



INSTITUTO
DE INGENIEROS
DE MINAS
DEL PERÚ



pro**EXPLO**
2019

Deep Exploration Imaging

**Meeting the challenges
of decreasing Discovery
rates through improved
drill targetting**

XI CONGRESO INTERNACIONAL DE
PROSPECTORES Y EXPLORADORES

**EXPLORACIÓN MINERA:
CIENCIA, INNOVACIÓN E
INVERSIÓN ESTRATÉGICA**

Rob Gordon, P. Eng., MBA
May 22, 2019

www.proexplo.com.pe

Caution – Presentation contains...

Forward Thinking Statements

Cautionary Note Regarding Forward-looking Statements: This document contains certain "forward-looking statements" and "forward-looking information" under applicable securities laws concerning the business, operations and financial performance (collectively, "forward-looking statements and forward-looking information"). Forward-looking statements and forward-looking information include, but are not limited to, statements with respect to the ability to complete the port assignment; the ability of the Company to realize upon the benefit of owning the port, impact of mineralogy, estimation of mineral resources at mineral projects of the Company, economics of production, success of exploration activities; the future economics of minerals including nickel and copper; synergies and financial impact facilities; the benefits of the development potential of the properties of the Company and currency exchange rate fluctuations. Except for statements of historical fact relating to the Company, certain information contained herein constitutes forward-looking statements. Forward-looking statements are frequently characterized by words such as "plan," "expect," "project," "intend," "believe," "anticipate", "estimate" and other similar words, or statements that certain events or conditions "may" or "will" occur. Forward-looking statements are based on the opinions and estimates of management at the date the statements are made, and are based on a number of assumptions and subject to a variety of risks and uncertainties and other factors that could cause actual events or results to differ materially from those projected in the forward-looking statements. Many of these assumptions are based on factors and events that are not within the control of the Company and there is no assurance they will prove to be correct. Factors that could cause actual results to vary materially from results anticipated by such forward-looking statements include difficulties realized in completion of the assignment, barriers to the assignment, difficulties in development of the assets and suitability of the port in relation to development of the assets of the Company, variations in metal grades, changes in market conditions, variations in recovery rates, risks relating to international operations, fluctuating metal prices and currency exchange rates, and other risks of the mining industry, including but not limited to the failure of plant, equipment or processes to operate as anticipated. The Company cautions that the foregoing list of important factors is not exhaustive. Investors and others who base themselves on forward-looking statements should carefully consider the above factors as well as the uncertainties they represent and the risk they entail. The Company believes that the expectations reflected in those forward-looking statements are reasonable, but no assurance can be given that these expectations will prove to be correct and such forward-looking statements included in this document should not be unduly relied upon. These statements speak only as of the date of this document. The Company undertakes no obligation to update forward-looking statements if circumstances or management's estimates or opinions should change except as required by applicable securities laws. Although the Company has attempted to identify important factors that could cause actual actions, events or results to differ materially from those described in forward-looking statements, there may be other factors that cause actions, events or results not to be anticipated, estimated or intended. Statements concerning mineral reserve and resource estimates may also be deemed to constitute forward-looking statements to the extent they involve estimates of the mineralization that will be encountered if the property is developed. Statements about the Company's future expectations and all other statements in this document other than historical facts are "forward-looking statements." Within the meaning of Section 27A of the Securities Act of 1933, Section 21E of the Securities Exchange Act of 1934 and as that term defined in the Private Litigation Reform Act of 1995, The Company intends that such forward-looking statements be subject to the safe harbours created thereby. Since these statements involve risks and uncertainties and are subject to change at any time, the Company's actual results may differ materially from the expected results. Technical Information, Qualified Person The Company is not aware of any legal, political, environmental or other risks that could materially affect the potential development of the project other than those set out in its annual report for the financial year ended December 31, 2015 filed on SEDAR under the Company's issuer profile at www.sedar.com. Please see below under the heading "Cautionary Note Regarding Forward-looking Statements" for further details regarding risks facing the Company.

Geophysicist

Black Flies!

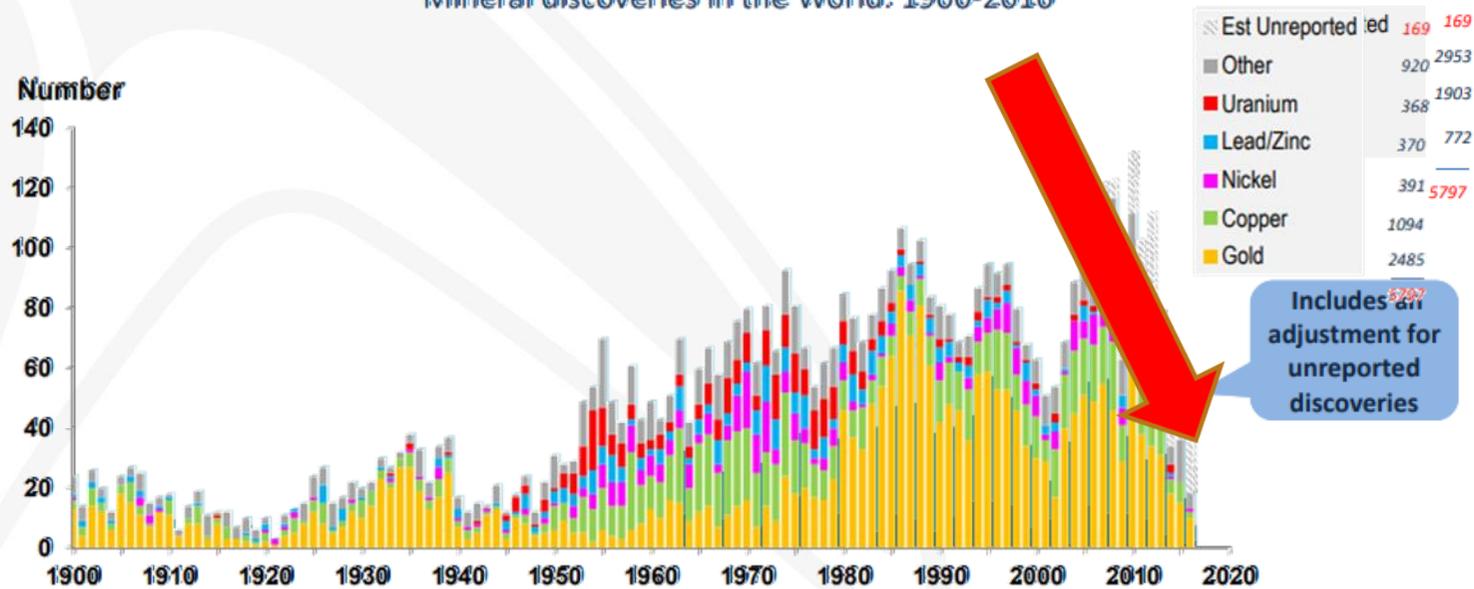
Overview

- **Drivers for innovation**
- **New technology (for enhanced deeper imaging)**
 - Case Applications
- **Increasing industry acceptance**
 - Changing processes – adapting millennials
- **Economics and discovery**

Drivers for deep innovation

Number of discoveries by commodity type

Mineral discoveries in the World: 1900-2016



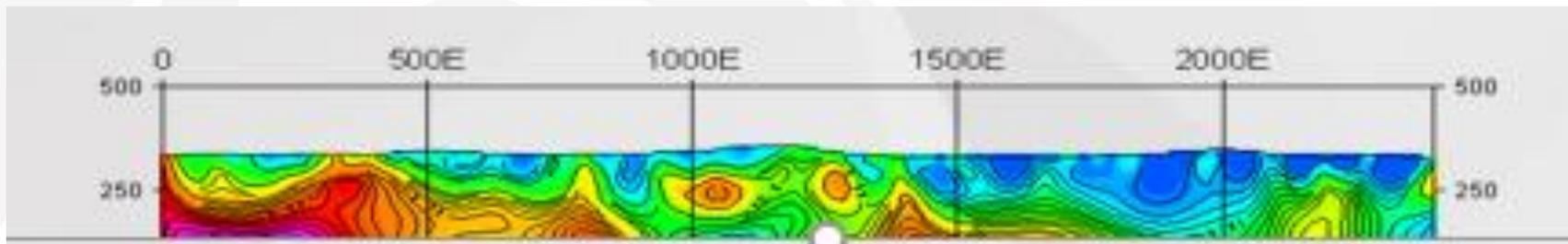
Note: Excludes Bulk Mineral discoveries (i.e. bauxite, potash, phosphate, coal and iron ore)
 "Moderate" >100koz Au, >10kt Ni, >100Kt Cu equiv, 250kt Zn+Pb, >5kt U₃O₈
 Note: Excludes Bulk Mineral discoveries (i.e. bauxite, potash, phosphate, coal and iron ore)
 "Giant" >6Moz Au, >1Mt Ni, >5Mt Cu equiv, 12Mt Zn+Pb, >125kt U₃O₈

Source: MinEx Consulting © October 2017

How are we exploring ?

