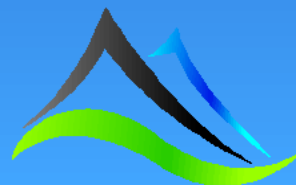


Depth of Detection and Resolution of Multipole and Double Offset Dipole-Dipole Arrays for Narrow Vein Targets

ExploreGeo
Technical Note 5



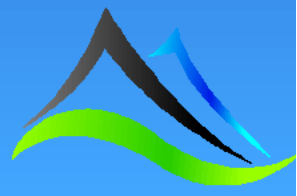
Forward Modelling Details

The purpose of this project was to compare the responses of a double offset dipole-dipole array, a variable receiver multipole array and a variable transmitter/receiver multipole array to narrow veins at differing depths, offsets and resistivity/chargeability contrasts.

Forward modelling was undertaken using Res3Dmodx64 with noise added to the exported chargeability and resistivity values. This was done by adding a random number to the primary voltage between -5% and 5% of the original value and then adding the same proportion of noise to the corresponding chargeability and resistivity values.

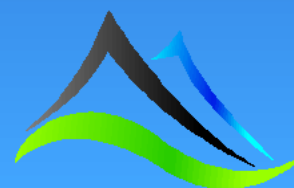
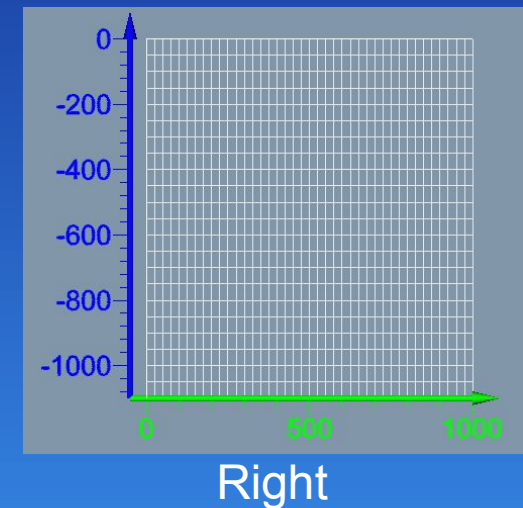
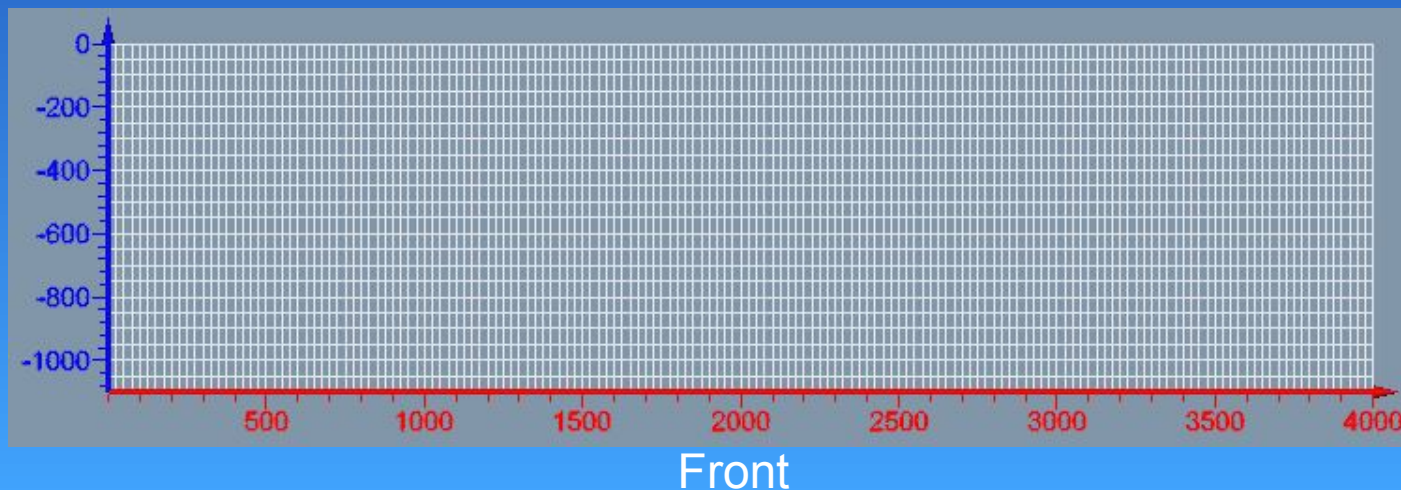
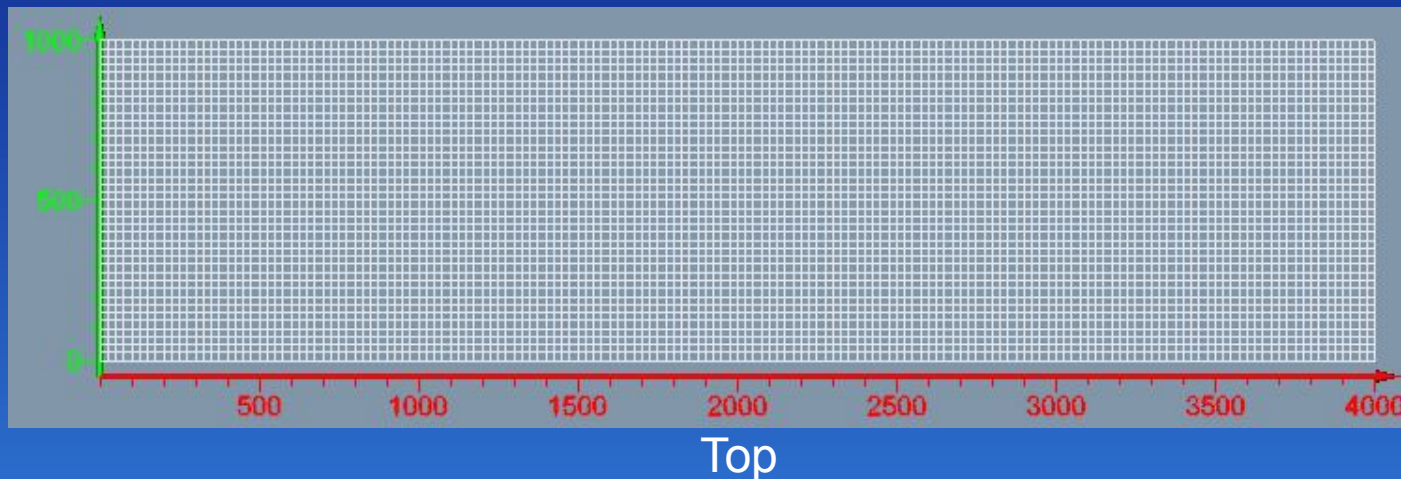
Primary voltage was calculated with an assumed current of 20A and was not clipped before the inversion because all values were above 0.1 mV.

These noise adjusted readings were then exported as a file to be read in by Res3Dinvx64.



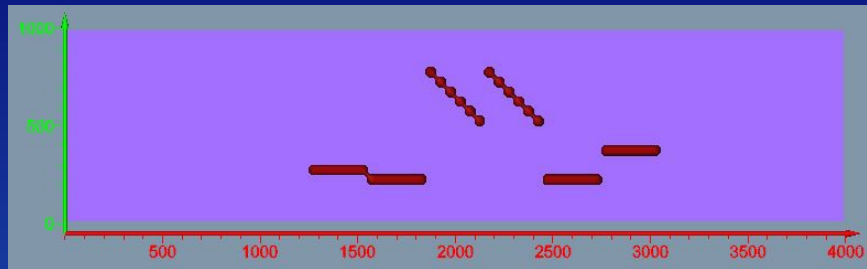
Mesh Details

The finite element mesh used to create the forward models is displayed below. It consisted of 25m x 25m x 50m voxels over a 4,000m x 1,000m x 1,100m volume. All electrodes (current and potential) were included in the mesh. Mesh size was 160 x 40 x 22

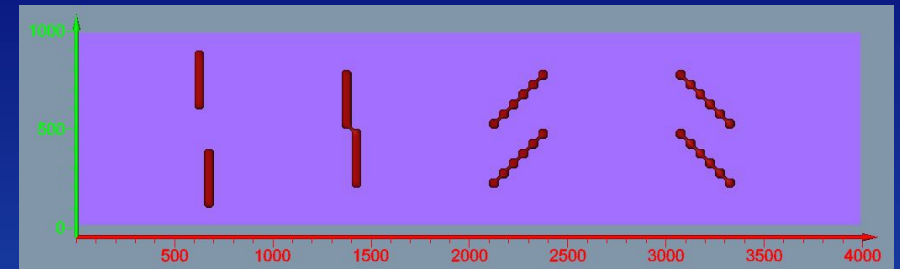


Model Details

There are two types of base forward model; Type A and Type B.



TYPE A PLAN VIEW



TYPE B PLAN VIEW

Model A consists of resistive veins which all lie beneath the receiver electrode area and was used to model the response of resistors oriented strike parallel to the survey lines.

Model B consists of resistive and conductive veins, four of which lie outside of the receiver electrode area. This model was used to compare resistive and conductive veins that are oriented strike perpendicular to the survey lines.

Each of these models were altered to reflect a different depth, thickness and/or resistivity/chargeability contrast.

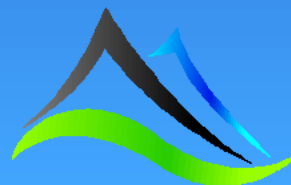
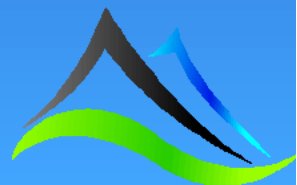


Figure Details

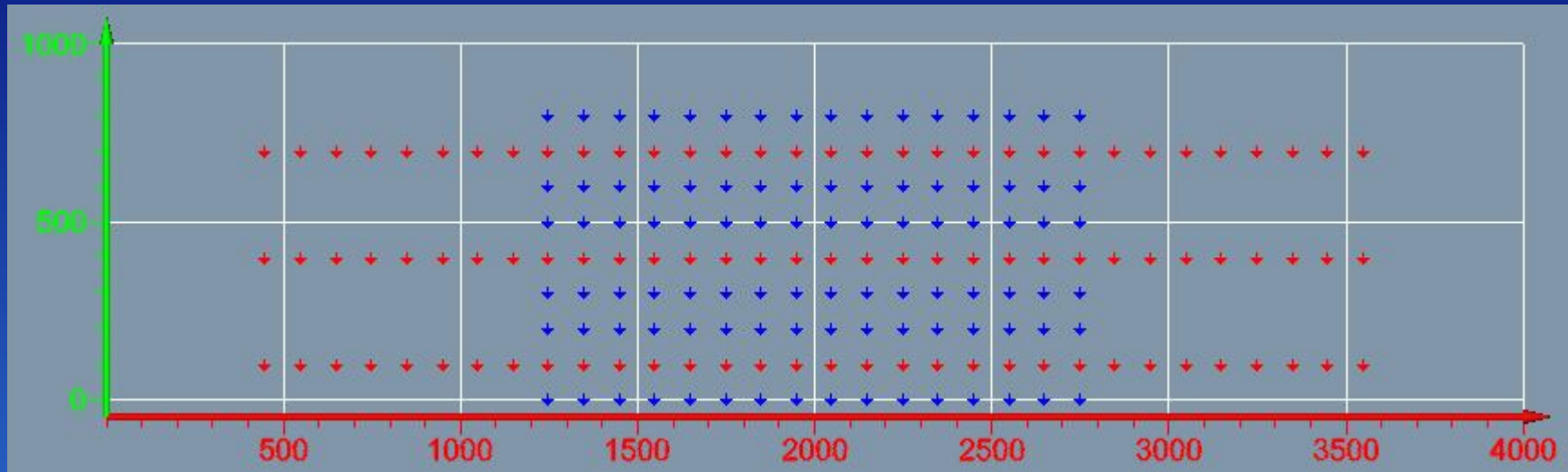
The inversion slides show a plan view taken from the top of the model and sections from the front and right side of the model, with black lines indicating where these sections were taken.

IP images use a local linear colour stretch and resistivity images use a logarithmic colour stretch.

IP figures display a 0.5 mV/V contour interval and resistivity figures display a logarithmic interval of 10 contours/decade.



Electrode Layout

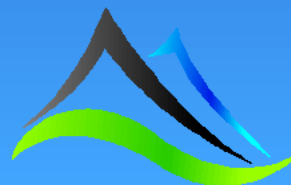


Red electrodes: transmitters

Blue electrodes: receivers

Line spacing: 100m

Electrode spacing: 100m



Array Types

Double Offset Dipole-Dipole (DODD)

- 200m transmitter dipole size AB
- 100m receiver dipole size MN

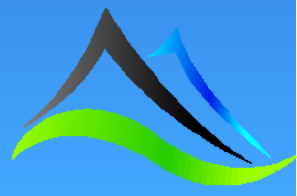
Variable receiver multipole (MRx)

- 200m transmitter dipole size AB
- 100m, 200m, 300m and 400m receiver dipole size MN

Variable transmitter and receiver multipole (MTxRx)

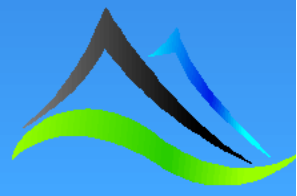
- 200m and 600m transmitter dipole size AB
- 100m, 200m, 300m and 400m receiver dipole size MN

For each transmitter dipole that is active, all dipoles on the two adjacent receiver lines are active.

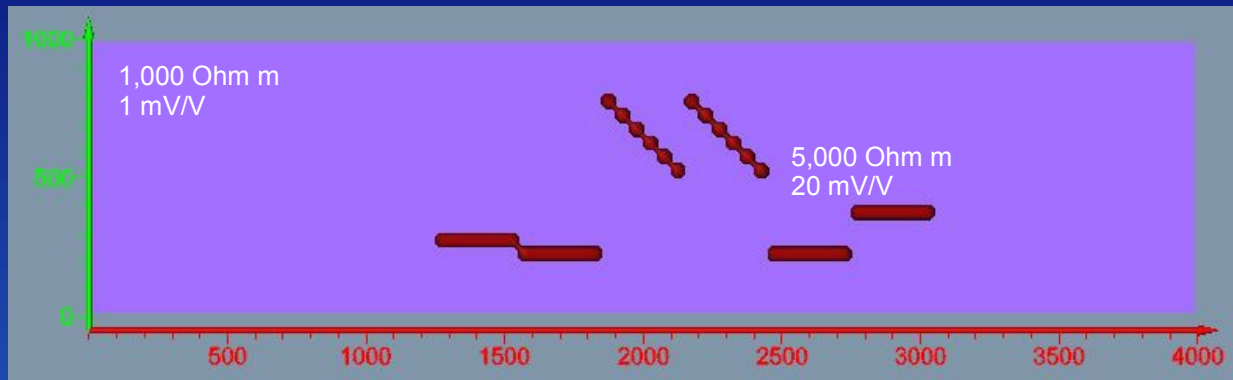


Intro: Type A – Resistors in a 1,000 Ωm half space

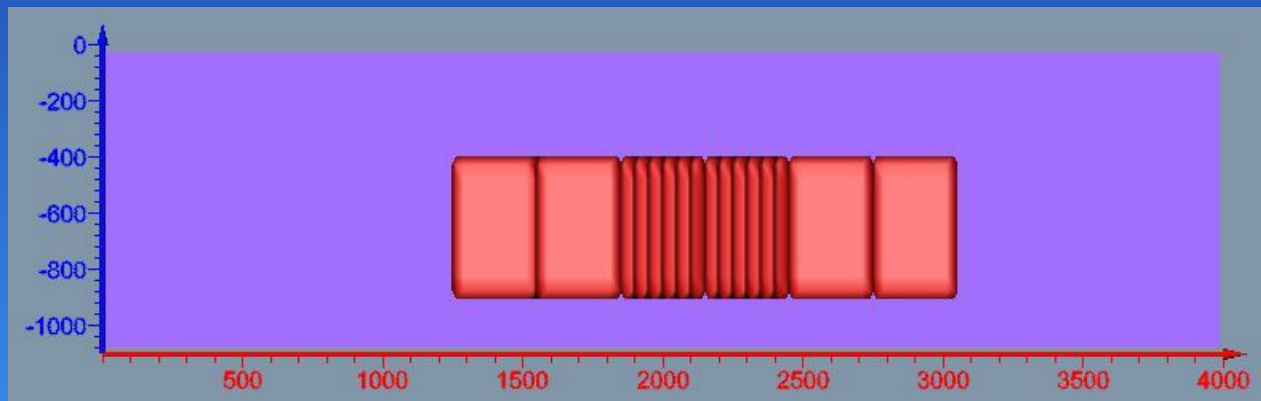
- The following set of slides show the inversion results of model type A for two resistivity contrasts. The first example is a resistor of 5,000 Ωm and the second is of 50,000 Ωm .
- The veins have a chargeability of 20 mV/V.
- The host rock has a resistivity of 1,000 Ωm and a chargeability of 1 mV/V.
- The depth to the top of the veins is 400m.



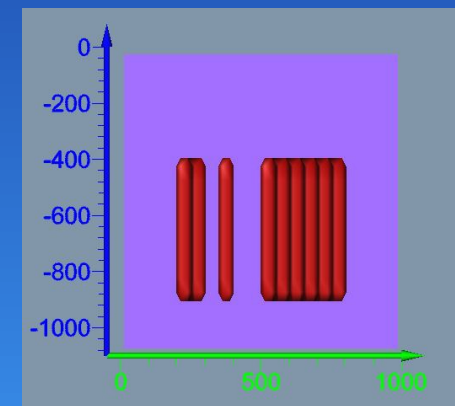
Model: Type A – 5,000 Ωm resistors in a 1,000 Ωm half space



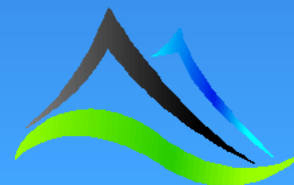
Top



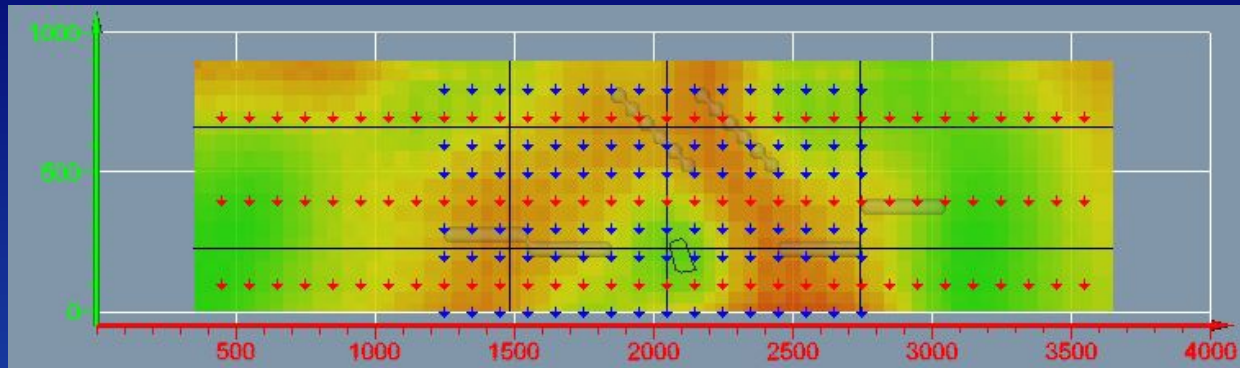
Front



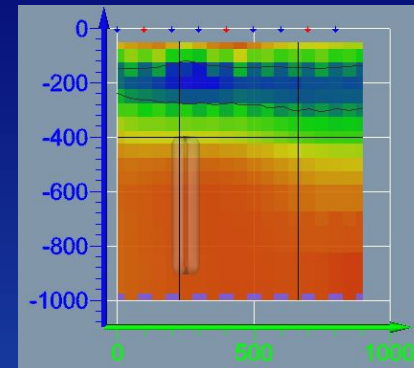
Right



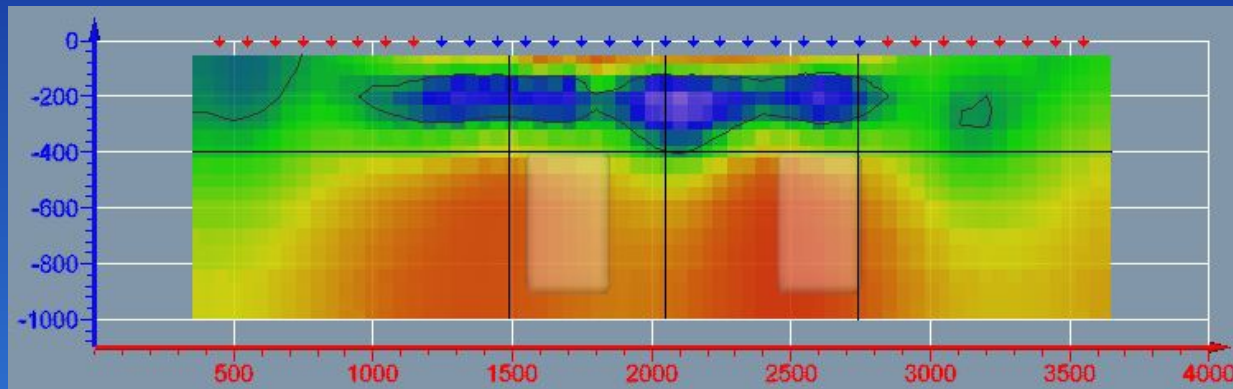
Type A – 5,000 Ωm in 1,000 Ωm – Resistivity Inversion (DODD)



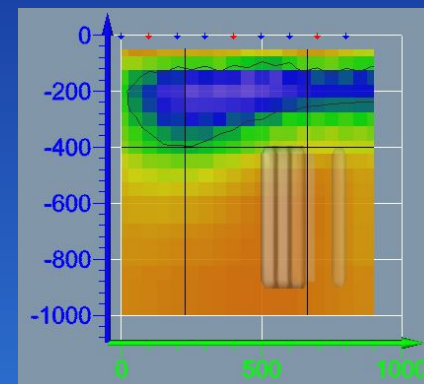
Plan View



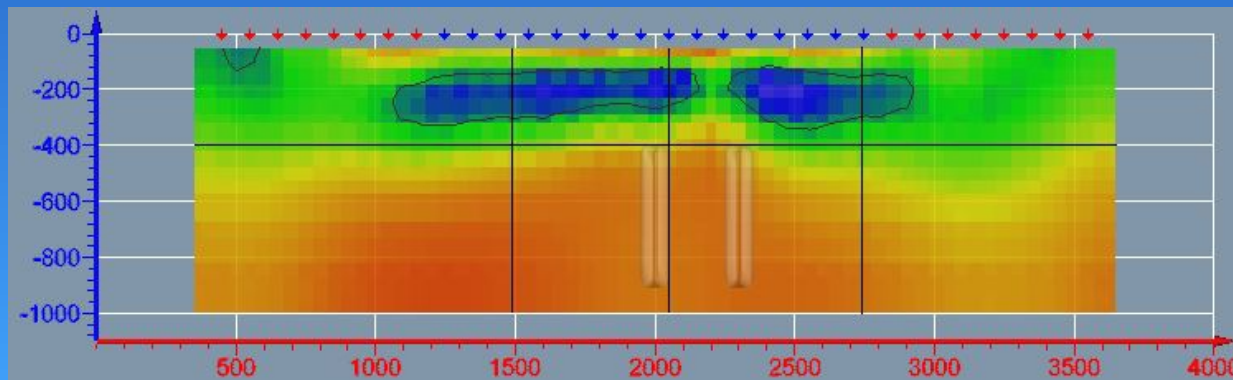
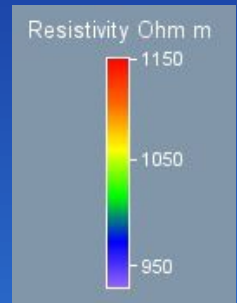
X-section - 1500



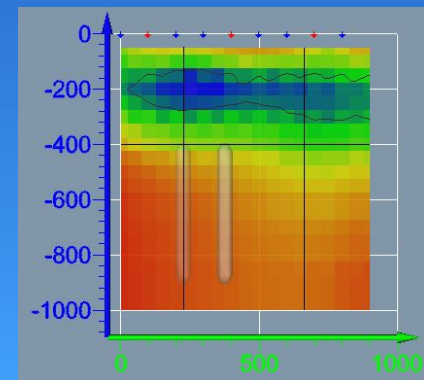
Long Section – 250



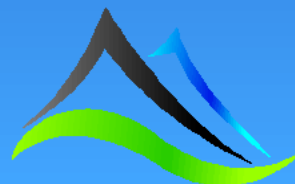
X-section - 2000



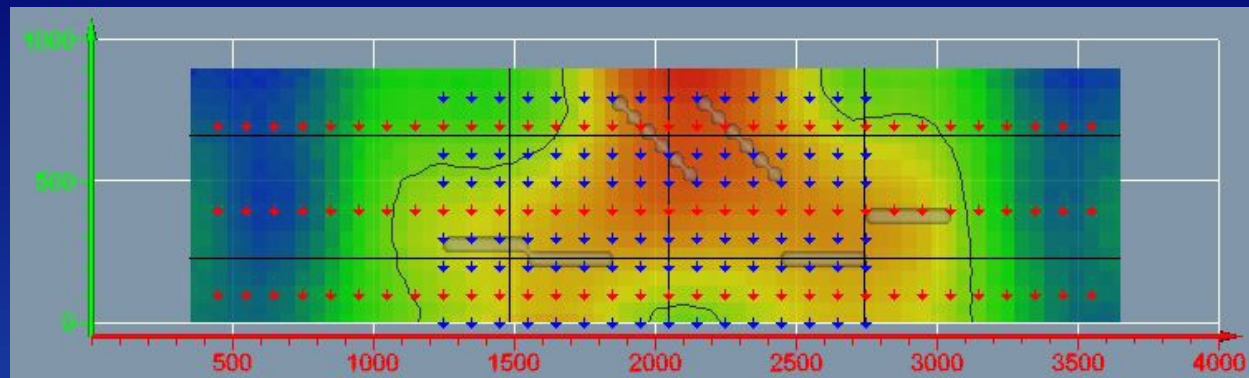
Long Section – 700



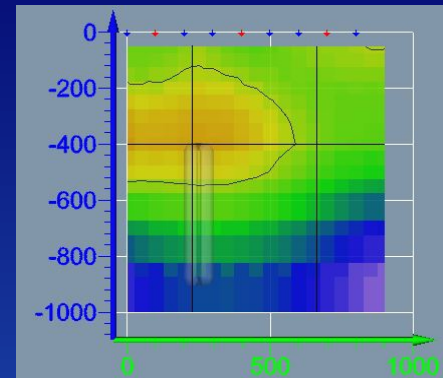
X-section - 2700



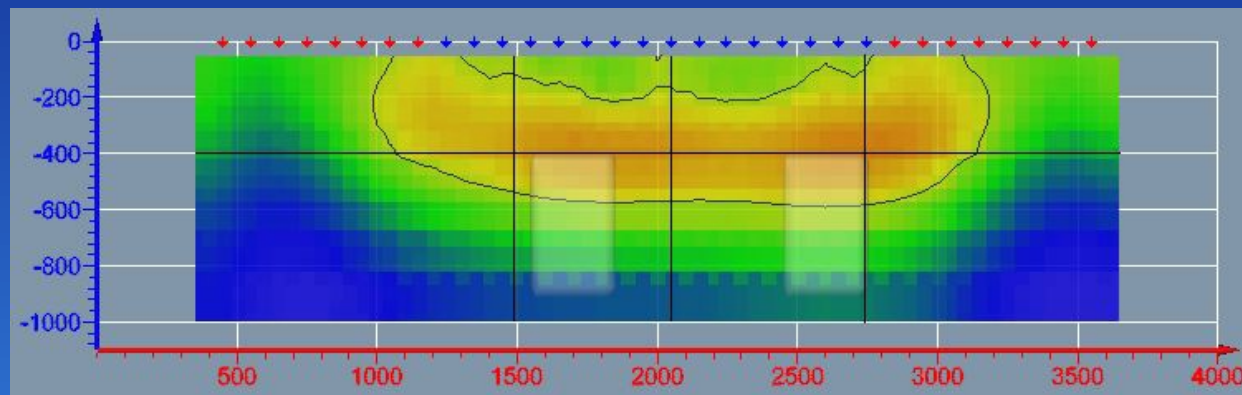
Type A – 5,000 Ωm in 1,000 Ωm – Chargeability Inversion (DODD)



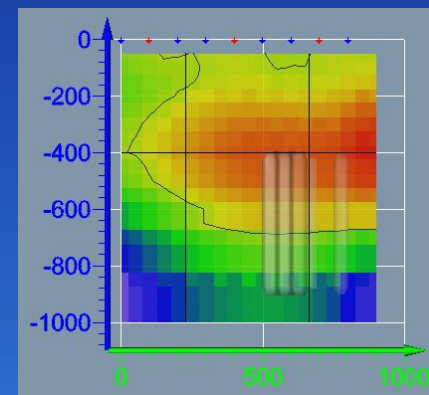
Plan View



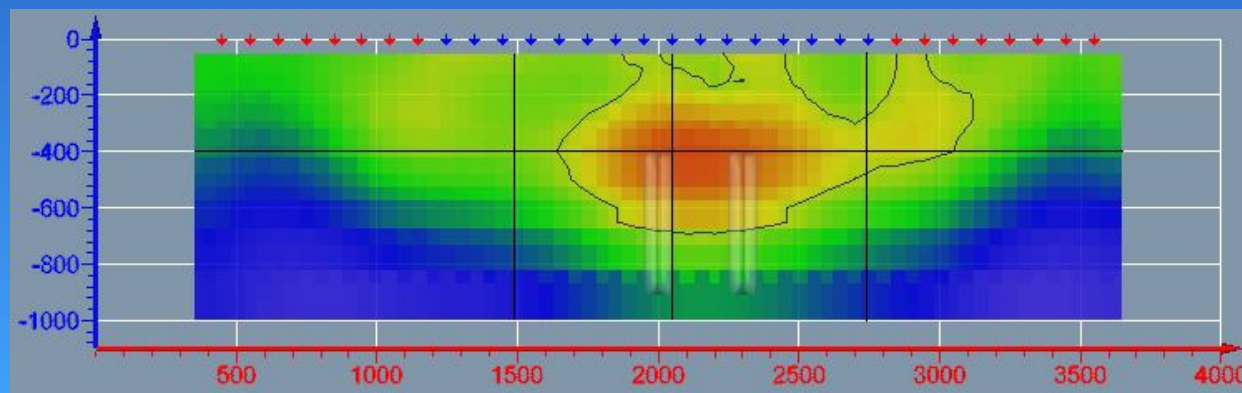
X-section - 1500



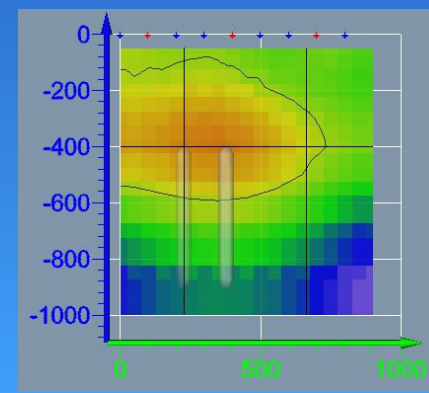
Long Section – 250



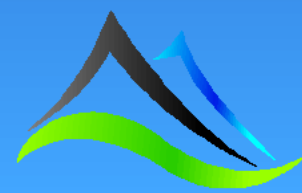
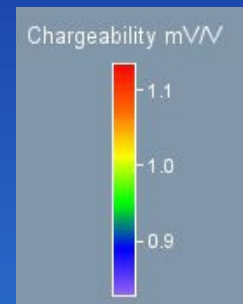
X-section - 2000



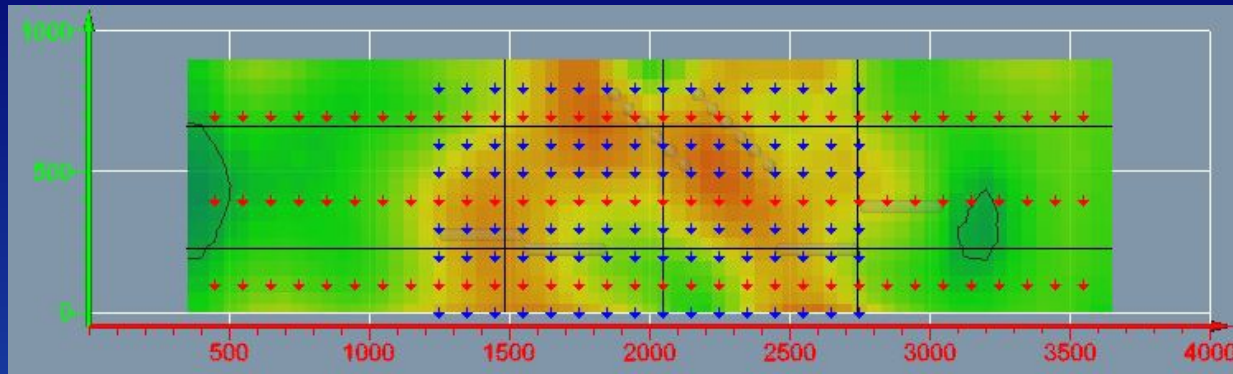
Long Section – 700



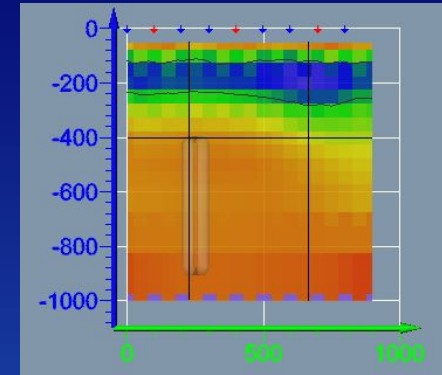
X-section - 2700



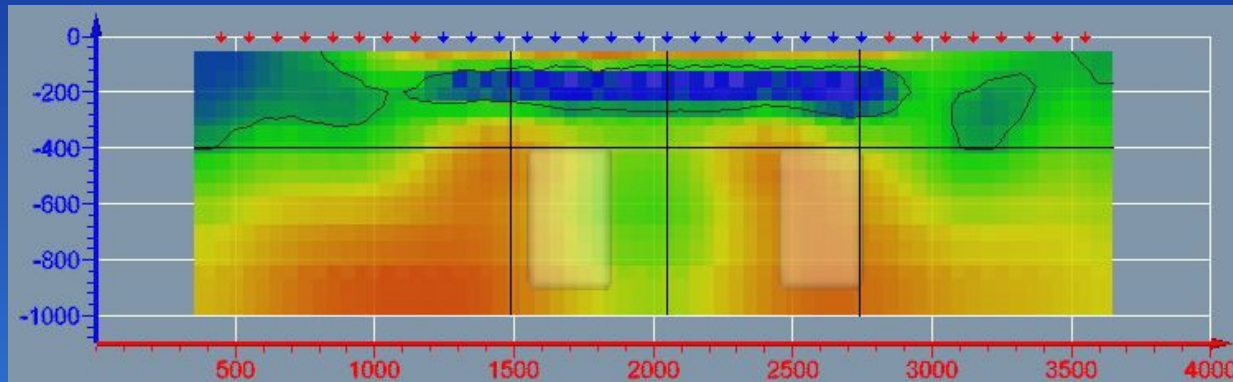
Type A – 5,000 Ωm in 1,000 Ωm – Resistivity Inversion (MRx)



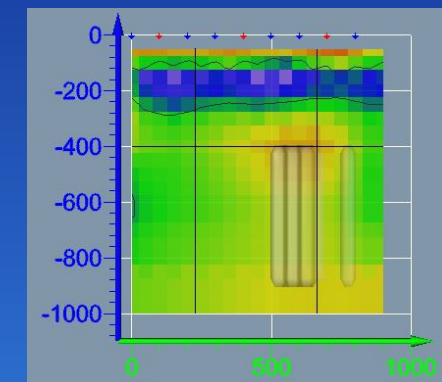
Plan View



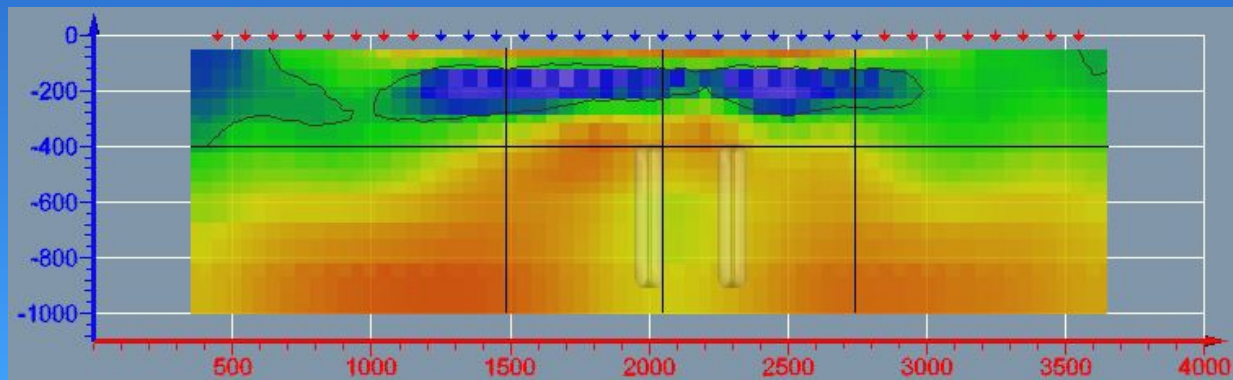
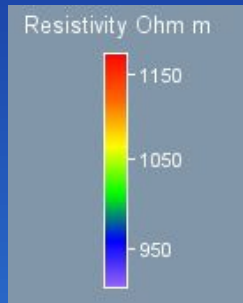
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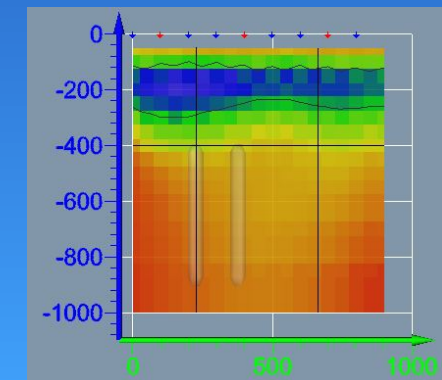
Long Section – 250



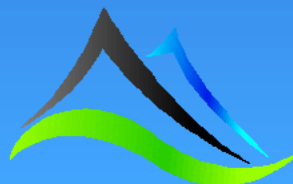
X-section - 2000



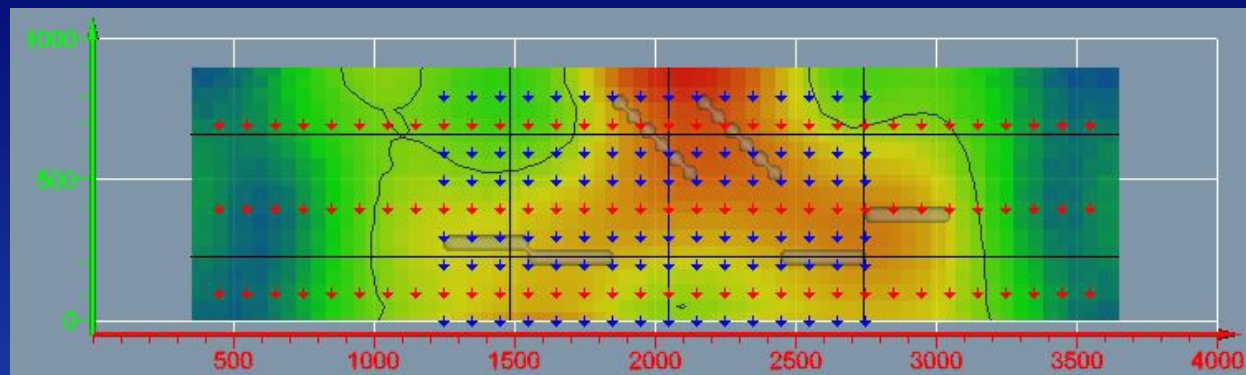
Long Section – 700



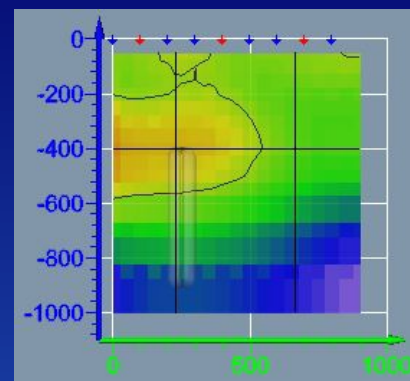
X-section - 2700



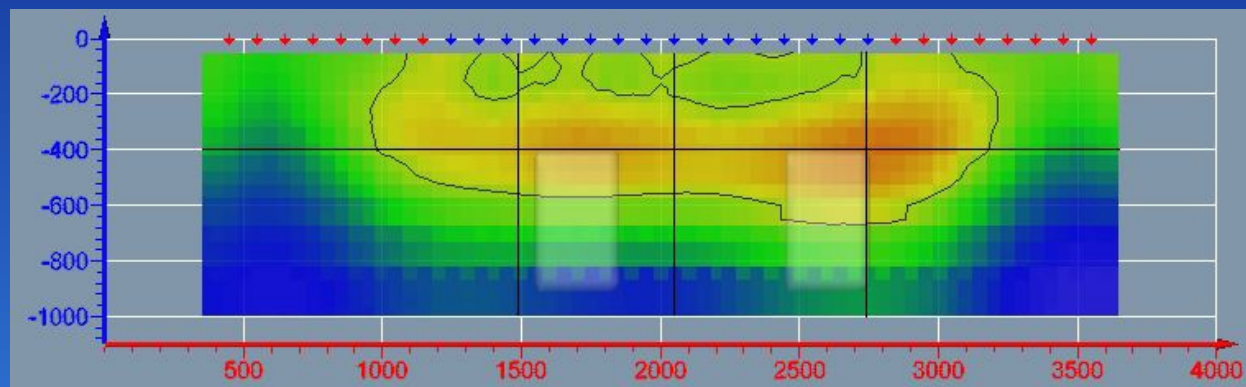
Type A – 5,000 Ωm in 1,000 Ωm – Chargeability Inversion (MRx)



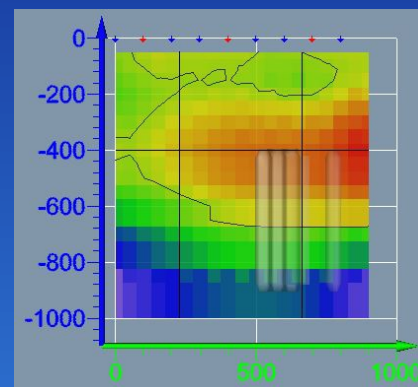
Plan View



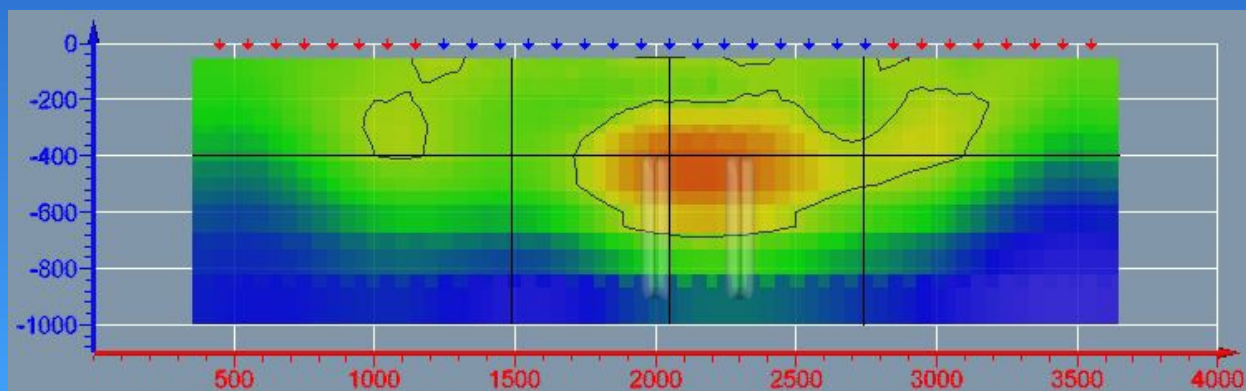
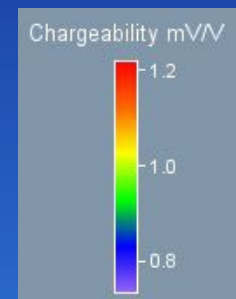
X-section - 1500



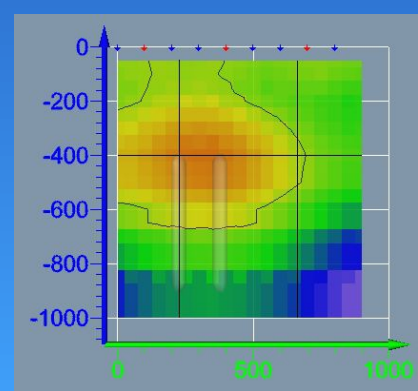
Long Section – 250



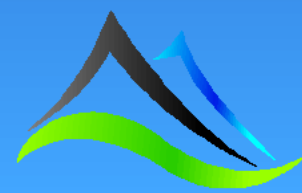
X-section - 2000



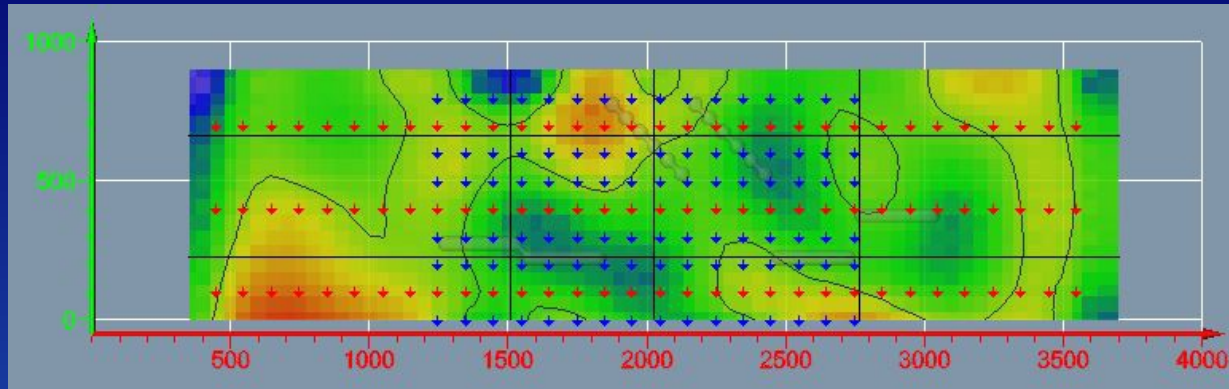
Long Section – 700



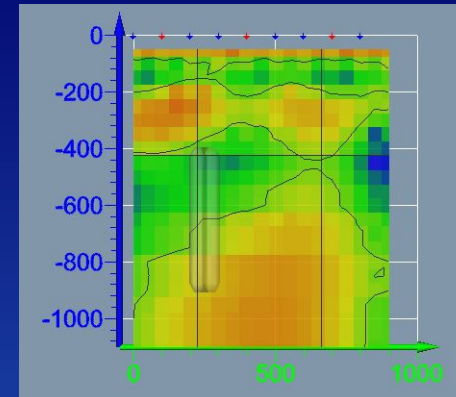
X-section - 2700



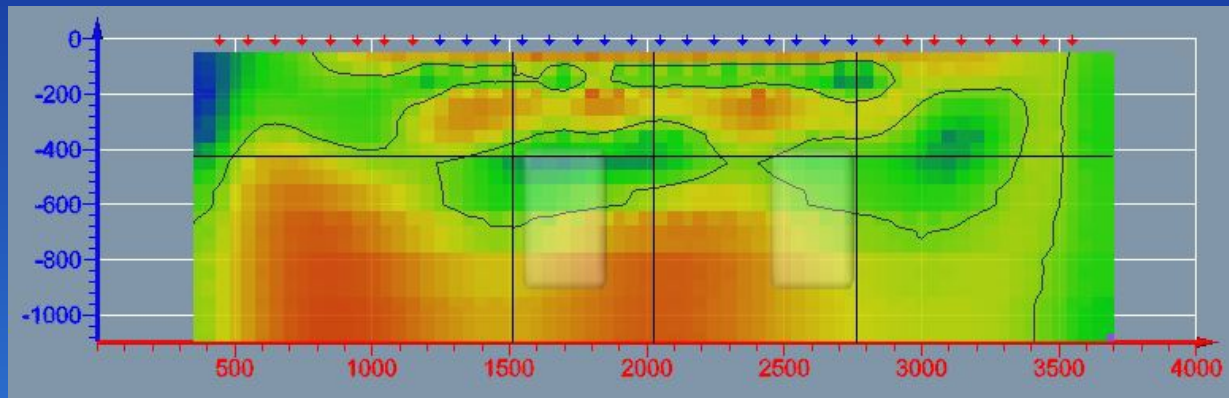
Type A – 5,000 Ωm in 1,000 Ωm – Resistivity Inversion (MTxRx)



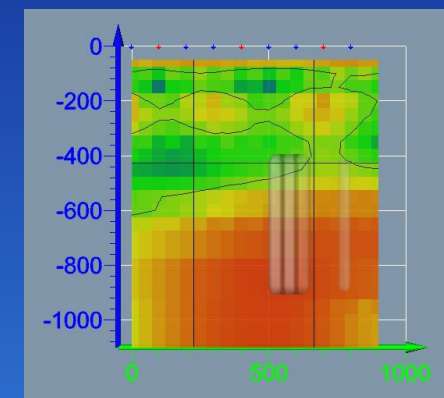
Plan View



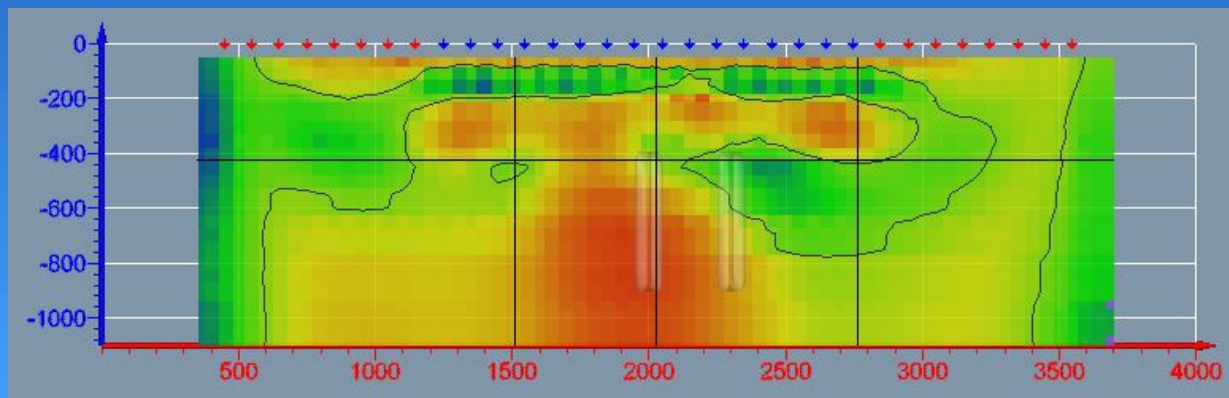
X-section - 1500



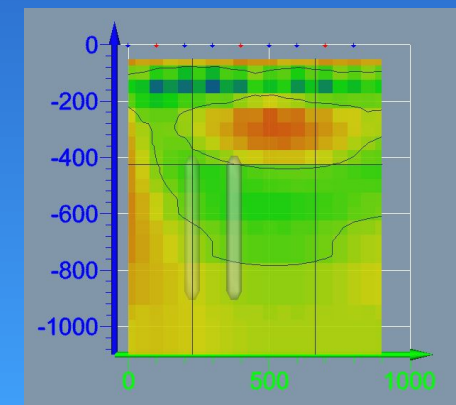
Long Section – 250



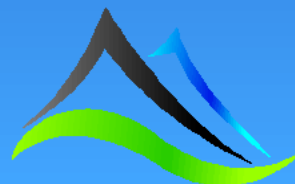
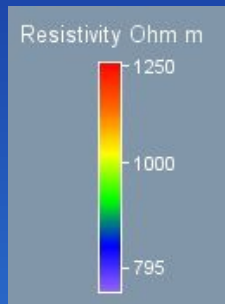
X-section - 2000



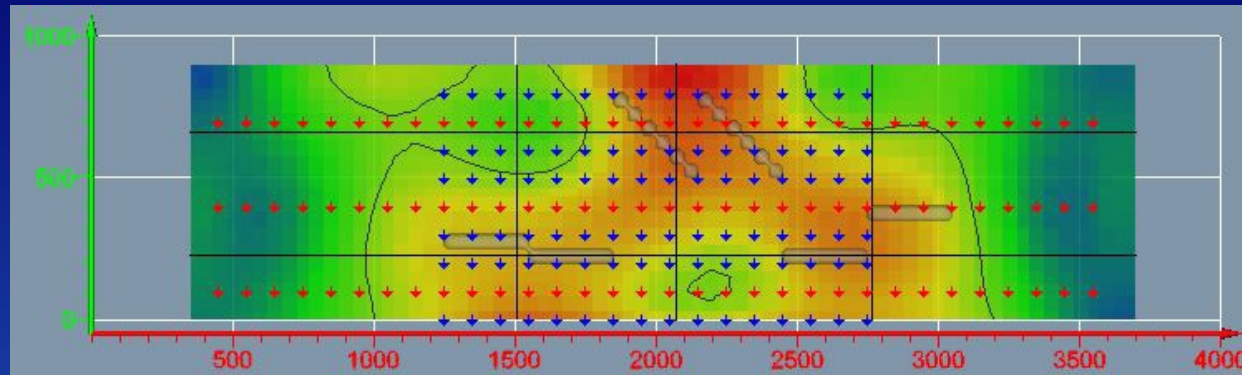
Long Section – 700



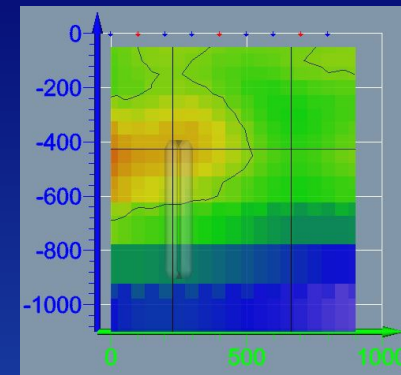
X-section - 2700



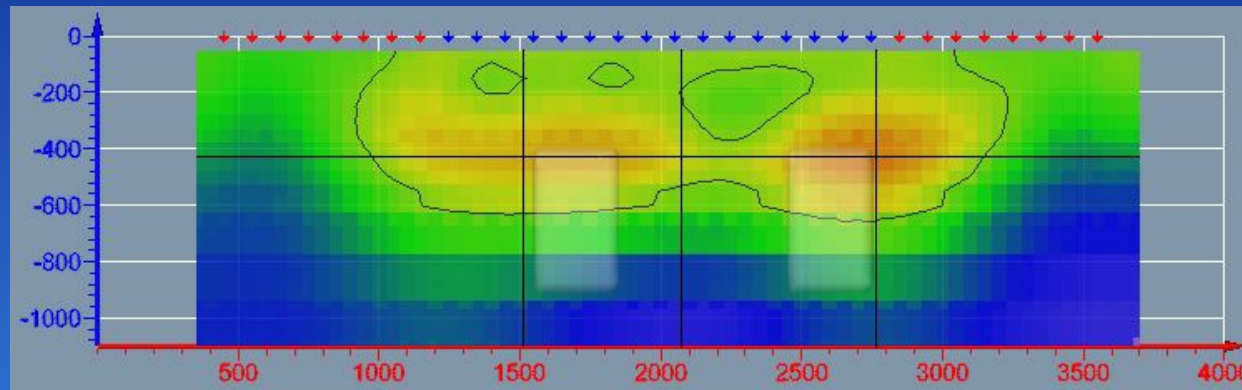
Type A – 5,000 Ωm in 1,000 Ωm – Chargeability Inversion (MTxRx)



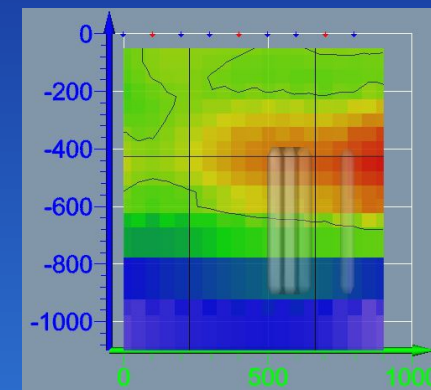
Plan View



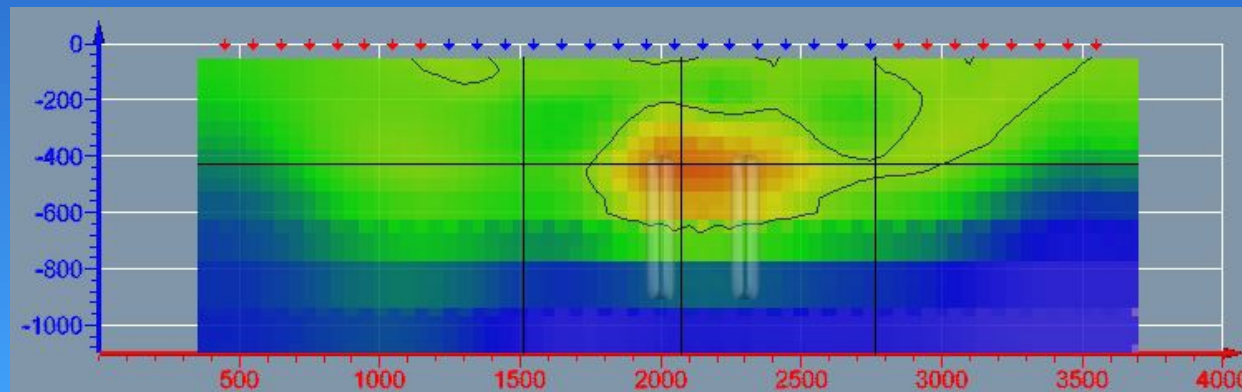
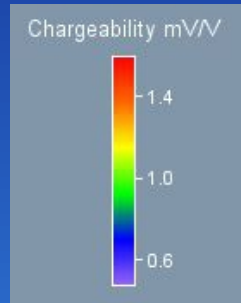
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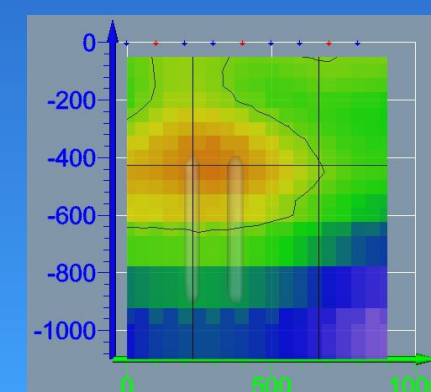
Long Section – 250



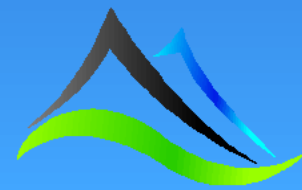
X-section - 2000



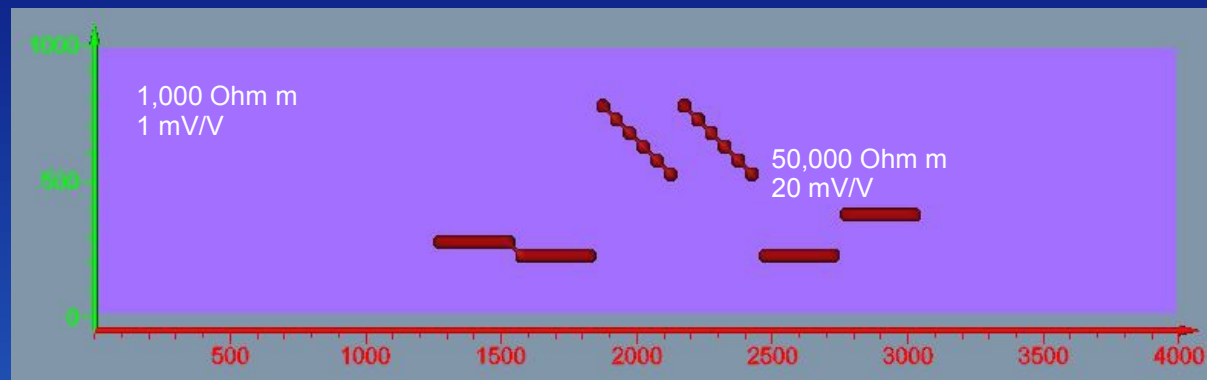
Long Section – 700



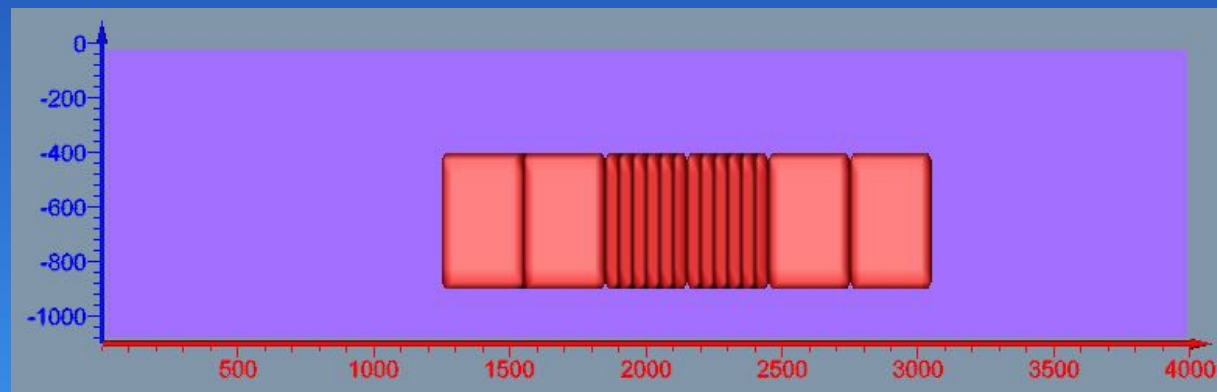
X-section - 2700



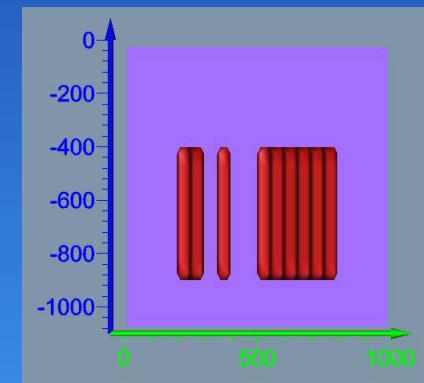
Model: Type A – 50,000 Ωm resistors in a 1,000 Ωm half space



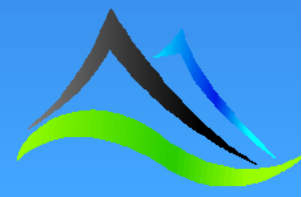
Top



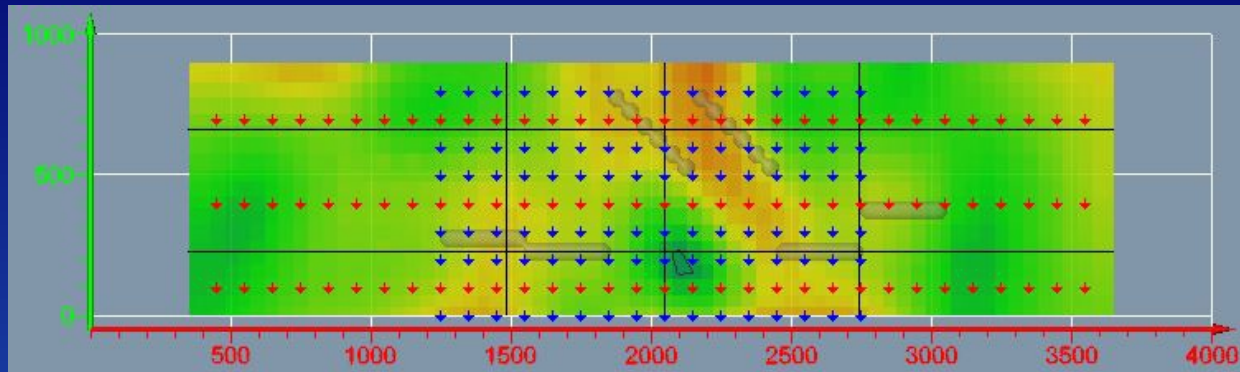
Front



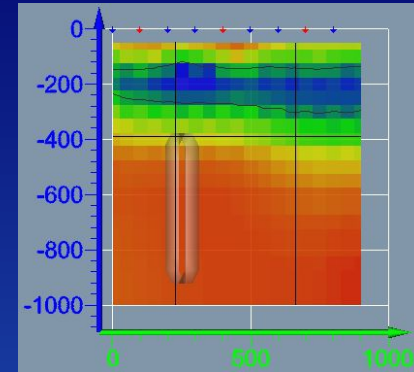
Right



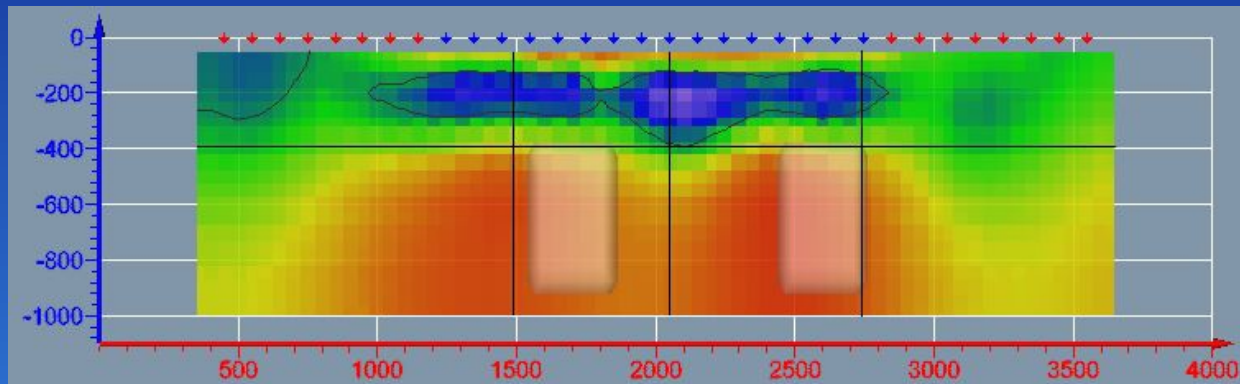
Type A – 50,000 Ωm in 1,000 Ωm – Resistivity Inversion (DODD)



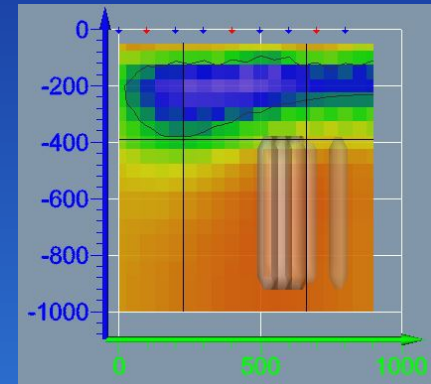
Plan View



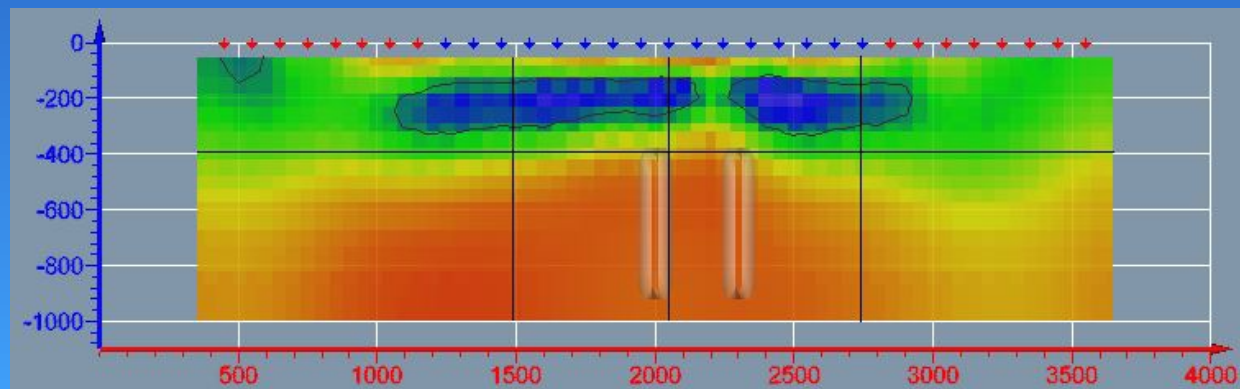
X-section - 1500



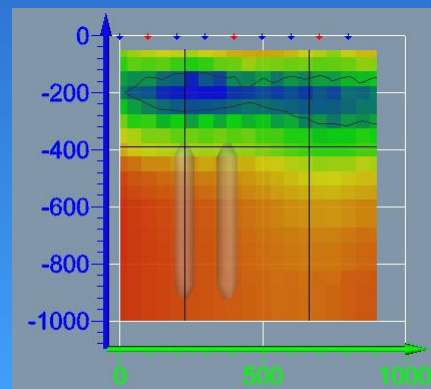
Long Section – 250



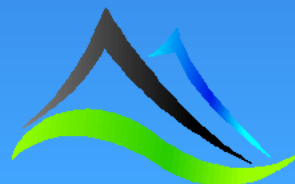
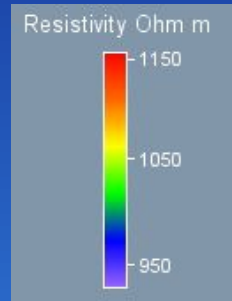
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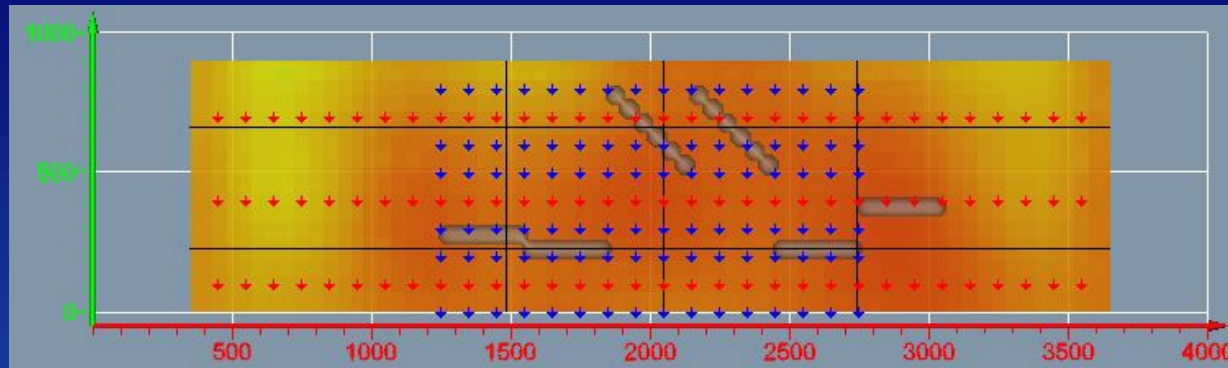
Long Section – 700



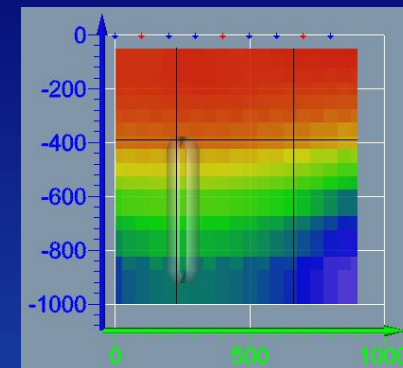
X-section - 2700



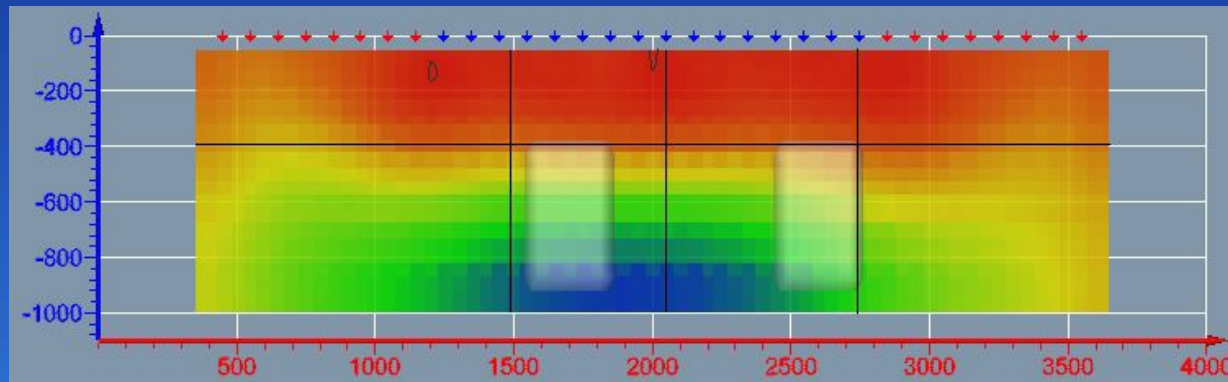
Type A – 50,000 Ωm in 1,000 Ωm – Chargeability Inversion (DODD)



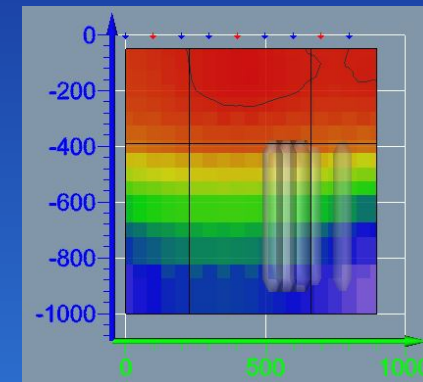
Plan View



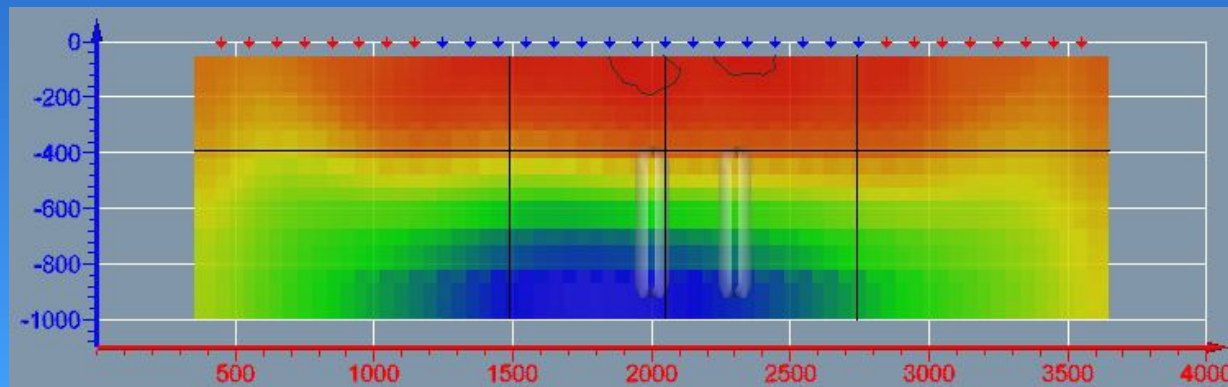
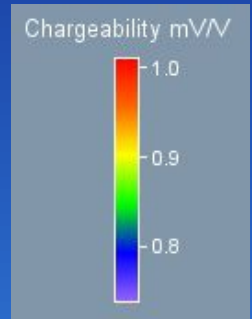
X-section - 1500



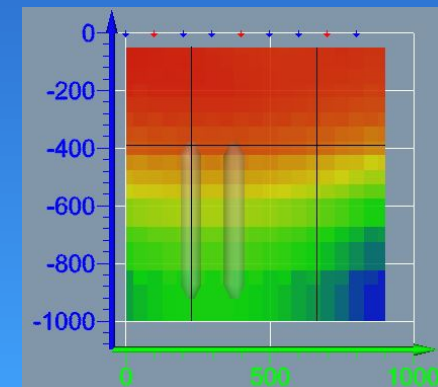
Long Section – 250



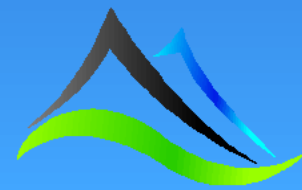
X-section - 2000



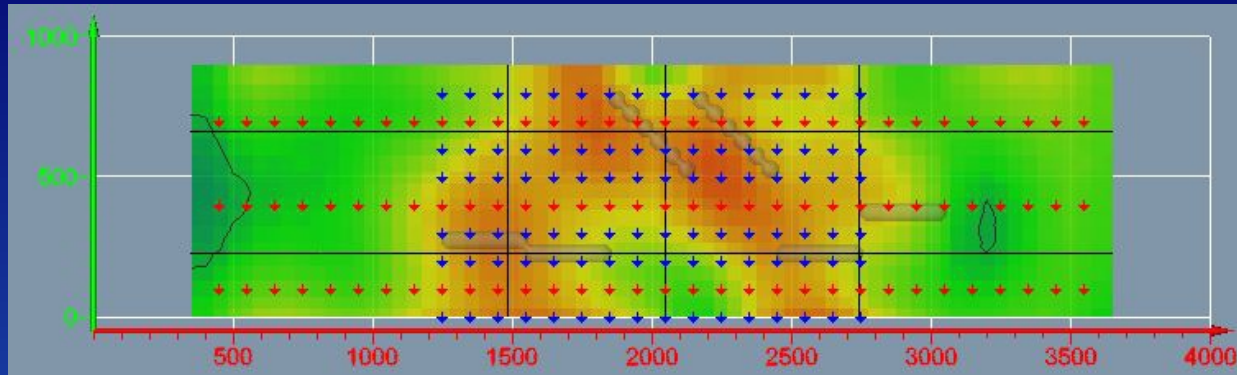
Long Section – 700



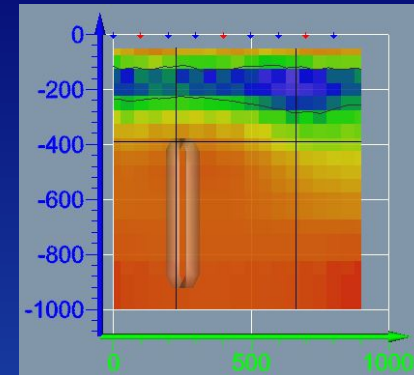
X-section - 2700



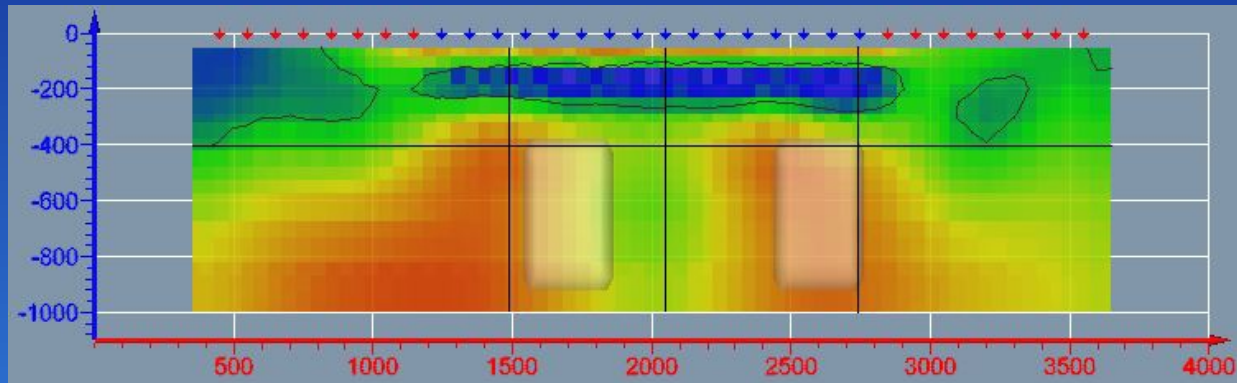
Type A – 50,000 Ωm in 1,000 Ωm – Resistivity Inversion (MRx)



