



Interpretation of 15m d_EXTO data at a Quebec multi-metal Mine.

15 meter long YieldPoint extensometers were installed in a roof. Blasting activity was taking place about 100 meters away. The extensometer has 6 anchors points situated at 2m, 4m, 6m, 8m, 10m and 15m from the collar.

Key interpretation points:

1. The displacement versus time data clearly shows the effect of blasts on Oct 22 and Oct 28. This was inferred from the data and can be confirmed. Although these are only accounting for dynamic movements of approximately 100 microns they do represent a point of reference to compare the effect of blasts of similar size during retreat and as the rock becomes more damaged. Note: The Head being close to the back is affected by temperature changes (Figure 1) within the excavation and consequently exhibits more noise.
2. The presumed blasts have two effects.
3. - there is initially an acceleration in movement
- there is then separation between adjacent anchor points.

For example after the 22 Oct event the Head and the 2.0m points began to diverge, and also the 4m anchor diverged from the deeper anchors.

4. Movement is presently confined between the back and 6m. As mining retreats towards the extensometer then deeper movements might occur.
5. The head and 2m anchors exhibit creep at a rate of around 0.15mm/day. Following the blast on Oct 22nd the rate at which the head was moving increased to 0.2mm/day (Figure 3).
6. Although the anchor at 4.0m moves due to blasting it does not creep (0.0mm/day). i.e. movements are observed in response to blasts but not otherwise. The 0.3mm (total) of movement measured may be in the elastic range.
7. The response of the anchors to the release of energy due to blasting is measured (Figure 4). For the 2m anchor on Oct 28 approximately 0.08mm of movement occurs due to the blast and then the movements decelerate for several hours while the driving stresses driving stresses re-establish around the excavation. The fact that the ground velocity decreases immediately after a last is a positive indicator. Ground velocity then returns to the initial level.



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8. Figure 5 indicates the displacement profile along the length of the 15m d_EXTO and how it has evolved with time. In early October the movement was principally between 2m and 4m but over time movement has begun to develop throughout the 6m adjacent to the back.

Continued monitoring will allow us to follow the rock around the excavation as it becomes more damaged (i.e. during retreat towards its location).

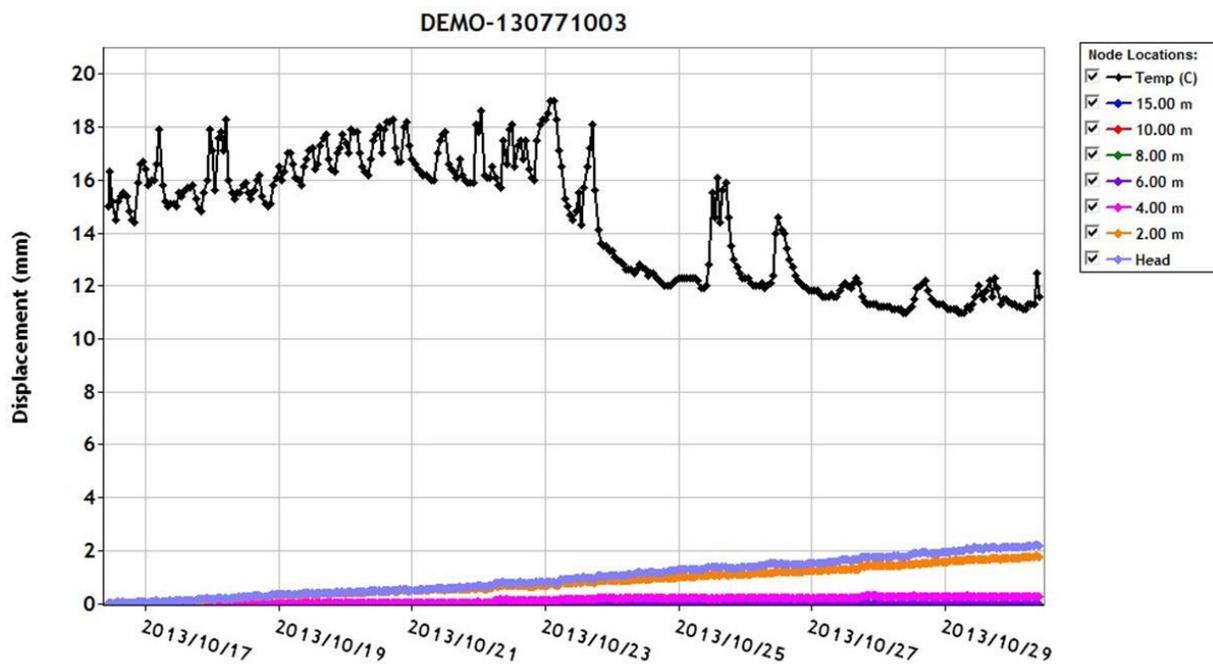


Figure 1 Note: Black trace is temperature.



