Seismic and Mineral Exploration

- Time for a new relationship

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Quickfire session
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Hon. Martin Fergusons's challenge to the "Searching the Deep Earth" Think Tank

"Deep earth exploration is the next frontier and it is a frontier that we must conquer if we are to continue to reap the economic benefits of our natural mineral wealth"

Conquering the new frontier!

Typical Solution
(Drilling)

Problem
(Exploration under cover)

Seismic Solution
(Seismic +Drilling)

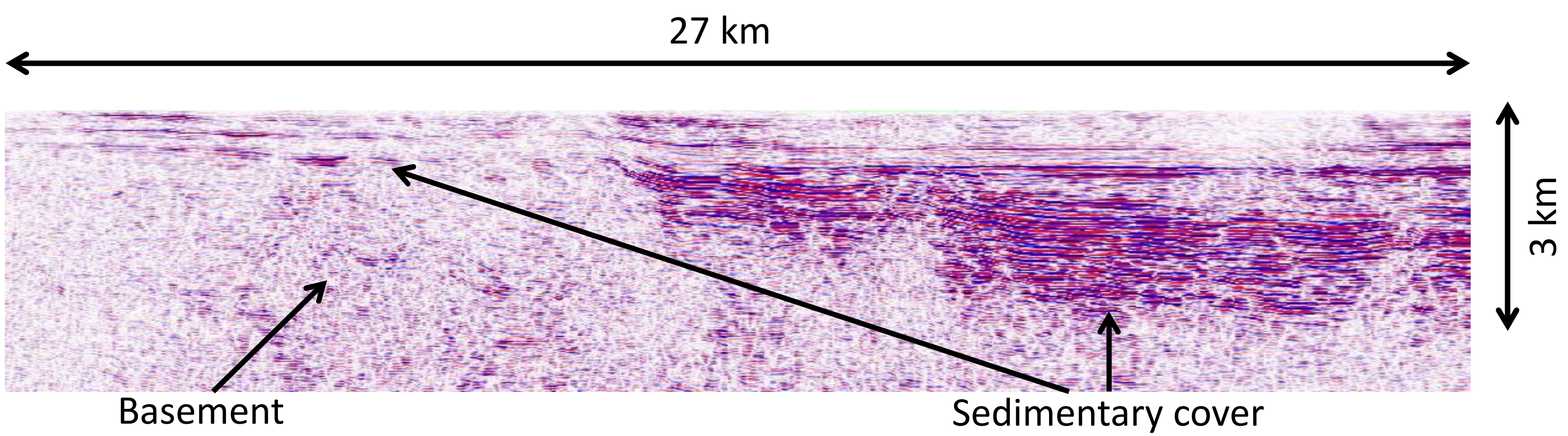
- Detect point locations of contacts and structures
- Resolution of conventional minerals geophysics degrades rapidly with depth
- Each hole tests a small area and provides limited context for further exploration
- 3 holes in 3 months
- ≈ $300K per km

- Map contacts and structures in 3D
- Resolution is maintained at depth
- Each 3D seismic survey screens multiple km^3 and provides framework for subsequent exploration
- $10km^2$ acquired and processed data in 3 months
- ≈$150K/$km^2$ (0→2km^+)
- Cost effective!

Seismic Reflection – Depth of Cover

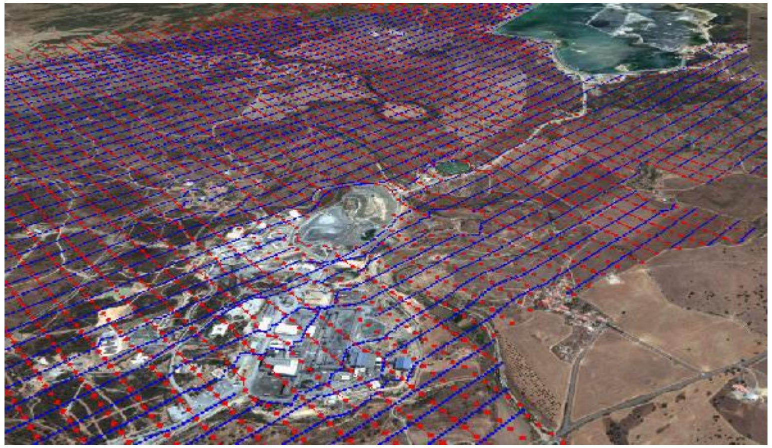
Key attributes:

- **Resolution - Resolution of the order of 10m, maintained as a function of depth**
- **Depth range - Can map cover thickness from 10s of metres to >1km**
- **Broad applicability - Works in wide range of environments**
- **Customisable – eg LiteSeis to map cover and basement structure ~ $3500/km**



