

Performance Comparison of Portable XRF Instruments: A Mineral Exploration Prospective

Presented by
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26th IAGS: Rotorua, NZ
Session 8A: Sampling & Real Time Analysis
19th November 2013



Both images are of Ni derived from the SAME samples



**Conventional
Aqua Regia**

pXRF

A

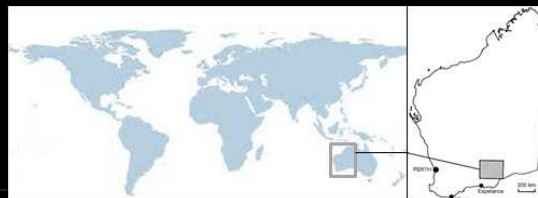
B

10km

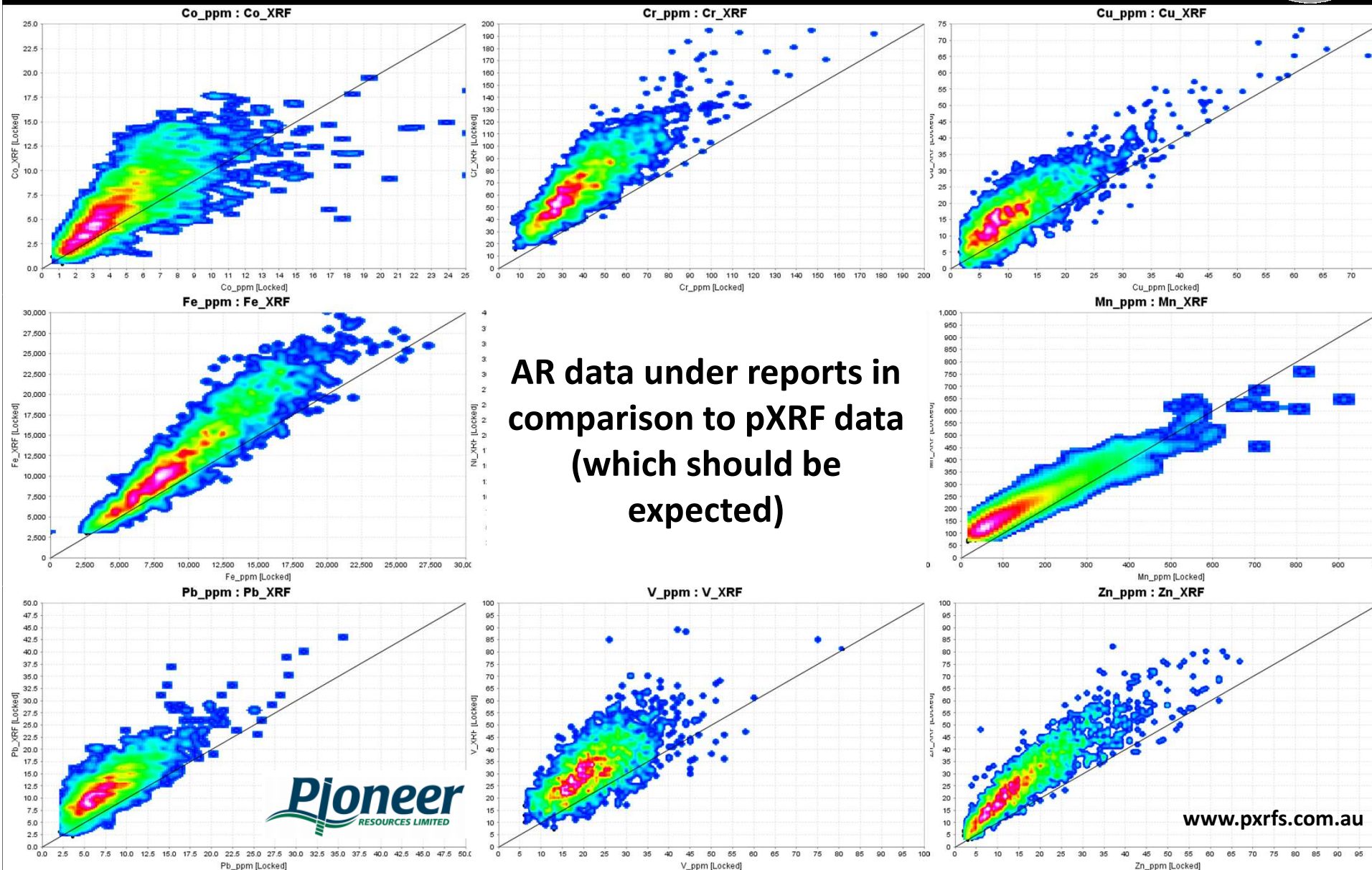
Which is the pXRF image?



n = 2240



Aqua Regia (x) vs pXRF (y) data




Talk Outline

- **Performance Comparison - pXRFs**
 - Mining Mode
 - Soil Mode
- **Certified Reference Materials**
- **Influence of batteries on hand held units**
- **Deterioration of instruments performance**
- **Beam times (accuracy and precision)**
- **Geochemical Mapping**
- **Conclusions**



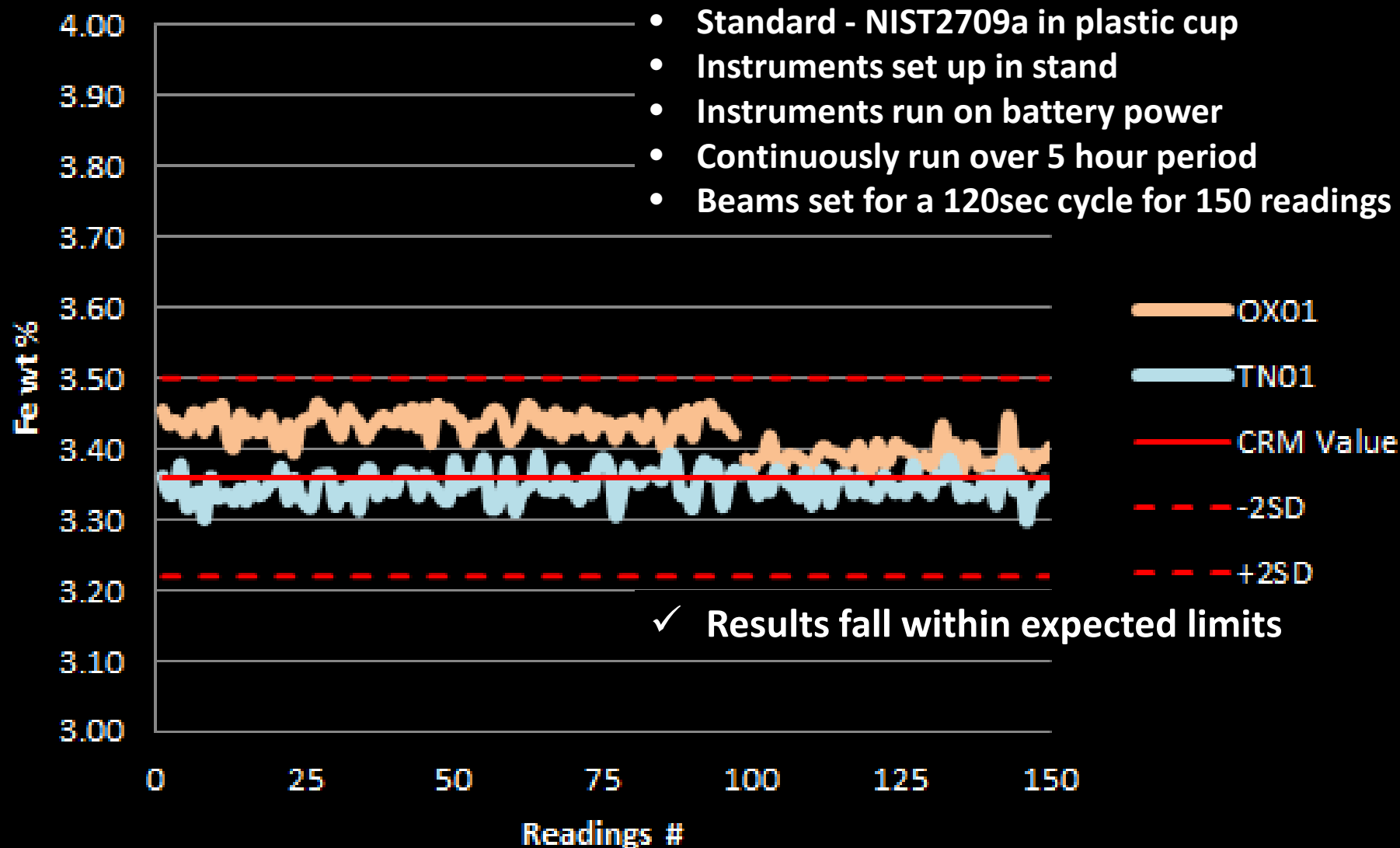
Baseline Response Two manufactures



Manufacturers	Olympus Innov-X	Thermo-Niton
pXRF Instrument	Delta Premium	XL3t 950s GOLDD+
Anode		
Tube Voltage (kV _{max})		
Tube Power (μA _{max})		
Resolution (eV)		
Detector area		
Electronics		
Power Source Used		
Element Range	Mg (Z12) and greater	
Application Modes	Mining and Soil Modes	
Cycle Time	120 seconds in Mining 180 seconds Soil Mode	
Windows	Propylene3	

Baseline Response (Mining Mode)

