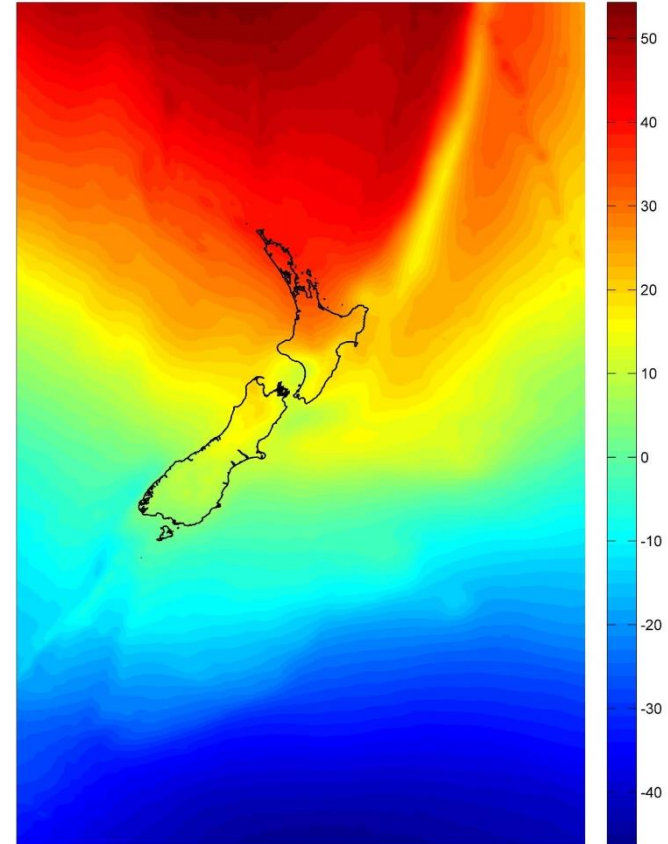




# NZGeoid2016

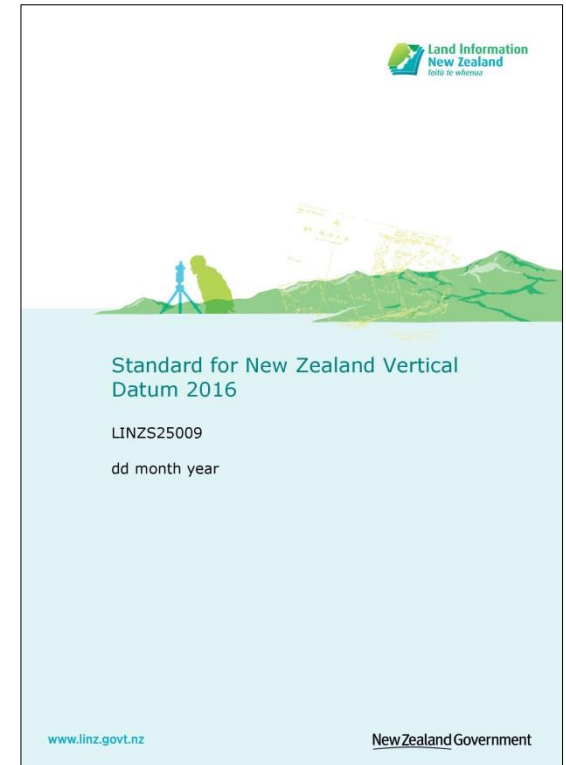
- Almost achieved 3cm goal in urban areas
- Likely to improve with test data cleaning

	<b>AKL</b>	<b>WLG</b>	<b>CHC</b>	<b>Urban</b>	<b>NZ</b>
# 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



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Questions?