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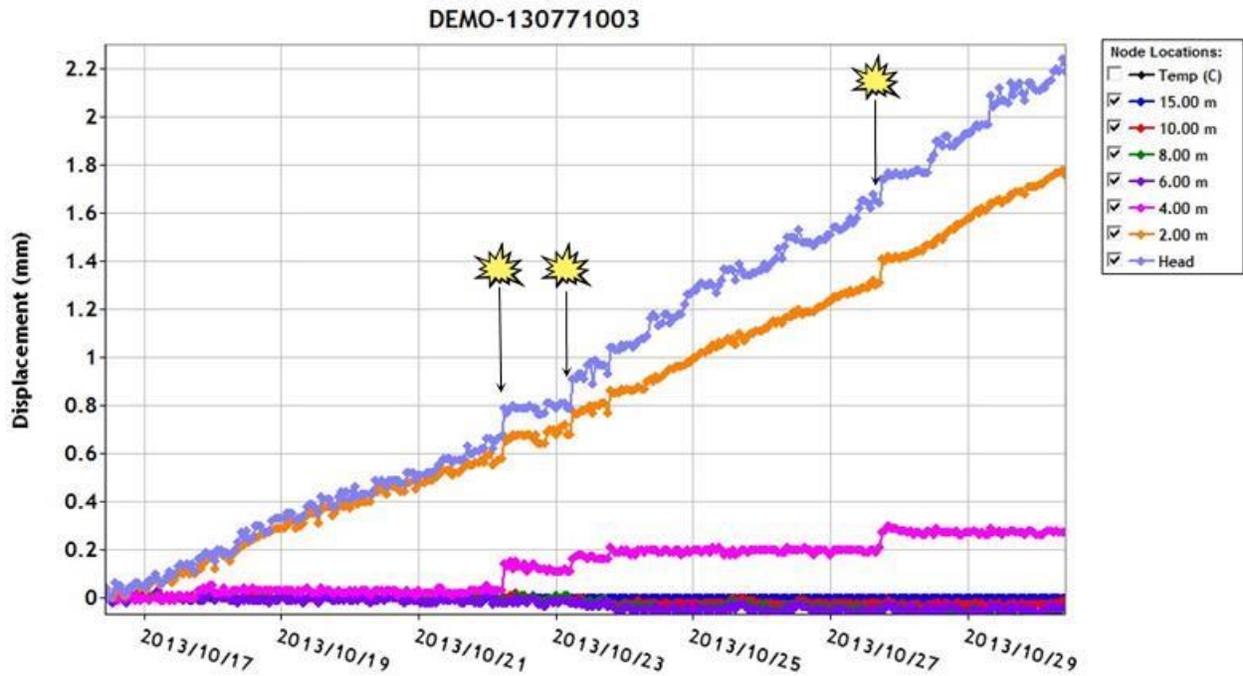
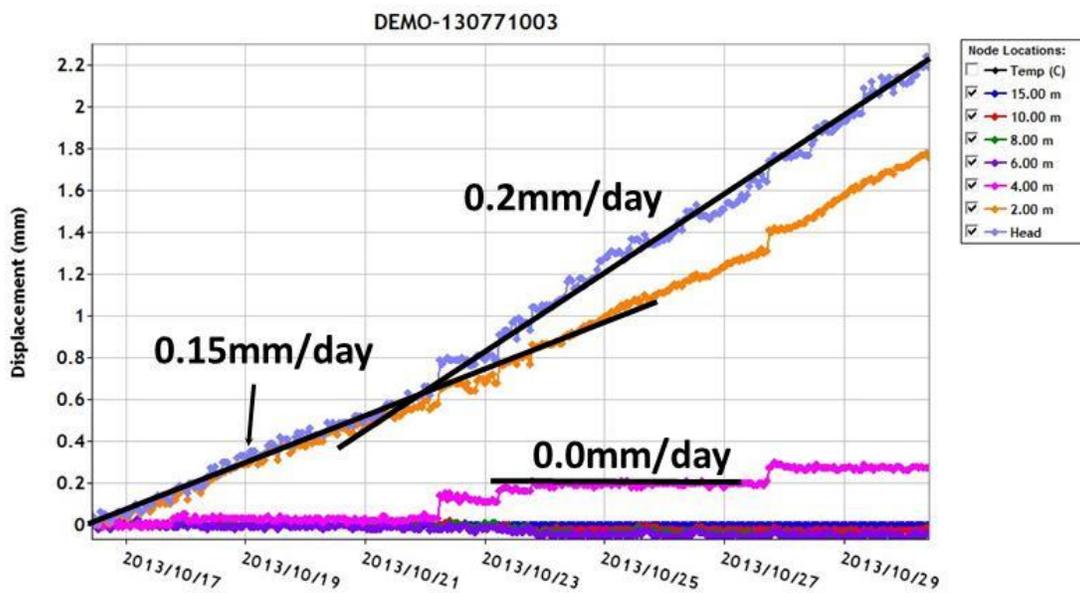


Figure 2:





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Figure 3

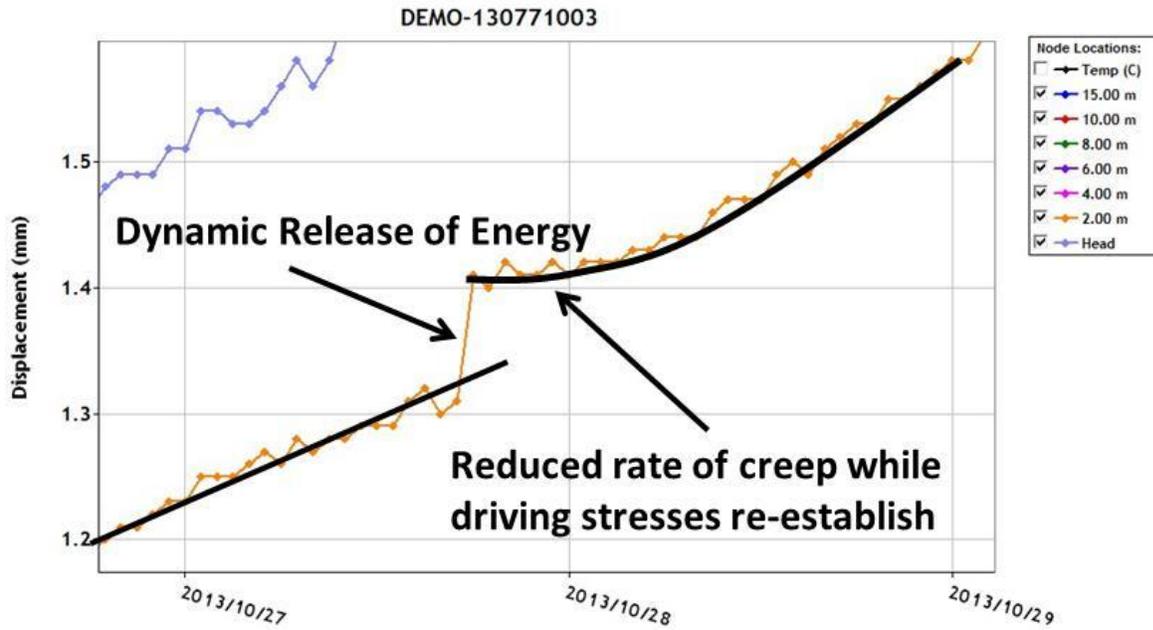


Figure 4:



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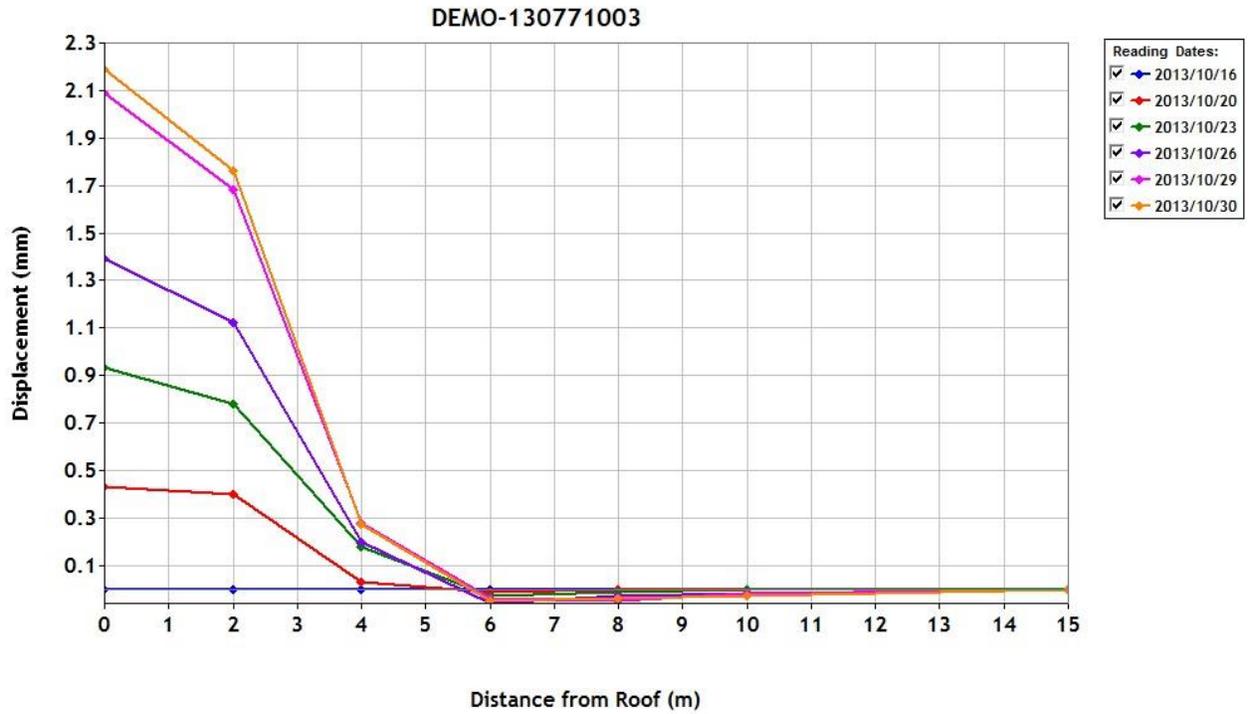


Figure 5.