NIST2709a



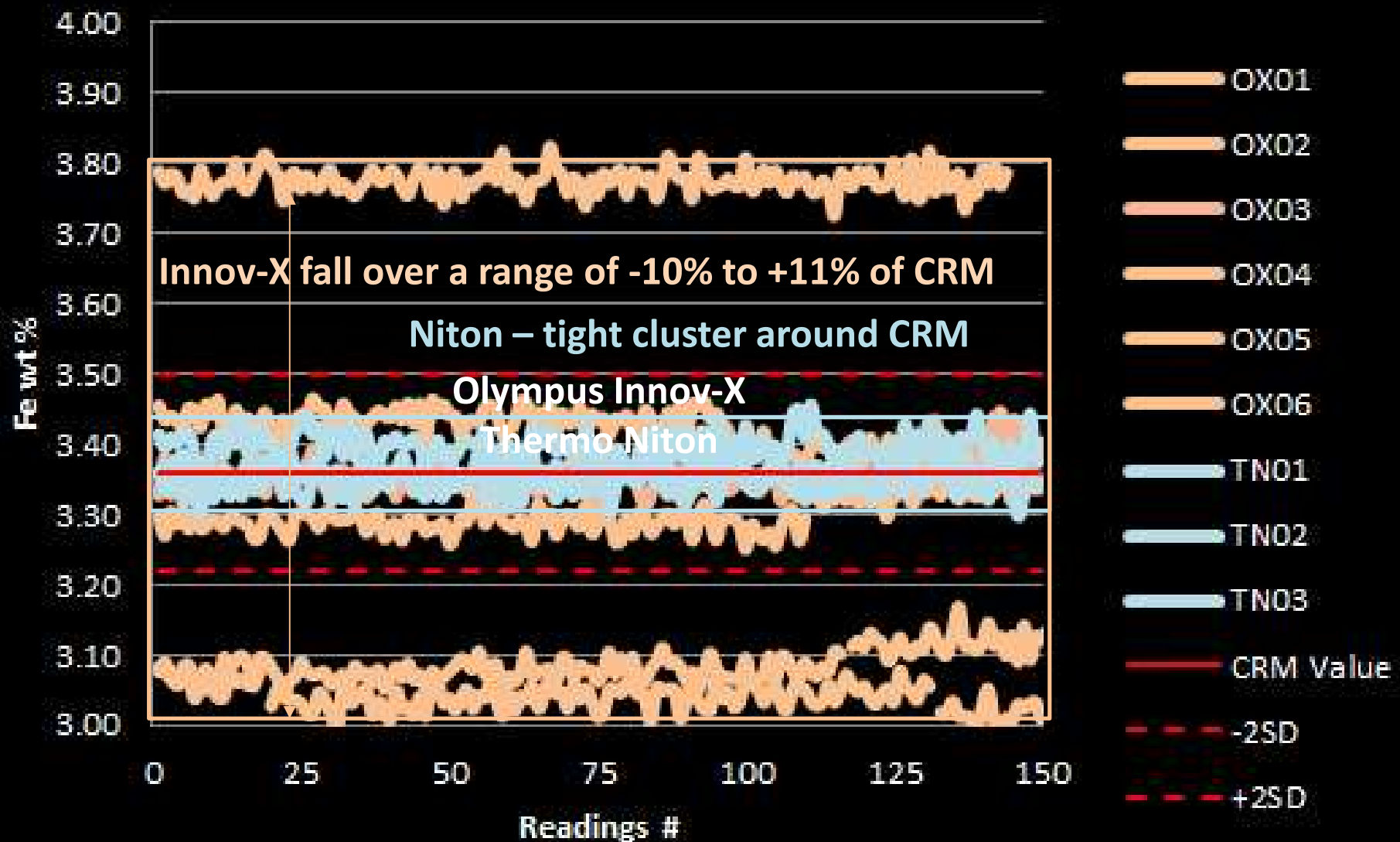
What happens when more instruments are tested?



Baseline Response (Mining Mode)



NIST2709a



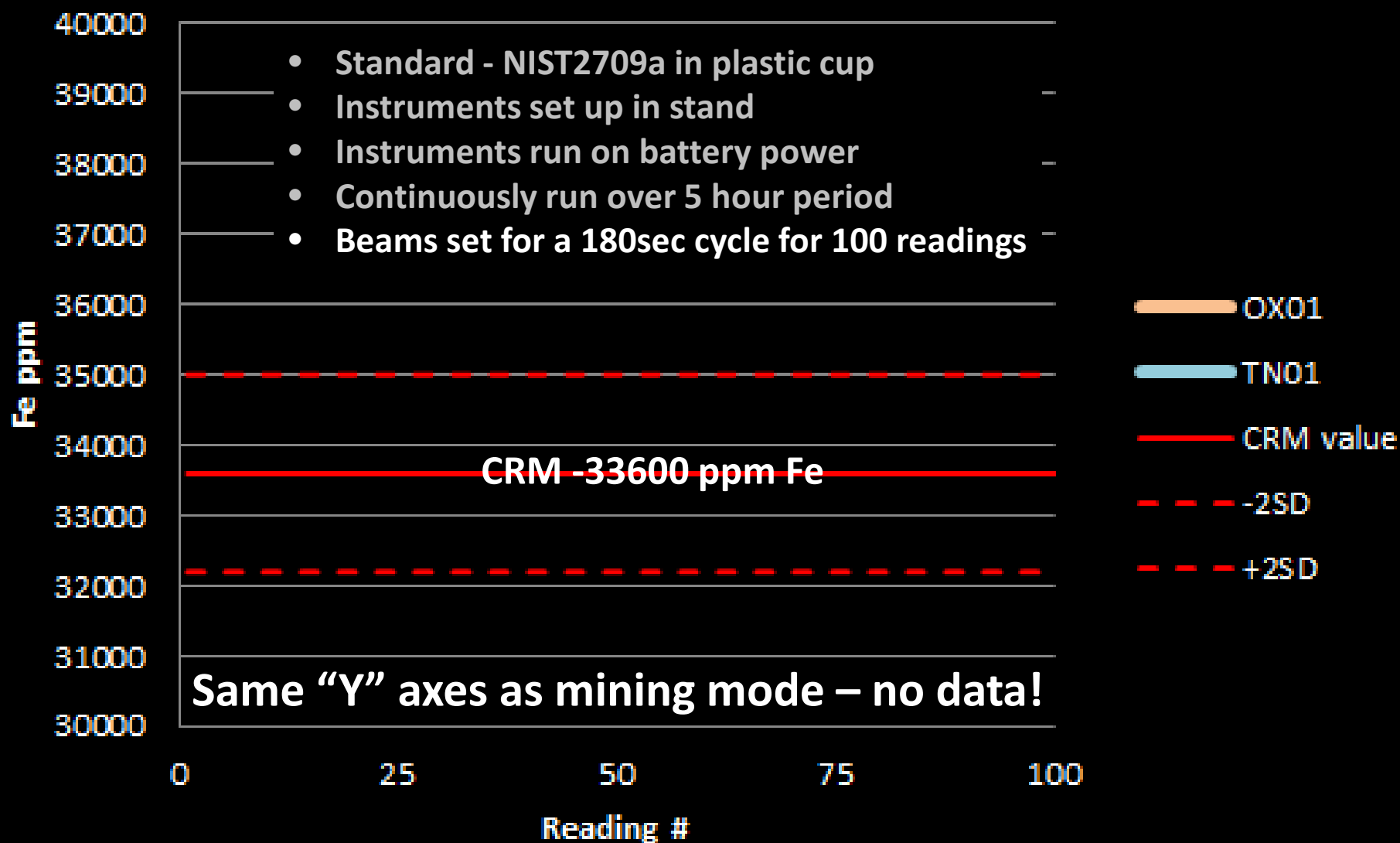


Baseline Response SOIL MODE



Baseline Response (Soil Mode)

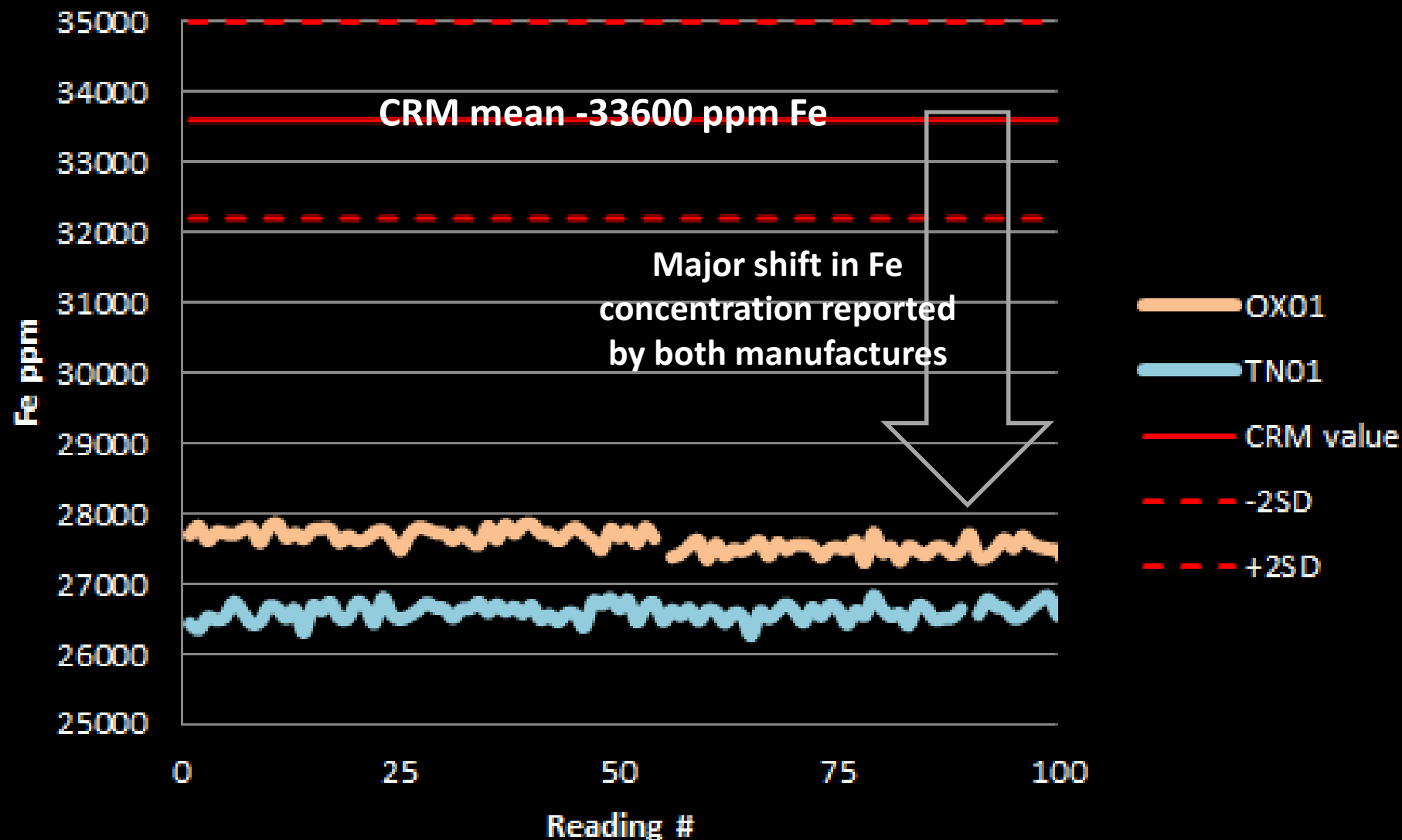
NIST2709a





Baseline Response (Soil Mode)

