

A decorative graphic in the bottom left corner consisting of a grid of colored dots in shades of green, yellow, orange, pink, purple, and blue, arranged in a pattern that tapers off to the right.

# Queensland Geochemistry: The Past, the Present and the Future

*Digging Deeper 10*  
*Geological Survey of Queensland Annual  
Seminar*  
*5 December 2012*

**Joseph Tang**  
Senior Geochemist  
Geological Survey of Queensland, DNRM

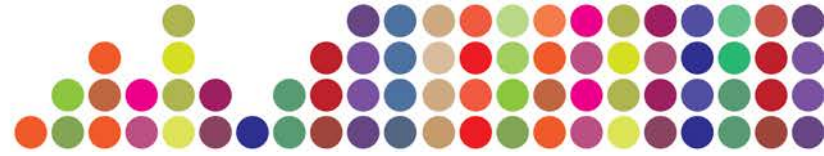


**Queensland  
Government**



# Talk outline

- Introduction
- Queensland geochemical data repository
  - Evolution of geochemical data usage and needs
- Major past geoscientific programs
- Current geochemistry programs
- Future geochemistry wish list
- Summary



# Introduction

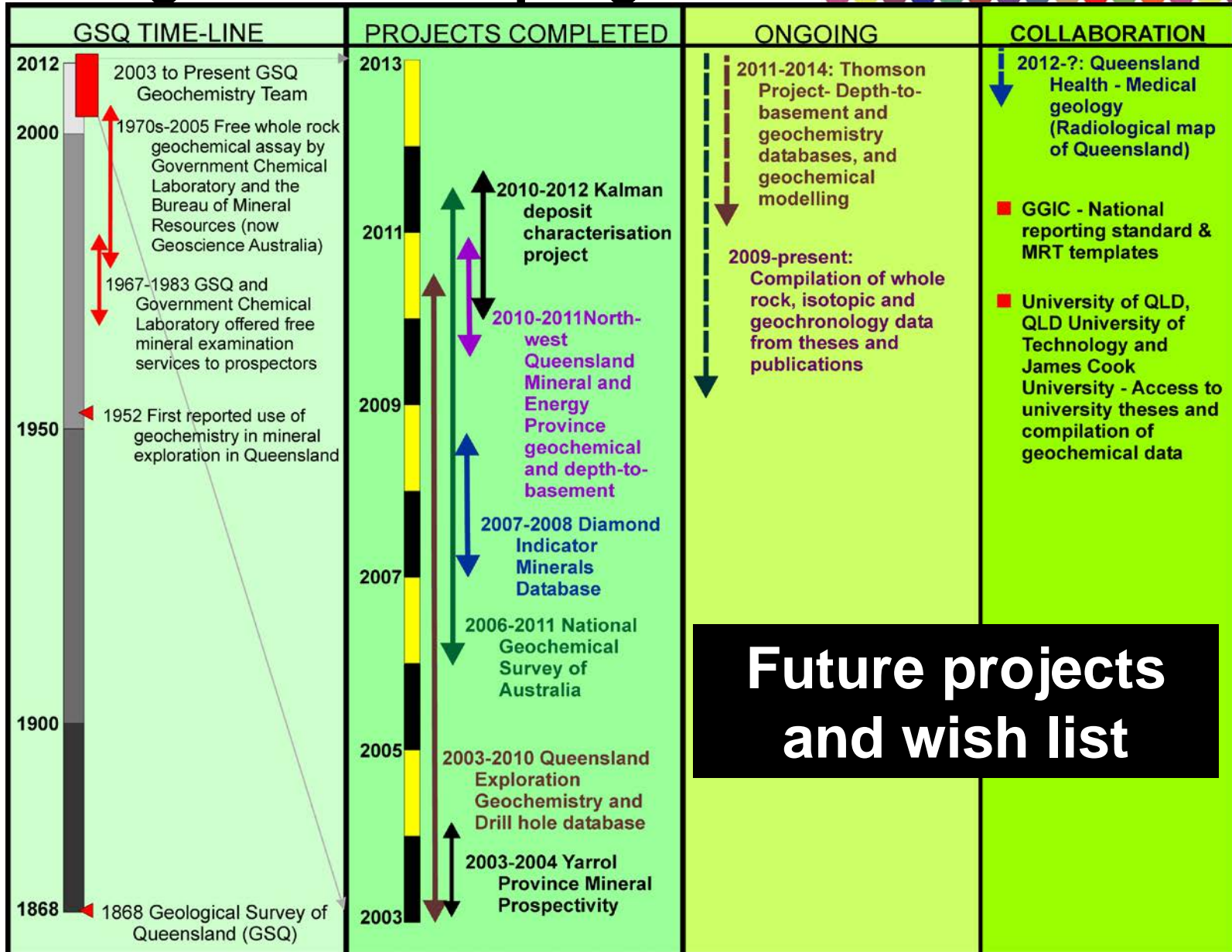
- Systematic geochemical sampling has been used in mineral exploration since the 1950s
- Geological Survey of Queensland estimated that ~\$200 million dollars (today's financial terms) were spent on geochemical data acquisition for approximately 5 million data points
- Most of these data were reported in hard copy company reports and theses
- Modern analytical methodologies have sensitivity and precision to parts-per-trillion
- Geochemistry is applied in petrogenetic studies, experimental petrology, tracing magma and fluid paths, identifying source regions, geochronology, medical geology, isotopic fingerprinting and mineral exploration

## Data repository

SAMPLE TYPES	Estimated data (2008)
Exploration geochemistry	4,500,000*
Whole rock geochemistry	33,078
Mineral geochemistry	21,080
Geochronology	~330
Isotopic data	1,761
Fluid inclusions	3,426
TOTAL	59,675