Drill Targeting

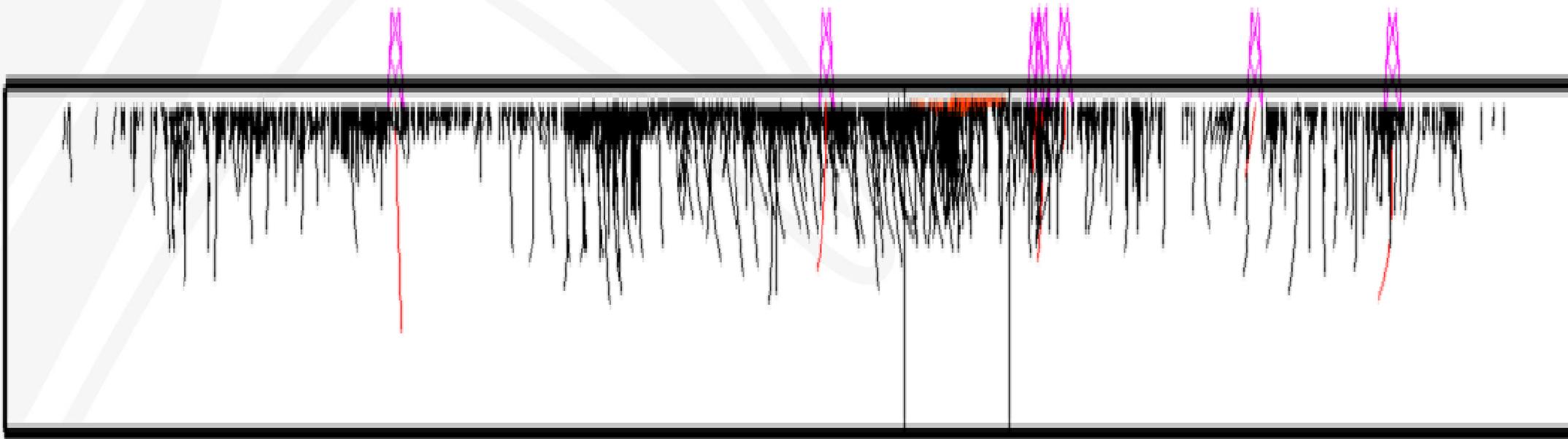
- Geology
- Geochemistry
- Geophysics



Generally, Geoscience information is used to guide your decisions ...

Discovery Rates are probably falling because ...

1. The earth is complicated
2. Undiscovered ore bodies are deeper and deeper



10 years of drilling One OrebodyGuess where??

1,000 years ago, patients survived brain surgery...



**...sometimes, and if they did,
they had to live with huge
holes in their heads!**

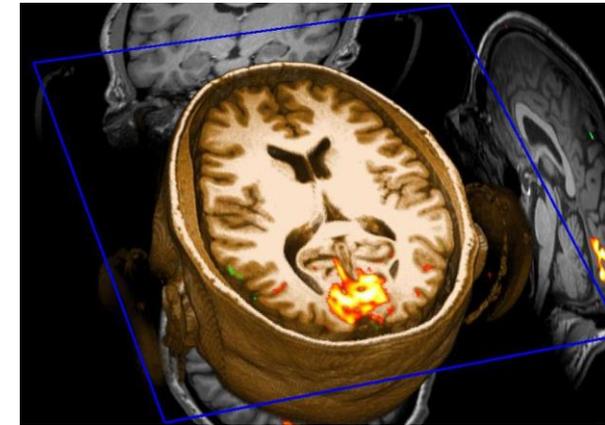
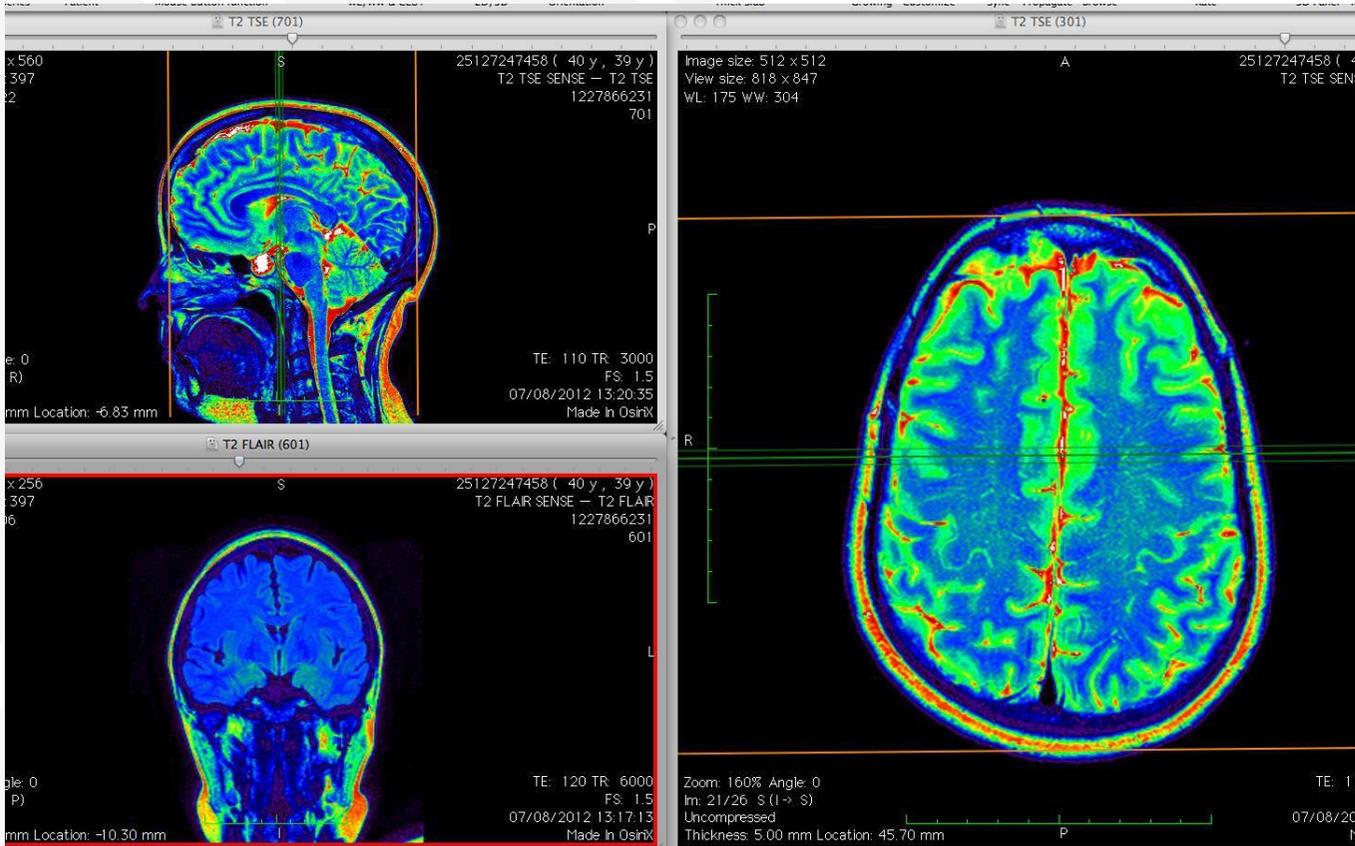
Acceptance, adaptation, then improvement



INSTITUTO
DE INGENIEROS
DE MINAS
DEL PERÚ



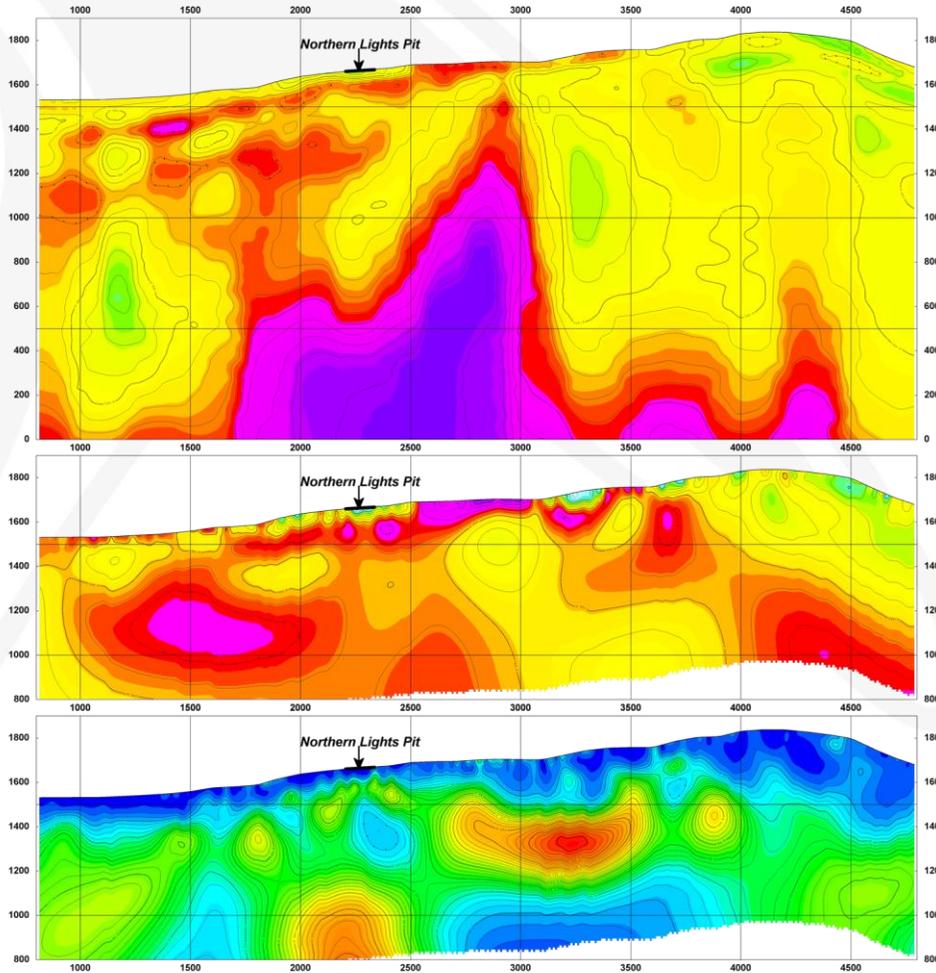
PROEXPLOR
2019



Today, sophisticated
imaging is a required

Evolution of MRI from the 1950's - 1970's, to practical use in the 80's and 90's, and further advances in the 2000's

Geophysical Imaging started to Advance significantly in 2000



Top panel: MT Resistivity

PW 2D inversion;

← Typically 1500 metres

Middle panel: DC Resistivity

UBC smooth inversion;

← Typically 500-750 metres

Bottom panel: Chargeability

UBC smooth inversion.