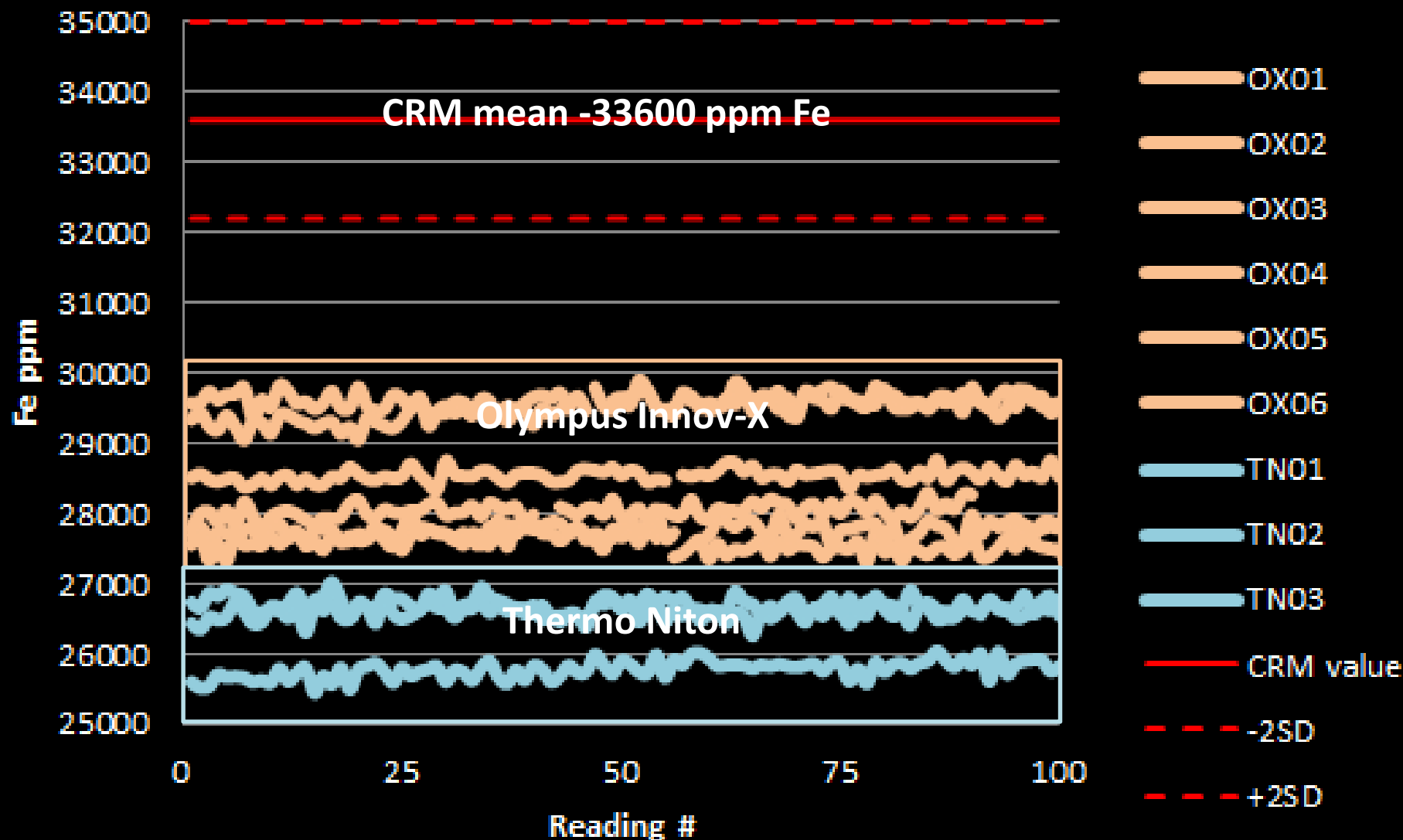
NIST2709a





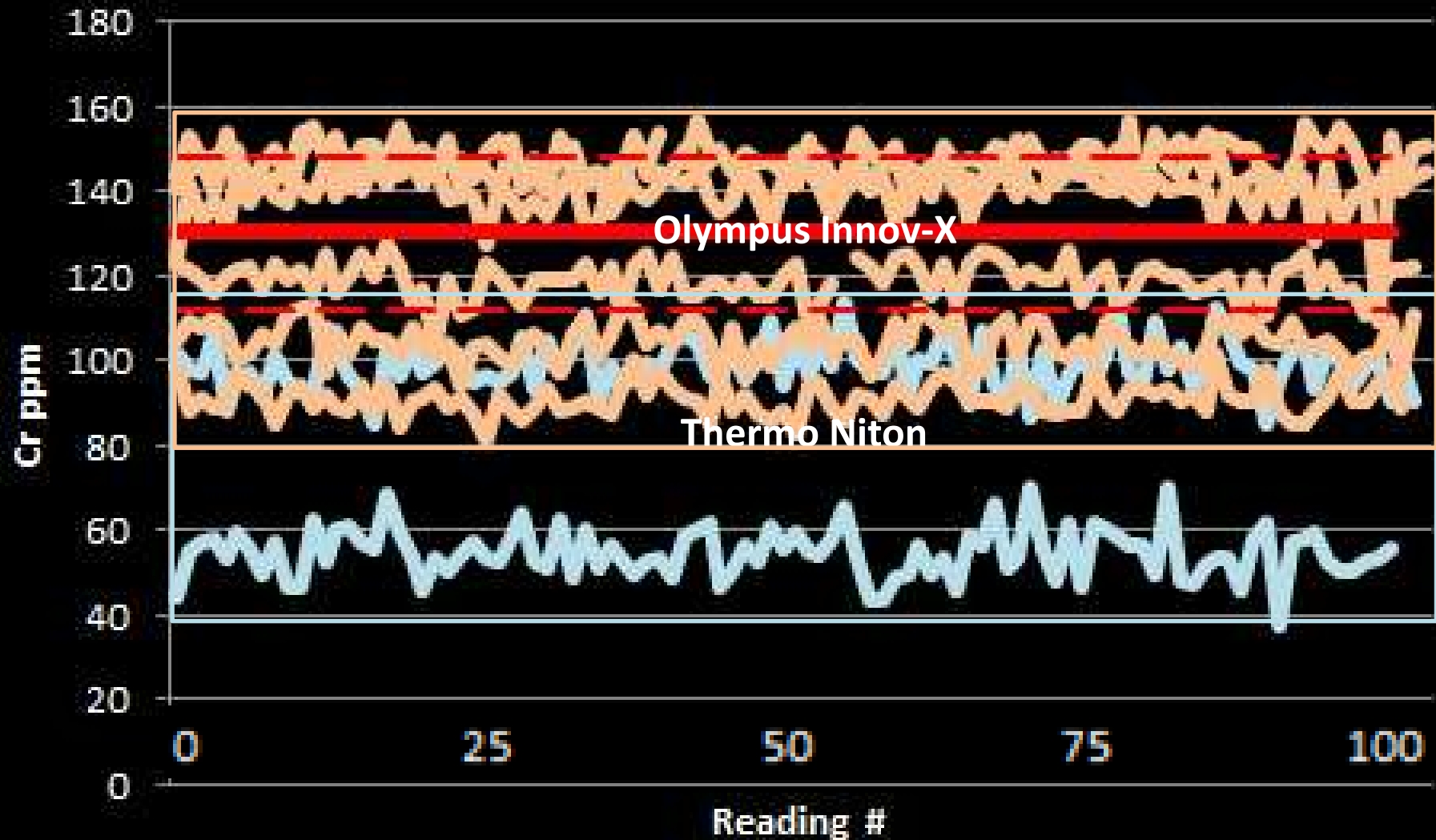
Baseline Response (Soil Mode)

NIST2709a



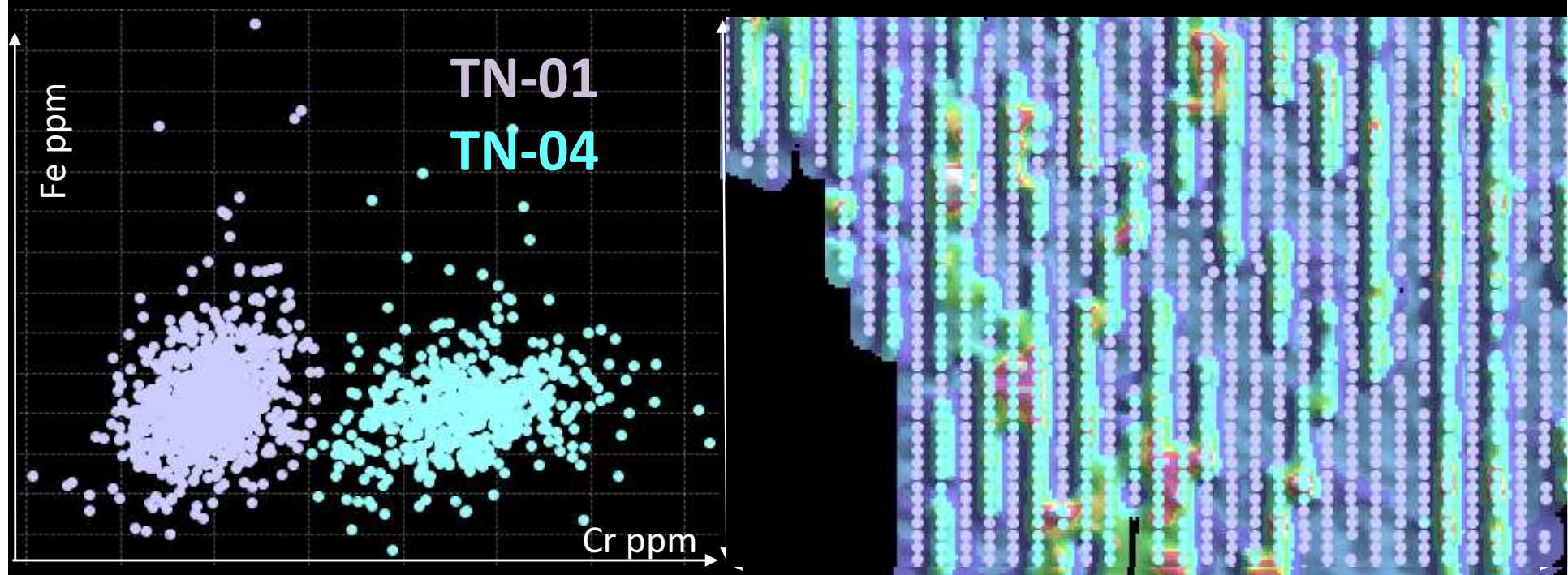
Baseline Response (Soil Mode)