\* Revised down from 5,000,000 data in 2010

# GSQ geochemical programs







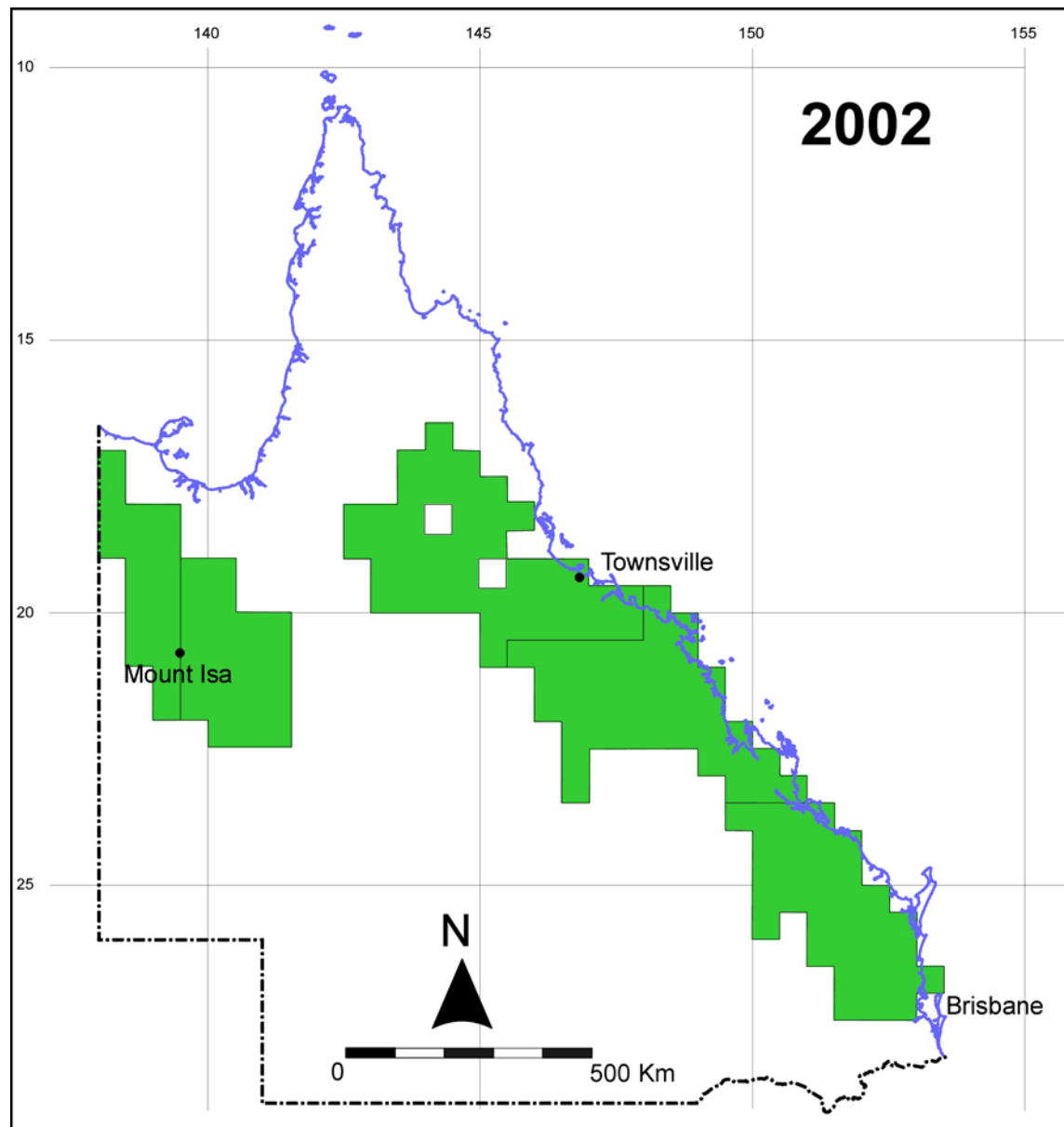
## Major geoscientific programs completed

1. Queensland Exploration Geochemistry and Drill Hole database (2003-2010)
2. Mineral Resources of the Yarrol Province (2003-2004)
3. The National Geochemical Survey of Australia (NGSA) Project (2006-2011)
4. Diamond Indicator Minerals Database (2007-2008)
5. North-West Queensland Mineral and Energy Province Data (2010-2011)
6. Kalman deposit characterisation Project (2010-2012)



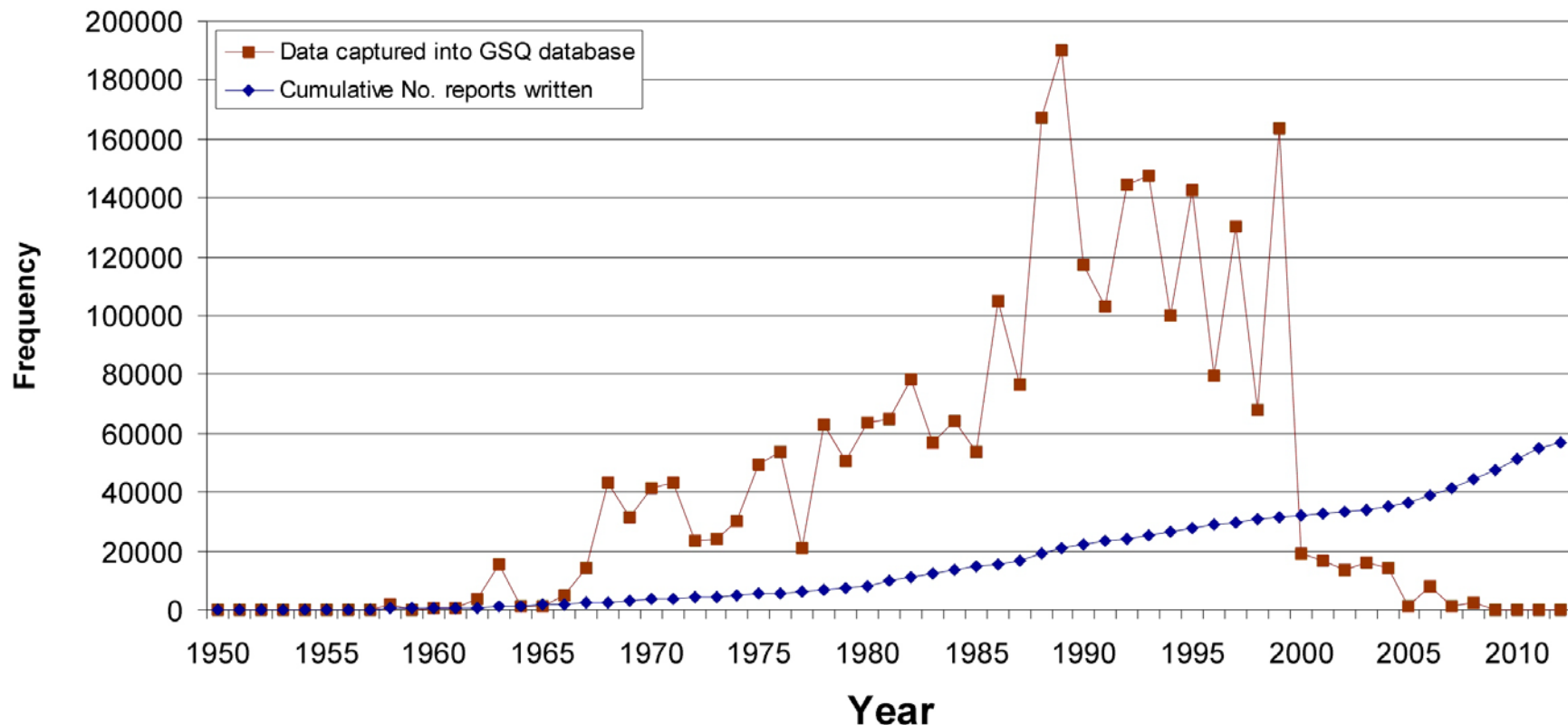
# 1. Queensland Exploration Geochemistry and Drill Hole database (2003-2010)