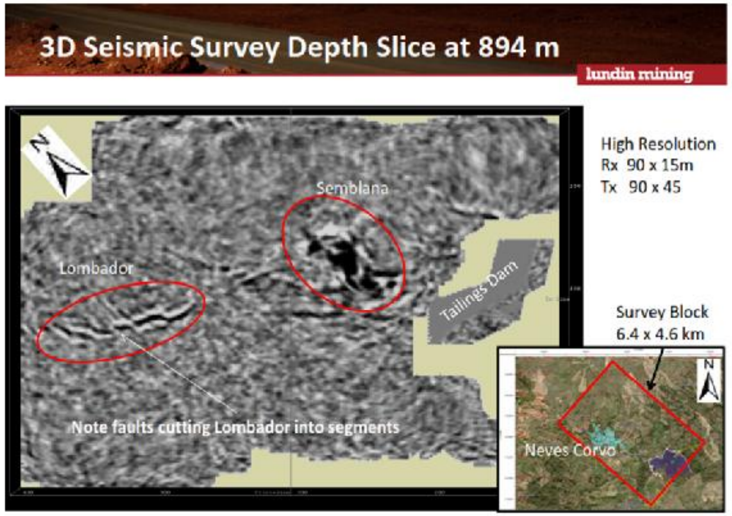
Geoscience Australia line GA_OD1 reprocessed by HiSeis

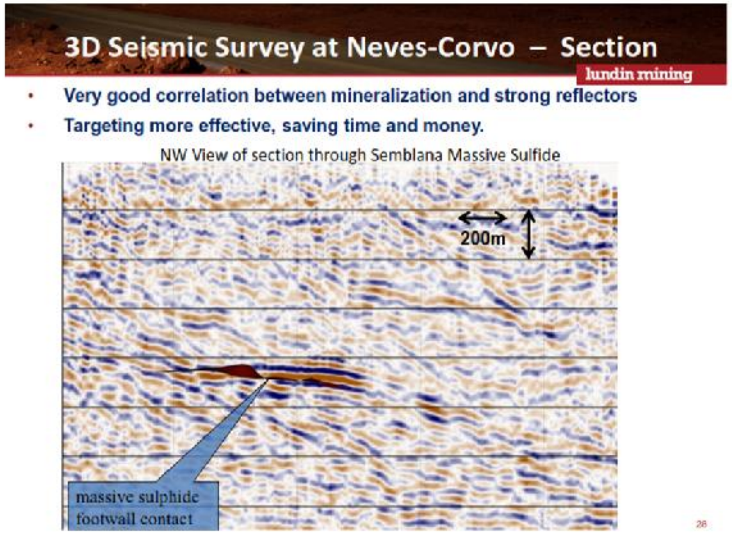
Seismic Reflection – Basement Geology



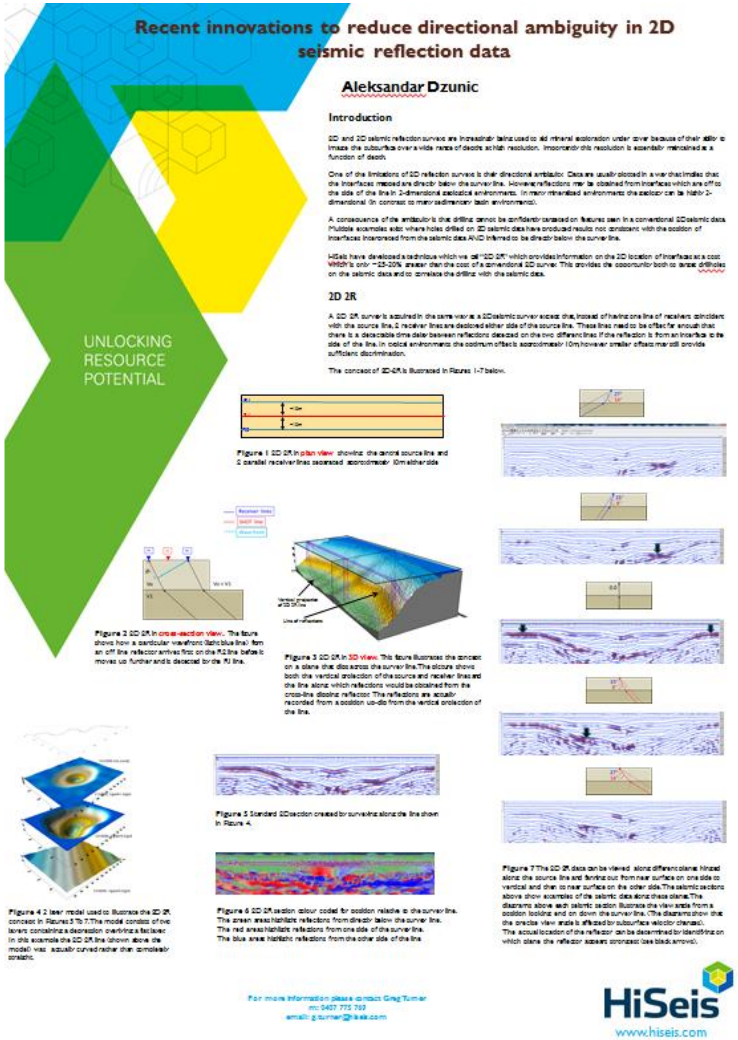
Key attributes:

- **Persistence – Maps bedrock structure through cover and below mine infrastructure**
- **Structures – Tight spacing of measurements excellent for mapping structures**
- **Direct detection – Massive sulphides present strong seismic property contrasts to most host rocks**





Seismic Reflection – Innovations



3D detection from 2D surveys

Come see our poster!