NIST2709a



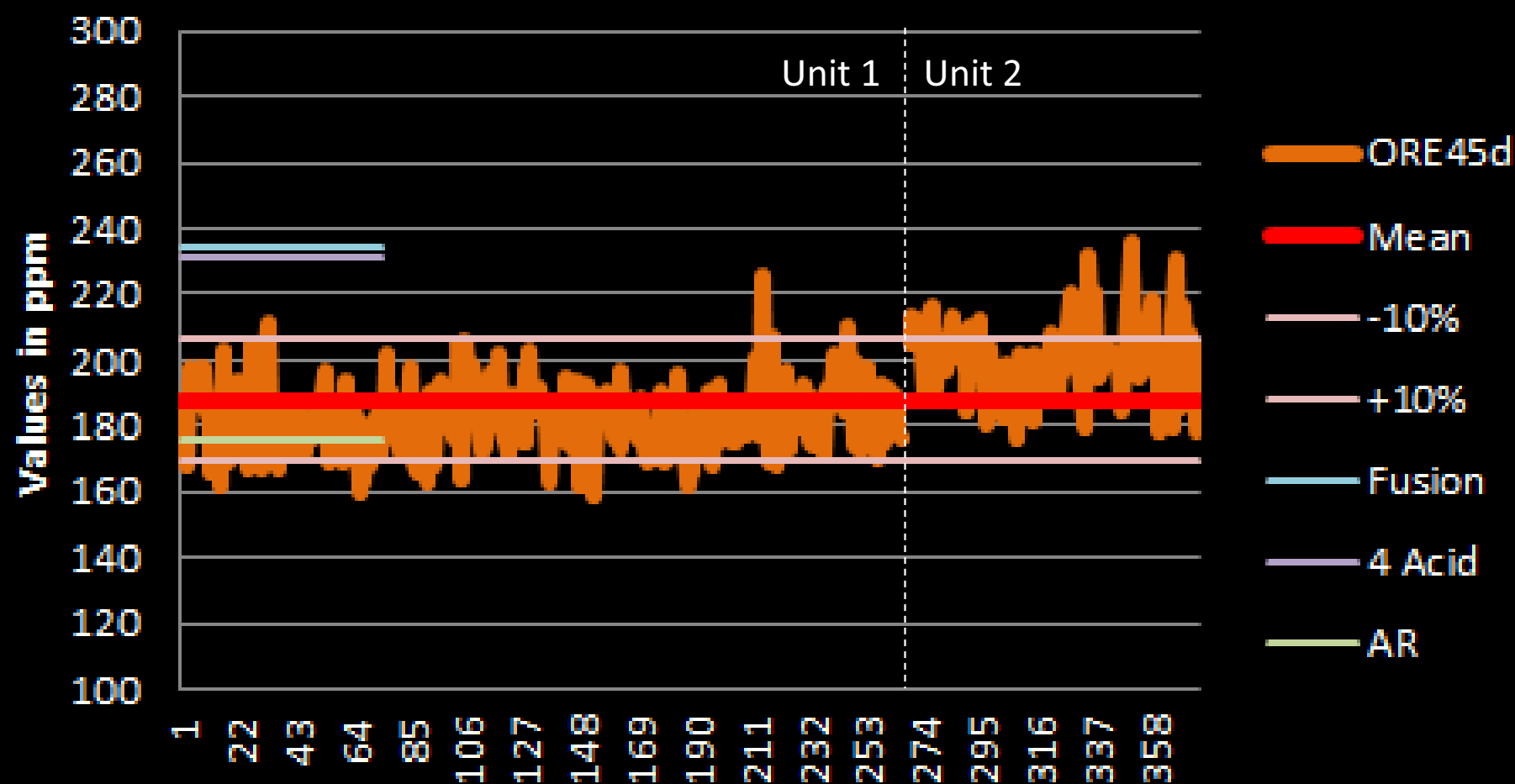
Mixing data from different Instruments

- Variation in instrument response has significant implications when mixed.