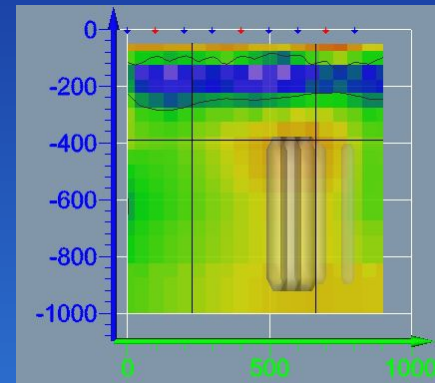
Plan View



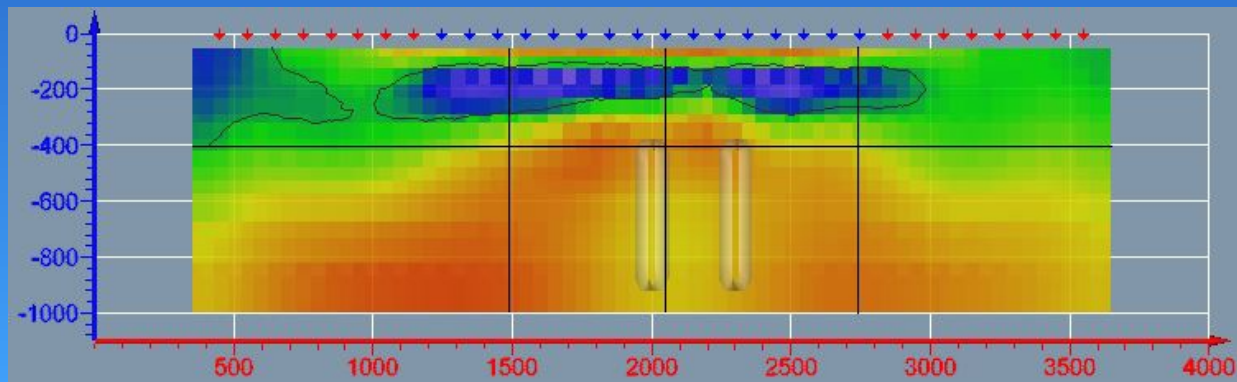
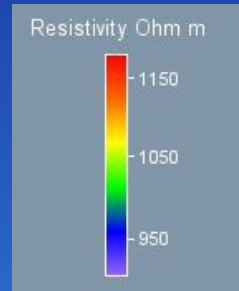
X-section - 1500



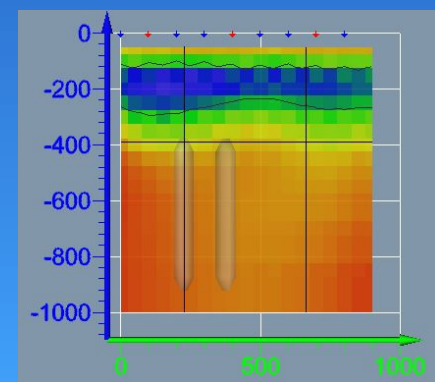
Long Section – 250



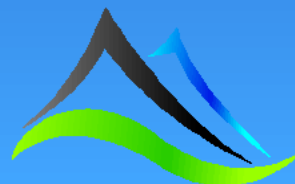
X-section - 2000



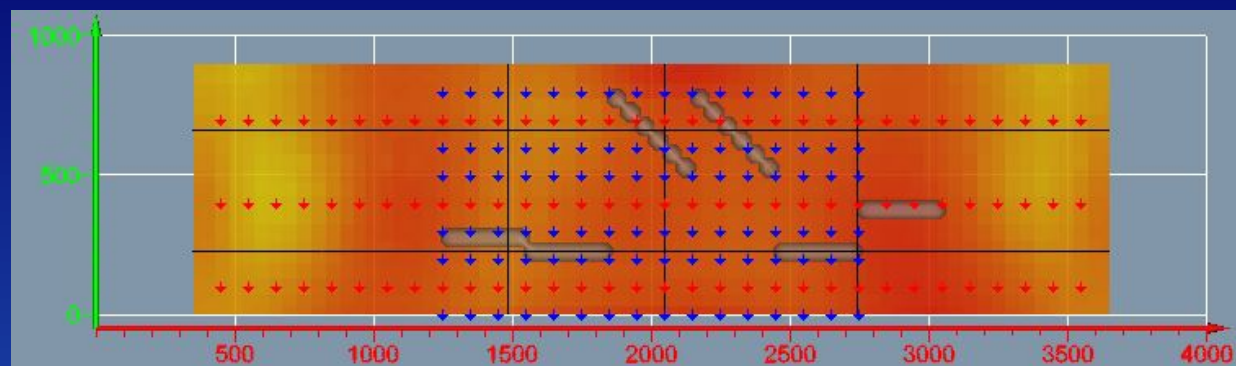
Long Section – 700



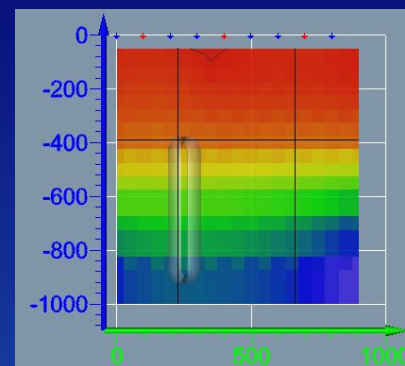
X-section - 2700



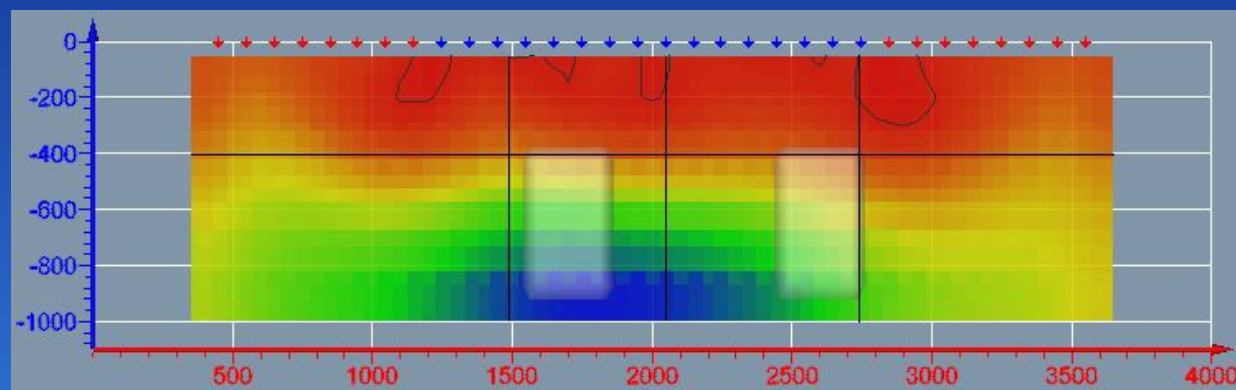
Type A – 50,000 Ωm in 1,000 Ωm – Chargeability Inversion (MRx)



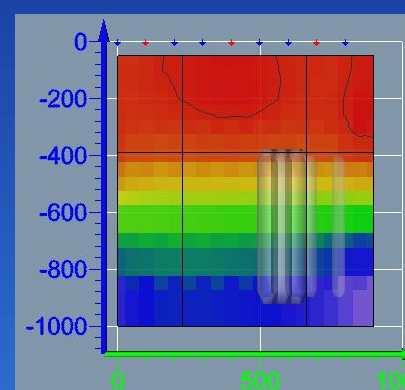
Plan View



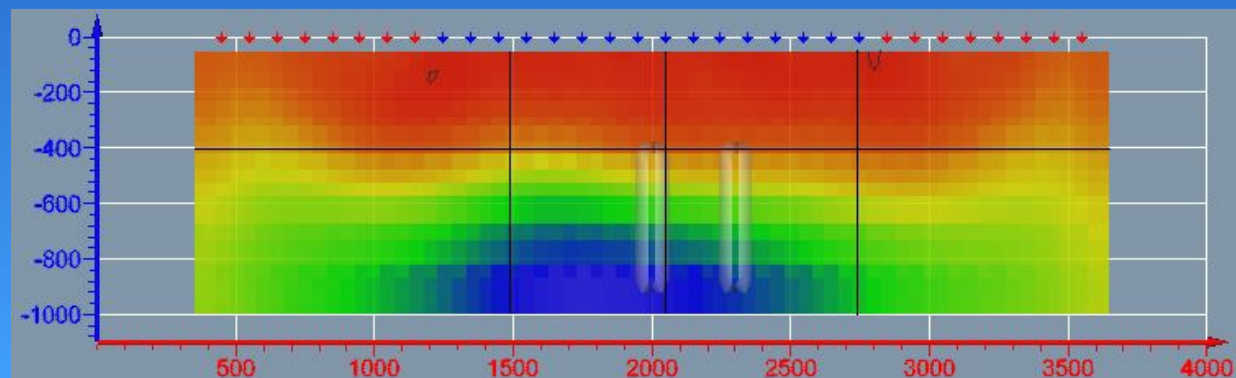
X-section - 1500



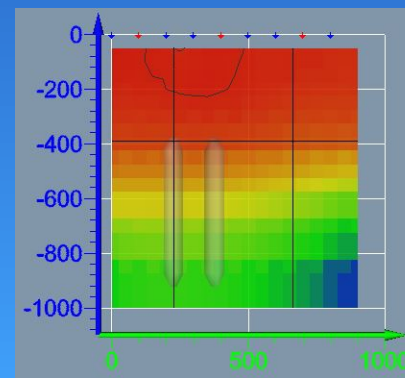
Long Section – 250



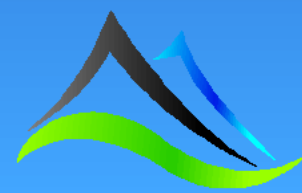
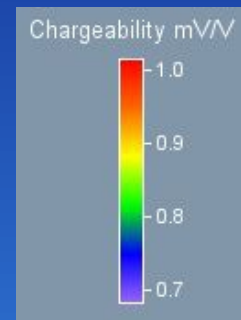
X-section - 2000



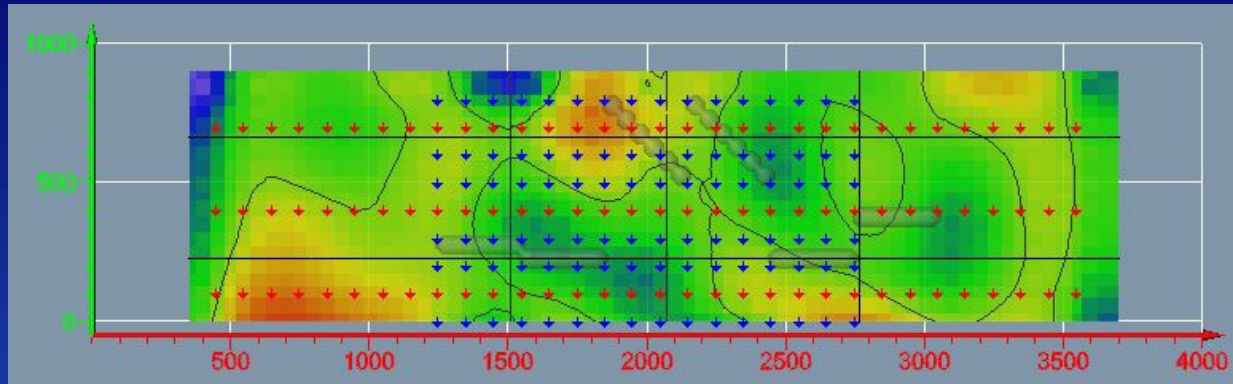
Long Section – 700



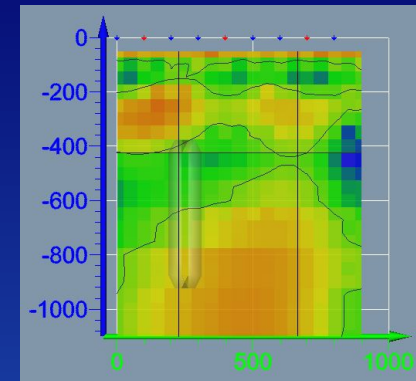
X-section - 2700



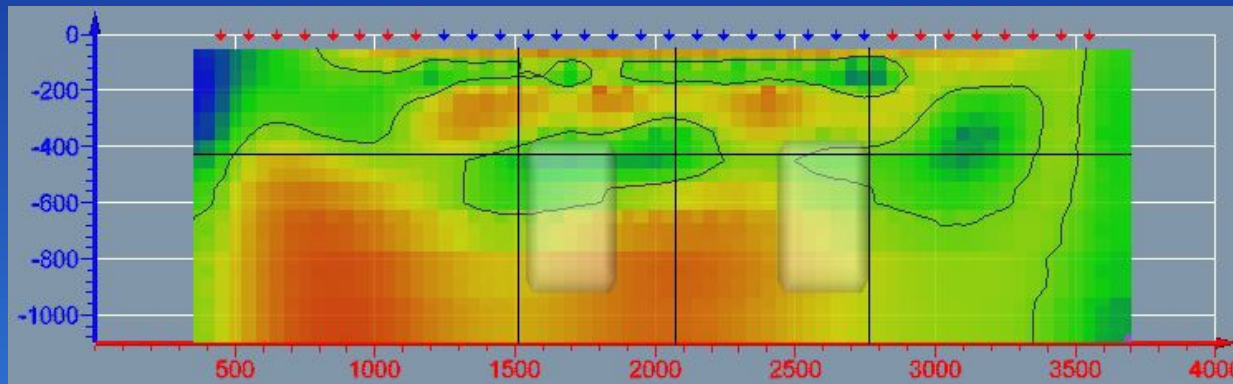
Type A – 50,000 Ωm in 1,000 Ωm – Resistivity Inversion (MTxRx)



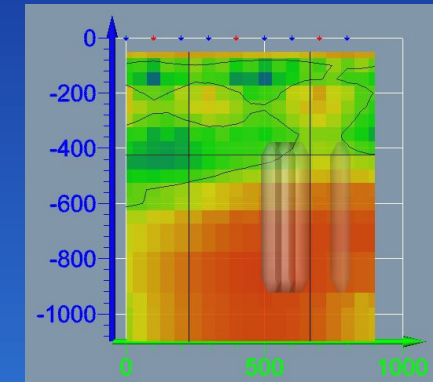
Plan View



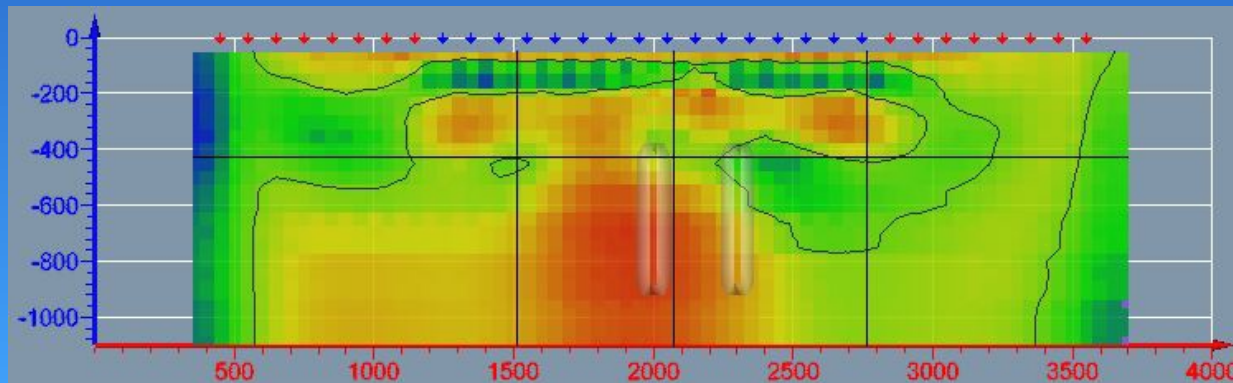
X-section - 1500



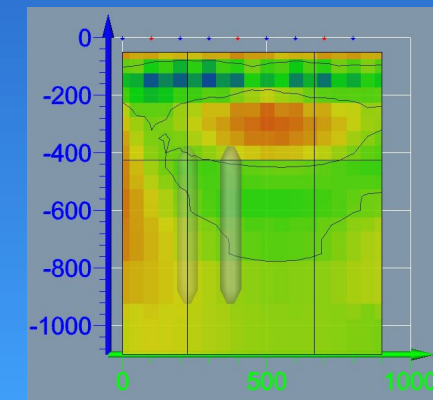
Long Section – 250



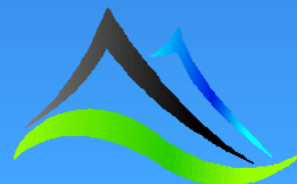
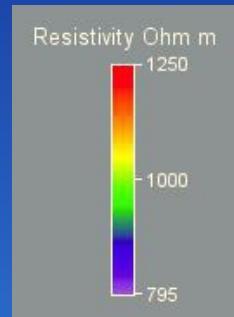
X-section - 2000



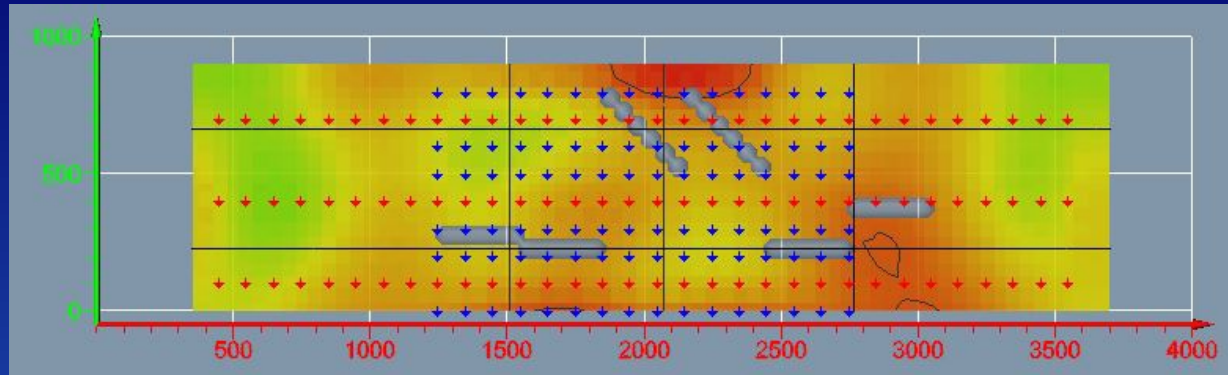
Long Section – 700



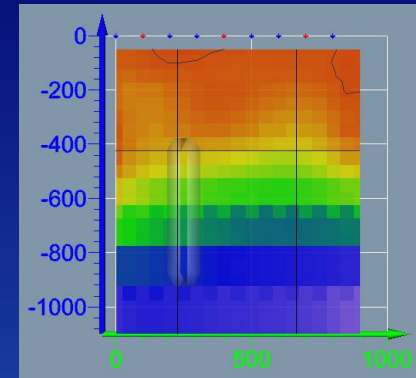
X-section - 2700



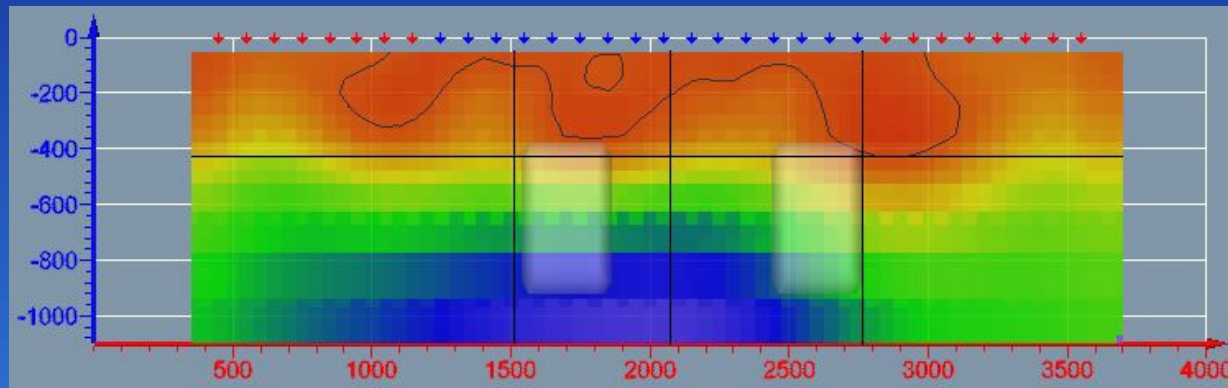
Type A – 50,000 Ωm in 1,000 Ωm – Chargeability Inversion (MTxRx)



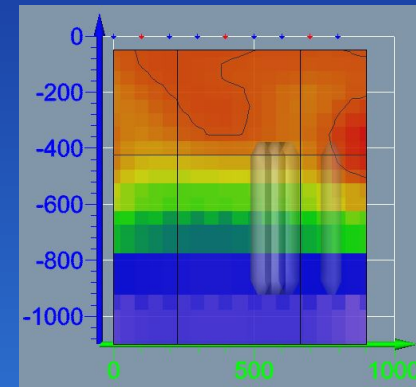
Plan View



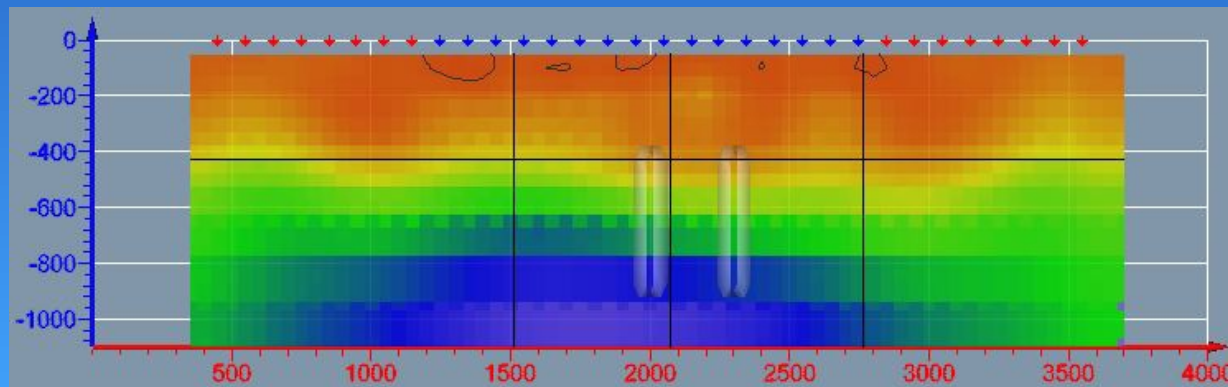
X-section - 1500



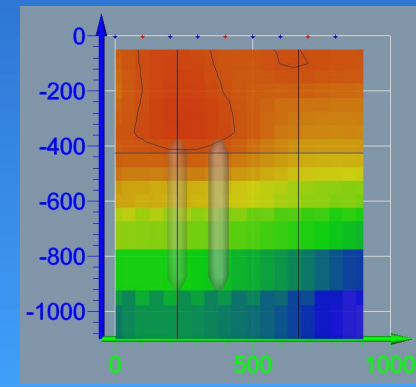
Long Section – 250



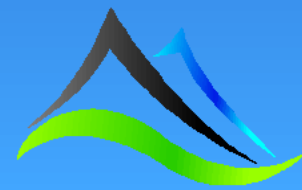
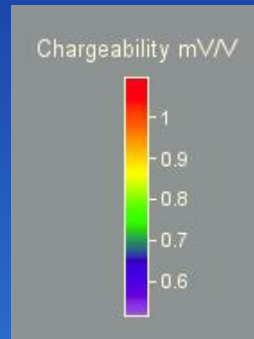
X-section - 2000



Long Section – 700

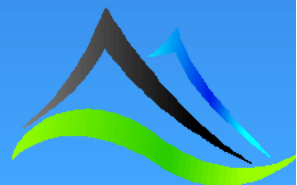


X-section - 2700



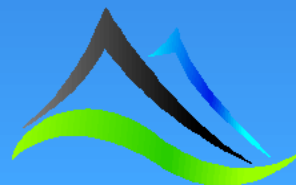
Summary: Type A – Resistors in a 1,000 Ωm half space

- The MTxRx array inversion resolves the tops of the resistors but reverses the polarity so that they are seen as relative conductors.
- The resistors in MRx and DODD can be detected in the images but the dynamic range is so low as to not be trustworthy.
- In the IP inversions, MTxRx finds the tops of the bodies well, with a dynamic range of 1 mV/V. MRx and DODD also find the tops of the bodies but only with a range of 0.3 mV/V.
- None of the inversions can separate closely spaced bodies but MTxRx does the best. This is evident in the long section 250 images.
- MRx and DODD place a thin layer of lower resistivity material at the surface above the bodies.
- The 50,000 Ωm IP inversions smears higher chargeability across the upper part of the model. Chargeability drops with depth but the dynamic range is so low that it simulates a homogeneous half space.

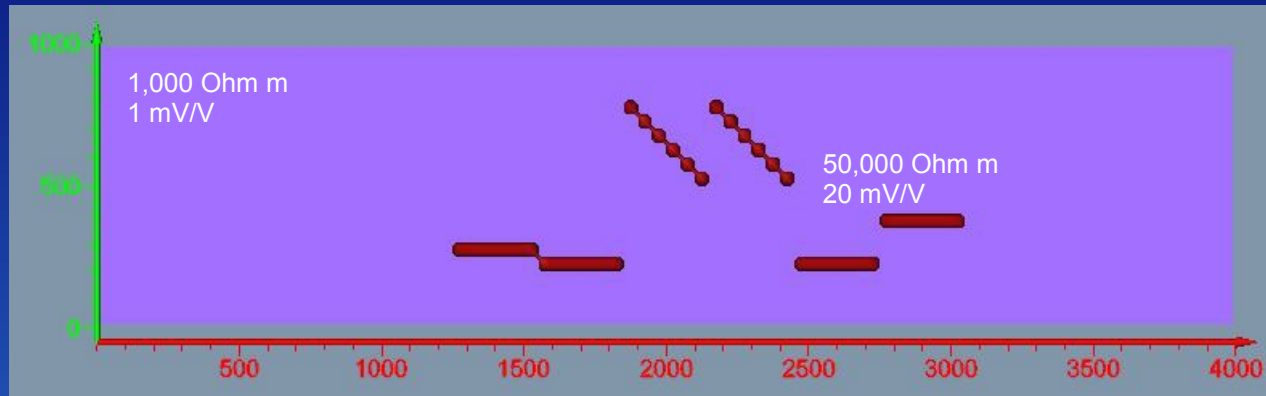


Intro: Type A – Double body-thickness resistors in a 1,000 Ωm half space

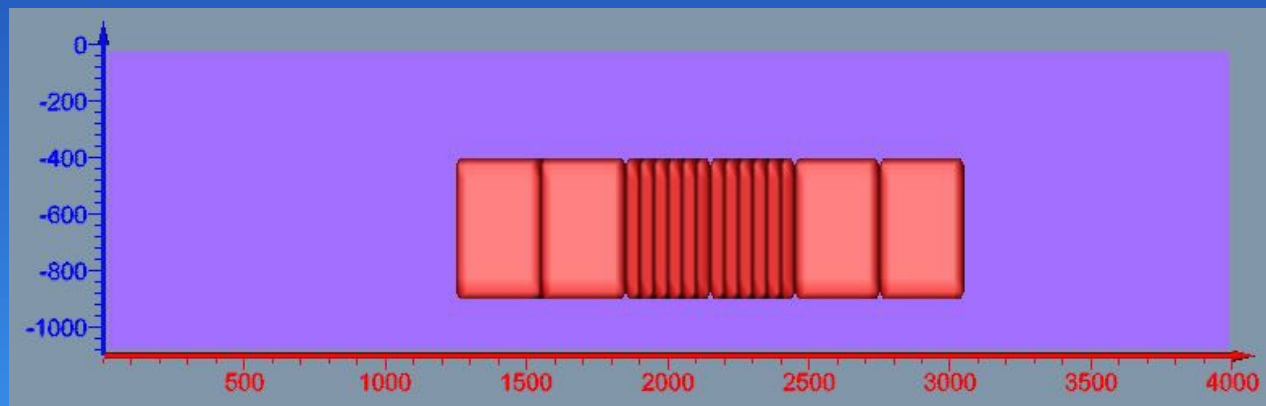
- The following set of slides show the inversion results of model type A for resistors of 50,000 Ωm with double the thickness of the original model.
- The veins have a chargeability of 20 mV/V.
- The host rock has a resistivity of 1,000 Ωm and a chargeability of 1 mV/V.
- The depth to the top of the veins is 400m.



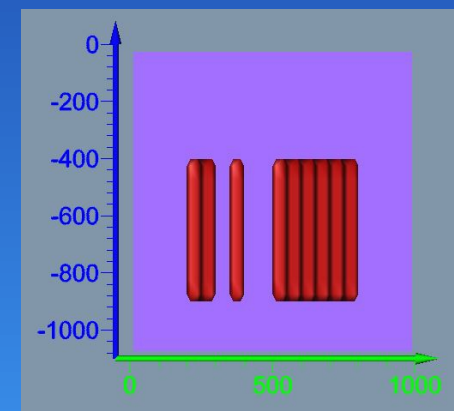
Model: Type A – 50,000 Ω m resistors in a 1,000 Ω m half space. Double body-thickness.



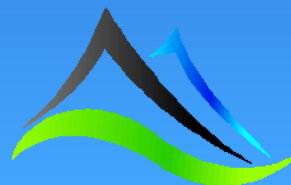
Top



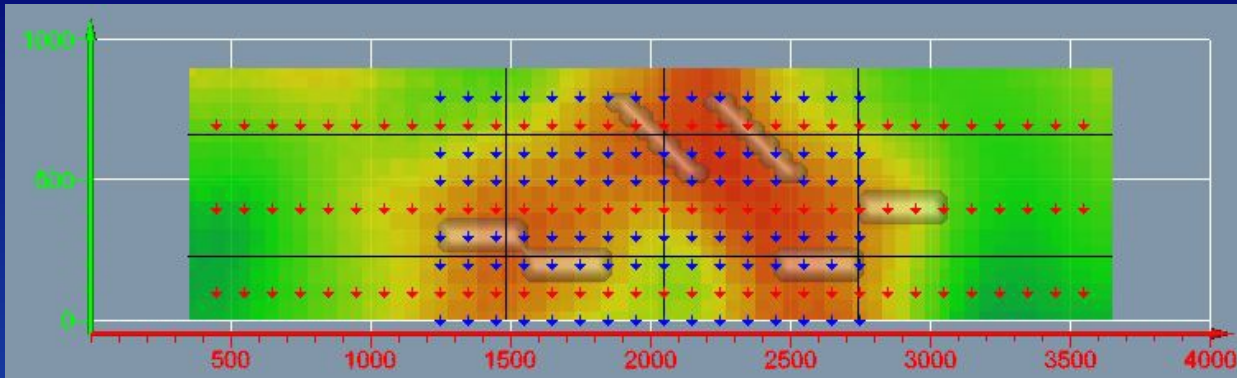
Front



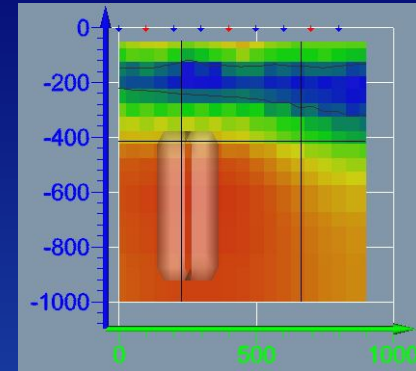
Right



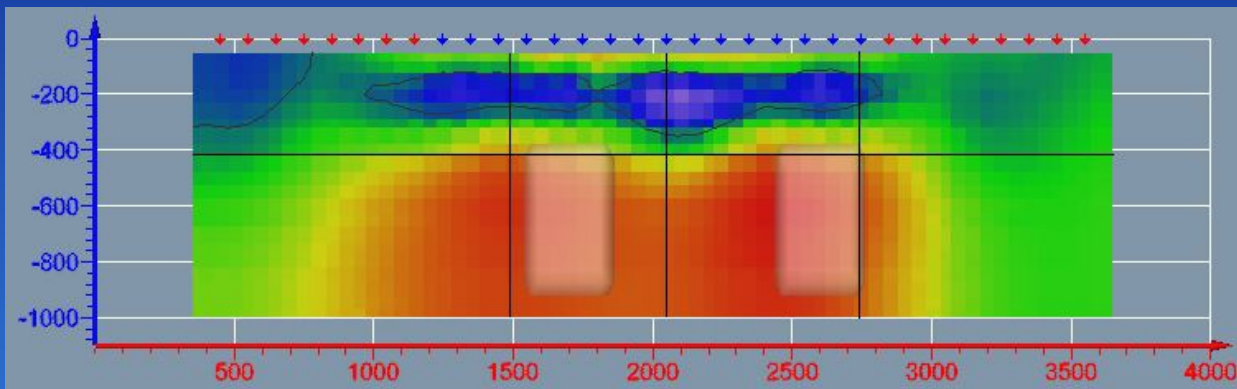
Type A – 50,000 Ωm in 1,000 Ωm double body-thickness – Resistivity Inversion (DODD)



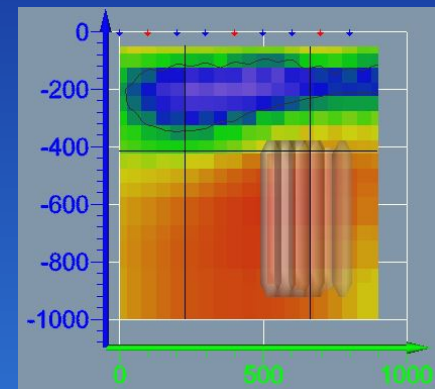
Plan View



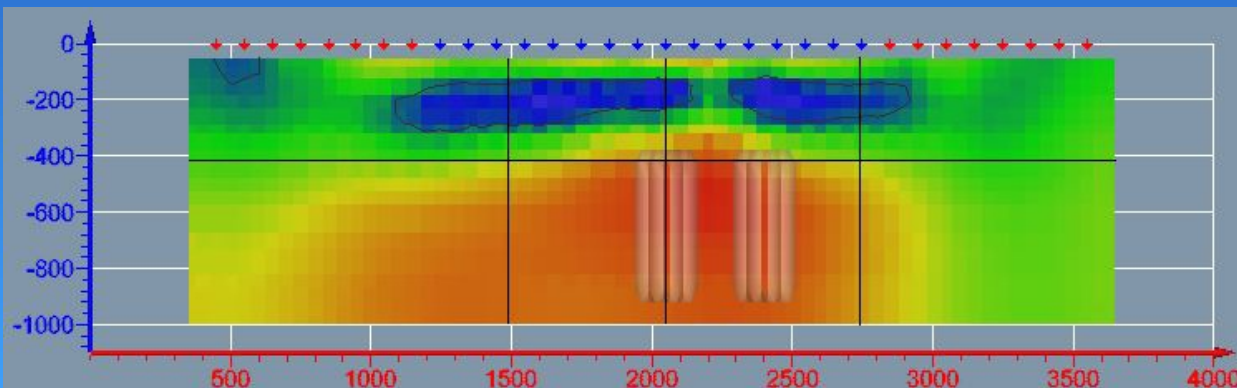
X-section - 1500



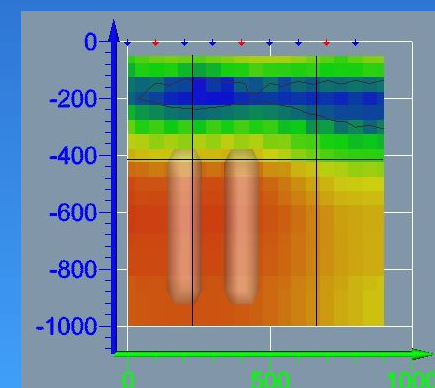
Long Section – 250



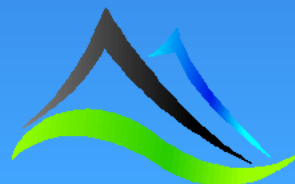
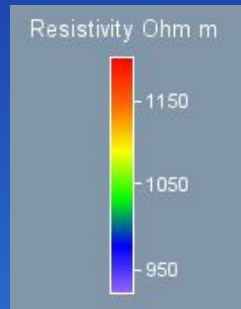
X-section - 2000



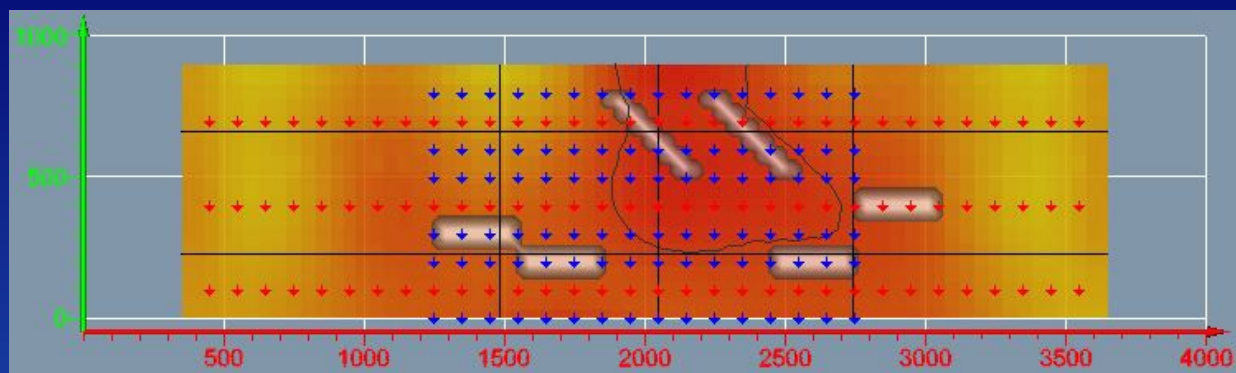
Long Section – 700



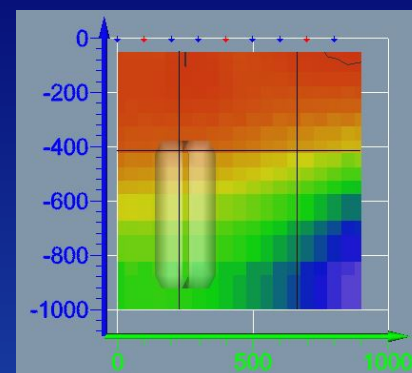
X-section - 2700



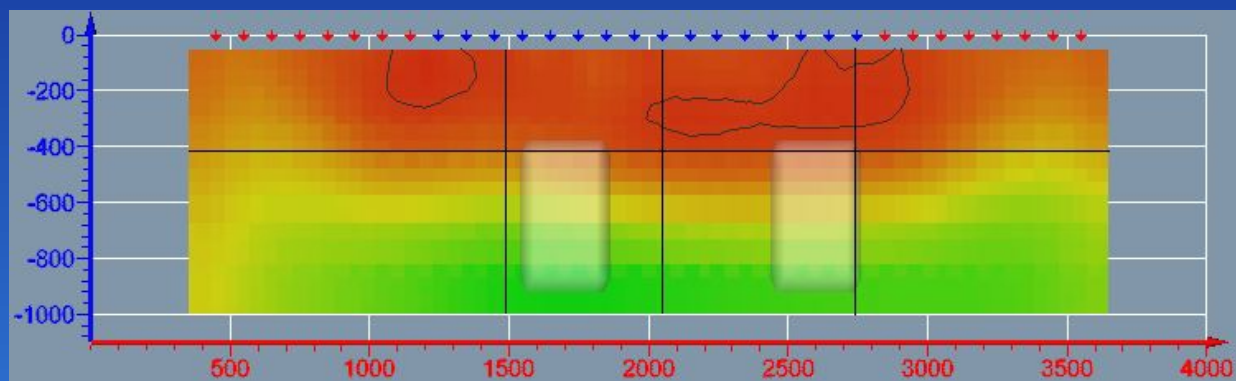
Type A – 50,000 Ωm in 1,000 Ωm double body-thickness – Chargeability Inversion (DODD)



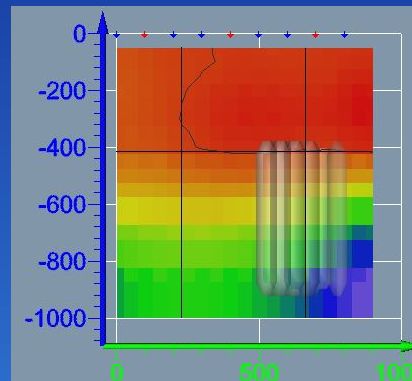
Plan View



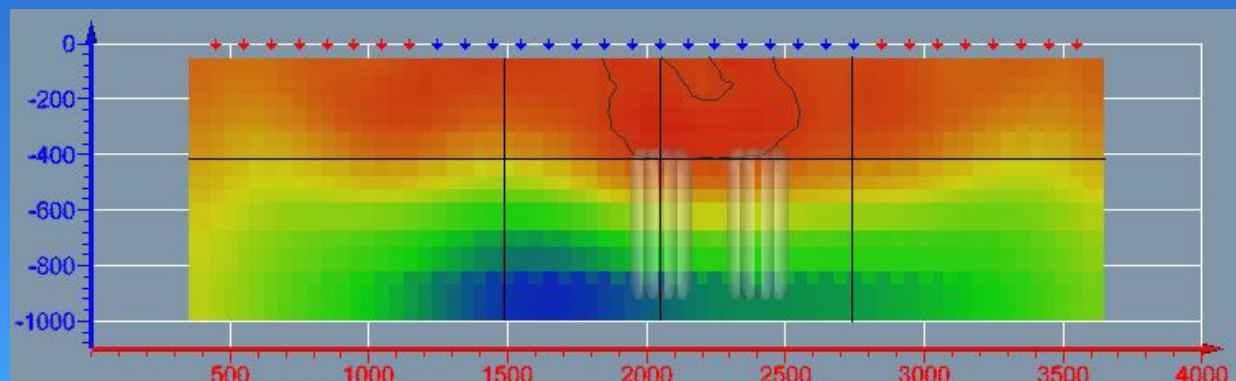
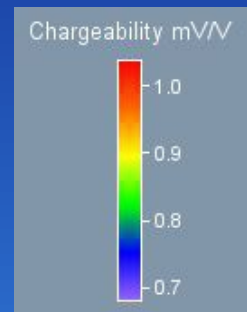
X-section - 1500



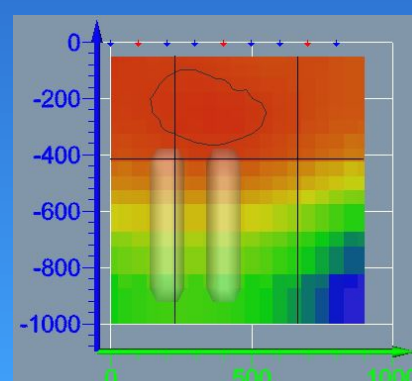
Long Section – 250



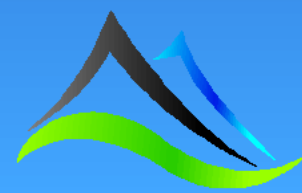
X-section - 2000



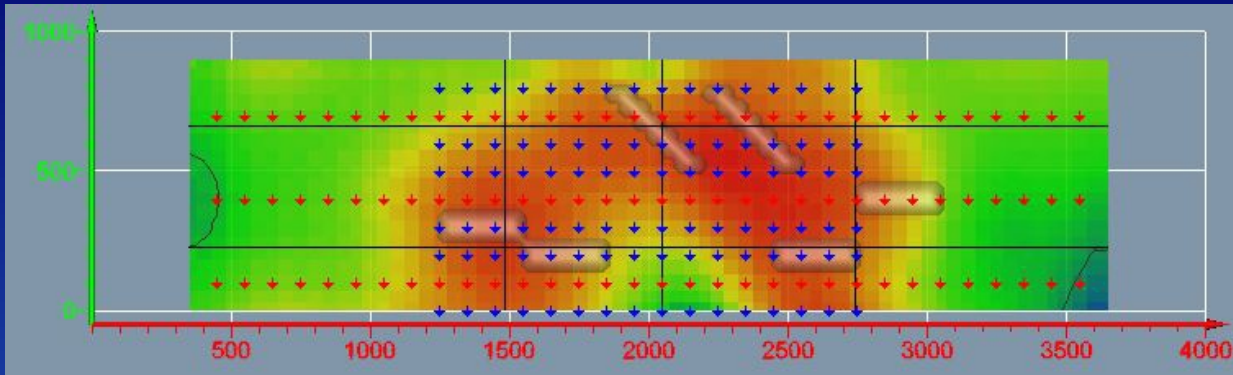
Long Section – 700



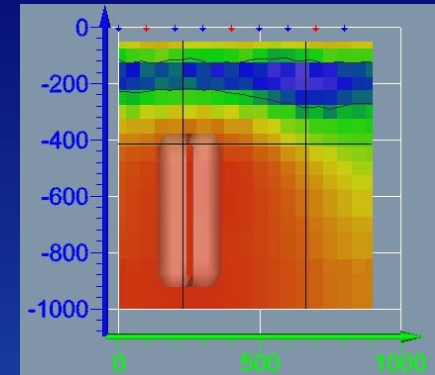
X-section - 2700



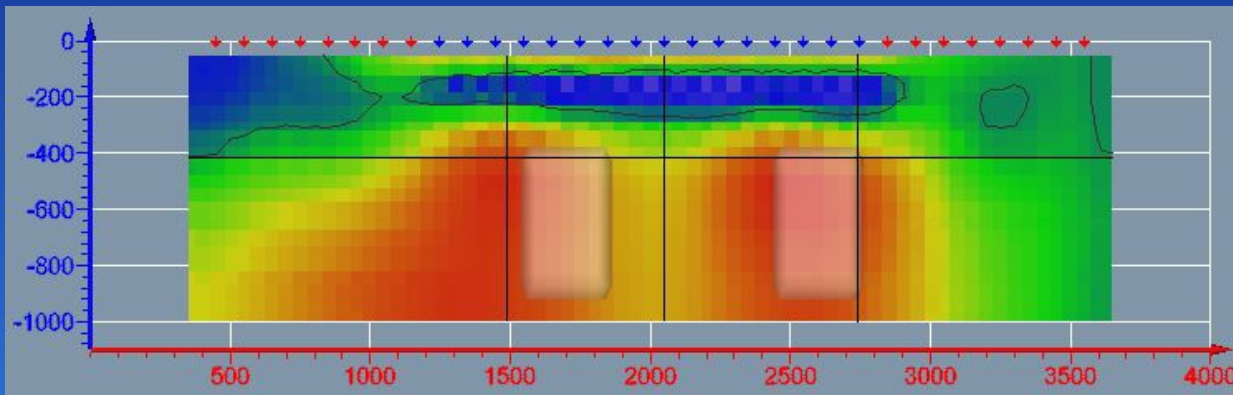
Type A – 50,000 Ωm in 1,000 Ωm double body-thickness – Resistivity Inversion (MRx)



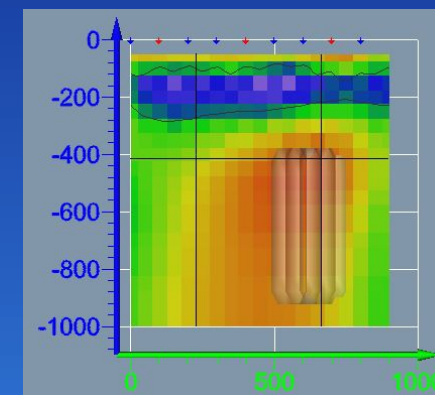
Plan View



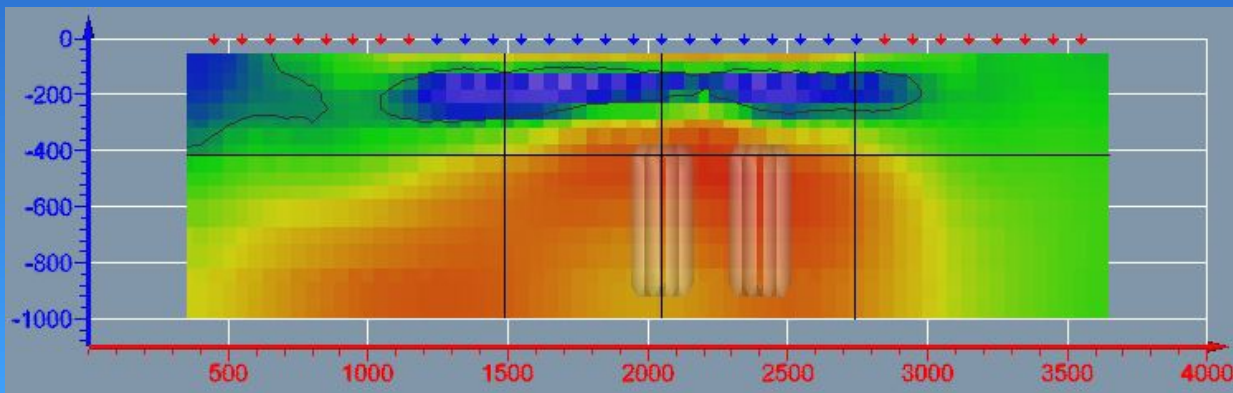
X-section - 1500



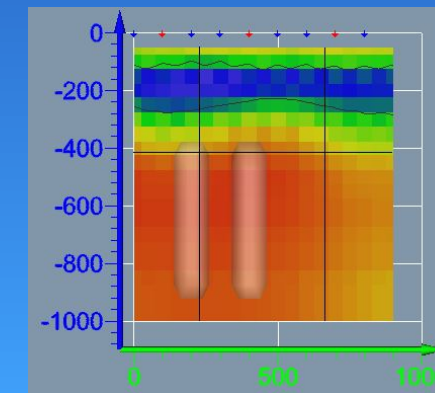
Long Section – 250



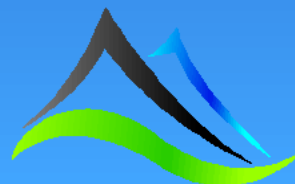
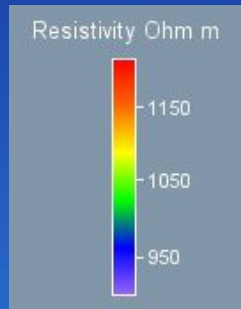
X-section - 2000



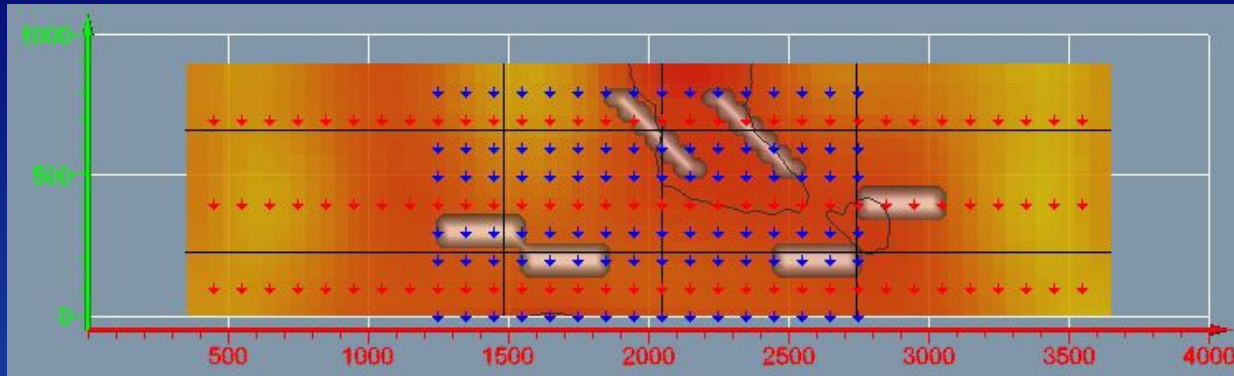
Long Section – 700



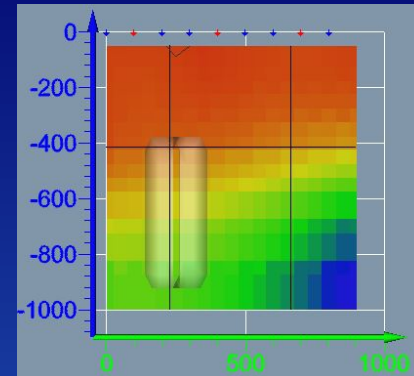
X-section - 2700



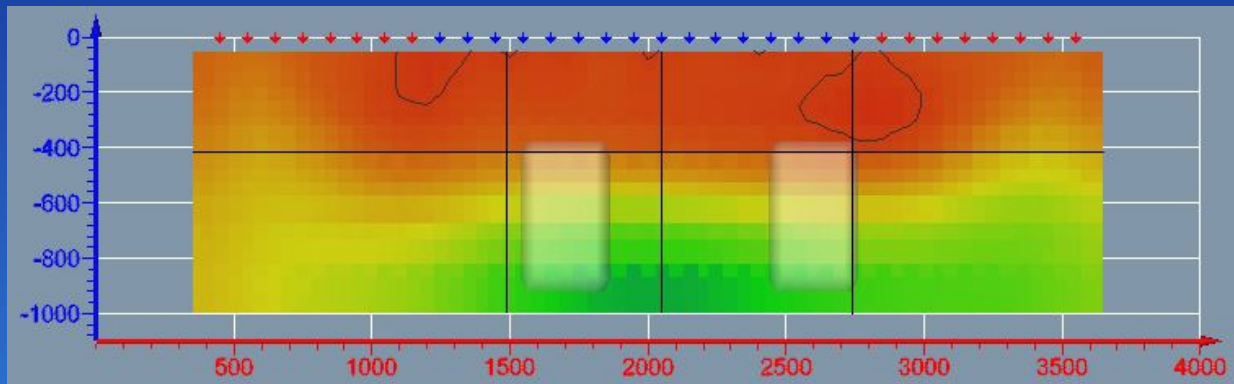
Type A – 50,000 Ωm in 1,000 Ωm double body-thickness – Chargeability Inversion (MRx)



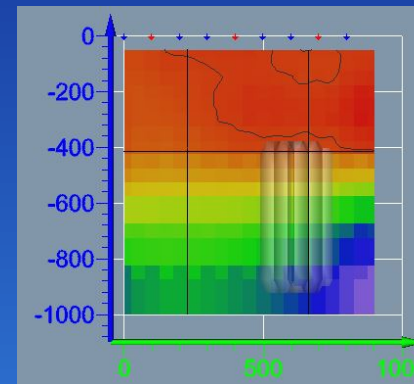
Plan View



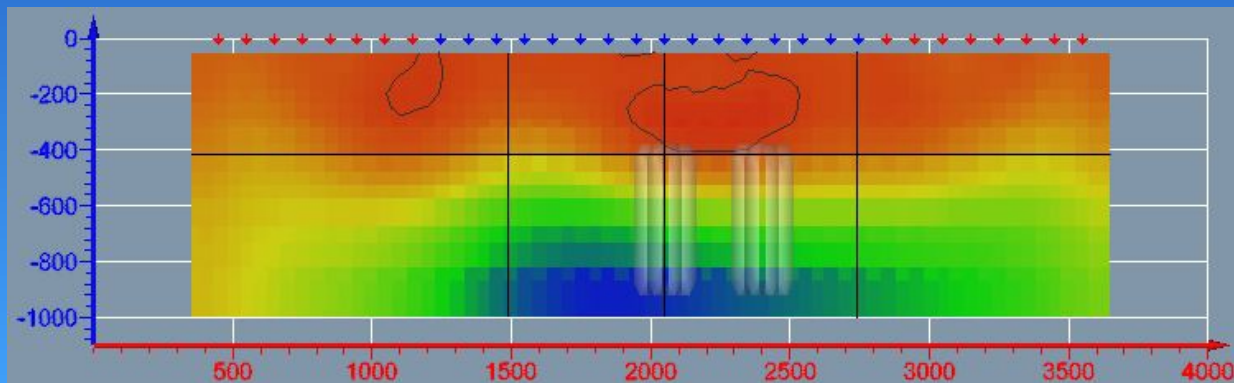
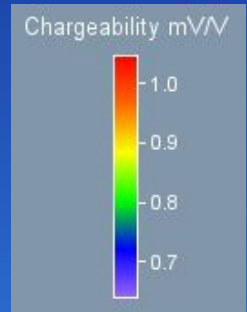
X-section - 1500



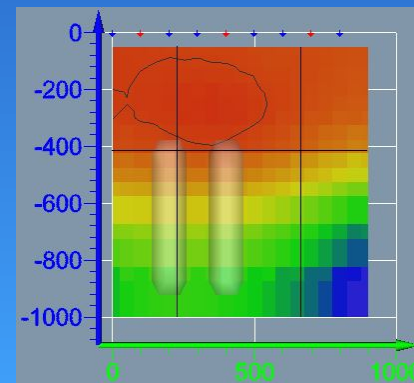
Long Section – 250



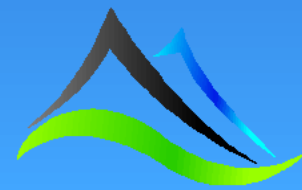
X-section - 2000



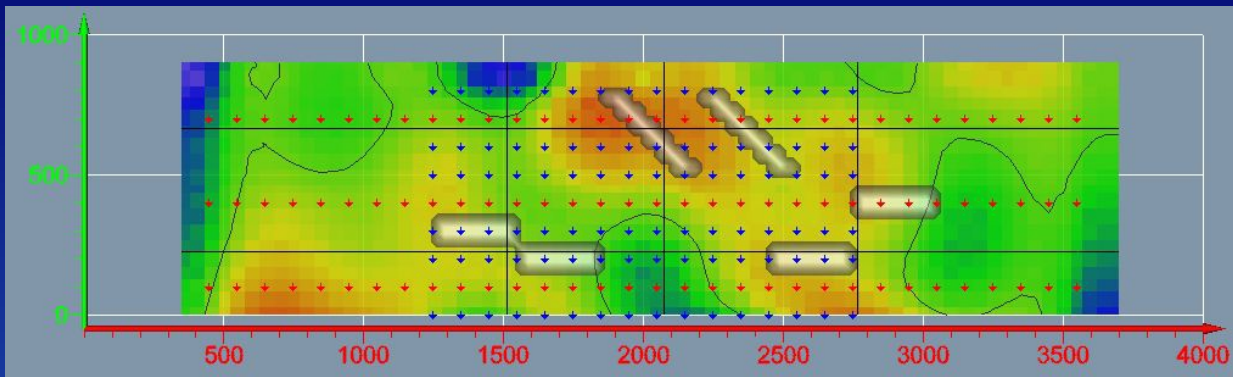
Long Section – 700



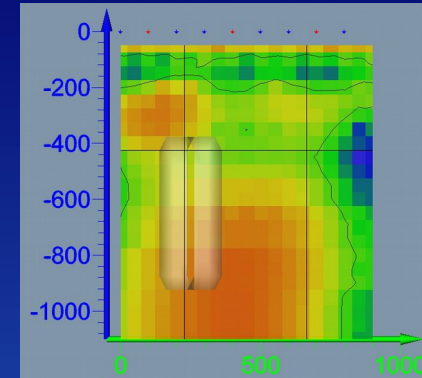
X-section - 2700



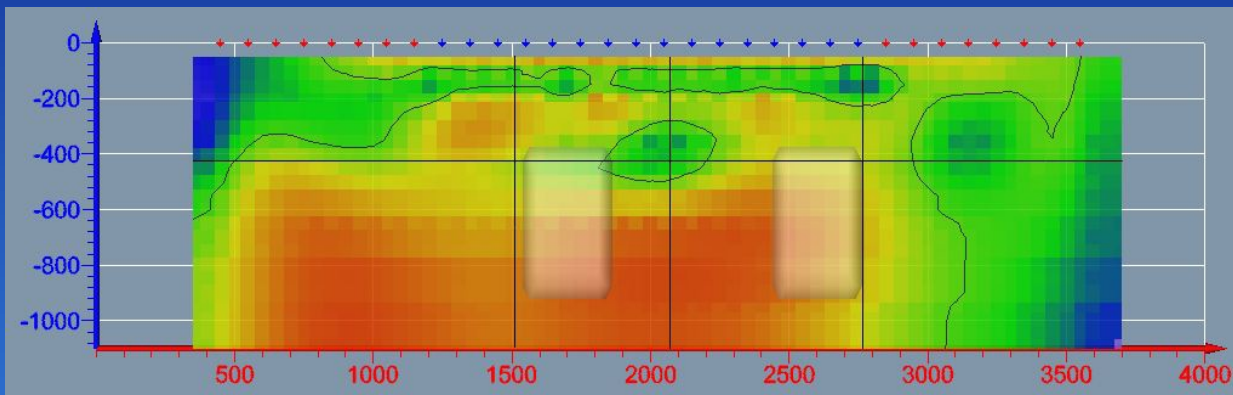
Type A – 50,000 Ωm in 1,000 Ωm double body-thickness – Resistivity Inversion (MTxRx)



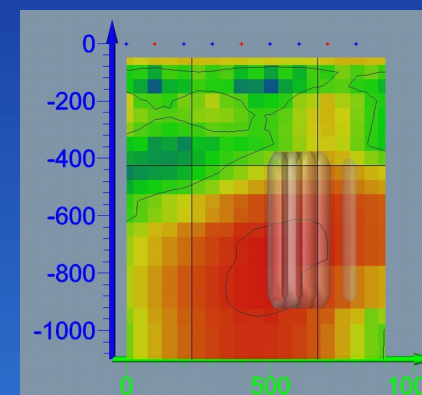
Plan View



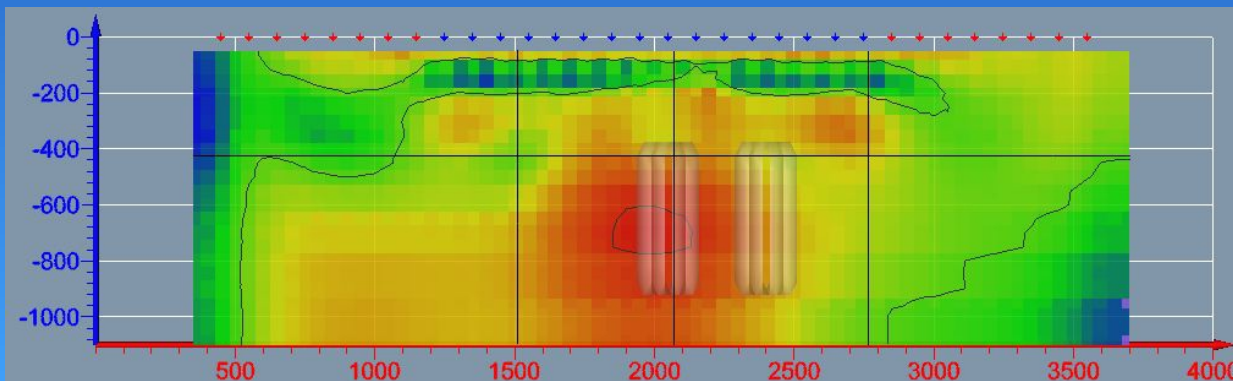
X-section - 1500



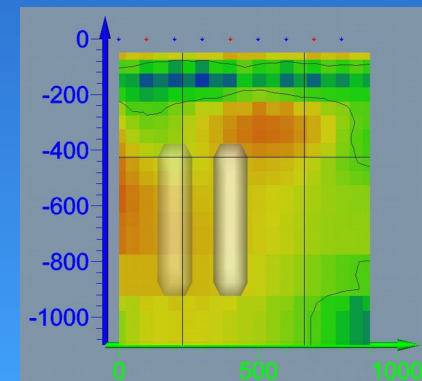
Long Section – 250



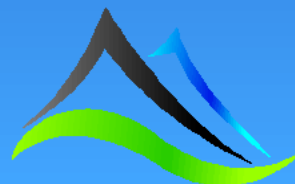
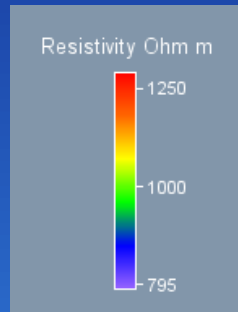
X-section - 2000



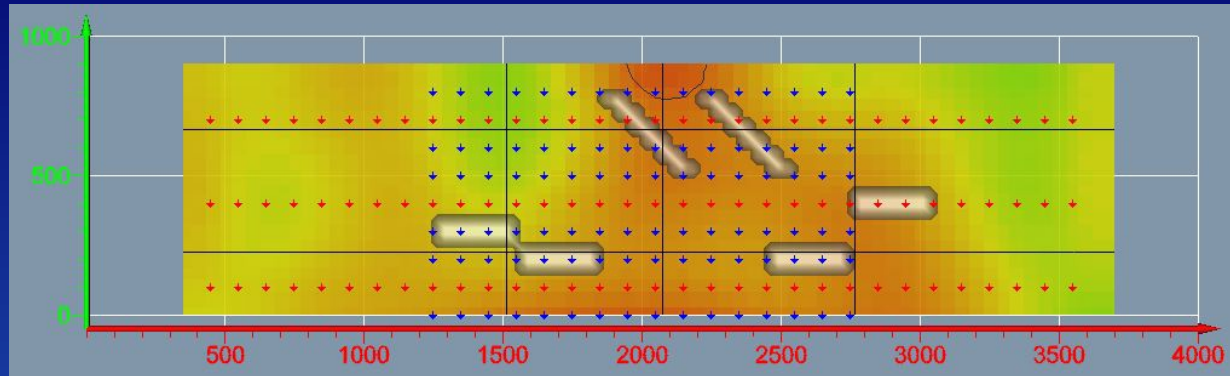
Long Section – 700



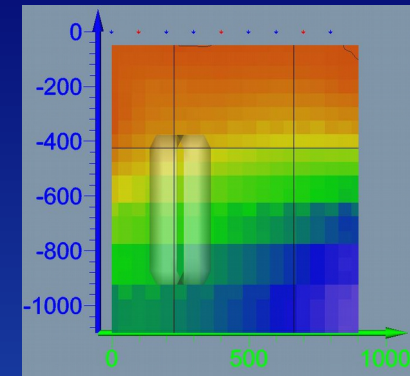
X-section - 2700



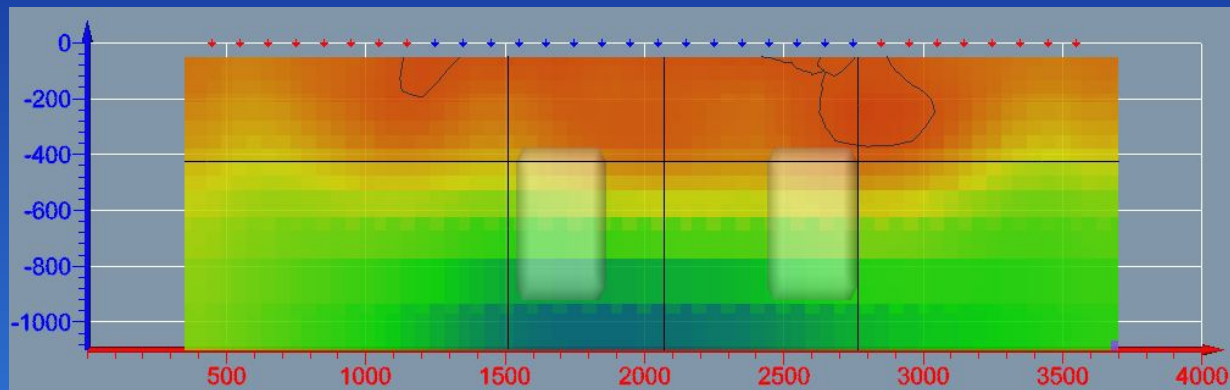
Type A – 50,000 Ωm in 1,000 Ωm double body-thickness – Chargeability Inversion (MTxRx)



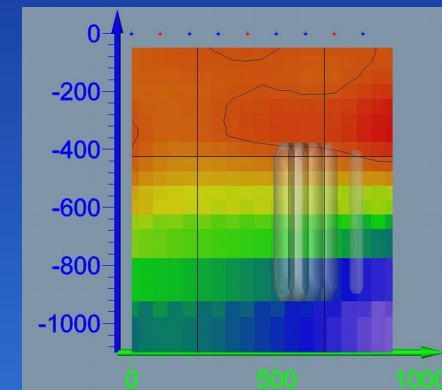
Plan View



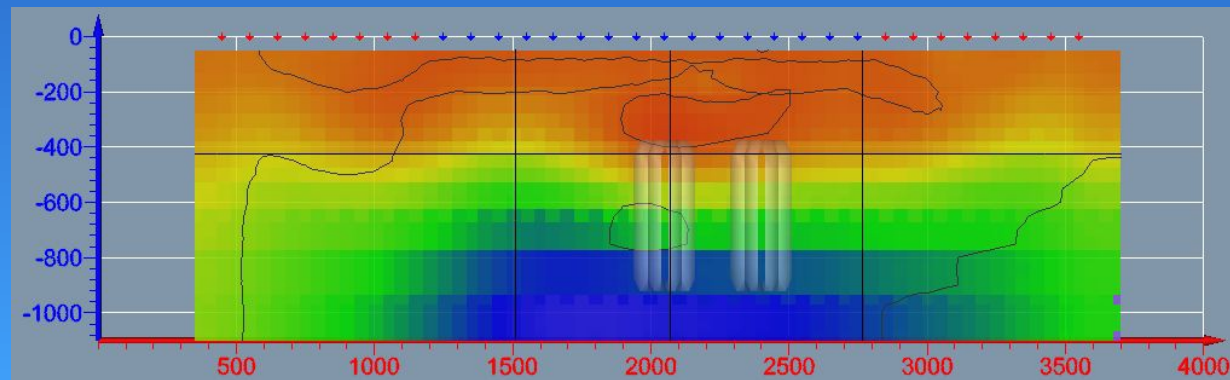
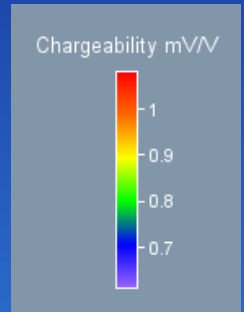
X-section - 1500



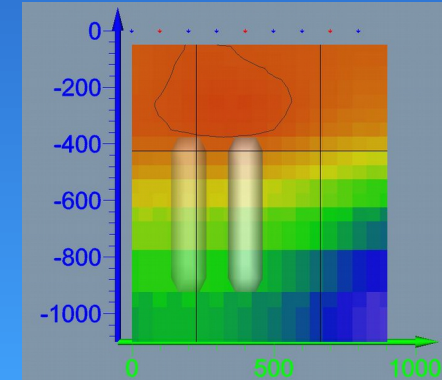
Long Section – 250



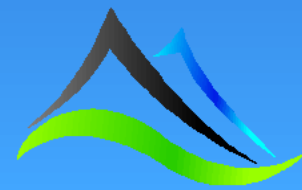
X-section - 2000



Long Section – 700

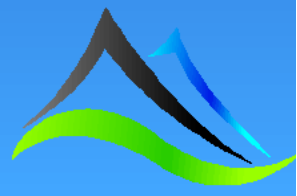


X-section - 2700



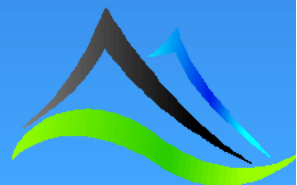
Summary: Type A – Double body-thickness resistors in a 1,000 Ωm half space

- Doubling the thickness of the bodies did not have any significant effect on the inversion's resolution.
- As with the previous example, MTxRx places relatively conductive areas near the tops of the resistors.
- Again, MRx and DODD inversions give an indication of the resistors but the dynamic range is too low.
- A lower resistivity layer is present at the surface.
- The IP images show elevated chargeability across the upper part of the model but within this local highs focus on the the tops of the bodies.

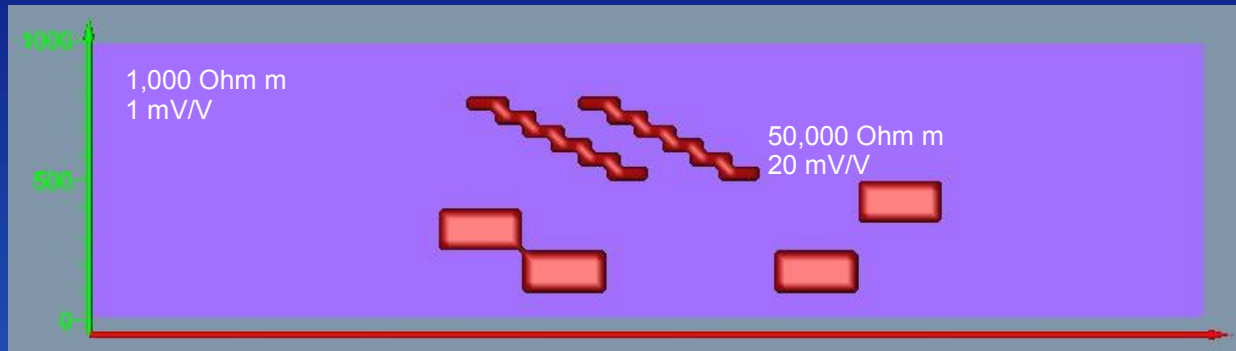


Intro: Type A – Triple body-thickness resistors in a 1,000 Ωm half space

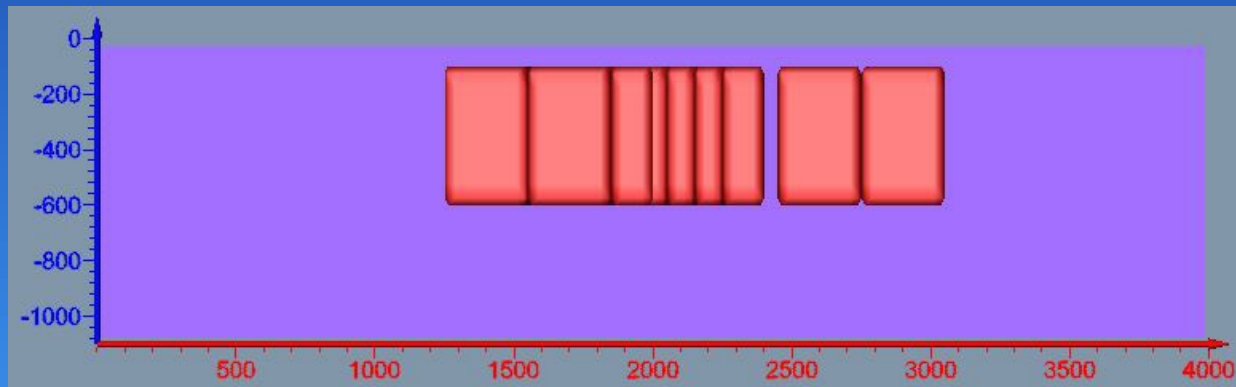
- The following set of slides show the inversion results of model type A for resistors of 50,000 Ωm with triple the thickness of the original model.
- Three different inversions were carried out, each of which used a model of varying depth to the top of the bodies. The three depths are 100m, 300m and 400m.
- The resistors have a chargeability of 20 mV/V.
- The host rock has a resistivity of 1,000 Ωm and a chargeability of 1 mV/V.



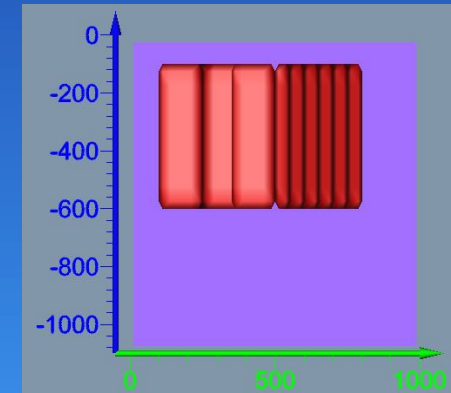
Model: Type A – 50,000 Ωm resistors in a 1,000 Ωm half space. Triple body-thickness. 100m depth to top.



