



# Levelling Till Geochemistry Surveys in New Brunswick

Eric Grunsky, Steve Adcock & Wendy Spirito



Natural Resources  
Canada

Ressources naturelles  
Canada

Canada 



# Till Geochemistry in NB

- Till geochemical surveys collected in 1:50,000 NTS sheets.
- Additional surveys collected by GSCO & GSCQ
- C-Horizon samples collected at 2km intervals
- $< 63\mu$  silt-clay size fraction used for analysis.
- Digestion methods varied (A-R, 4 acid).
- Analytical methods varied (INAA, ICP-OES, ICP-MS, AA-CV).
- Primary distinction between partial and total analyses.





# Till Geochemistry in NB

- Quaternary studies in NB indicate that most glacial till is locally derived.
- Fine silt-clay fraction may be a substitute/proxy for soils.
- Can the geochemistry of these soils be used to define background?
- Before background can be established – survey data must be examined for consistency.
- Primary observation – data are not level for the 12 elements of interest to HC.
- Elements of interest: As, Cd, Co, Cr, Cu, Hg, Ni, Pb, Sb, Th, U, Zn.



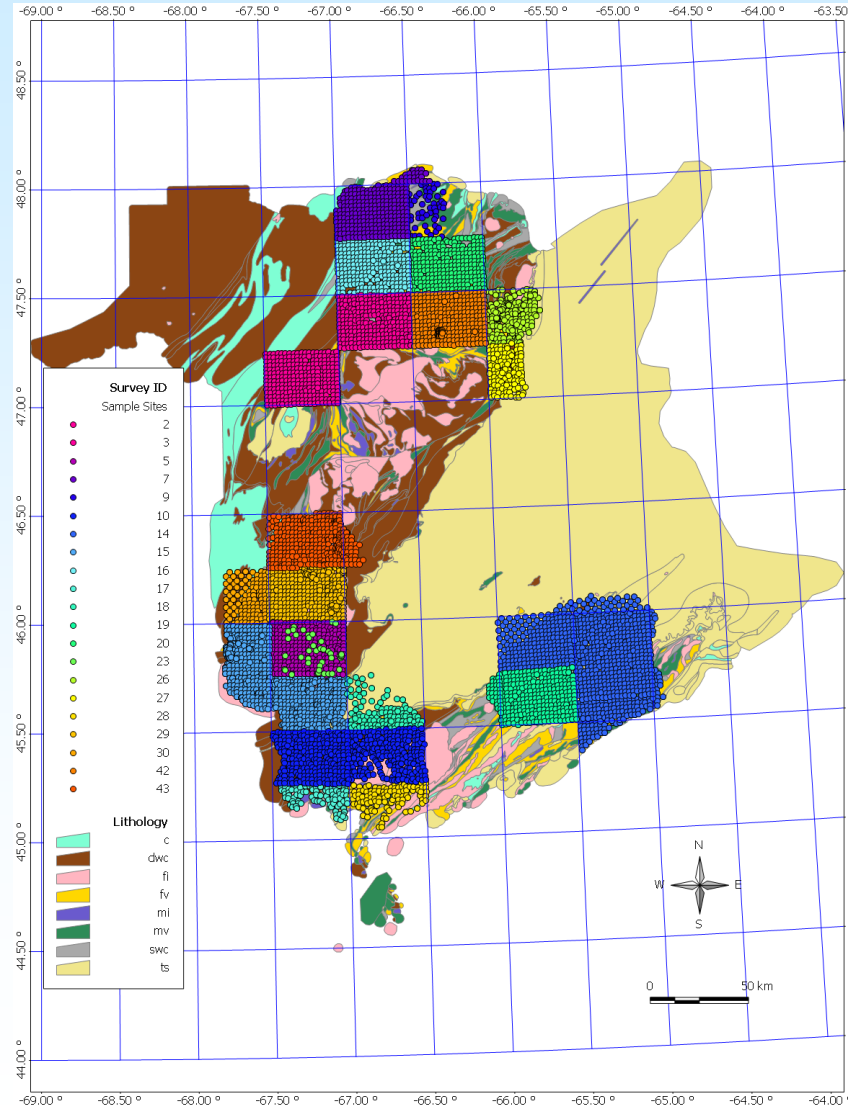
# Till Geochemistry in NB

- Choosing an appropriate basis for levelling requires a “trusted” set of data.
- ~ 300 samples were re-analyzed using QA/QC practices across the province.
- These samples form the basis for levelling all survey results.
- New samples were analyzed using INAA and ICP-MS and 4 acid digestion – representing “total” values.
- Many surveys were analyzed for “partials” only.
- Levelling of the partial analyses is unresolved at this time.