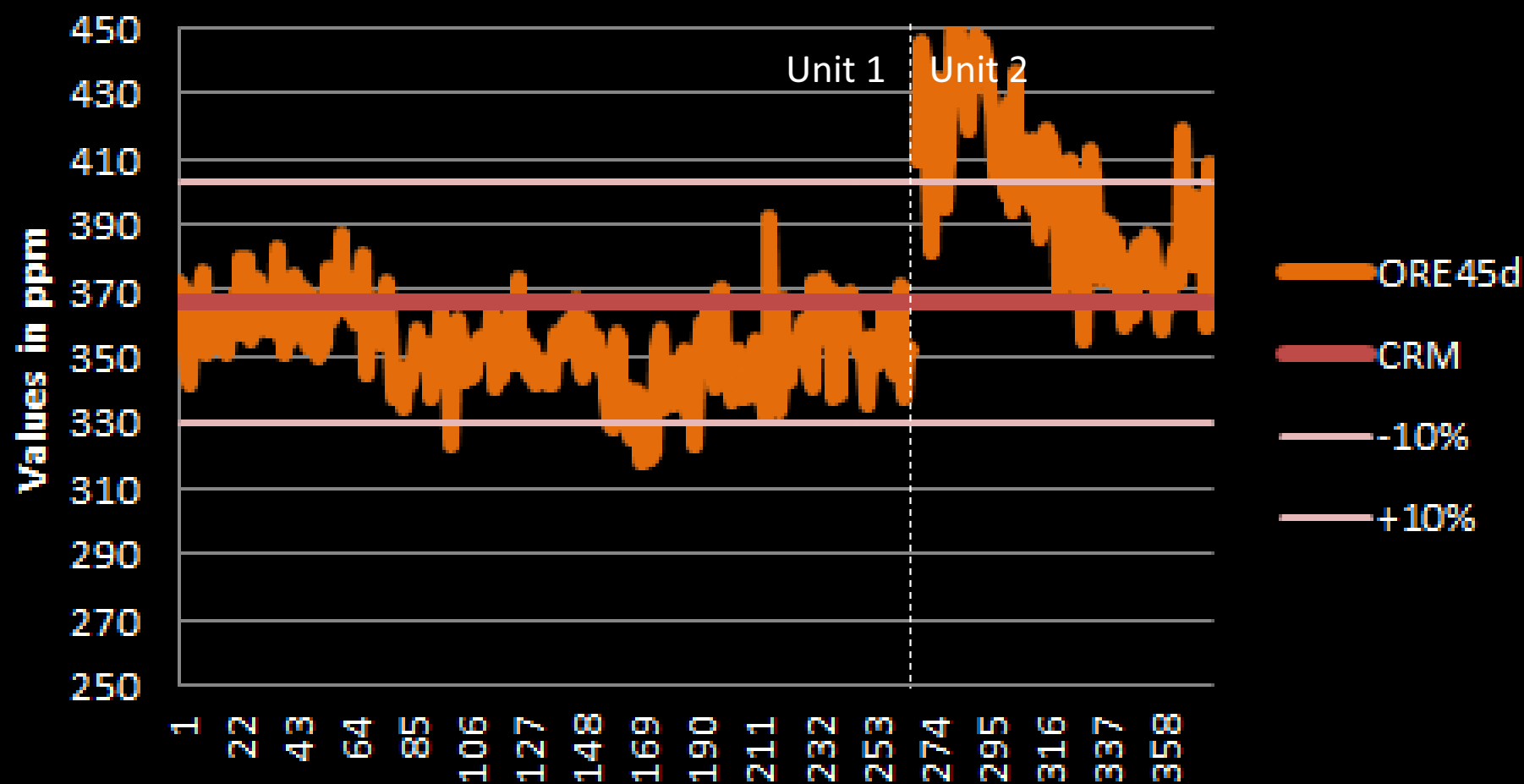


pXRF CRMs - OREAS 45d: Ni

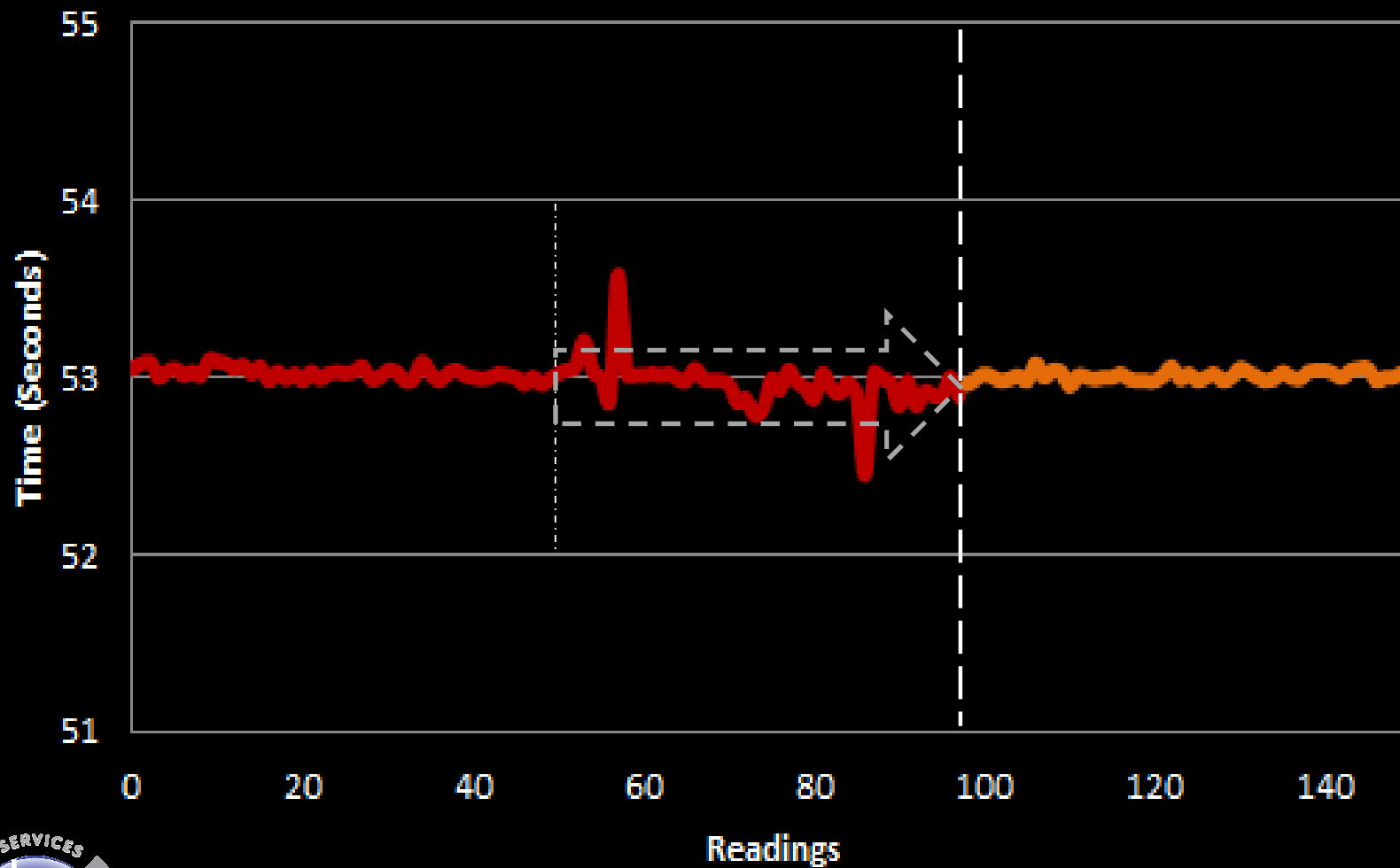




pXRF CRMs - Cr

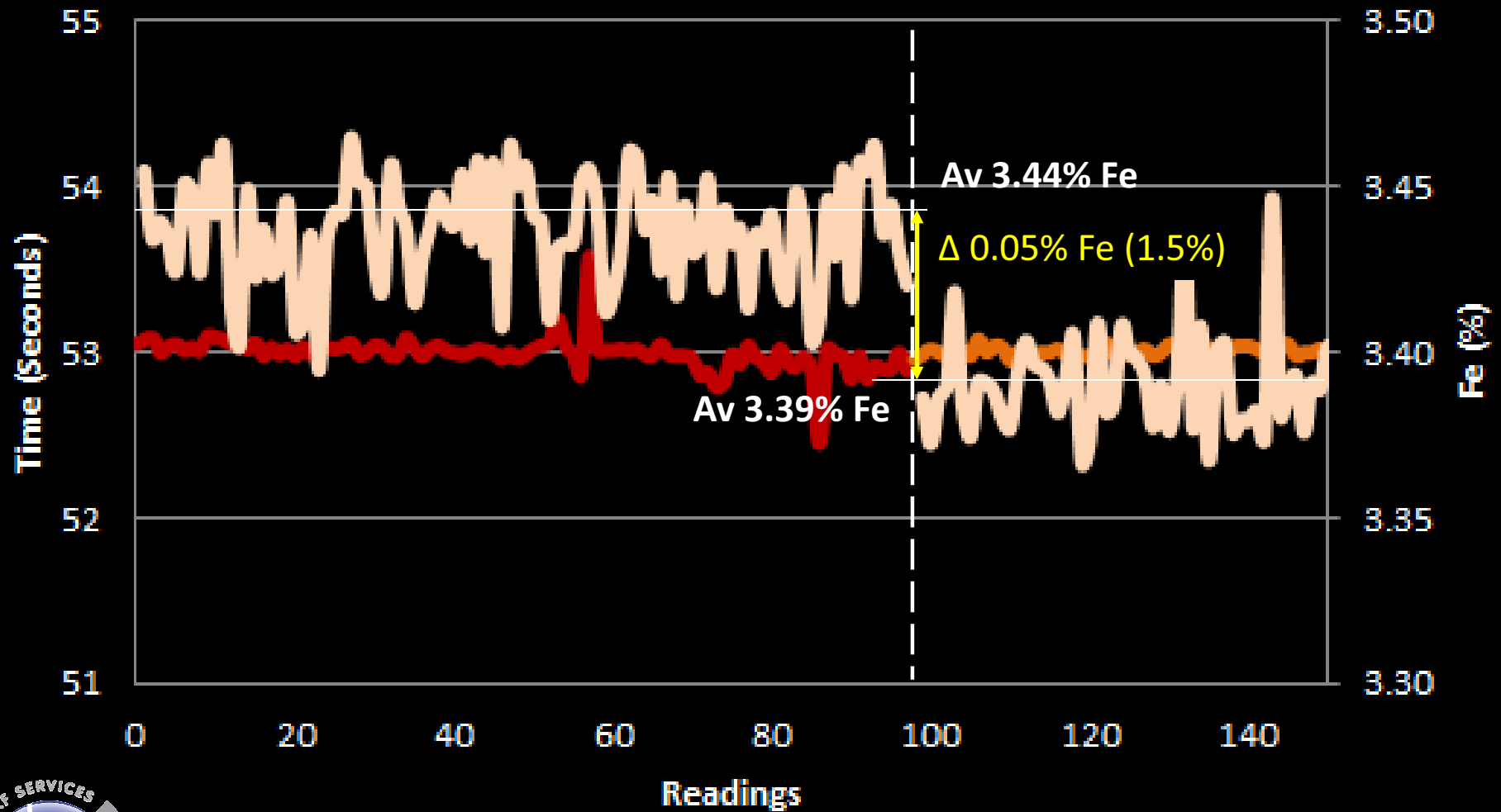


Influence of Batteries on Analysis (OI)

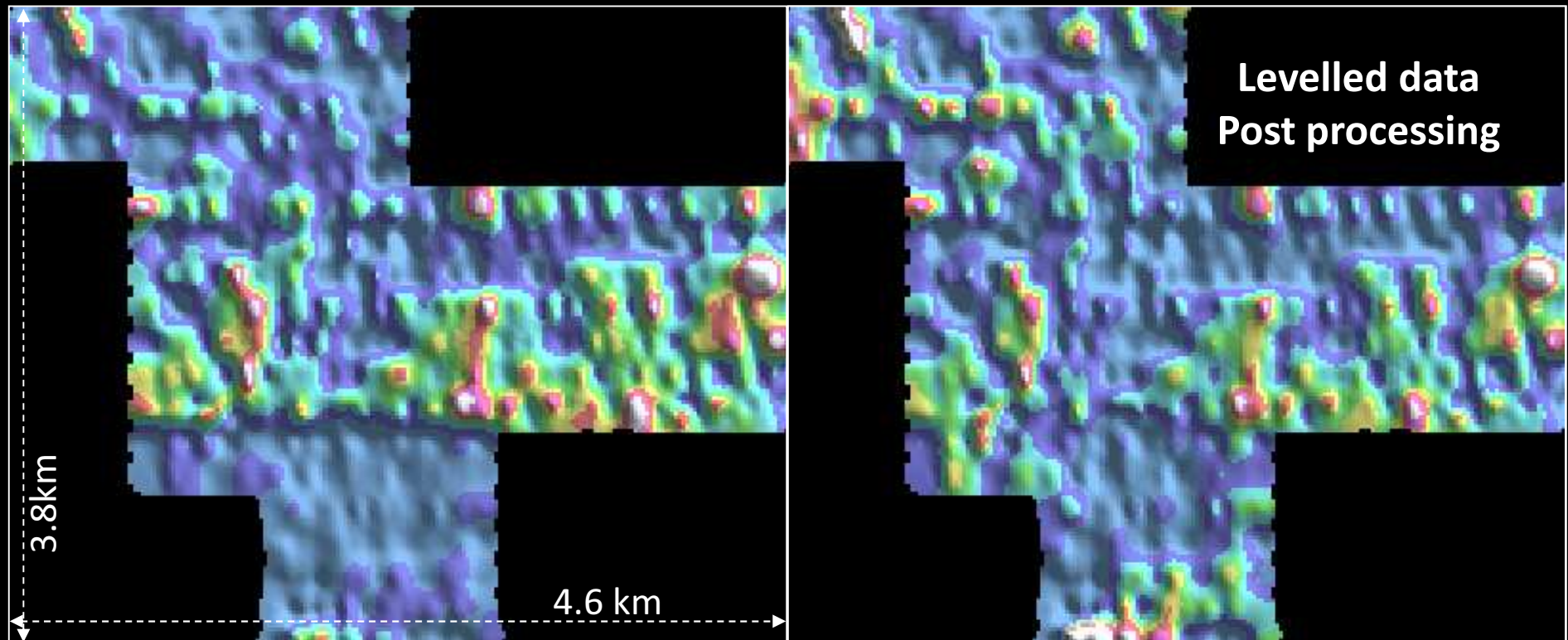


Battery #47552 Battery #47553

Influence of Batteries on Analysis (OI)