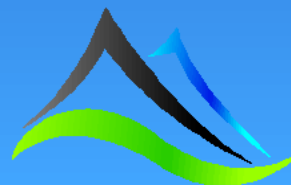
Top



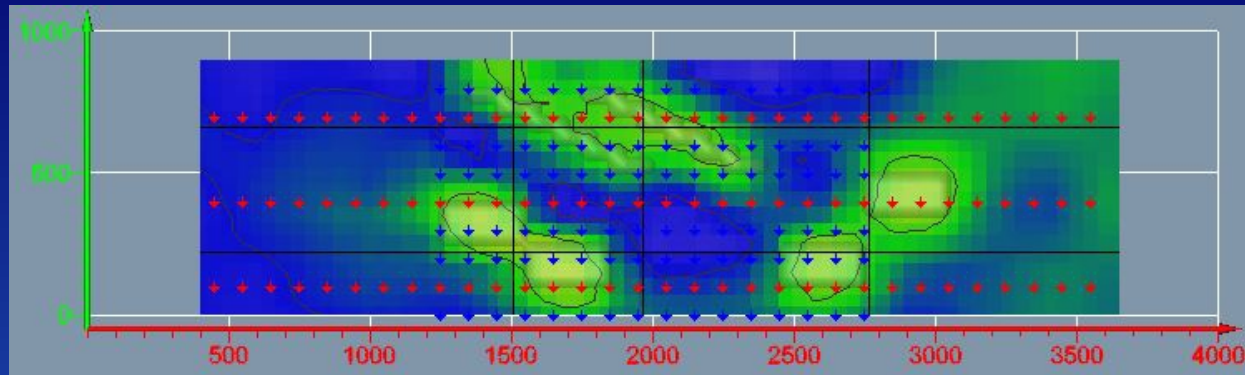
Front



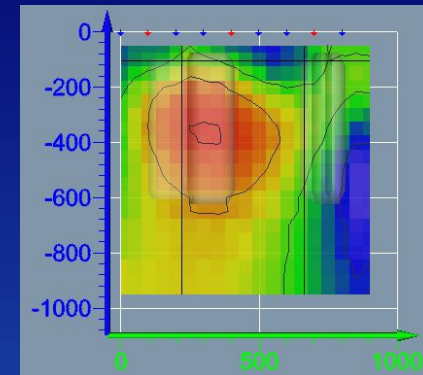
Right



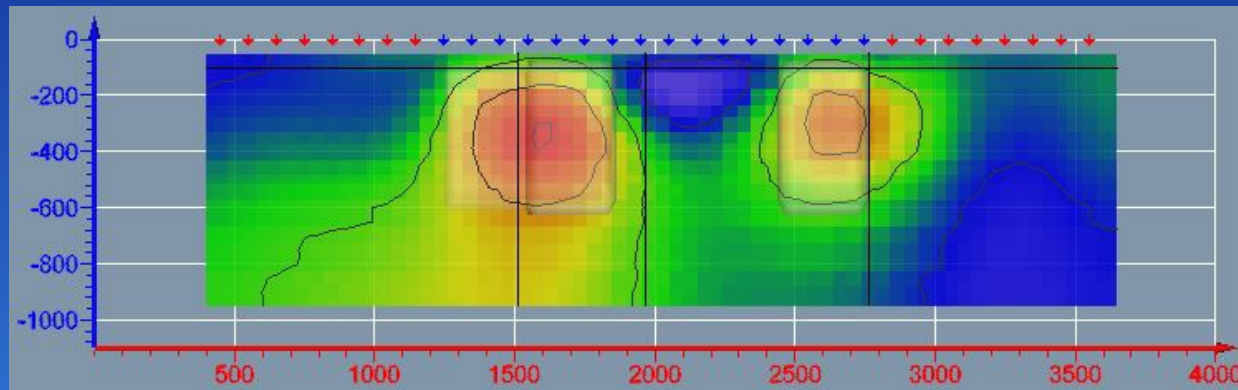
Type A – 50,000 Ωm in 1,000 Ωm triple body-thickness 100m depth to top – Resistivity Inversion (DODD)



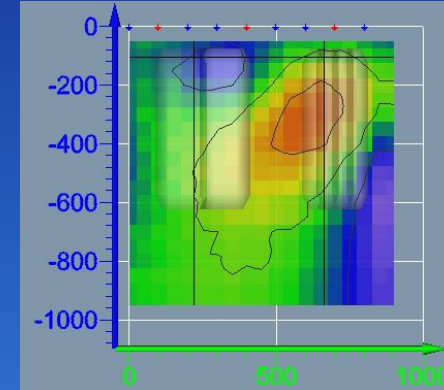
Plan View



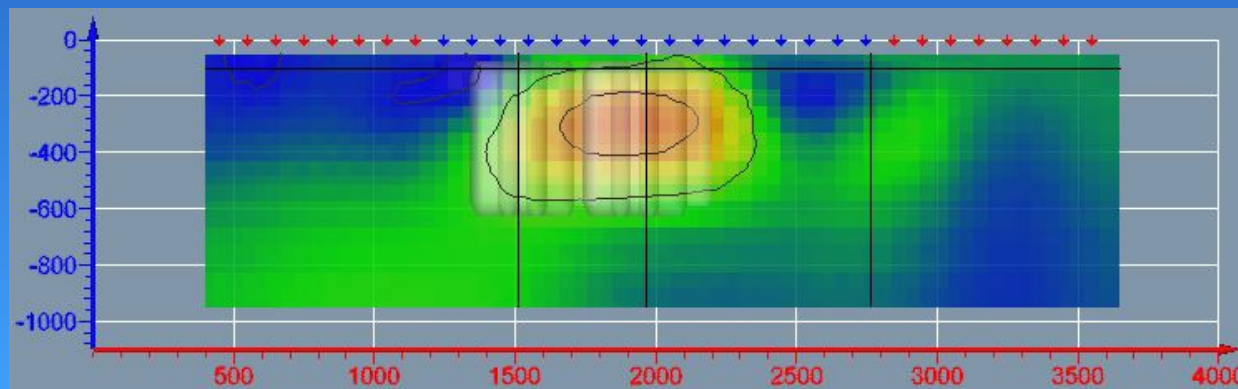
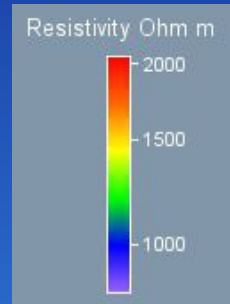
X-section - 1500



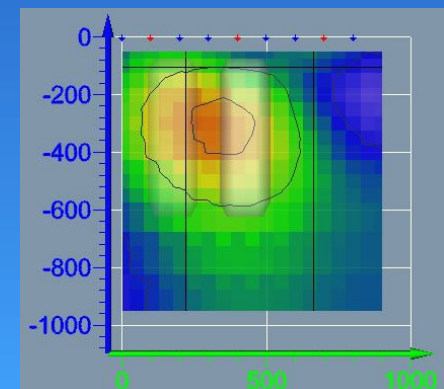
Long Section – 250



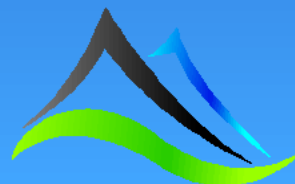
X-section - 2000



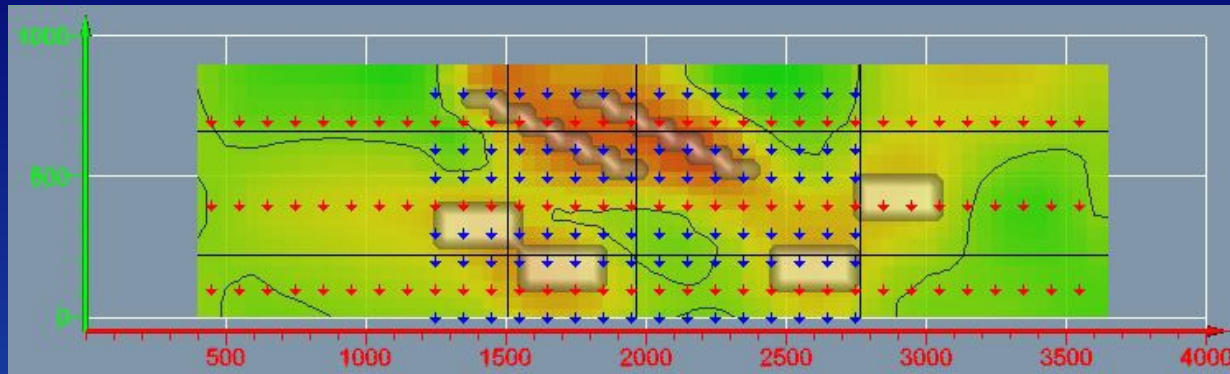
Long Section – 700



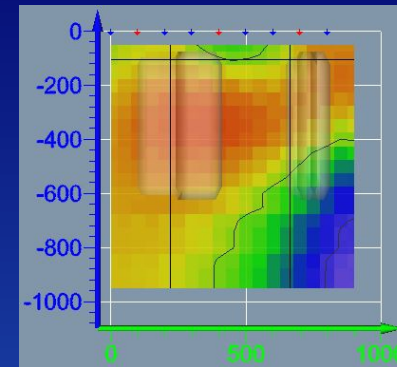
X-section - 2700



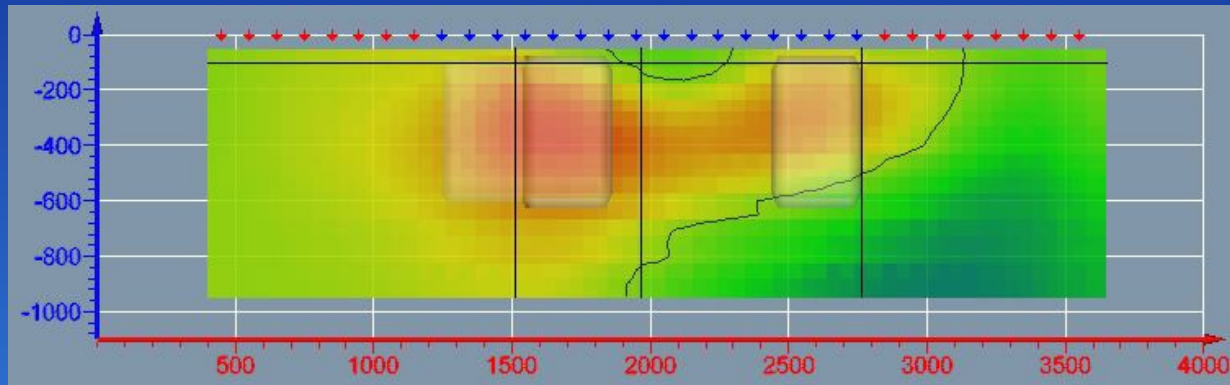
Type A – 50,000 Ωm in 1,000 Ωm triple body-thickness 100m depth to top – Chargeability Inversion (DODD)



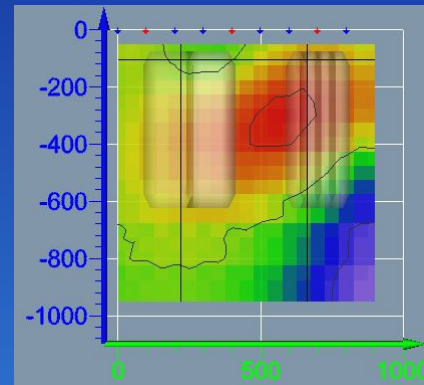
Plan View



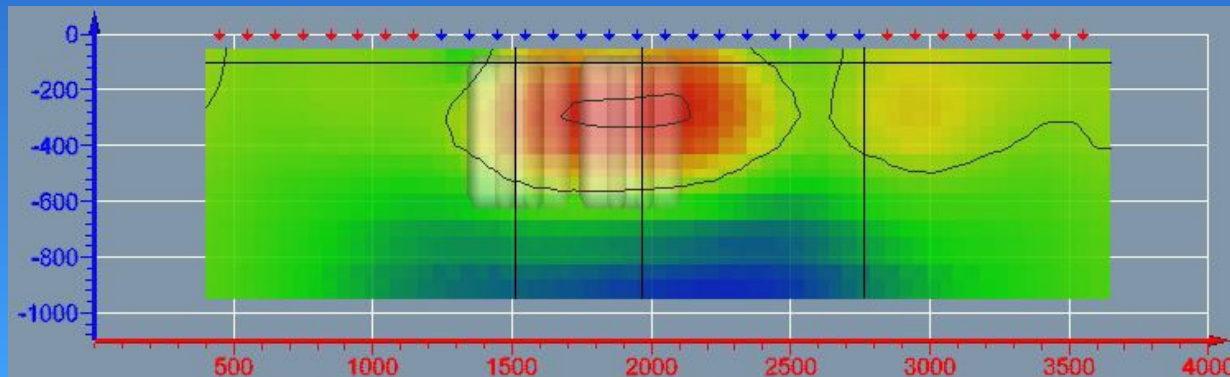
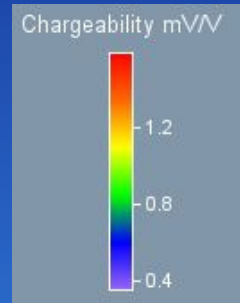
X-section - 1500



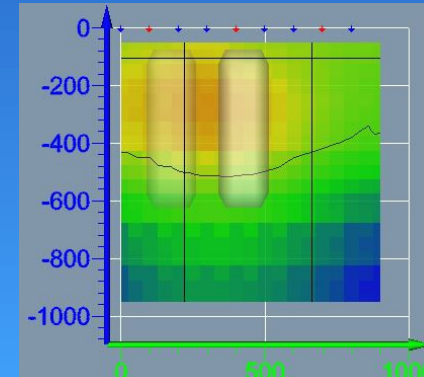
Long Section – 250



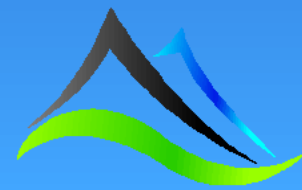
X-section - 2000



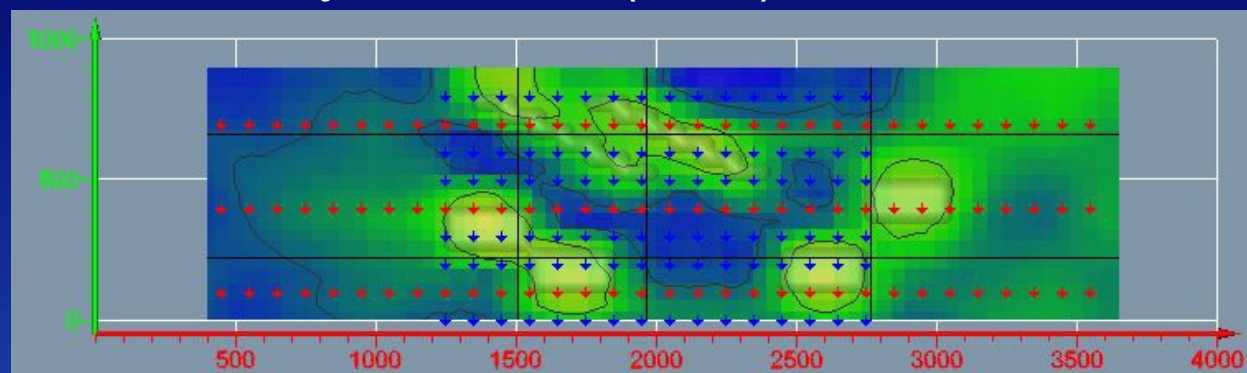
Long Section – 700



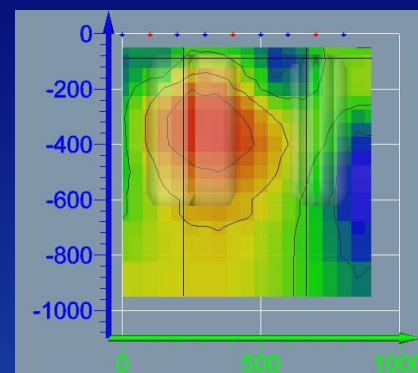
X-section - 2700



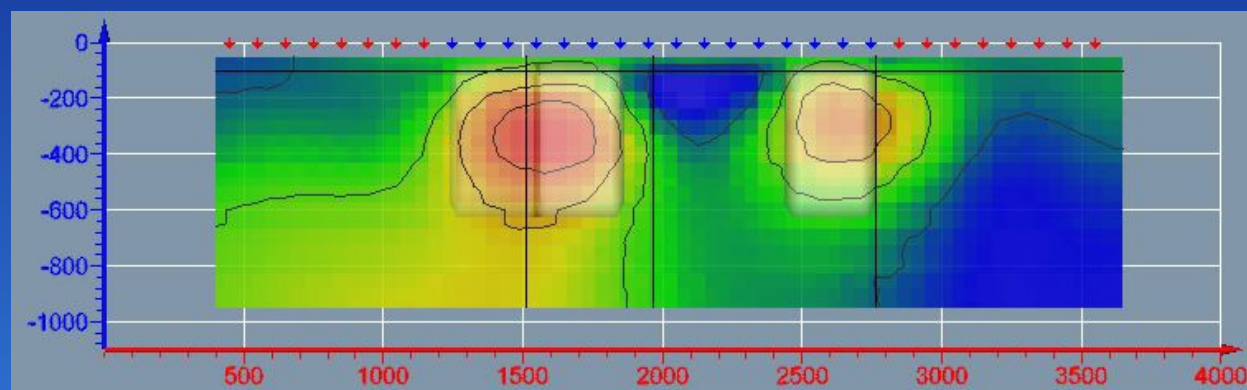
Type A – 50,000 Ωm in 1,000 Ωm triple body-thickness 100m depth to top – Resistivity Inversion (MRx)



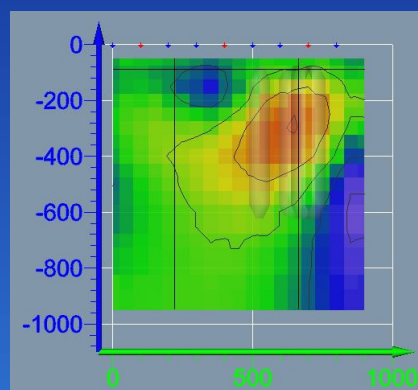
Plan View



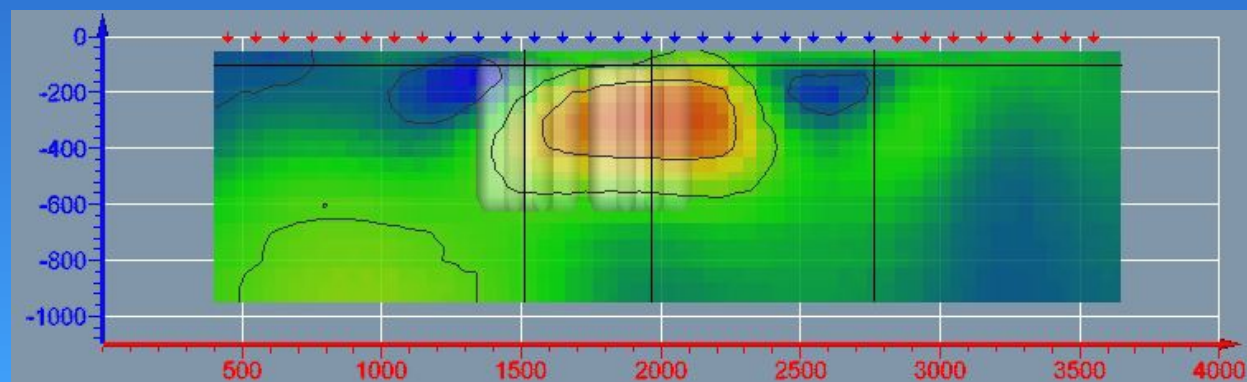
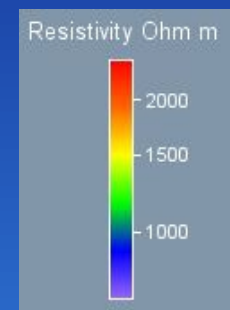
X-section - 1500



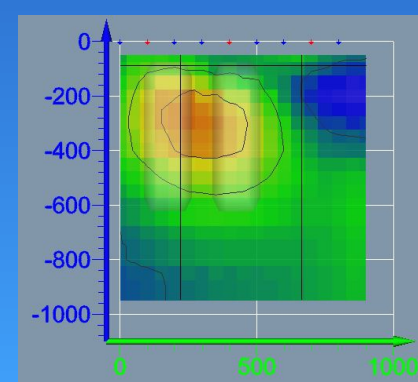
Long Section – 250



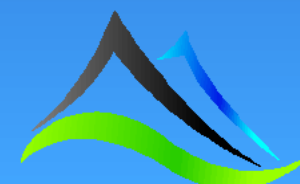
X-section - 2000



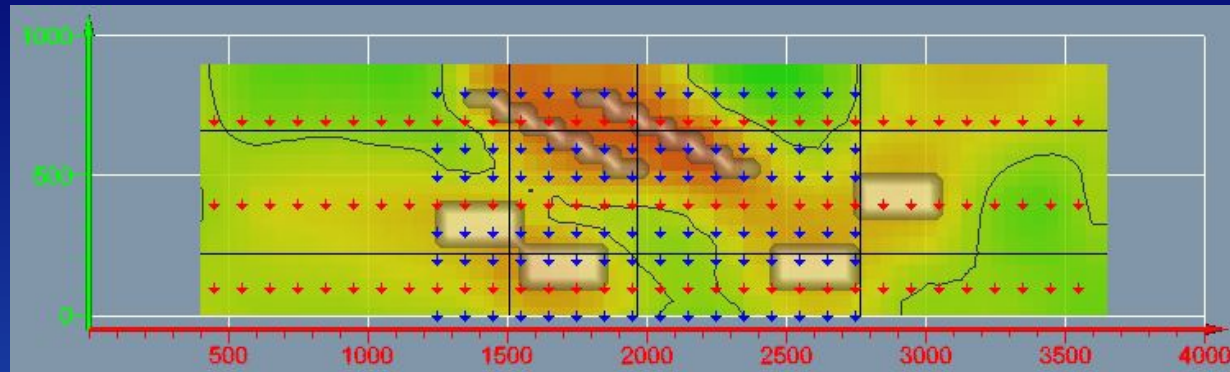
Long Section – 700



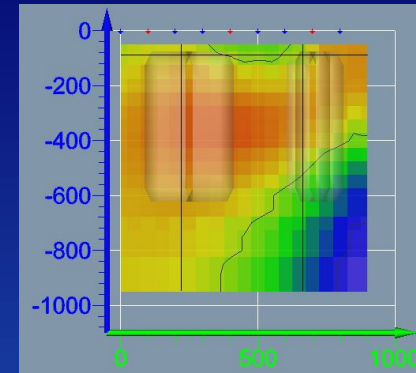
X-section - 2700



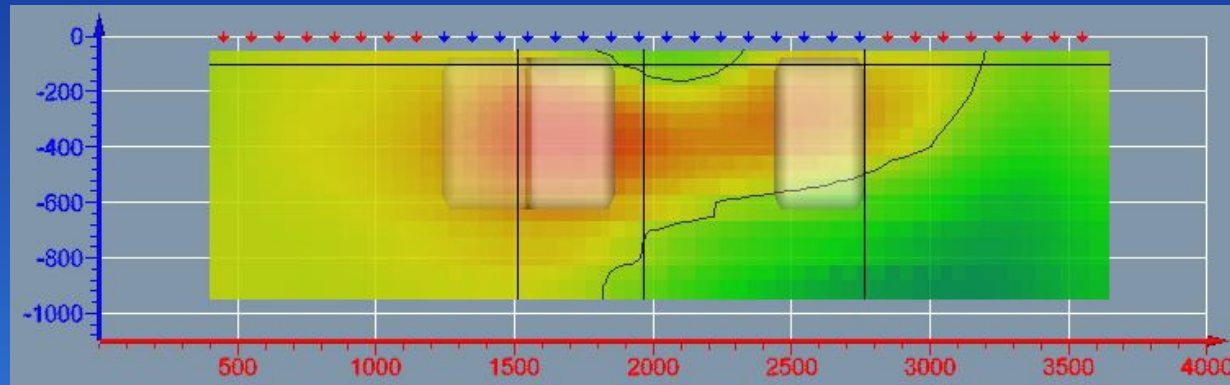
Type A – 50,000 Ωm in 1,000 Ωm triple body-thickness 100m depth to top – Chargeability Inversion (MRx)



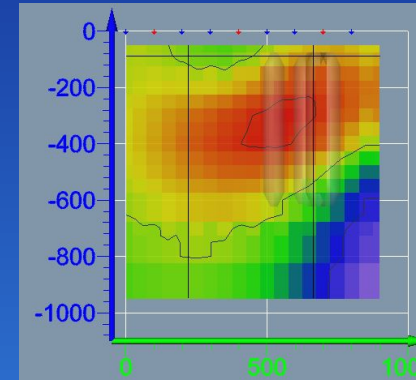
Plan View



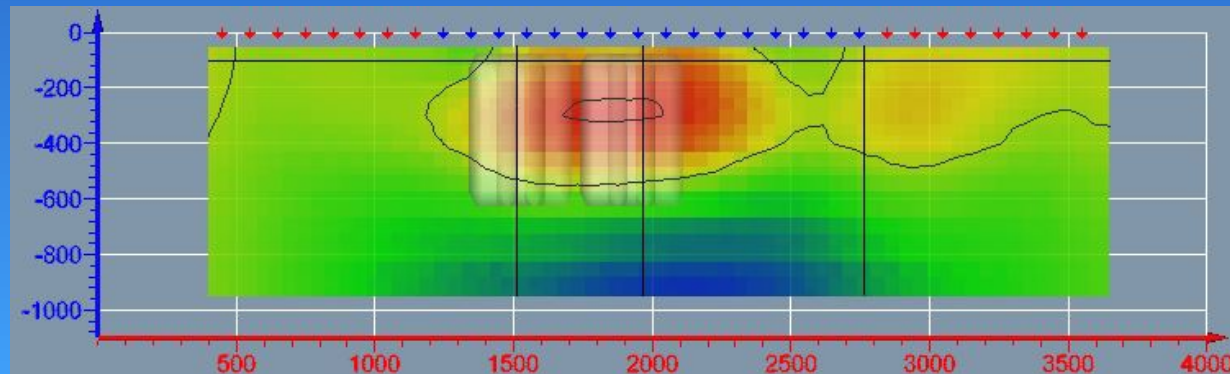
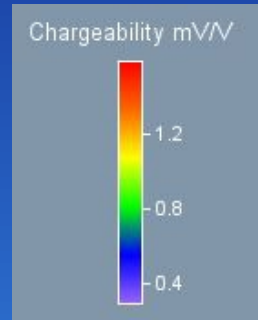
X-section - 1500



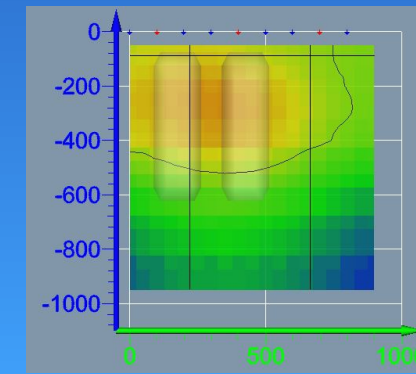
Long Section – 250



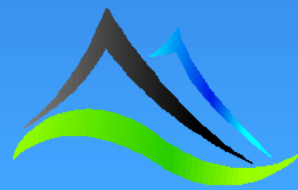
X-section - 2000



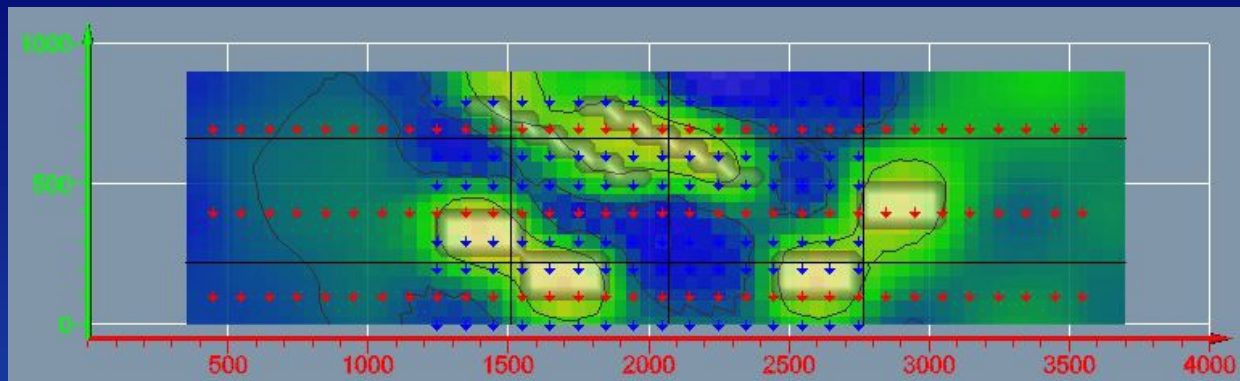
Long Section – 700



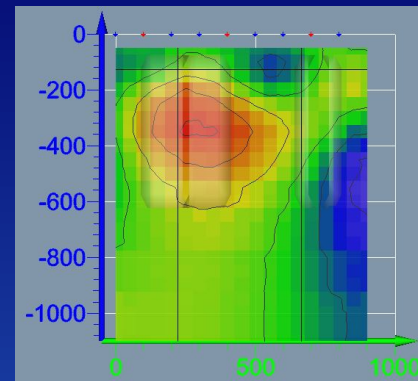
X-section - 2700



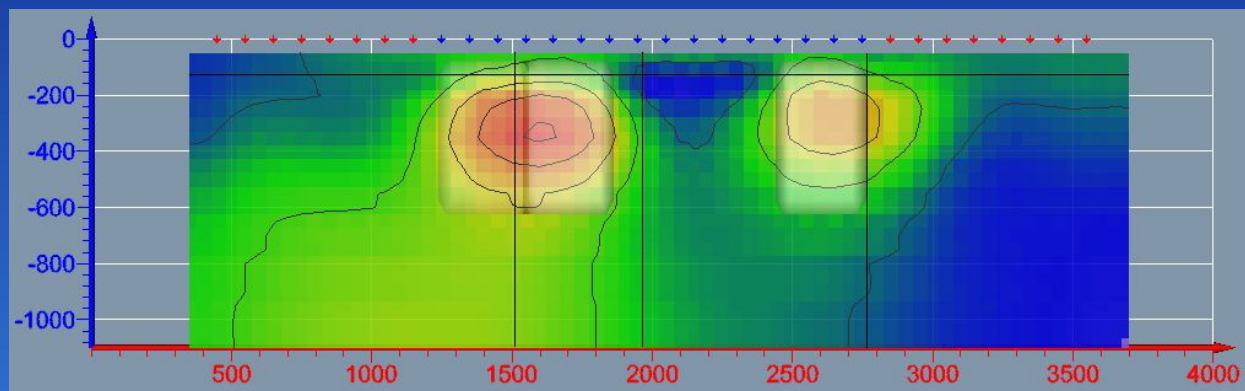
Type A – 50,000 Ωm in 1,000 Ωm triple body-thickness 100m depth to top – Resistivity Inversion (MTxRx)



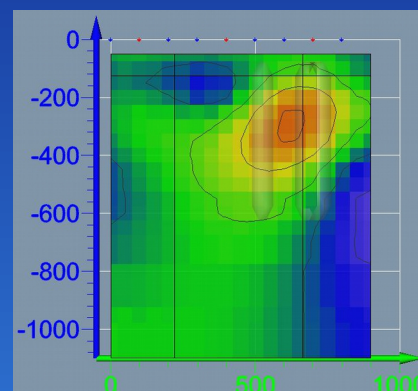
Plan View



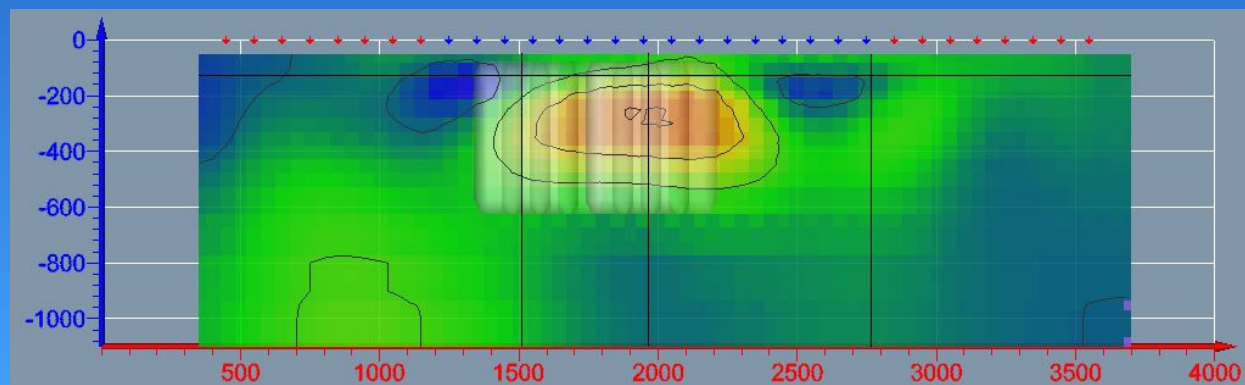
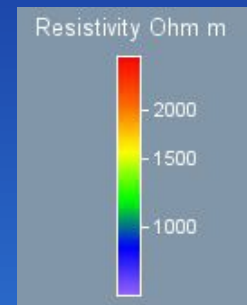
X-section - 1500



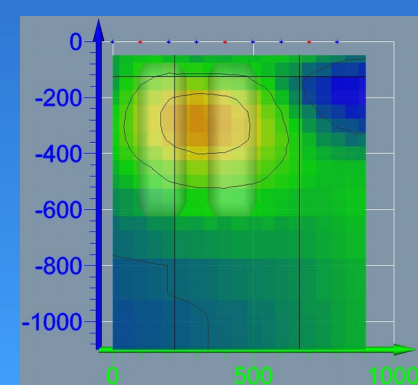
Long Section – 250



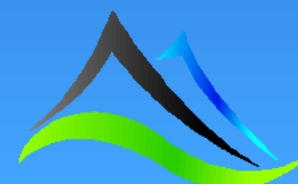
X-section - 2000



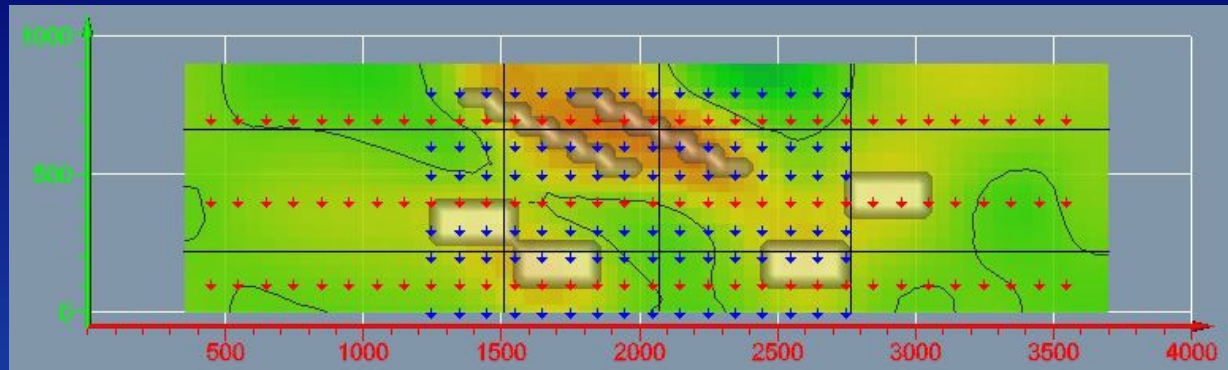
Long Section – 700



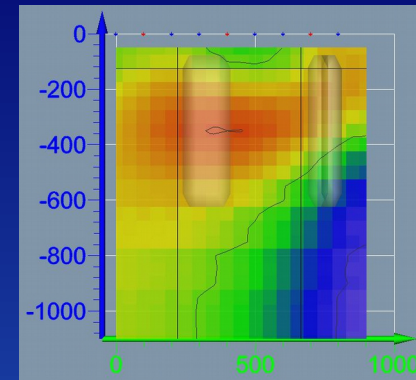
X-section - 2700



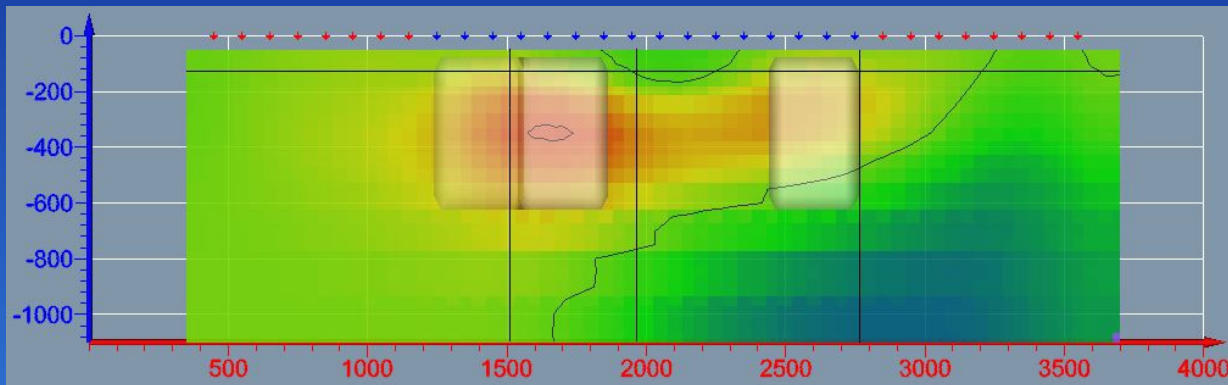
Type A – 50,000 Ωm in 1,000 Ωm triple body-thickness 100m depth to top – Chargeability Inversion (MTxRx)



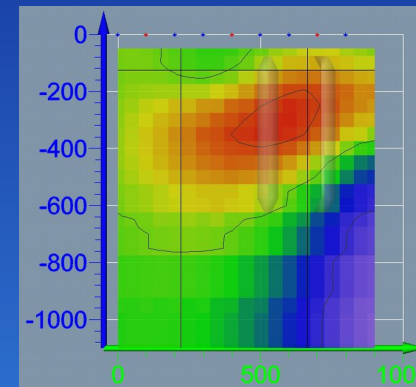
Plan View



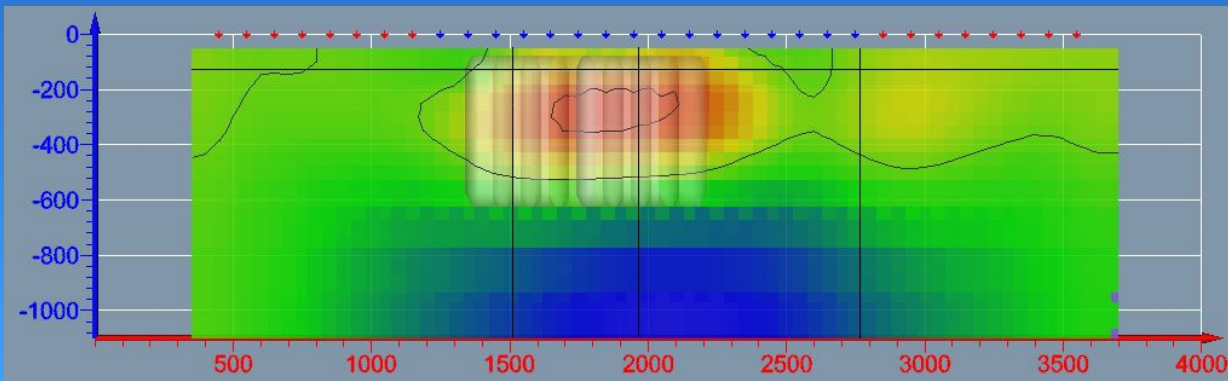
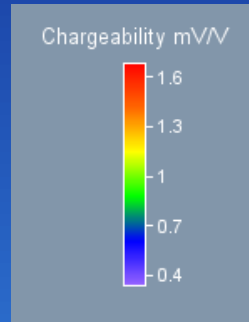
X-section - 1500



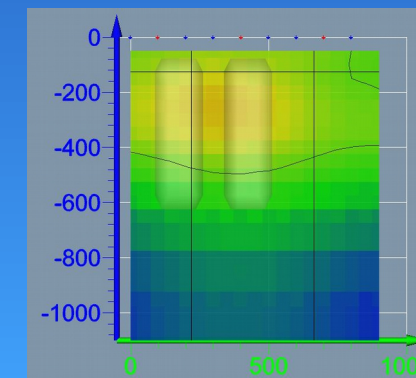
Long Section – 250



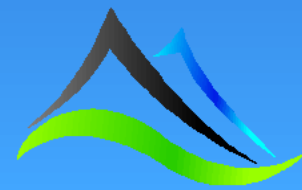
X-section - 2000



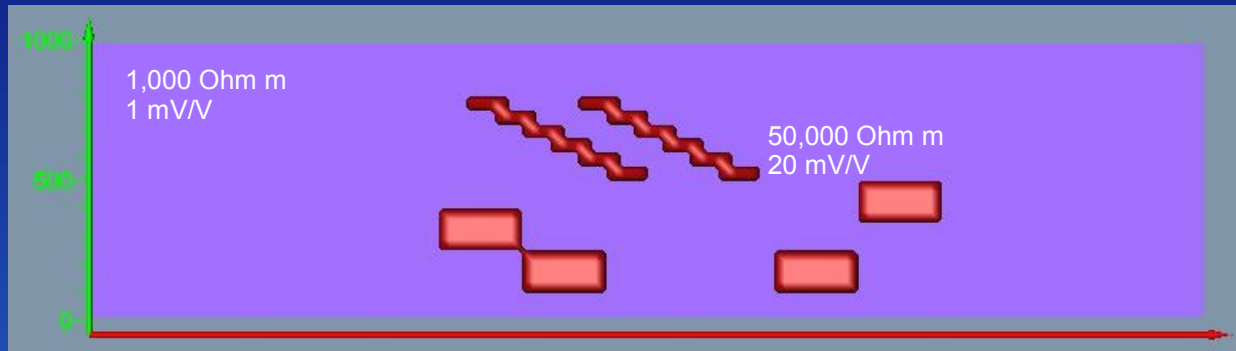
Long Section – 700



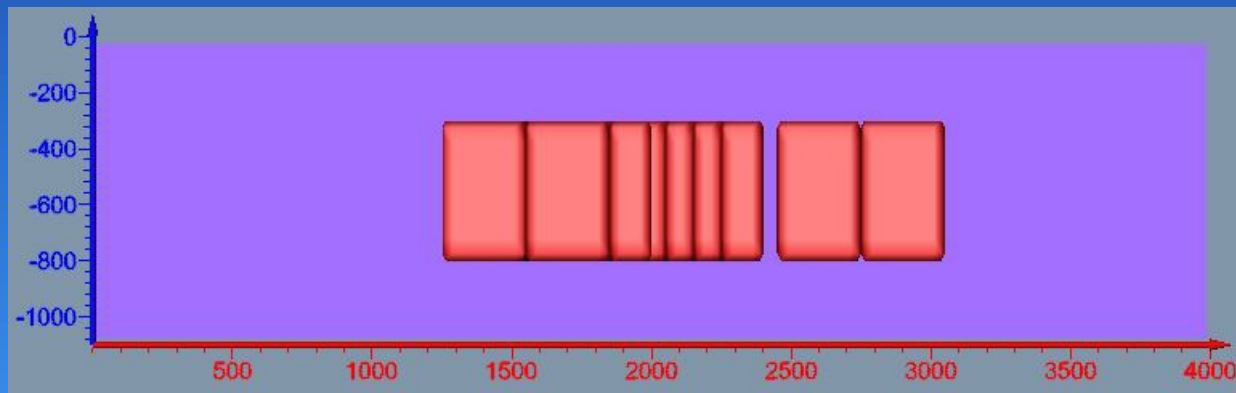
X-section - 2700



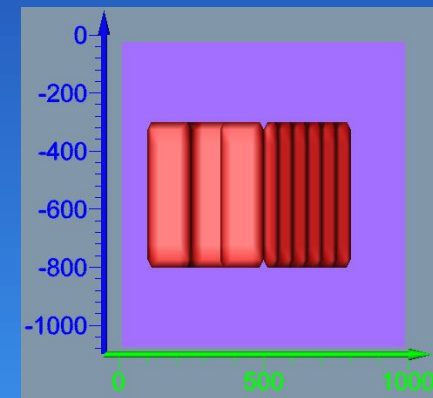
Model: Type A – 50,000 Ωm resistors in a 1,000 Ωm half space. Triple-body thickness. 300m depth to top.



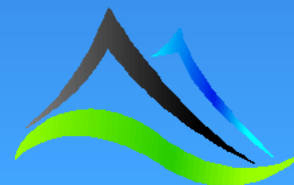
Top



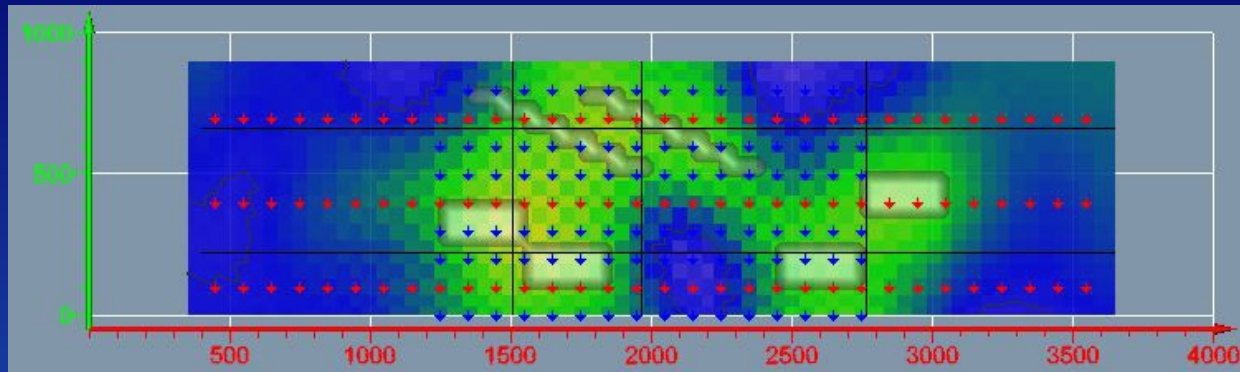
Front



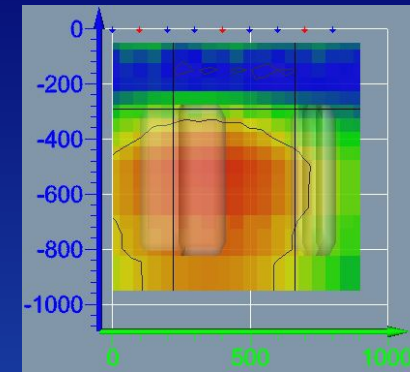
Right



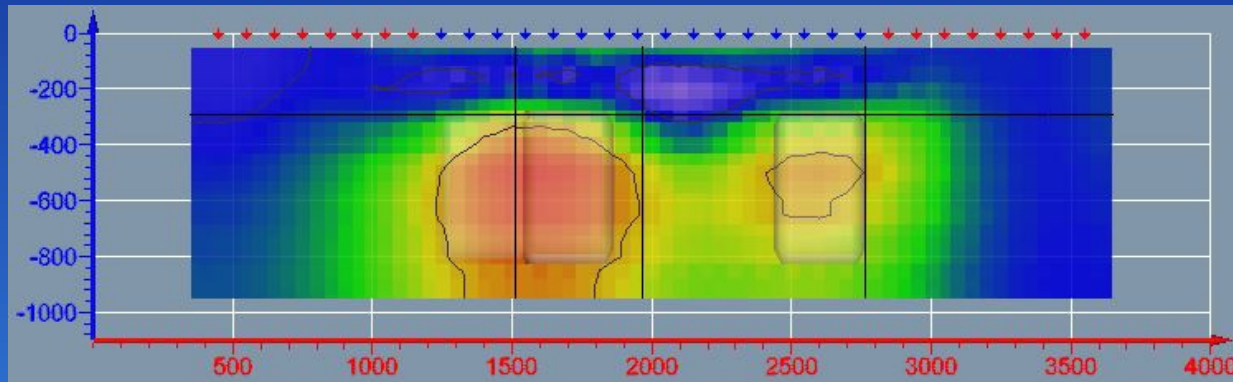
Type A – 50,000 Ωm in 1,000 Ωm triple body-thickness 300m depth to top – Resistivity Inversion (DODD)



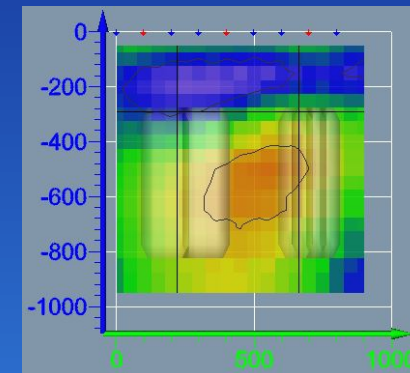
Plan View



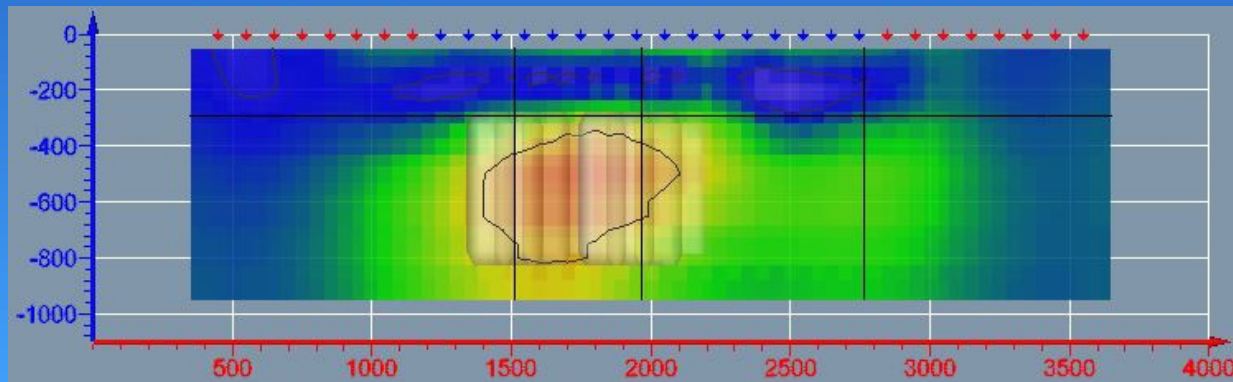
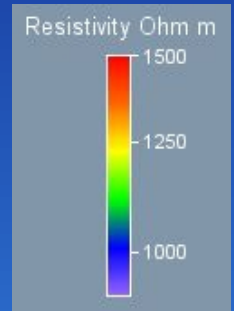
X-section - 1500



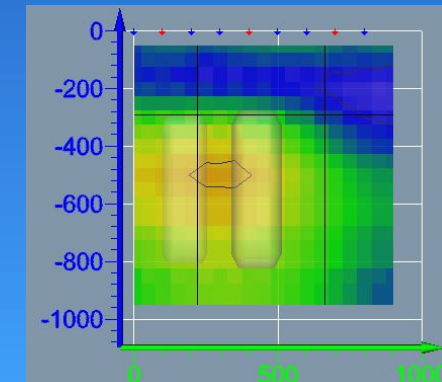
Long Section – 250



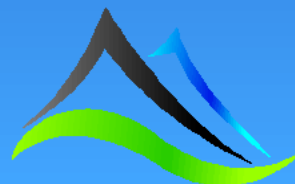
X-section - 2000



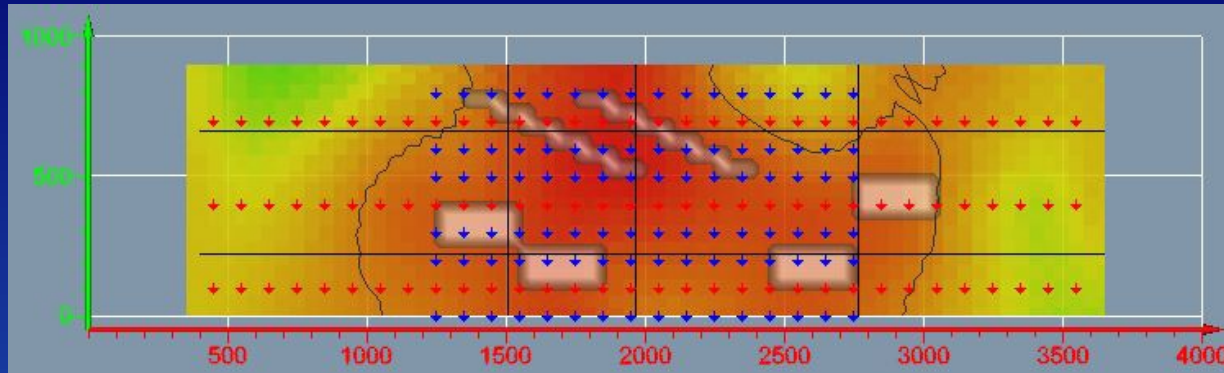
Long Section – 700



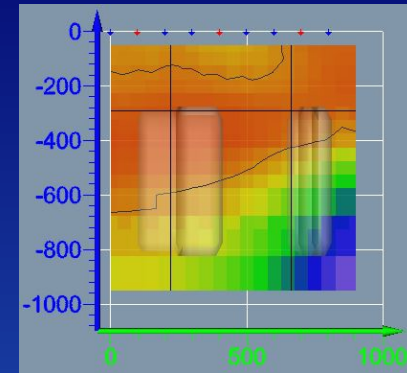
X-section - 2700



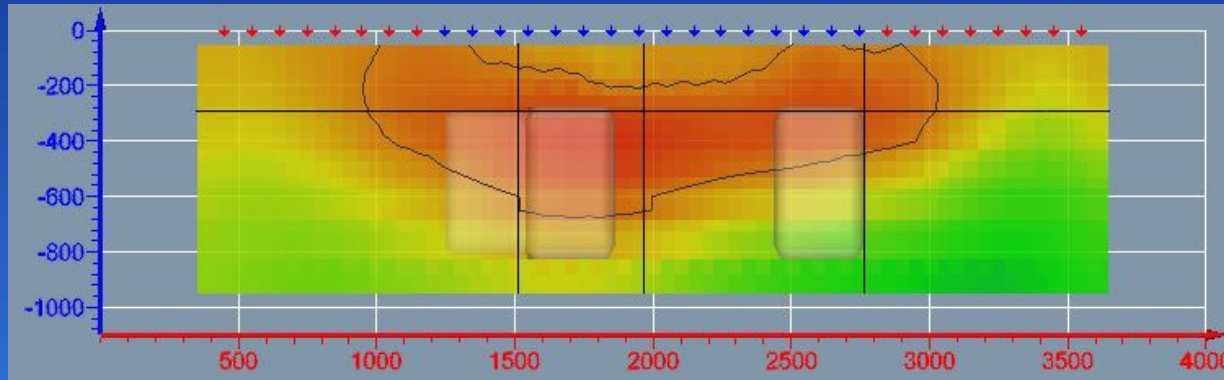
Type A – 50,000 Ωm in 1,000 Ωm triple body-thickness 300m depth to top – Chargeability Inversion (DODD)



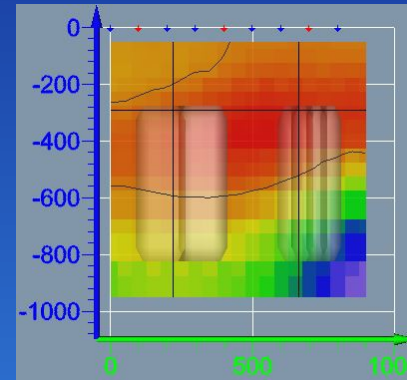
Plan View



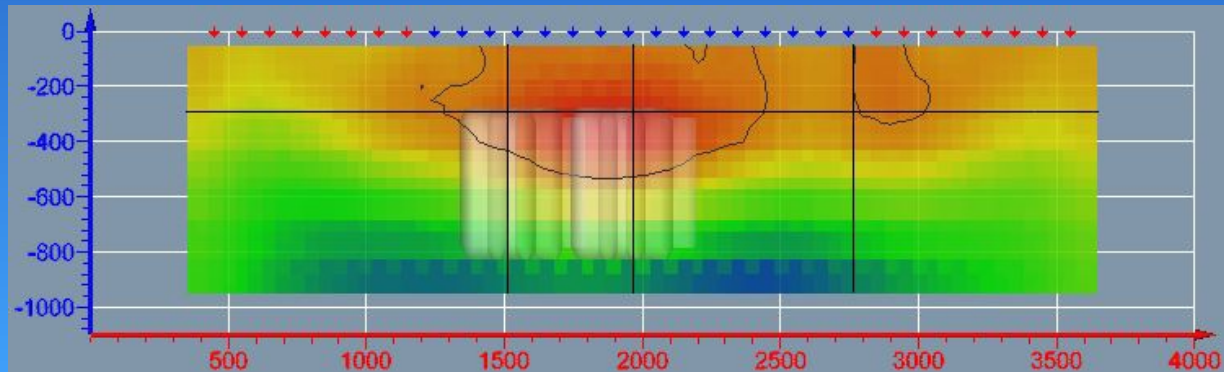
X-section - 1500



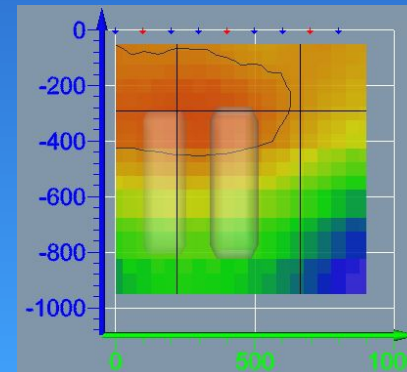
Long Section – 250



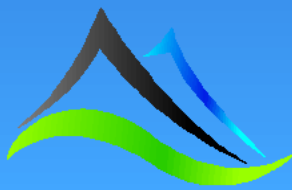
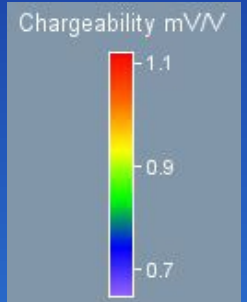
X-section - 2000



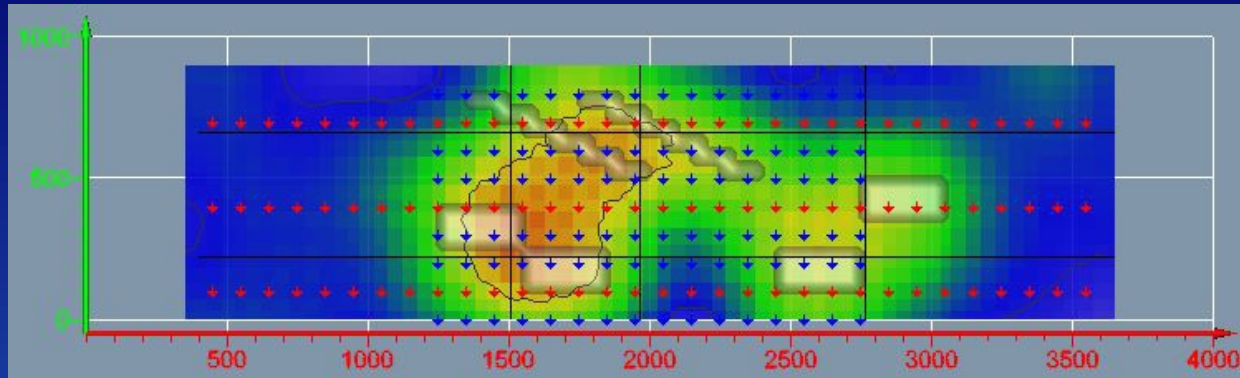
Long Section – 700



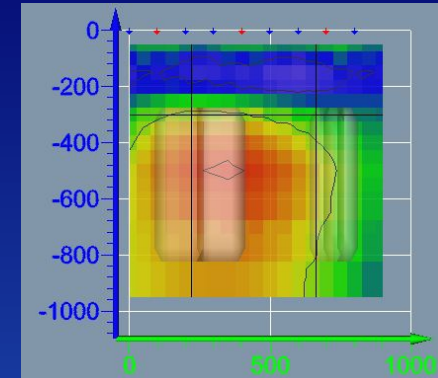
X-section - 2700



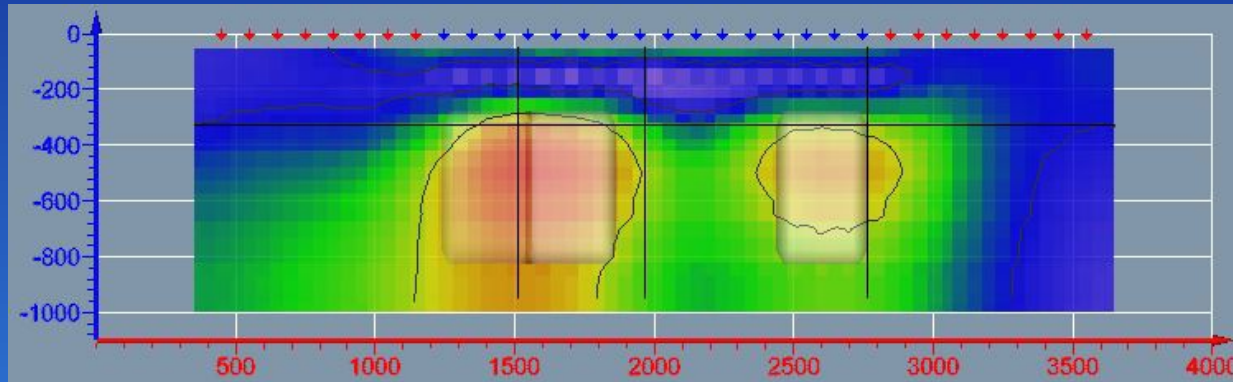
Type A – 50,000 Ωm in 1,000 Ωm triple body-thickness 300m depth to top – Resistivity Inversion (MRx)



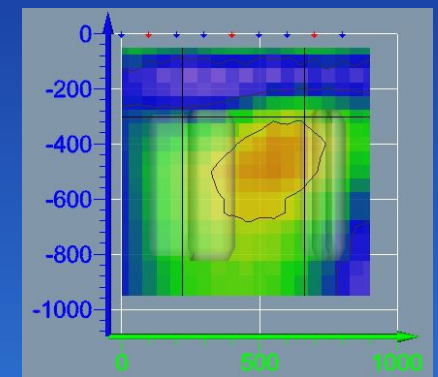
Plan View



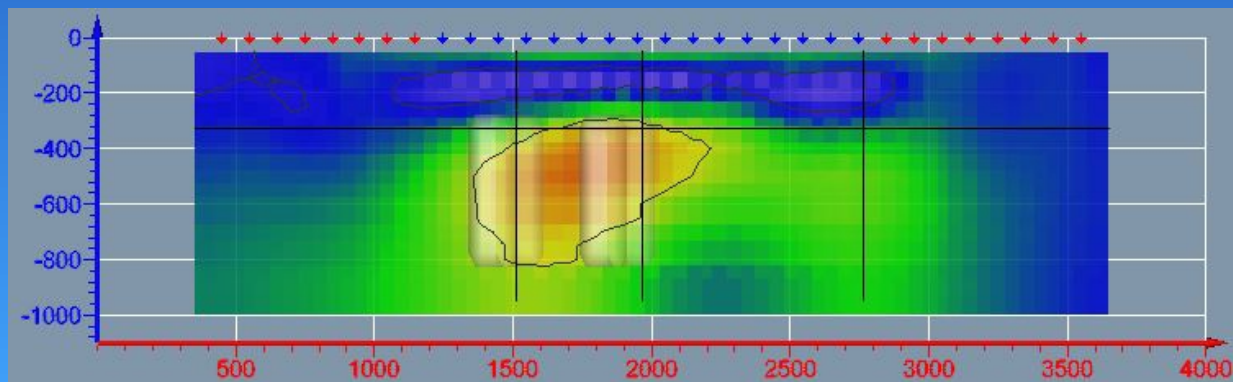
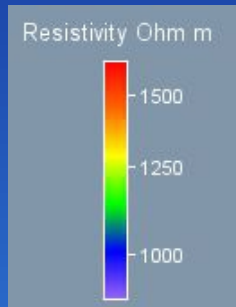
X-section - 1500



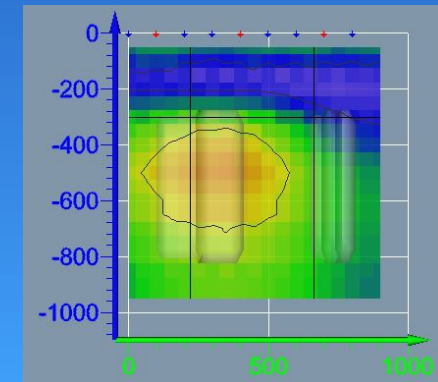
Long Section – 250



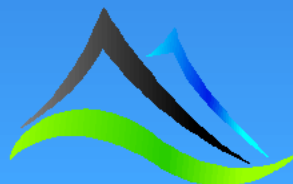
X-section - 2000



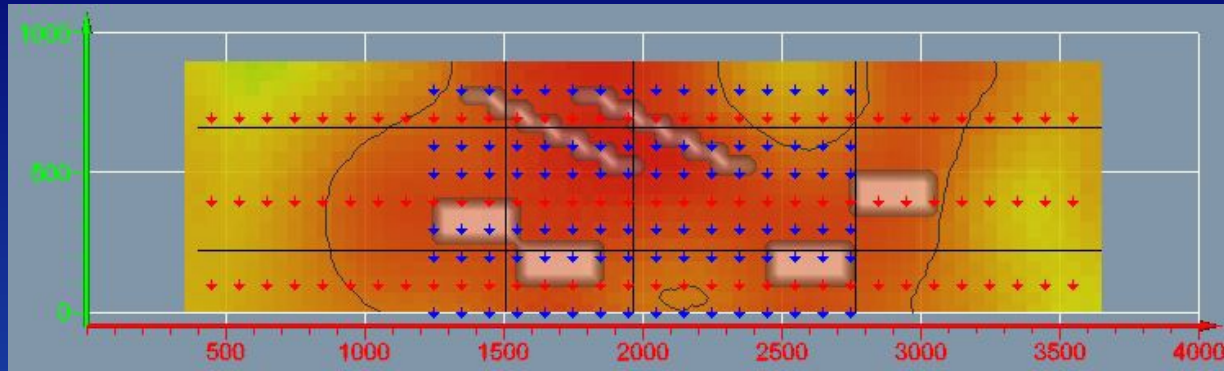
Long Section – 700



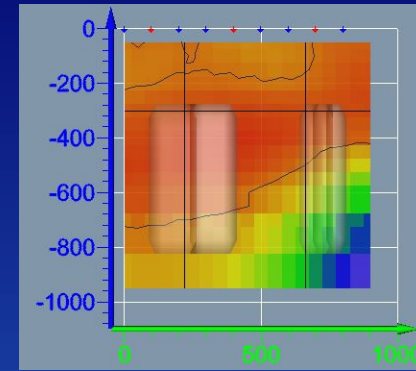
X-section - 2700



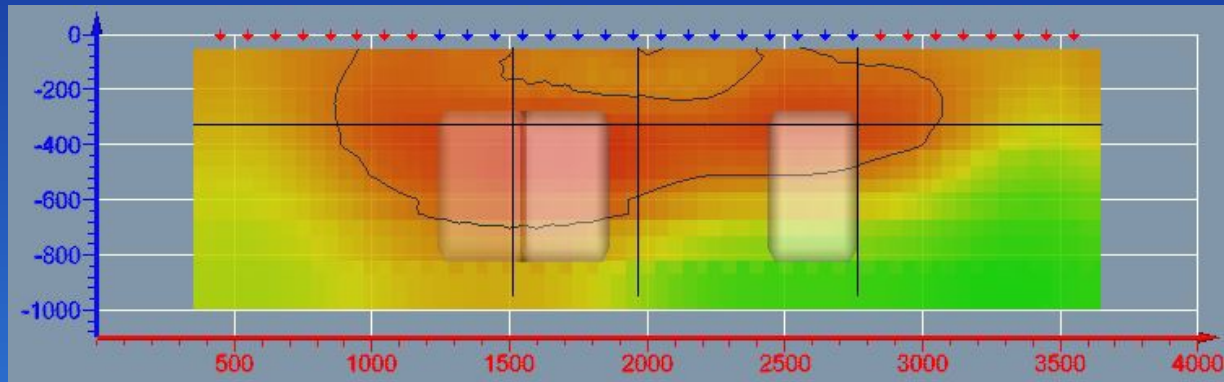
Type A – 50,000 Ωm in 1,000 Ωm triple body-thickness 300m depth to top – Chargeability Inversion (MRx)



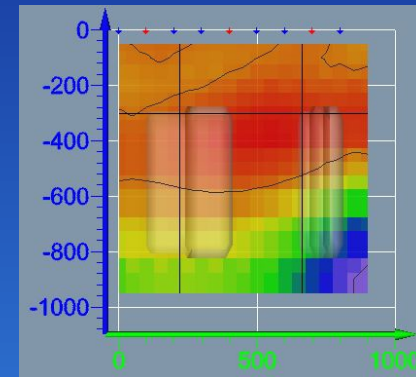
Plan View



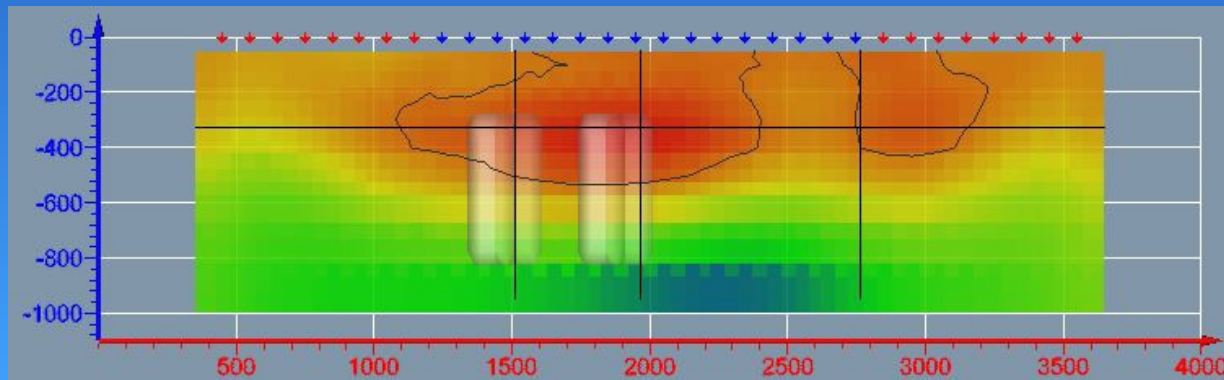
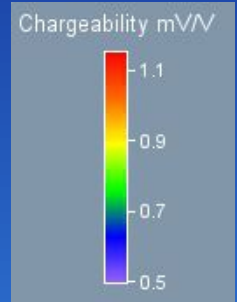
X-section - 1500



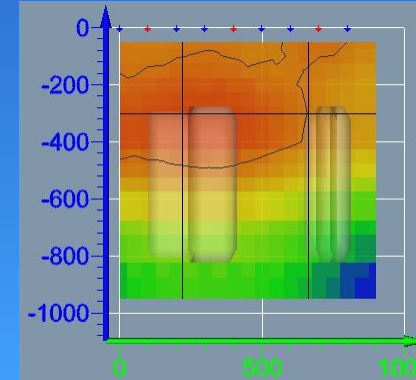
Long Section – 250



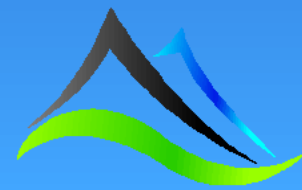
X-section - 2000



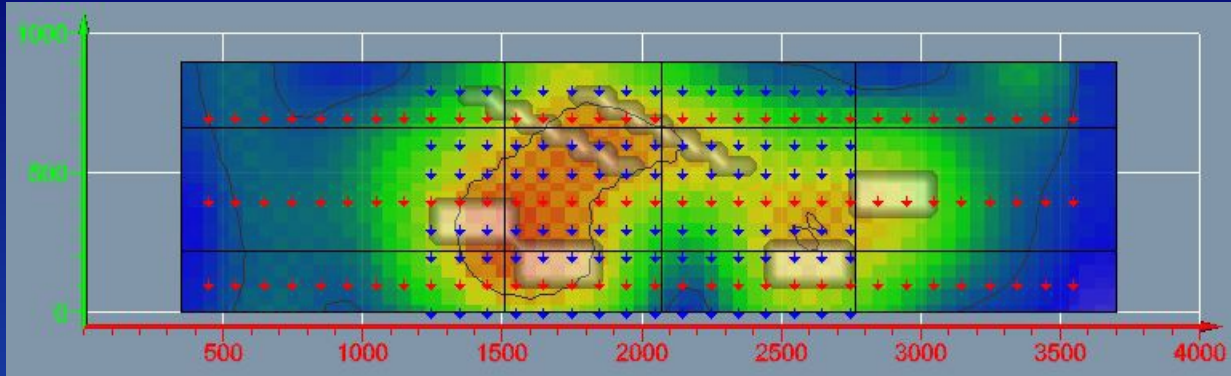
Long Section – 700



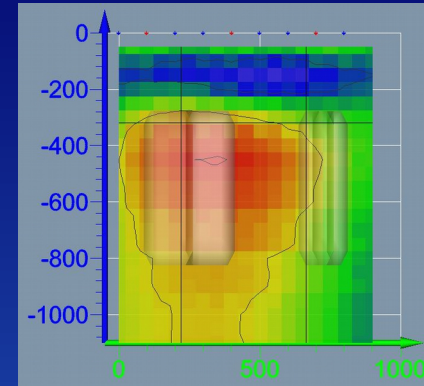
X-section - 2700



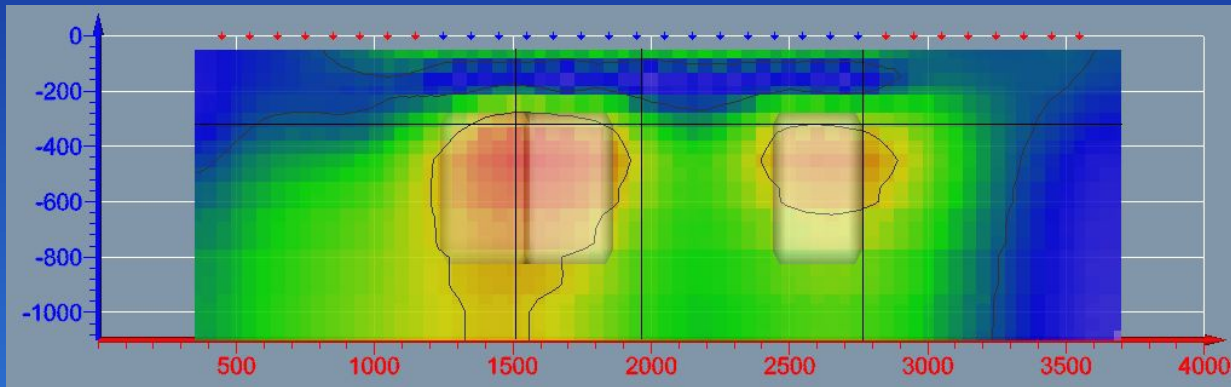
Type A – 50,000 Ωm in 1,000 Ωm triple body-thickness 300m depth to top – Resistivity Inversion (MTxRx)



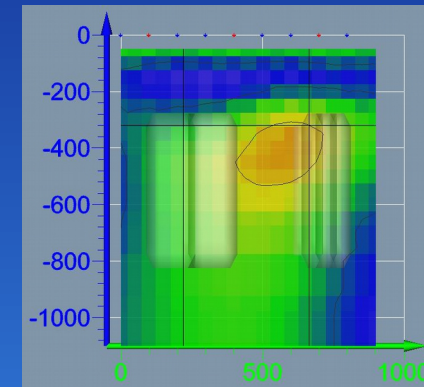
Plan View



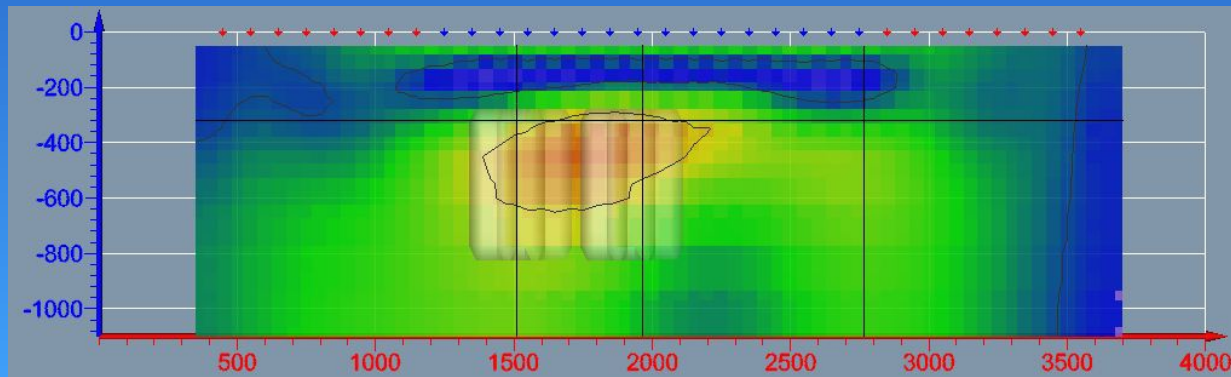
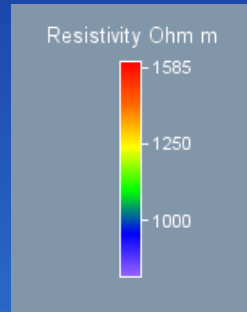
X-section - 1500



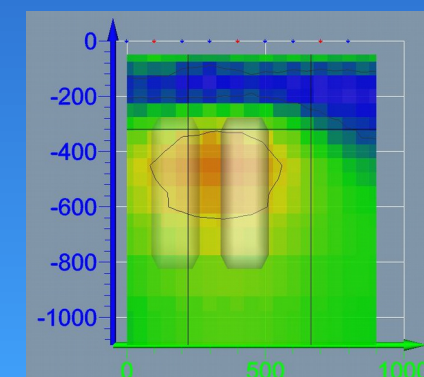
Long Section – 250



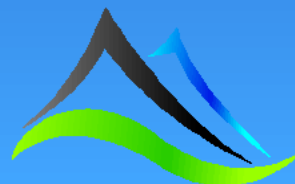
X-section - 2000



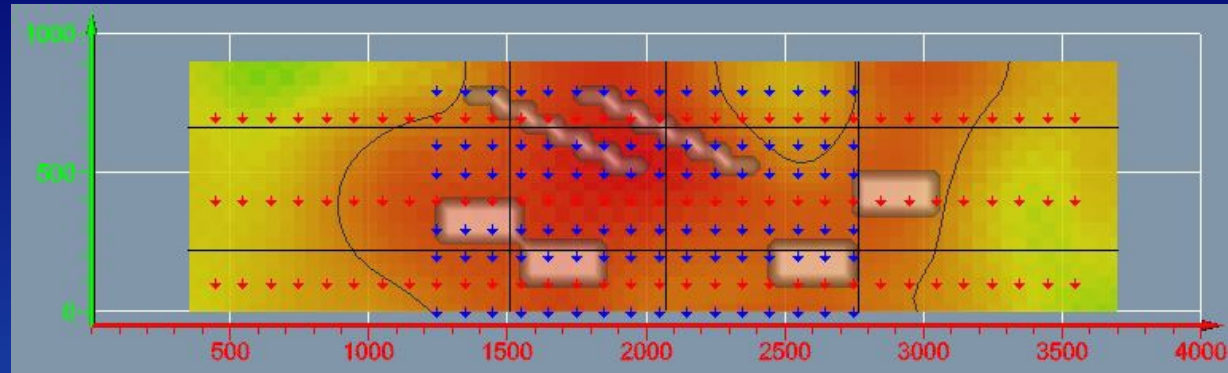
Long Section – 700



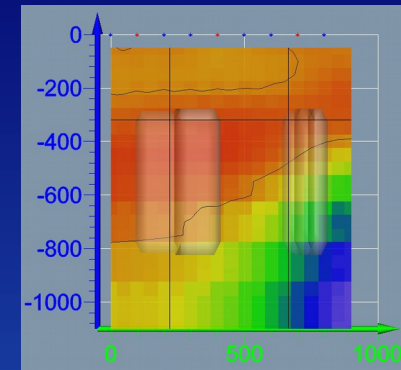
X-section - 2700



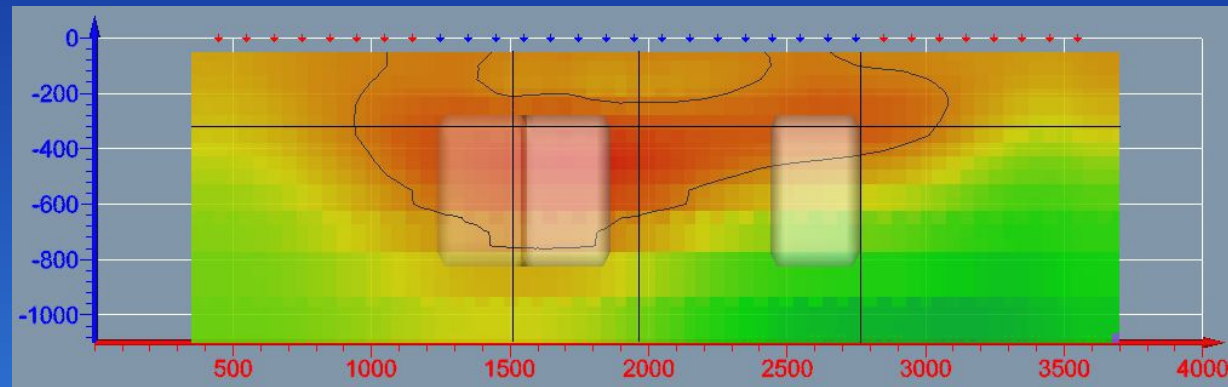
Type A – 50,000 Ωm in 1,000 Ωm triple body-thickness 300m depth to top – Chargeability Inversion (MTxRx)



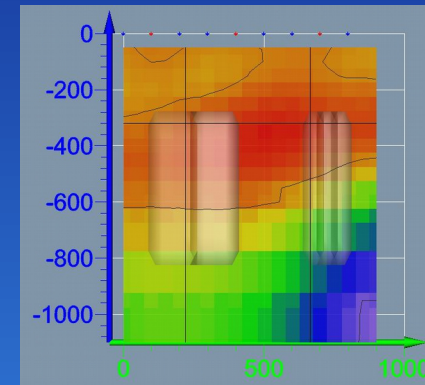
Plan View



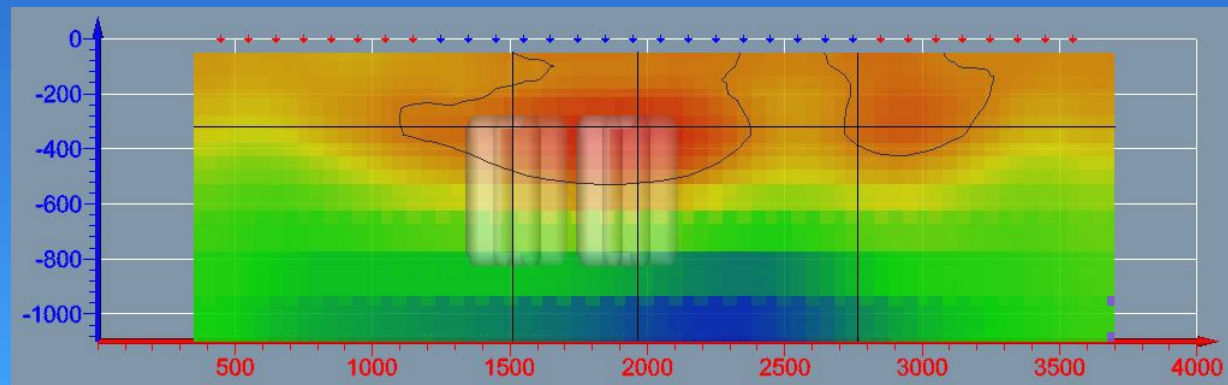
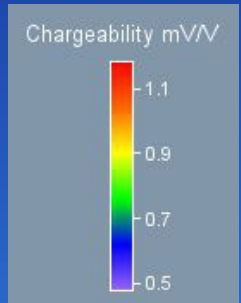
X-section - 1500



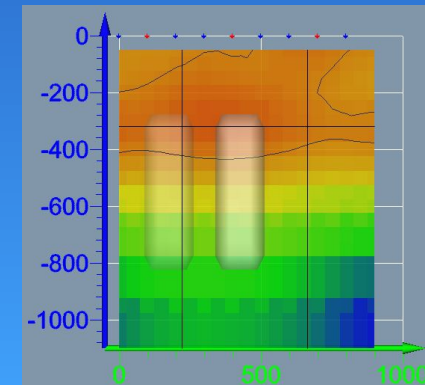
Long Section – 250



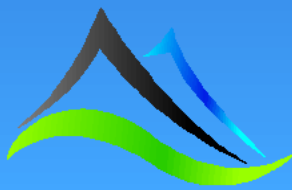
X-section - 2000



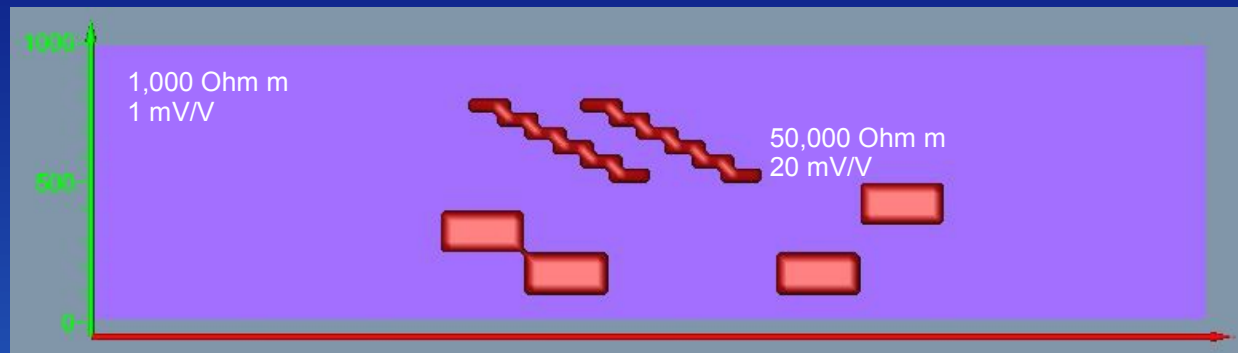
Long Section – 700



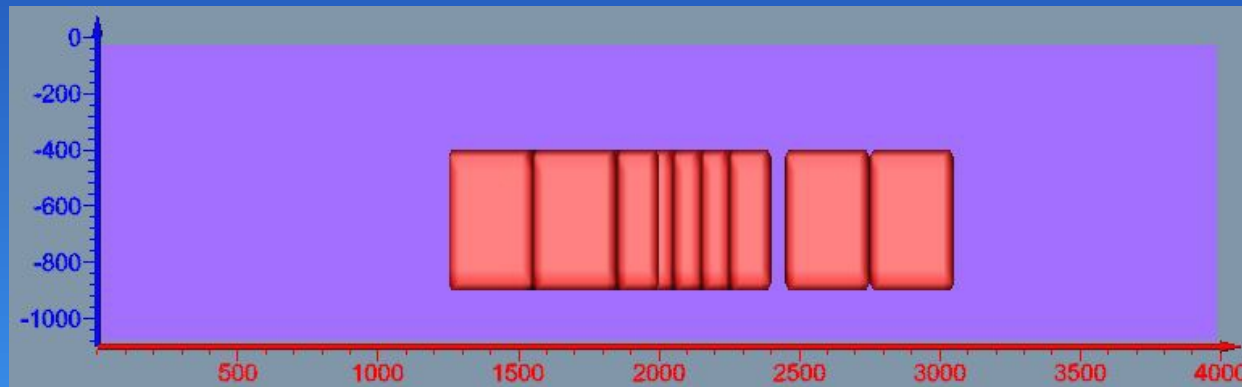
X-section - 2700



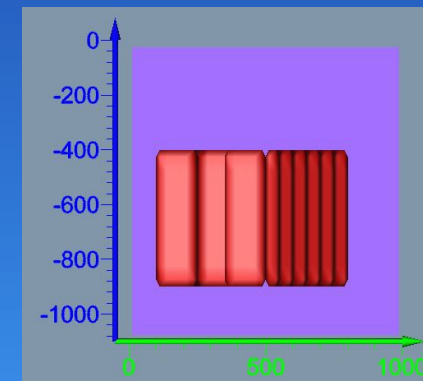
Model: Type A – 50,000 Ωm resistors in a 1,000 Ωm half space. Triple-body thickness. 400m depth to top.