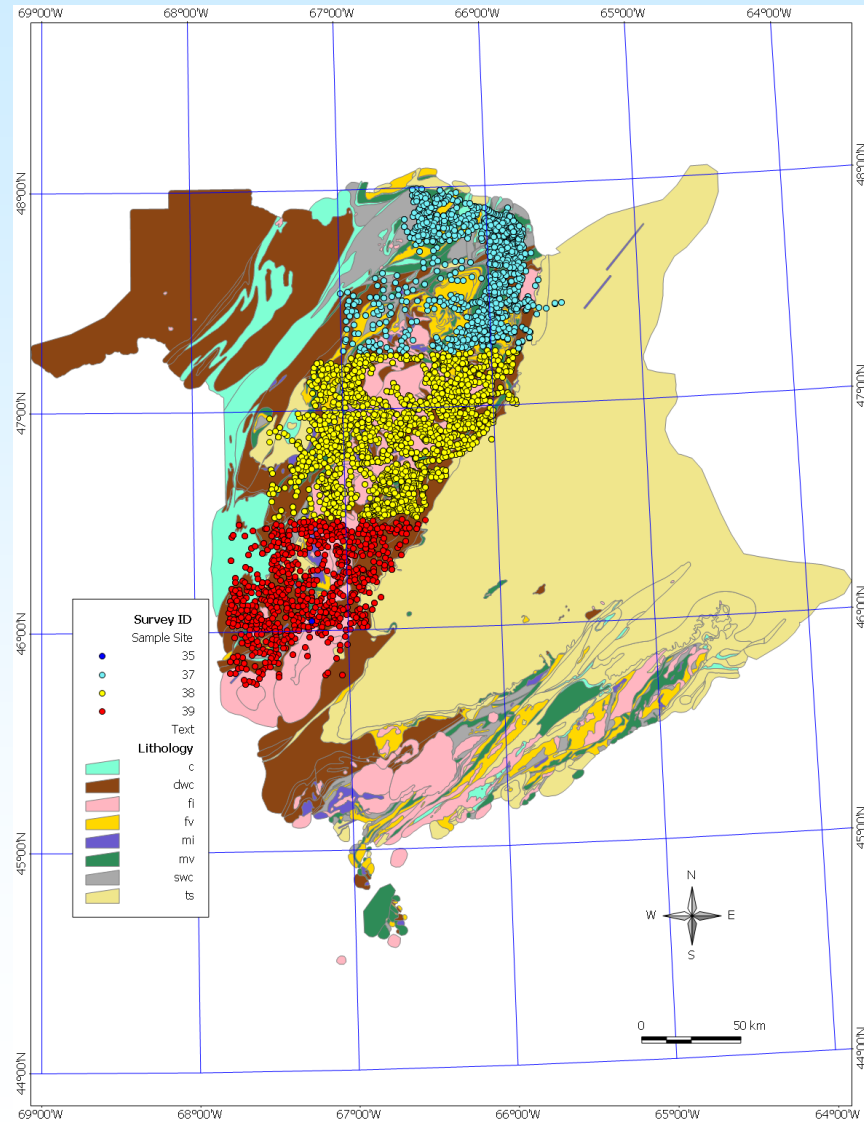


# Till Surveys in New Brunswick



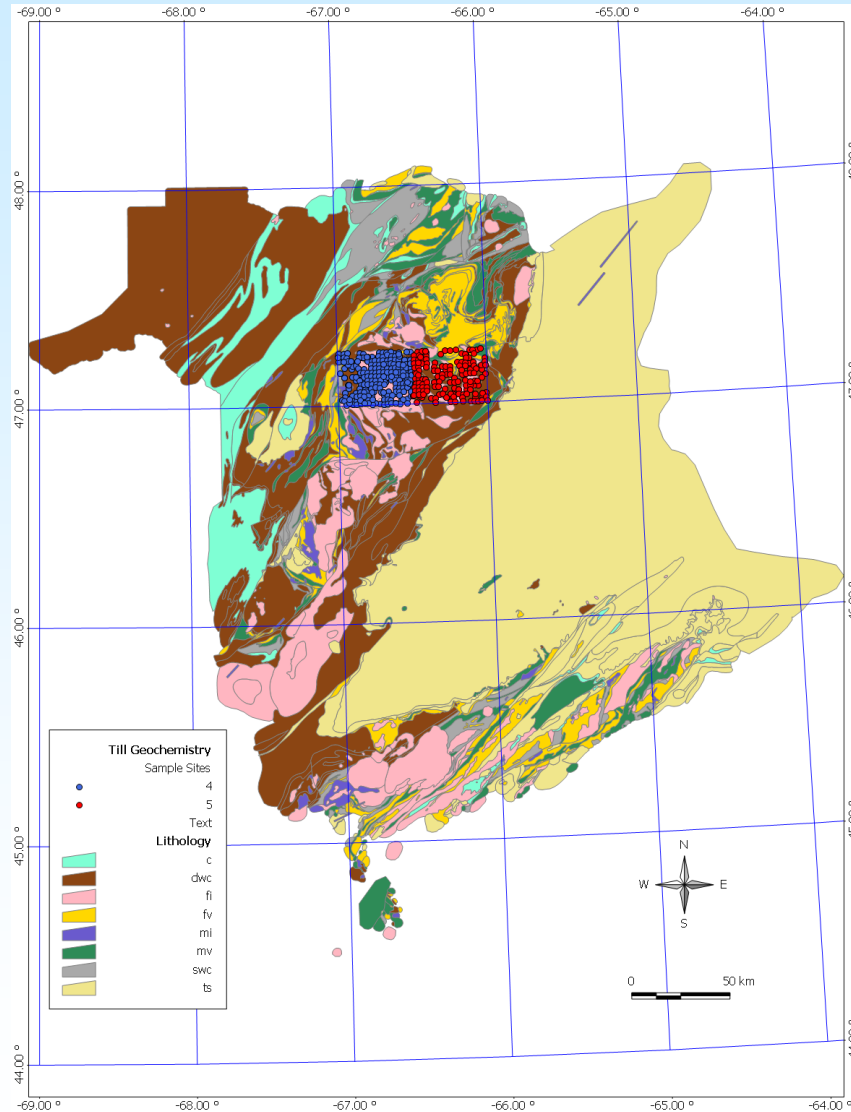


# Till Surveys by GSCO



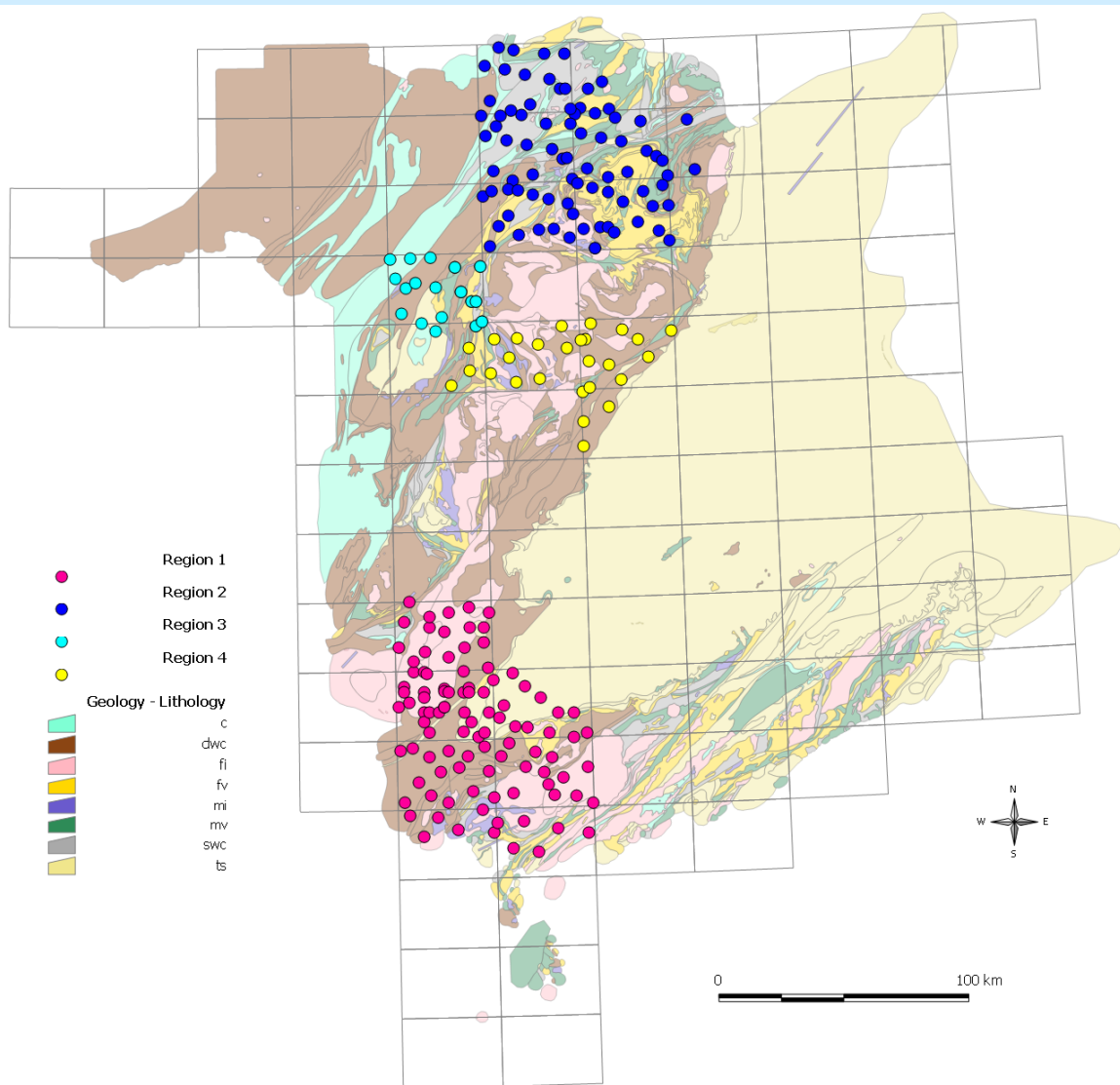


# Till Surveys by GSCQ





# Control – Re-analysis – 4 Regions

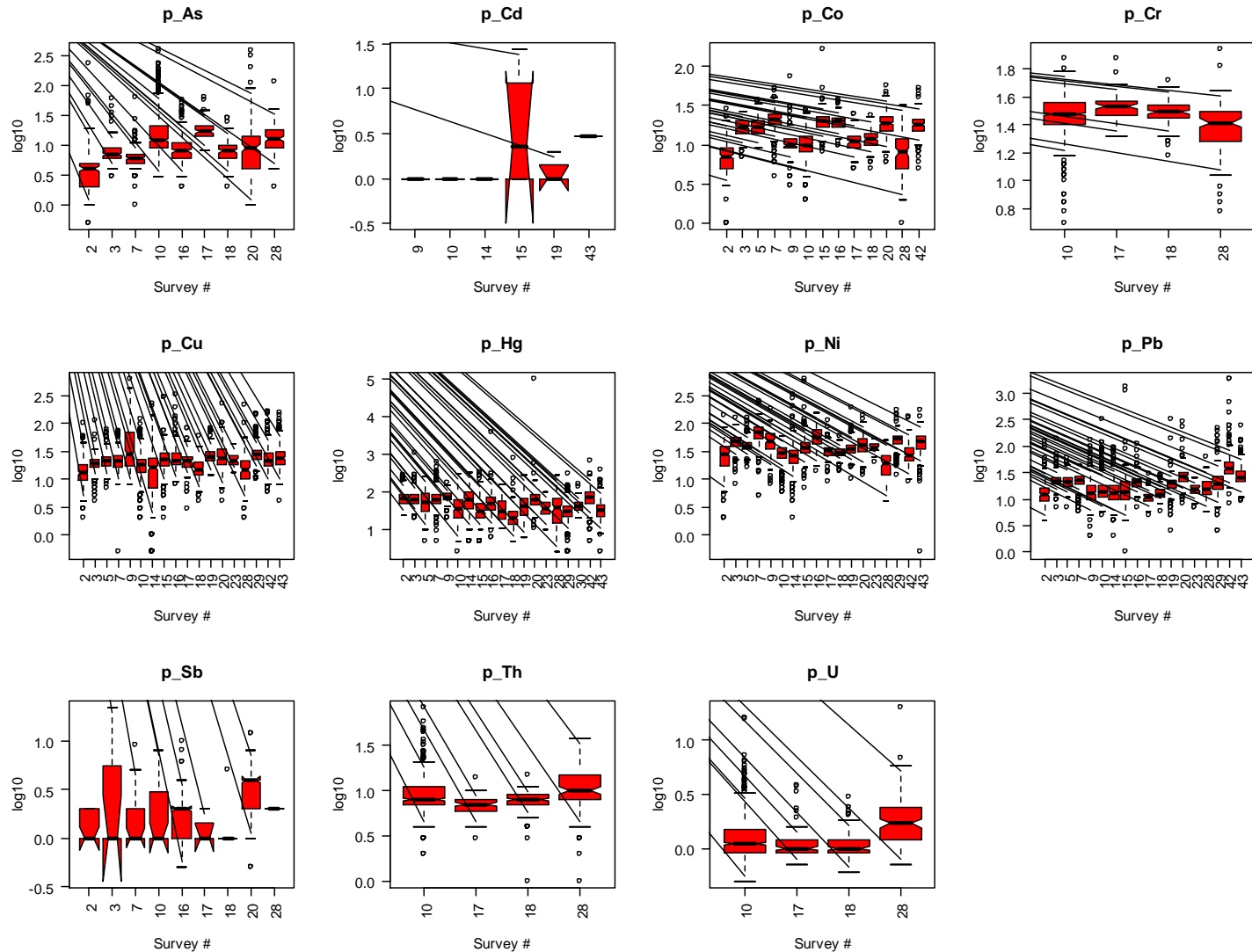