- Smart Exploration funding
- Contractor (Terra Search Pty Ltd)
- Internal GSQ data extraction team
- DVD product





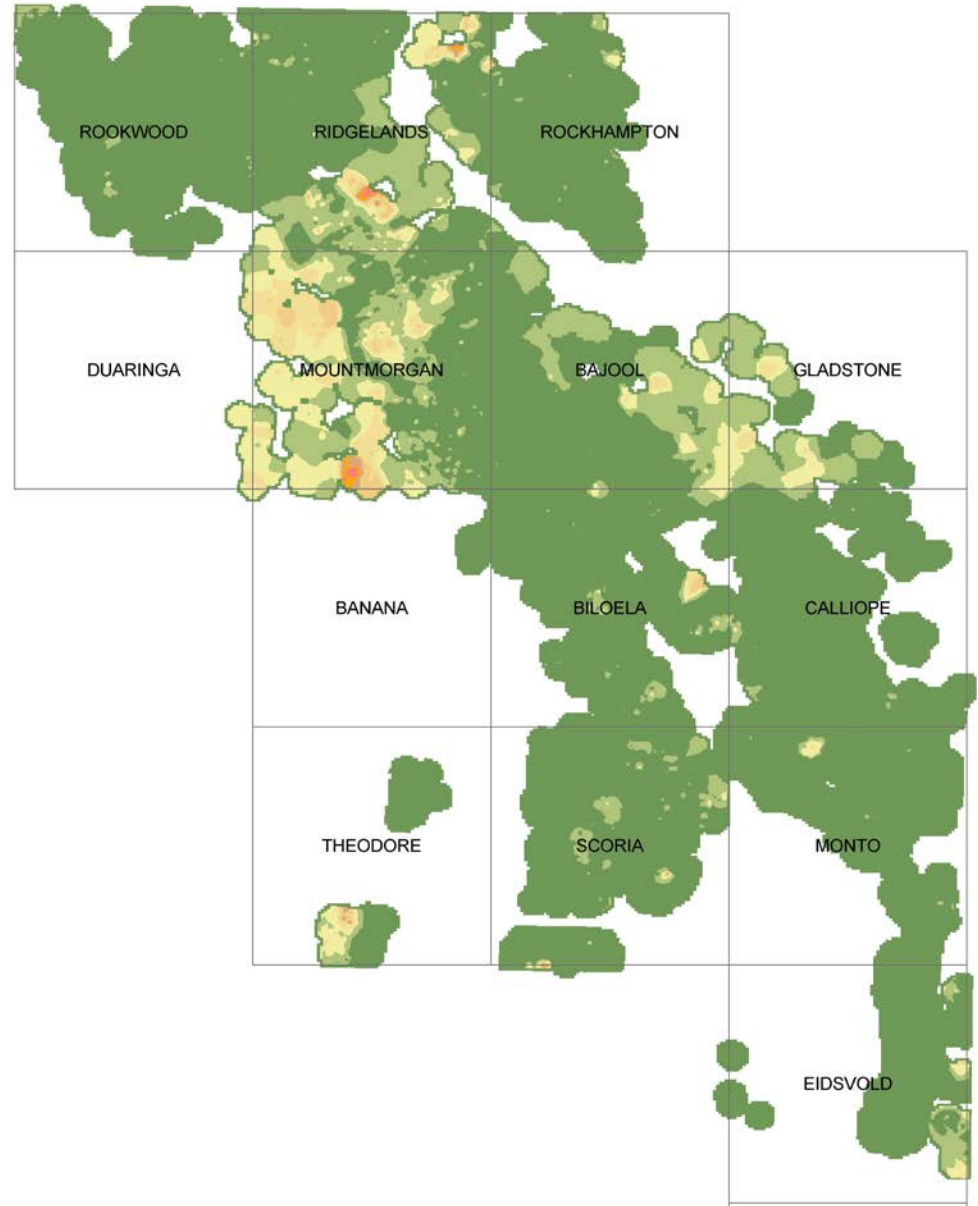
## Data backlog



- Estimated 120,000 new geochemistry and related data added to Queensland each year (excludes mining lease data)
- ~2 million data points requiring lots of time, personnel and ~\$2 million funds to capture