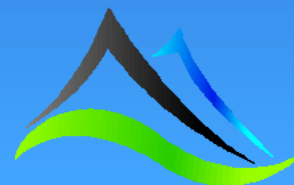
Top



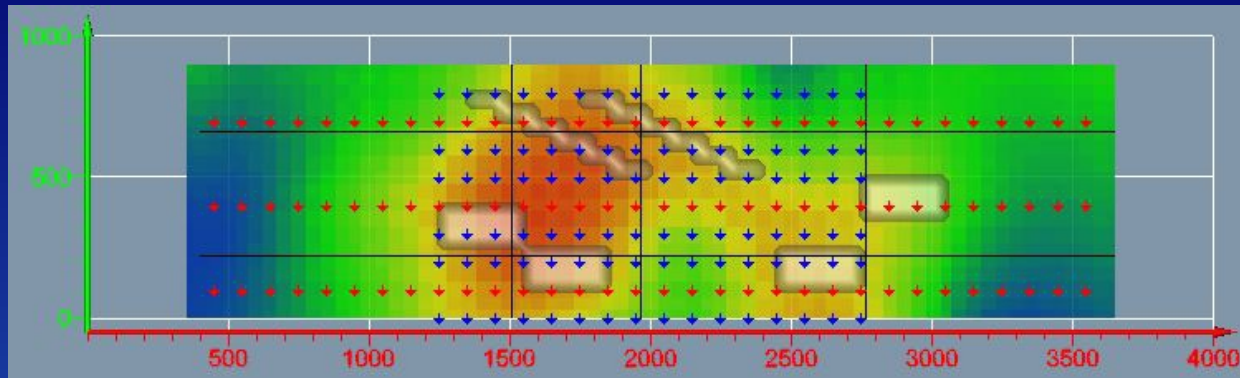
Front



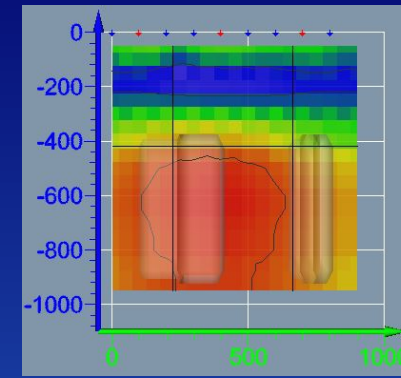
Right



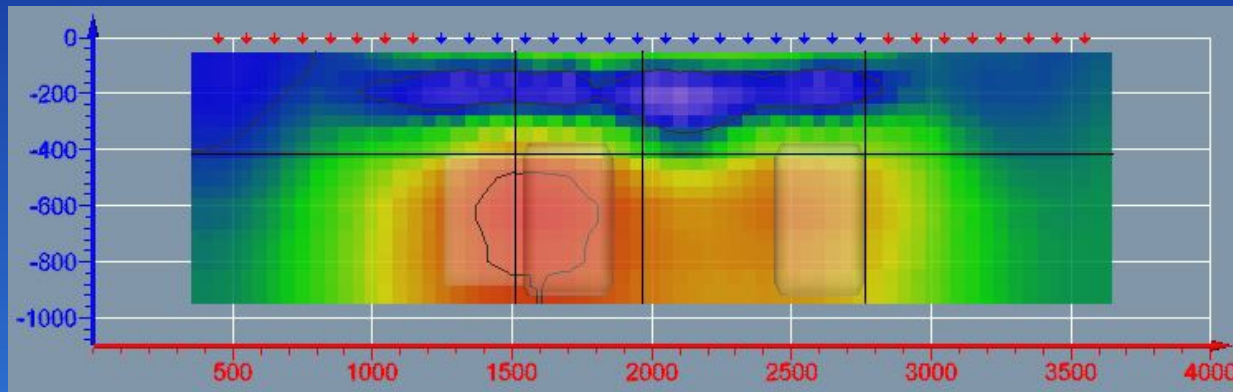
Type A – 50,000 Ωm in 1,000 Ωm triple body-thickness 400m depth to top – Resistivity Inversion (DODD)



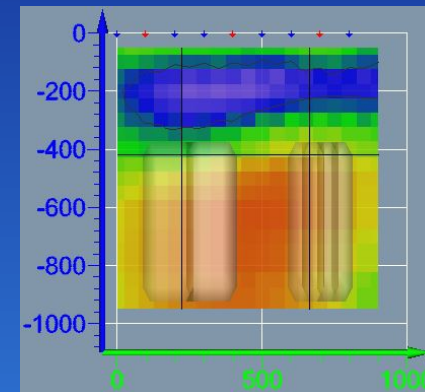
Plan View



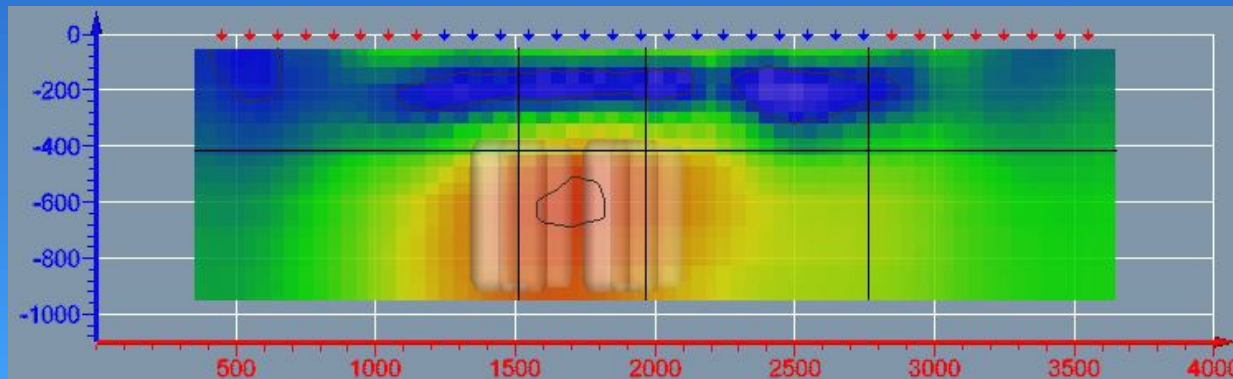
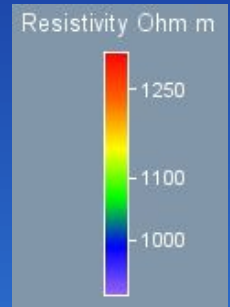
X-section - 1500



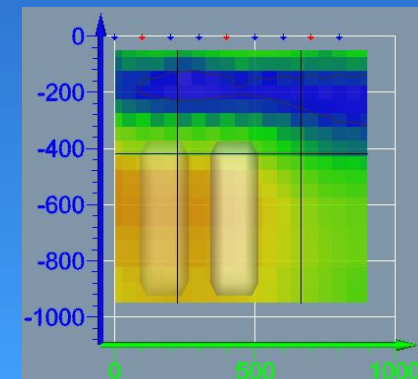
Long Section – 250



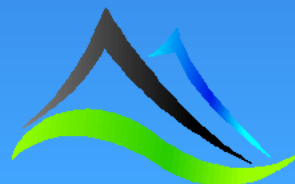
X-section - 2000



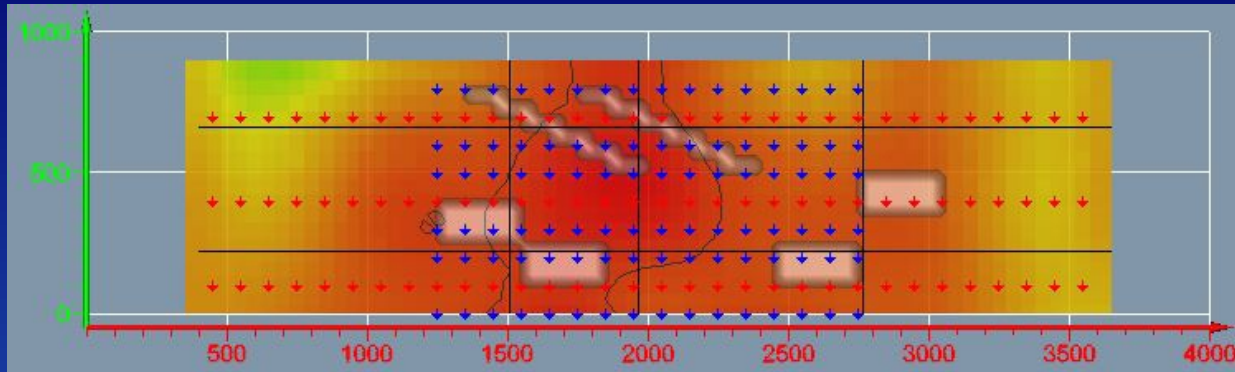
Long Section – 700



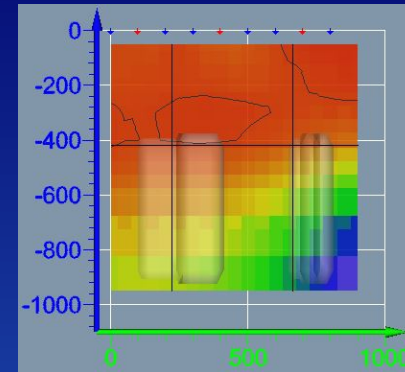
X-section - 2700



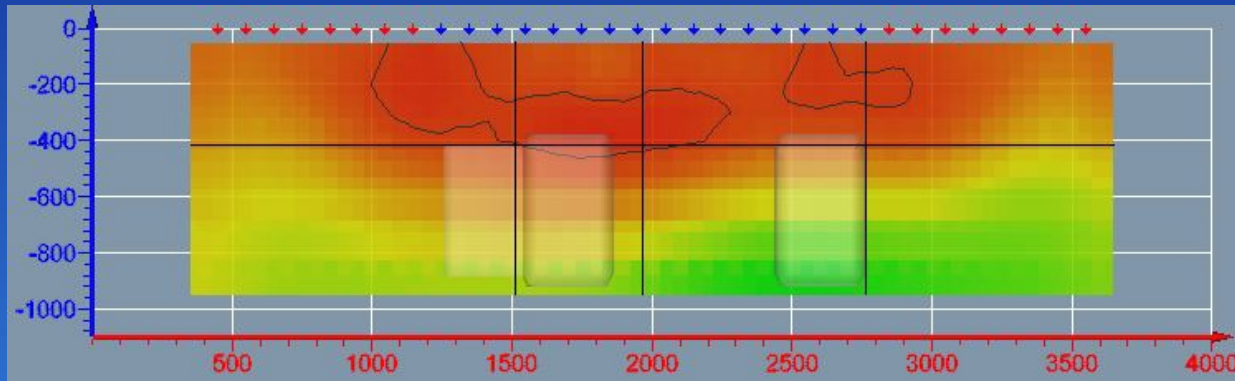
Type A – 50,000 Ωm in 1,000 Ωm triple body-thickness 400m depth to top – Chargeability Inversion (DODD)



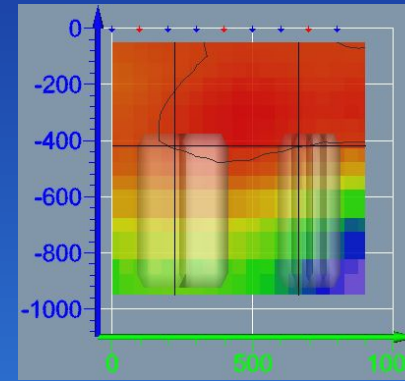
Plan View



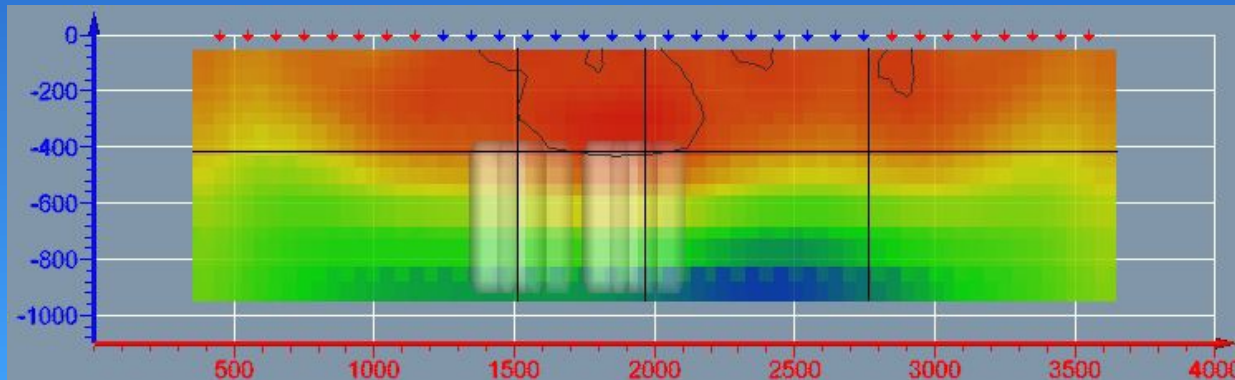
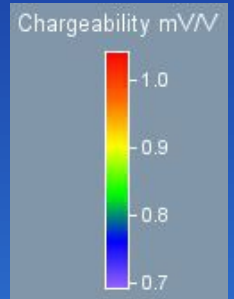
X-section - 1500



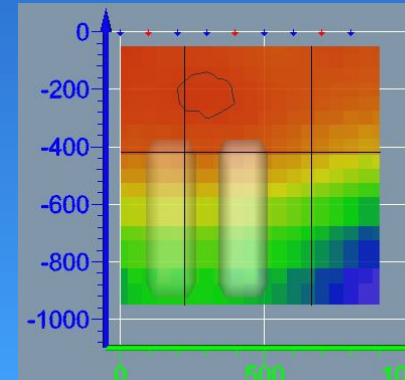
Long Section – 250



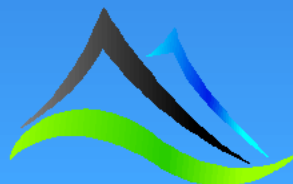
X-section - 2000



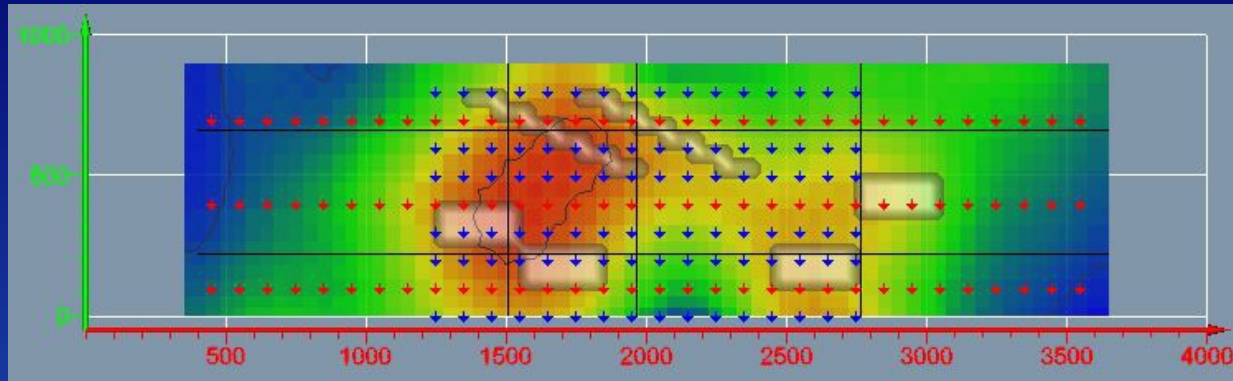
Long Section – 700



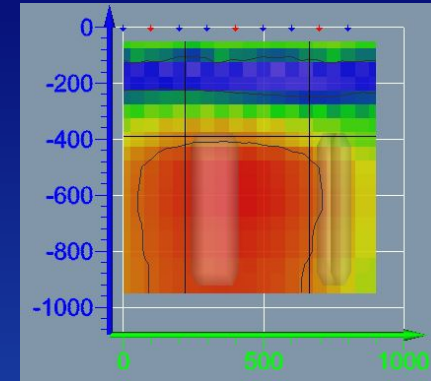
X-section - 2700



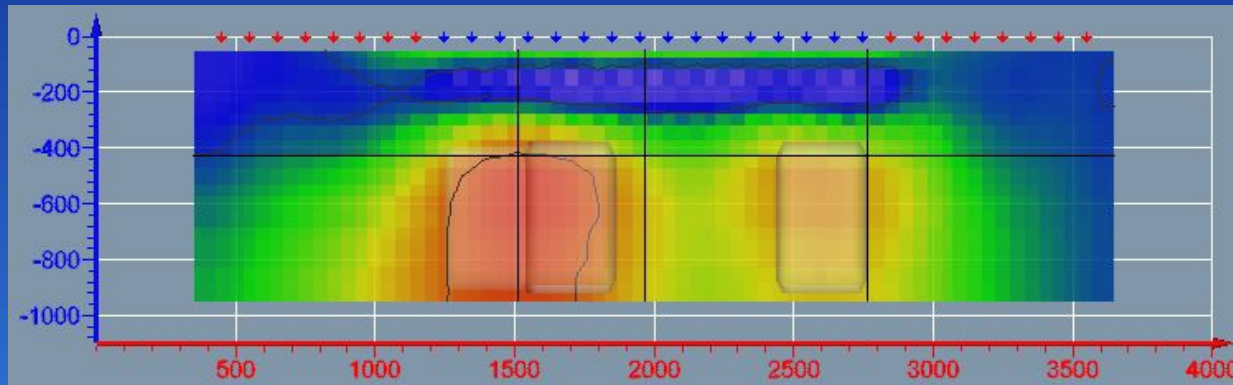
Type A – 50,000 Ωm in 1,000 Ωm triple body-thickness 400m depth to top – Resistivity Inversion (MRx)



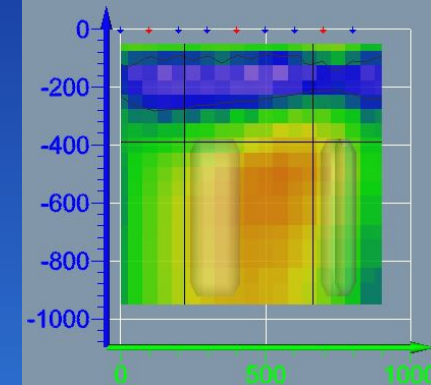
Plan View



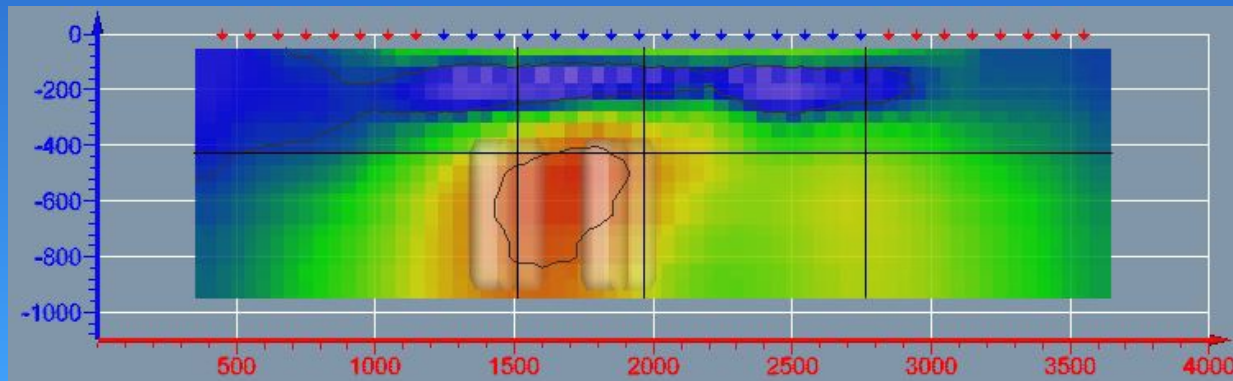
X-section - 1500



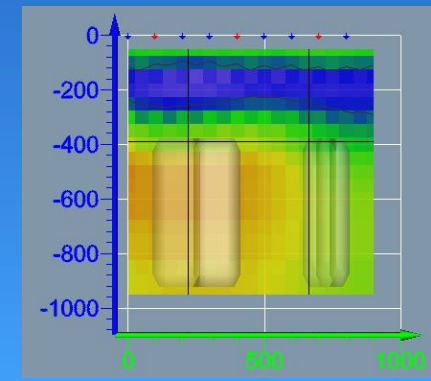
Long Section – 250



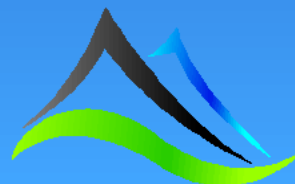
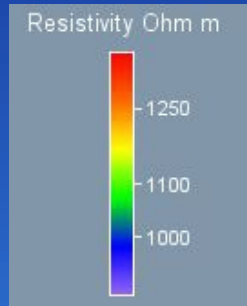
X-section - 2000



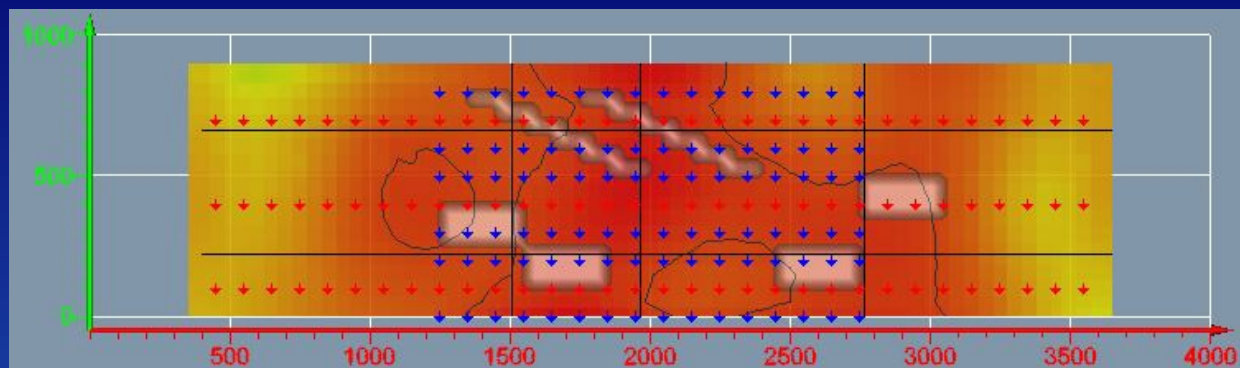
Long Section – 700



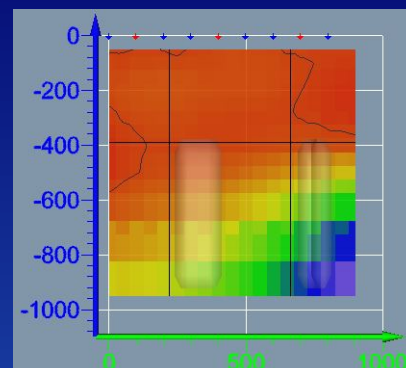
X-section - 2700



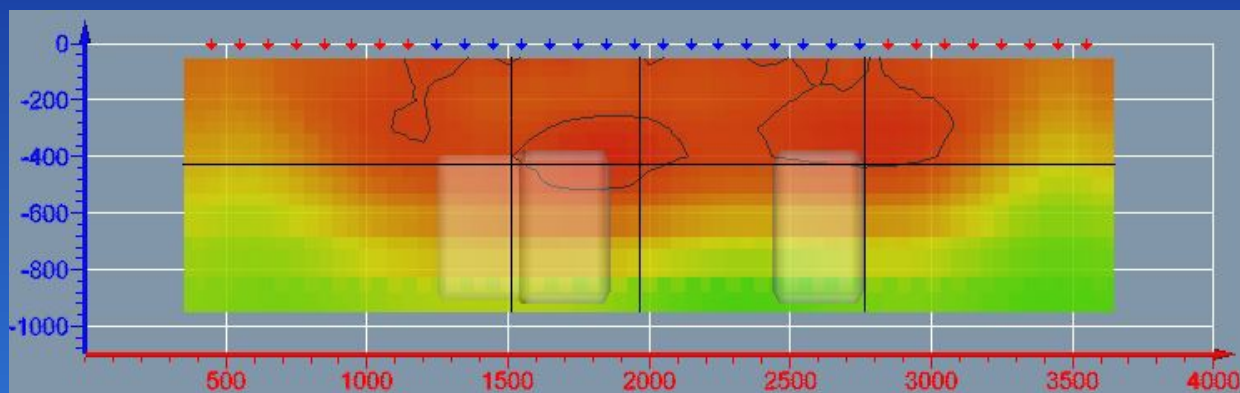
Type A – 50,000 Ωm in 1,000 Ωm triple body-thickness 400m depth to top – Chargeability Inversion (MRx)



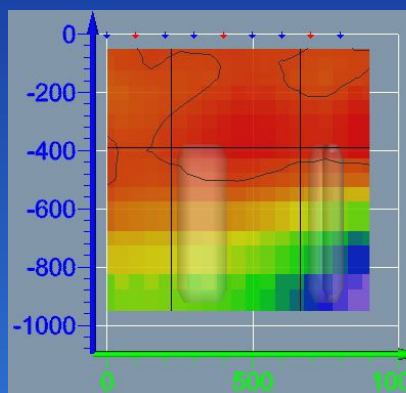
Plan View



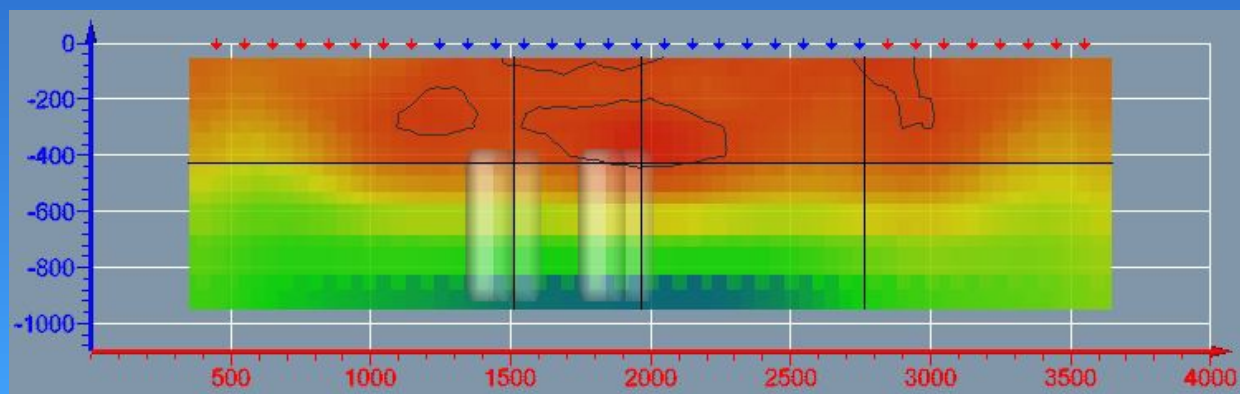
X-section - 1500



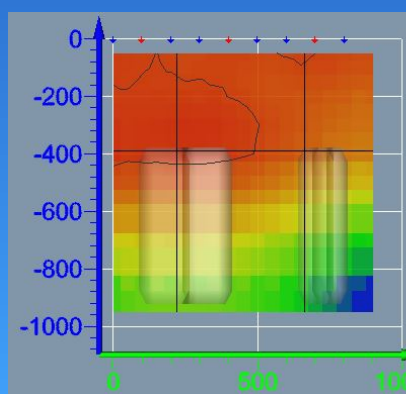
Long Section – 250



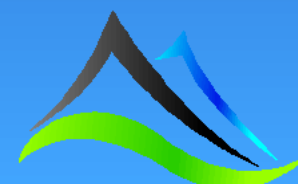
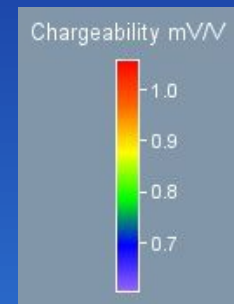
X-section - 2000



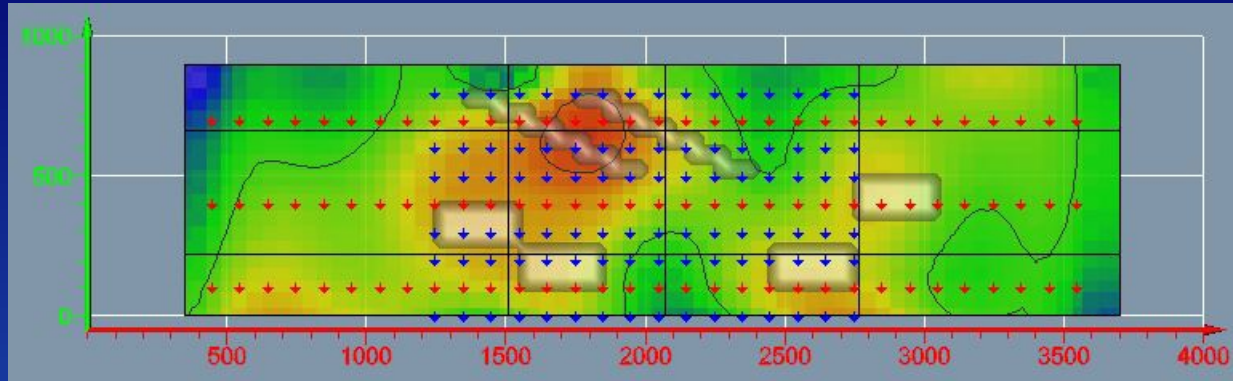
Long Section – 700



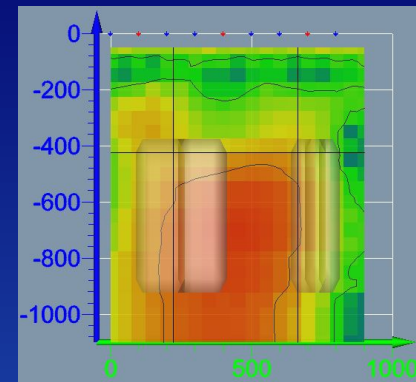
X-section - 2700



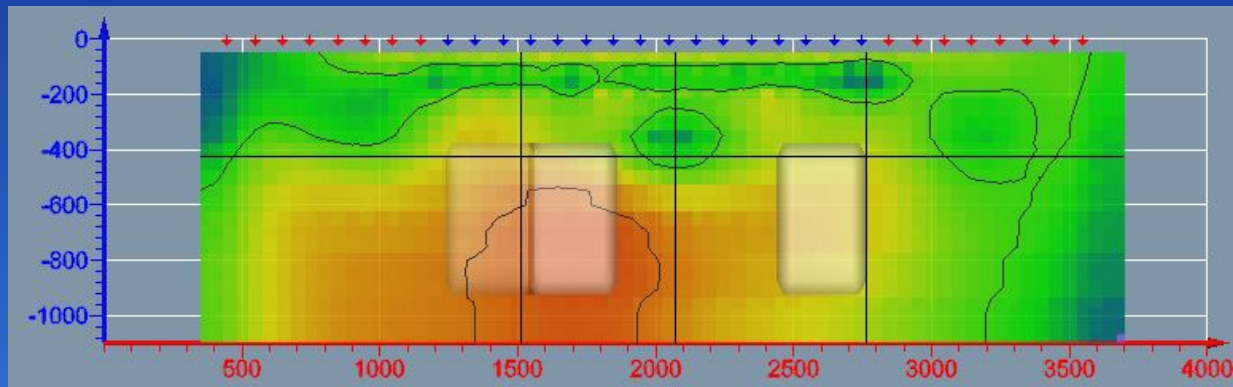
Type A – 50,000 Ωm in 1,000 Ωm triple body-thickness 400m depth to top – Resistivity Inversion (MTxRx)



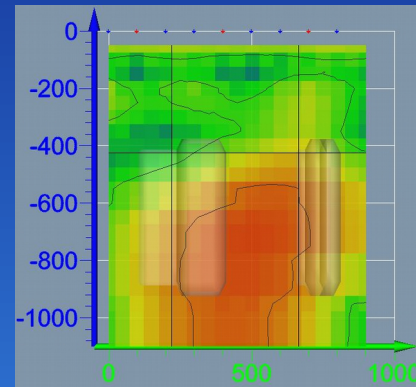
Plan View



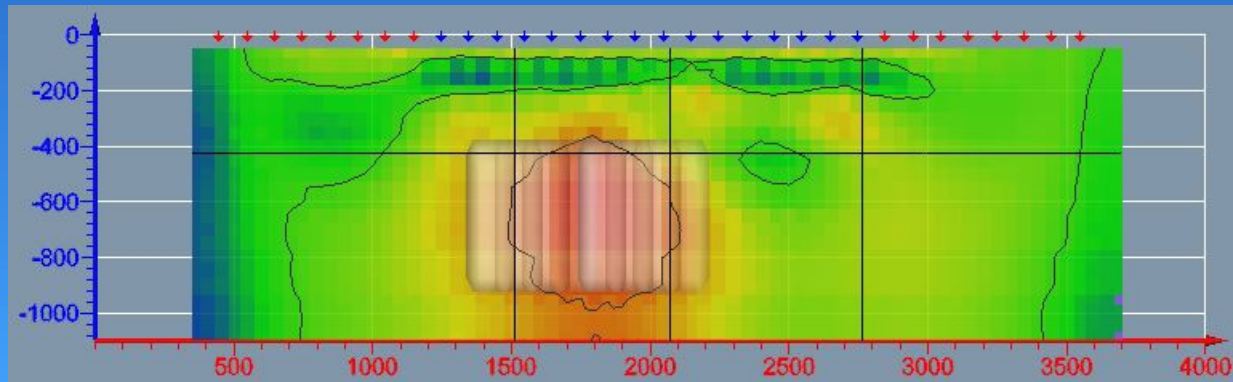
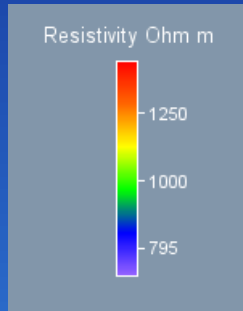
X-section - 1500



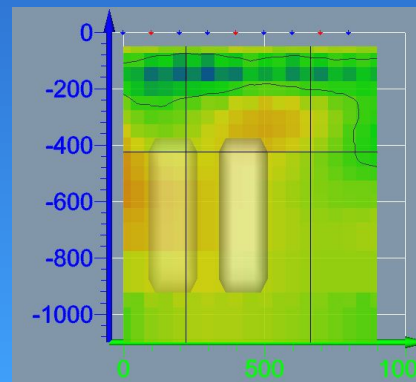
Long Section – 250



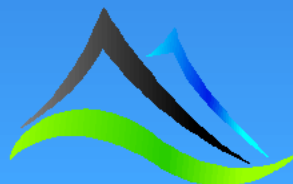
X-section - 2000



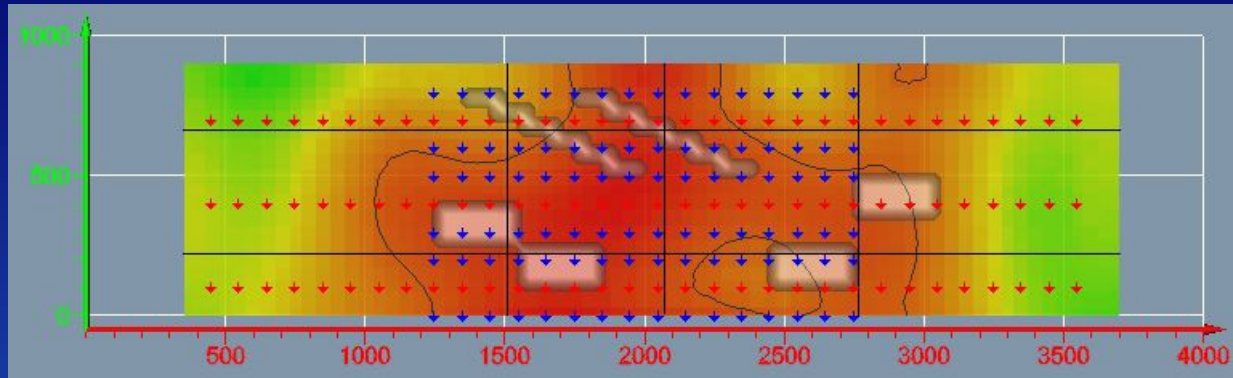
Long Section – 700



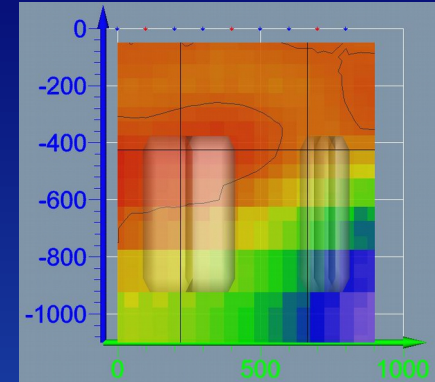
X-section - 2700



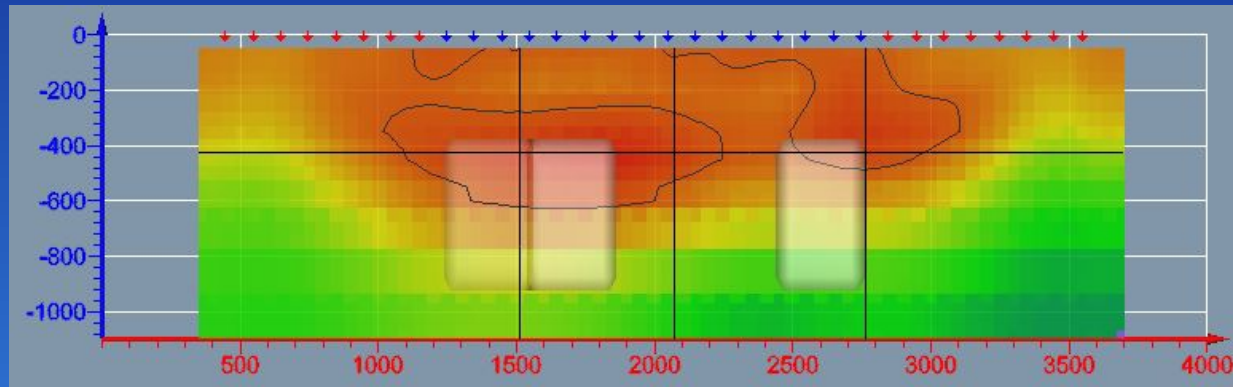
Type A – 50,000 Ωm in 1,000 Ωm triple body-thickness 400m depth to top – Chargeability Inversion (MTxRx)



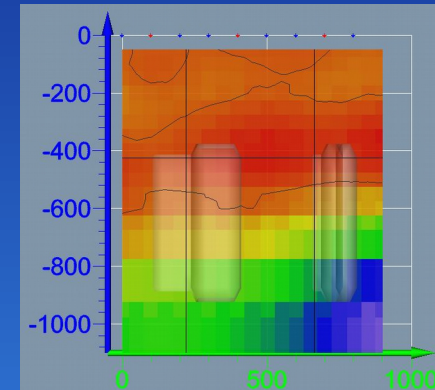
Plan View



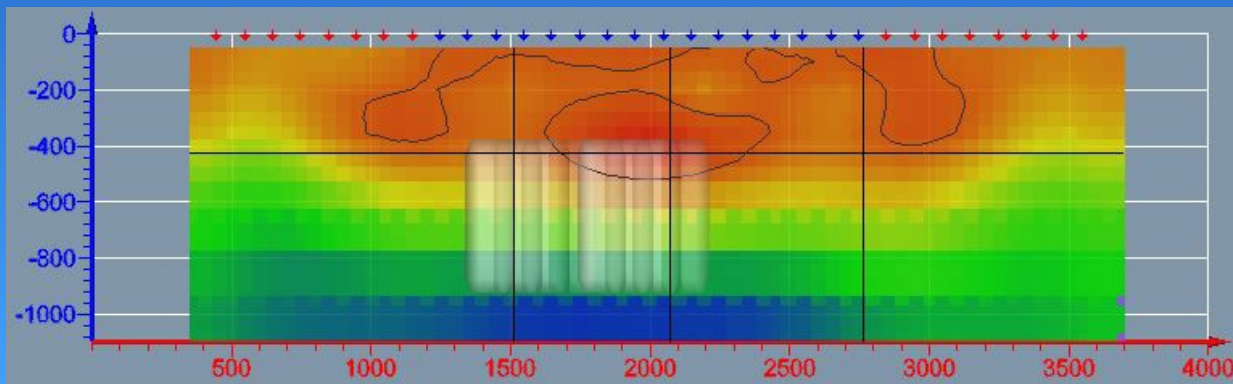
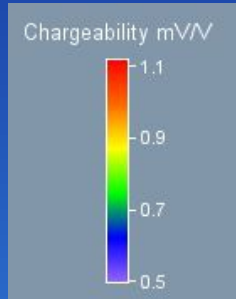
X-section - 1500



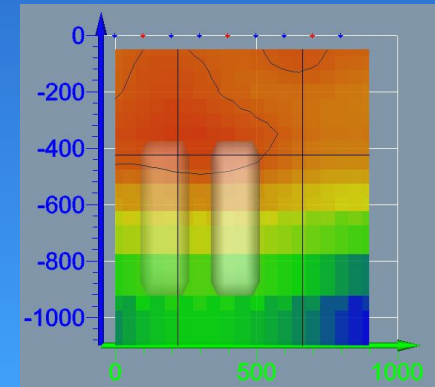
Long Section – 250



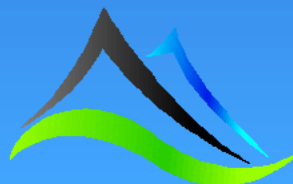
X-section - 2000



Long Section – 700

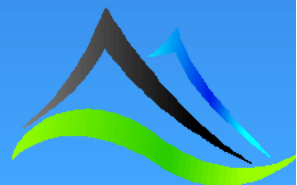


X-section - 2700



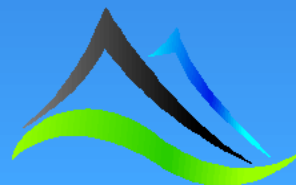
Summary: Type A – Triple body-thickness resistors in a 1,000 Ωm half space

- The 100m resistivity inversion has great spatial resolution but turns most closely spaced bodies into a single body. MRx and DODD do better than MTxRx at resolving the separate bodies but have a lower dynamic range.
- In contrast, for the 300m and 400m resistivity inversions MTxRx resolves the bodies better than both MRx and DODD.
- For the IP inversions, multiple bodies cannot be resolved into separate bodies at any depth for any array. Although the image for MTxRx at 100m shows separation the dynamic range is too low to resolve in practice.
- The 300m and 400m IP inversions produced the high chargeable zone across the surface as seen in previous examples.

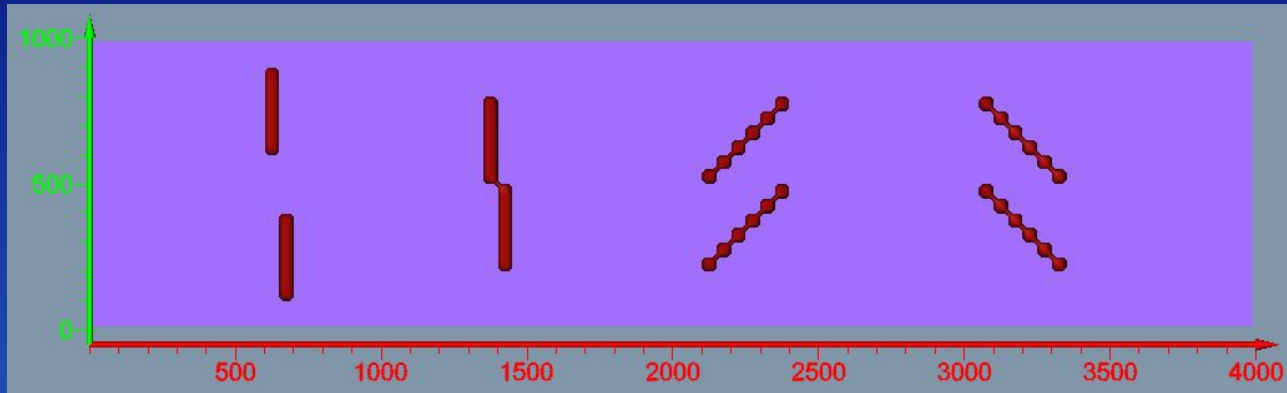


Intro: Type B – Resistors in a 1,000 Ωm half space

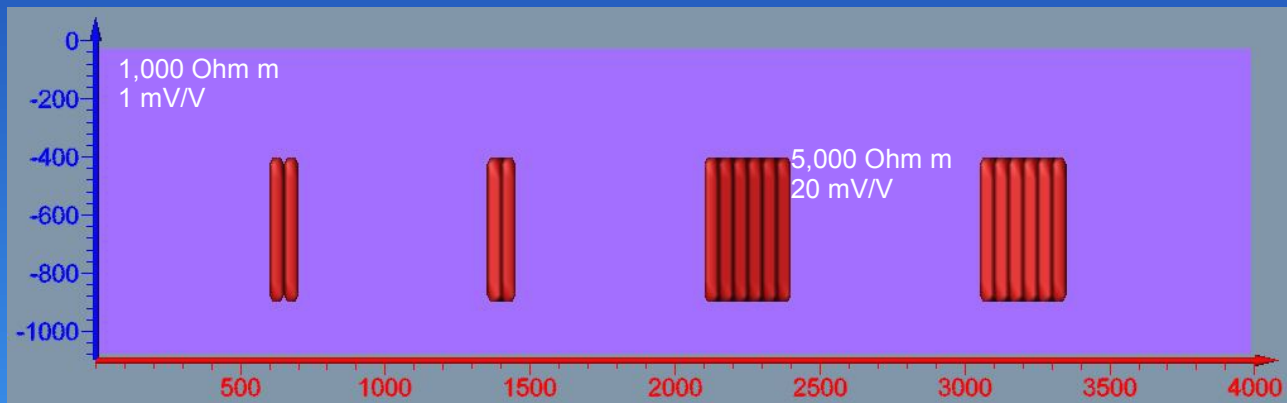
- The following set of slides show the inversion results of model type B for three resistivity contrasts. The first example has a vein resistivity of 5,000 Ωm , the second of 10,000 Ωm and the third of 50,000 Ωm .
- The veins have a chargeability of 20 mV/V.
- The host rock has a resistivity of 1,000 Ωm and a chargeability of 1 mV/V.
- The depth to the top of the veins is 400m.



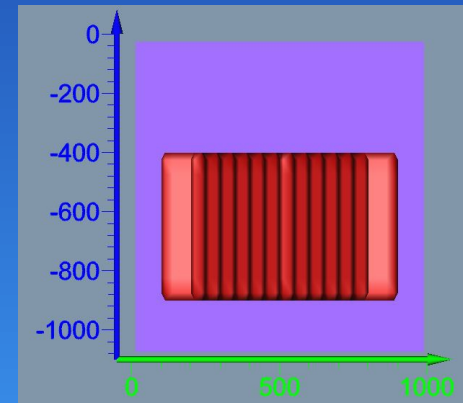
Model: Type B – 5,000 Ωm resistors in a 1,000 Ωm half space



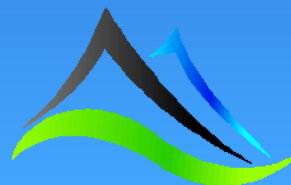
Top



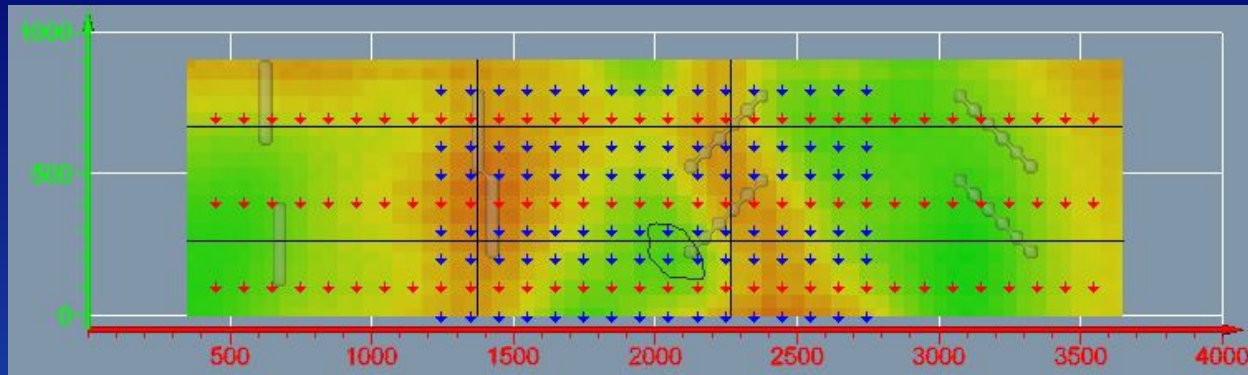
Front



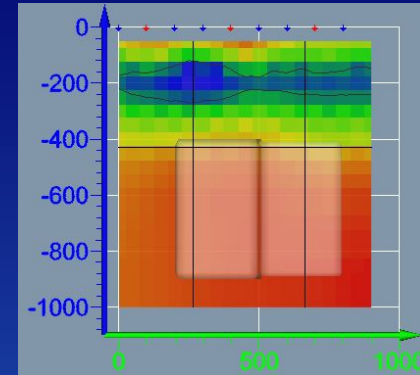
Right



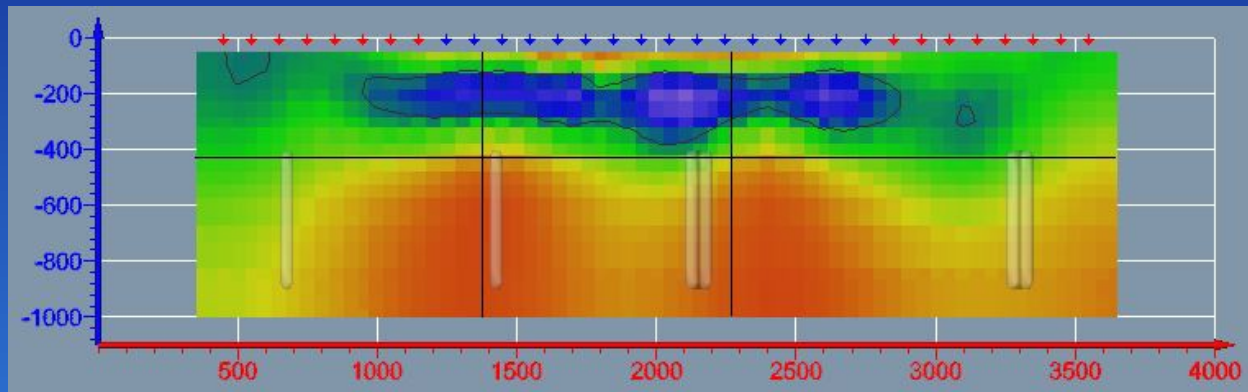
Type B – 5,000 Ωm in 1,000 Ωm – Resistivity Inversion (DODD)



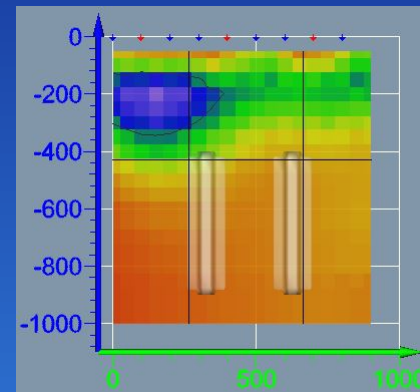
Plan View



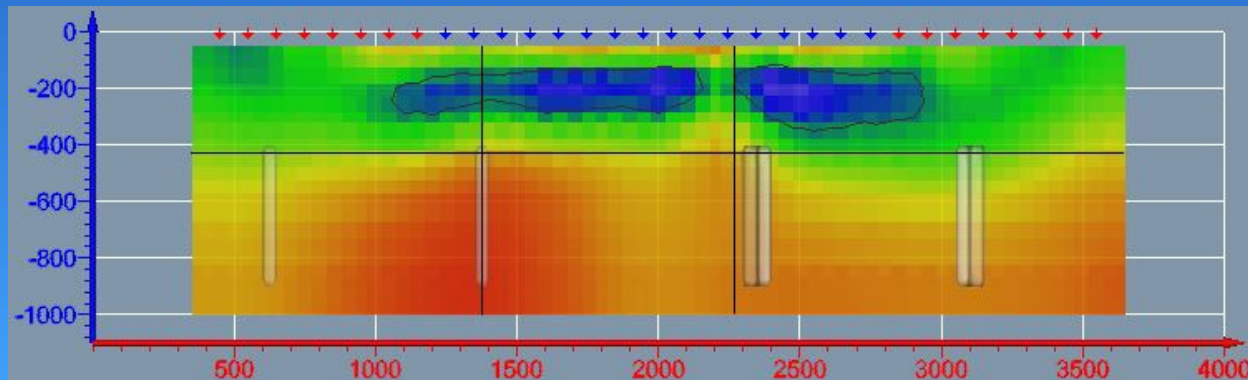
X-section - 1400



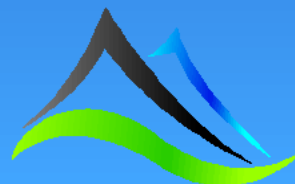
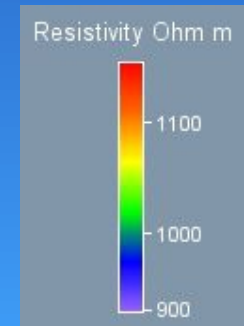
Long Section – 250



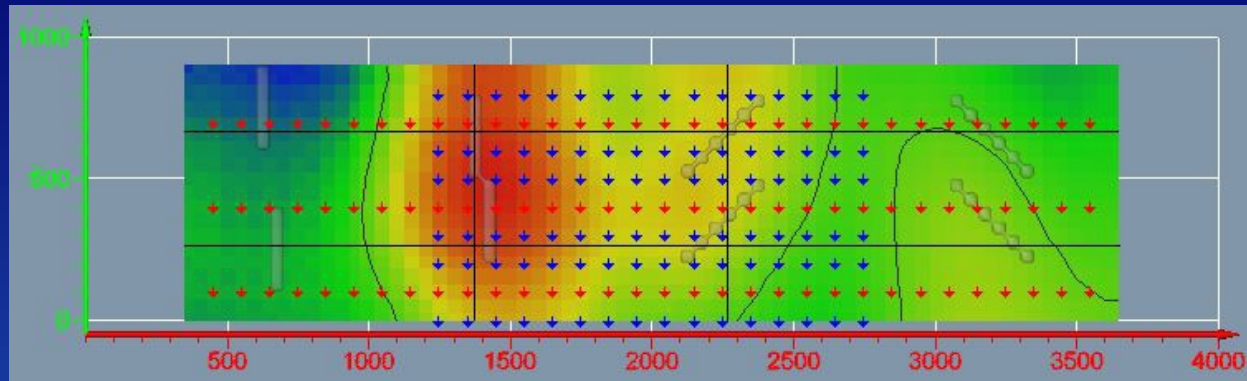
X-section – 2300



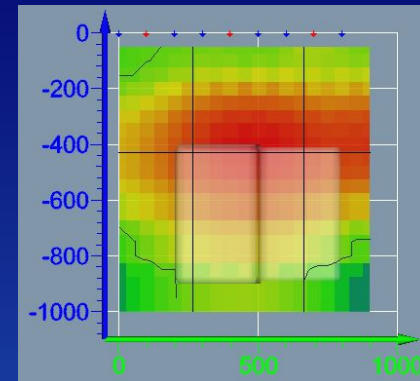
Long Section – 700



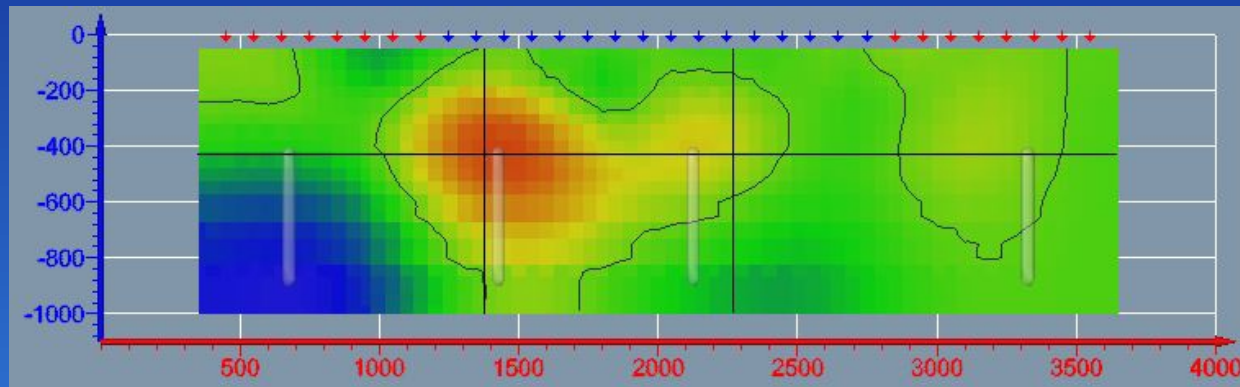
Type B – 5,000 Ωm in 1,000 Ωm – Chargeability Inversion (DODD)



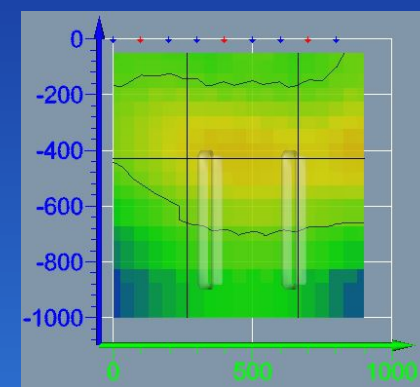
Plan View



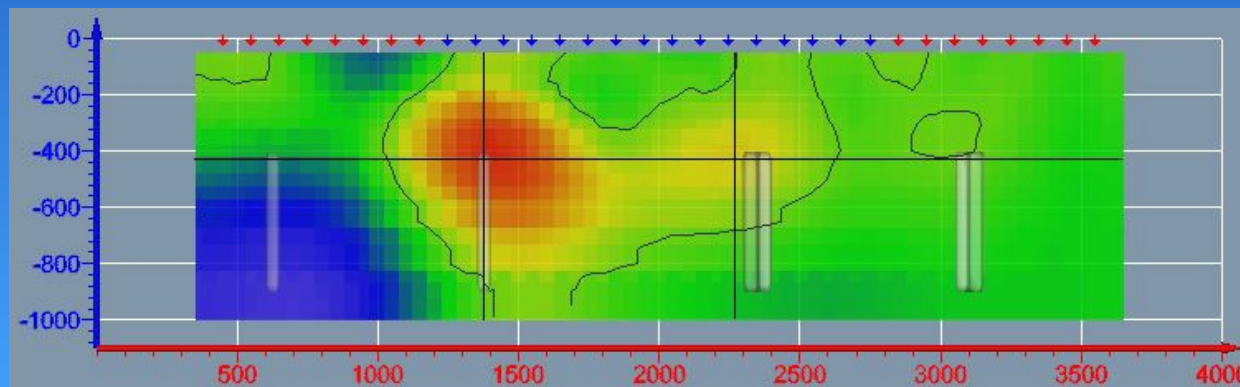
X-section - 1400



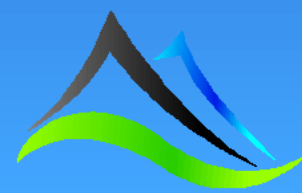
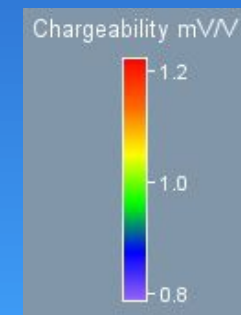
Long Section – 250



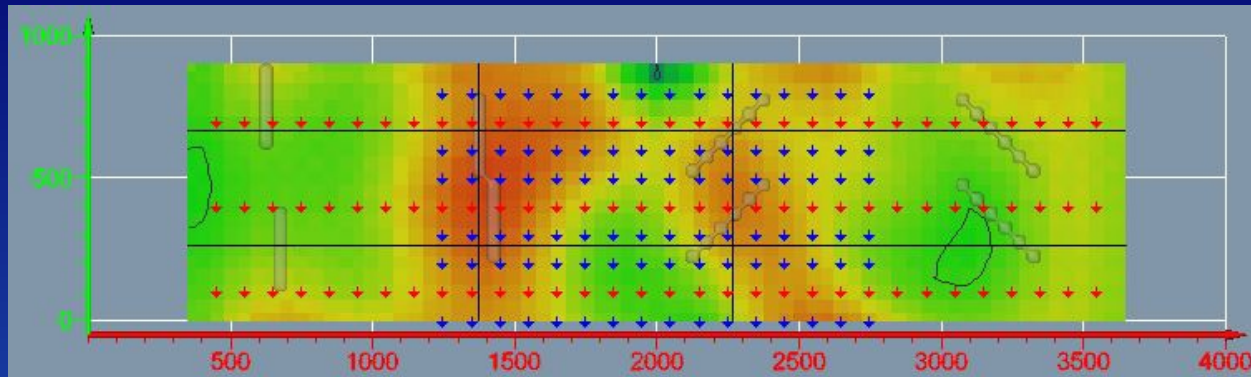
X-section - 2300



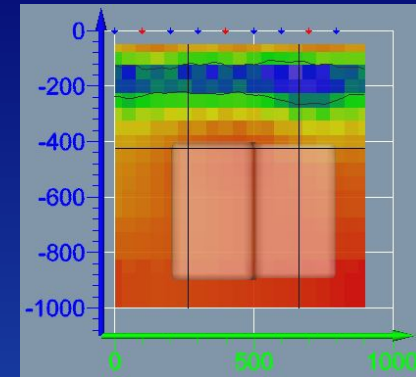
Long Section – 700



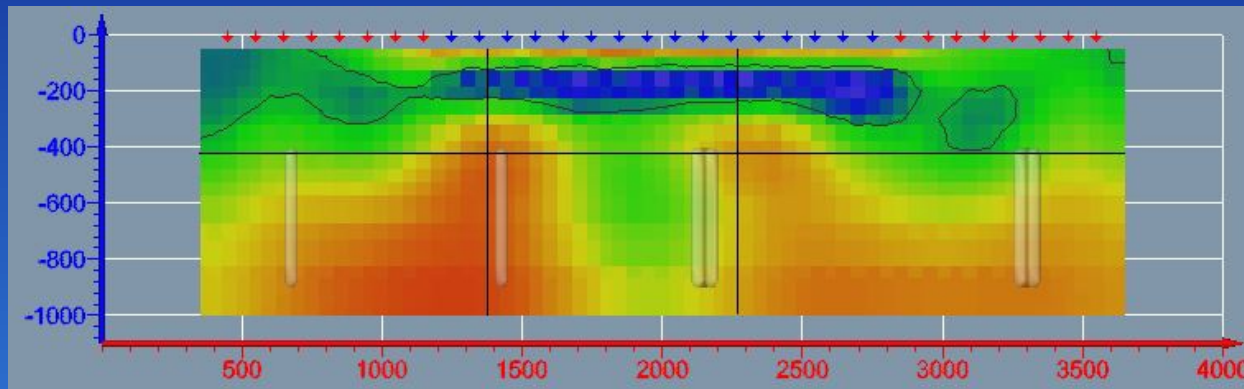
Type B – 5,000 Ωm in 1,000 Ωm – Resistivity Inversion (MRx)



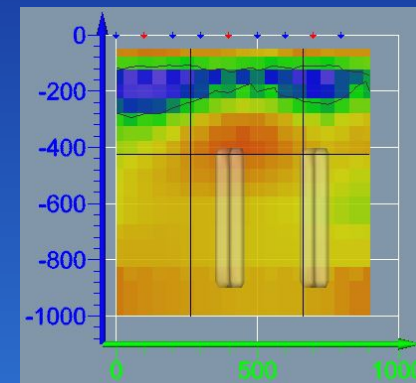
Plan View



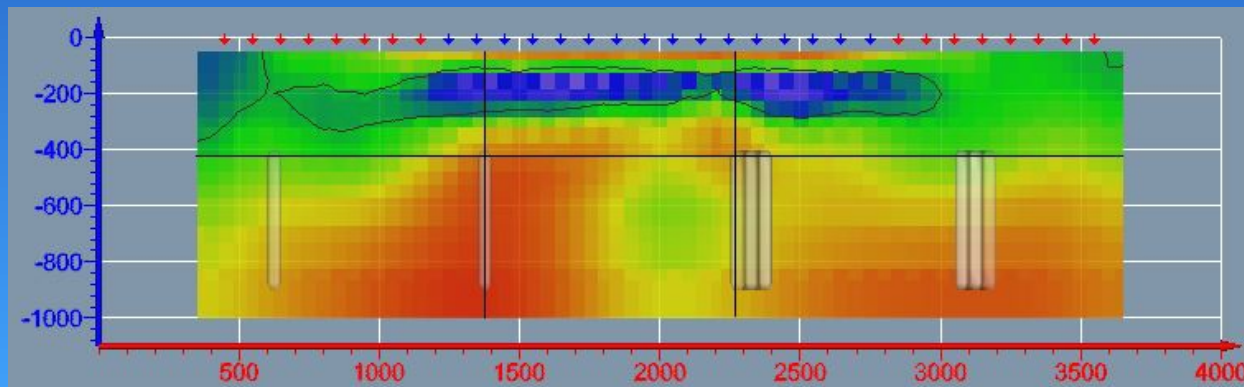
X-section - 1400



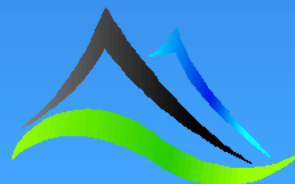
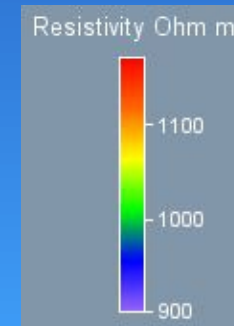
Long Section - 250