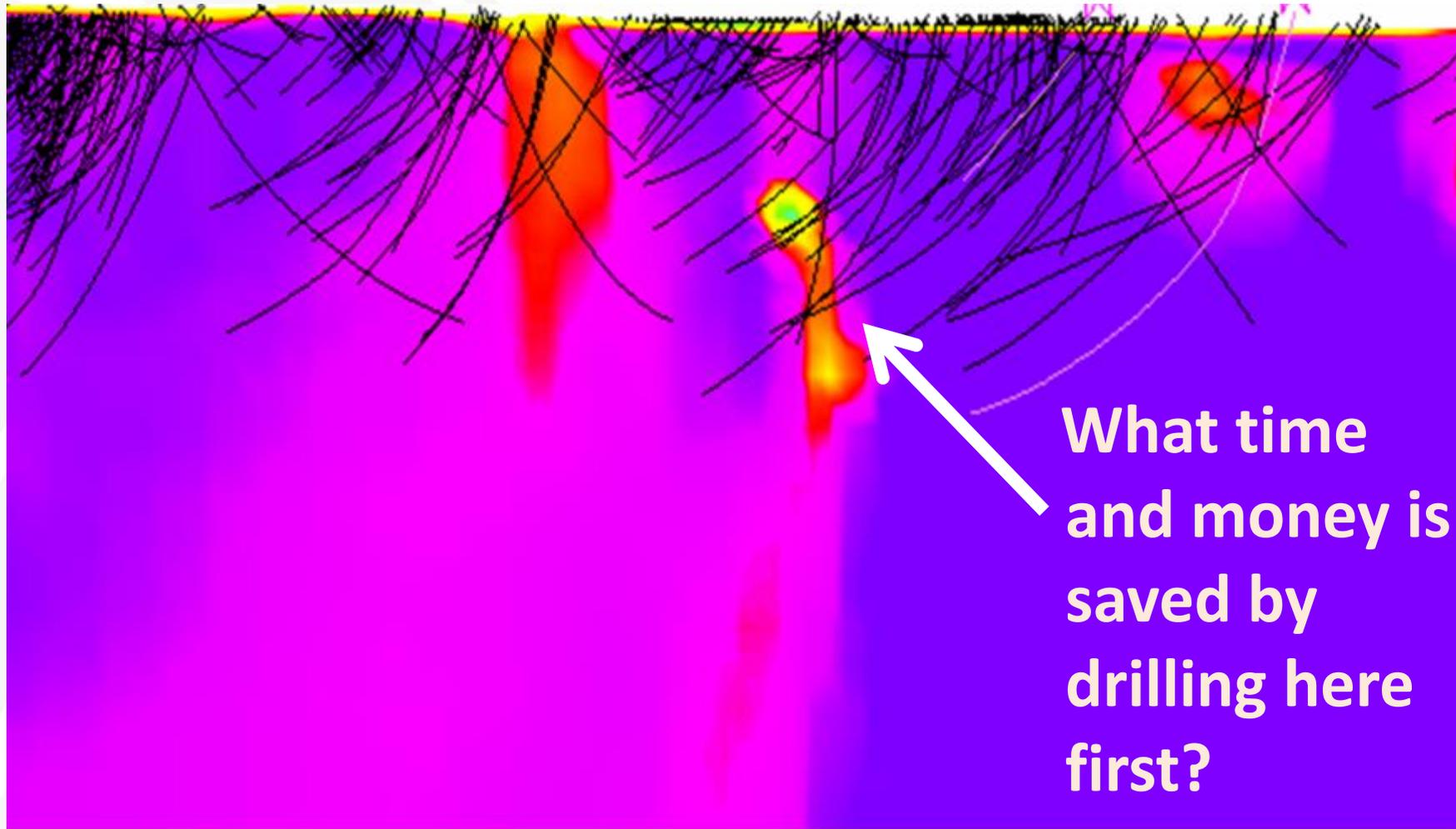
In 2001 The imaging demonstrated how money could be saved



INSTITUTO
DE INGENIEROS
DE MINAS
DEL PERÚ



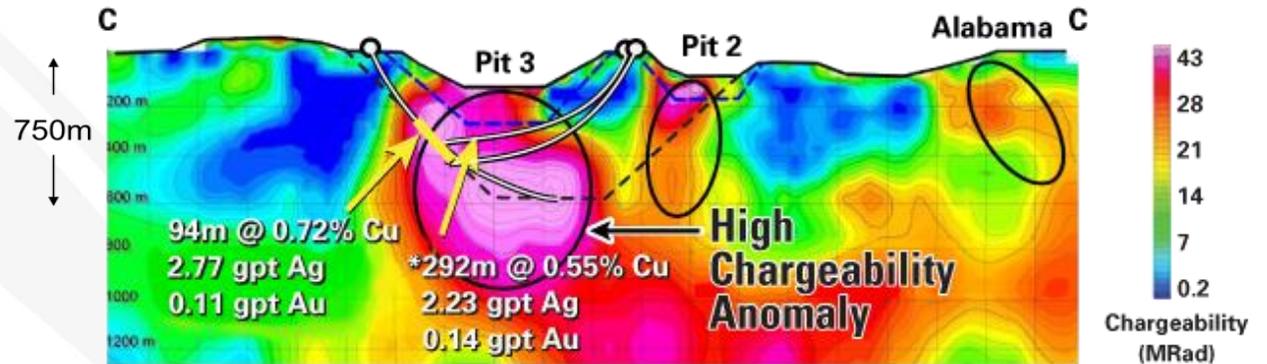
PROEXPLOR
2019



But overall adaptation was quite slow

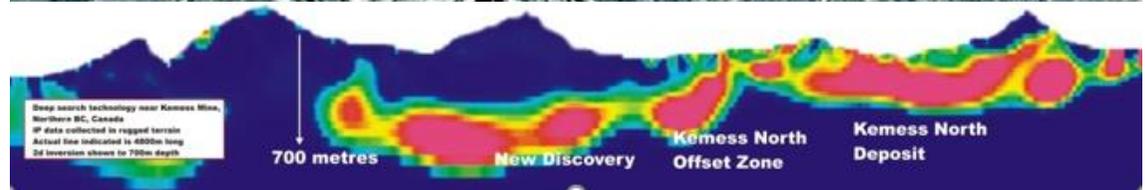
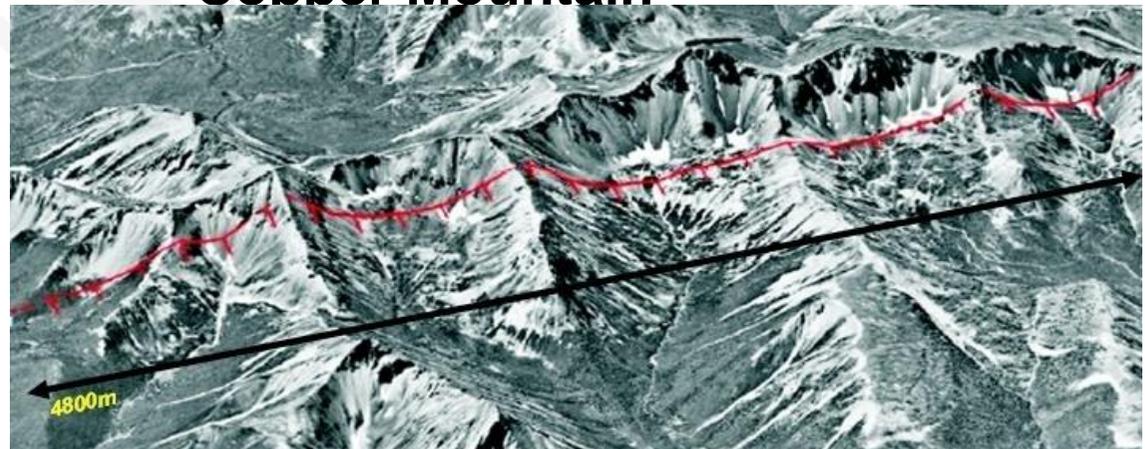
Early adapters had immediate success

- ❑ This image helped the company raise **50 MILLION dollars !**
- ❑ Changed mine design