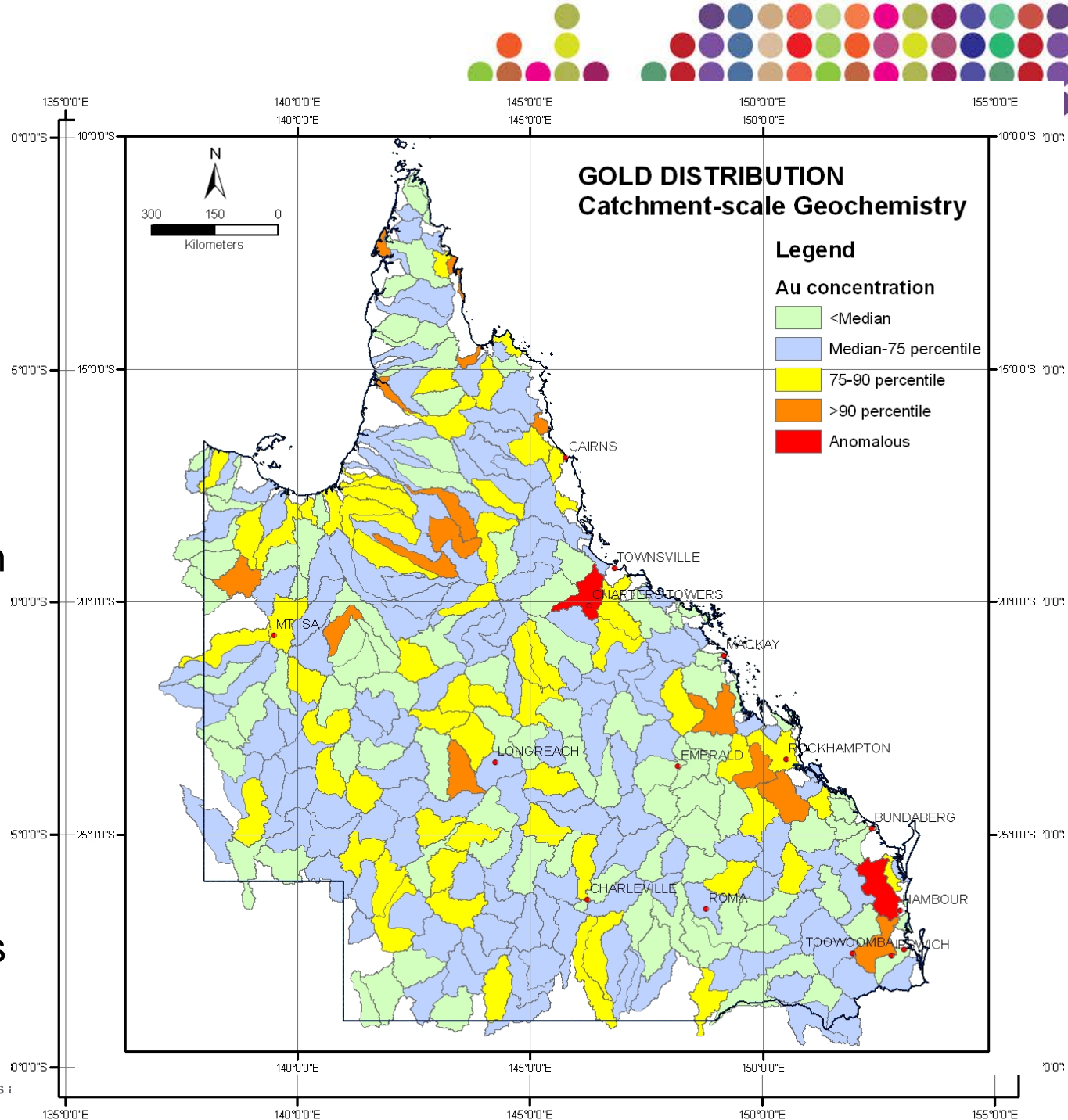
## 2. Mineral Resources of the Yarrol Province (2003-2004)

- Processing of geochemical data as part of a regional study
- Gridding for WOE and GIS package
- E.g. Au, Ag, Cu grids
- Report released in 2006



### 3. The National Geochemical Survey of Australia (2006-2011)

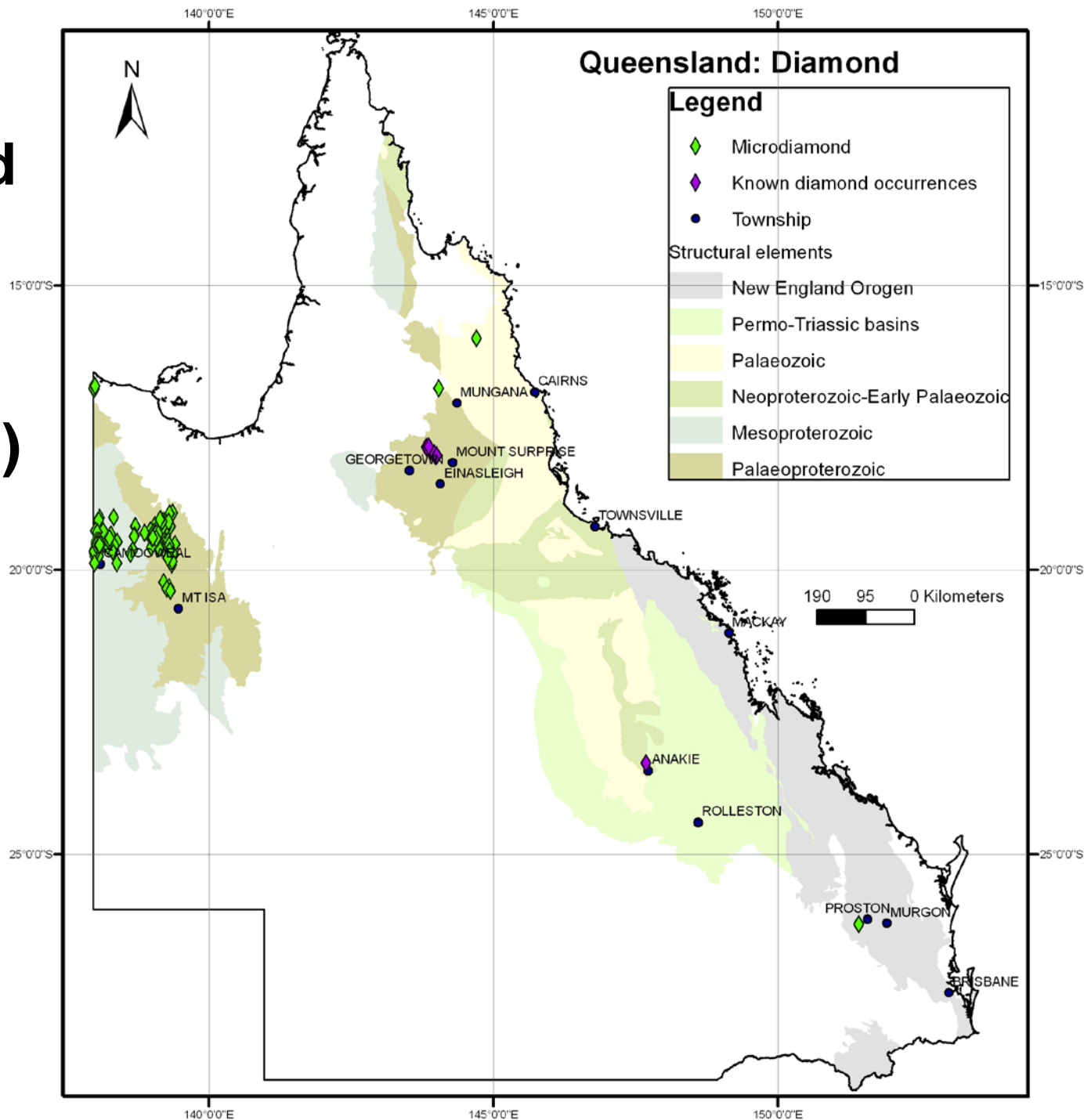
- Collaboration with Geoscience Australia
- New data
- 311 catchment state-wide
- 68 elements
- Greenfield targets
- Report