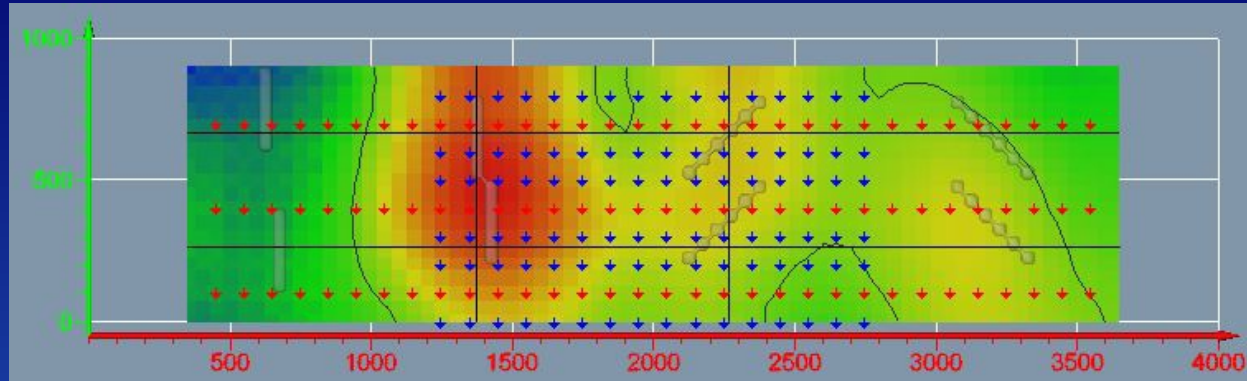
X-section - 2300



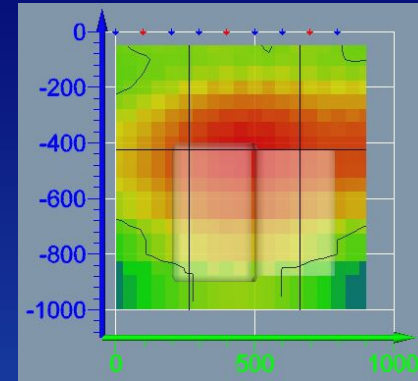
Long Section - 700



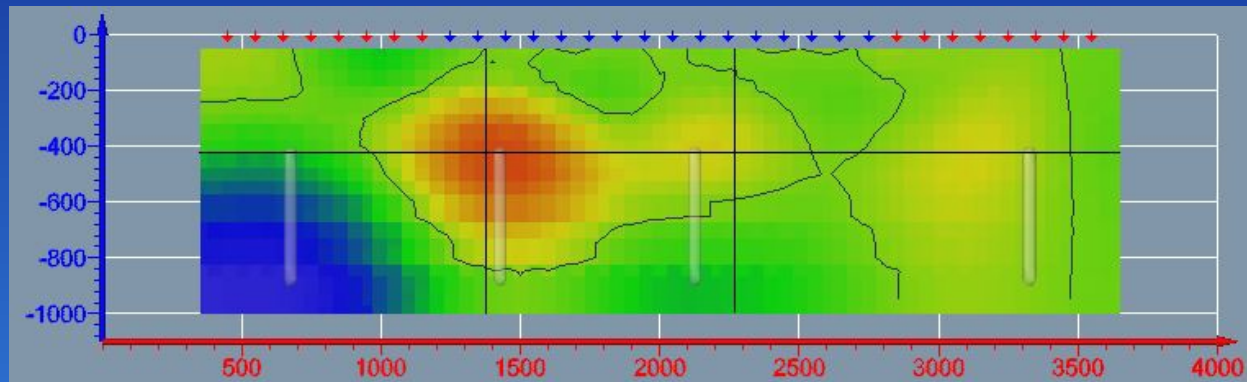
Type B – 5,000 Ωm in 1,000 Ωm – Chargeability Inversion (MRx)



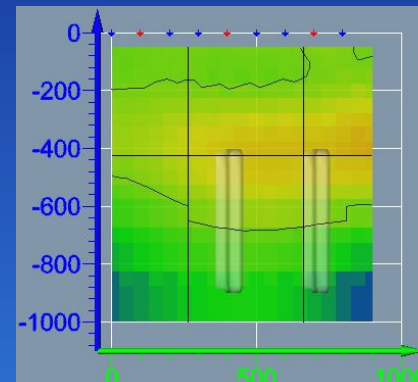
Plan View



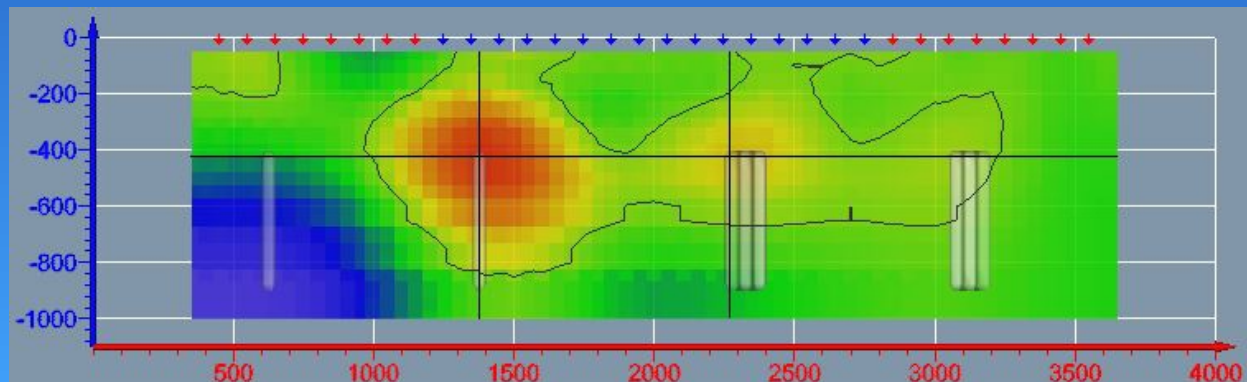
X-section - 1400



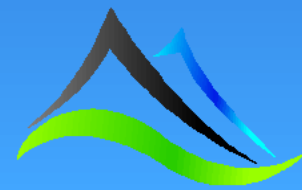
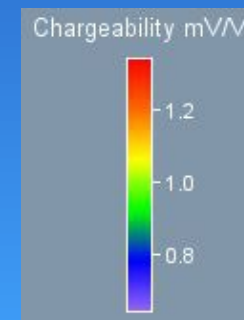
Long Section – 250



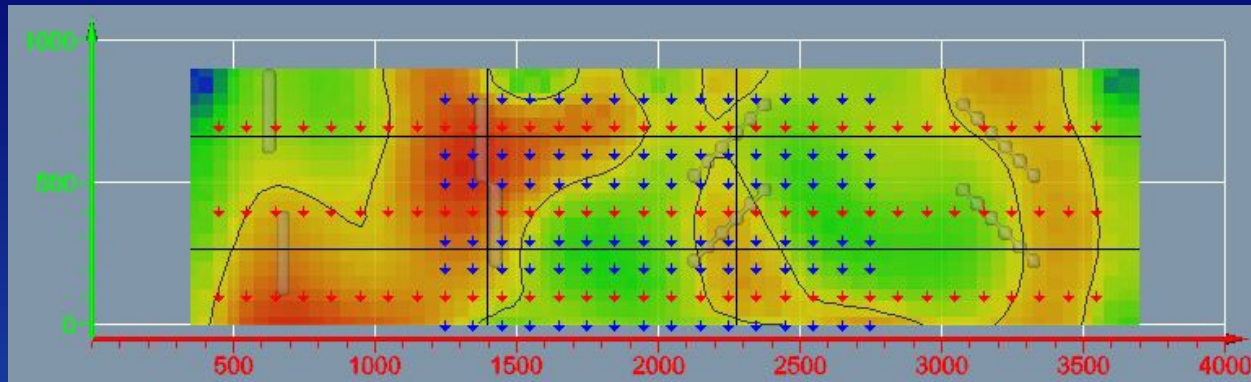
X-section - 2300



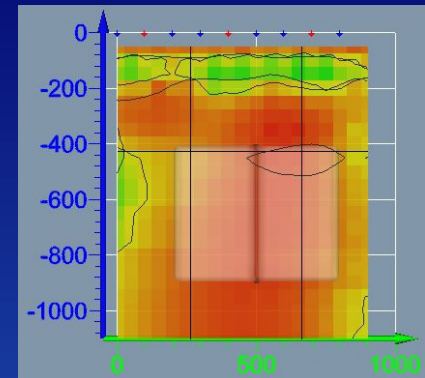
Long Section – 700



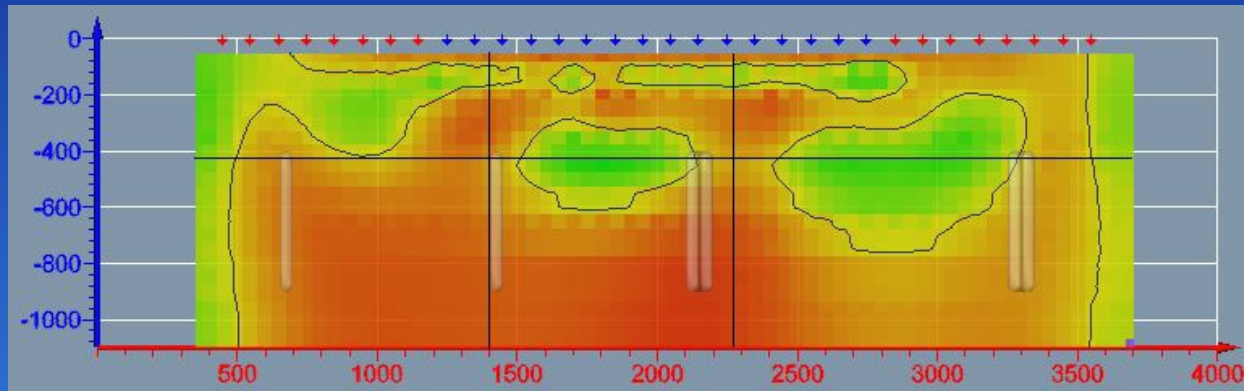
Type B – 5,000 Ωm in 1,000 Ωm – Resistivity Inversion (MTxRx)



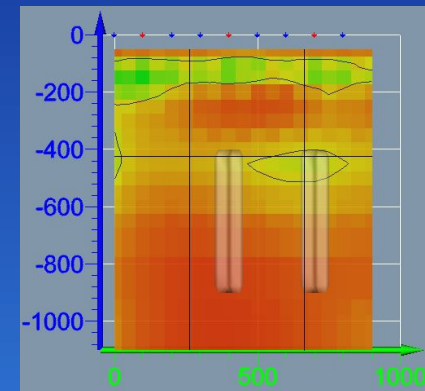
Plan View



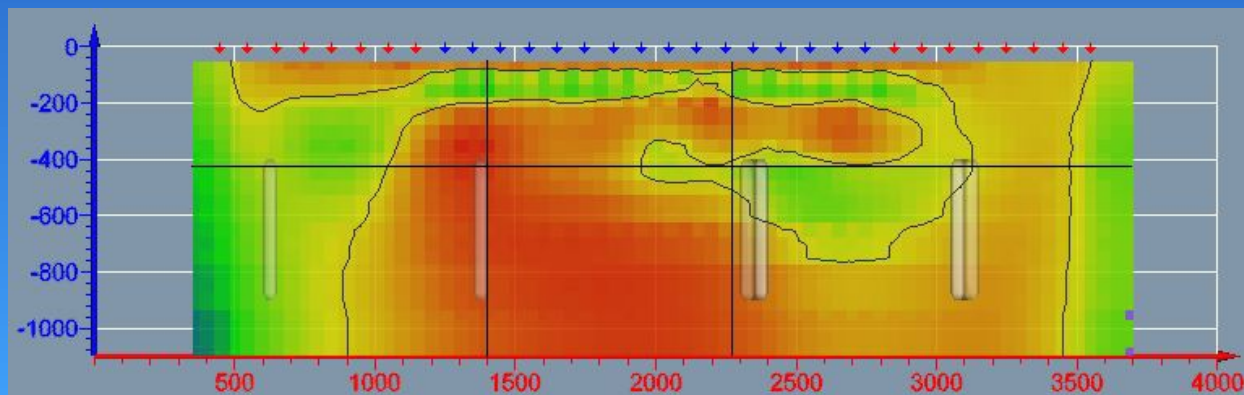
X-section - 1400



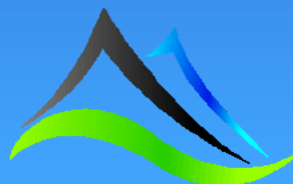
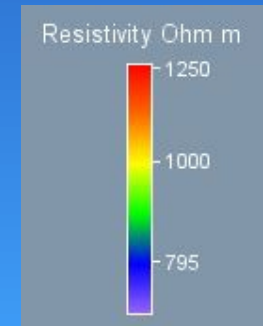
Long Section – 250



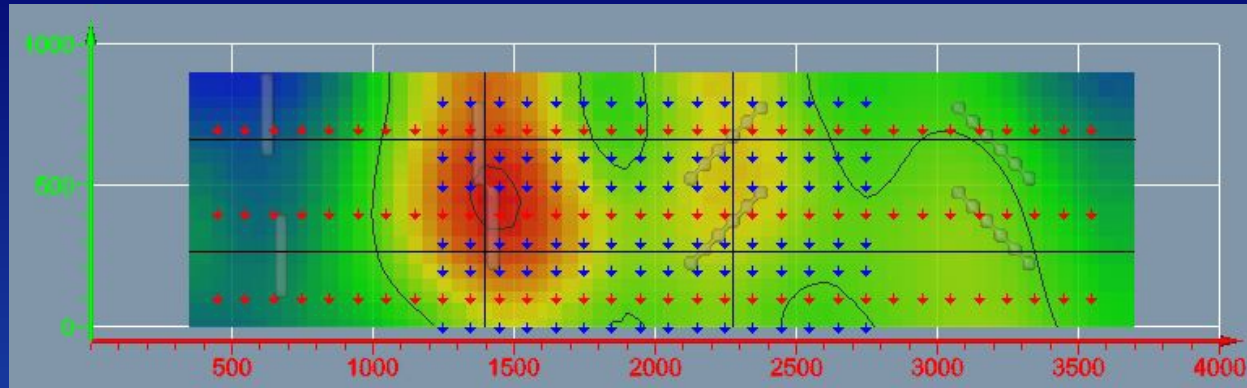
X-section – 2300



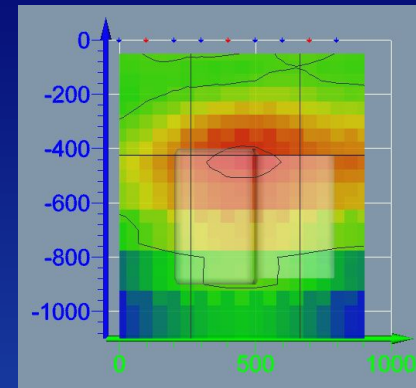
Long Section – 700



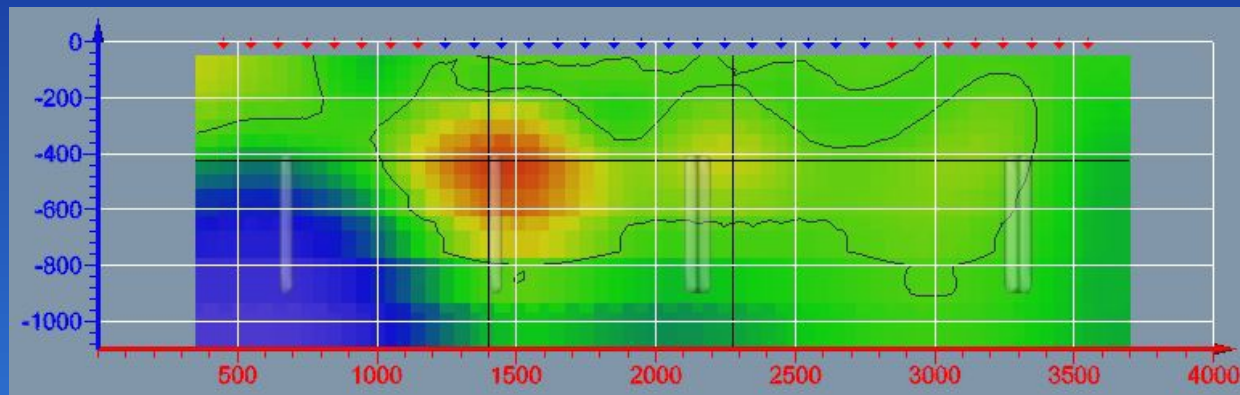
Type B – 5,000 Ωm in 1,000 Ωm – Chargeability Inversion (MTxRx)



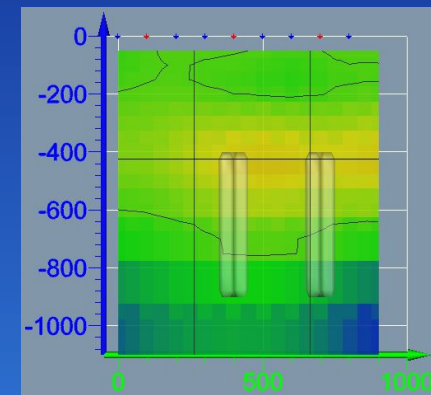
Plan View



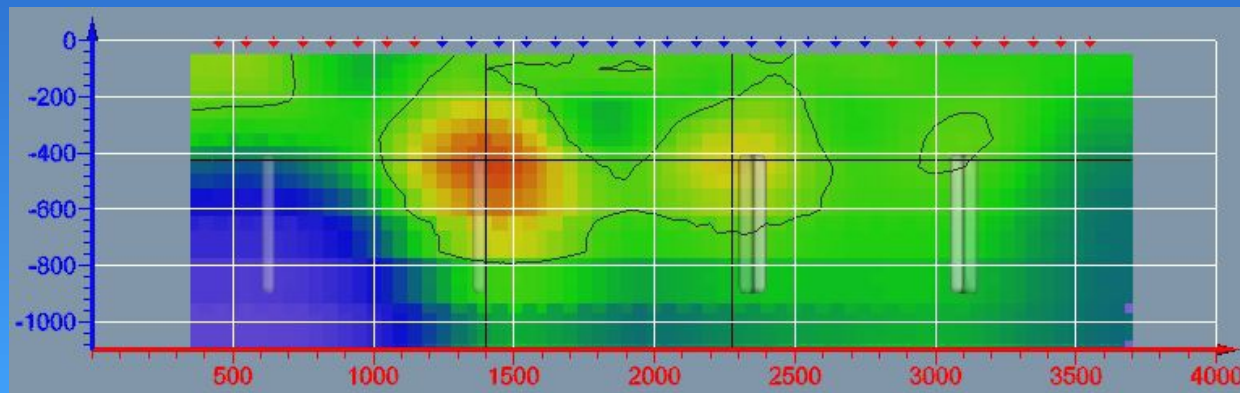
X-section - 1400



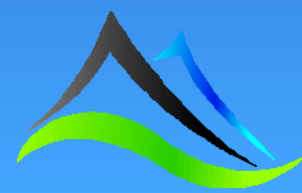
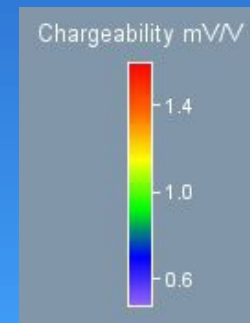
Long Section - 250



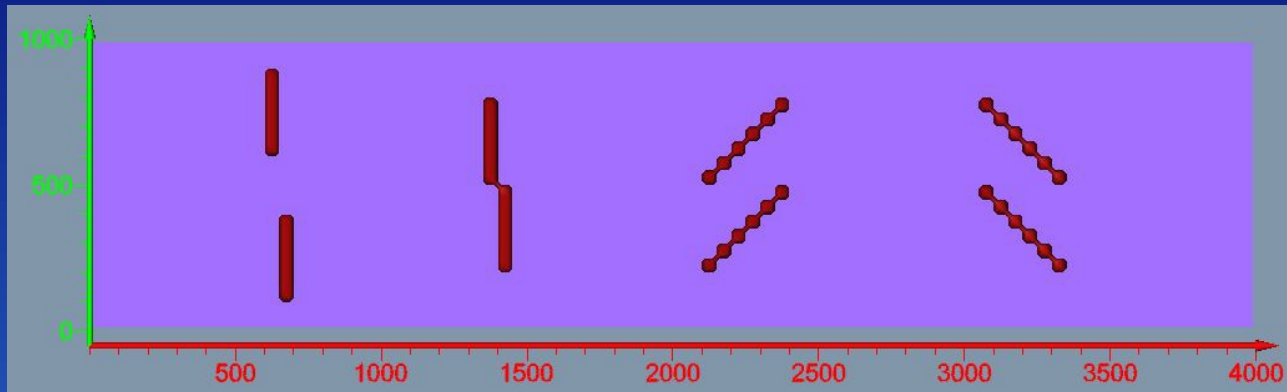
X-section - 2300



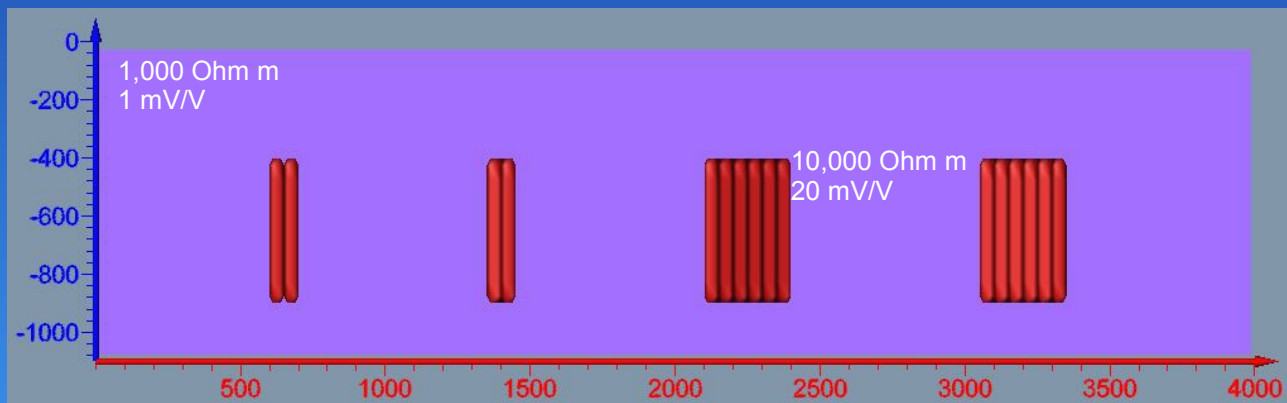
Long Section - 700



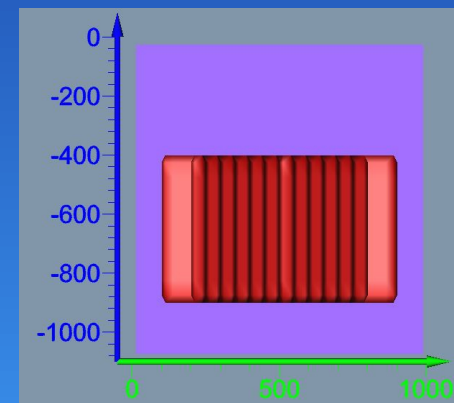
Model: Type B – 10,000 Ωm resistors in a 1,000 Ωm half space



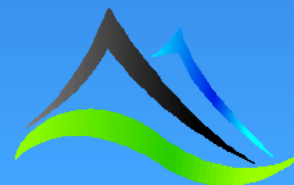
Top



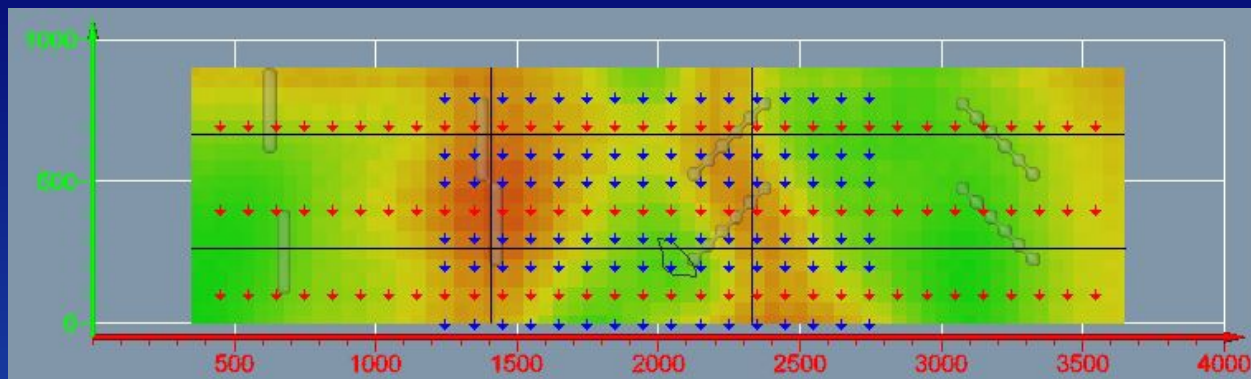
Front



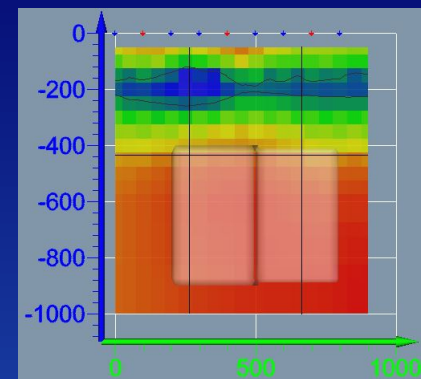
Right



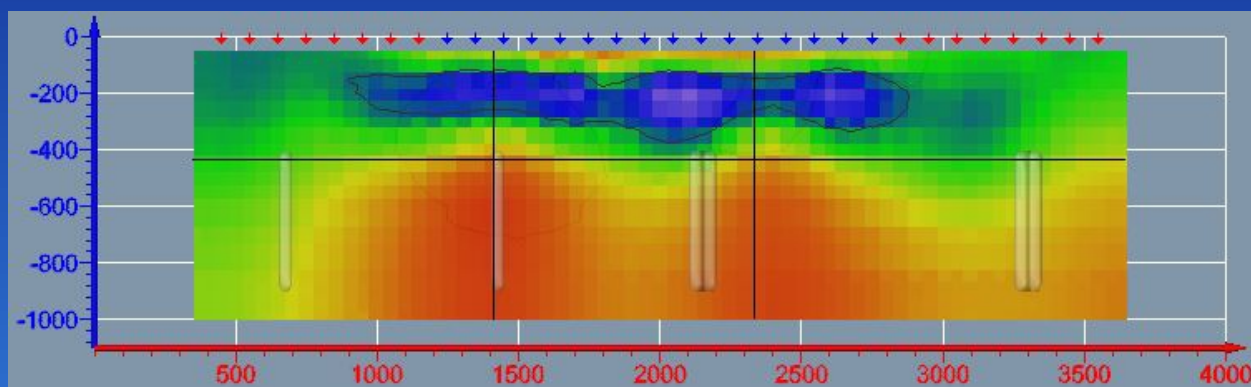
Type B – 10,000 Ωm in 1,000 Ωm – Resistivity Inversion (DODD)



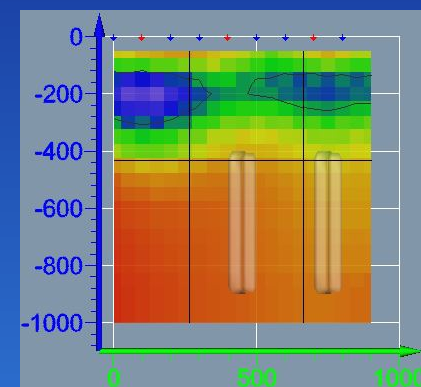
Plan View



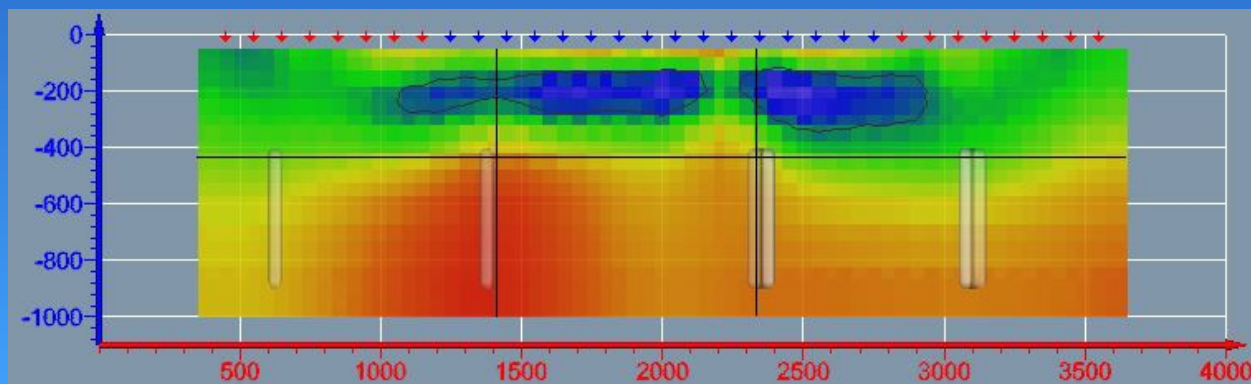
X-section - 1400



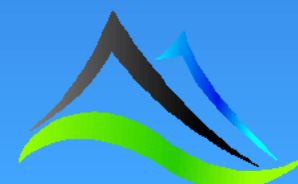
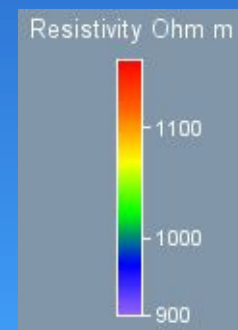
Long Section – 250



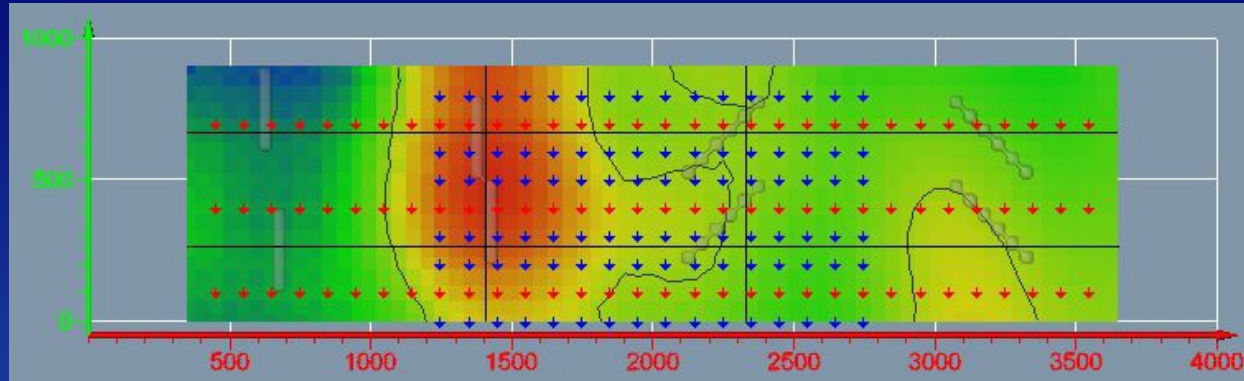
X-section – 2300



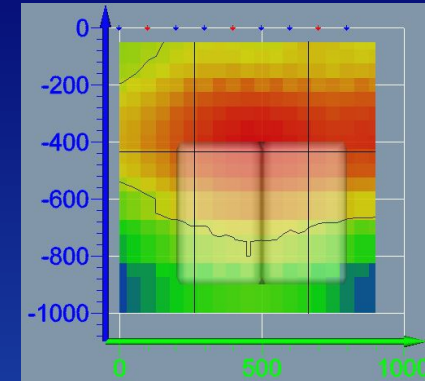
Long Section – 700



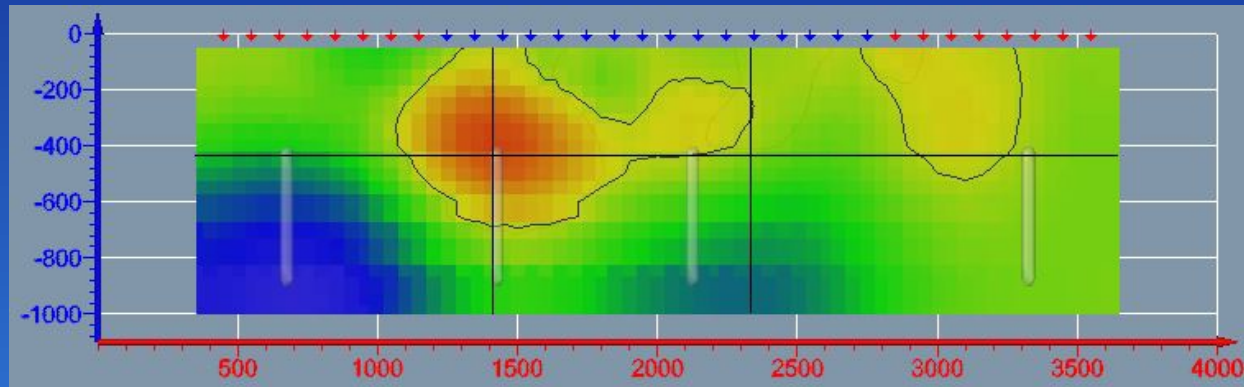
Type B – 10,000 Ωm in 1,000 Ωm – Chargeability Inversion (DODD)



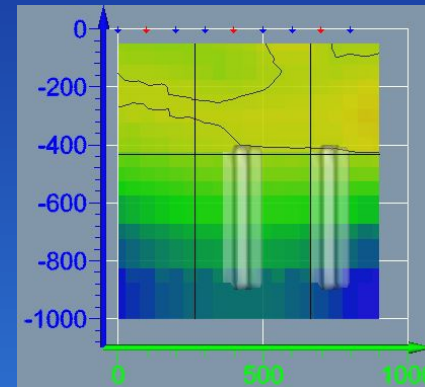
Plan View



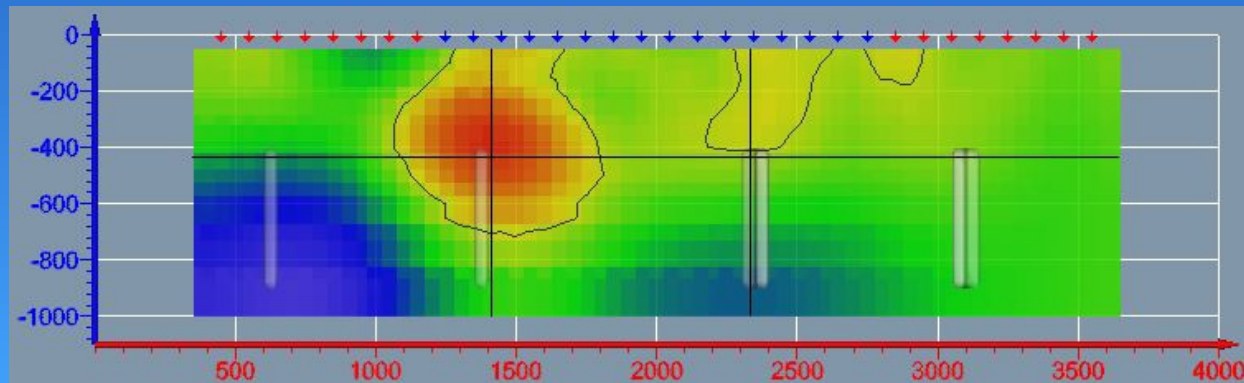
X-section - 1400



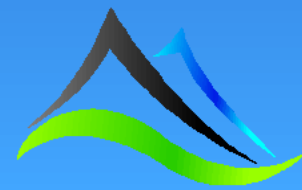
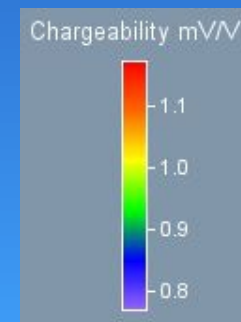
Long Section – 250



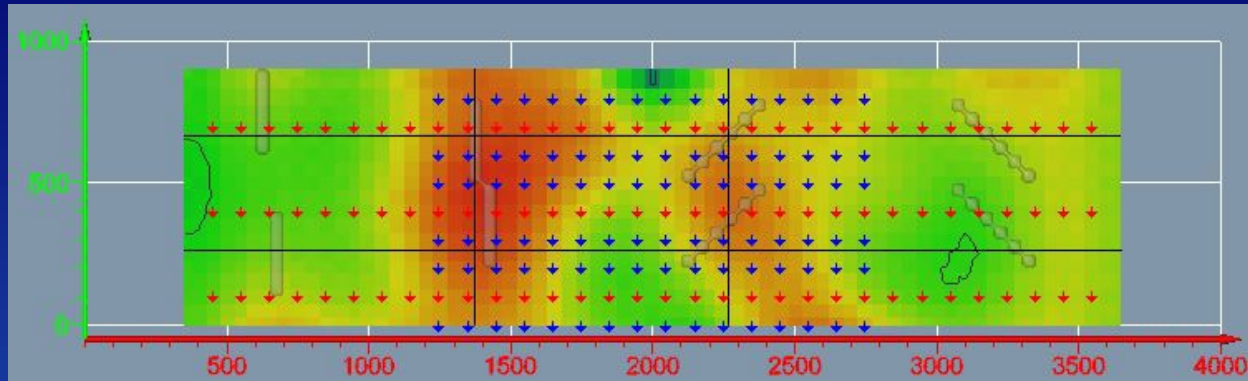
X-section - 2300



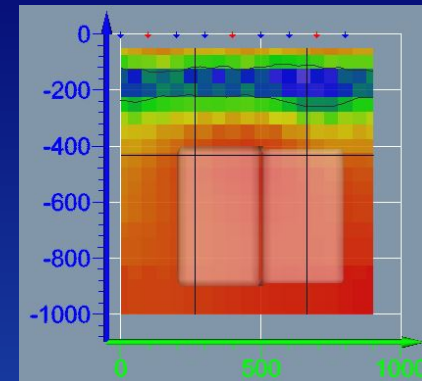
Long Section – 700



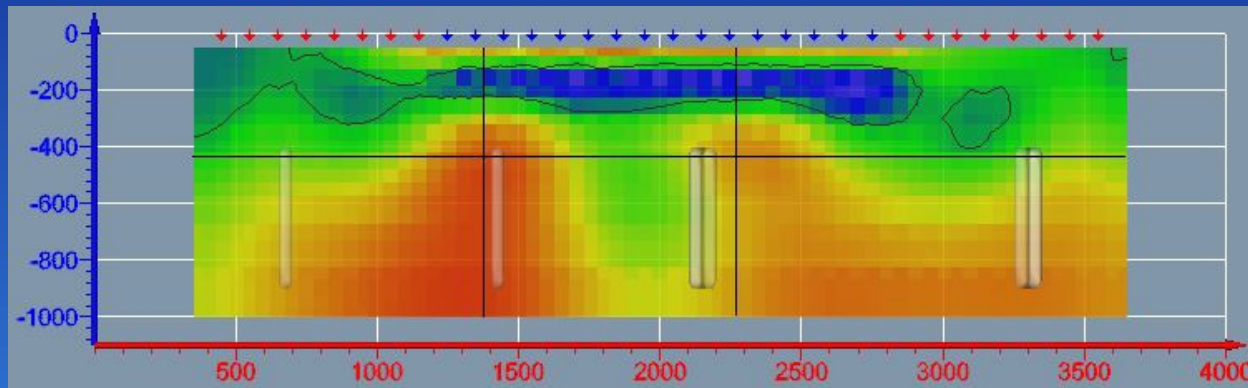
Type B – 10,000 Ωm in 1,000 Ωm – Resistivity Inversion (MRx)



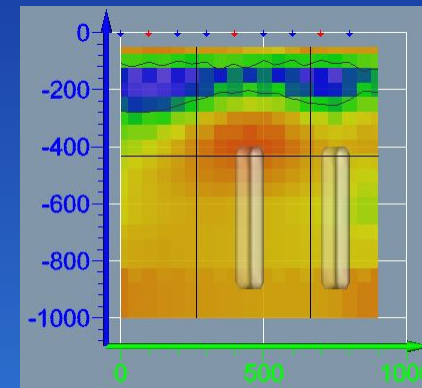
Plan View



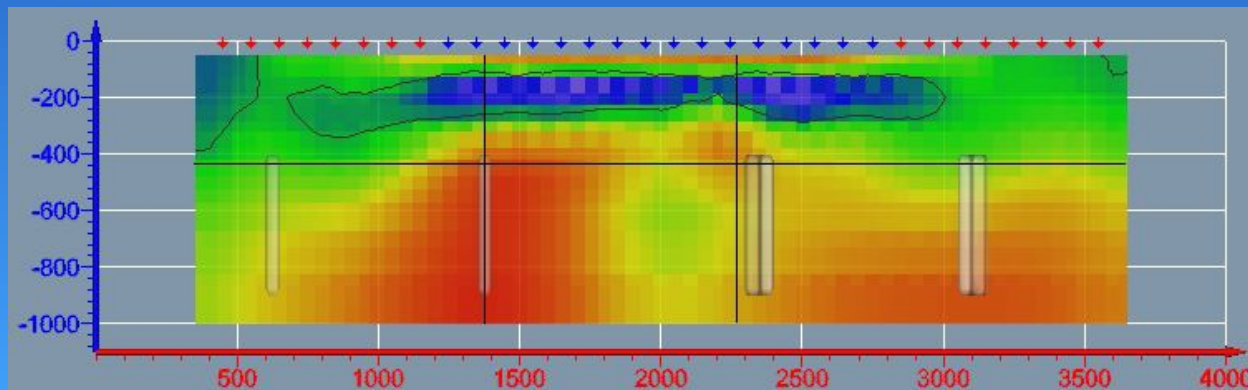
X-section - 1400



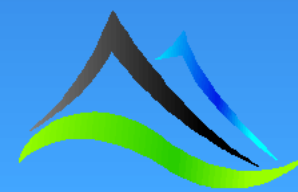
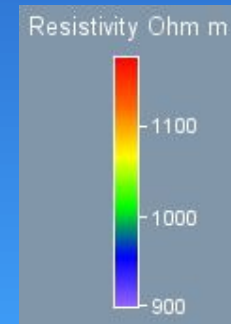
Long Section – 250



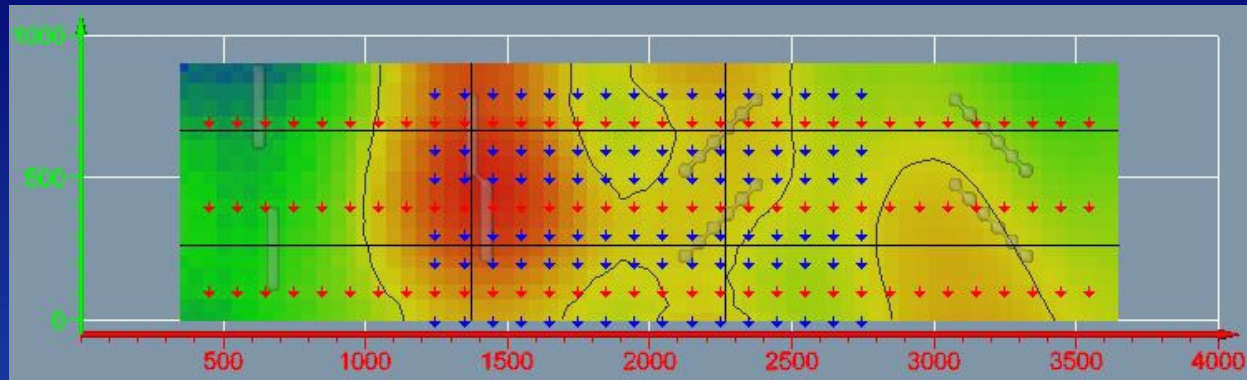
X-section – 2300



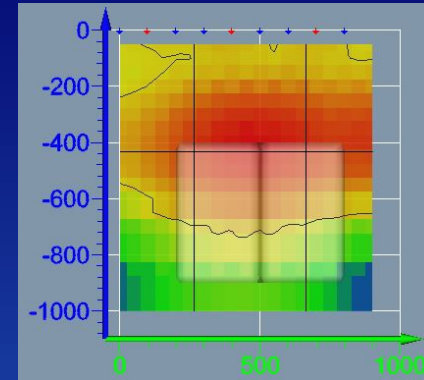
Long Section – 700



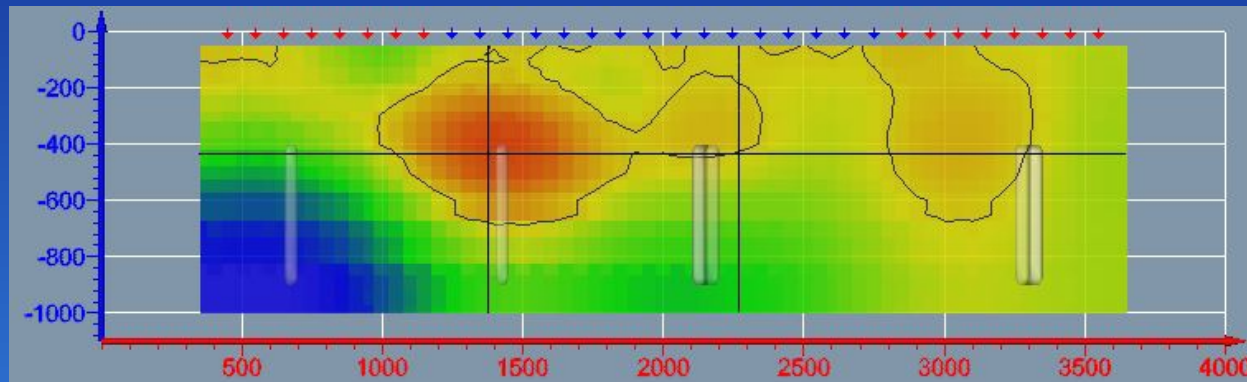
Type B – 10,000 Ωm in 1,000 Ωm – Chargeability Inversion (MRx)



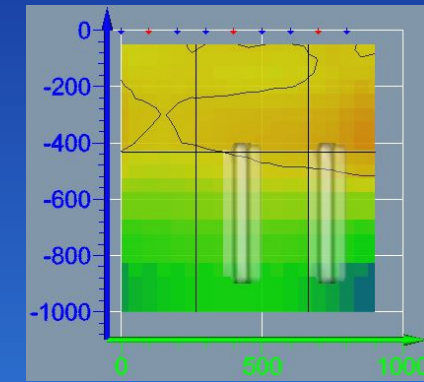
Plan View



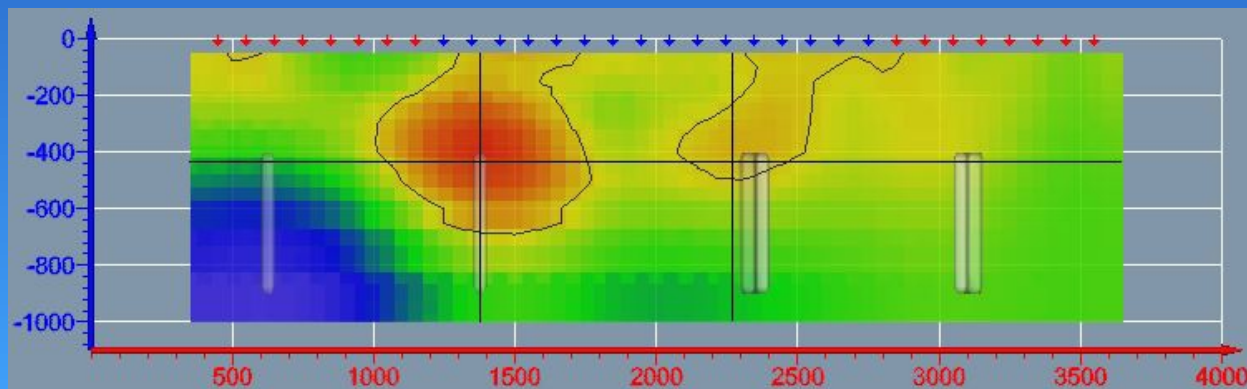
X-section - 1400



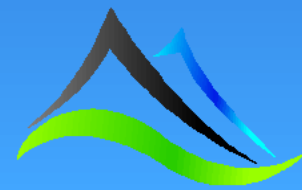
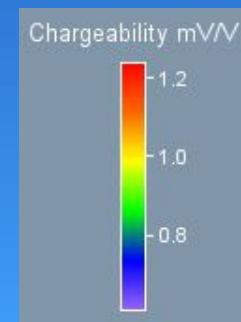
Long Section – 250



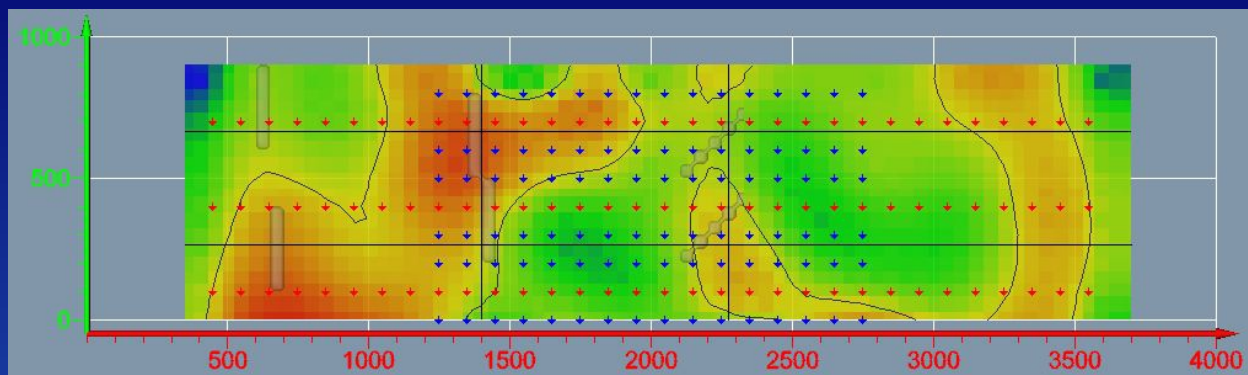
X-section - 2300



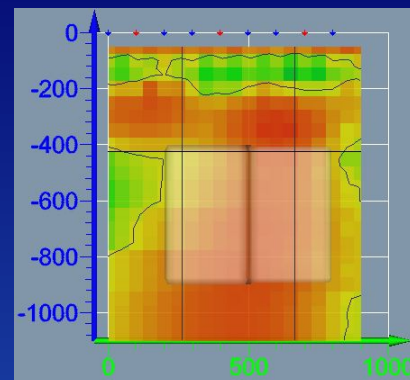
Long Section – 700



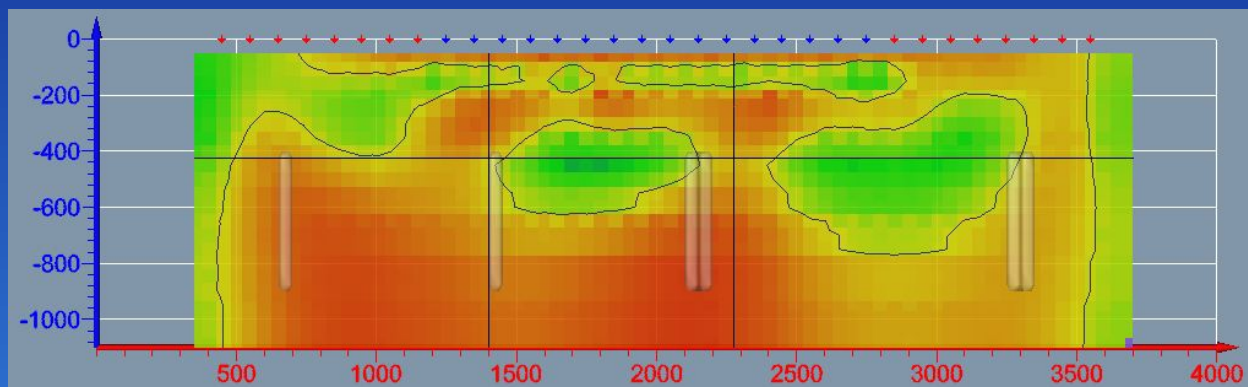
Type B – 10,000 Ωm in 1,000 Ωm – Resistivity Inversion (MTxRx)



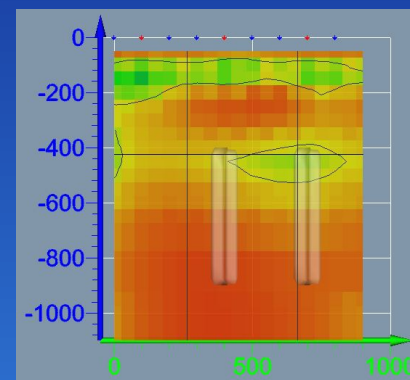
Plan View



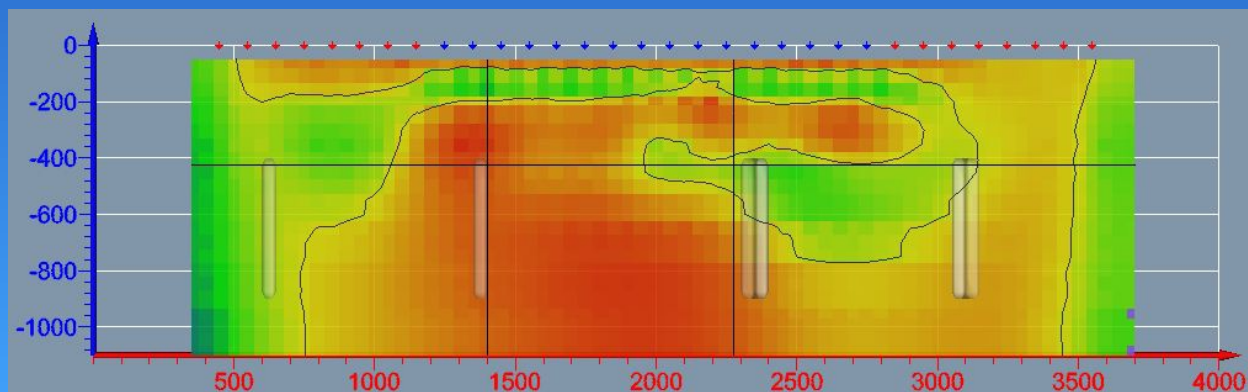
X-section - 1400



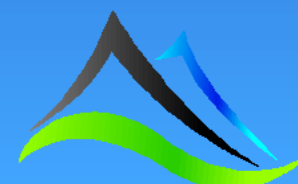
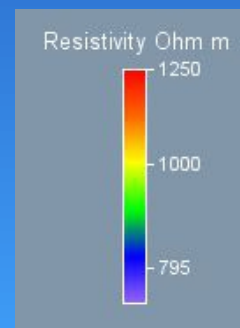
Long Section – 250



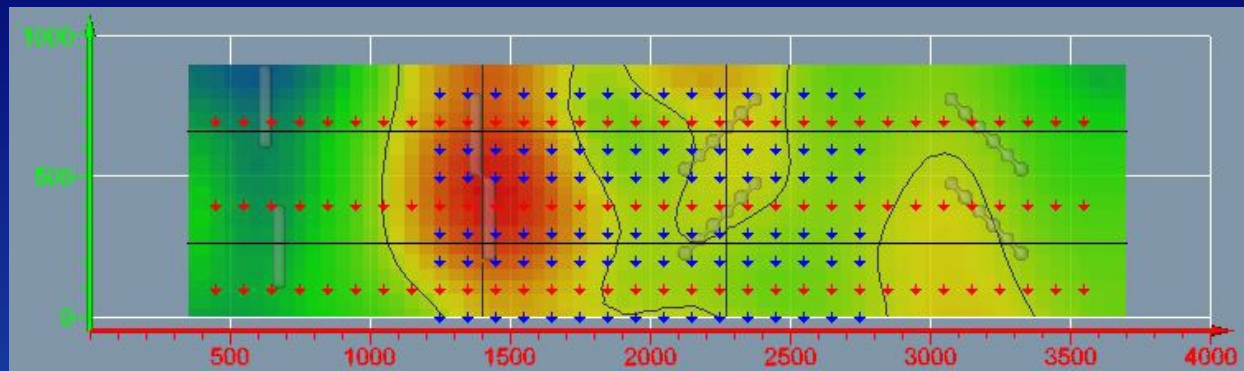
X-section – 2300



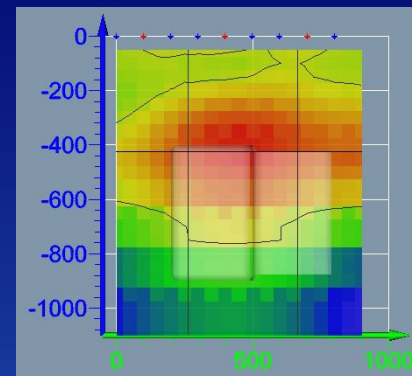
Long Section – 700



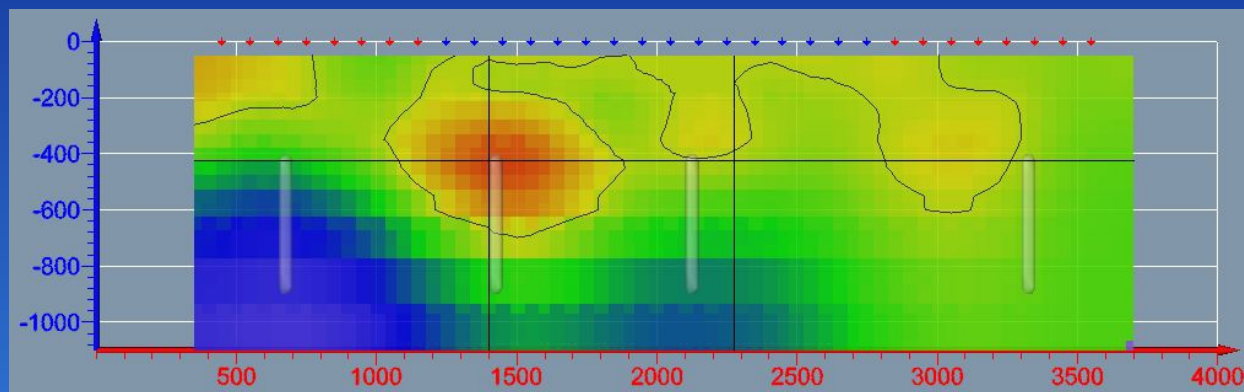
Type B – 10,000 Ωm in 1,000 Ωm – Chargeability Inversion (MTxRx)



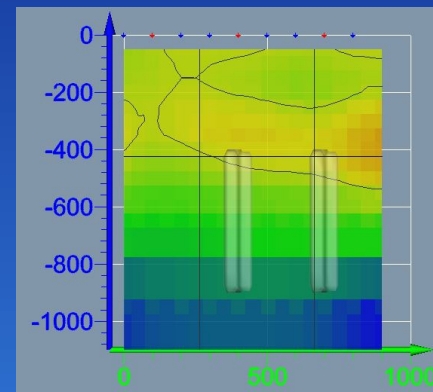
Plan View



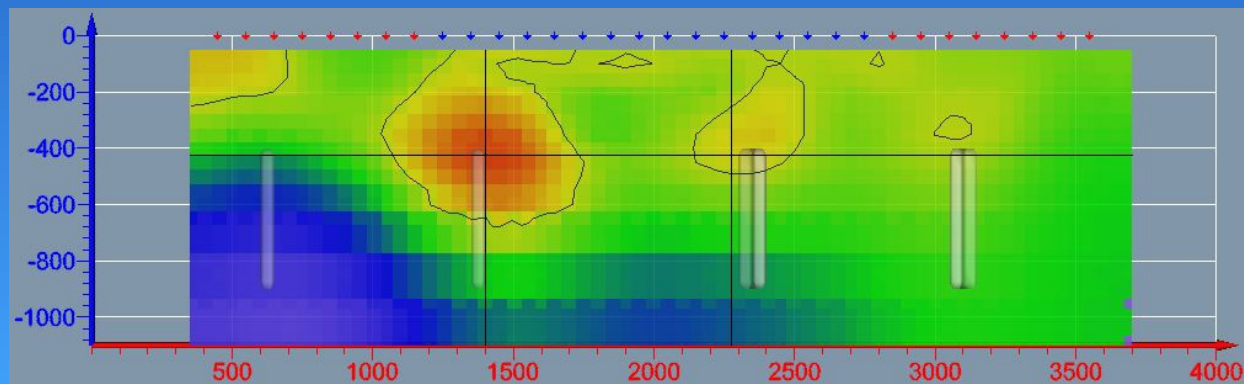
X-section - 1400



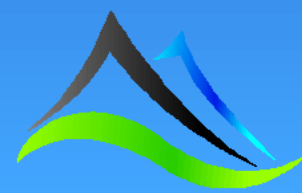
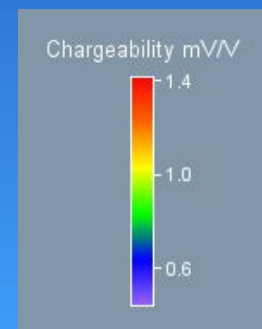
Long Section – 250



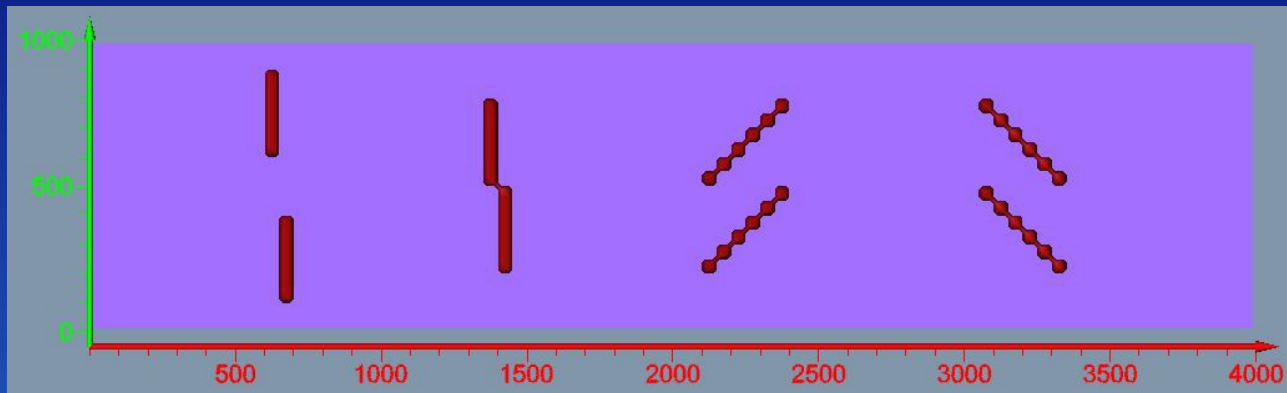
X-section - 2300



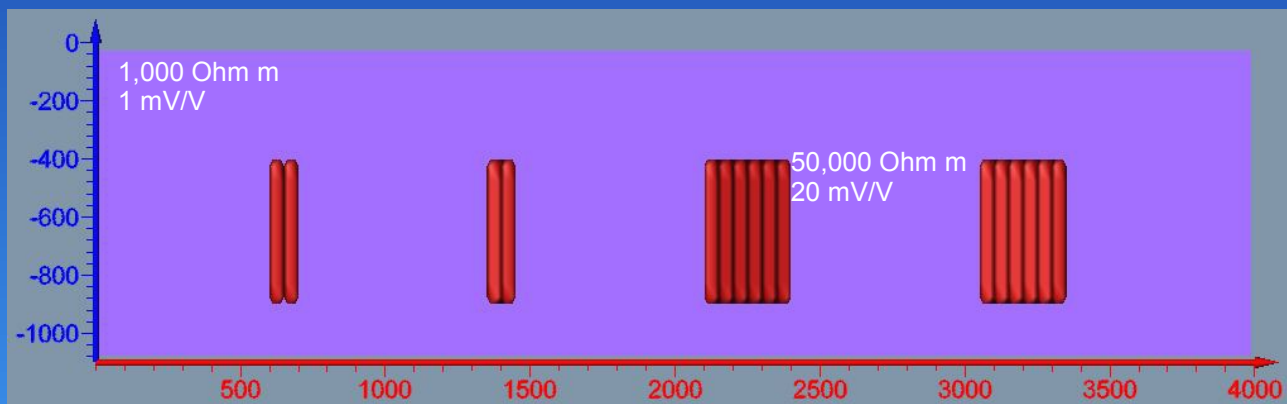
Long Section – 700



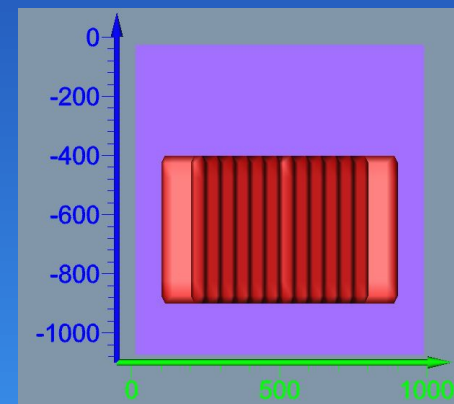
Model: Type B – 50,000 Ωm resistors in a 1,000 Ωm half space



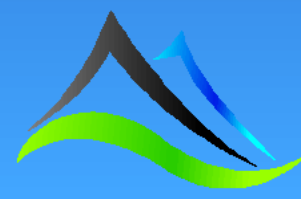
Top



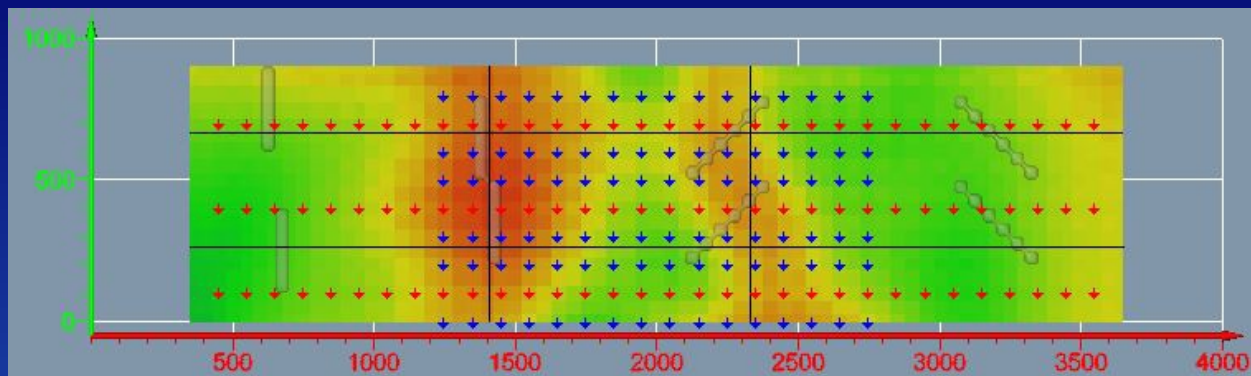
Front



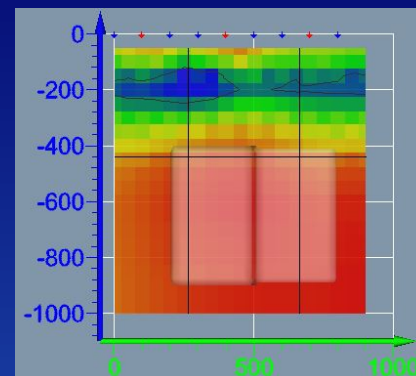
Right



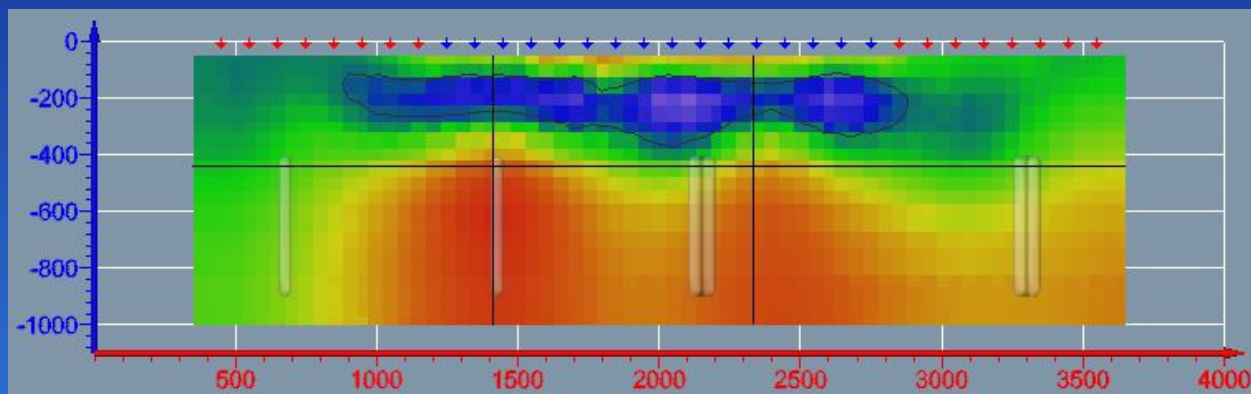
Type B – 50,000 Ωm in 1,000 Ωm – Resistivity Inversion (DODD)



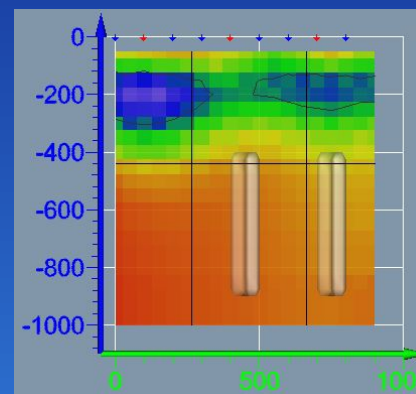
Plan View



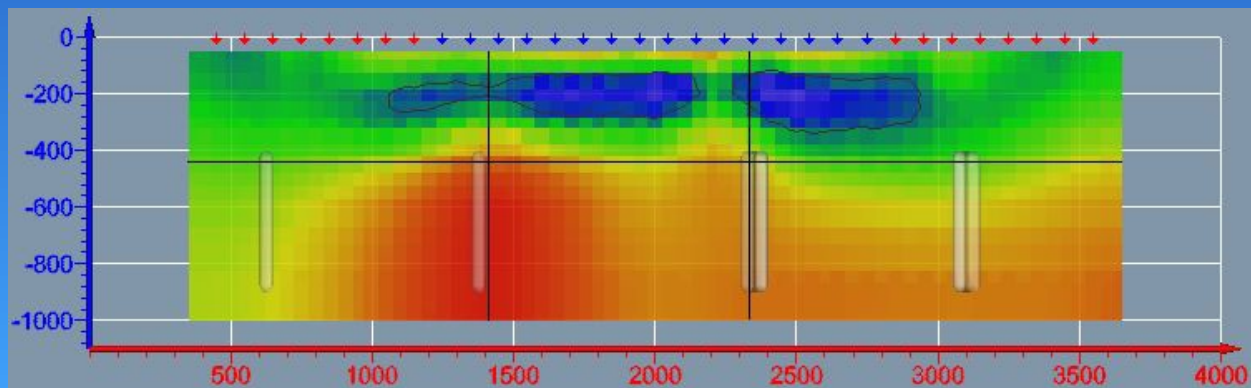
X-section - 1400



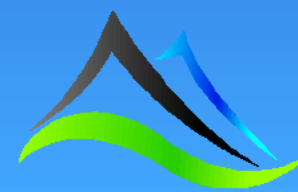
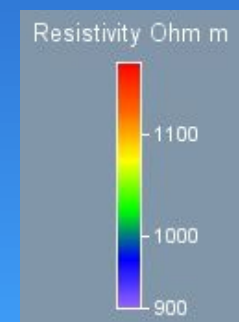
Long Section – 250



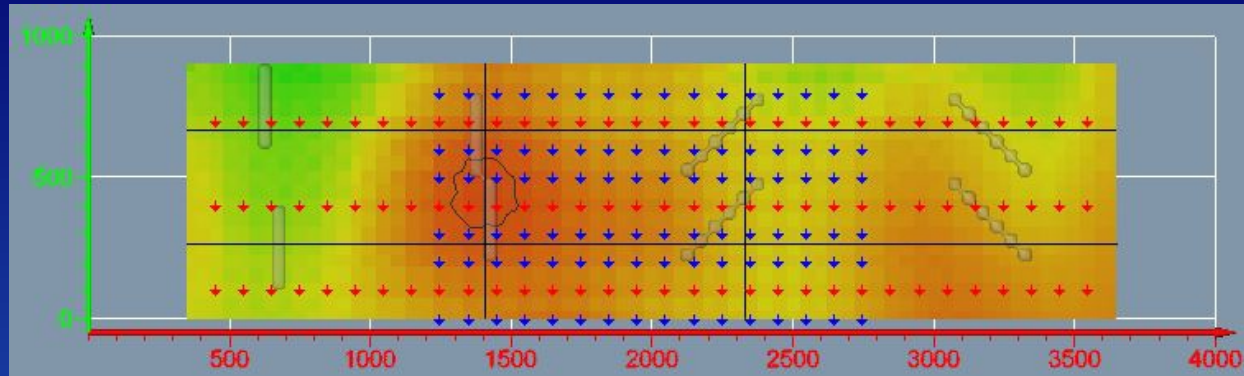
X-section – 2300



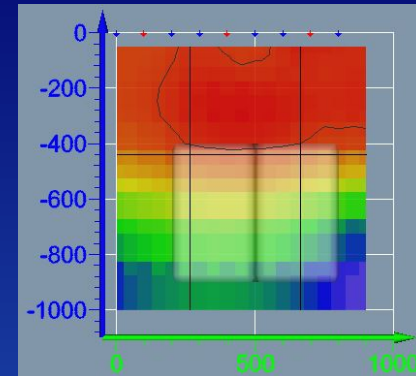
Long Section – 700



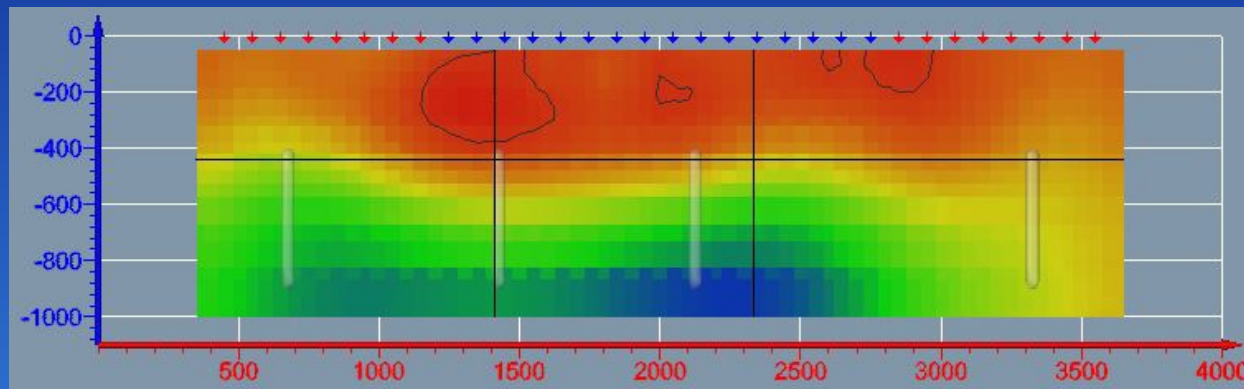
Type B – 50,000 Ωm in 1,000 Ωm – Chargeability Inversion (DODD)



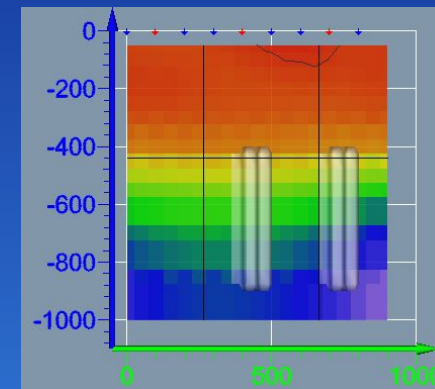
Plan View



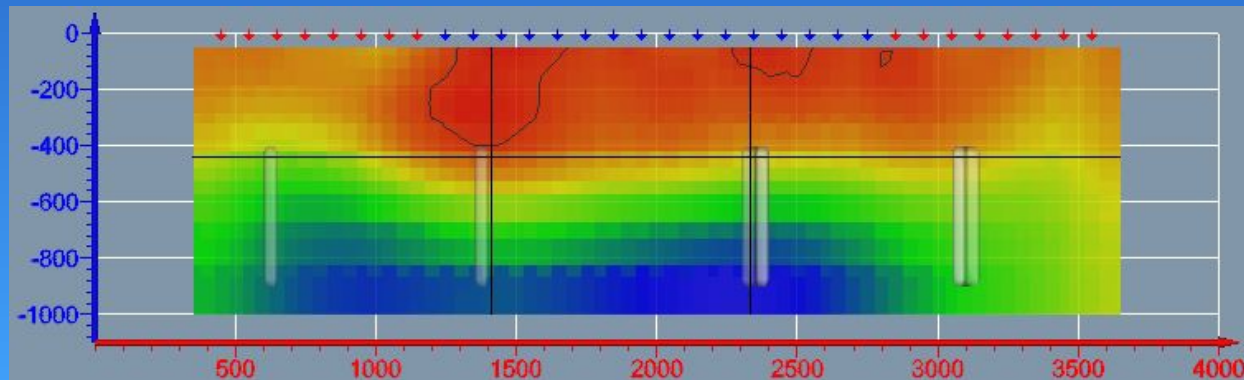
X-section - 1400



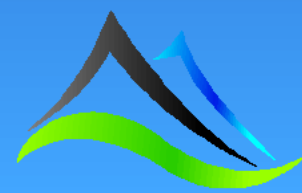
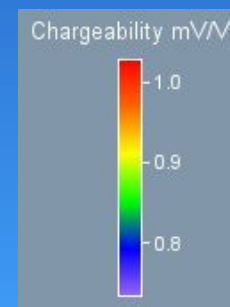
Long Section – 250