# Variability by Survey

NB Till Surveys <63µm



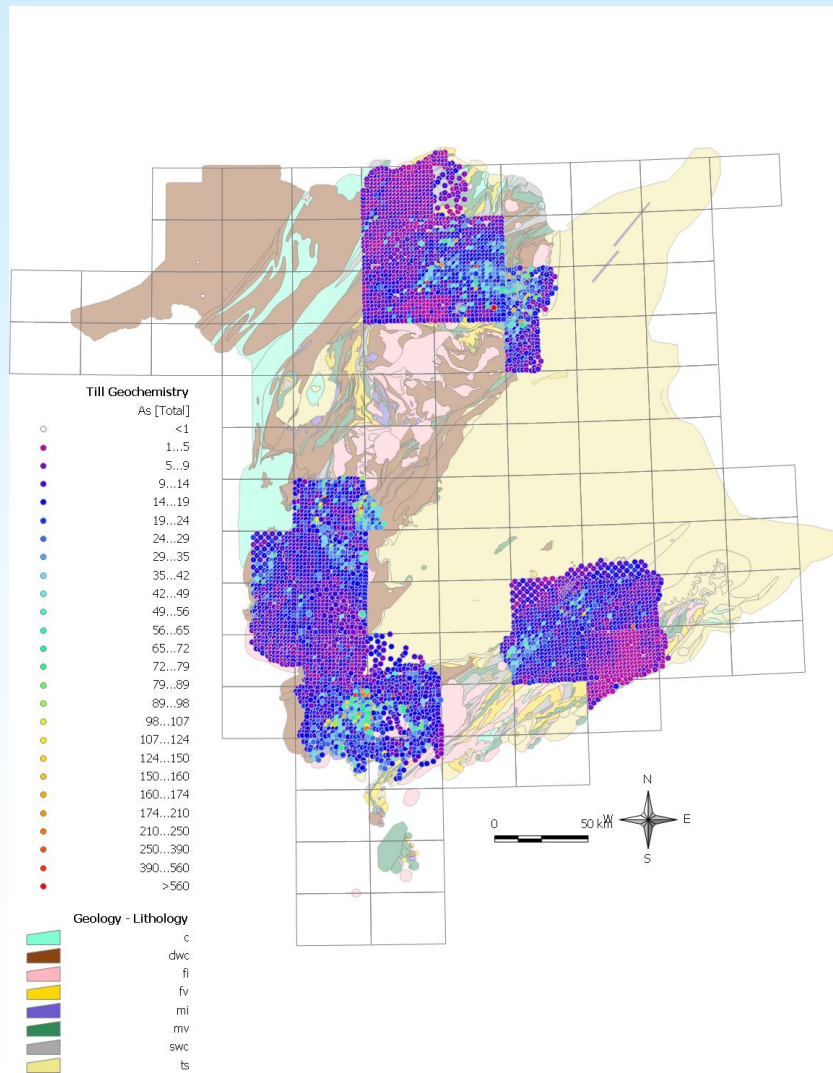
Natural Resources  
Canada

Ressources naturelles  
Canada

Canada



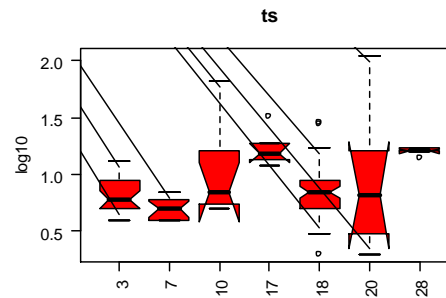
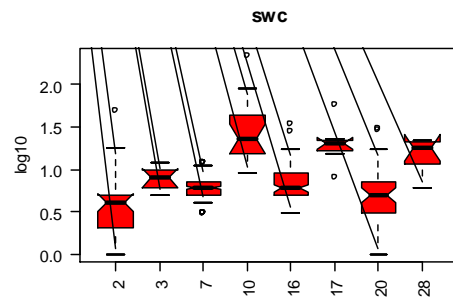