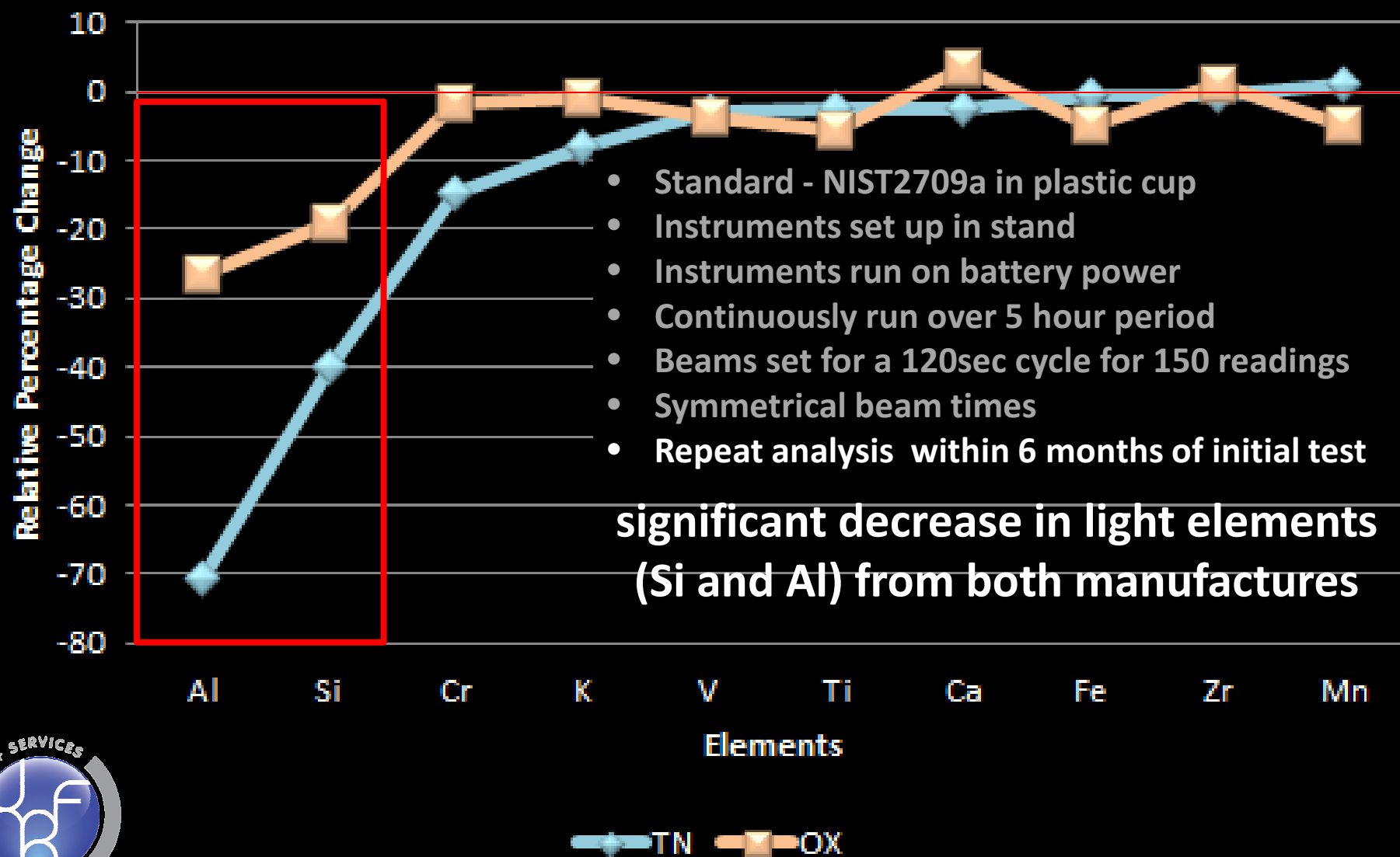


Influence of Battery's Cu in soils



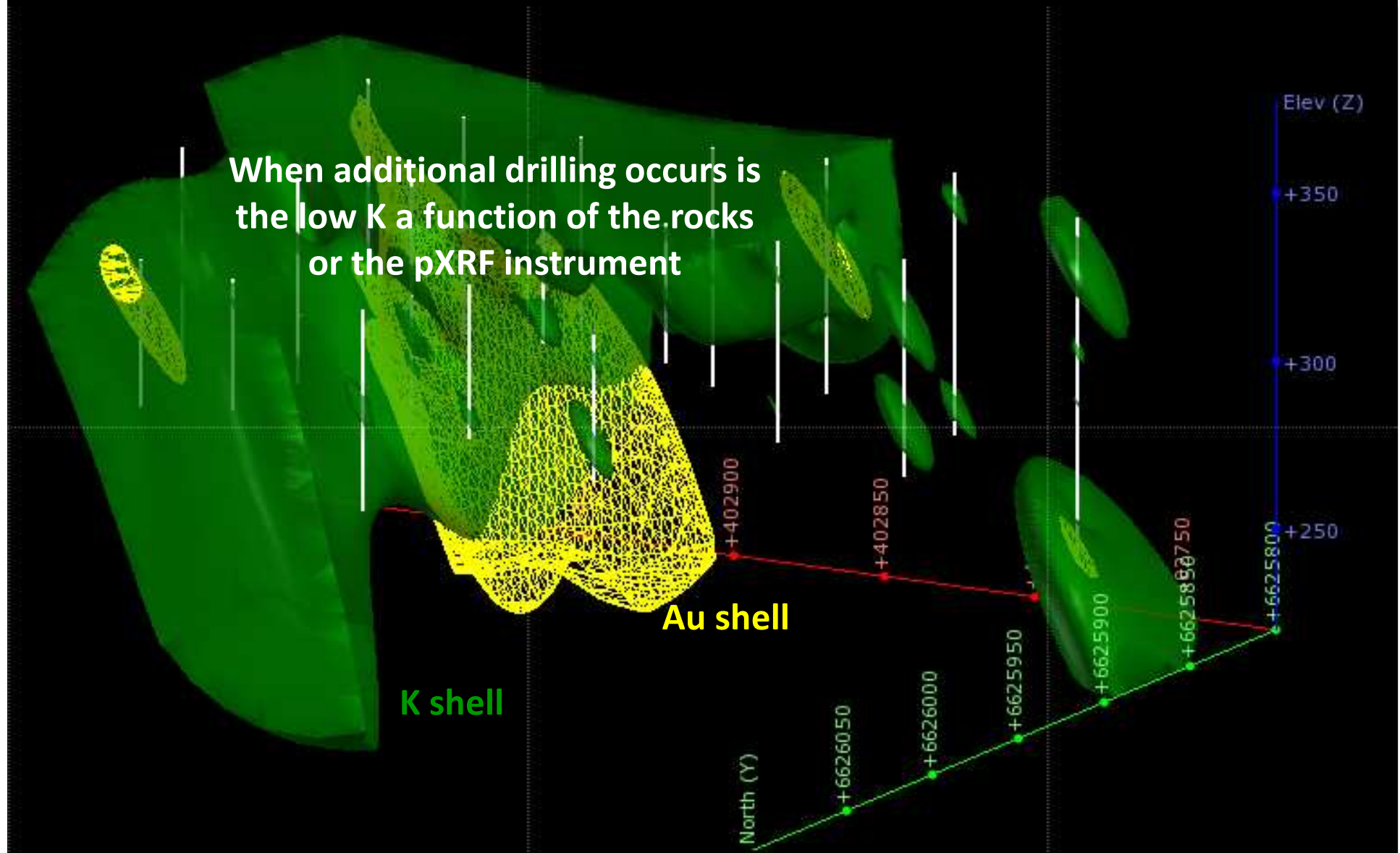
Medium - Soils
Grid = 200 x 40m
n = 1250

Repeat baseline response – Mining Mode



3D Model of Drill Data

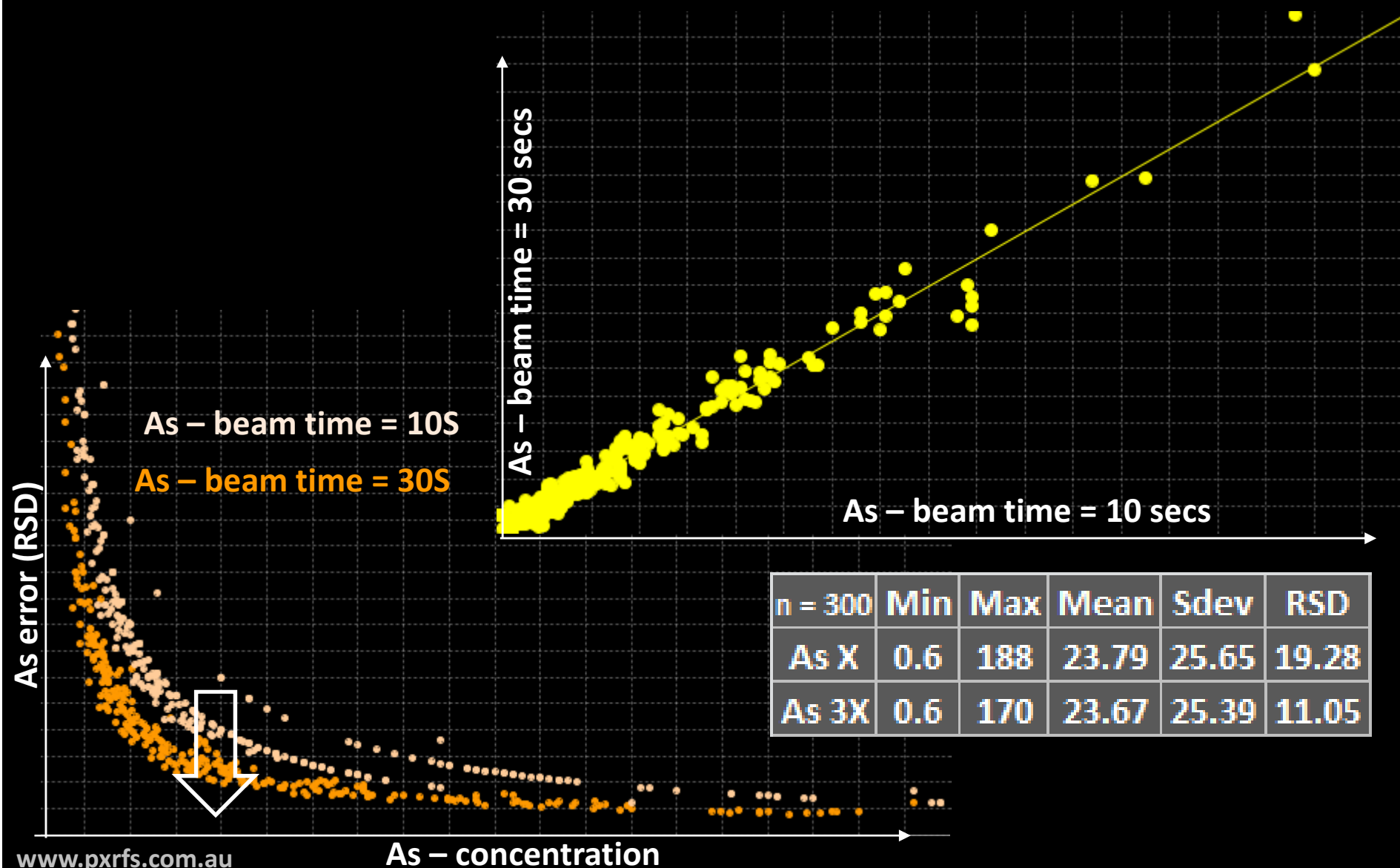
Integration of pXRF data with conventional Au (AR) analysis