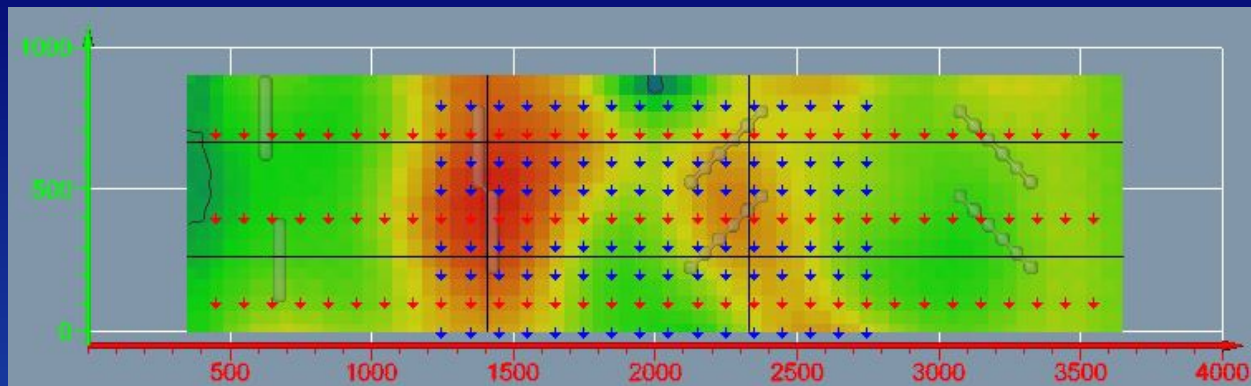
X-section - 2300



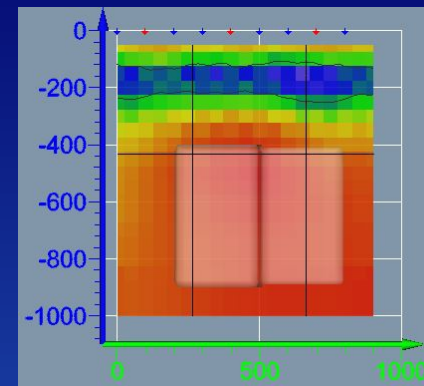
Long Section – 700



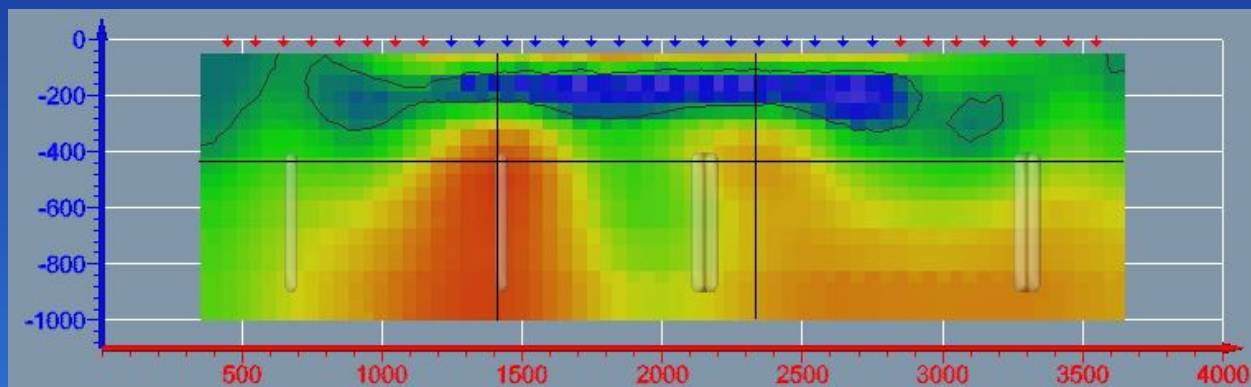
Type B – 50,000 Ωm in 1,000 Ωm – Resistivity Inversion (MRx)



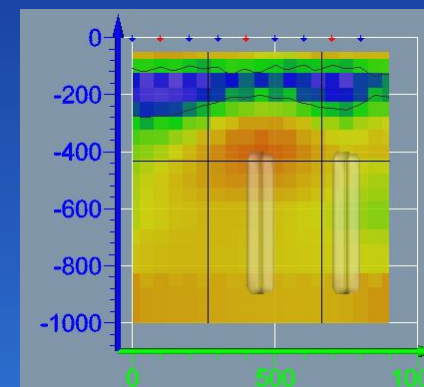
Plan View



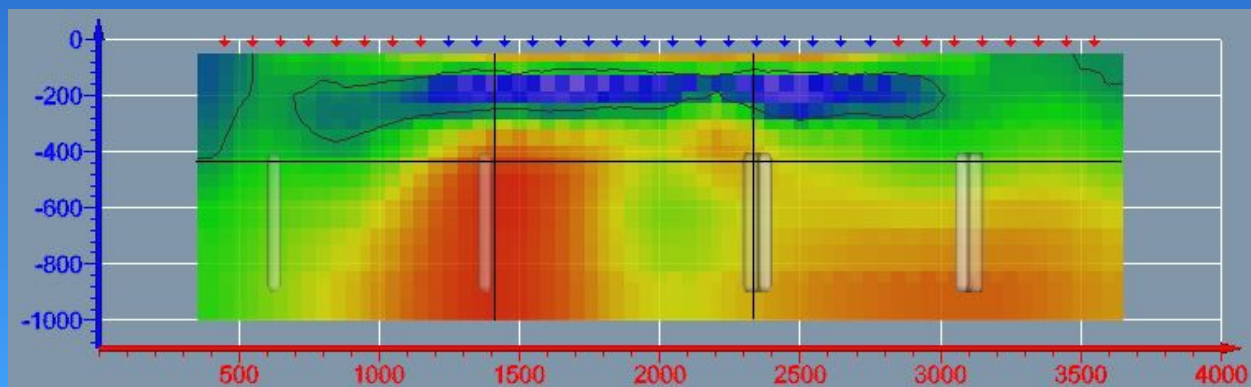
X-section - 1400



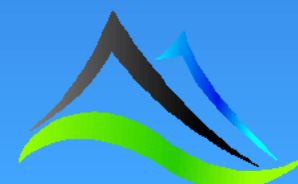
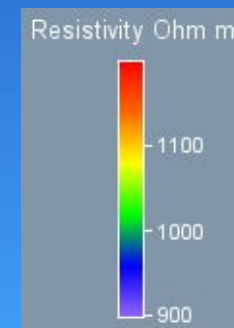
Long Section – 250



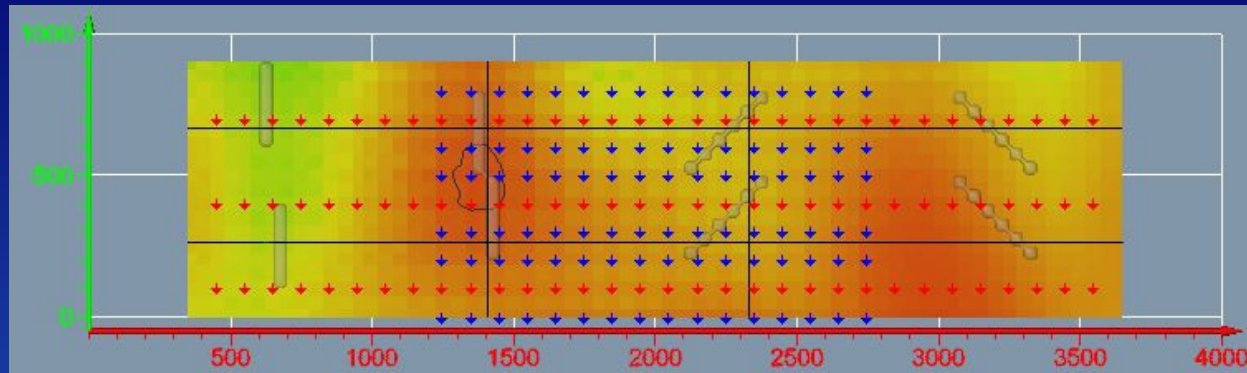
X-section – 2300



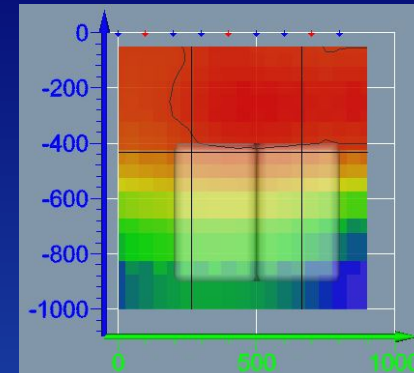
Long Section – 700



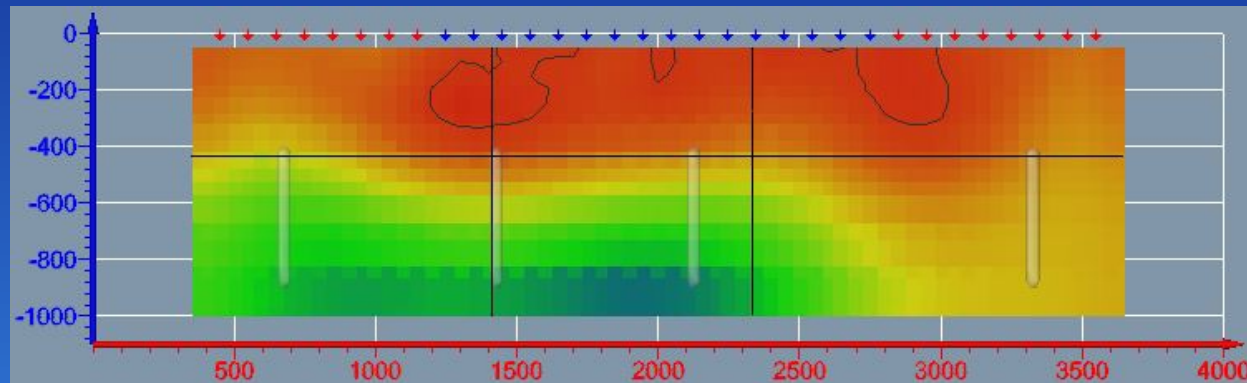
Type B – 50,000 Ωm in 1,000 Ωm – Chargeability Inversion (MRx)



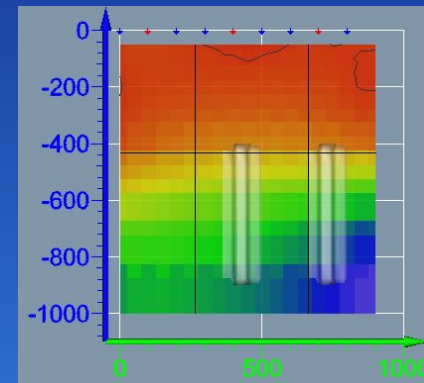
Plan View



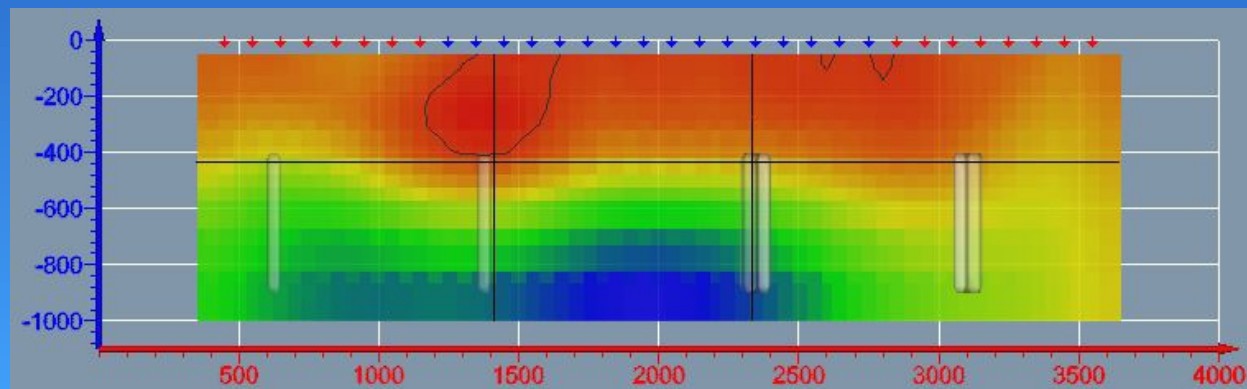
X-section - 1400



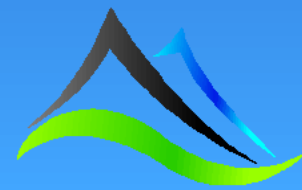
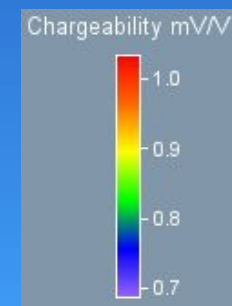
Long Section – 250



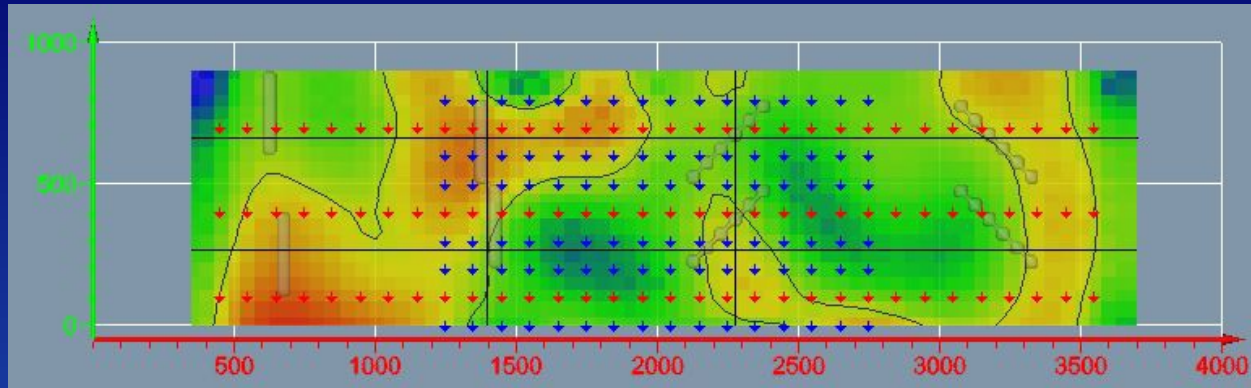
X-section - 2300



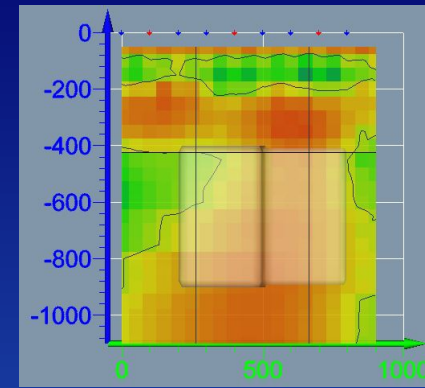
Long Section – 700



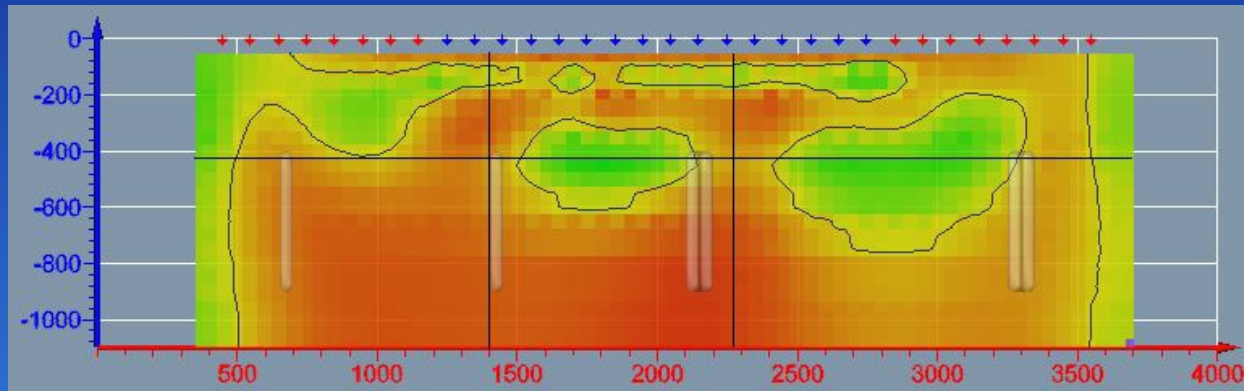
Type B – 50,000 Ωm in 1,000 Ωm – Resistivity Inversion (MTxRx)



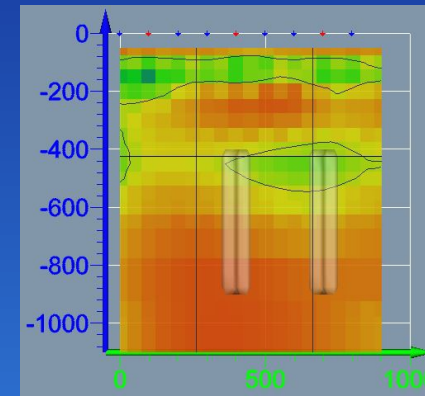
Plan View



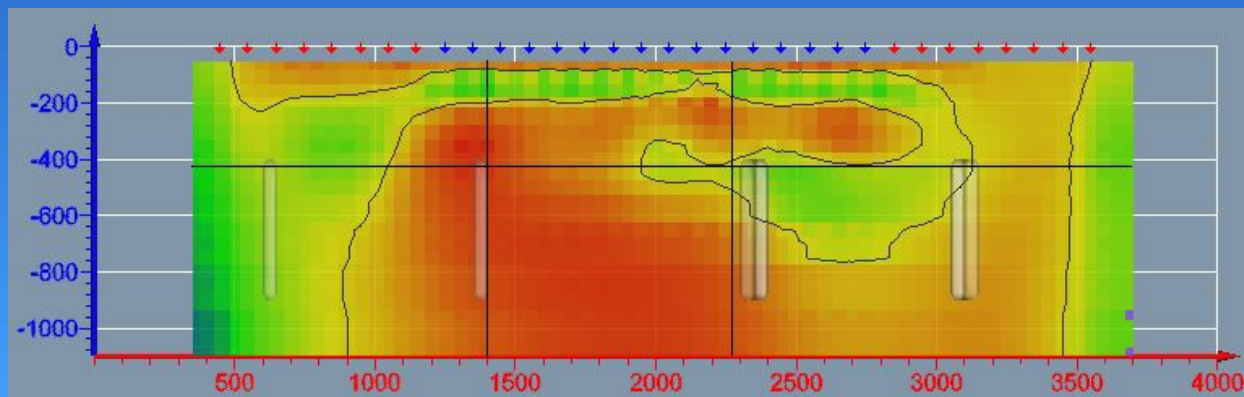
X-section - 1400



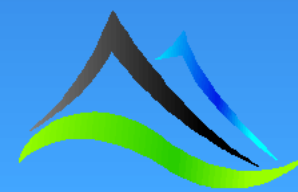
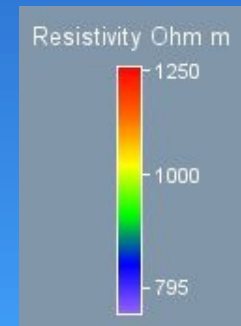
Long Section – 250



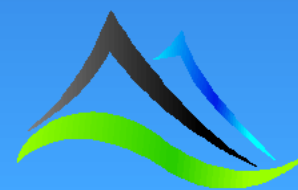
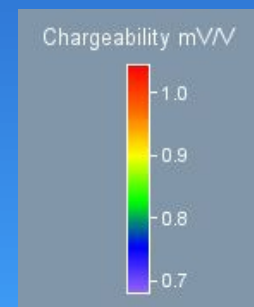
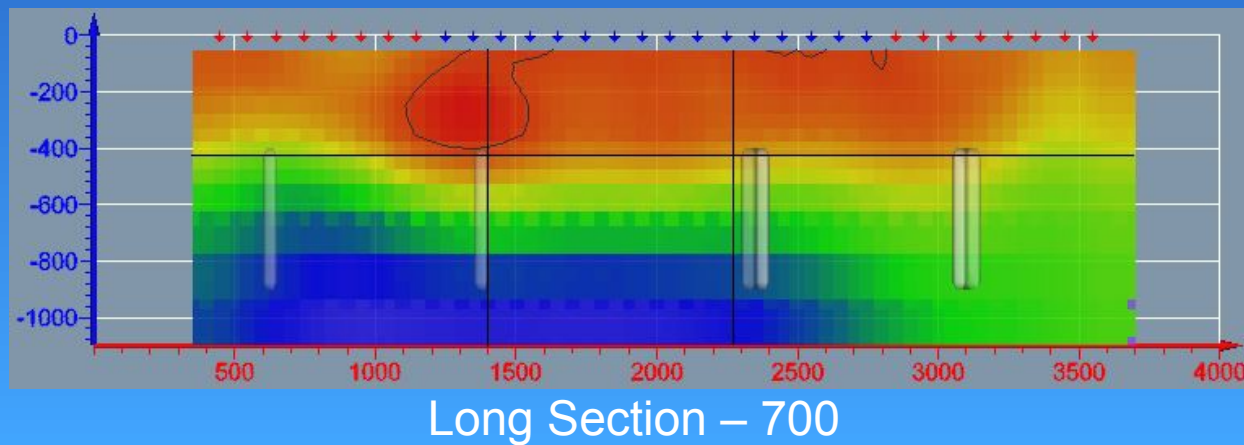
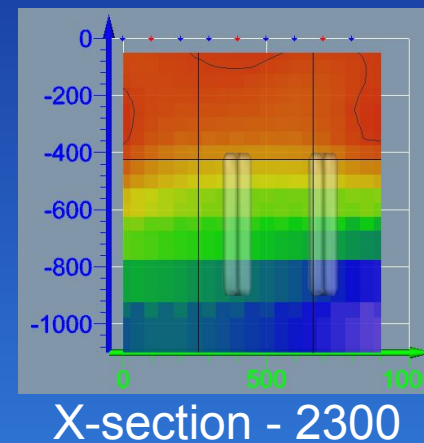
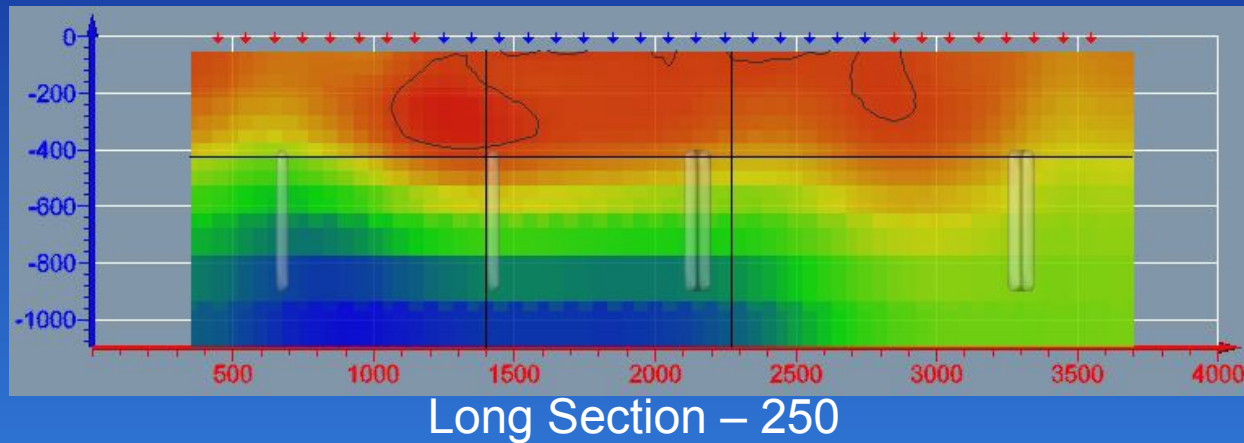
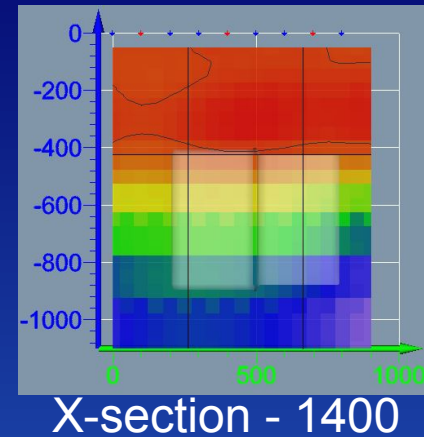
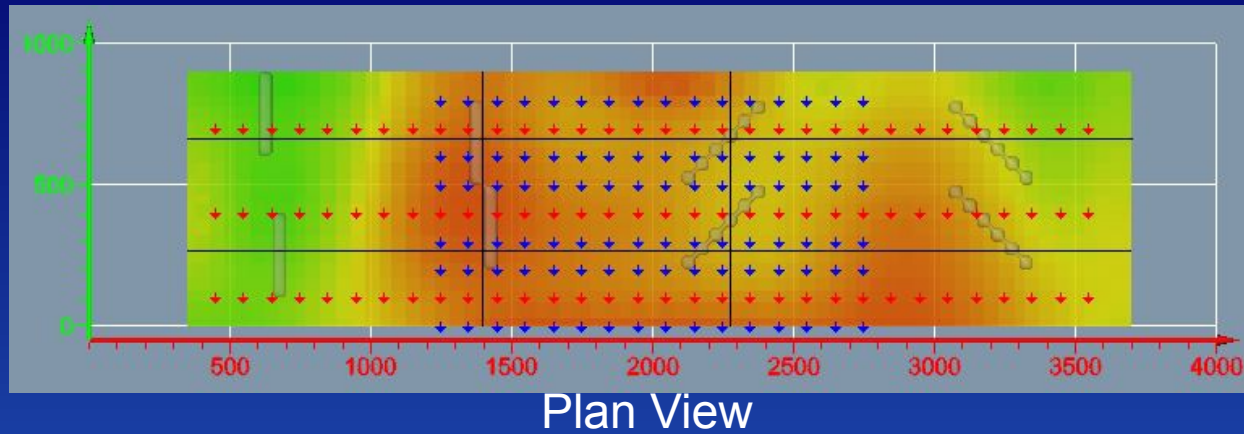
X-section – 2300



Long Section – 700

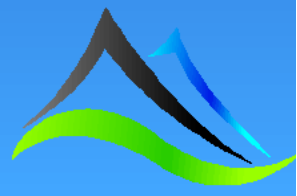


Type B – 50,000 Ωm in 1,000 Ωm – Chargeability Inversion (MTxRx)



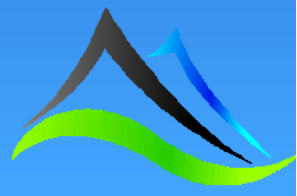
Summary: Type B – Resistors in a 1,000 Ωm half space

- The IP inversions do the best job where the resistor is perpendicular to the line direction, in all cases the MTxRx array does the best job.
- For strong resistivity contrasts all arrays struggle to define resistive veins
- In regards to the resistivity inversions, MTxRx merges nearly all of the bodies into just a couple of large, higher resistive areas.
- The layer of low resistivity surface material can also be seen in these examples.



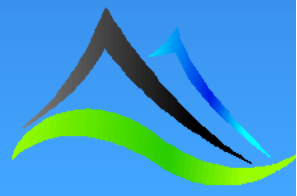
Summary Cont: Type B – Resistors in a 1,000 Ωm half space

- Comparing the 5,000 Ωm in a 1,000 Ωm half space for model A and B, it appears as though resolution is best when the bodies are oriented strike perpendicular to the survey lines. This is most evident in plan view; the two bodies at station 1400 in model B are resolved most clearly while the diagonal bodies are barely detected. The perpendicular bodies to the west are not resolved at all because they lie outside the receiver electrode area.
- The plan view of model A shows that the strike parallel bodies are not resolved well but better resolution is seen in the diagonal lines since they are closer to perpendicular to the line orientation.

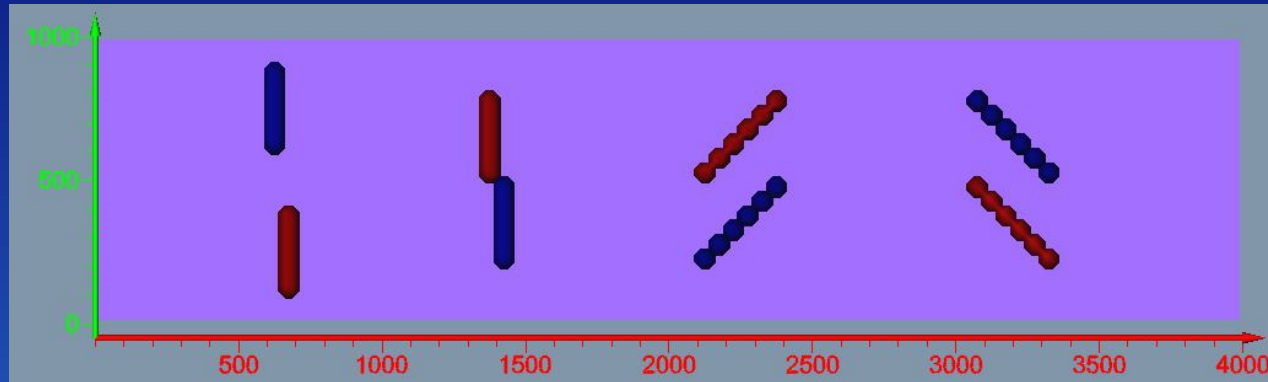


Intro: Type B – Various resistors and 10 Ωm conductors in a 1,000 Ωm half space

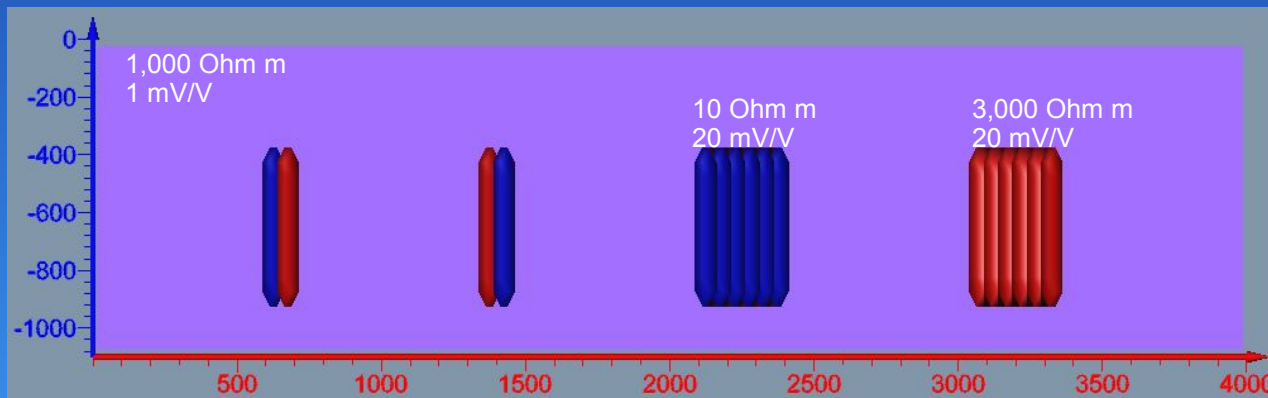
- The following set of slides show the inversion results of model type B with a mix of conductive and resistive veins. The resistivity of the conductive veins was held constant while the value for resistive veins was allowed to vary. Three resistivity contrasts were tested. The first example has veins with a resistivity of 3,000 Ωm , the second of 5,000 Ωm and the third of 10,000 Ωm .
- The 5,000 Ωm example consists of five different inversions in which the depth to the top of the veins was altered from 100m to 500m in 100m increments.
- The veins have a chargeability of 20 mV/V.
- The conductive veins have a resistivity value of 10 mV/V
- The host rock has a resistivity of 1000 Ωm and a chargeability of 1 mV/V.



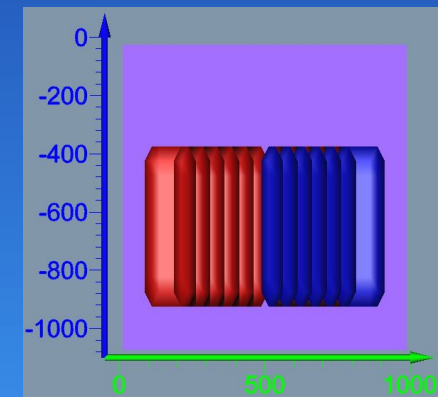
Model: Type B – 3,000 Ωm resistors and 10 Ωm conductors in a 1,000 Ωm half space



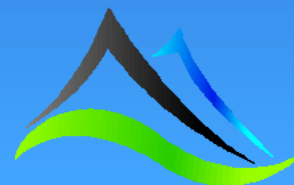
Top



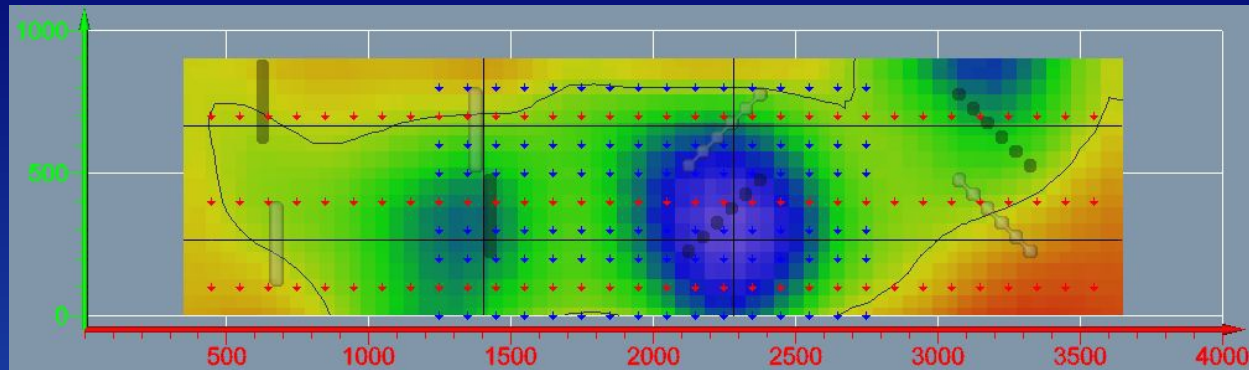
Front



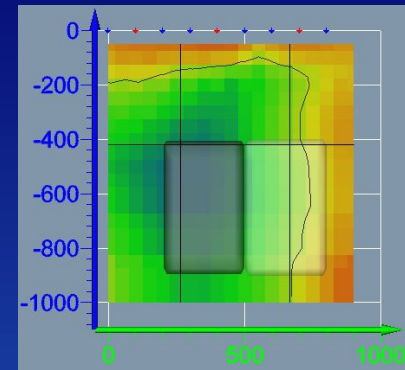
Right



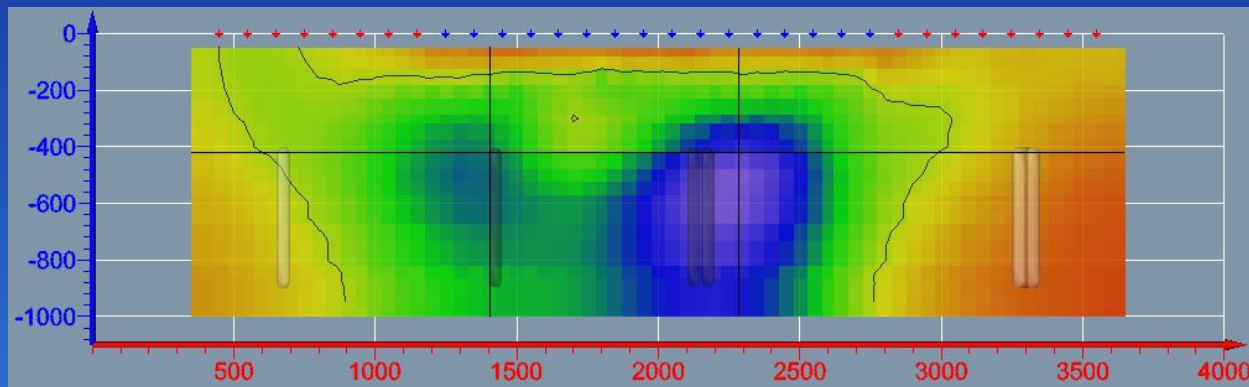
Type B – 3,000 Ωm and 10 Ωm in 1,000 Ωm – Resistivity Inversion (DODD)



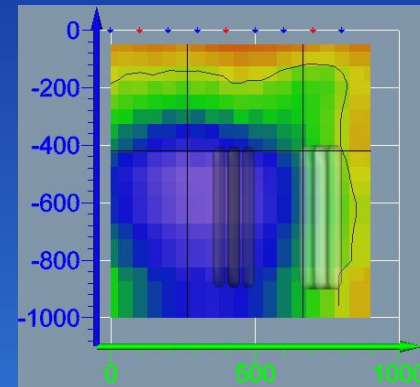
Plan View



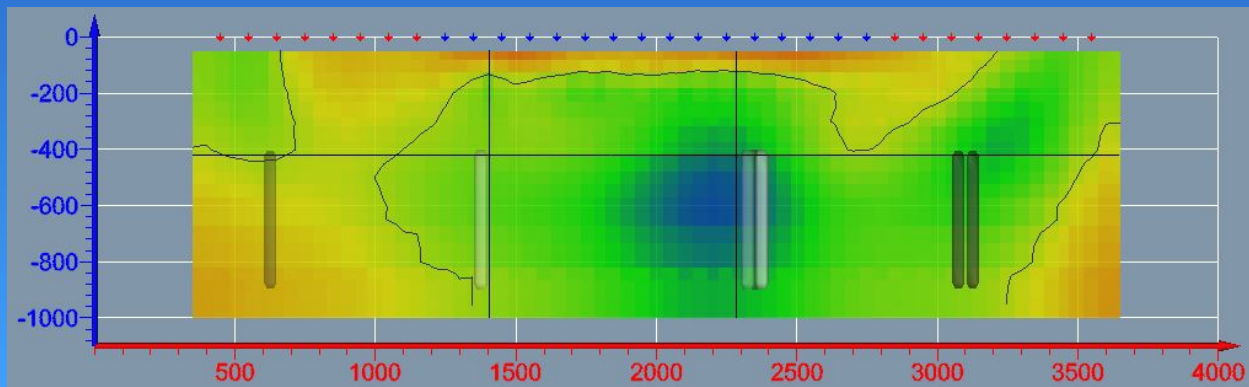
X-section - 1400



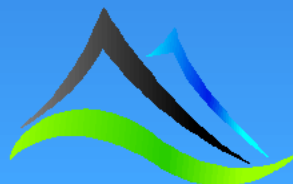
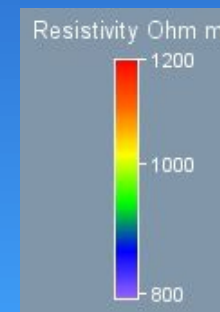
Long Section – 250



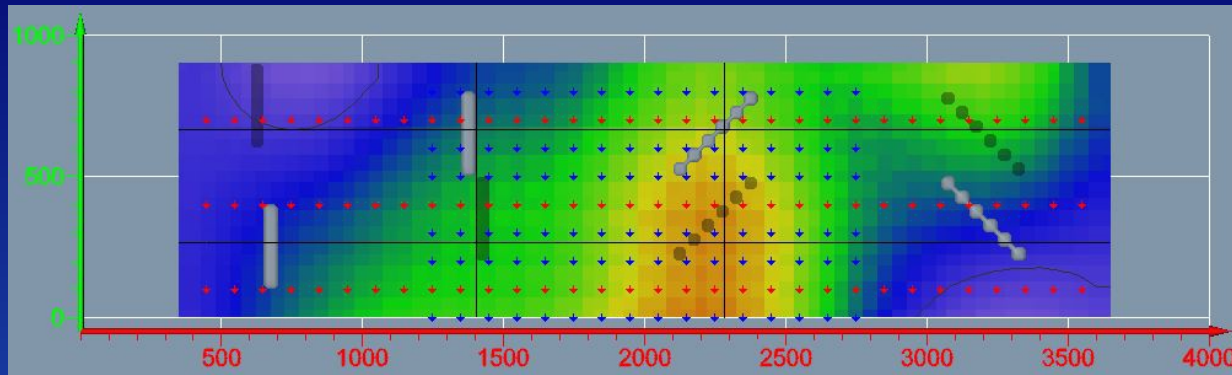
X-section – 2300



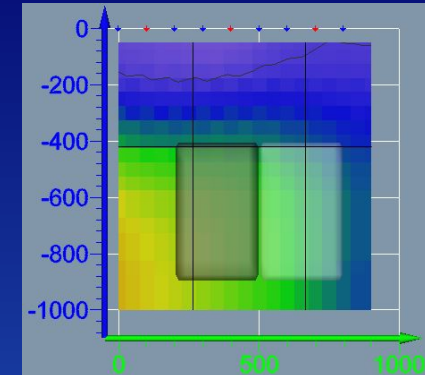
Long Section – 700



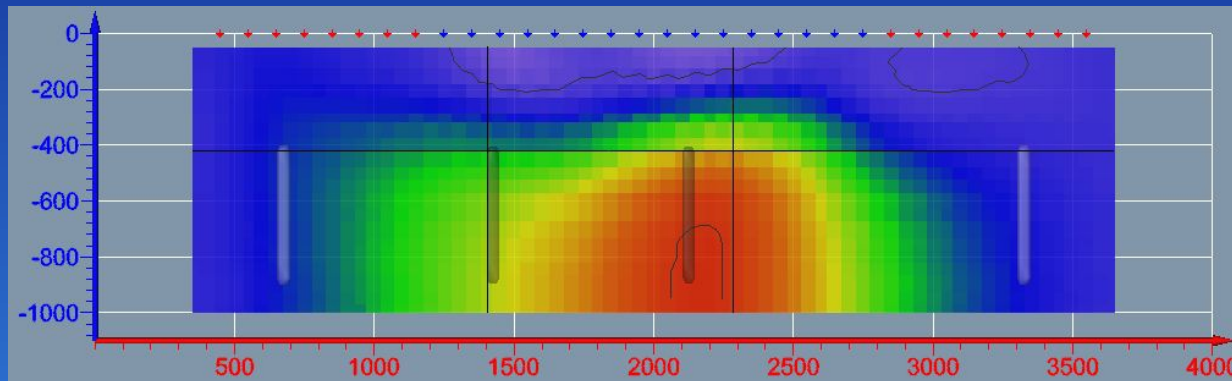
Type B – 3,000 Ωm and 10 Ωm in 1,000 Ωm – Chargeability Inversion (DODD)



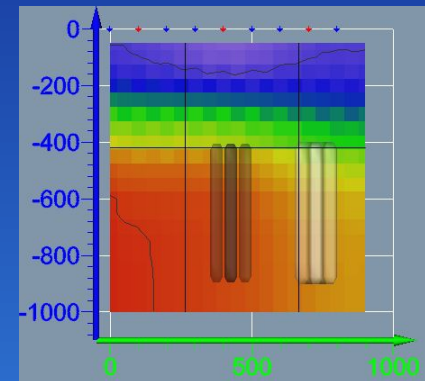
Plan View



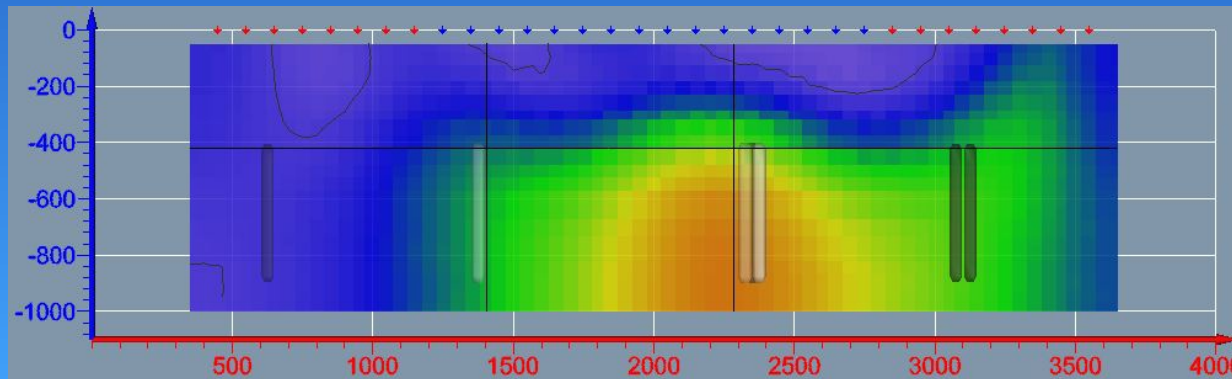
X-section - 1400



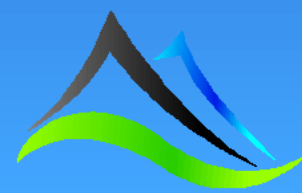
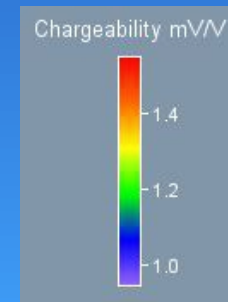
Long Section – 250



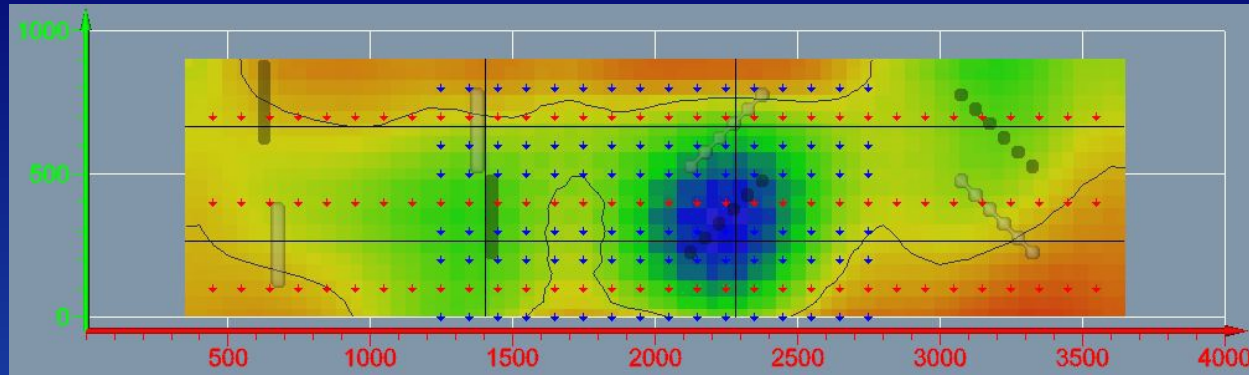
X-section - 2300



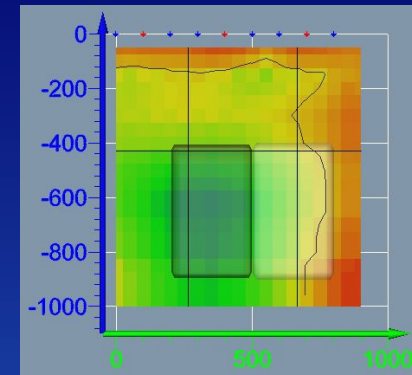
Long Section – 700



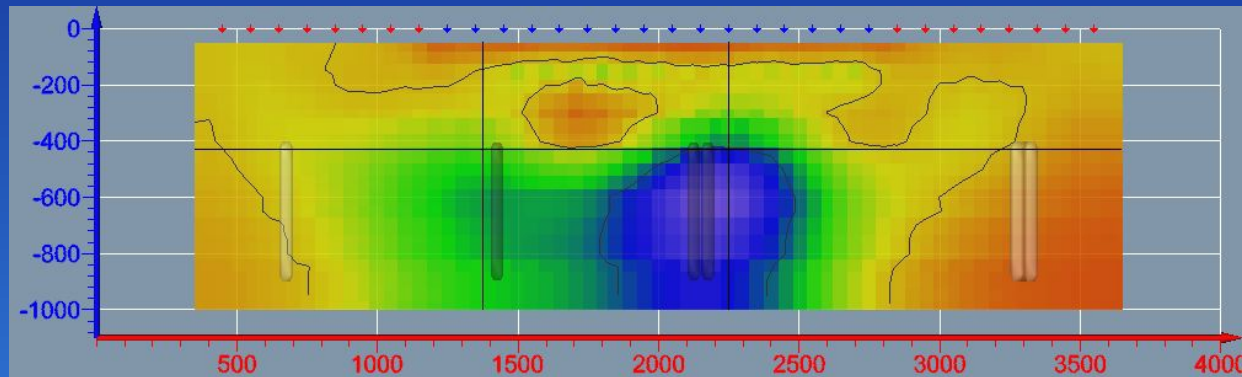
Type B – 3,000 Ωm and 10 Ωm in 1,000 Ωm – Resistivity Inversion (MRx)



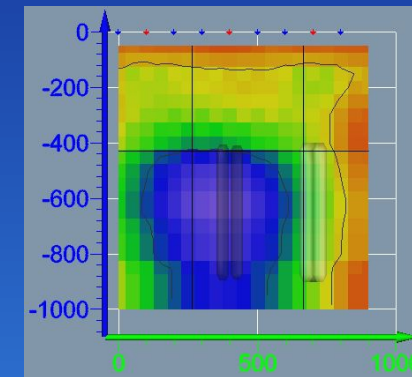
Plan View



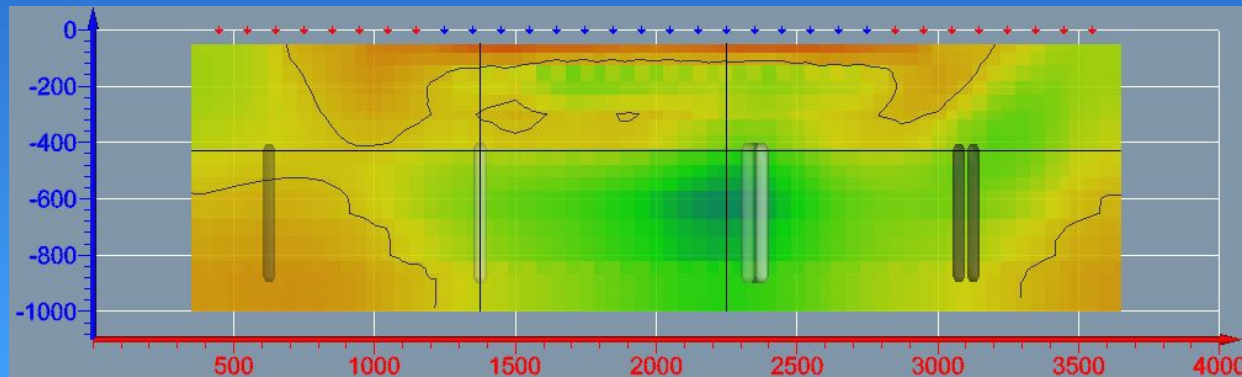
X-section - 1400



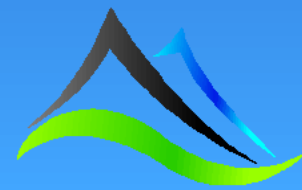
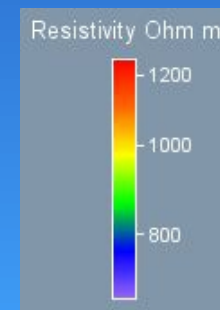
Long Section – 250



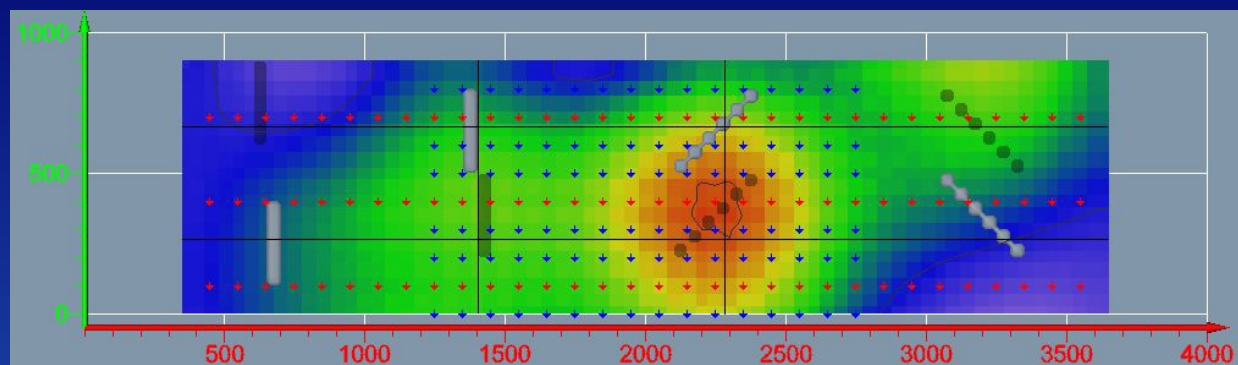
X-section – 2300



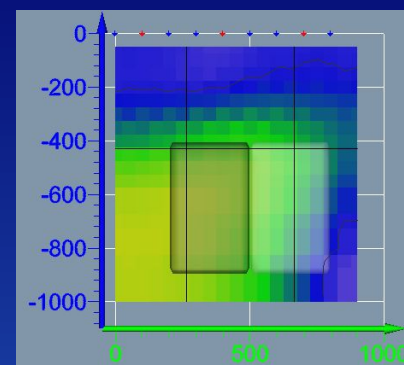
Long Section – 700



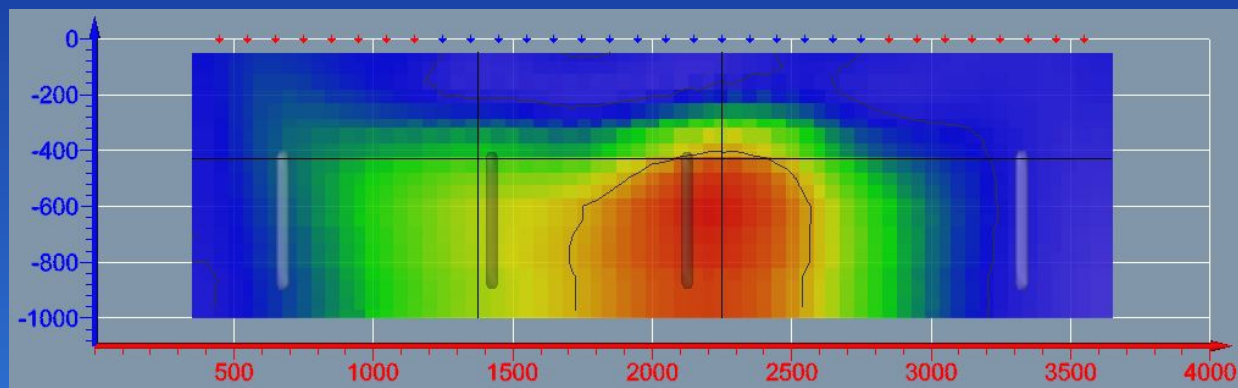
Type B – 3,000 Ωm and 10 Ωm in 1,000 Ωm – Chargeability Inversion (MRx)



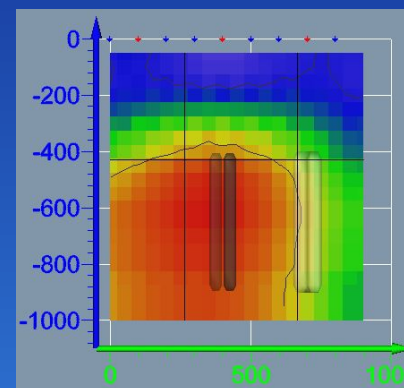
Plan View



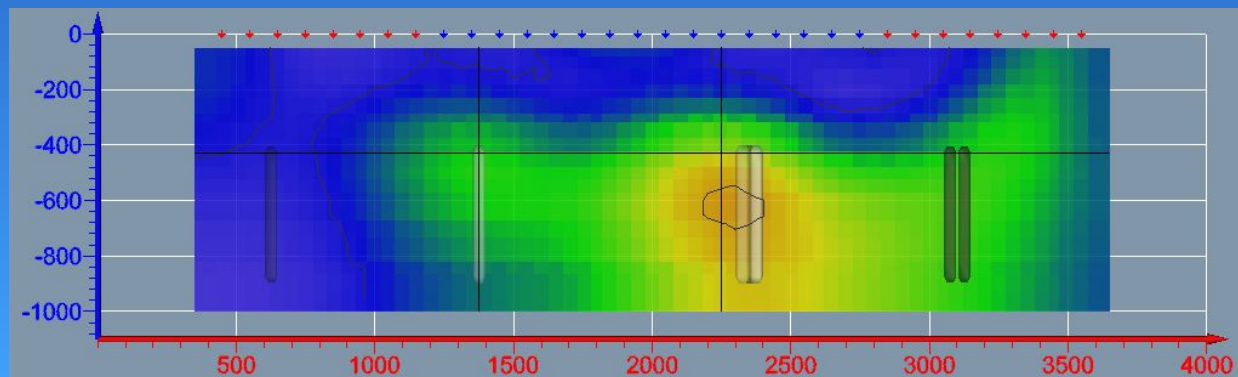
X-section - 1400



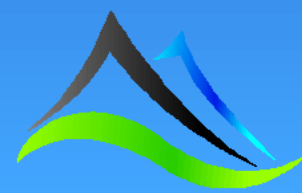
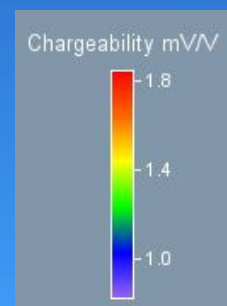
Long Section – 250



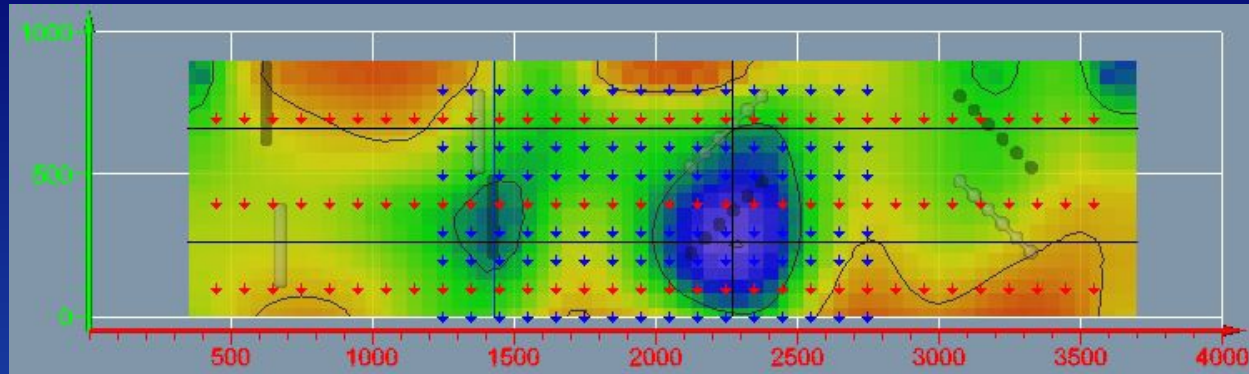
X-section - 2300



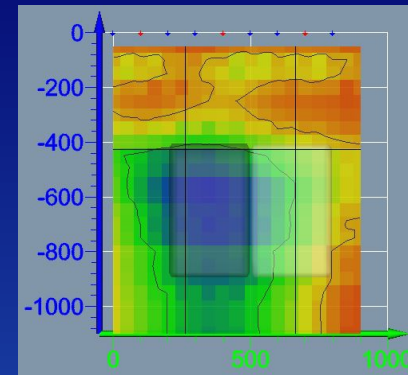
Long Section – 700



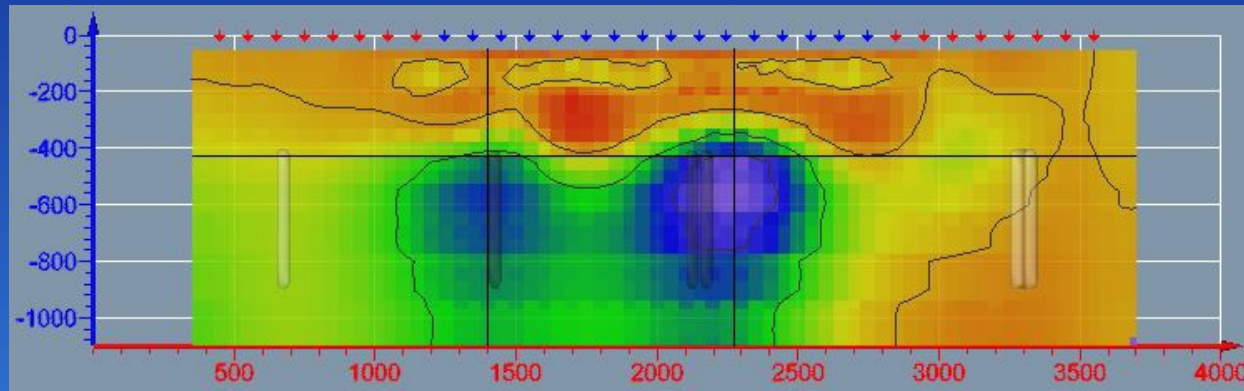
Type B – 3,000 Ωm and 10 Ωm in 1,000 Ωm – Resistivity Inversion (MTxRx)



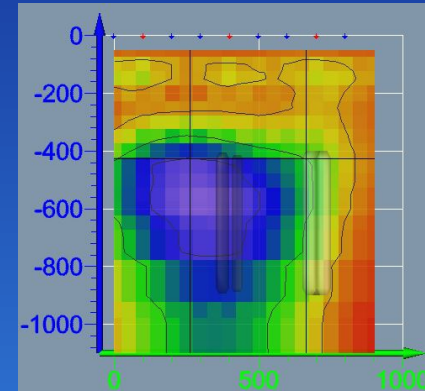
Plan View



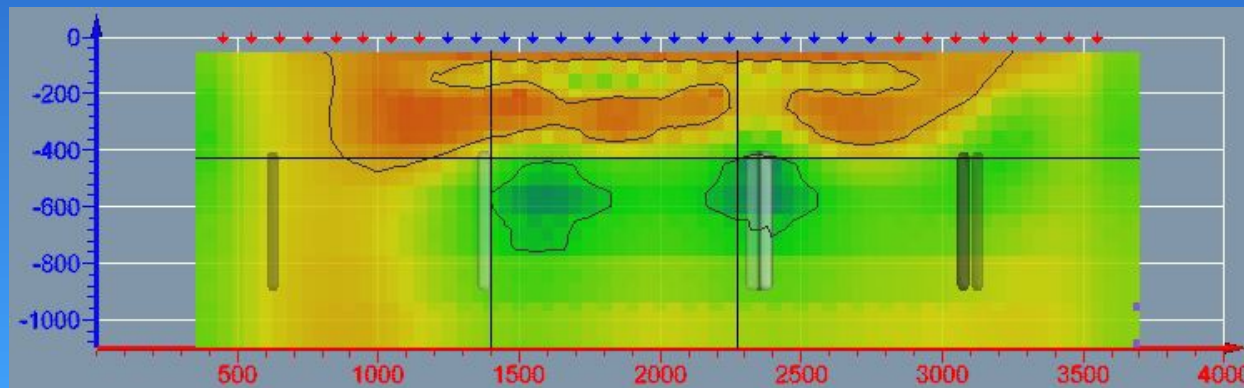
X-section - 1400



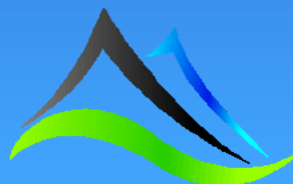
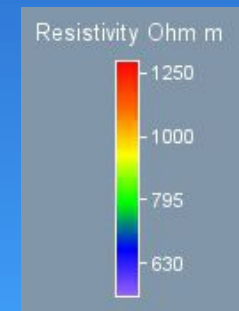
Long Section – 250



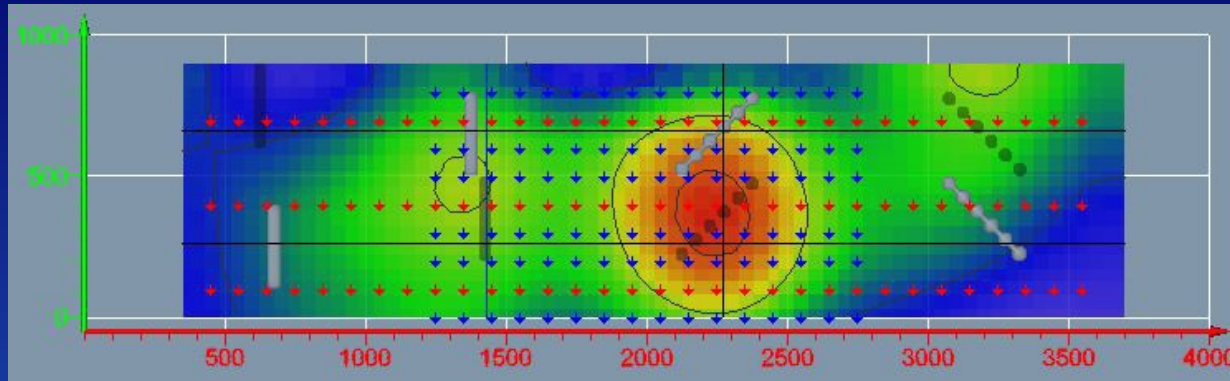
X-section – 2300



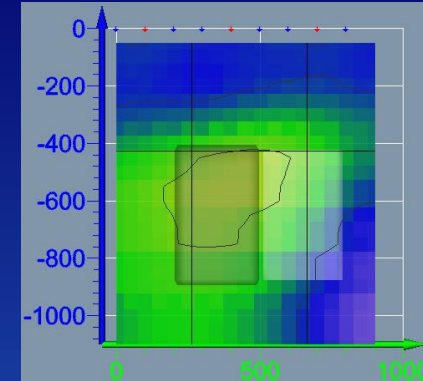
Long Section – 700



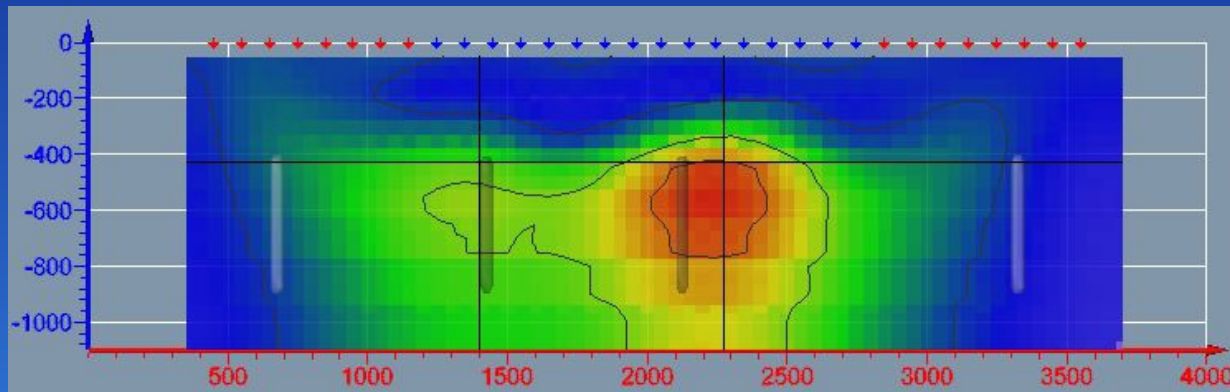
Type B – 3,000 Ωm and 10 Ωm in 1,000 Ωm – Chargeability Inversion (MTxRx)



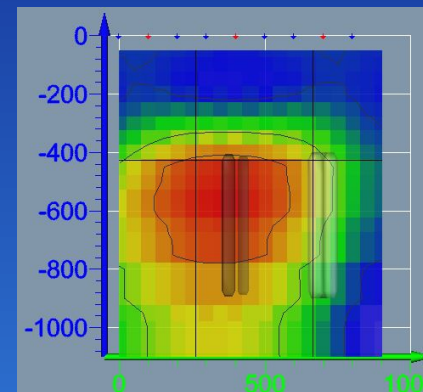
Plan View



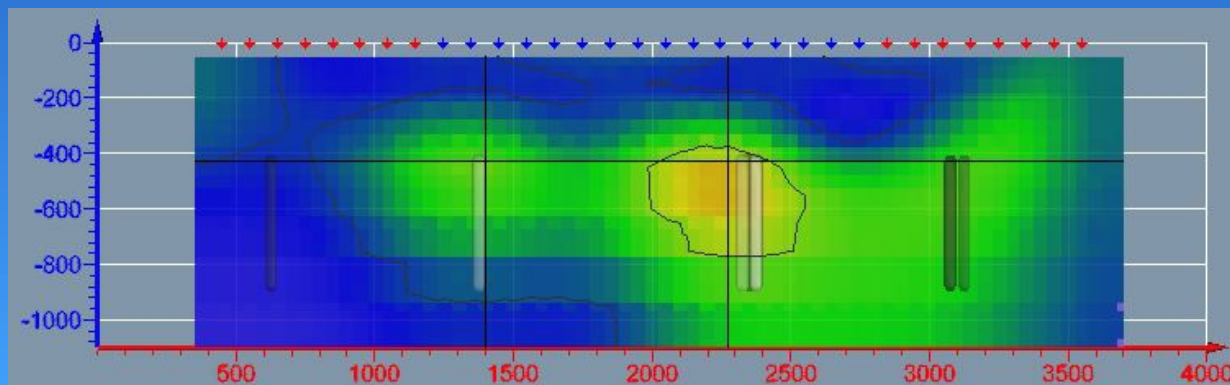
X-section - 1400



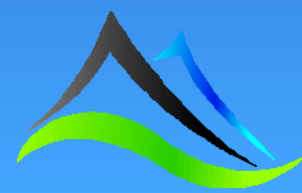
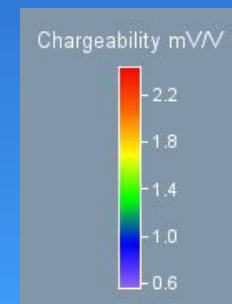
Long Section – 250



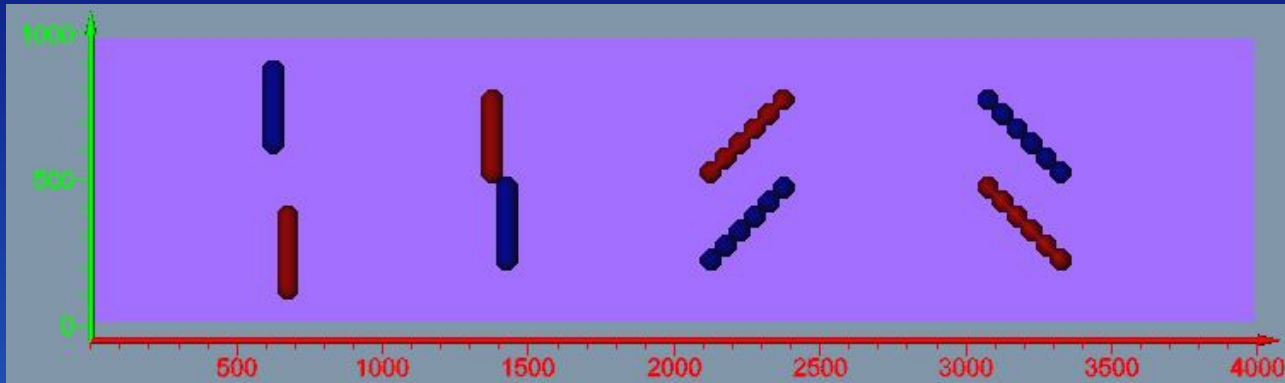
X-section - 2300



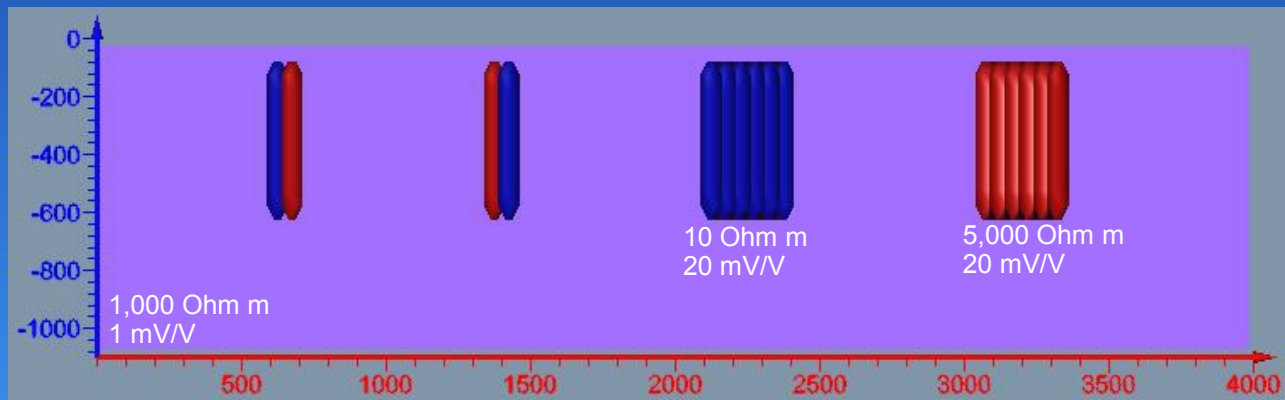
Long Section – 700



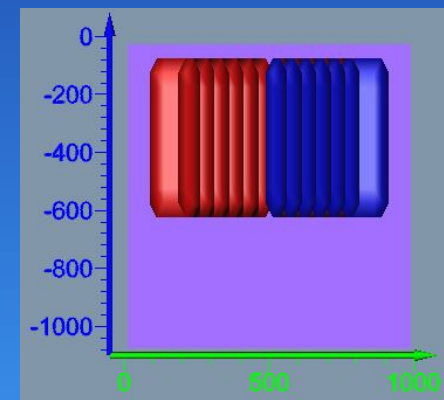
Model: Type B – 5,000 Ωm resistors and 10 Ωm conductors in a 1,000 Ωm half space. 100m depth to top.