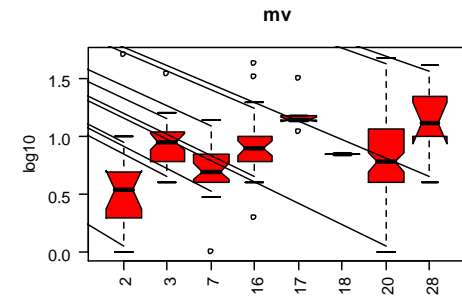
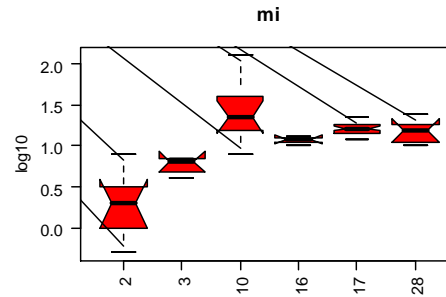
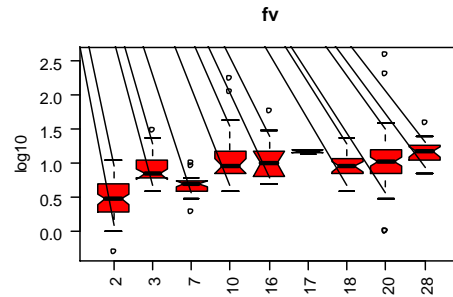
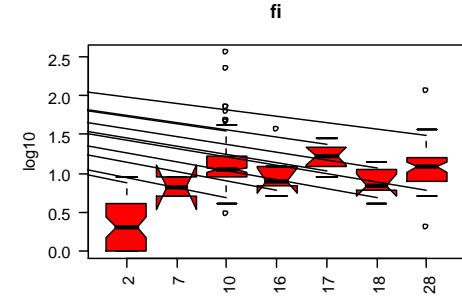
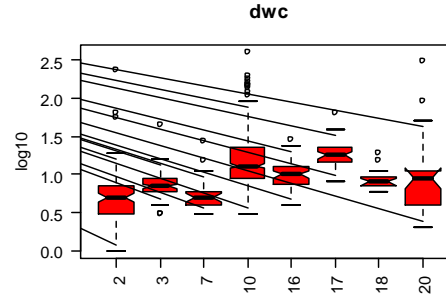
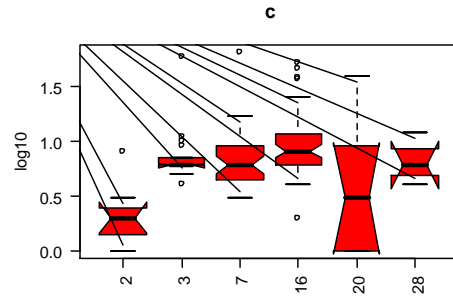
# Arsenic – Total – Survey Differences