Beam Times



Influence of Beam Times

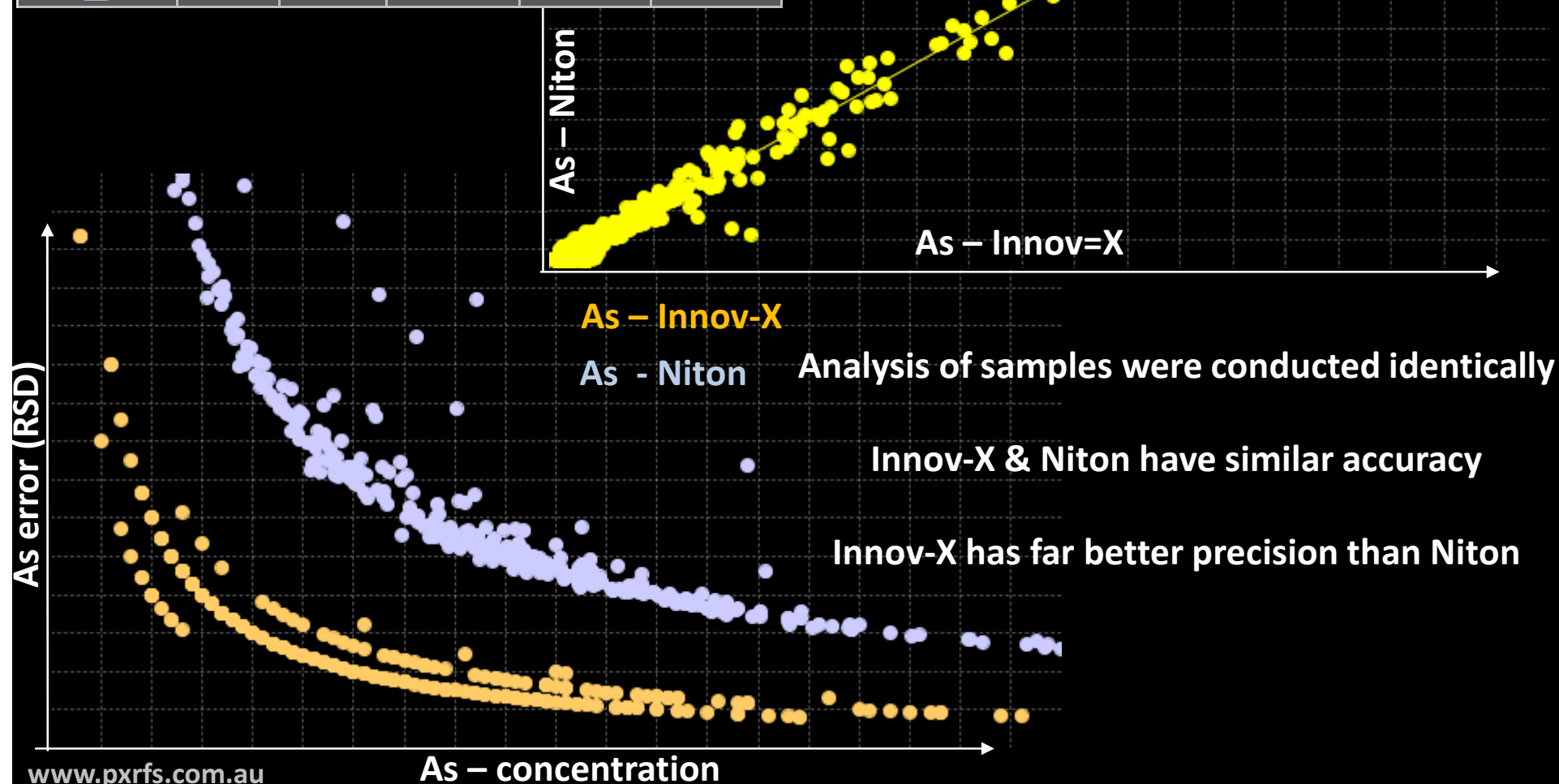


Instrument comparison

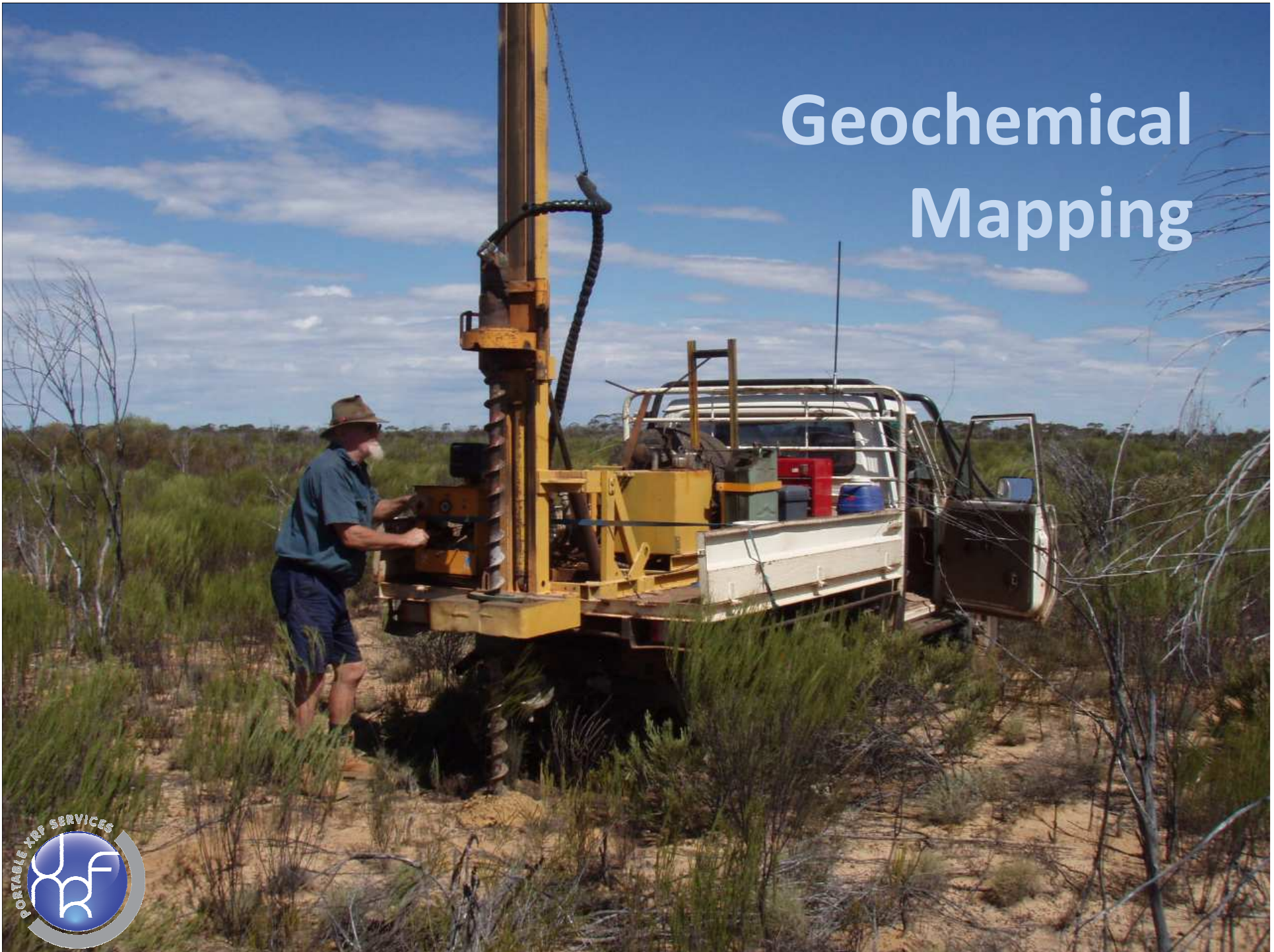
Innov-X vs Niton (30S)



n = 300	Min	Max	Mean	Sdev	RSD
As_OI	0.6	170	23.67	25.39	11.05
As_TN	LOD	168	24.22	25.77	38.77



