FLEET

Technology Comparison: Ambient Noise Tomography (ANT) and 2D Active Seismic

Introduction

The increasing demand for critical minerals is resulting in a growing need for mineral explorers to identify new deposits at a faster pace. The industry is currently focussing on deeper deposits in areas under cover and geophysical methods are being used as screening and targeting tools. In that scenario, our ExoSphere solution utilises Ambient Noise Tomography (ANT) method to penetrate cover with great sensitivity to deep deposits, allowing large areas to be explored quickly and providing greater confidence in deep drill targets.

Active Seismic Challenges

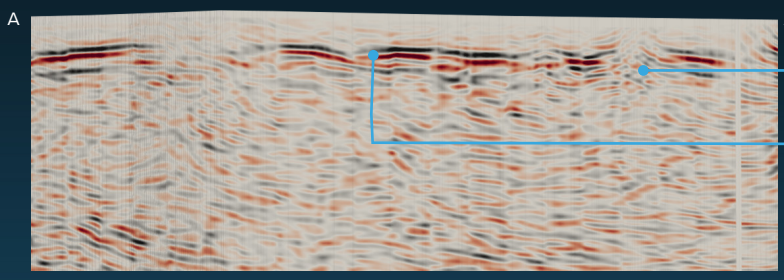
Active seismic imaging has been the cornerstone of oil & gas exploration for its high resolving power and depth sensitivity. However, for mineral exploration there are significant limitations of the technology in terms of high cost, considerable environmental impact and complex logistics that impede its ongoing application. This method struggles with subvertical features at depth, like faults and lithological contacts. The ANT method addresses these challenges with an easy deployment and cost-effective solution that has the potential to fast-track mineral exploration.

Technology Comparison

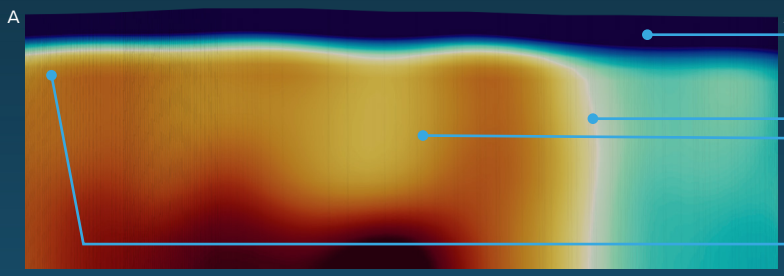
We can see that there is relatively a good agreement in the depth of cover between ANT and 2D Active Seismic, with the ANT method potentially providing more information on the nature of the cover. While many reflection responses correlate between surveys, the sub-vertical stratigraphy is better imaged with ANT. The subvertical high velocity region near the middle of the section likely corresponds to a relevant fault.

We can also see a transition from high to low velocity in the basement. The fault is seen in the Active Seismic data near the surface, but hard to identify and delineate at depth. Short, active seismic lines find such geometry challenging, as illustrated by the comparison images of the methods and the 3D ANT image illustrated below.

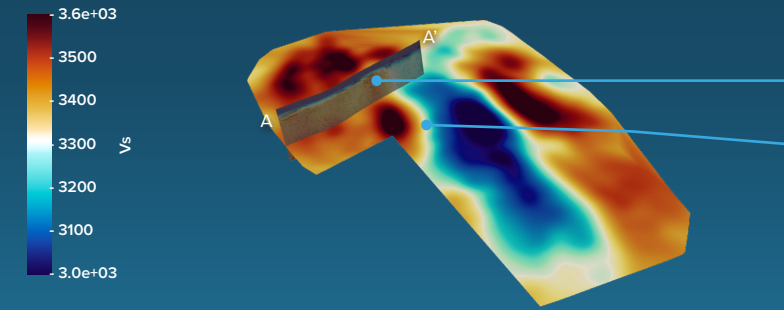
2D Active Seismic Image



ANT Image



3D ANT Image highlights the faults very clearly



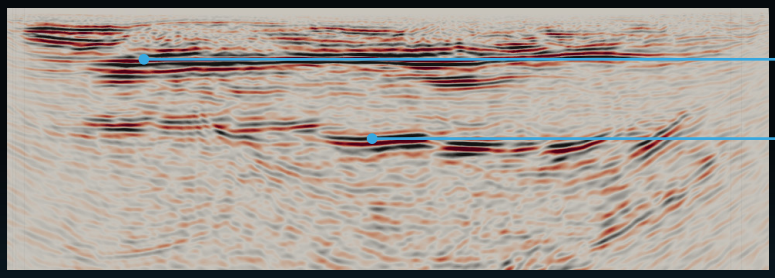
ExoSphere solution and the ANT Method

Fleet's solution ExoSphere utilises the Ambient Noise Tomography (ANT) method which does not require an active source to image the subsurface. It utilises sensors that measure ambient seismic noise to create a 3D model of the deep surface in just a few days. ANT uses passive sensors deployed in an array of devices to measure ambient noise in which the post-processing of the data and the correlation between sensors yields a 3D map of seismic velocity, from which ore body candidates can be identified.

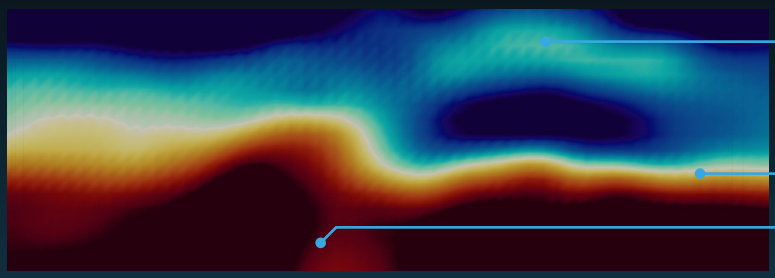
Great correlation of ANT and 2D Active Seismic

This case highlights a great correlation of ANT and Active Seismic featured in the image of both models below. On the top of the figure we have a good match with ANT and the seismic reflections from layers in the cover sequence. We also have a good match with ANT and the seismic reflections from the upper basement. On the left side it marks the contact between the slow shallow layer and the faster second layer within the cover. To the center-right we distinguish a 3 layer cover sequence, the second layer being an anomalous high velocity associated with stratabound mineralised area. Within the basement we can identify a velocity change in the center, which is harder to see with active seismic.

2D Active Seismic Image



ANT Image



Tech Benefits

- **Low environmental footprint**
- **Easy deployment**
- **Fast survey results**
- **Cost-effective solution**
- **3D mapping survey coverage**
- **Better imaging of subvertical features**

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Speak to an Exploration Specialist

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