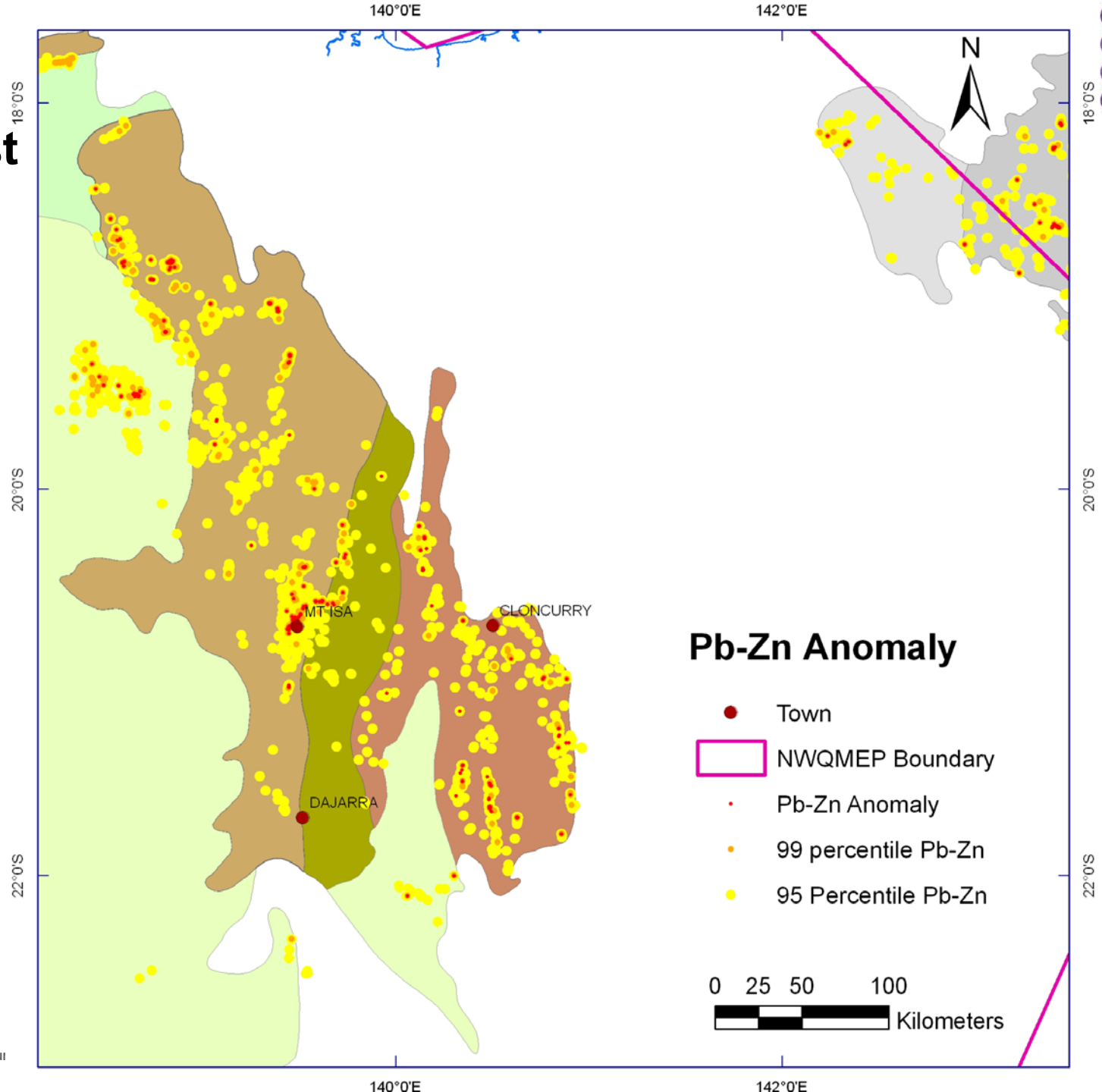
## 4. Diamond Indicator Mineral database (2007-2008)

- Based on NTGS template
- Captured data from company reports (to 2006)
- Needs updating
- Report