Copper Mountain

- ❑ This image helped Geological team vector to **New Discovery**



Kemess

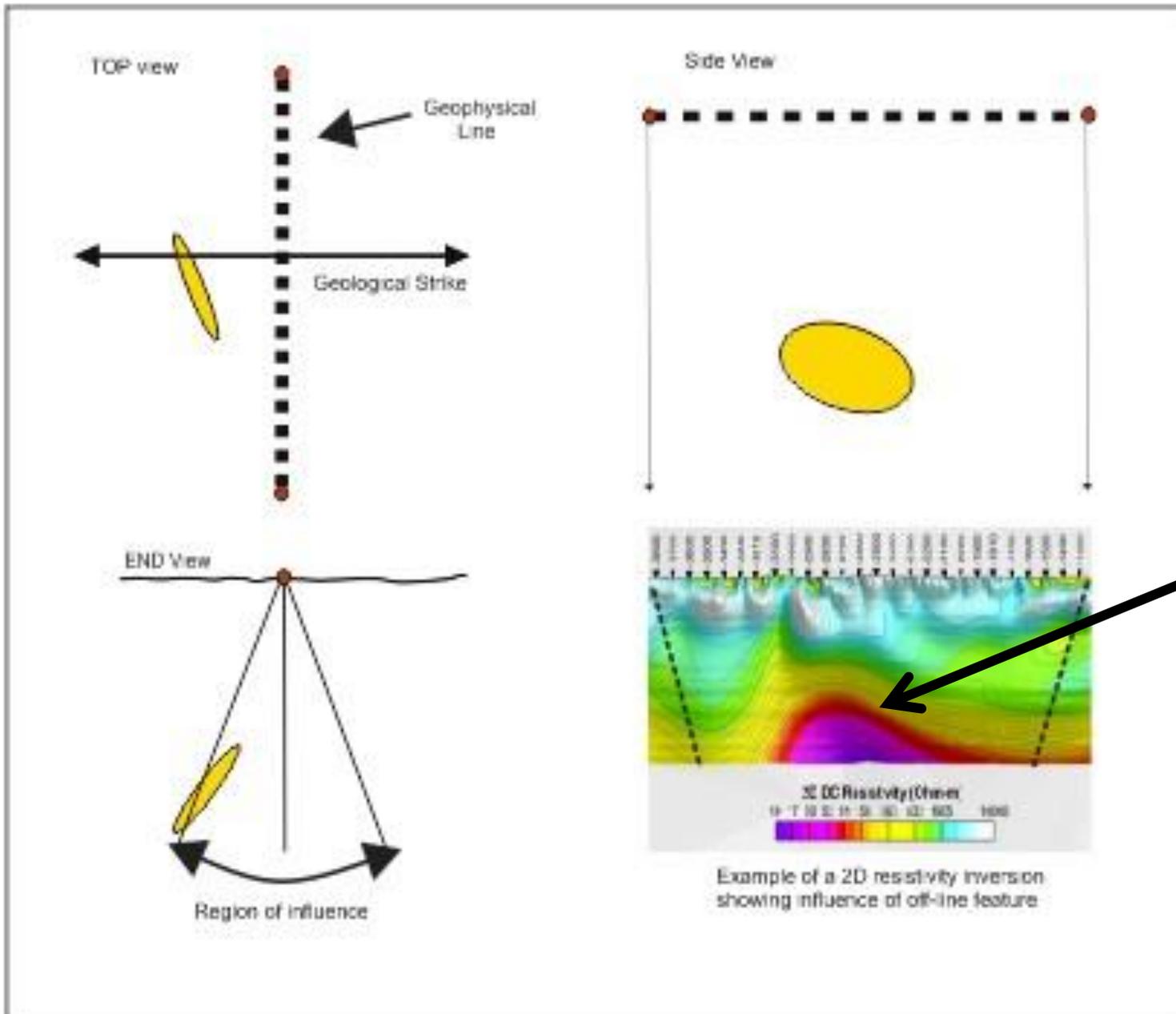
2D Geophysics



INSTITUTO
DE INGENIEROS
DE MINAS
- EL PERÚ

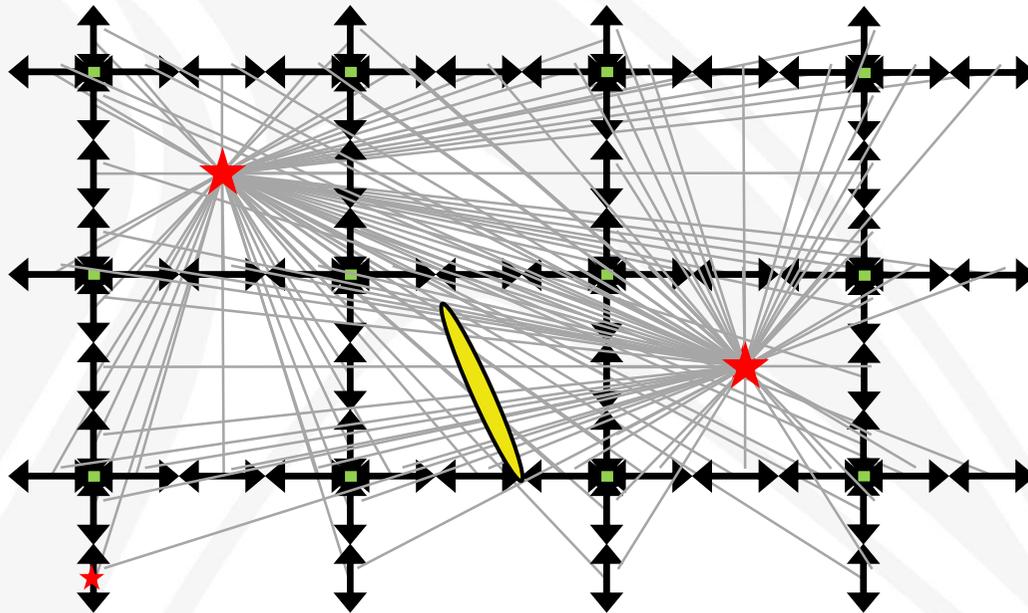


proEXPLO
2019



If you drill this..
you may miss ?

TRUE 3D Interrogating and imaging in all directions



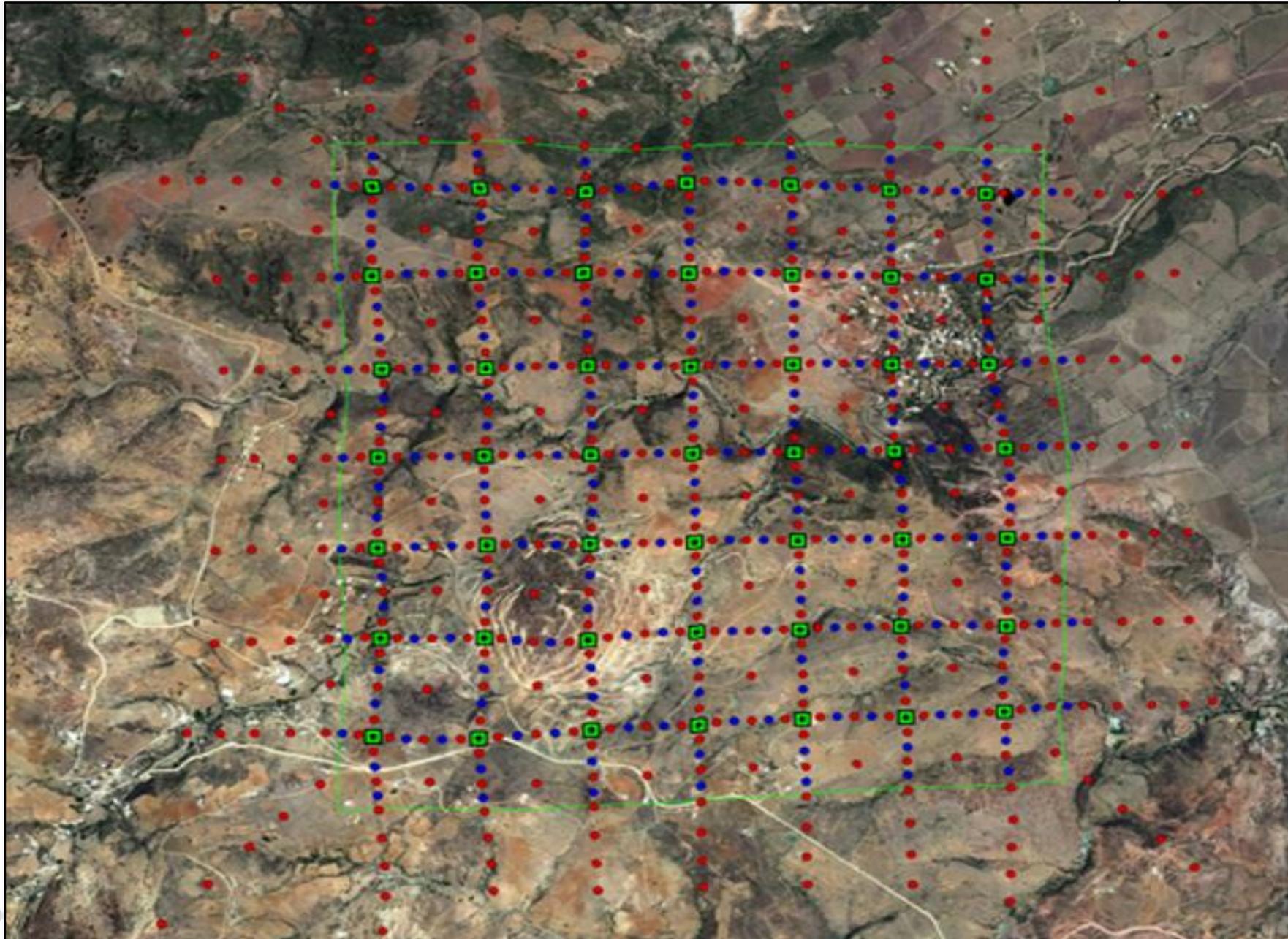
- ↔ Receiver dipole
- Data recorder
- ★ Current injection
- “Conceptual” current path

- True 3D measurement (DCIP)
- Simultaneous receiver sampling
- Omni-directional data free from receiver geometry bias

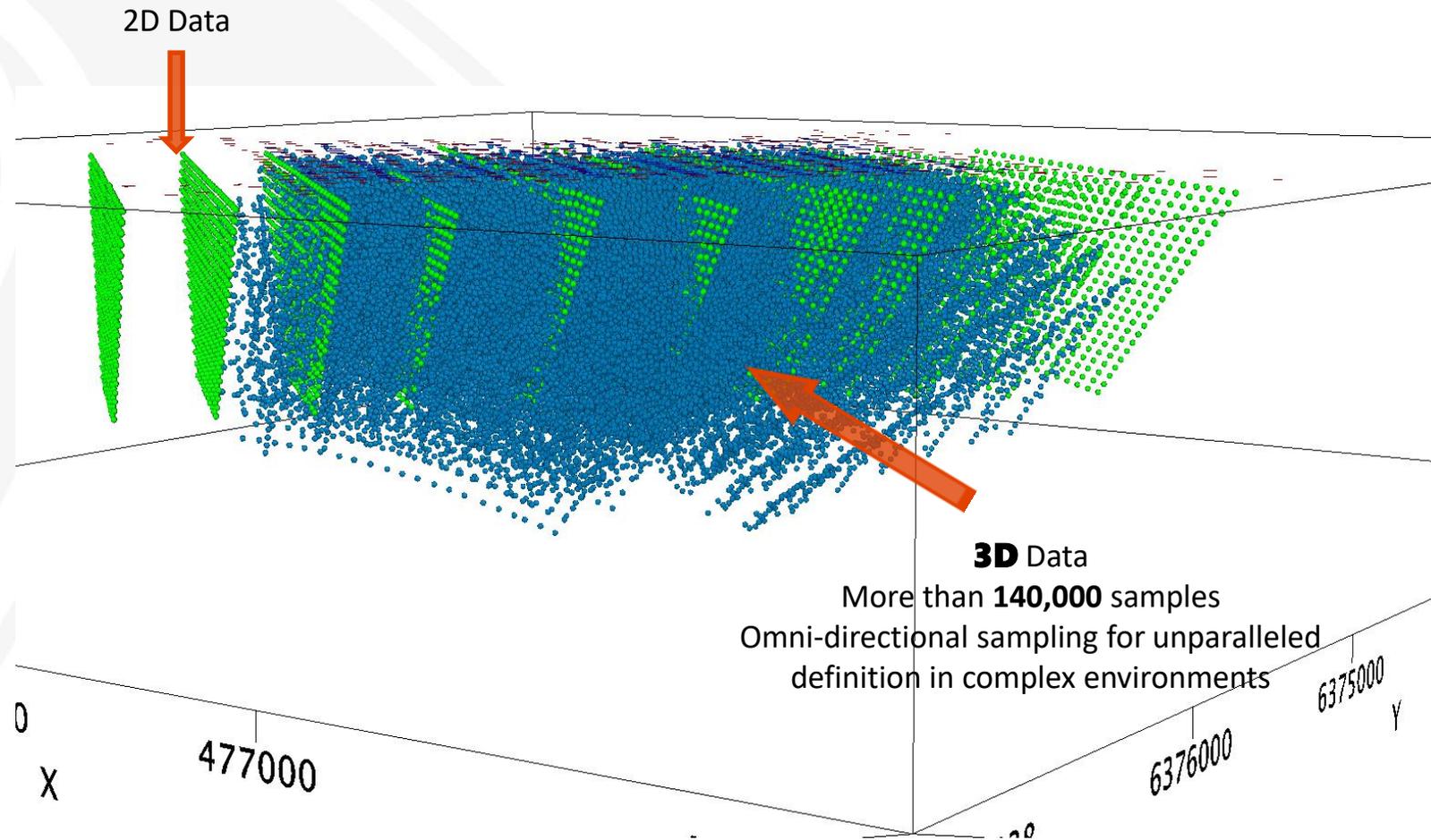


Large Survey footprint (2km x 2km and more)