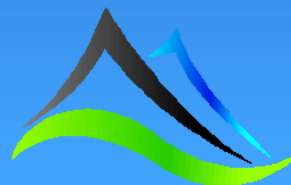
Top



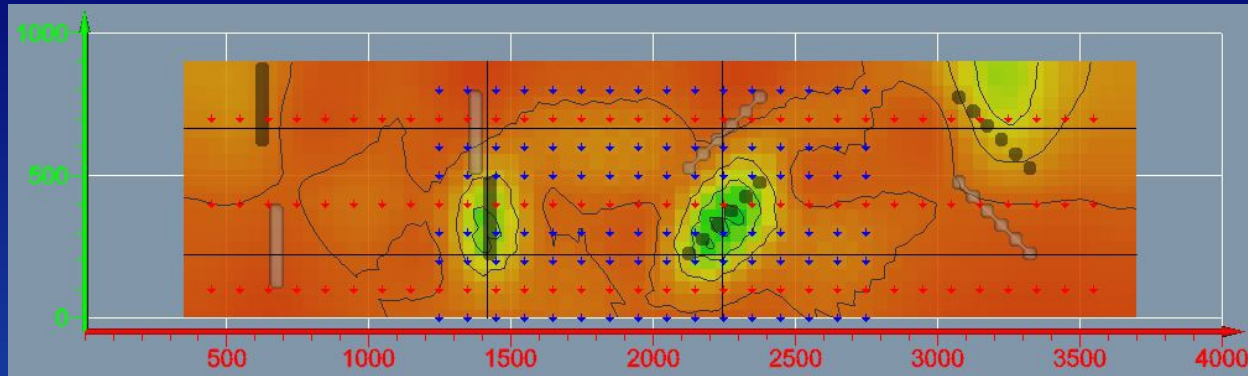
Front



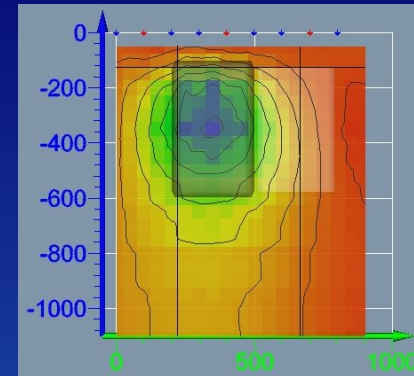
Right



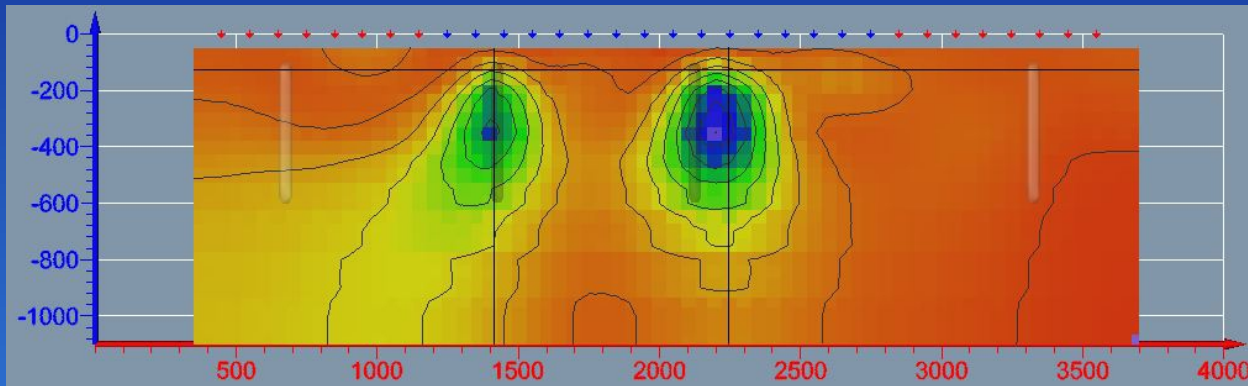
Type B – 5,000 Ωm and 10 Ωm in 1,000 Ωm 100m depth to top – Resistivity Inversion (DODD)



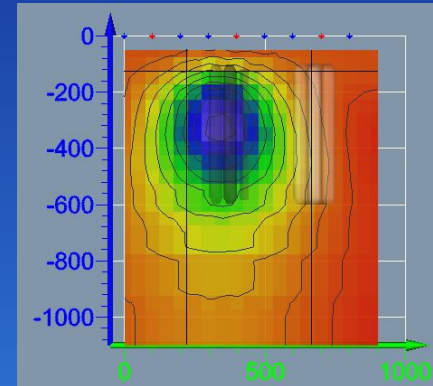
Plan View



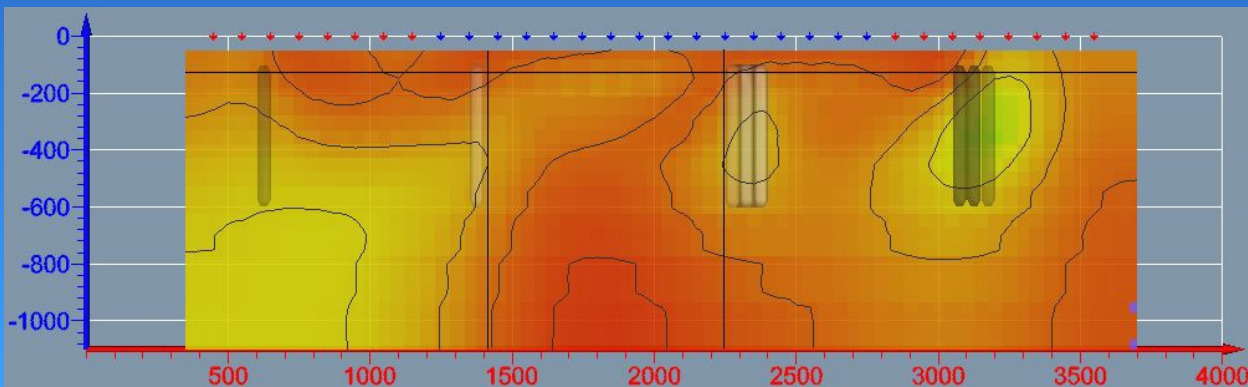
X-section - 1400



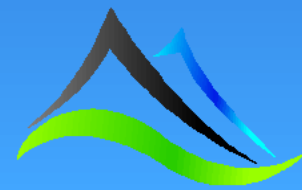
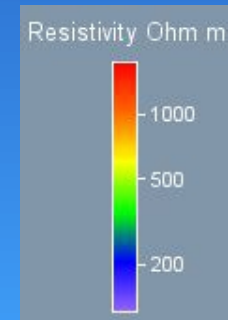
Long Section – 250



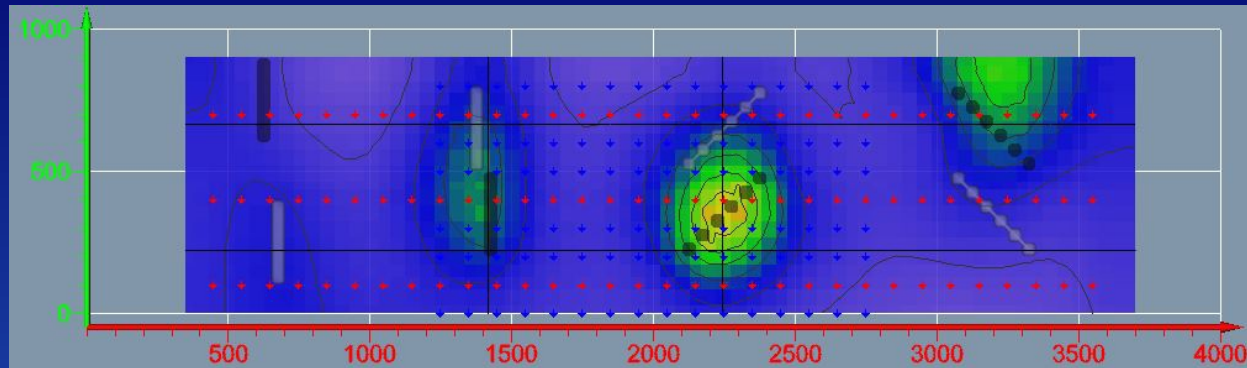
X-section – 2300



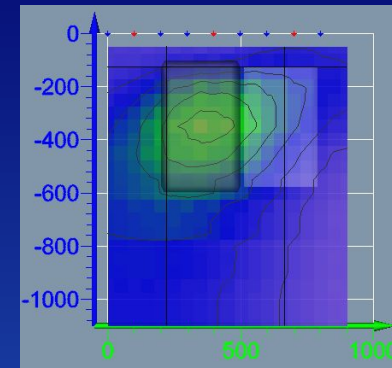
Long Section – 700



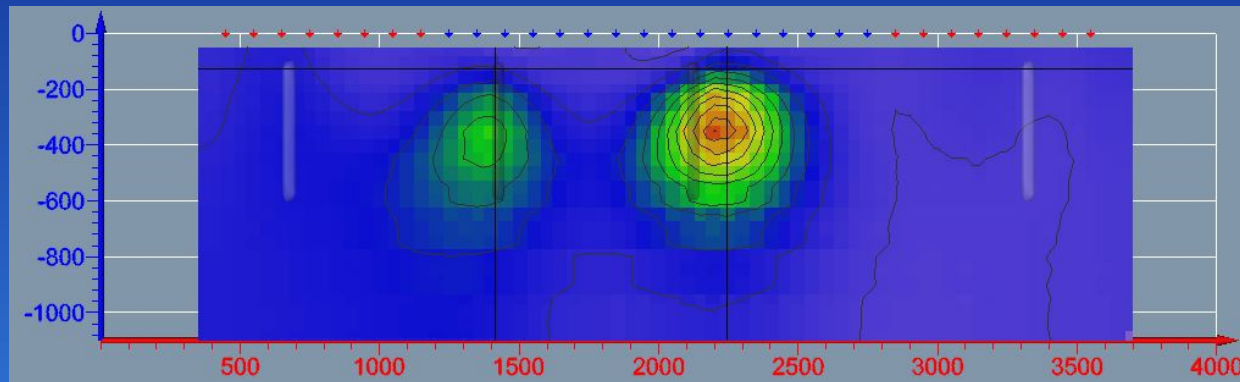
Type B – 5,000 Ωm and 10 Ωm in 1,000 Ωm 100m depth to top – Chargeability Inversion (DODD)



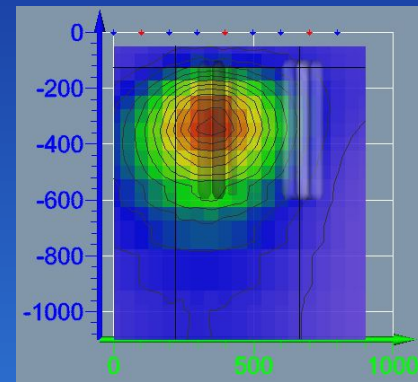
Plan View



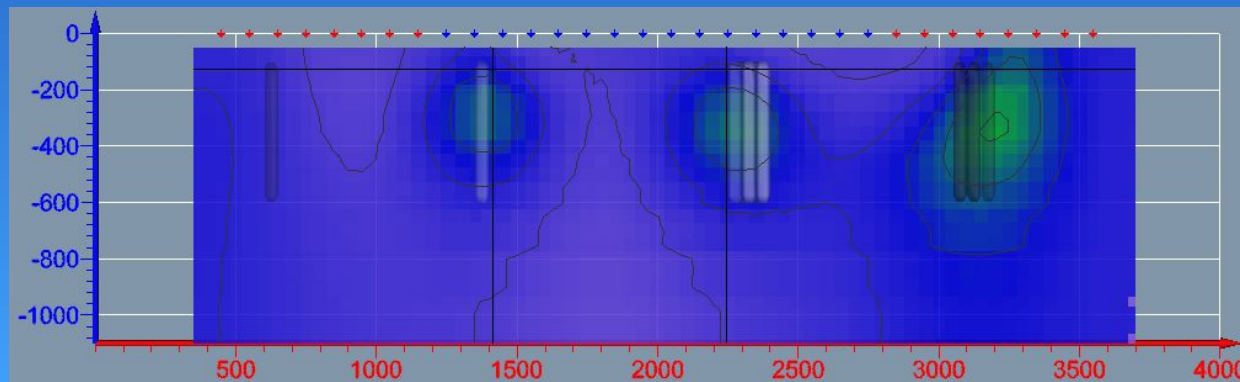
X-section - 1400



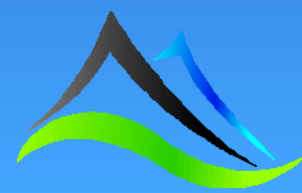
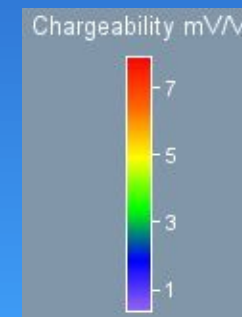
Long Section – 250



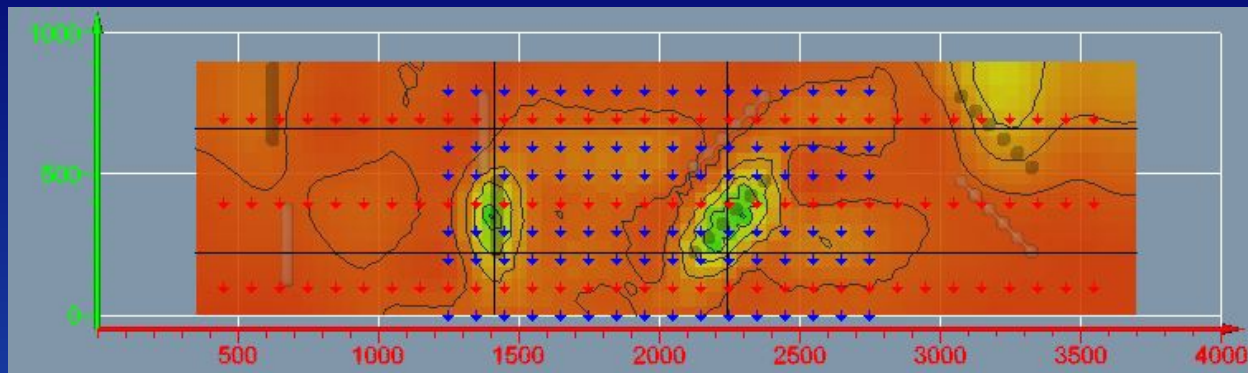
X-section - 2300



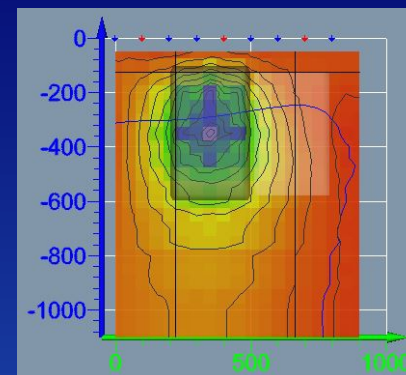
Long Section – 700



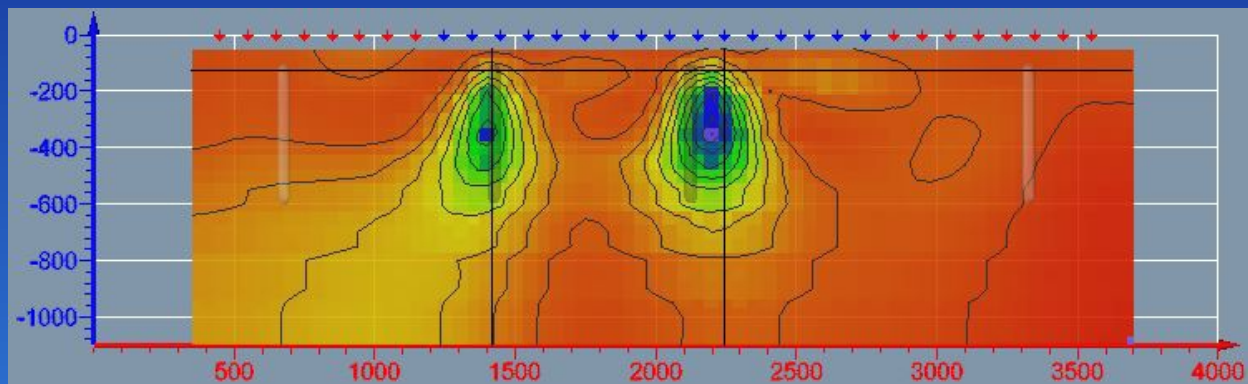
Type B – 5,000 Ωm and 10 Ωm in 1,000 Ωm 100m depth to top – Resistivity Inversion (MTxRx)



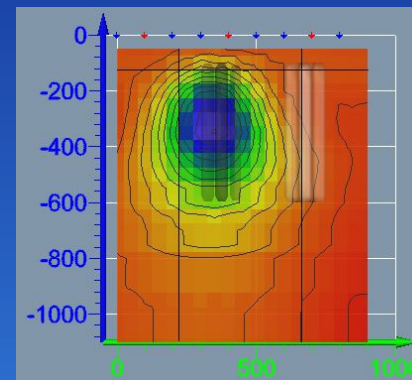
Plan View



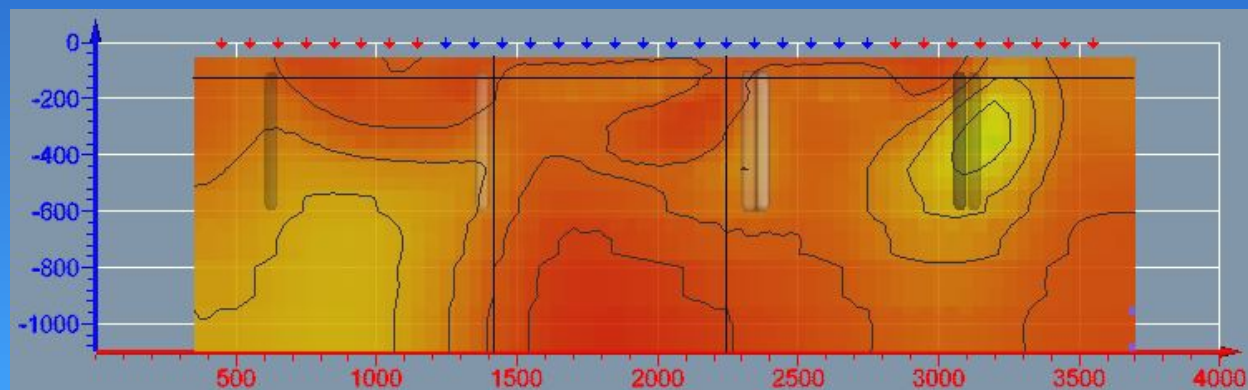
X-section - 1400



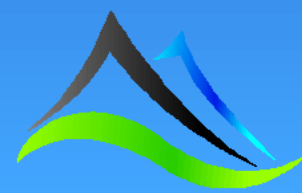
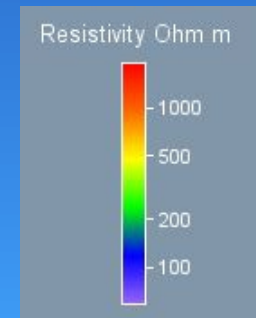
Long Section – 250



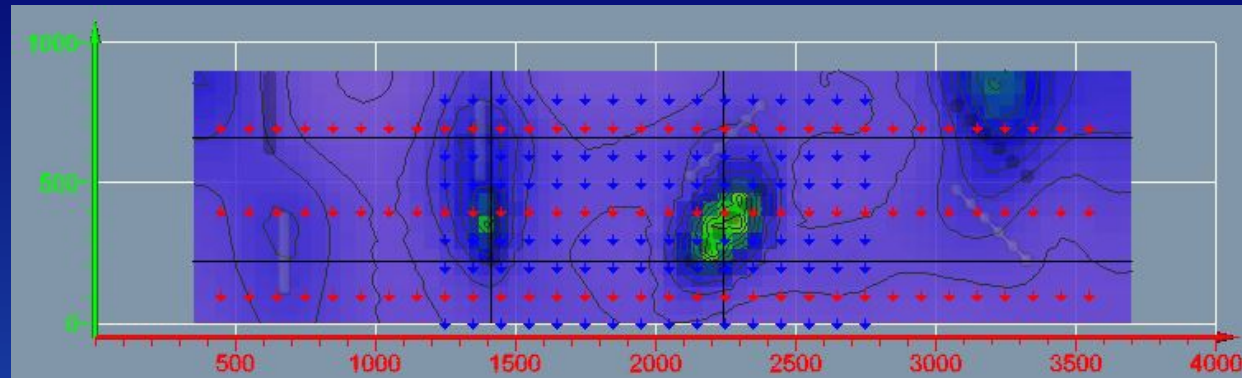
X-section – 2300



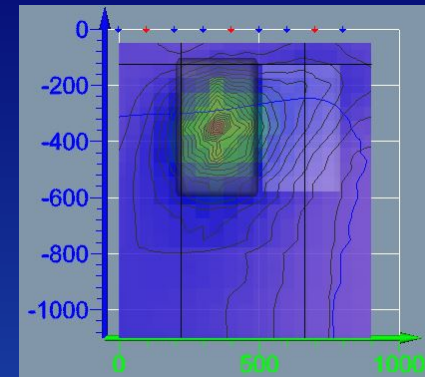
Long Section – 700



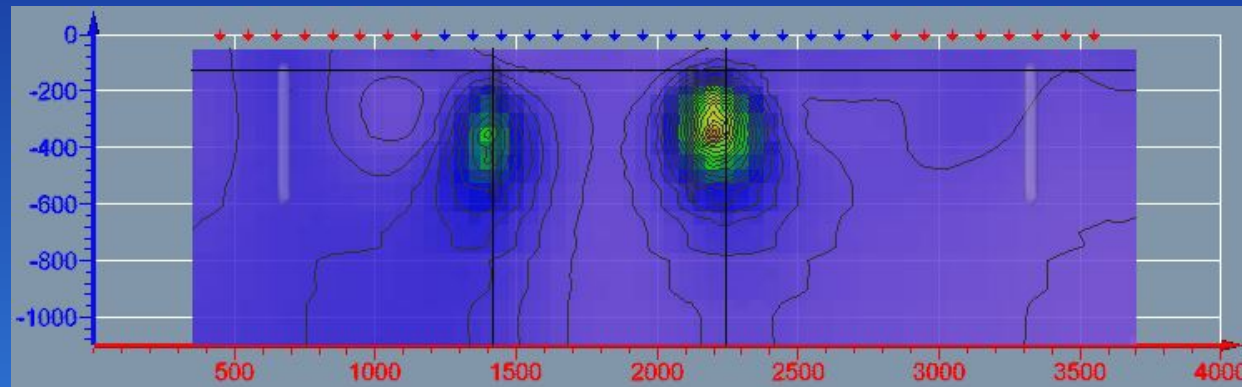
Type B – 5,000 Ωm and 10 Ωm in 1,000 Ωm 100m depth to top – Chargeability Inversion (MTxRx)



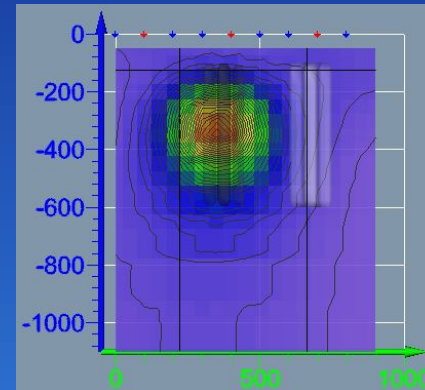
Plan View



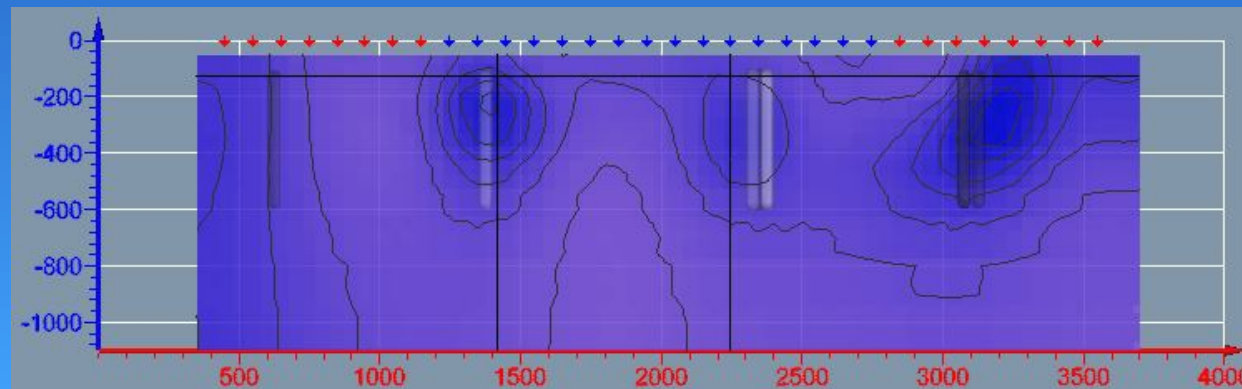
X-section - 1400



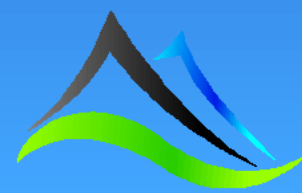
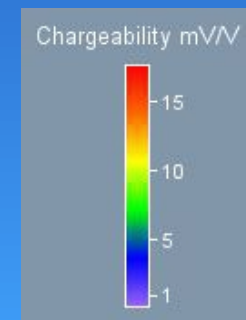
Long Section – 250



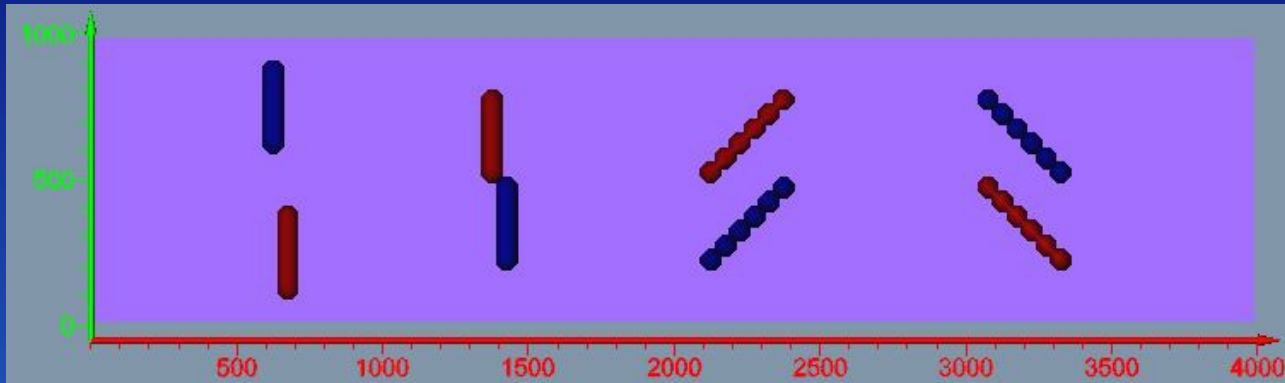
X-section - 2300



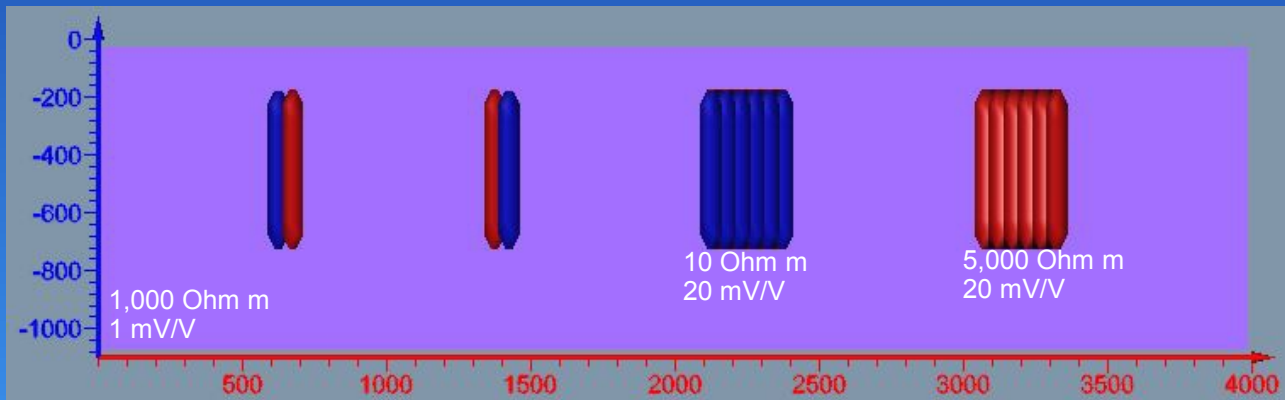
Long Section – 700



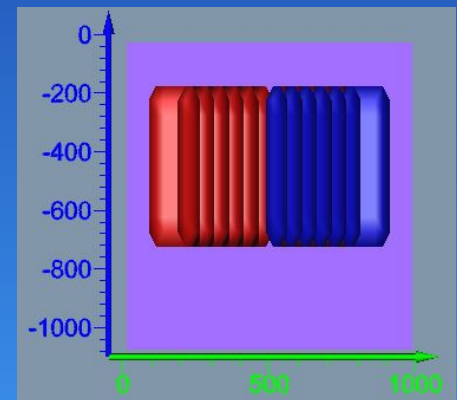
Model: Type B – 5,000 Ωm resistors and 10 Ωm conductors in a 1,000 Ωm half space. 200m depth to top.



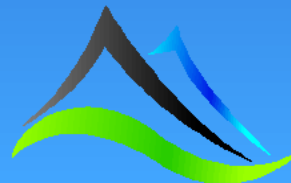
Top



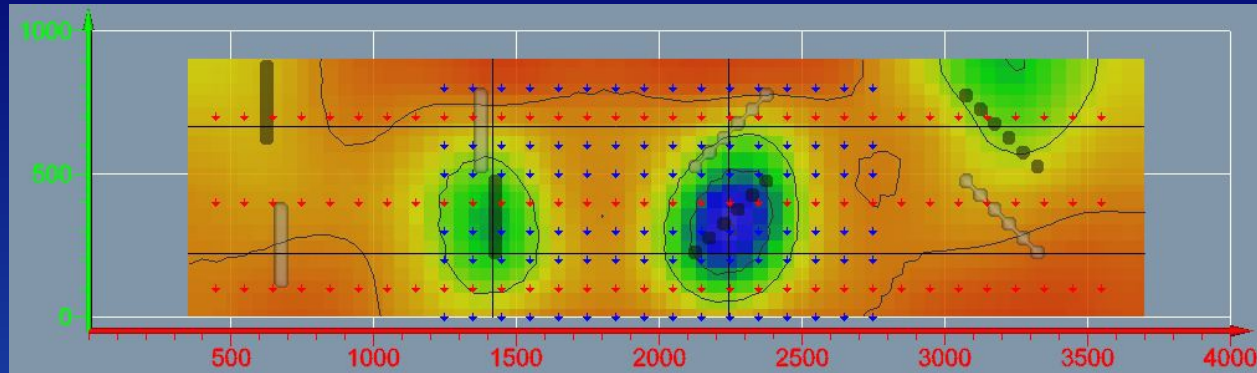
Front



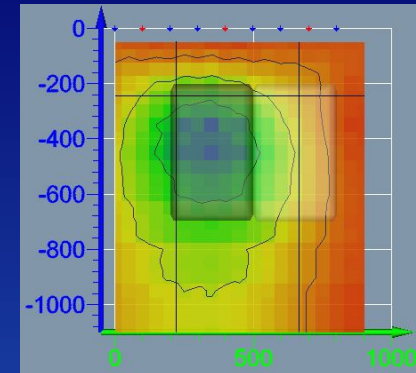
Right



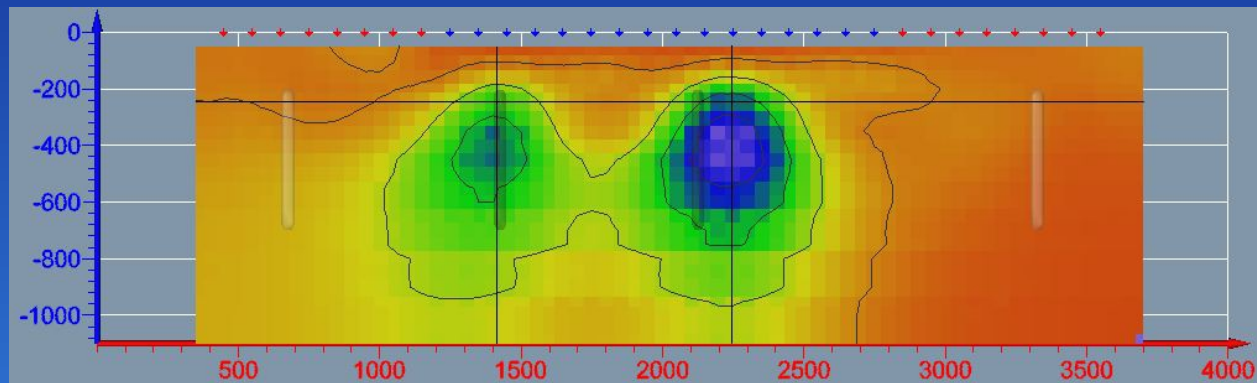
Type B – 5,000 Ωm and 10 Ωm in 1,000 Ωm 200m depth to top – Resistivity Inversion (DODD)



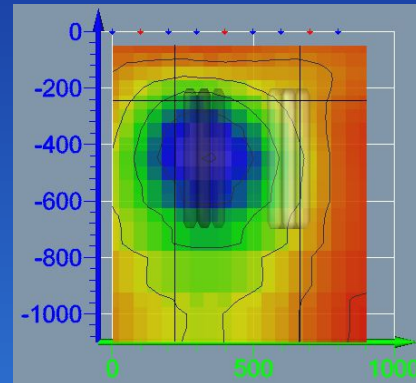
Plan View



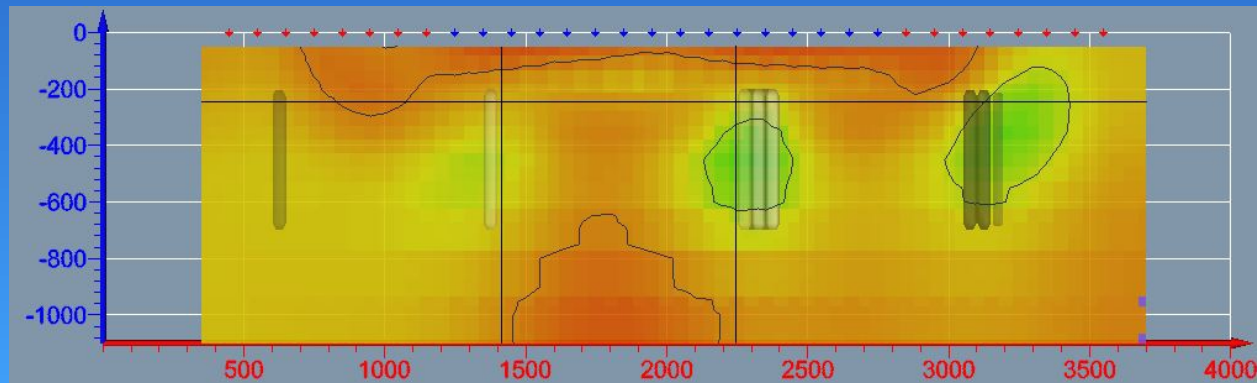
X-section - 1400



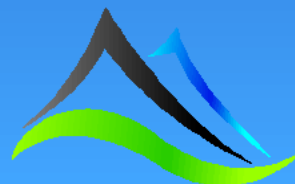
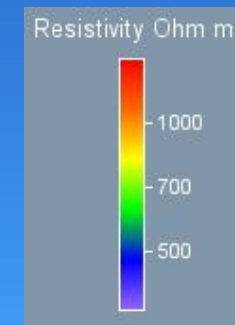
Long Section – 250



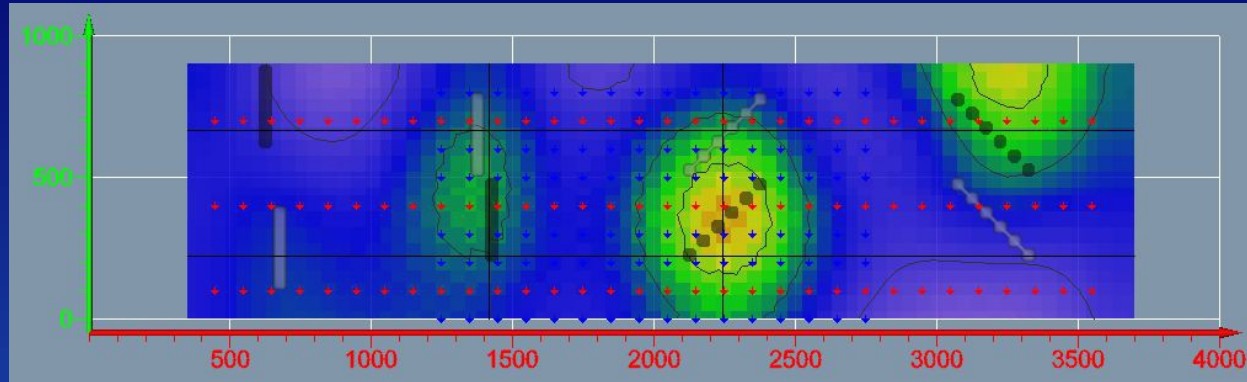
X-section – 2300



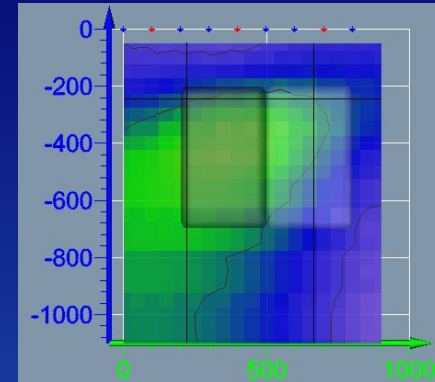
Long Section – 700



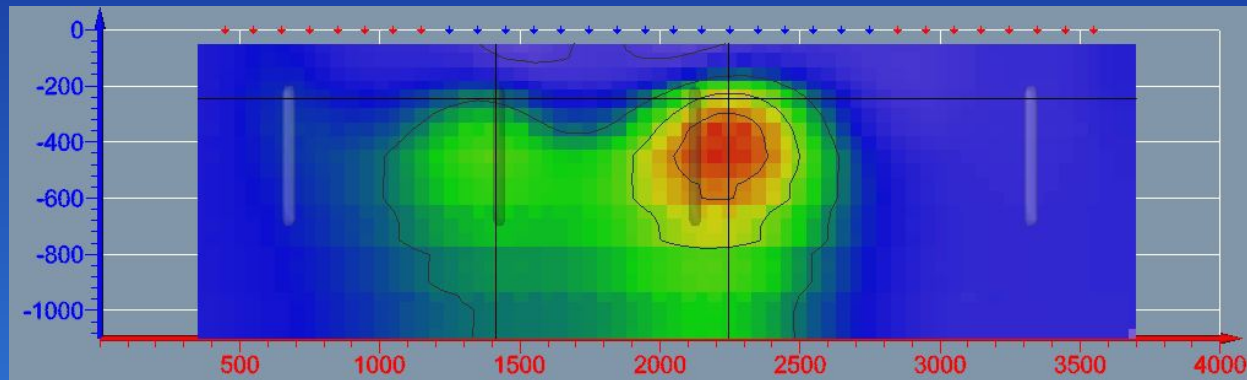
Type B – 5,000 Ωm and 10 Ωm in 1,000 Ωm 200m depth to top – Chargeability Inversion (DODD)



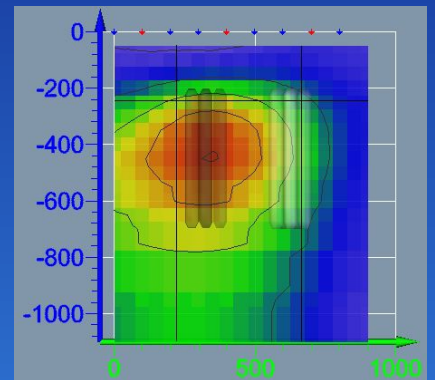
Plan View



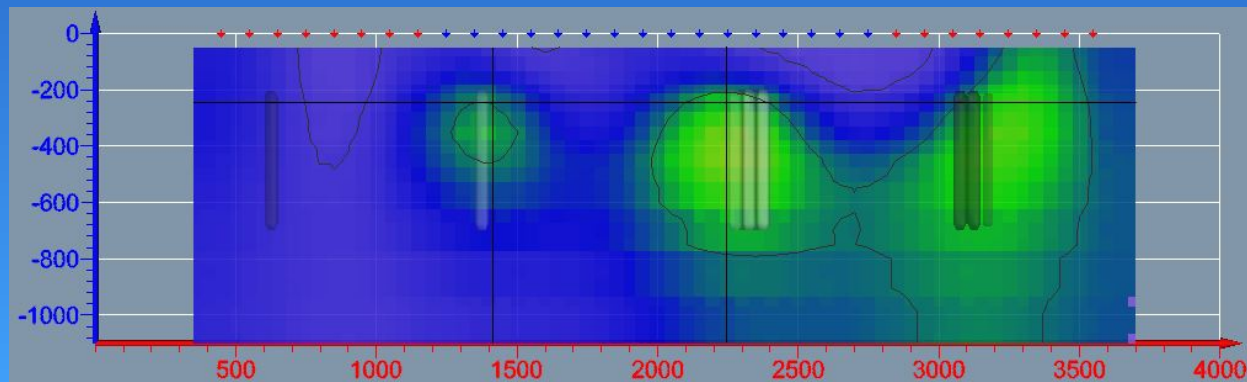
X-section - 1400



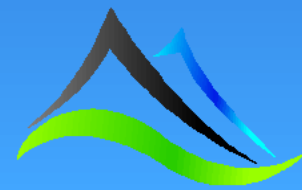
Long Section – 250



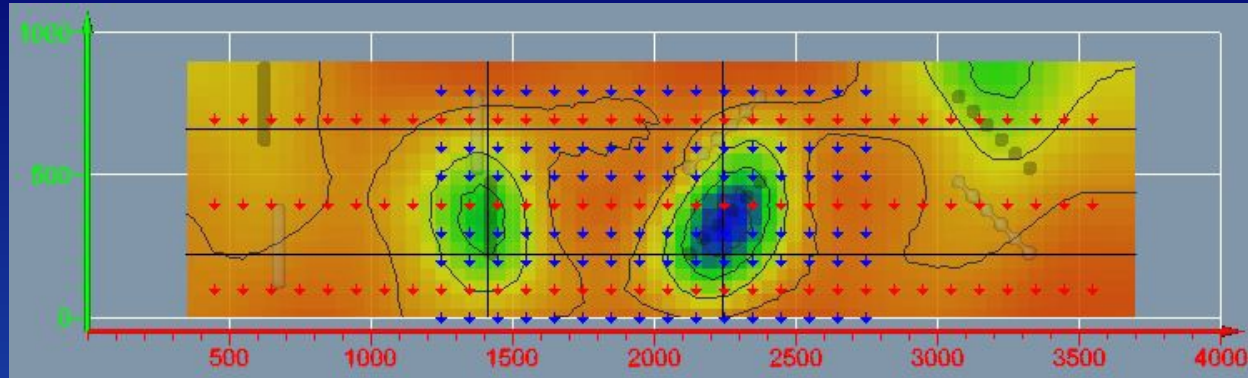
X-section - 2300



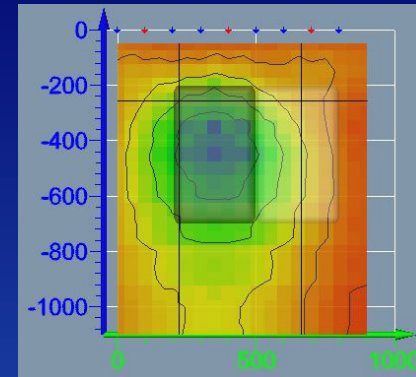
Long Section – 700



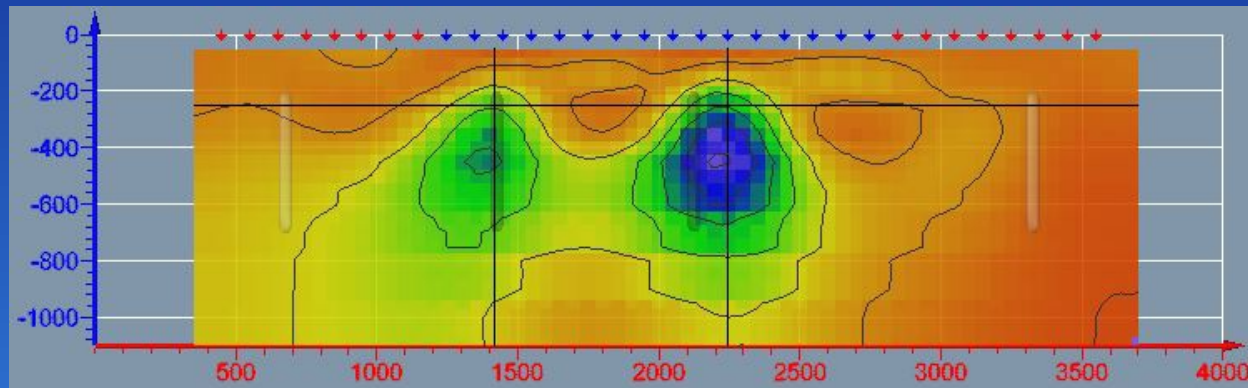
Type B – 5,000 Ωm and 10 Ωm in 1,000 Ωm 200m depth to top – Resistivity Inversion (MTxRx)



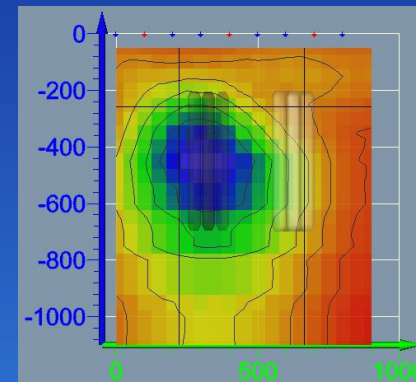
Plan View



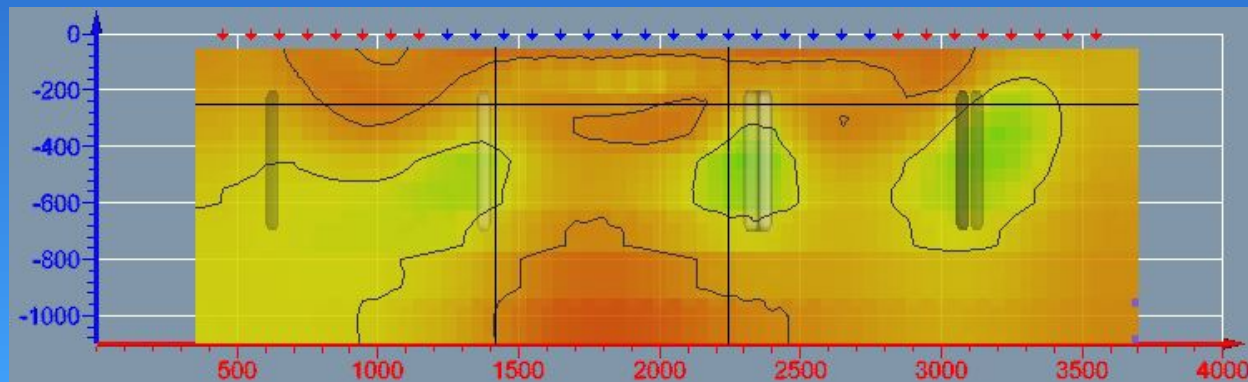
X-section - 1400



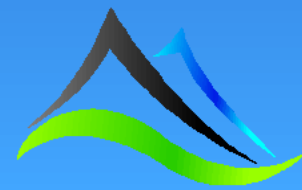
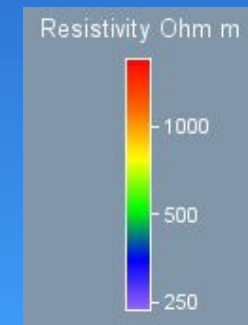
Long Section – 250



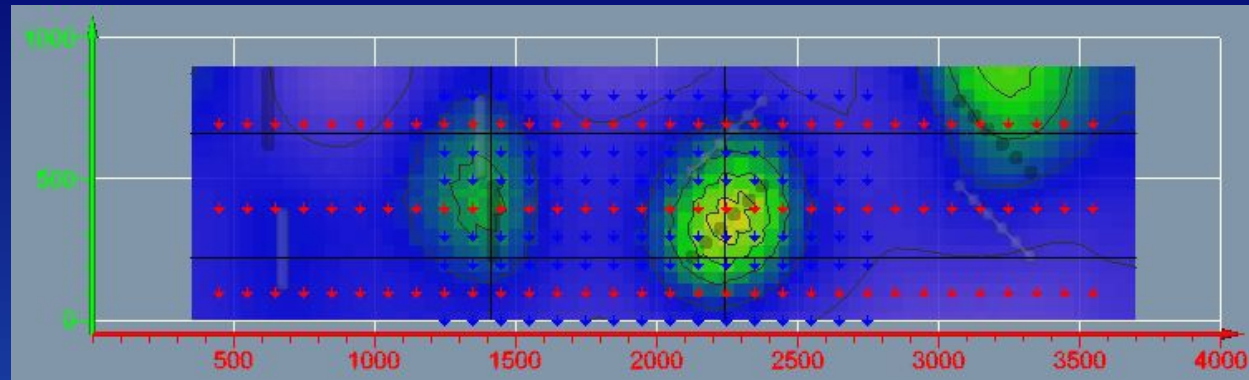
X-section – 2300



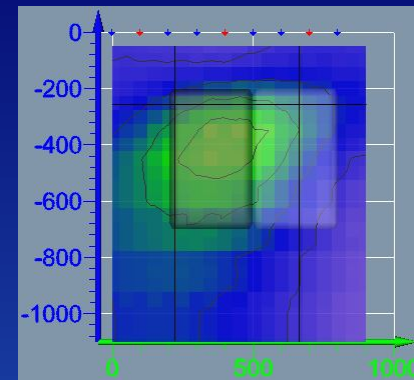
Long Section – 700



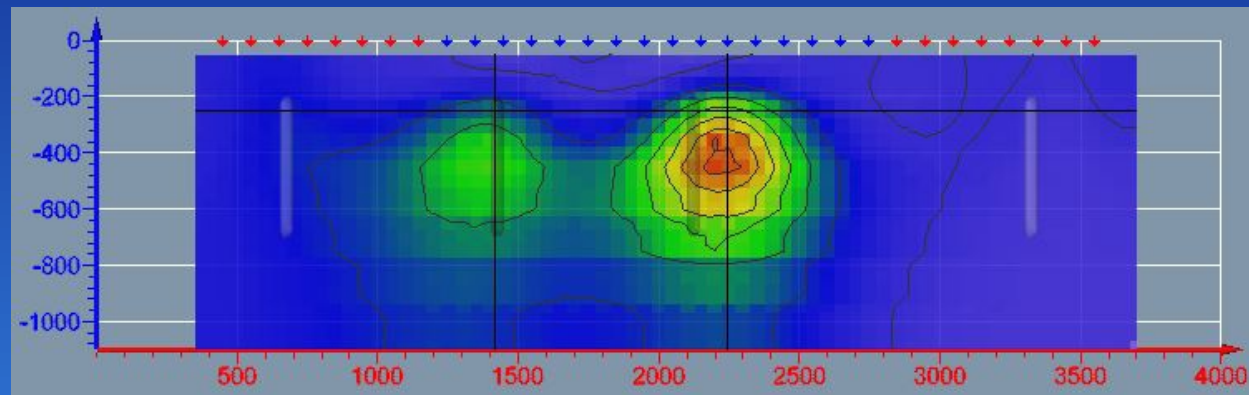
Type B – 5,000 Ωm and 10 Ωm in 1,000 Ωm 200m depth to top – Chargeability Inversion (MTxRx)



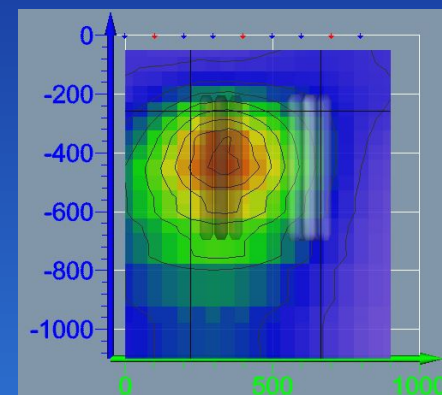
Plan View



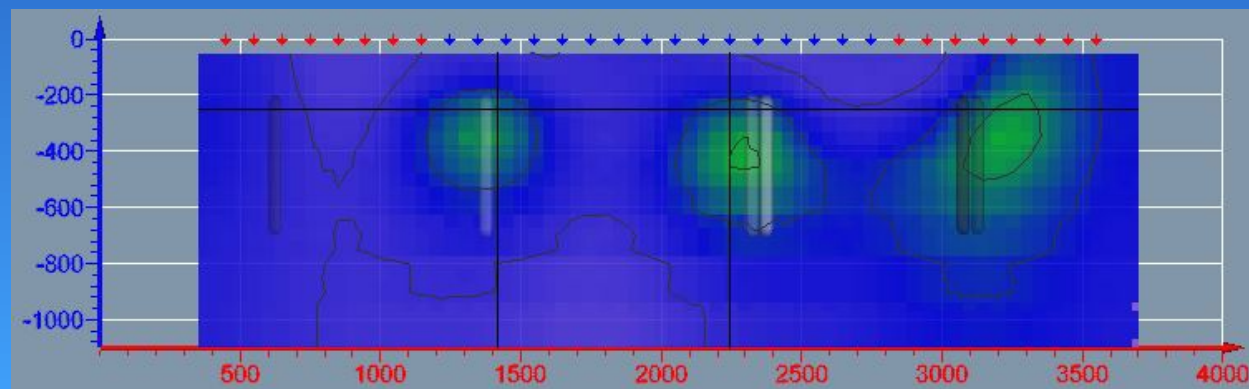
X-section - 1400



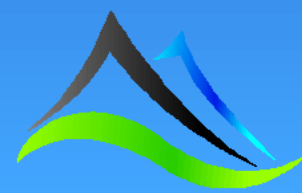
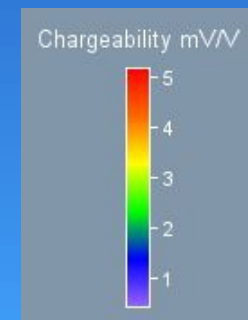
Long Section – 250



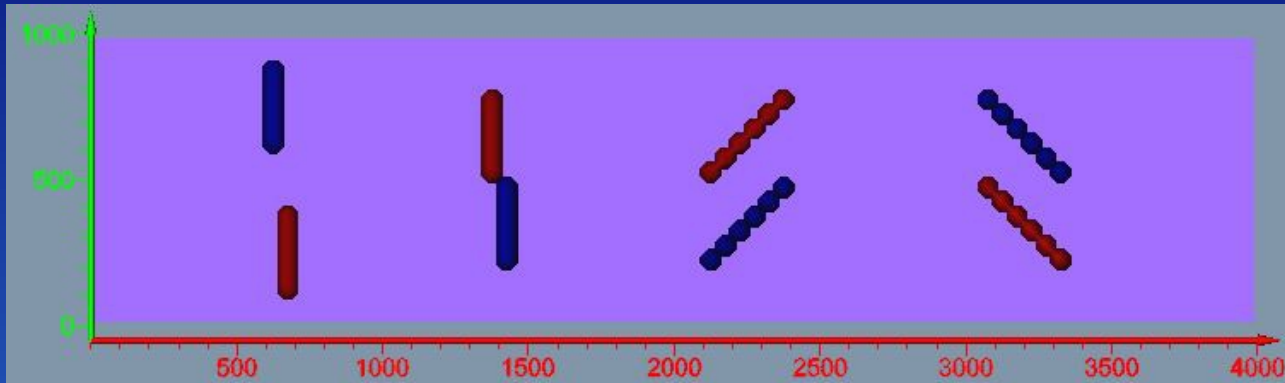
X-section - 2300



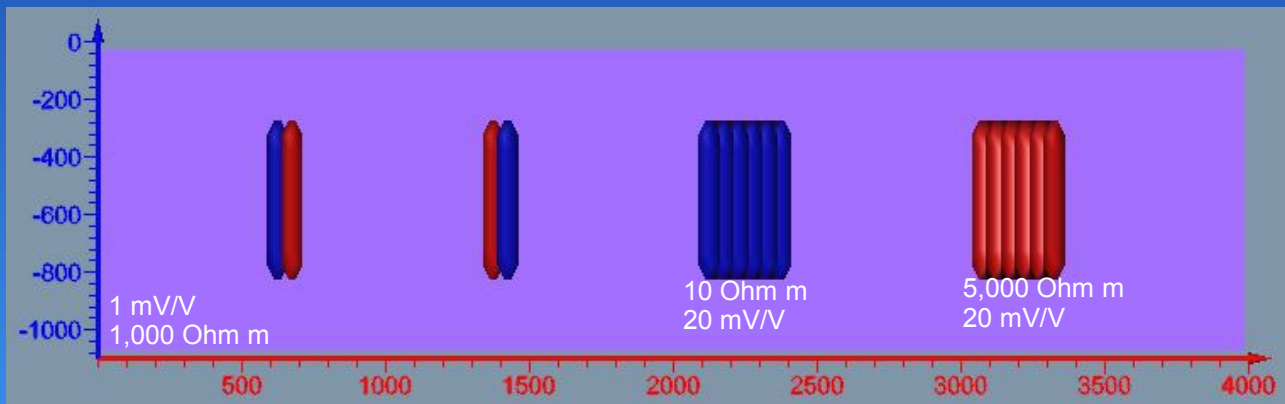
Long Section – 700



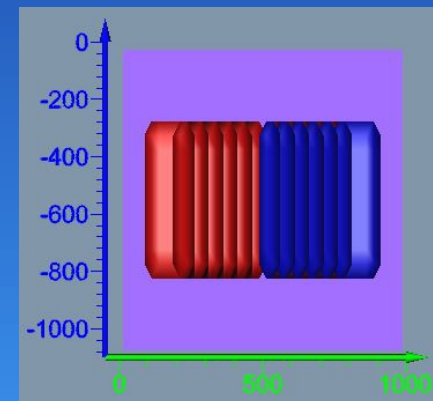
Model: Type B – 5,000 Ωm resistors and 10 Ωm conductors in a 1,000 Ωm half space. 300m depth to top.



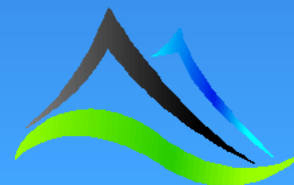
Top



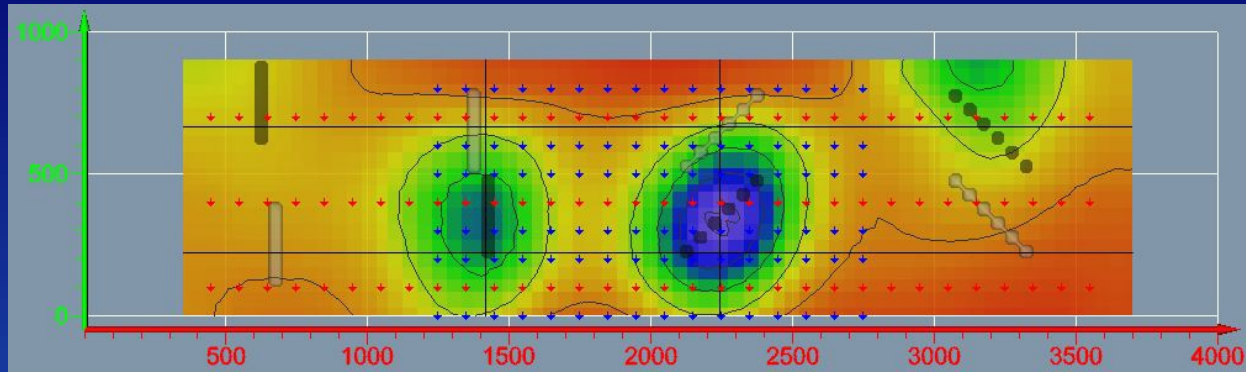
Front



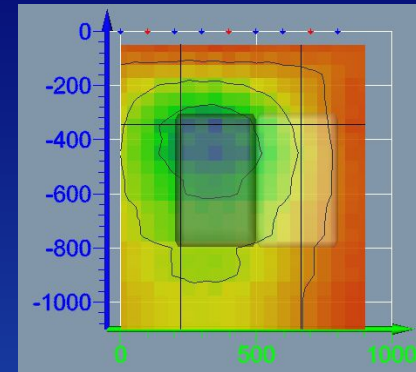
Right



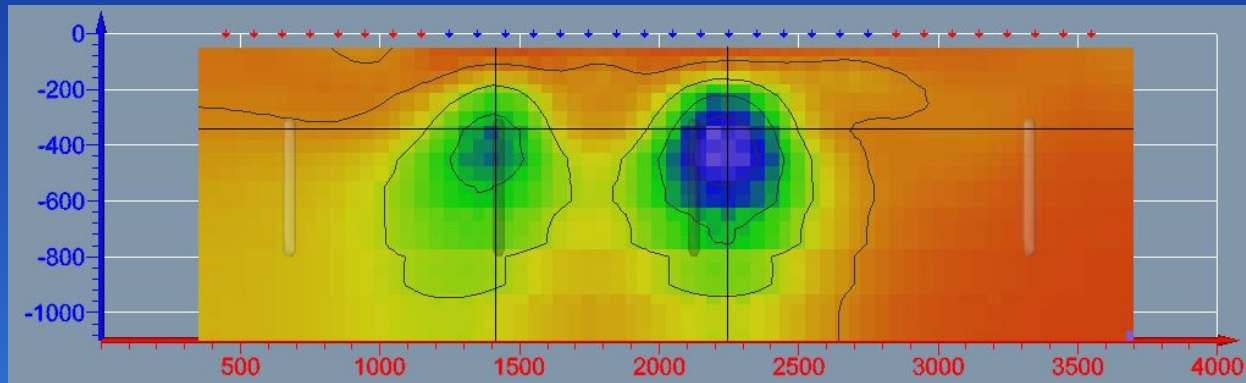
Type B – 5,000 Ωm and 10 Ωm in 1,000 Ωm 300m depth to top – Resistivity Inversion (DODD)



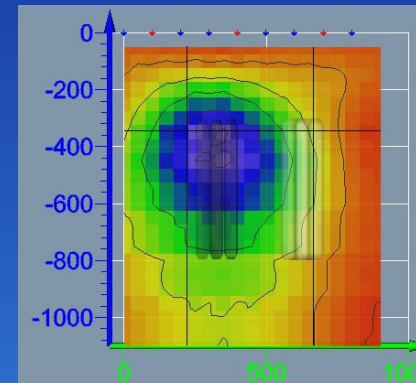
Plan View



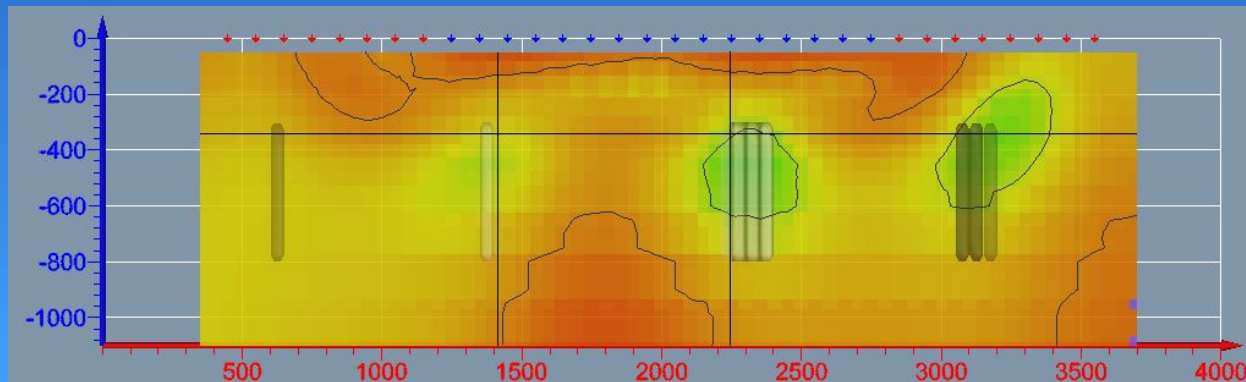
X-section - 1400



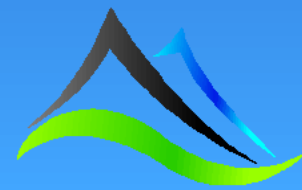
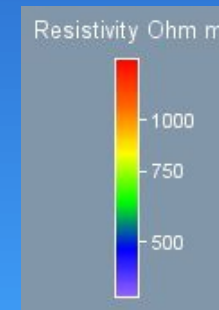
Long Section – 250



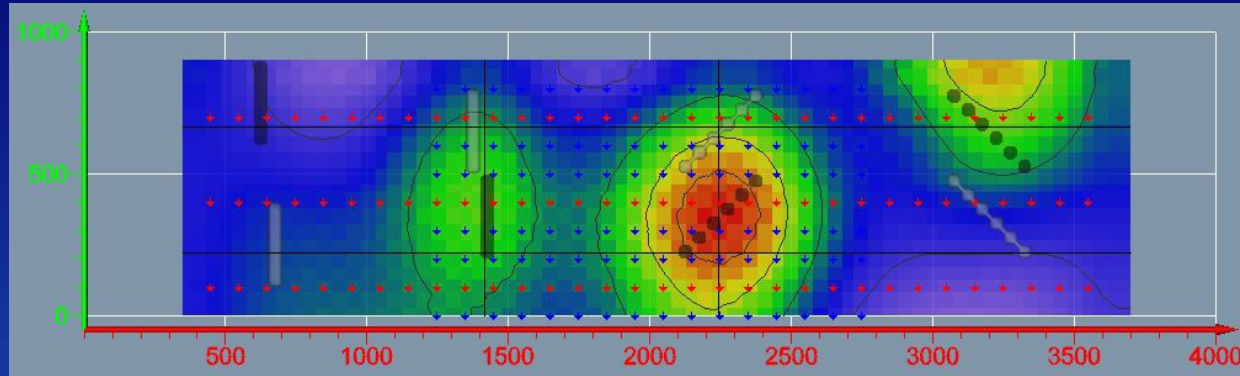
X-section – 2300



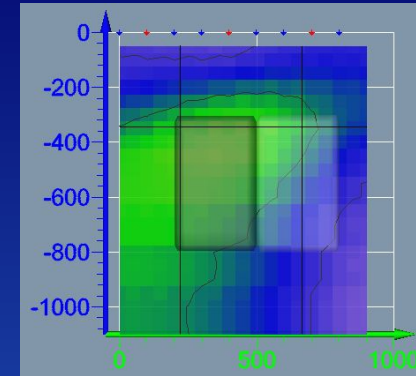
Long Section – 700



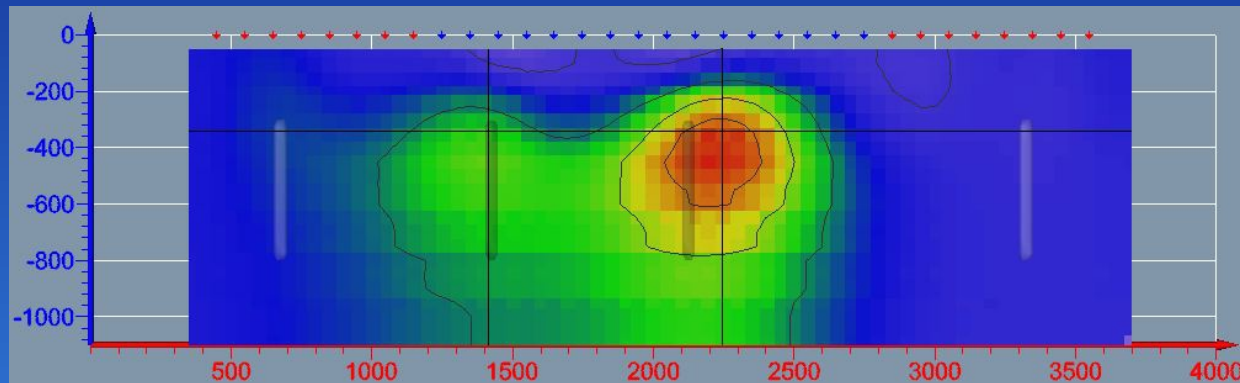
Type B – 5,000 Ωm and 10 Ωm in 1,000 Ωm 300m depth to top – Chargeability Inversion (DODD)



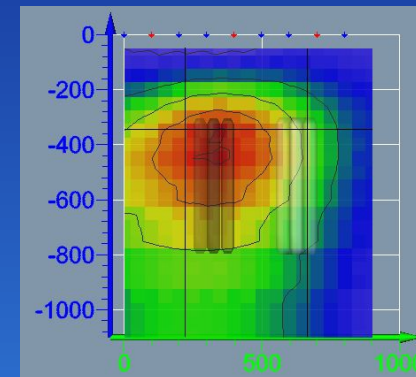
Plan View



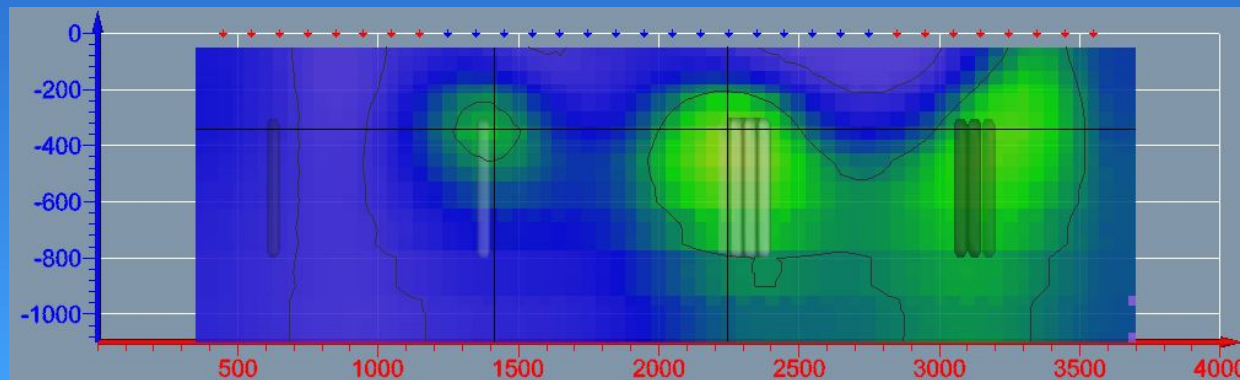
X-section - 1400



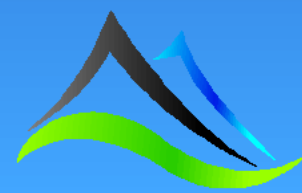
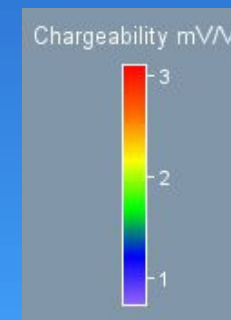
Long Section – 250



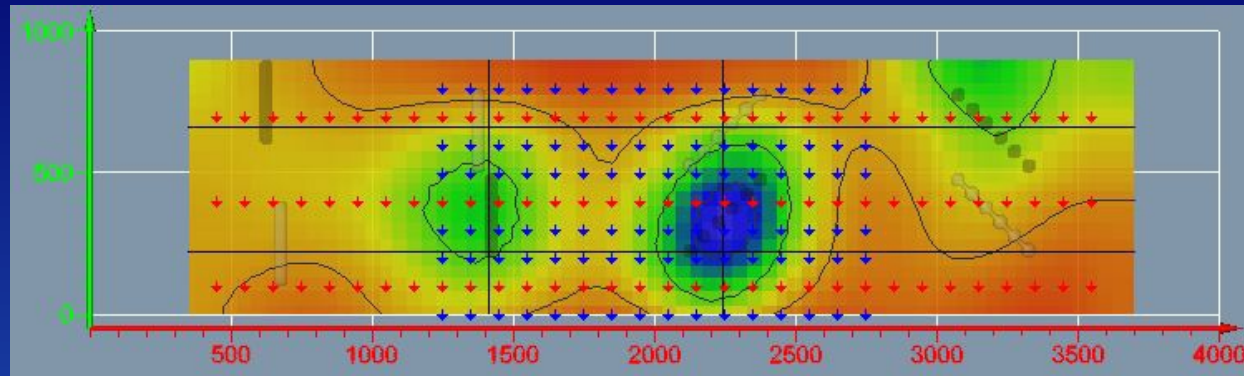
X-section - 2300



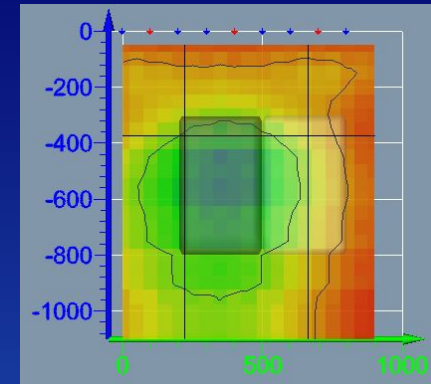
Long Section – 700



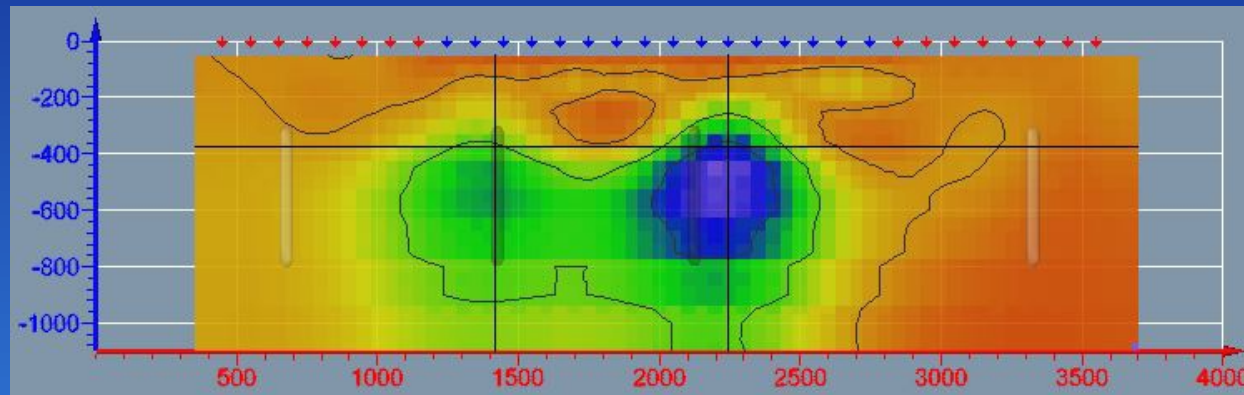
Type B – 5,000 Ωm and 10 Ωm in 1,000 Ωm 300m depth to top – Resistivity Inversion (MTxRx)



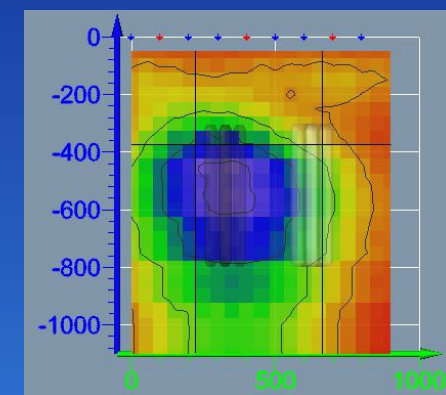
Plan View



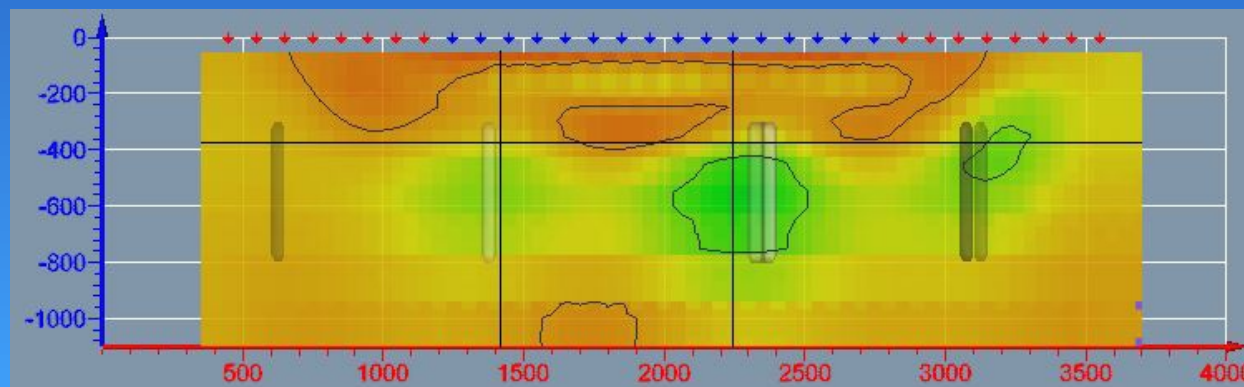
X-section - 1400



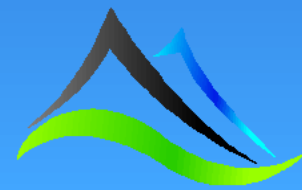
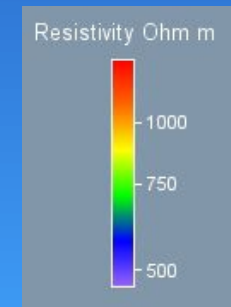
Long Section – 250



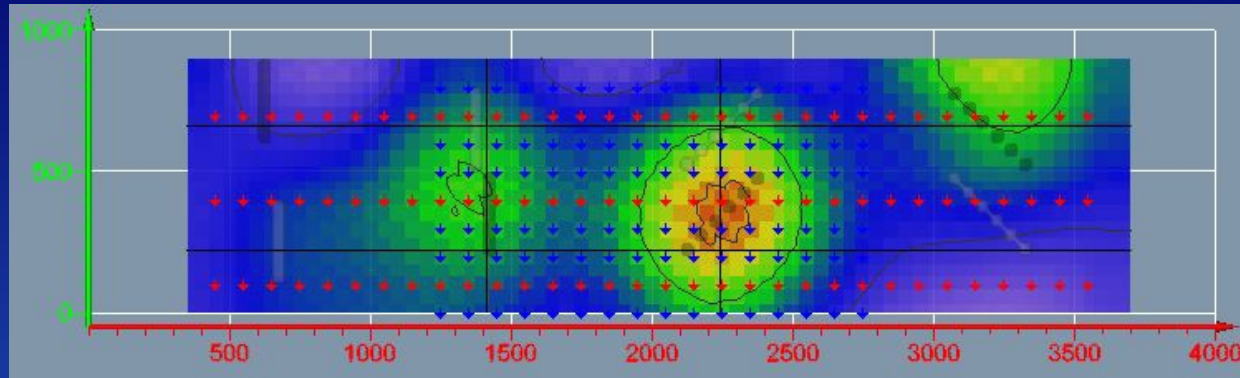
X-section – 2300



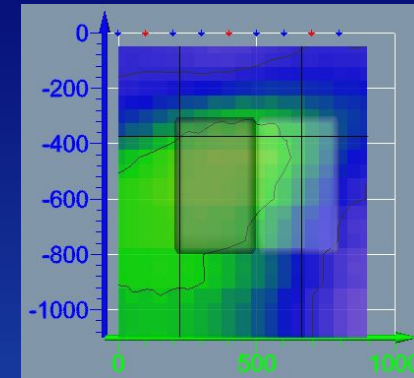
Long Section – 700



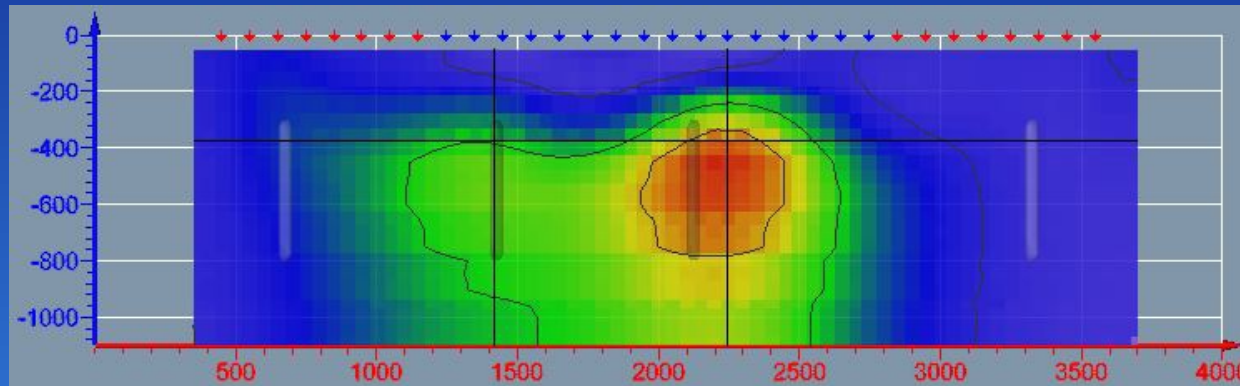
Type B – 5,000 Ωm and 10 Ωm in 1,000 Ωm 300m depth to top – Chargeability Inversion (MTxRx)



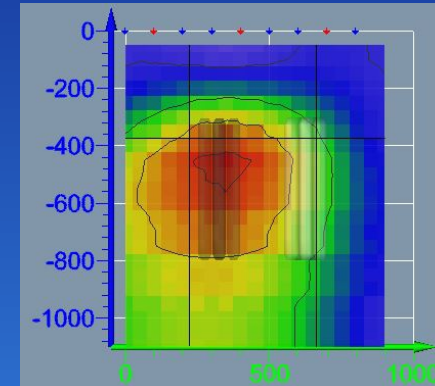
Plan View



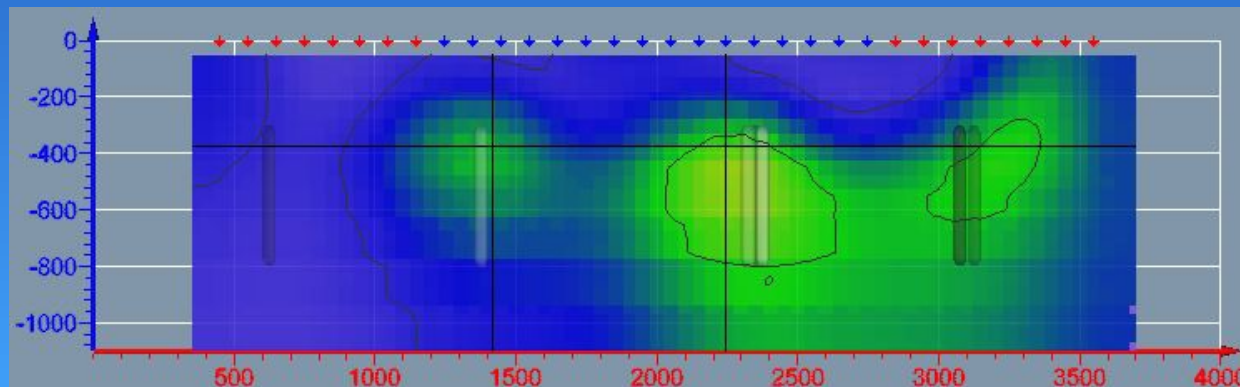
X-section - 1400



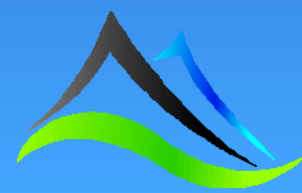
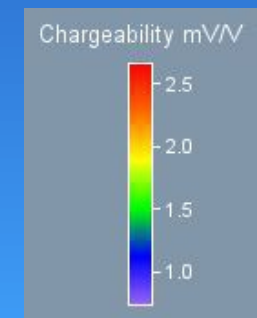
Long Section – 250



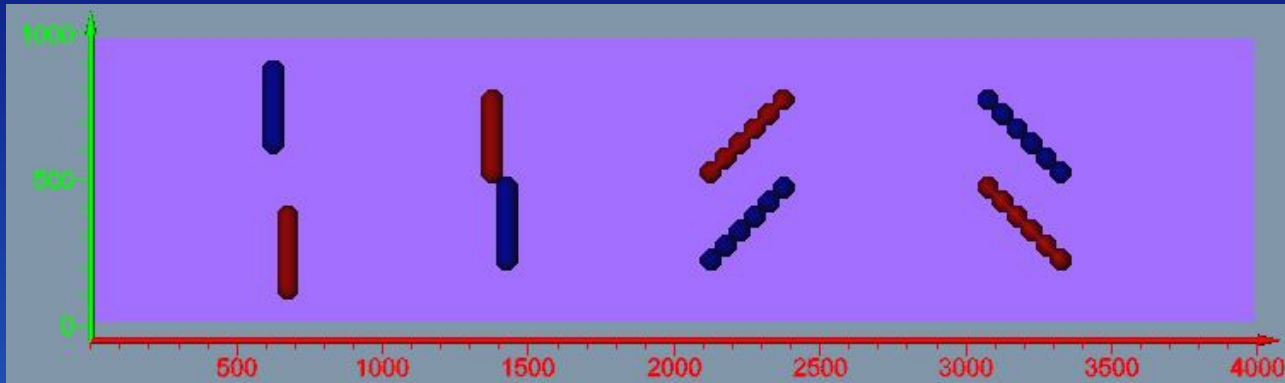
X-section - 2300



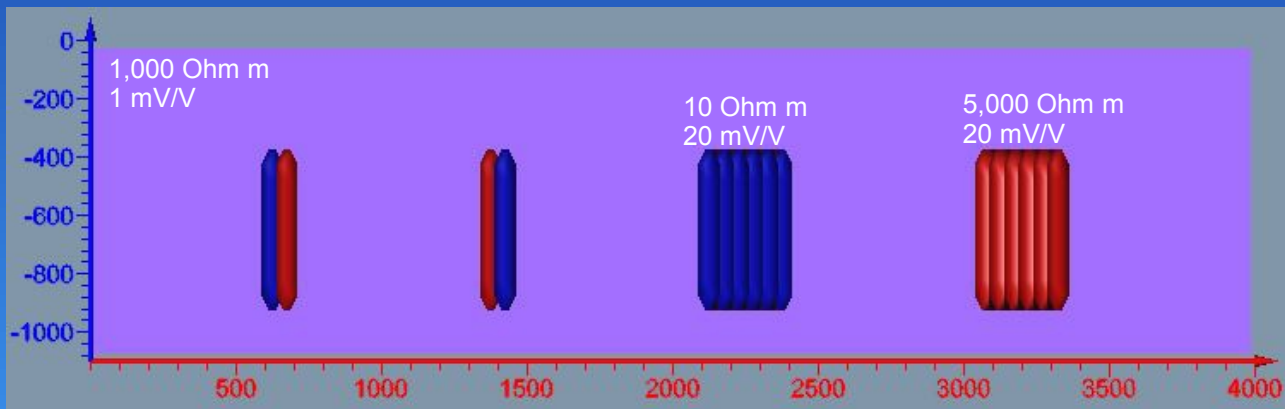
Long Section – 700



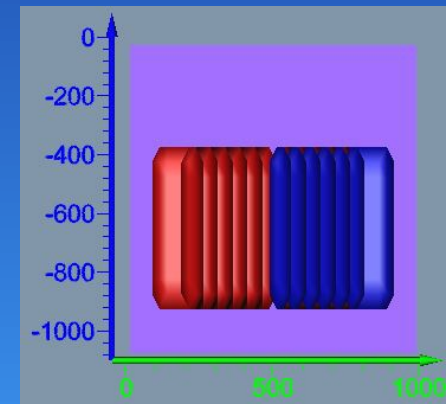
Model: Type B – 5,000 Ωm resistors and 10 Ωm conductors in a 1,000 Ωm half space. 400m depth to top.