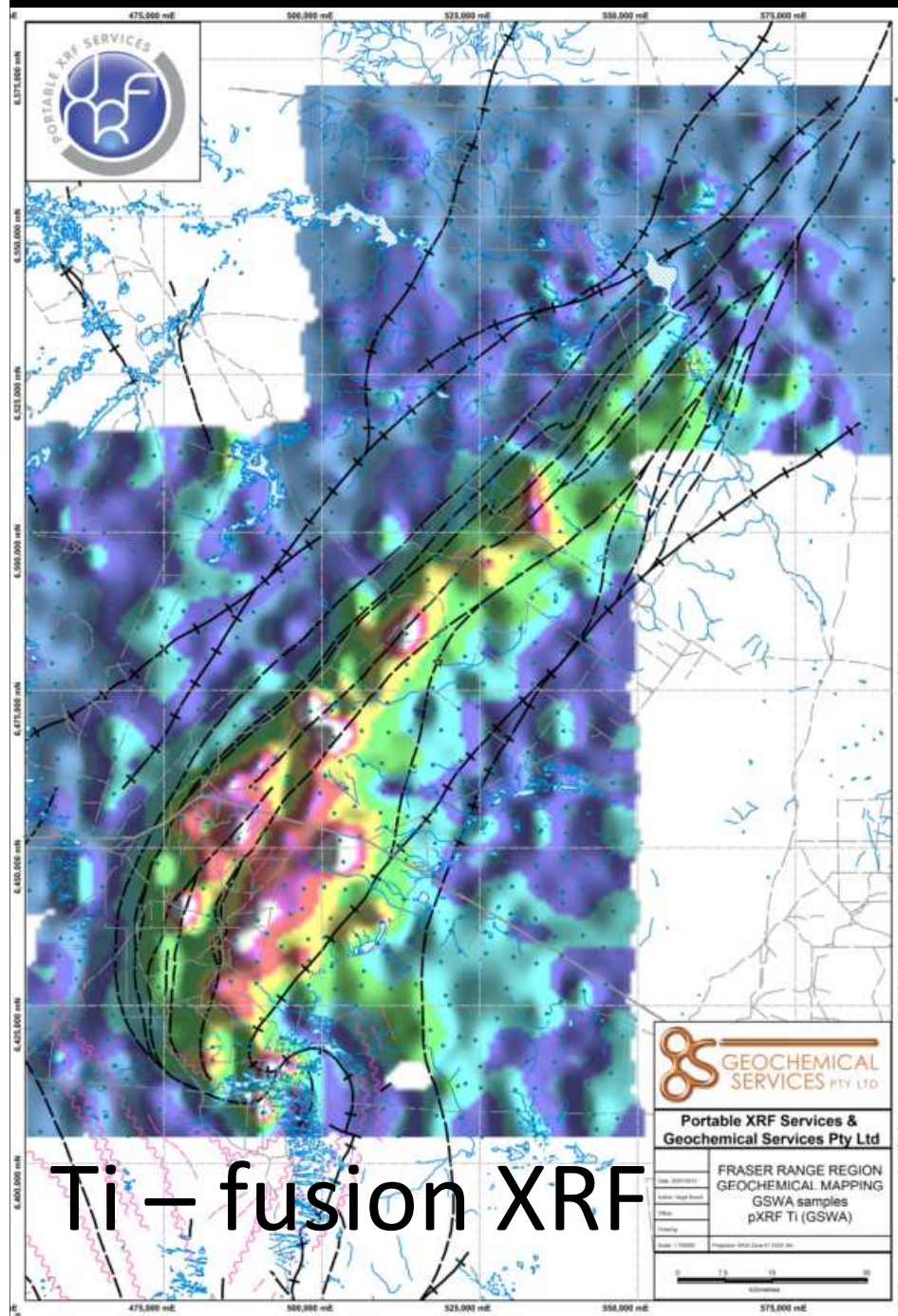
Geochemical Mapping



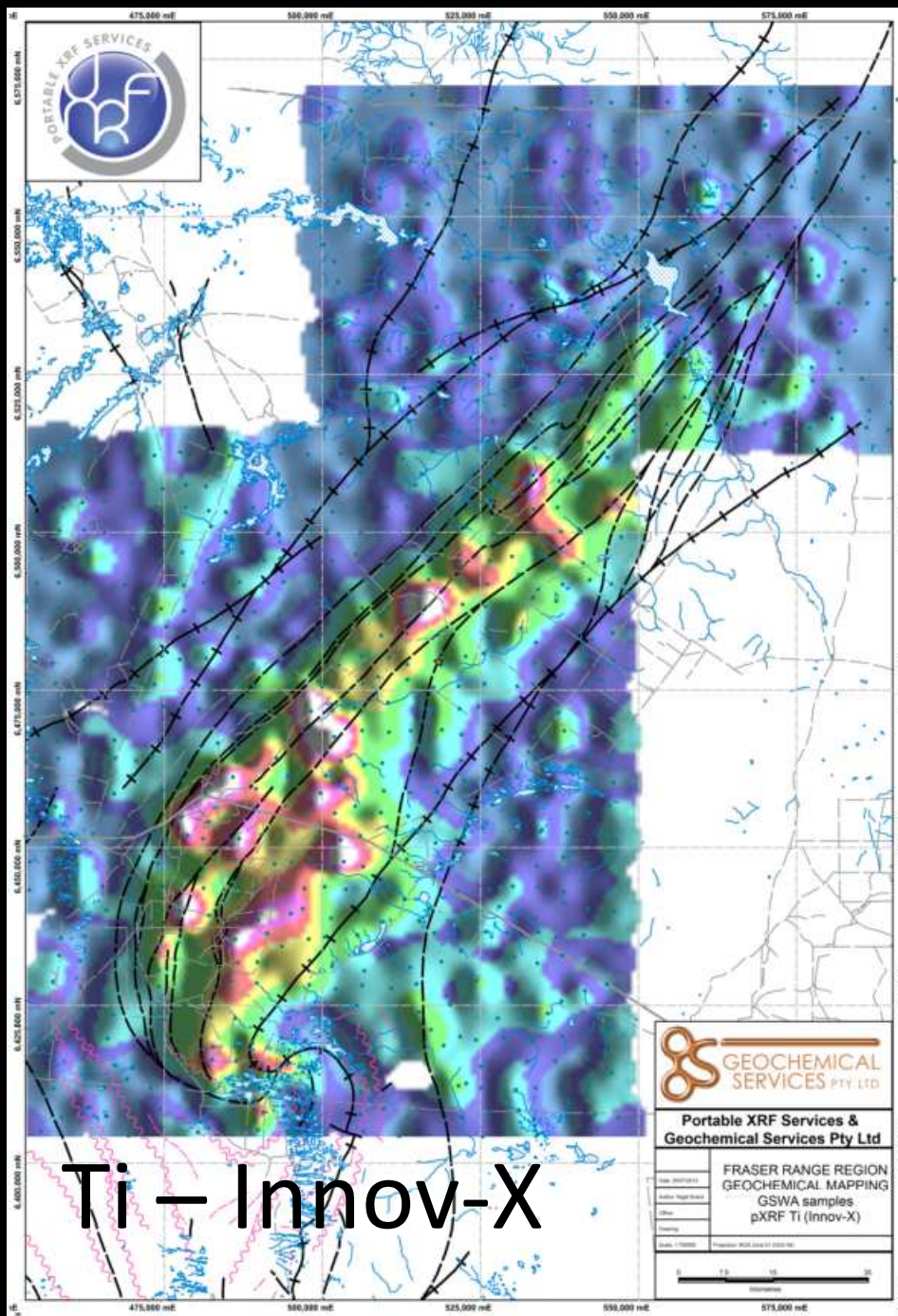
Geochemical Mapping

- Can pXRF provide real time “fit for purpose” data to be collected?
 - Using samples collected by Geological Survey of Western Australia (GSWA) we reanalyzed 14 year old samples with OI and TN pXRF.





Ti – fusion XRF



Ti – Innov-X

Correlation	Ti_ppm	Ti_ppm-Inno...	Ti_ppm-Niton
Ti_ppm	1	0.92	0.85
Ti_ppm-Innov-X	0.92	1	0.87
Ti_ppm-Niton	0.85	0.87	1

Ti - fusion XRF

GEOCHEMICAL SERVICES PTY LTD

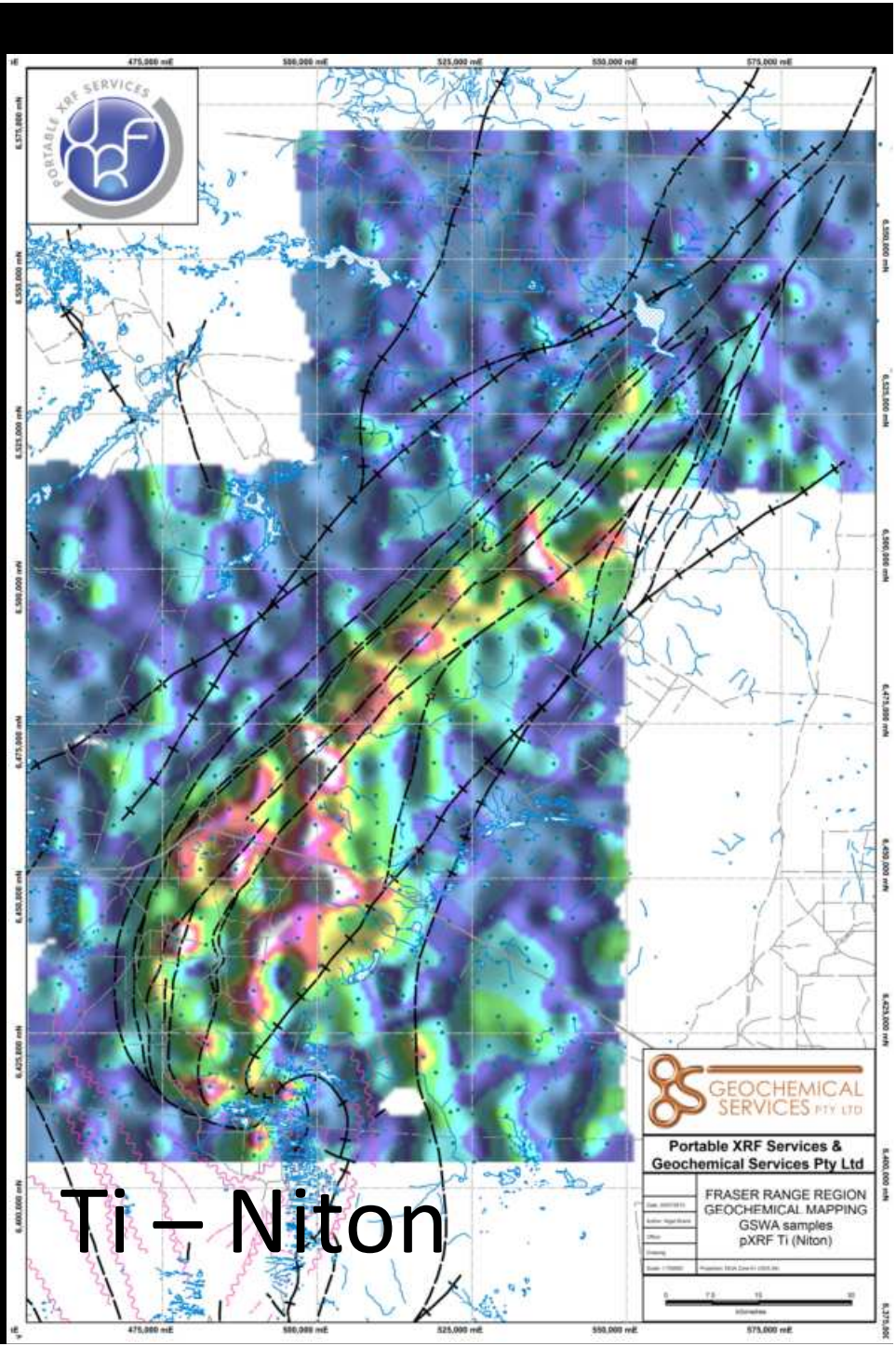
Portable XRF Services & Geochemical Services Pty Ltd

FRASER RANGE REGION
GEOCHEMICAL MAPPING
GSWA samples
pXRF Ti (GSWA)

Scale: 1:50000 Projection: MGA Zone 51 100m

0 7.5 15 30
Kilometres

Ti – fusion XRF



Ti – Niton

Ni derived from the SAME samples



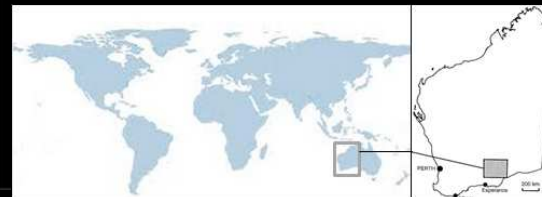
AR

pXRF

Understand your
pXRF to generate
“fit for purpose”
data

10km

n = 2240





Summary & Conclusions

- “Off the shelf” pXRF are
 - individual and unique instruments.
 - precise yet inaccurate.
- Separate **batteries** will effect element response (OI)
- Over time pXRF **performance will degrade**
 - Most noticeably in light elements (Si. Al)
- pXRF instruments provides “**fit for purpose**” data for mineral exploration.

PORTABLE XRF SERVICES



www.pxrfs.com.au