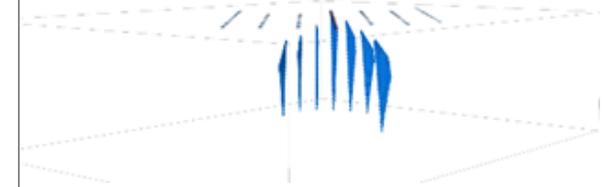
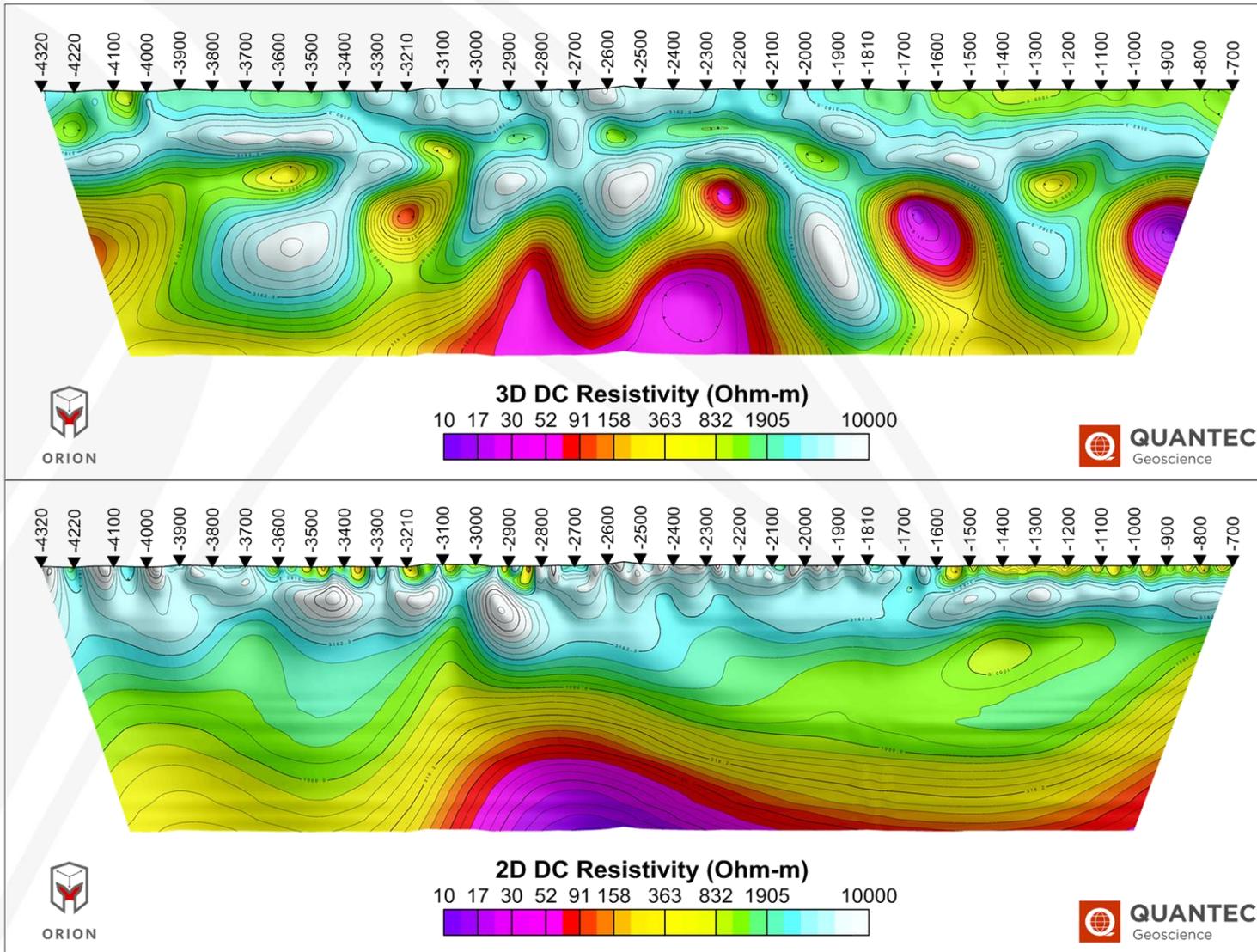
- ◆ Tx
- Rx
- Data Logger



Sampling everything (from all directions)



Improving resolution and detection

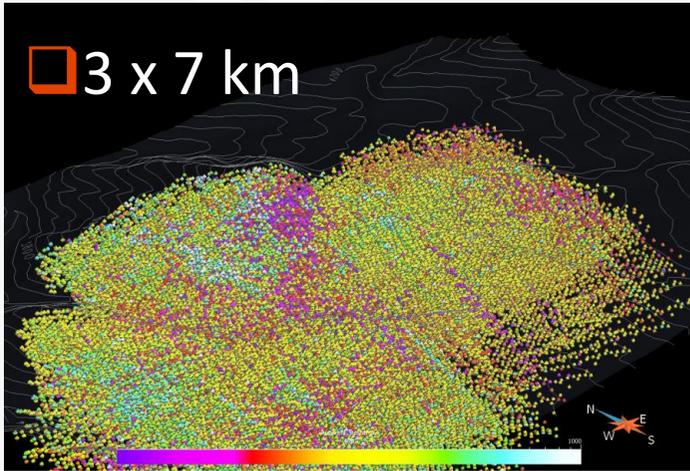


Resistivity data acquisition from multiple lines (2D slice through a 3D inversion)

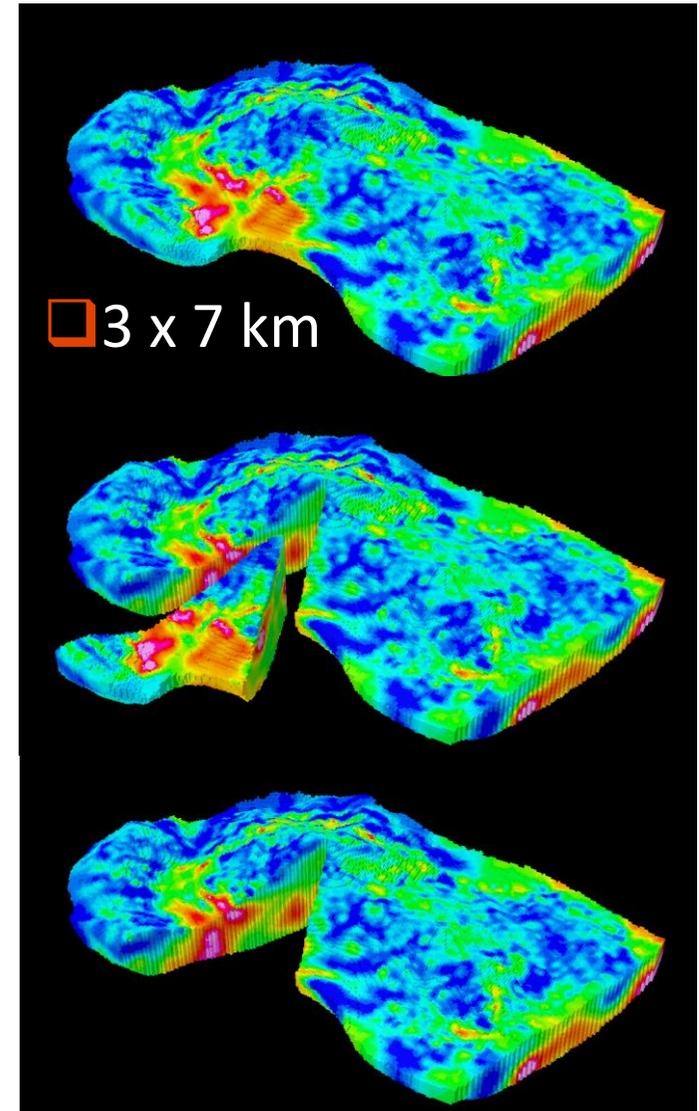
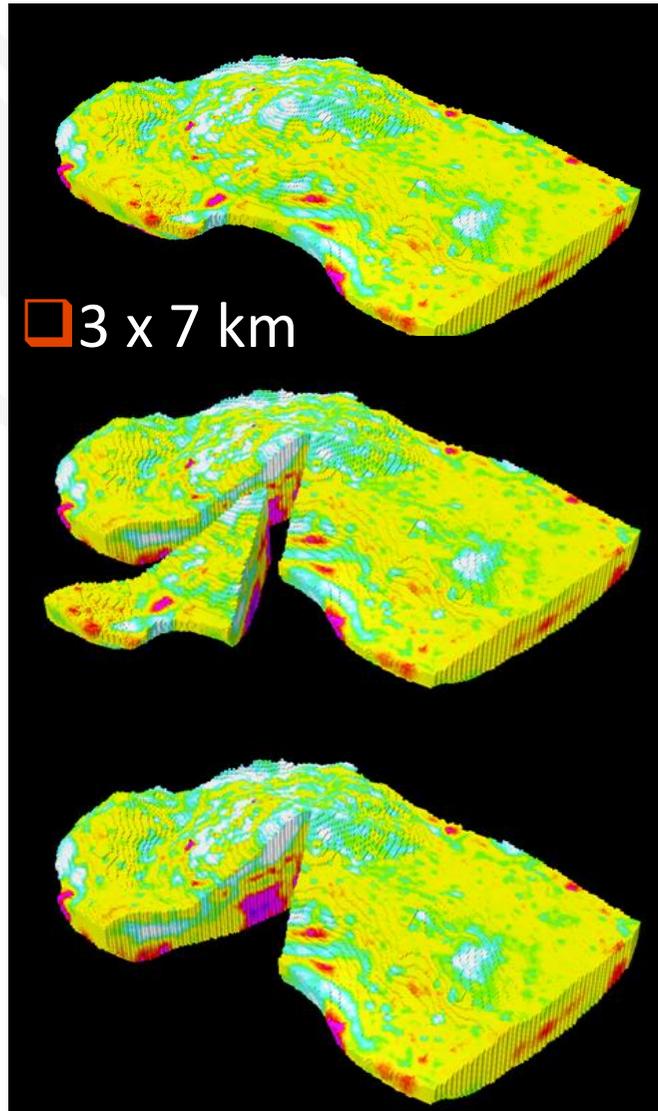
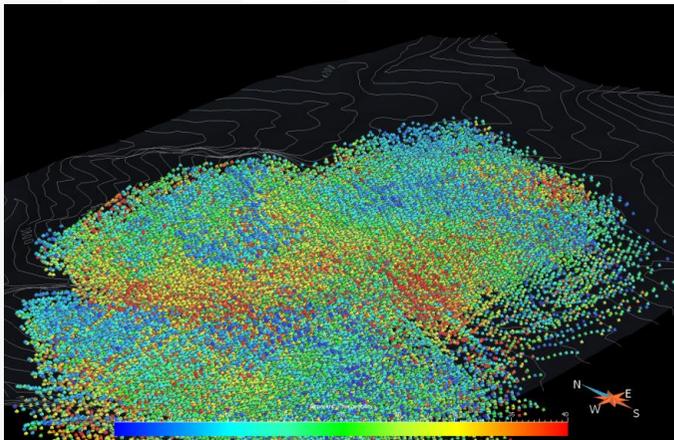
Resistivity data acquisition from 1 line (2D Inversion)