## 5. North-west Queensland Mineral and Energy Province (2010-2011)

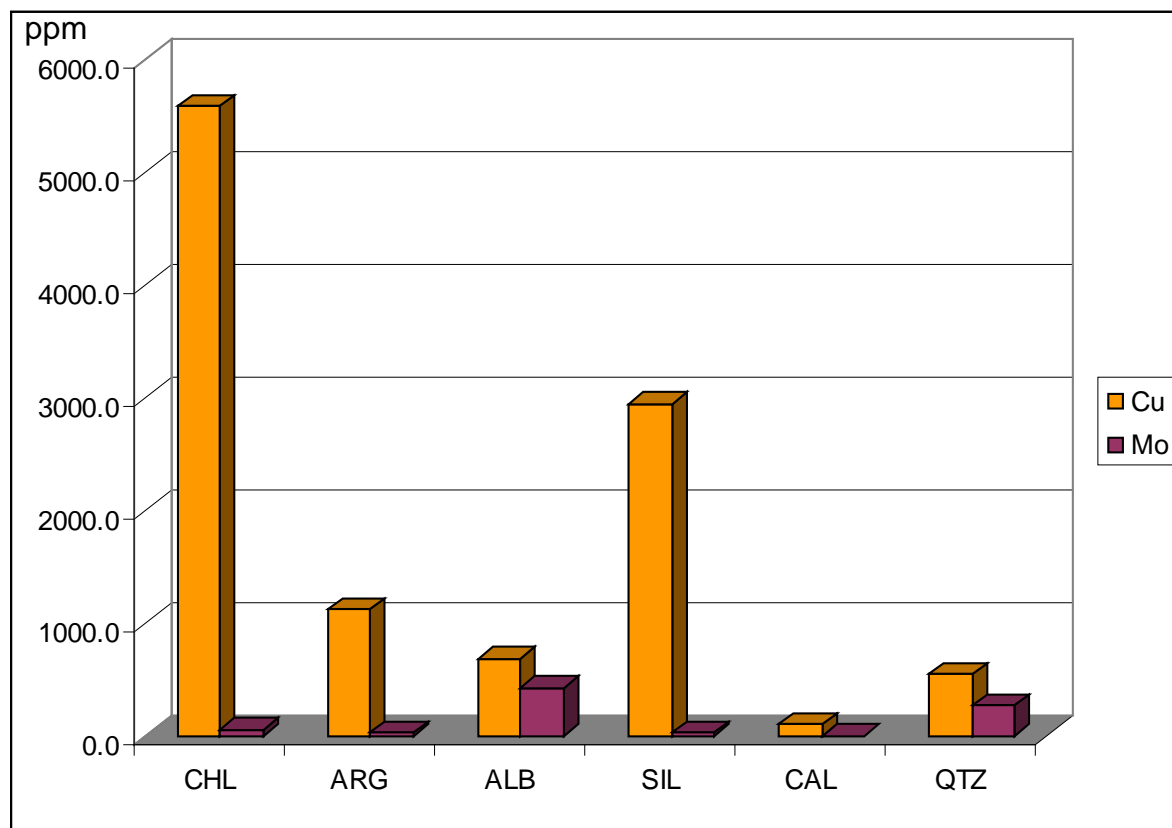
- Compile geochemistry and drill hole database
- Depth-to-basement database
- Geochemical data processing
- Report





## 6. Kalman Deposit Characterisation Project (2010-2012)

- Use of handheld XRF analyser
- Analysed at 1-metre interval
- 10 drill holes assayed with ~3500 analyses
- Geochemical data processing and interpretation
- Report



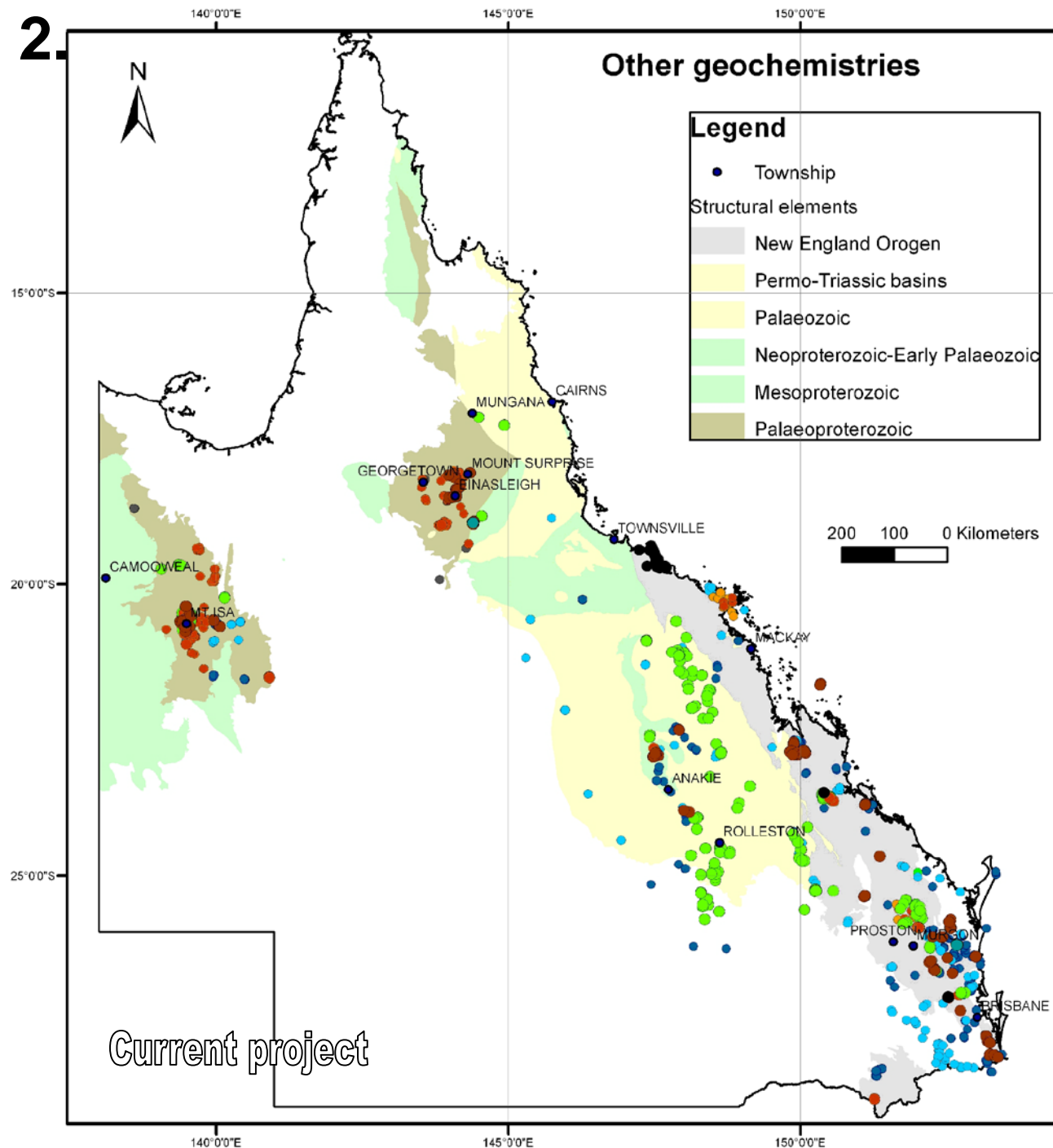
Geochemical association with alteration in the Kalman deposit