# Variability by Lithology

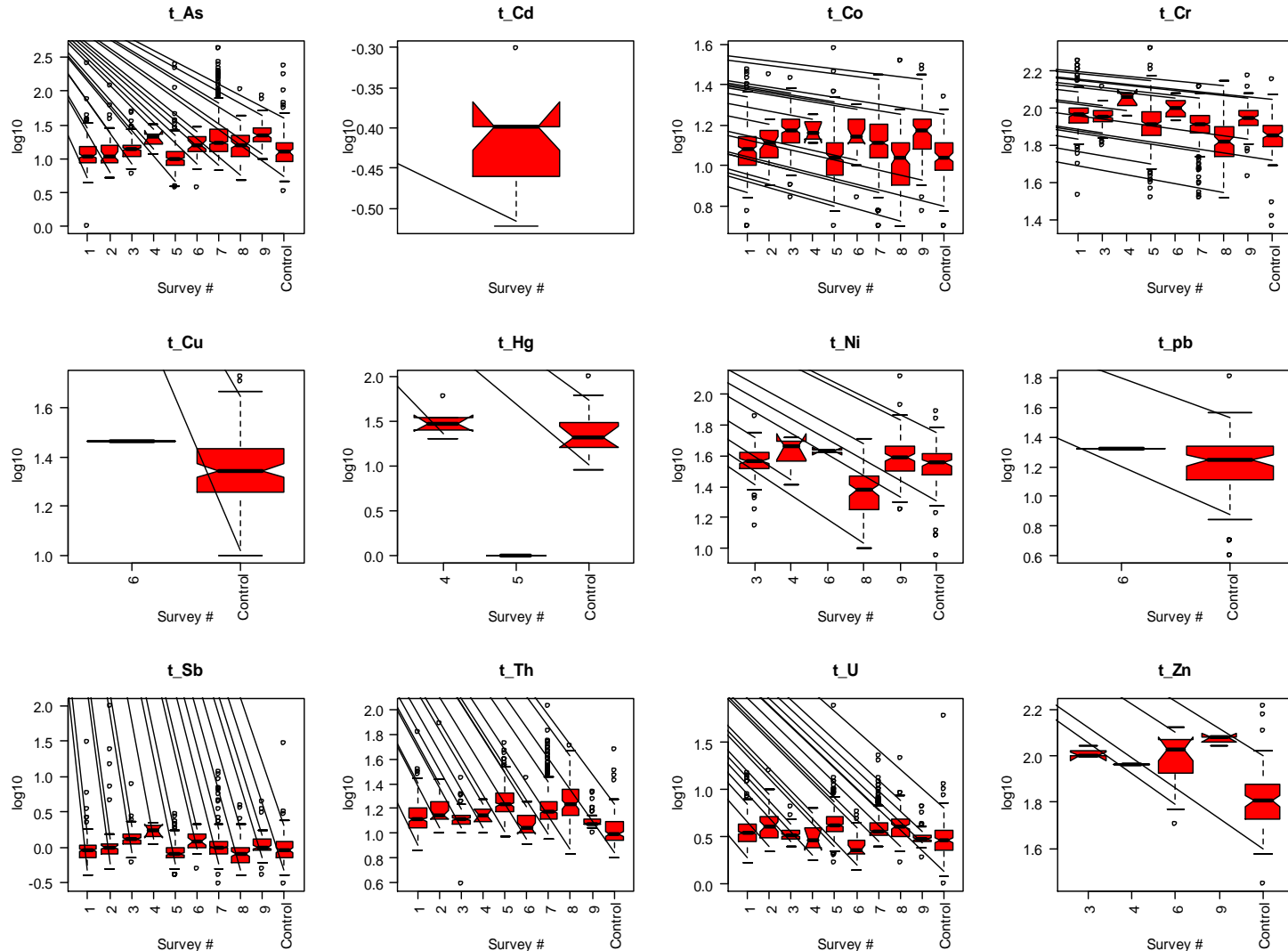
p\_As NB Till Surveys <63µm





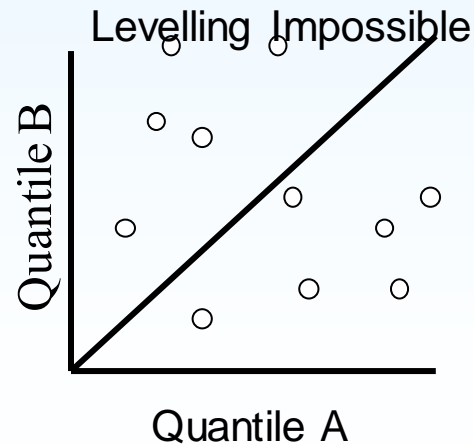
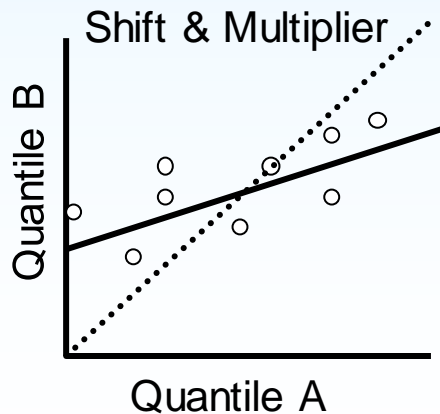
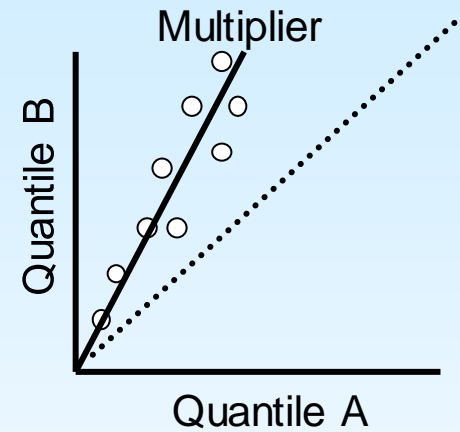
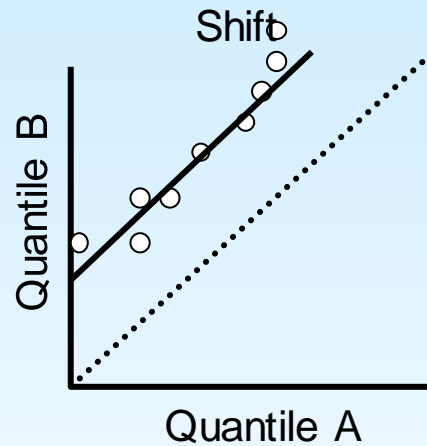
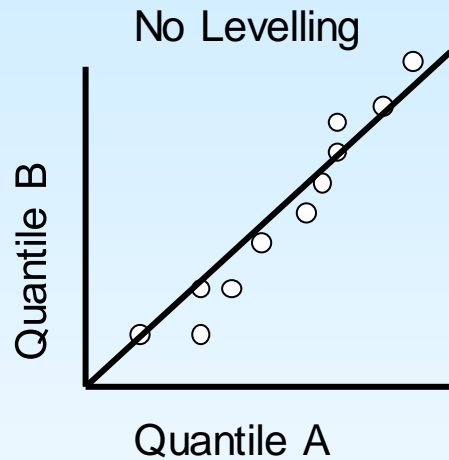
# Variability: Surveys vs. Control

Region 1 - Till Surveys <63µm





# Parametric Levelling Scenarios



From Garrett



Natural Resources  
Canada

Ressources naturelles  
Canada

Canada



# Levelling by Survey

- Using re-analyzed samples (Control), samples are grouped by survey identifier and compared to the re-analyzed samples.