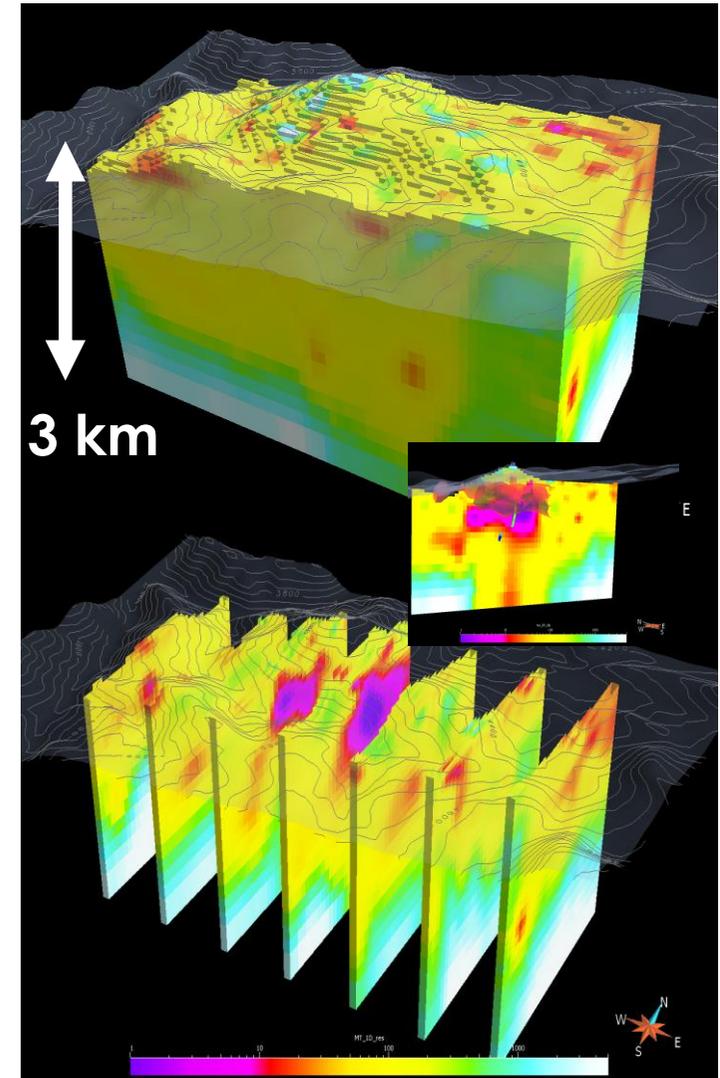
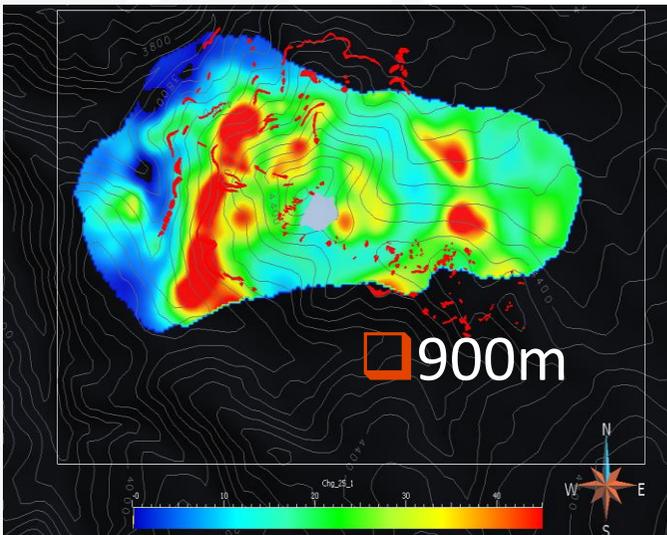
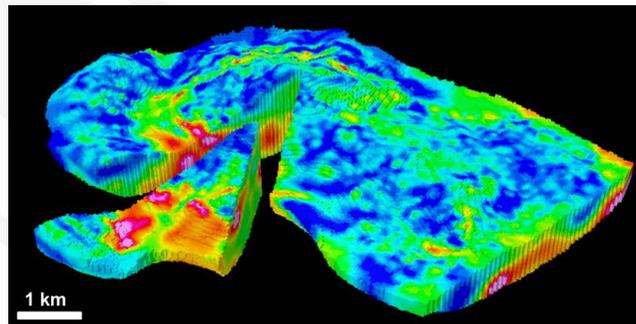
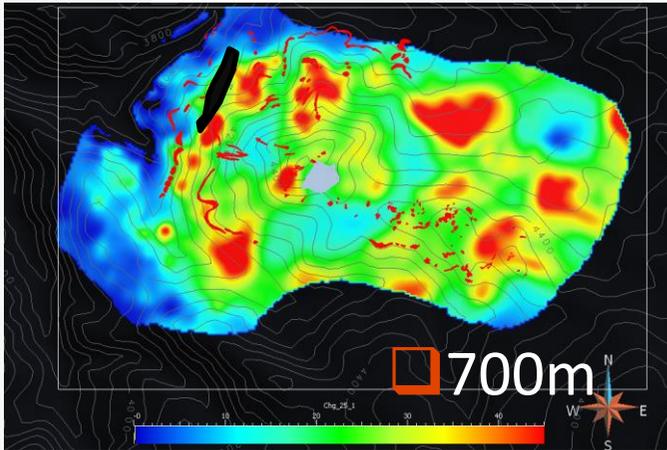
Broad exploration areas



More data = Accurate



Multi parameter Deep 3D surveys



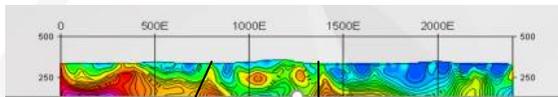
Increase overall likelihood of success (survival !)

Conventional method

- Geology
- Geochemistry
- Drilling

Image before drilling

- Geology
- Geochemistry
- NEW 3D GEOPHYSICS**
 - Structure (faults)
 - Mineralisation (delineation)
 - Alteration
 - Condemnation
 - Discovery
- Drilling

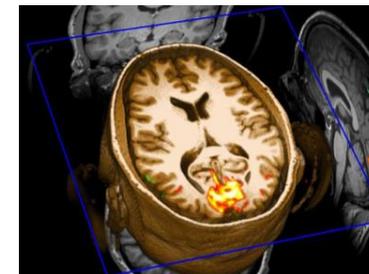
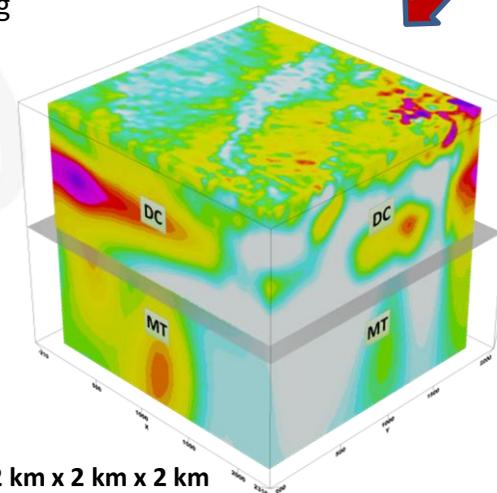


?

?

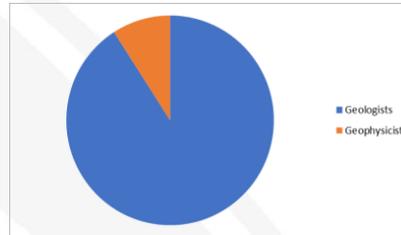
?