## Current Geochemistry Programs

1. National reporting standard and MRT template (Version 1.4)
2. Whole rock and isotopic geochemistry and geochronology data (ongoing data acquisition and compilation)
3. Thomson Orogen Project (2011-2014)

2



## Legend

### Mineral chemistry

#### Minerals (2,554 assays)

- Sulphides (76)
- Accessory minerals (130)
- Oxides (2347)

### Stable isotopes

#### Isotopes (1,601 assays)

- Deuterium (74)
- Carbon (553)
- Sulphur (214)
- Oxygen (760)

### Geochronology (10,518)

#### Method

- Fission Track (10)
- SHRIMP (149)
- U-Th-He (15)
- Pb-isotopes (76)
- Ar-Ar (9,643)
- Sm-Nd (224)
- K-Ar (236)
- Rb-Sr (165)



### 3. Current project



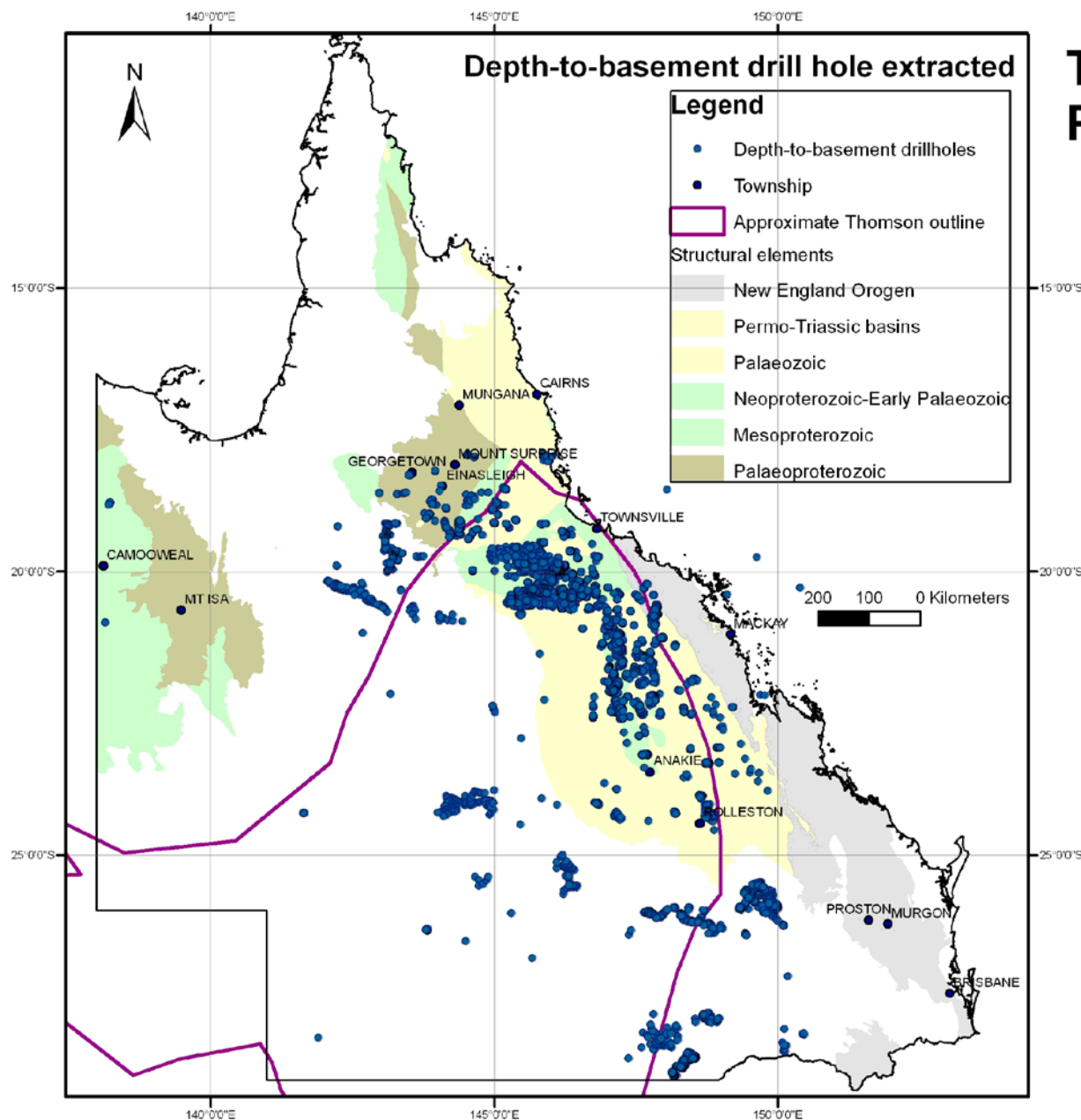
## Thomson Project

No. of company report reviewed: 1542

17,700 drill hole locations compiled.