- A statistical basis is used to determine if the survey samples require levelling.
- Difficulties arise because of different methods and detection limits.
- Only works for “total” analyses.





# Using Re-analyzed Samples

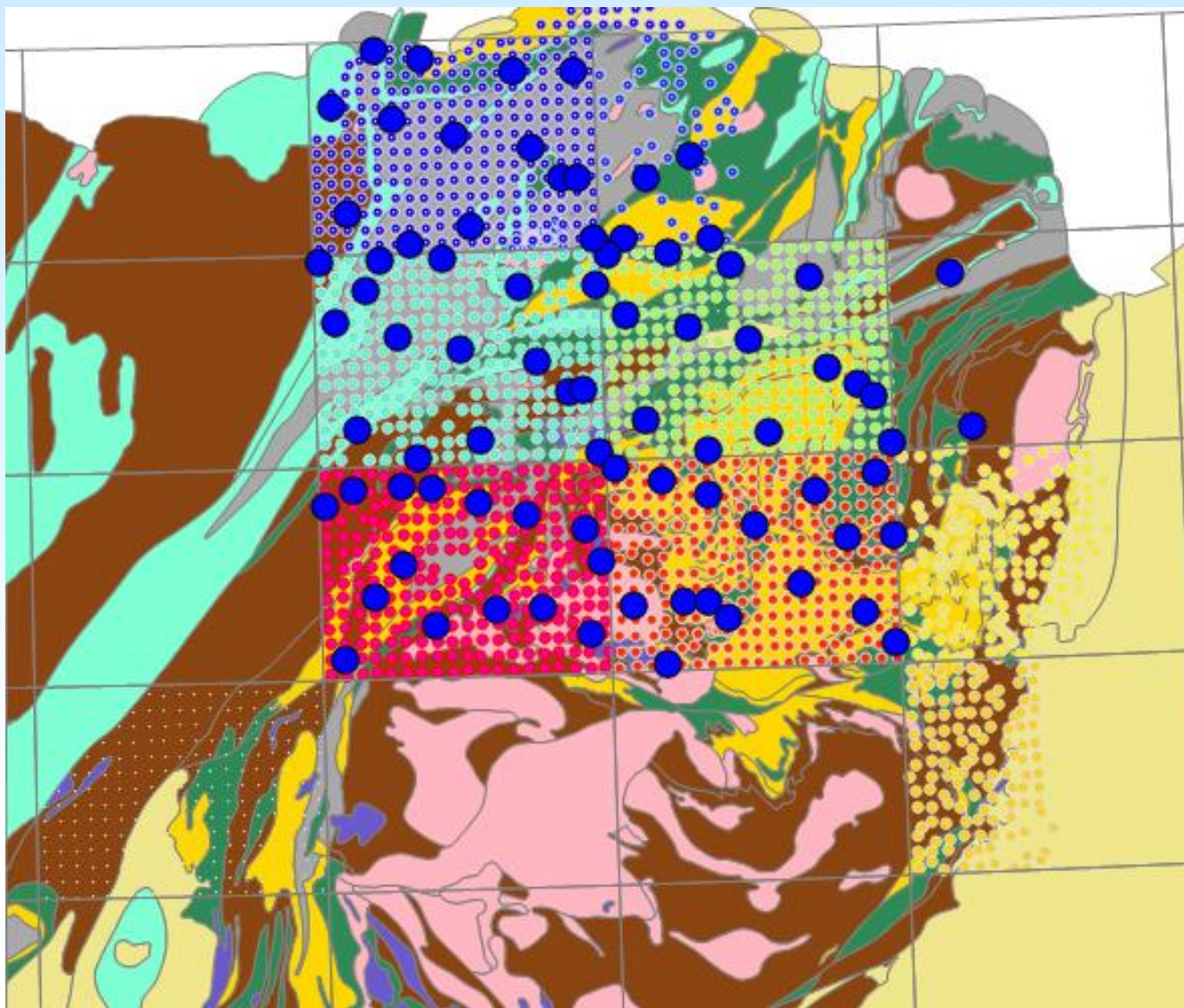
- Re-analyzed samples are sparse across individual mapsheets (surveys).
- Fewer than 20 analyses per map sheet.
- Re-analyzed samples subdivided into 4 regions representing grouped samples in similar domains.
- Provides a better statistical basis for levelling.