?

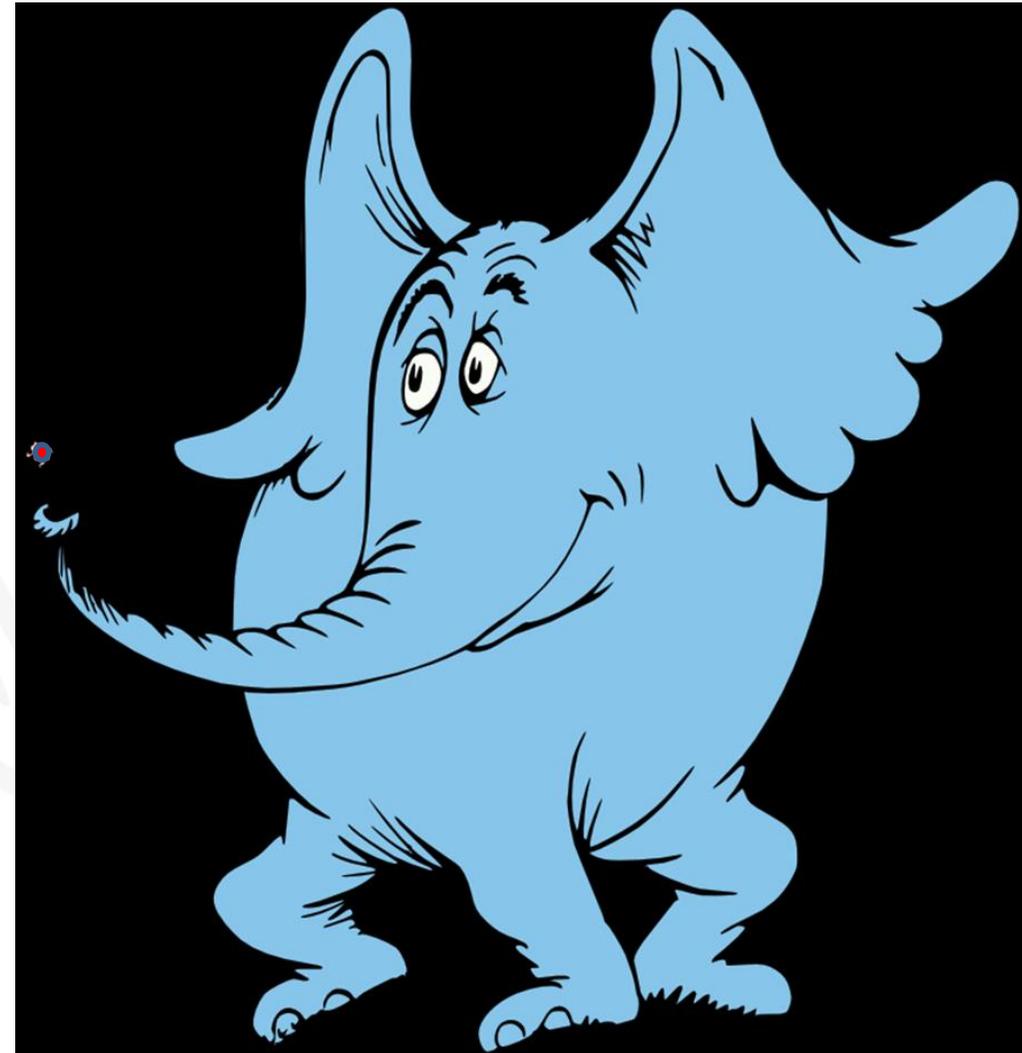
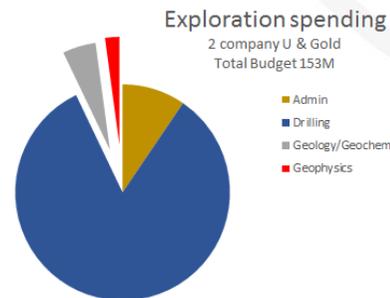


Exploration budgets are typically gauged in meters drilled

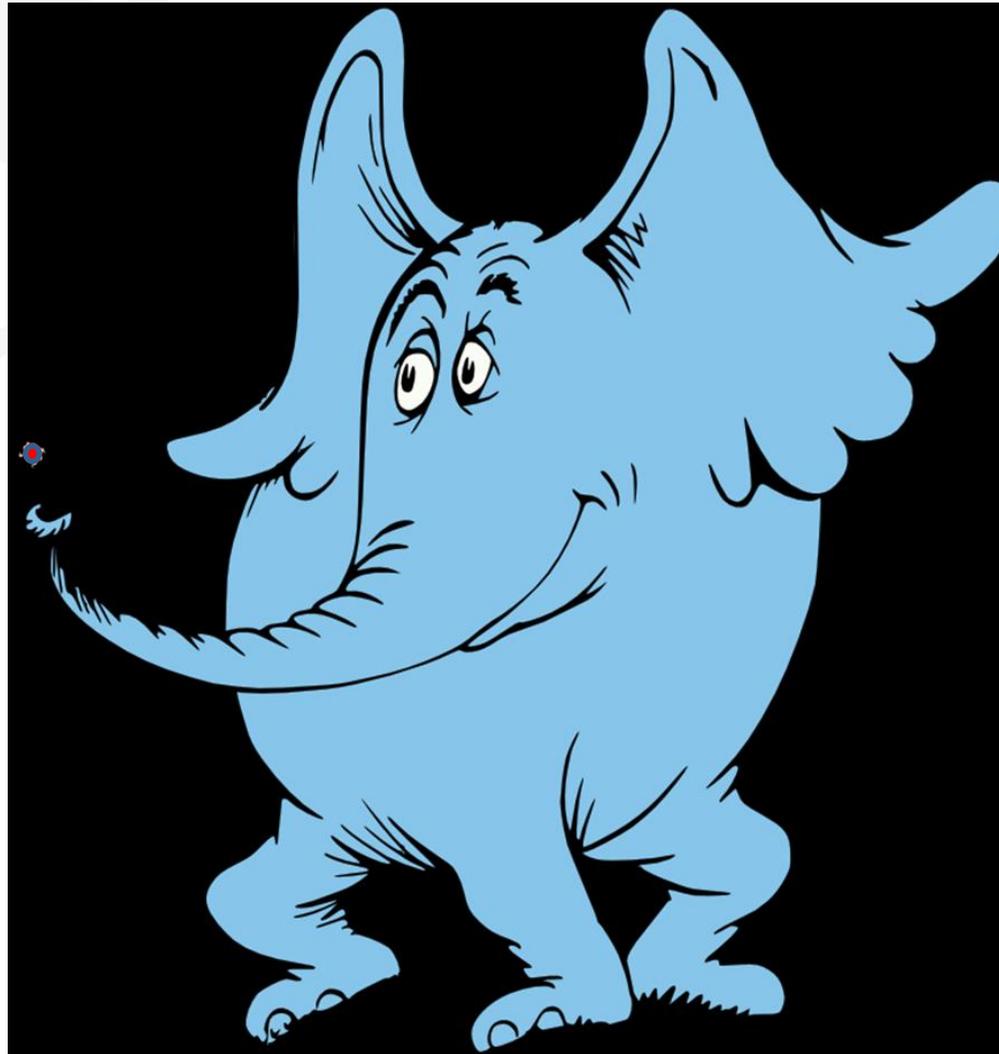
- Exploration budgets are driven by Geologists for most companies



- Globally, several statistics point to roughly only 3 - 4% of budgets are used for geophysics



The Geologist controls the exploration



Geophysics is often
an after thought

WE ARE HERE
WE ARE HERE
WE ARE HERE
WE ARE HERE
WE ARE HERE



Deep Imaging
Geophysics



Accurate imaging: More effective drilling



INSTITUTO
DE INGENIEROS
DE MINAS
DEL PERÚ



PROEXPLO
2019

More knowledge before drilling



Improve drill planning



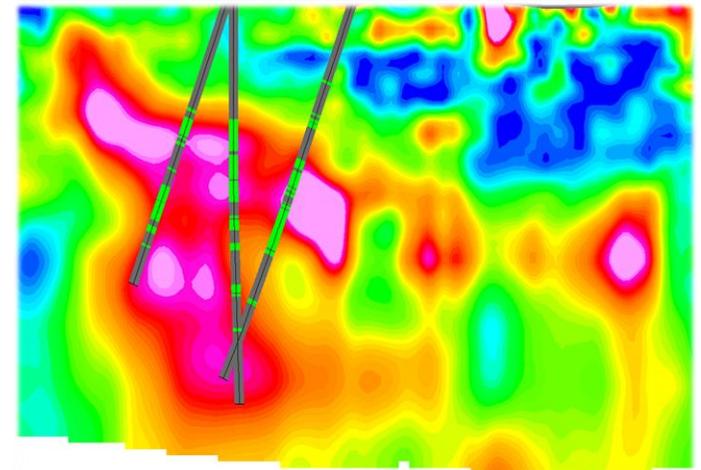
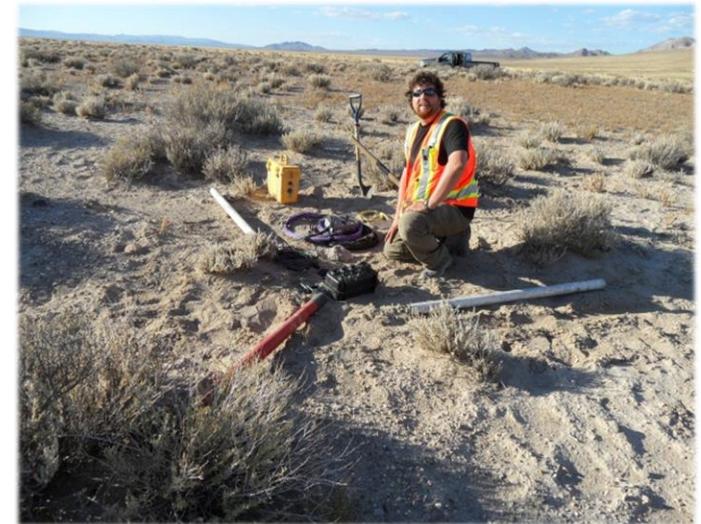
More effective drilling