14,500 drill logs validated for depth-to-basement information

Work ongoing.






## Future Geochemistry Wish list

1. Online geochemical data delivery and implementation of the MRT software and templates (2013?)
2. Create a consolidated Queensland whole rock database (2012-?)
3. Undercover geochemical and hydrochemical prospectivity modelling (2012-?)
4. Pb and other isotopic databases (2013-?)
5. Medical geology (2012-?)
6. Upgrading the Exploration Geochemistry and other geoscientific databases (?)
7. Follow-up work program for the NGSA and salt lake sampling (?)

## Data compilation progress and targets



<b>SAMPLE TYPES</b>	<b>Estimated data (2008)</b>	<b>Data compiled (2012)</b>	<b>Outstanding (2012)</b>	<b>Percentage captured (2012)</b>
Exploration geochemistry	4,500,000*	2,909,691	1,590,309	64.7%
Whole rock geochemistry	33,078	24,731	8,347	74.8%
Mineral geochemistry	21,080	2,554	18,526	12.1%
Geochronology	~330	10,518	-10,188	+3187.3%
Isotopic data	1,761	1,601	160	90.9%
Fluid inclusions	3,426	0	3,426	0.00%
<b>TOTAL</b>	<b>59,675</b>	<b>39,404</b>	<b>20,271</b>	

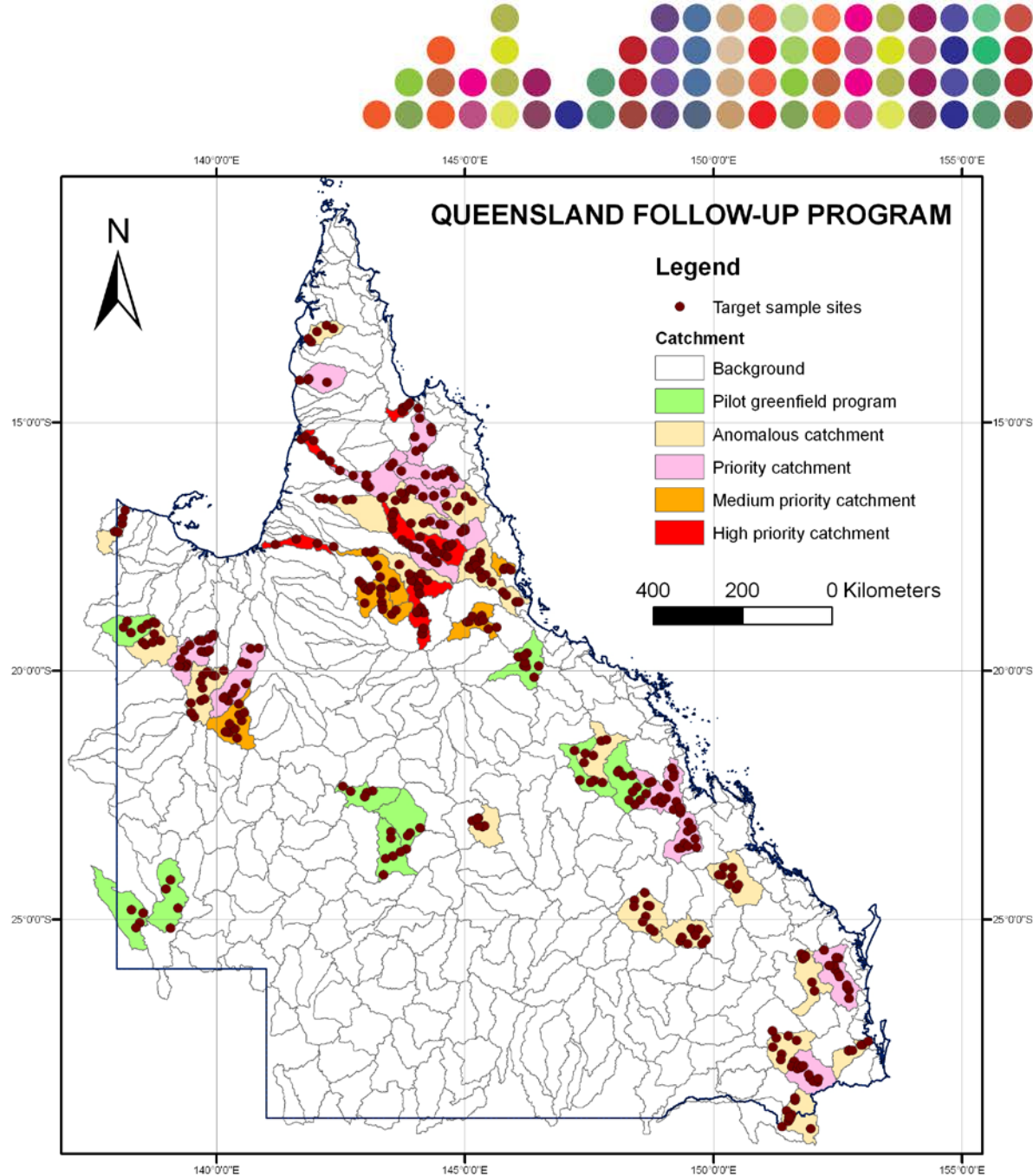
Data estimates based on scoping exercises undertaken in 2006 and 2008. The figures do not take into account additional data since 2008. Whole rock data exclude the 7,893 exploration company report data.

\* Revised down from 5,000,000 data in 2010.

? Future project

# Proposed follow-up program on the National Geochemical Survey of Australia and Salt Lake program

- 26% of Qld identified for follow up sampling
- Reduce sample density to 1 sample per 500-1000 sq km
- Use same analytical methods for 68 elements
- Estimated cost ~\$1M over 3 years





## Summary

- GSQ has a small but very proactive Geochemistry (3 staff)/ Minerals Geoscience team
- Geochemical programs are tailored within the limited GSQ funding to maximise outputs suited to both mineral industry and geoscientific research
- Proposed current and future directions are to develop supporting information packages that can be used by the next generation of researchers and explorers targeting brownfield as well as concealed, greenfield mineral systems

# Thank you