# Survey 2 Levelling



Natural Resources  
Canada

Ressources naturelles  
Canada

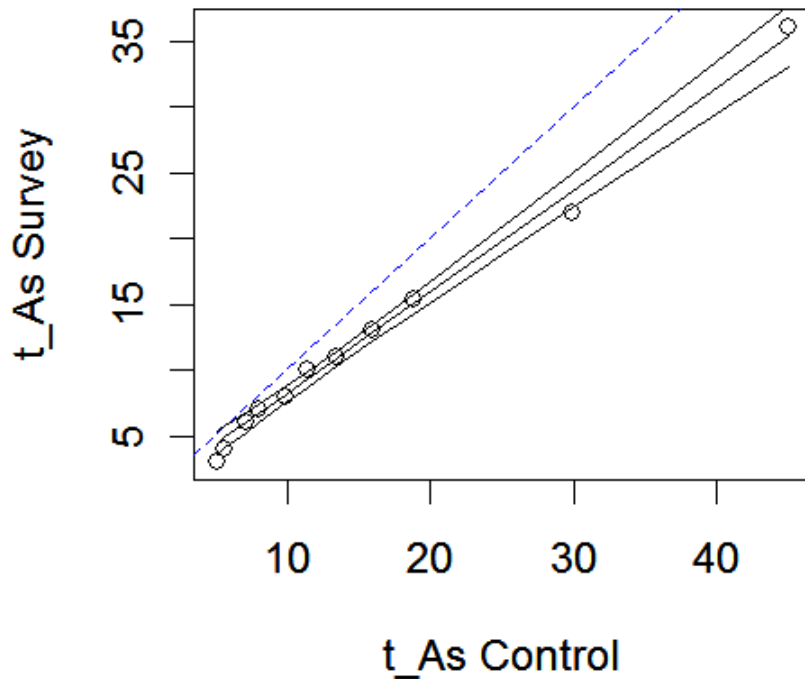
Canada



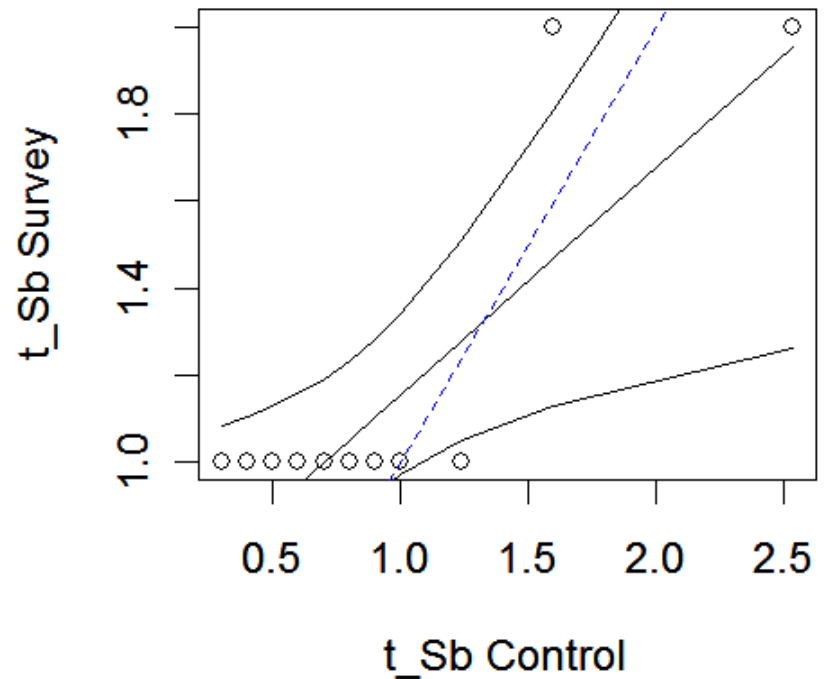


# Survey 2 Levelling As, Sb

**t\_As K-S Test D= 0.16**



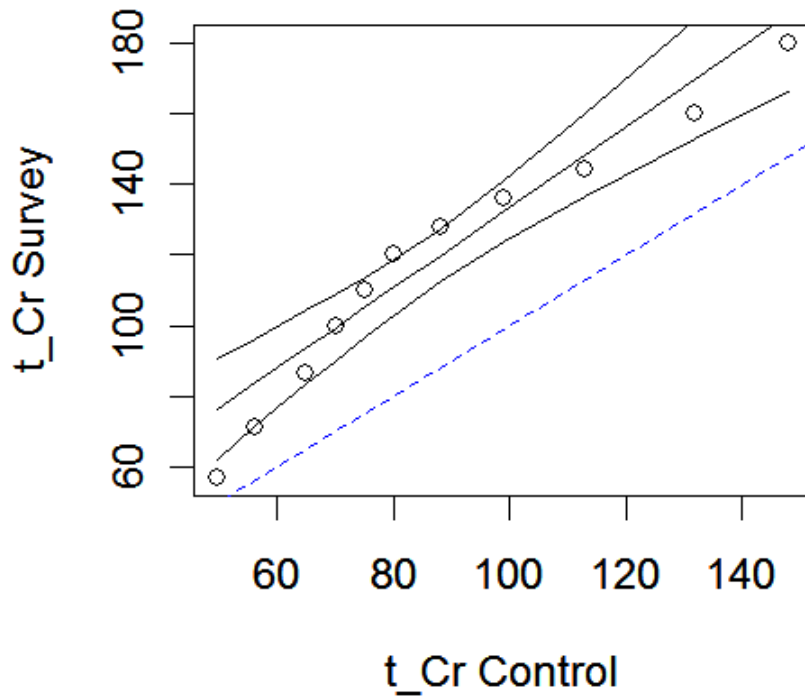
**t\_Sb K-S Test D= 0.77**



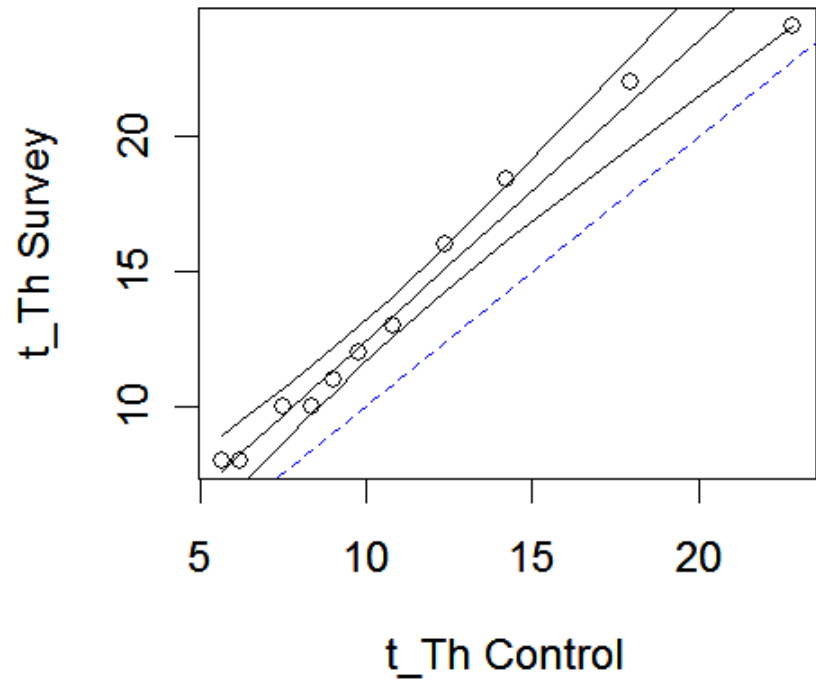


# Survey 2 Levelling Cr, Th

**t\_Cr K-S Test D= 0.42**

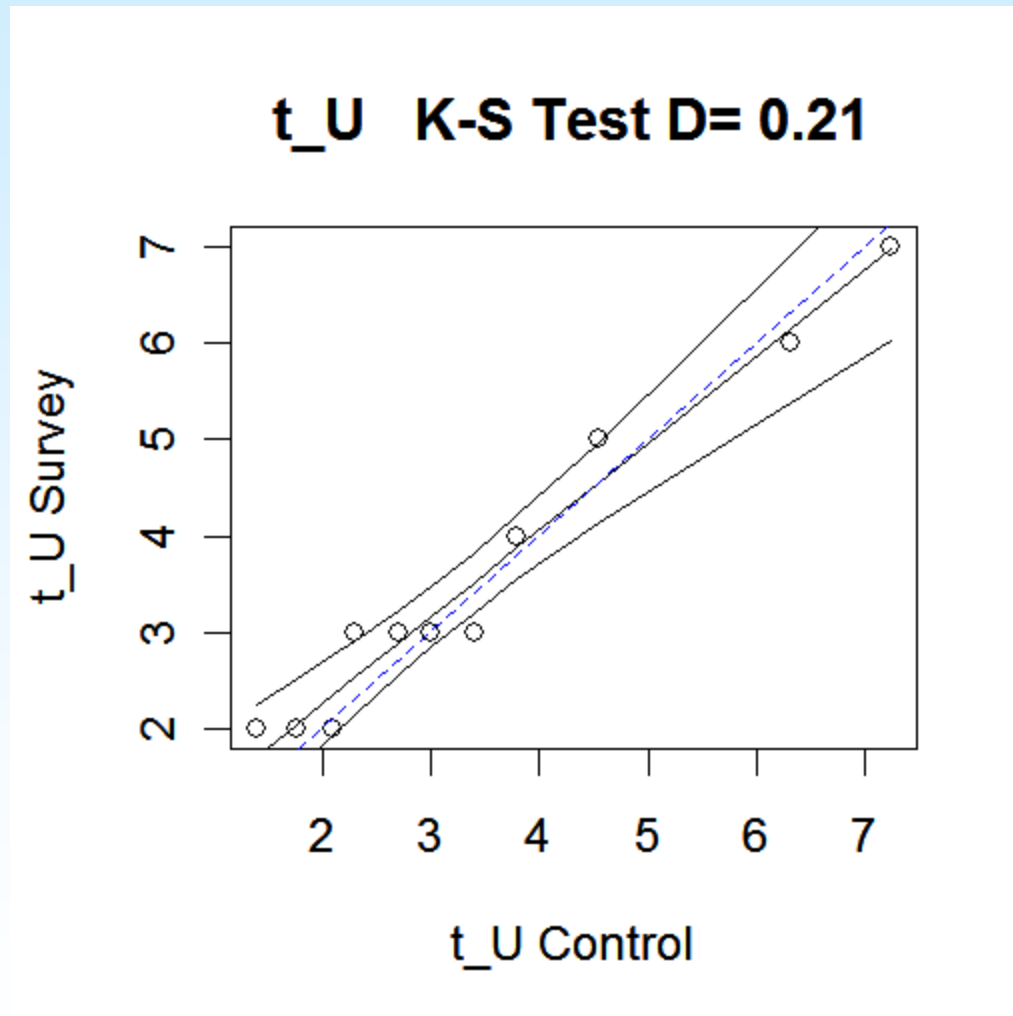


**t\_Th K-S Test D= 0.33**





# Survey 2 Levelling U





# Levelling Issues

- No samples have been analyzed using partial digestion methods.
- Re-analyzed control samples are being investigated for use in levelling partial extraction analyses.
- Using work of Allard (NB Survey) previously levelled data can be used as an “offset” to the re-analyzed control samples.





# Summary

- Levelling geochemical data is necessary to establish background variability.
- Levelling requires the use of “assured” values by which all other measures can be adjusted.
- Establishment of levelling protocols will result in a consistent approach to determining background variability.