Save money
Explore Faster

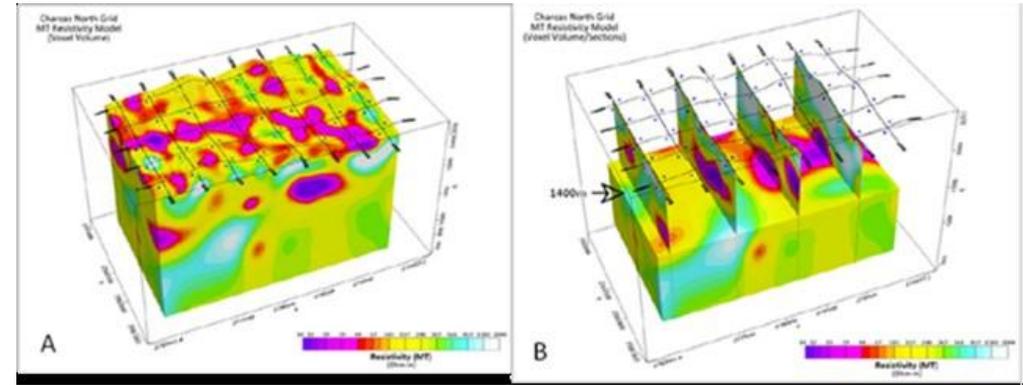


Increase overall likelihood of success



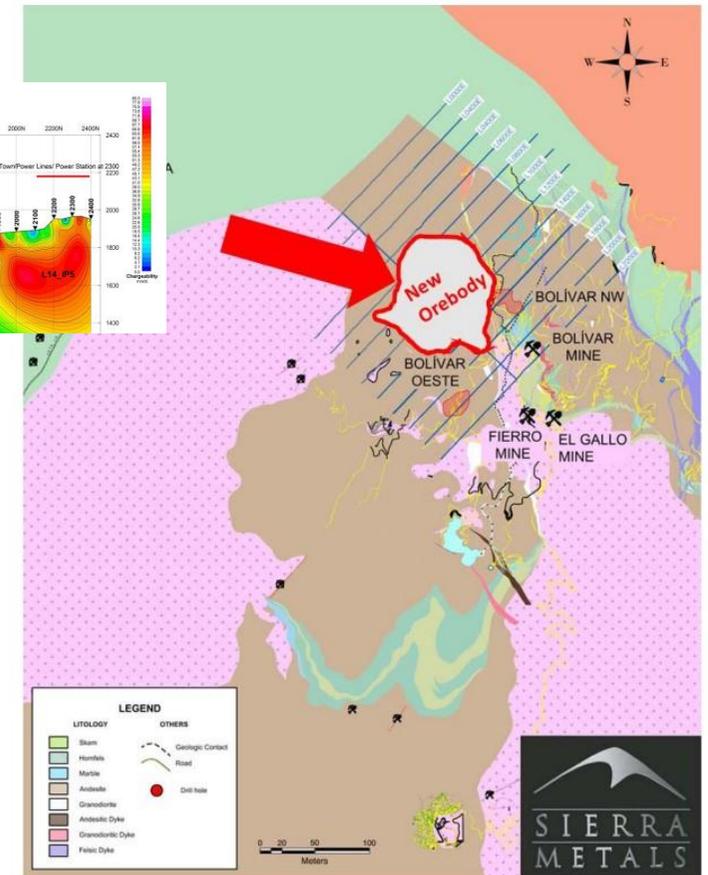
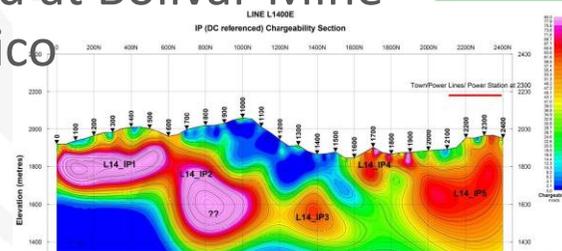
Some new discoveries

SIERRA METALS CONFIRMS PORPHYRY MINERALIZATION AT ITS YAURICOCHA MINE IN PERU, POSITIVE RESULTS INCLUDE 22 METERS OF 0.46% COPPER AND 134 PPM MOLYBDENUM AND 10.73 PPM COBALT The discovery comes as part of an ongoing drilling program to test priority geophysical anomalies at the Yauricocha Mine,

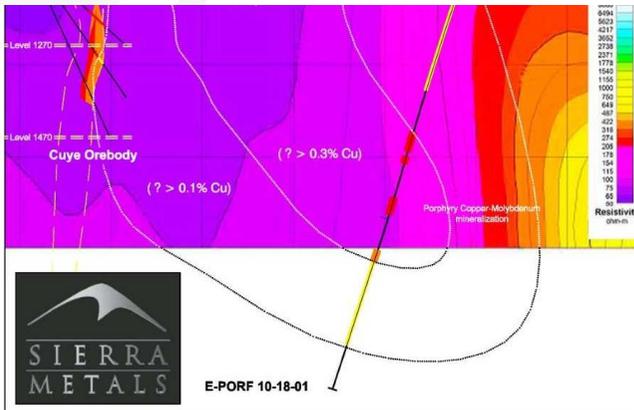
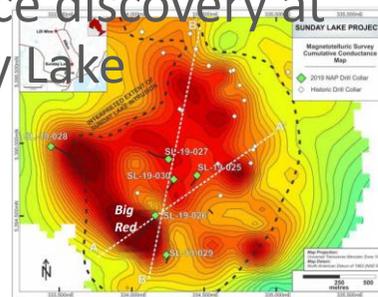


□ Grupo Mexico covers large areas for ongoing targeting programs

□ Additional resources found at Bolivar Mine Mexico



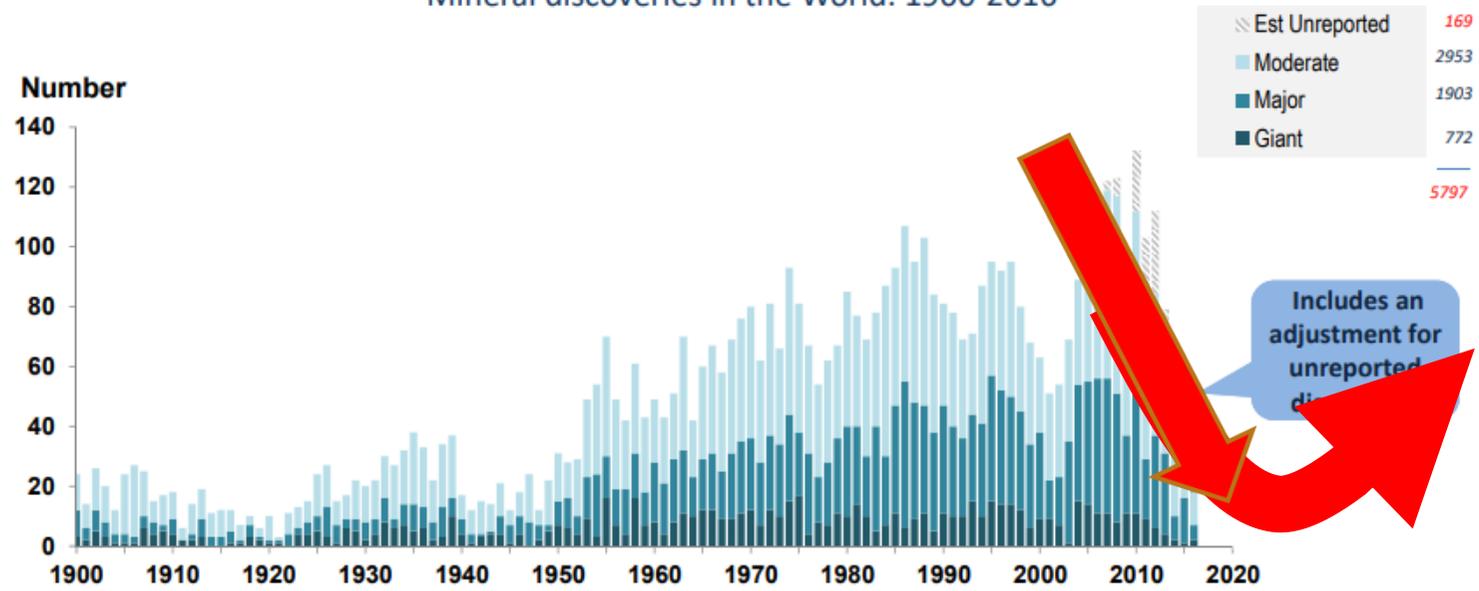
□ NAP using MT to enhance discovery at Sunday Lake



Technology for Discovery

Number of discoveries by size

Mineral discoveries in the World: 1900-2016



Note: Excludes Bulk Mineral discoveries (i.e. bauxite, potash, phosphate, coal and iron ore)
 Moderate >100koz Au, >10kt Ni, >100Kt Cu equiv, 250kt Zn+Pb, >5kt U₃O₈
 Major >1Moz Au, >100kt Ni, >1Mt Cu equiv, 2.5Mt Zn+Pb, >25kt U₃O₈
 Giant >6Moz Au, >1Mt Ni, >5Mt Cu equiv, 12Mt Zn+Pb, >125kt U₃O₈

Source: MinEx Consulting © October 2017



Thank you !



INSTITUTO
DE INGENIEROS
DE MINAS
DEL PERÚ



pro**EXPLO**
2019

Acknowledgements

**Sierra Metals
Grupo Mexico**

XI CONGRESO INTERNACIONAL DE
PROSPECTORES Y EXPLORADORES

**EXPLORACIÓN MINERA:
CIENCIA, INNOVACIÓN E
INVERSIÓN ESTRATÉGICA**

Rgordon@quantecgeoscience.com
Lramayo@quantecgeoscience.com

www.proexplo.com.pe



INSTITUTO
DE INGENIEROS
DE MINAS
DEL PERÚ



proEXPLO
2019

Main title **21- point Arial Black with** **shading**

Sub title: 18-point Arial with black

Text: 18-point Arial