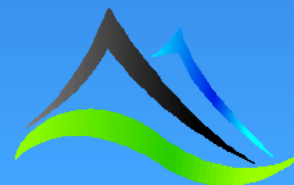
Top



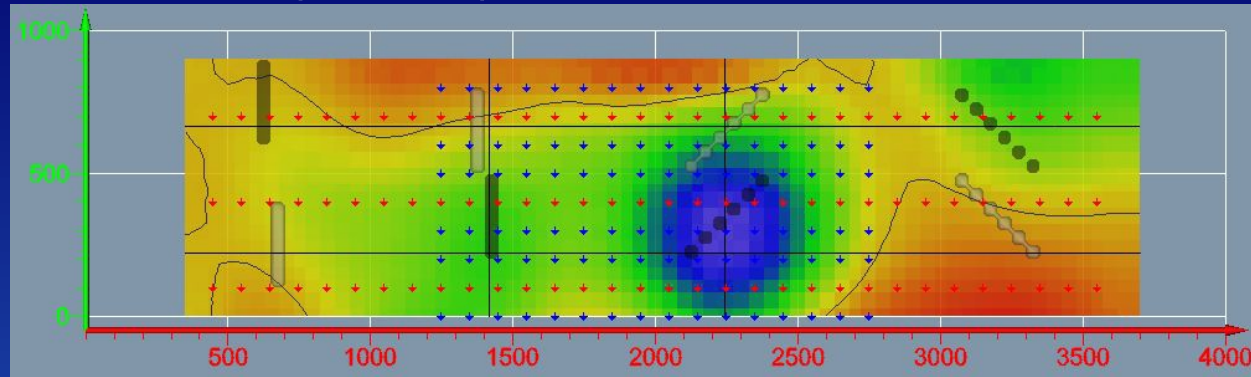
Front



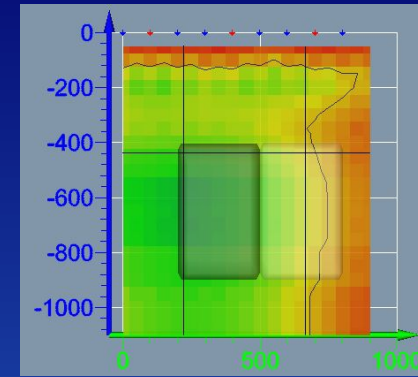
Right



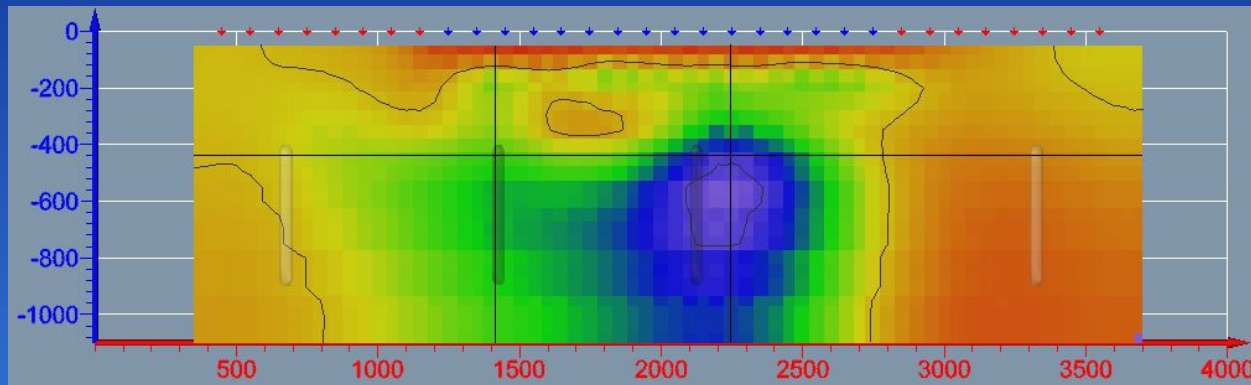
Type B – 5,000 Ωm and 10 Ωm in 1,000 Ωm 400m depth to top – Resistivity Inversion (DODD)



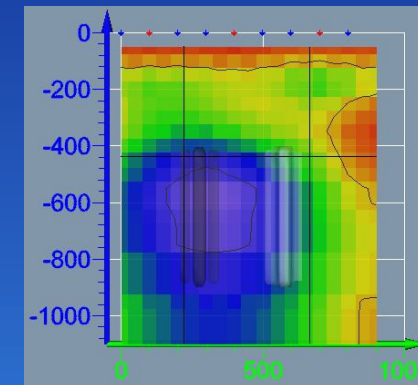
Plan View



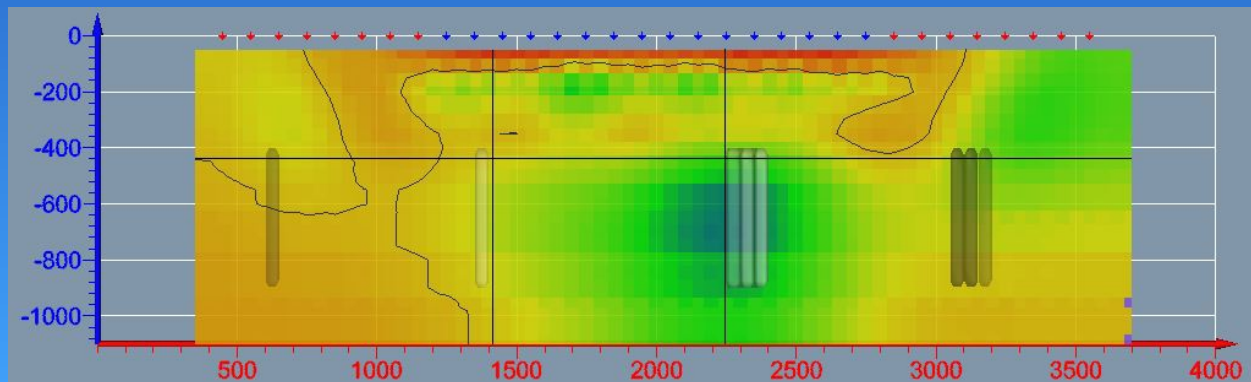
X-section - 1400



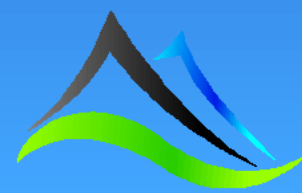
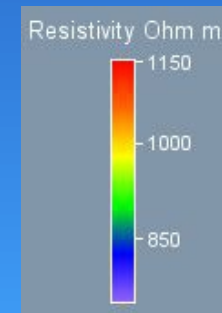
Long Section – 250



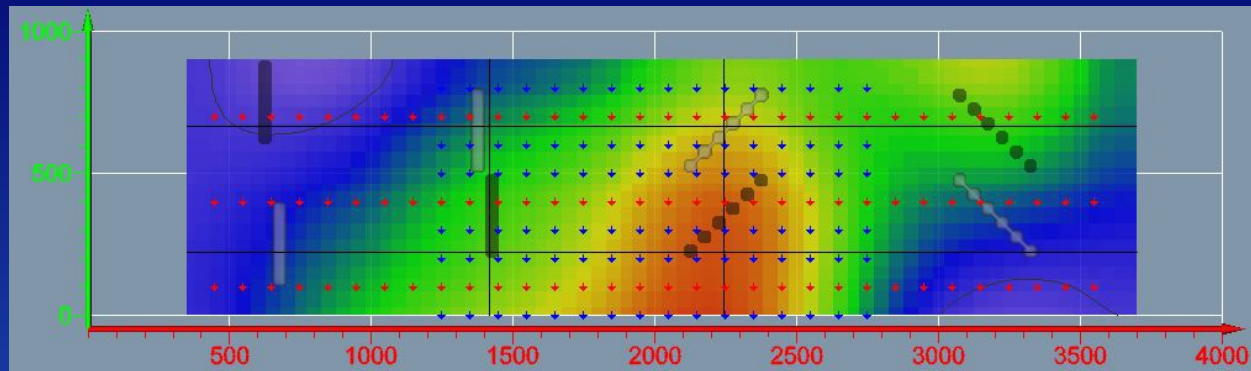
X-section – 2300



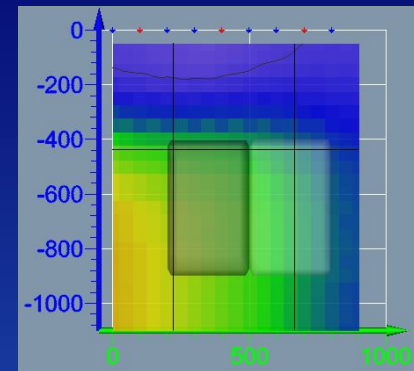
Long Section – 700



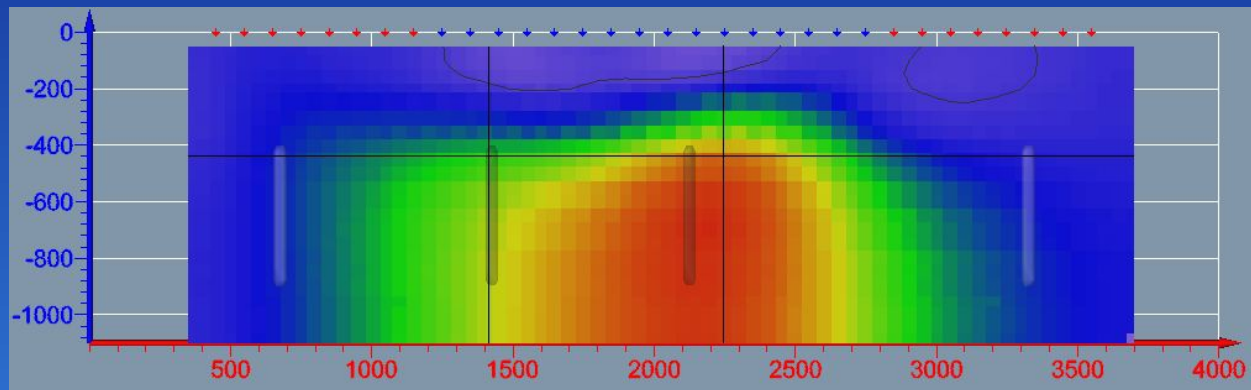
Type B – 5,000 Ωm and 10 Ωm in 1,000 Ωm 400m depth to top – Chargeability Inversion (DODD)



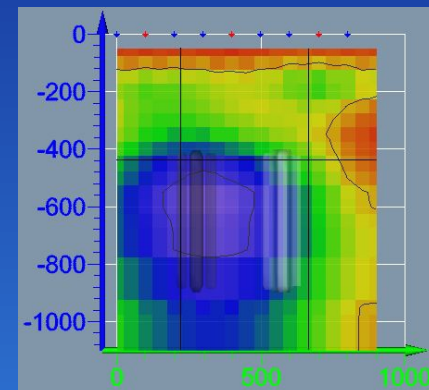
Plan View



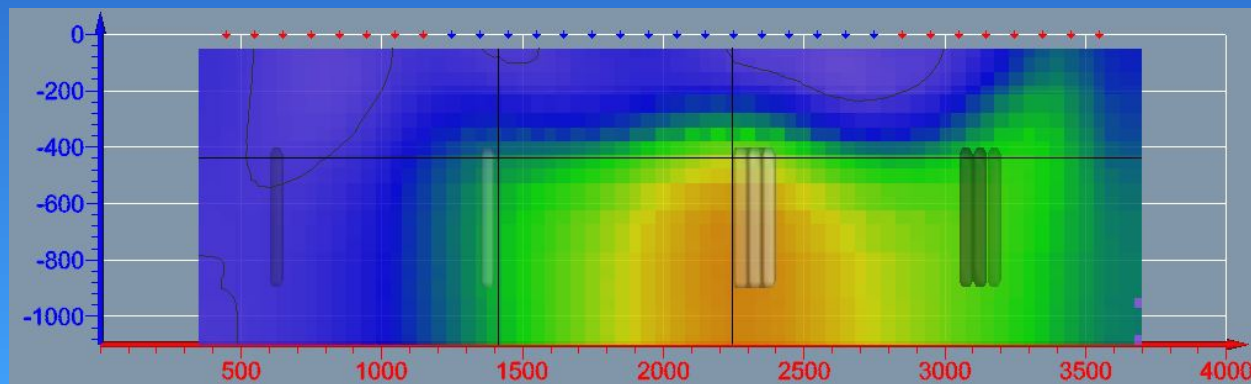
X-section - 1400



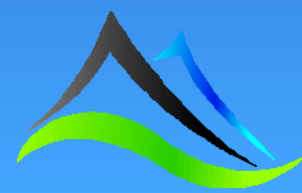
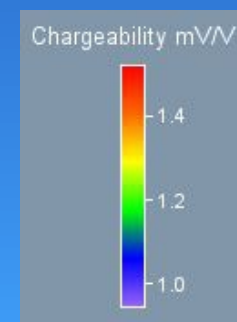
Long Section – 250



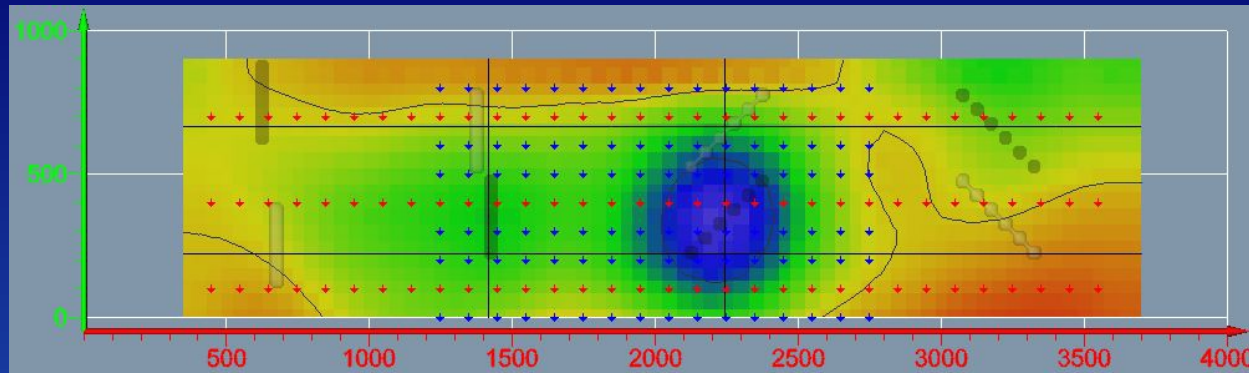
X-section - 2300



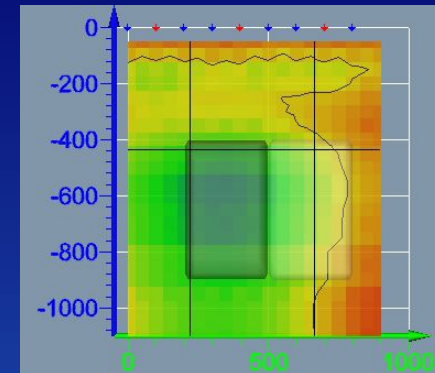
Long Section – 700



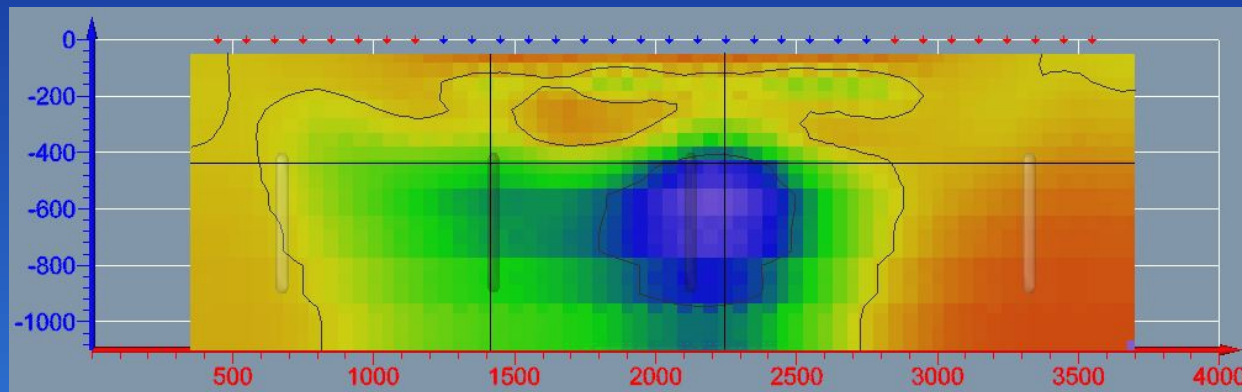
Type B – 5,000 Ωm and 10 Ωm in 1,000 Ωm 400m depth to top – Resistivity Inversion (MRx)



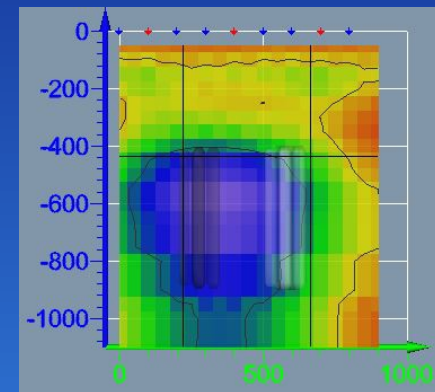
Plan View



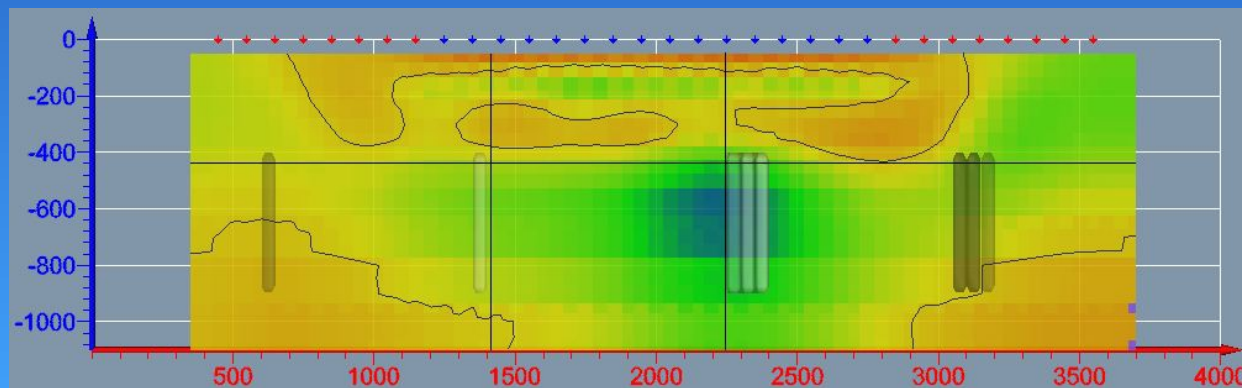
X-section - 1400



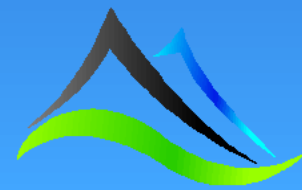
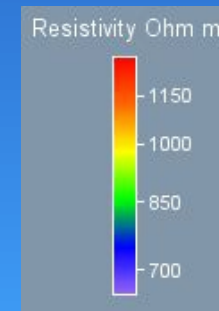
Long Section – 250



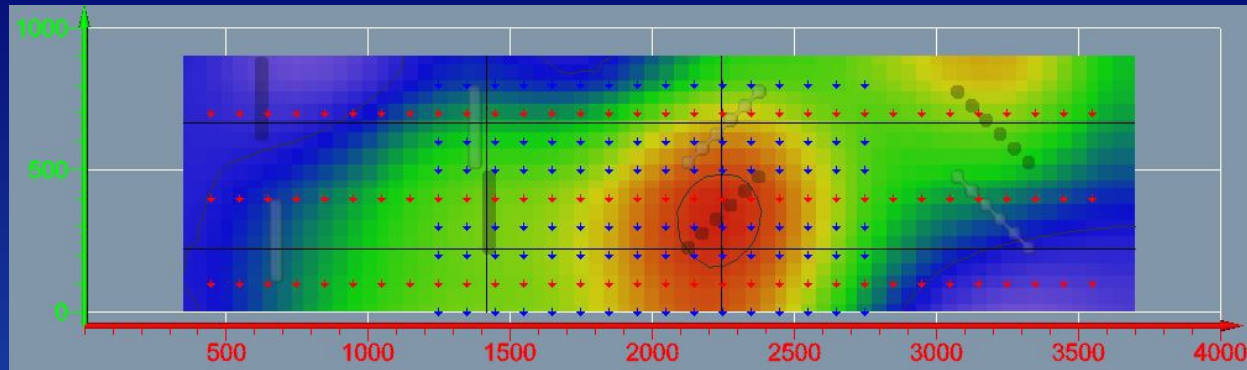
X-section – 2300



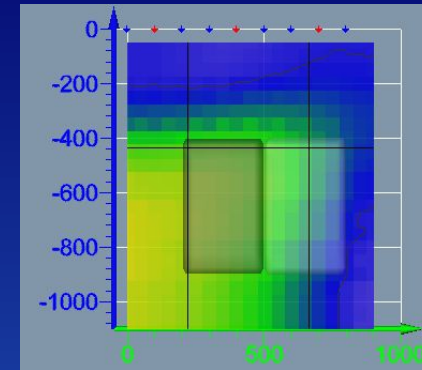
Long Section – 700



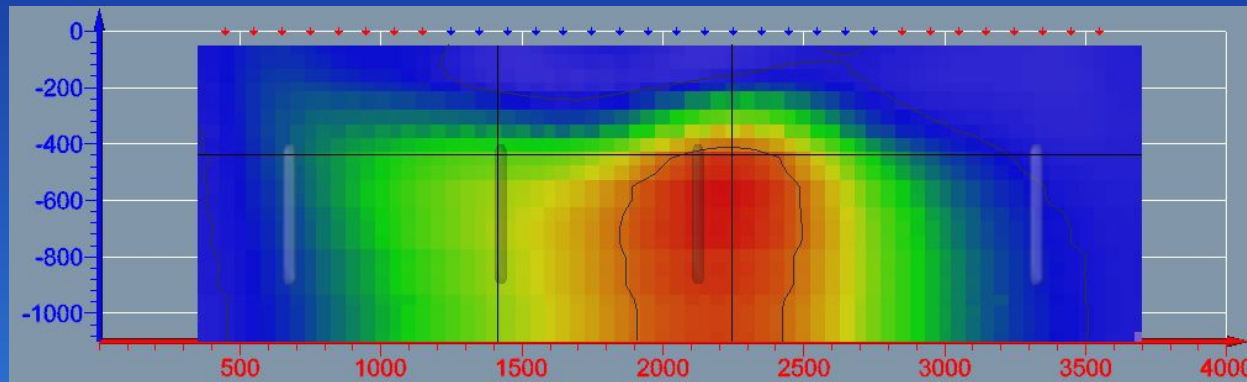
Type B – 5,000 Ωm and 10 Ωm in 1,000 Ωm 400m depth to top – Chargeability Inversion (MRx)



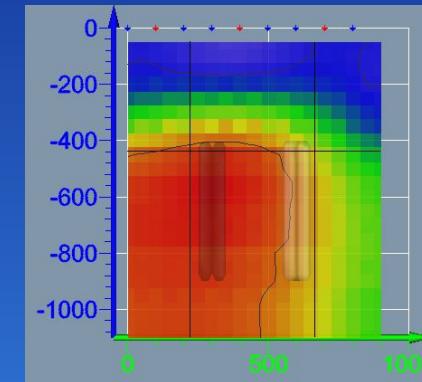
Plan View



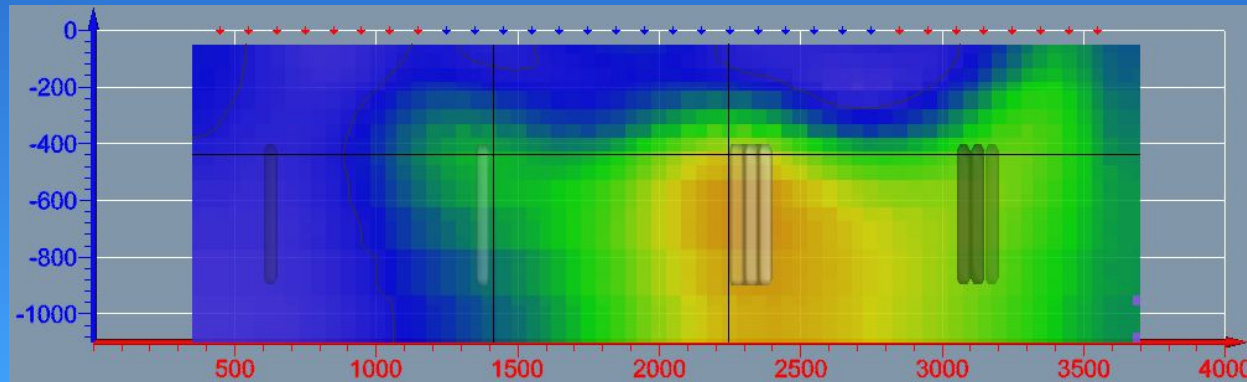
X-section - 1400



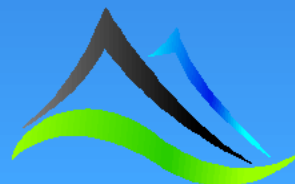
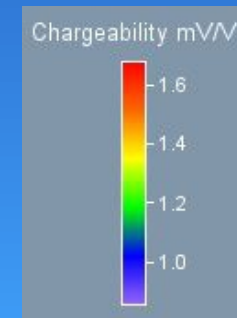
Long Section – 250



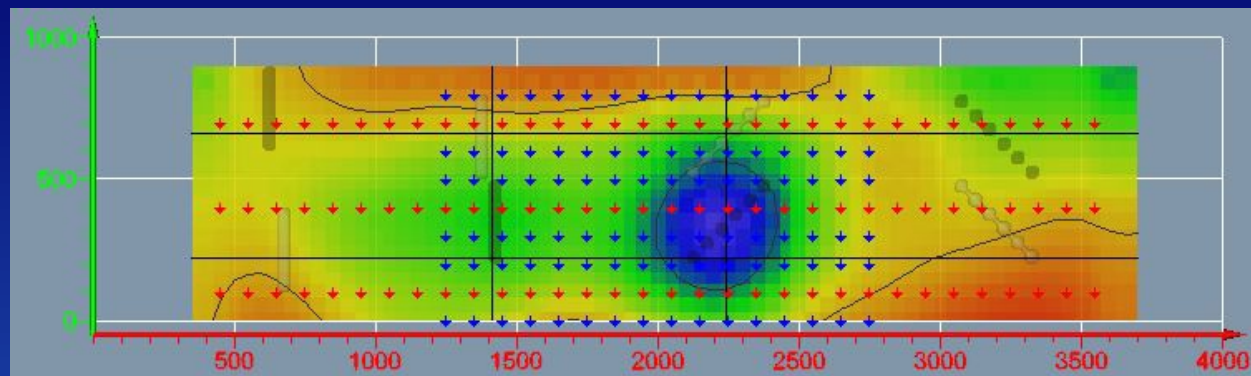
X-section - 2300



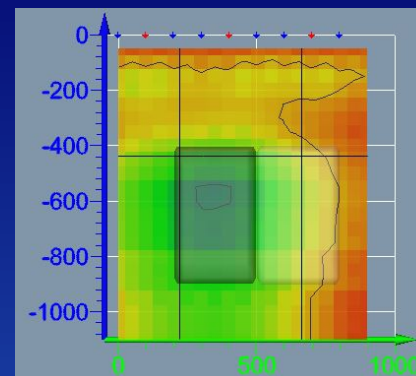
Long Section – 700



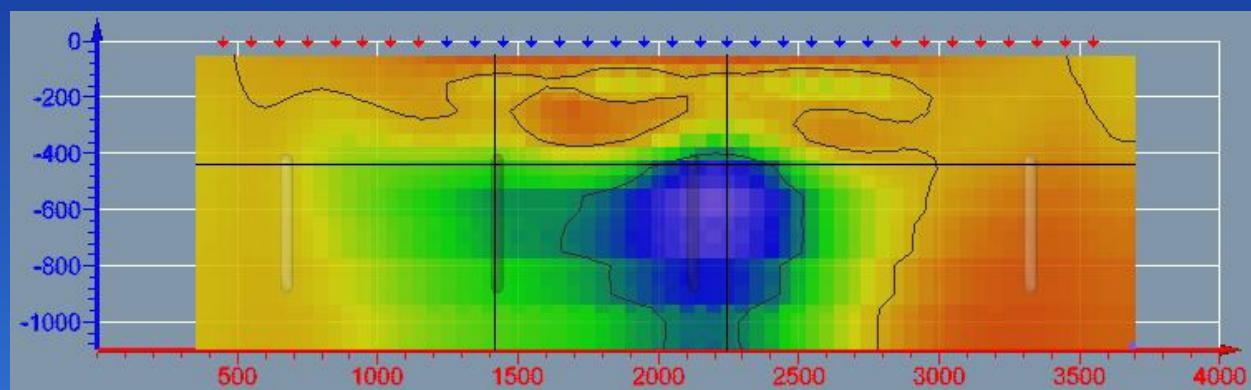
Type B – 5,000 Ωm and 10 Ωm in 1,000 Ωm 400m depth to top – Resistivity Inversion (MTxRx)



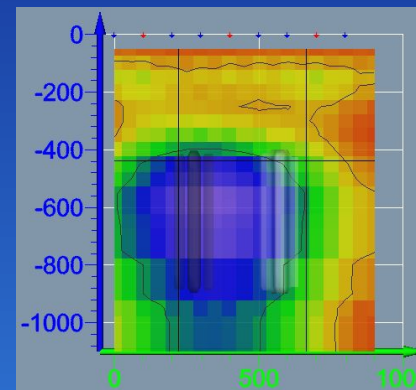
Plan View



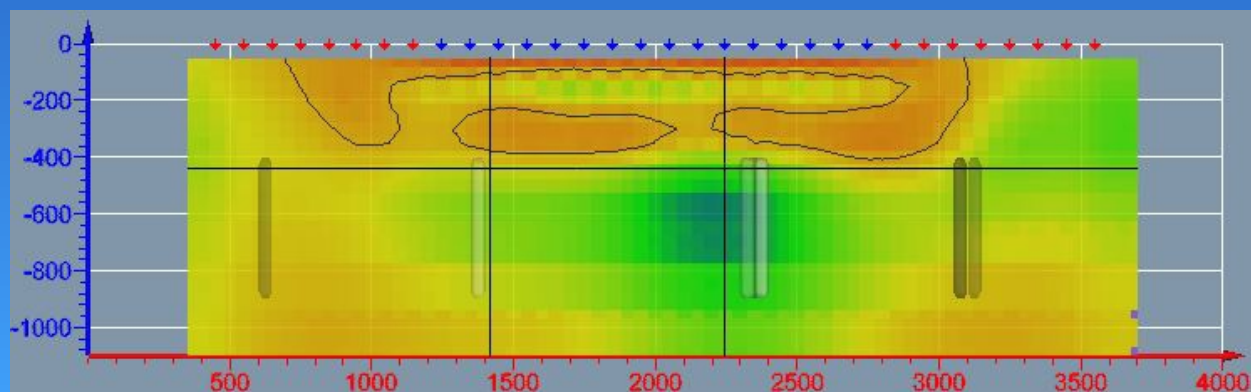
X-section - 1400



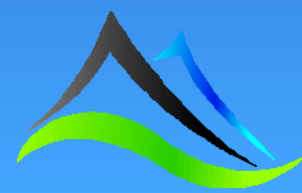
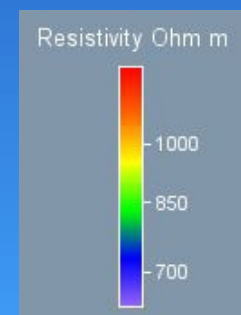
Long Section – 250



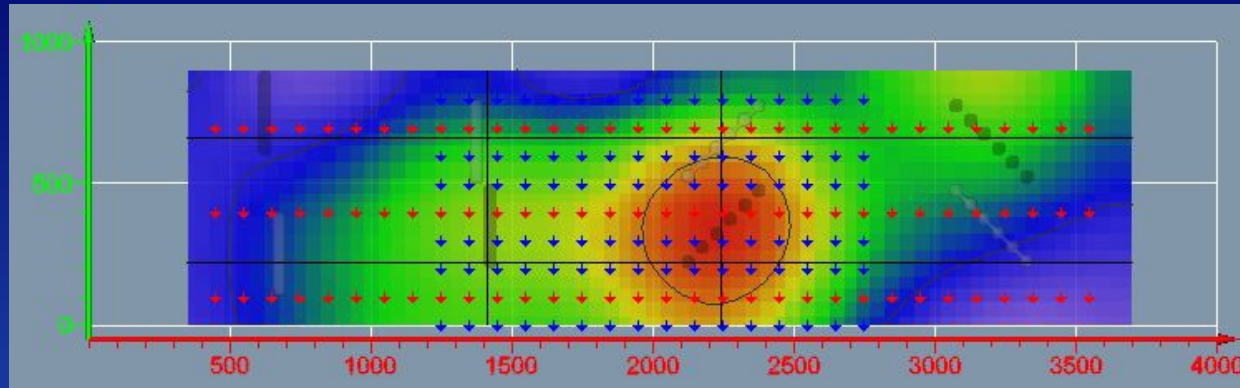
X-section – 2300



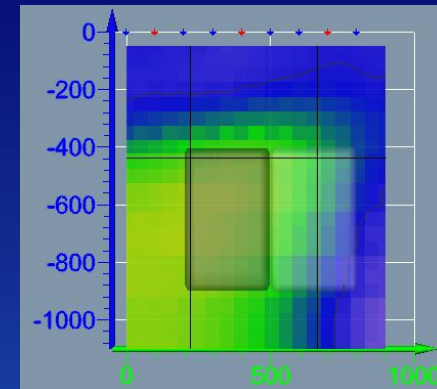
Long Section – 700



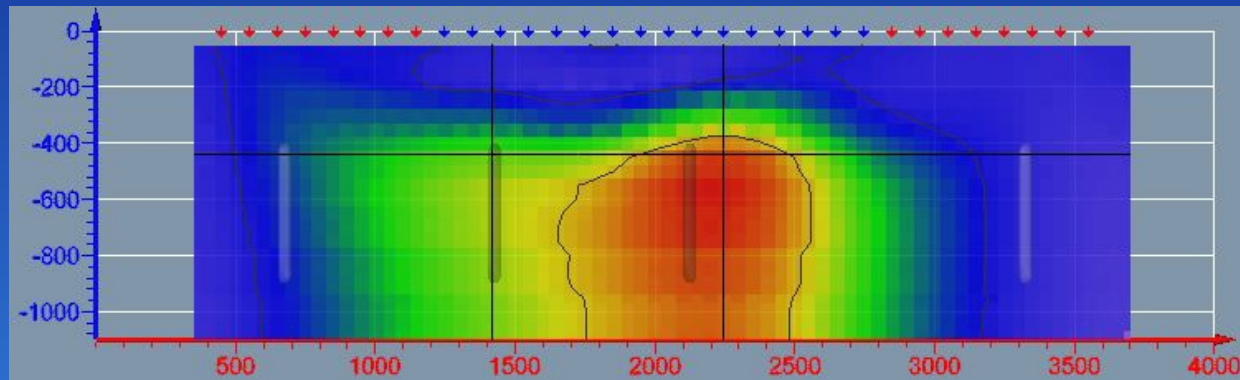
Type B – 5,000 Ωm and 10 Ωm in 1,000 Ωm 400m depth to top – Chargeability Inversion (MTxRx)



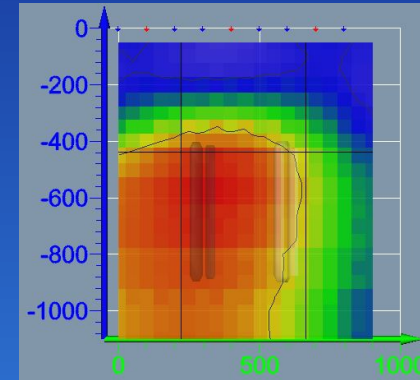
Plan View



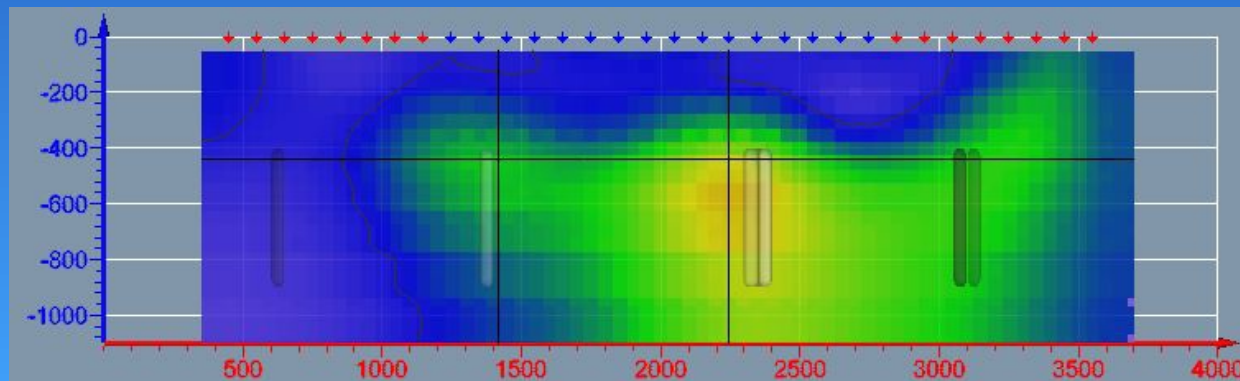
X-section - 1400



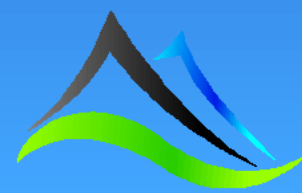
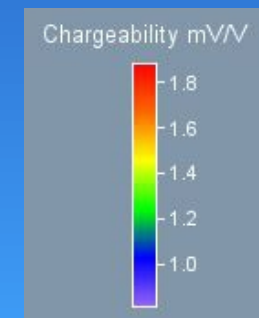
Long Section – 250



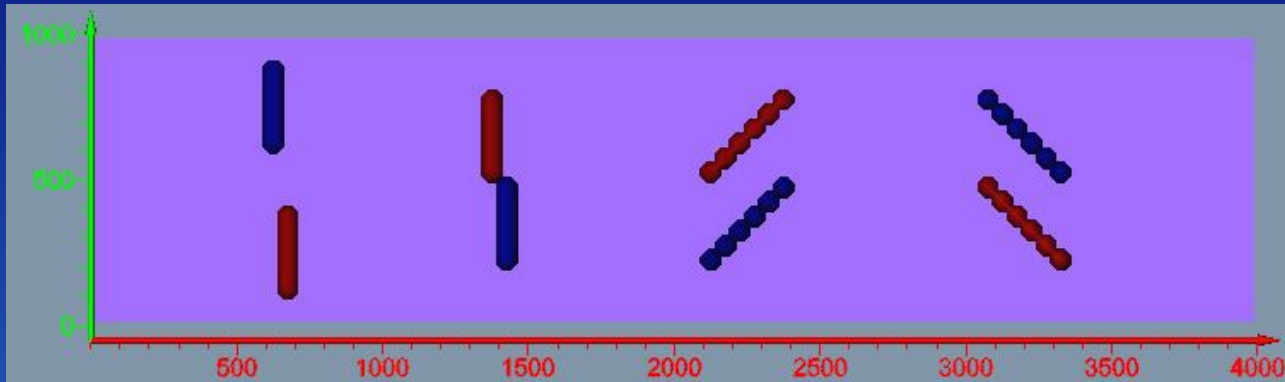
X-section - 2300



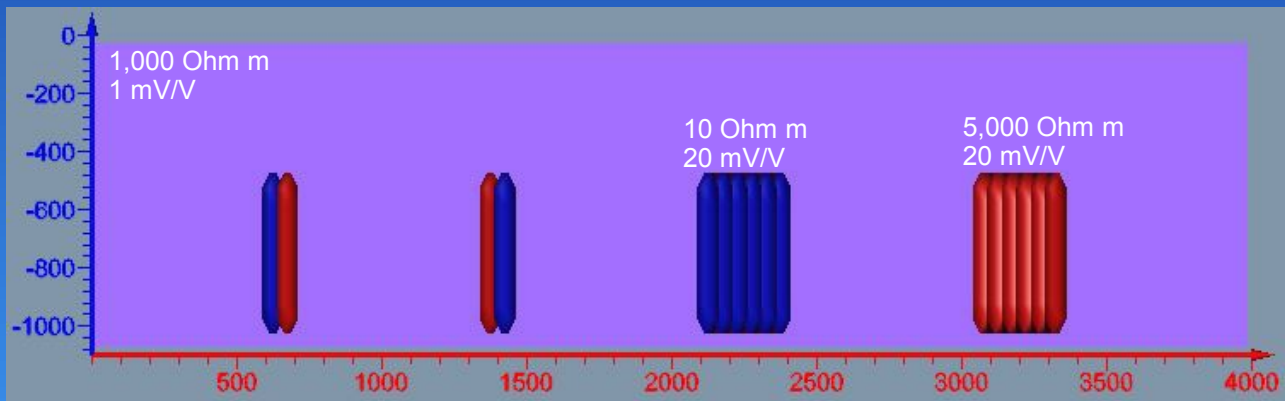
Long Section – 700



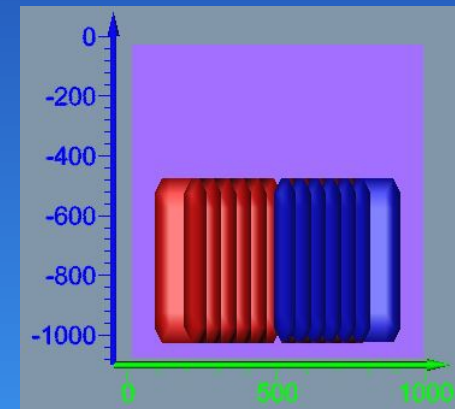
Model: Type B – 5,000 Ωm resistors and 10 Ωm conductors in a 1,000 Ωm half space. 500m depth to top.



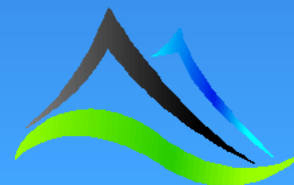
Top



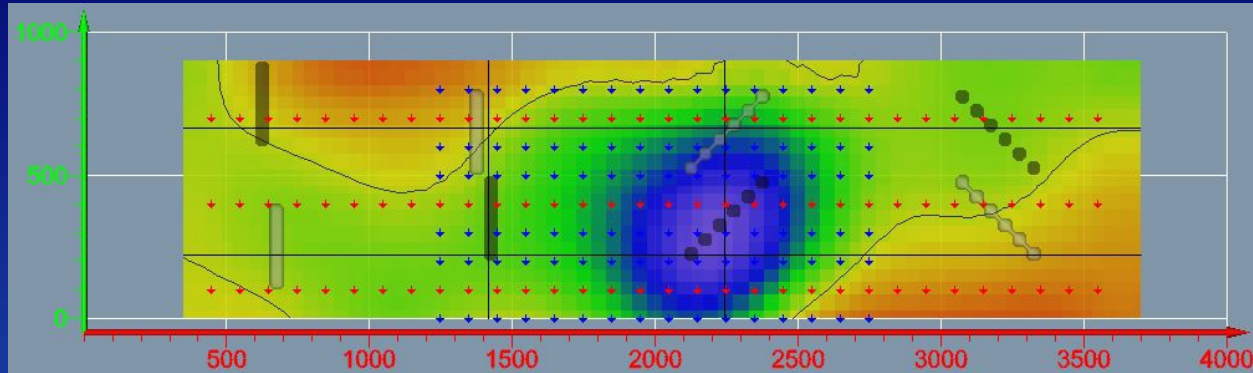
Front



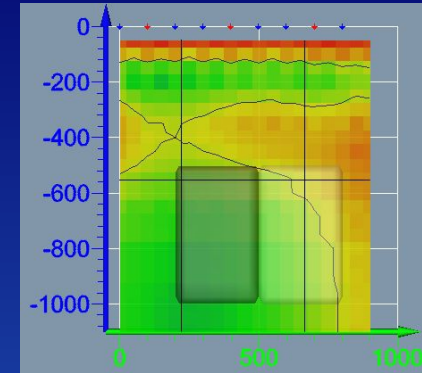
Right



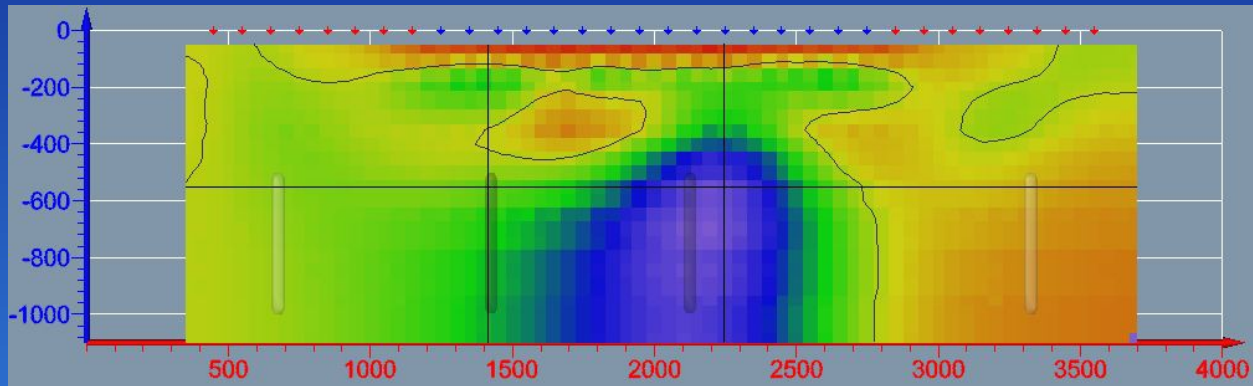
Type B – 5,000 Ωm and 10 Ωm in 1,000 Ωm 500m depth to top – Resistivity Inversion (DODD)



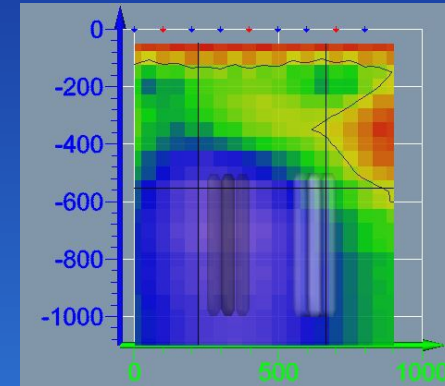
Plan View



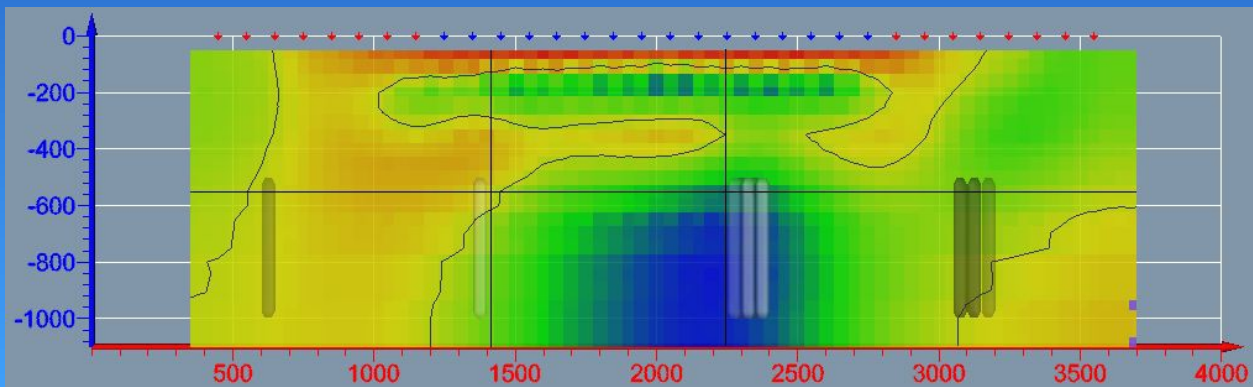
X-section - 1400



Long Section – 250

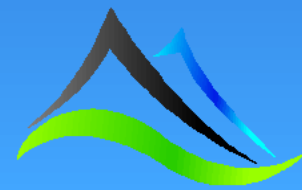


X-section – 2300

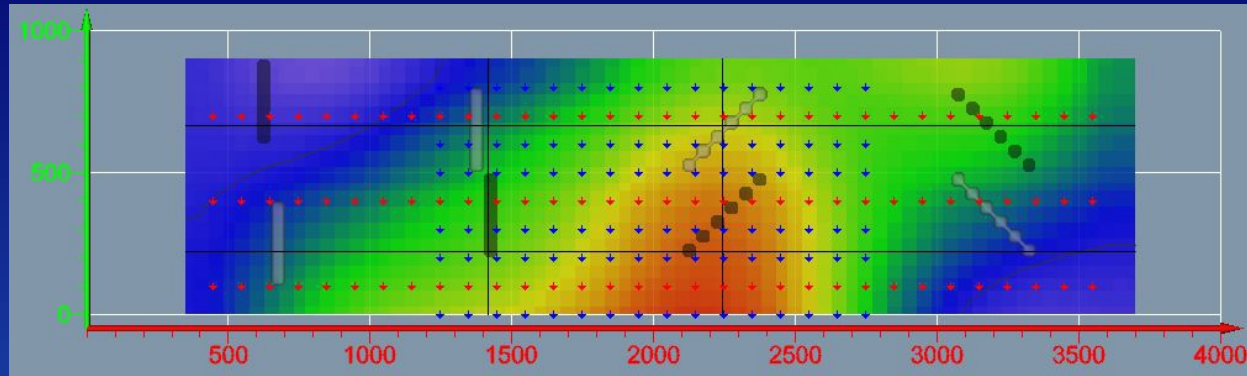


Long Section – 700

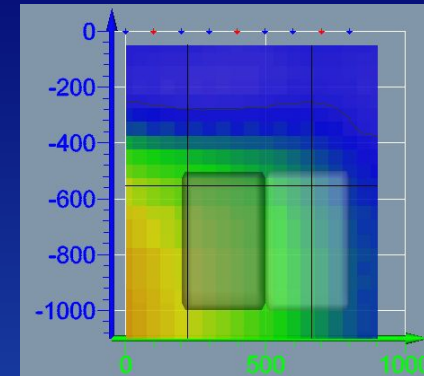
Resistivity Ωm m



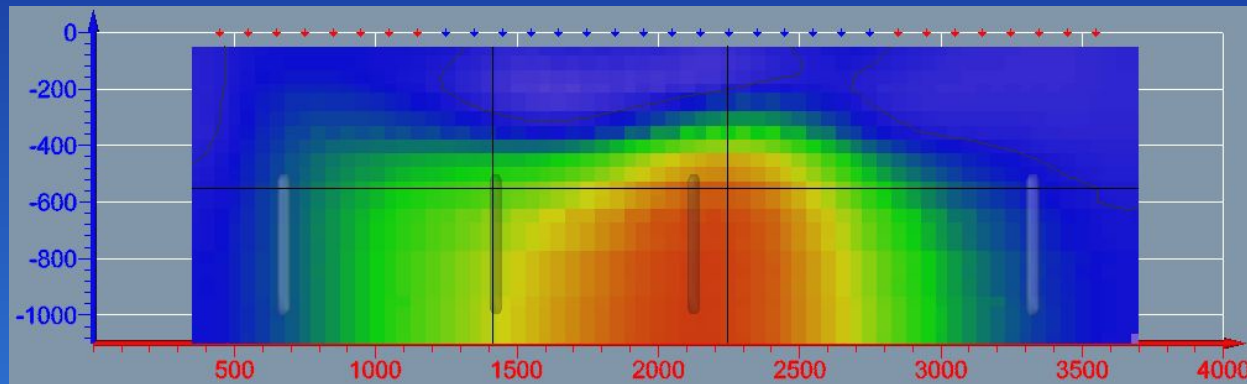
Type B – 5,000 Ωm and 10 Ωm in 1,000 Ωm 500m depth to top – Chargeability Inversion (DODD)



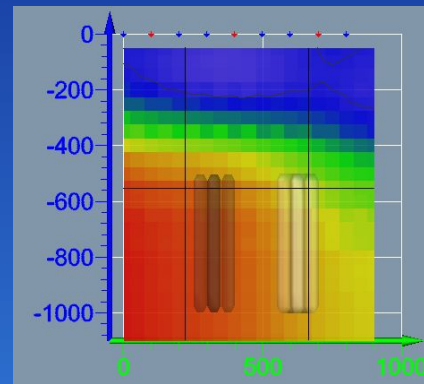
Plan View



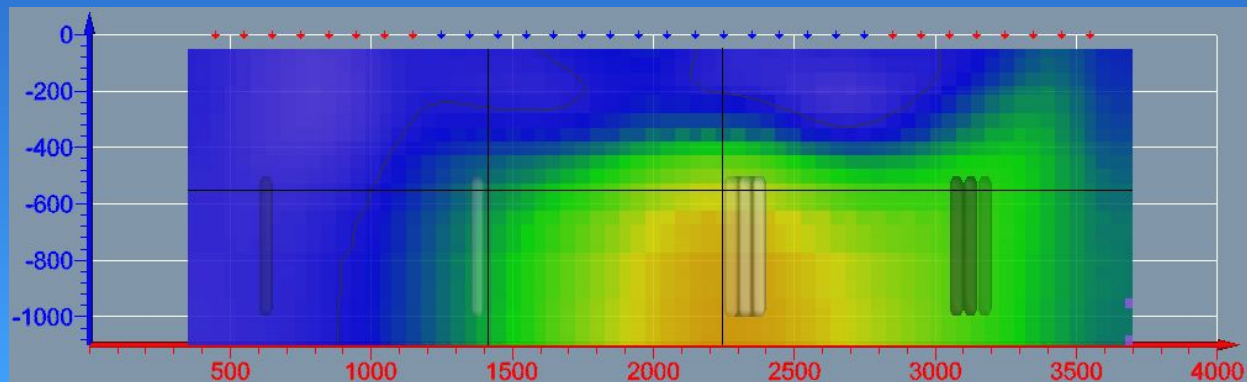
X-section - 1400



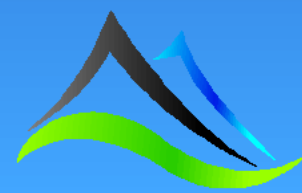
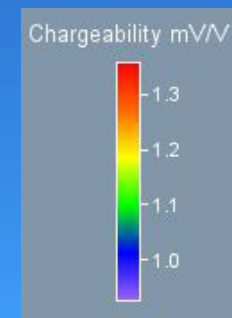
Long Section – 250



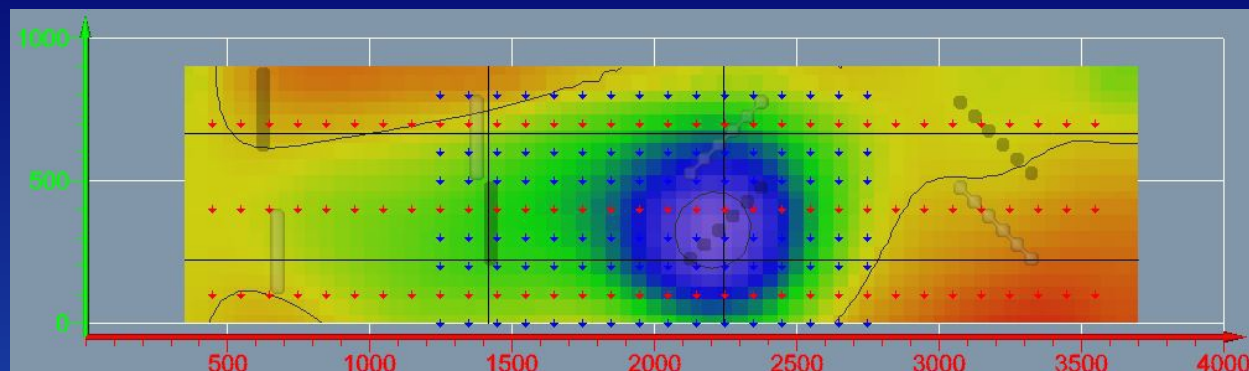
X-section - 2300



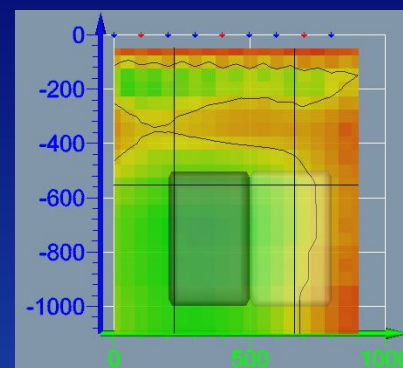
Long Section – 700



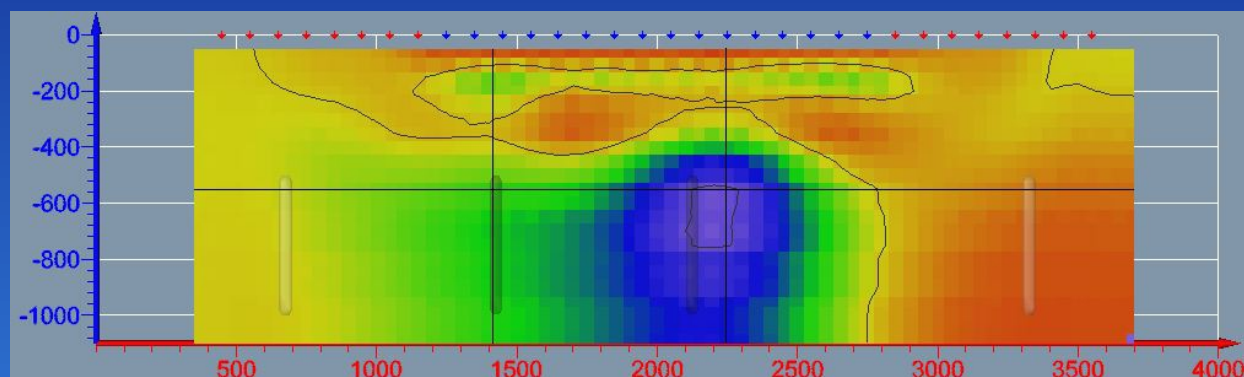
Type B – 5,000 Ωm and 10 Ωm in 1,000 Ωm 500m depth to top – Resistivity Inversion (MRx)



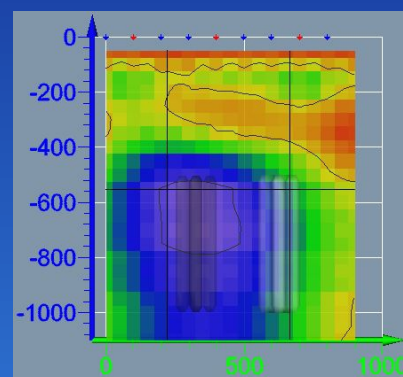
Plan View



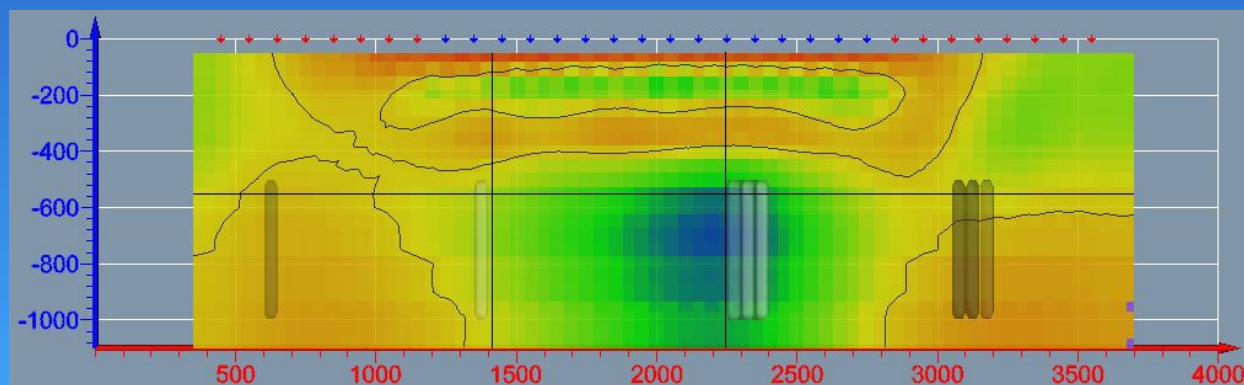
X-section - 1400



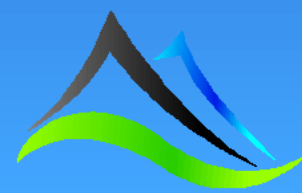
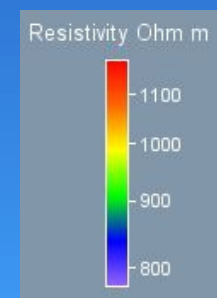
Long Section – 250



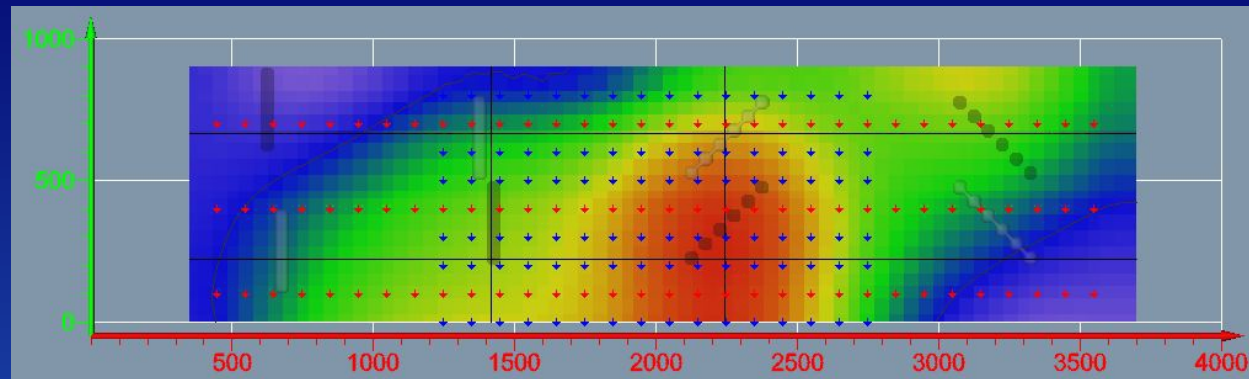
X-section – 2300



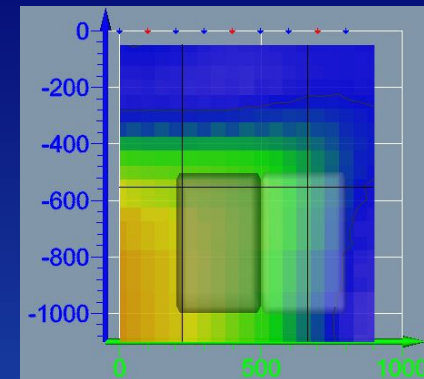
Long Section – 700



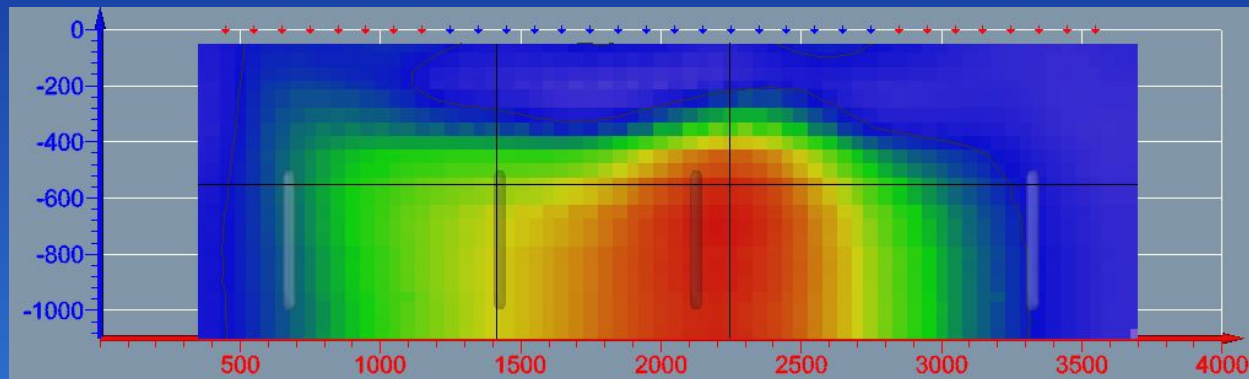
Type B – 5,000 Ωm and 10 Ωm in 1,000 Ωm 500m depth to top – Chargeability Inversion (MRx)



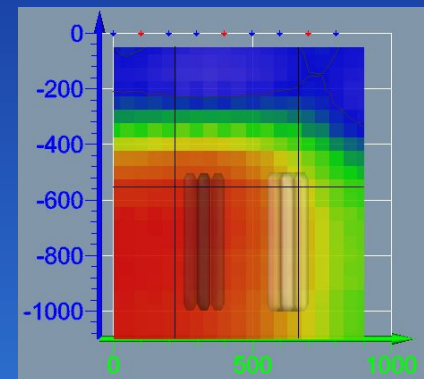
Plan View



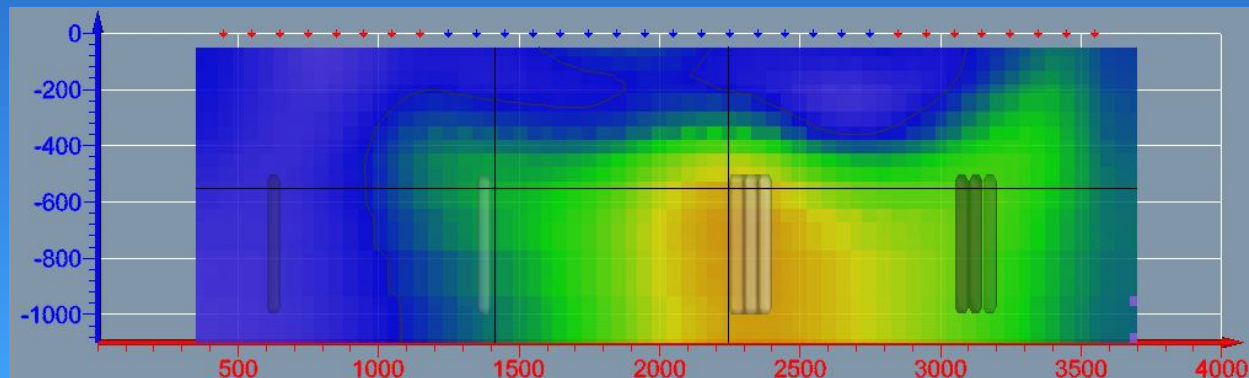
X-section - 1400



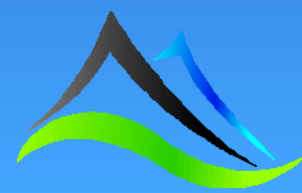
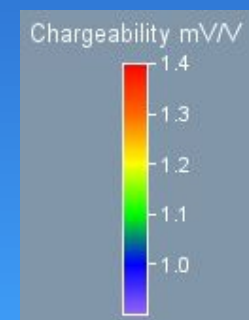
Long Section – 250



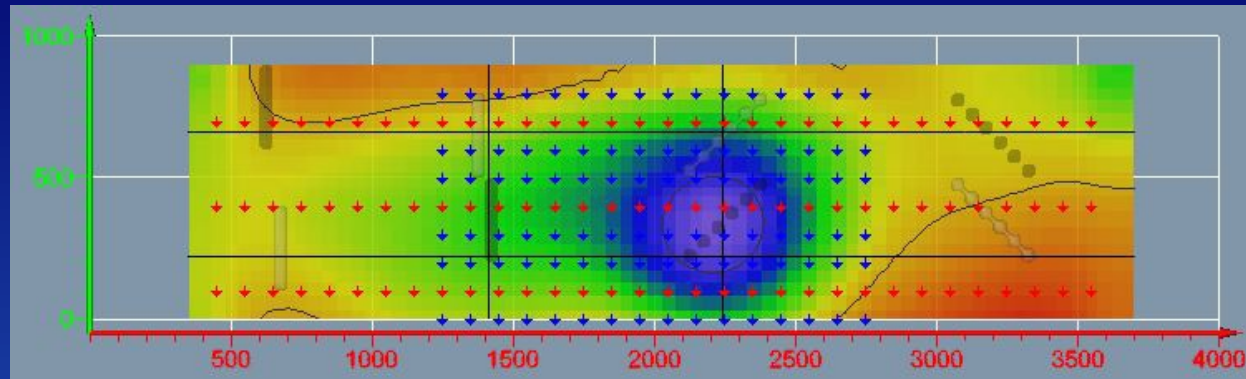
X-section - 2300



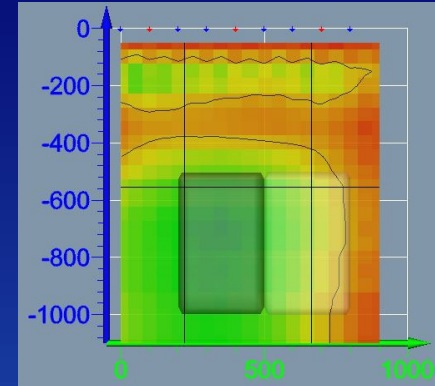
Long Section – 700



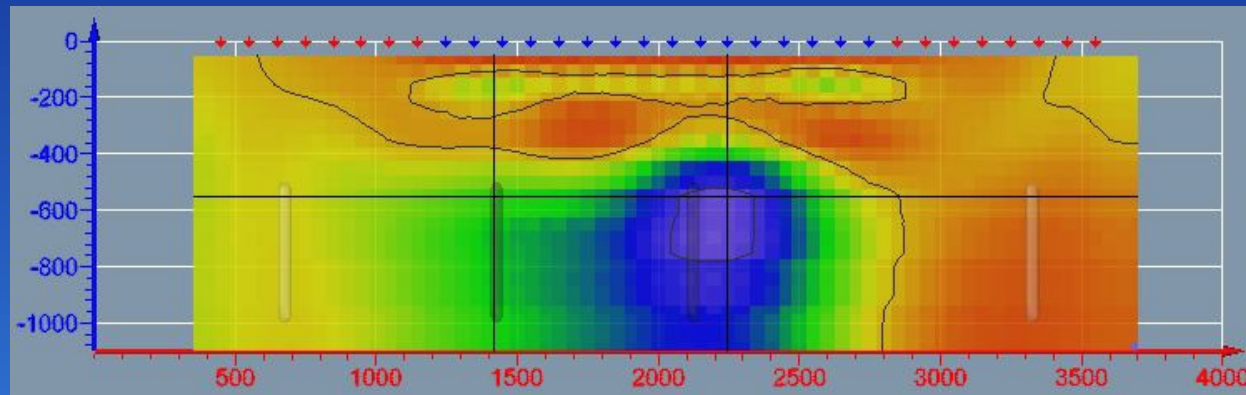
Type B – 5,000 Ωm and 10 Ωm in 1,000 Ωm 500m depth to top – Resistivity Inversion (MTxRx)



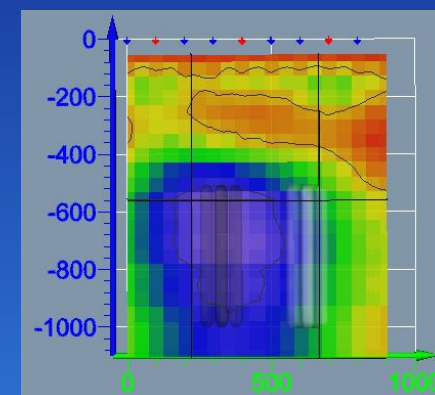
Plan View



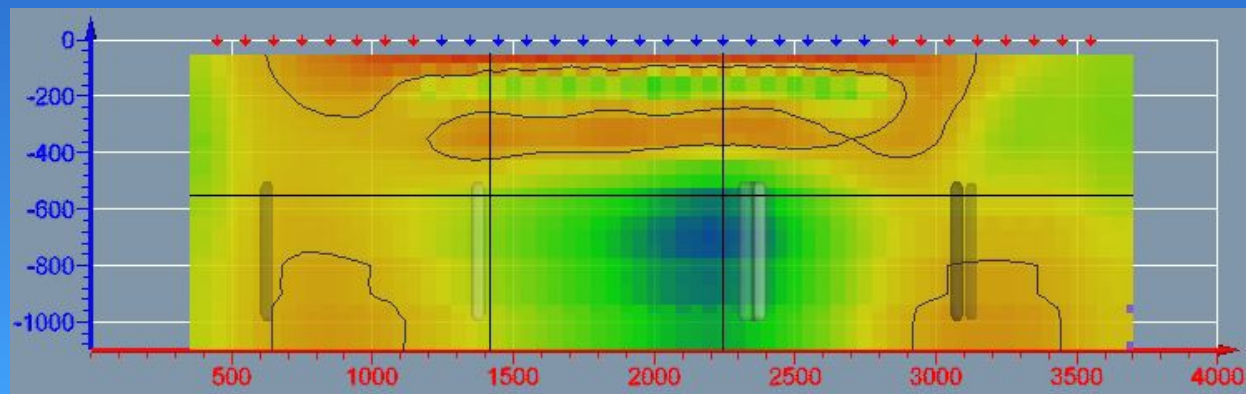
X-section - 1400



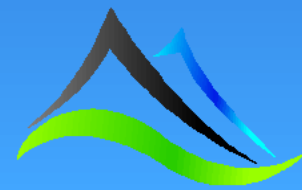
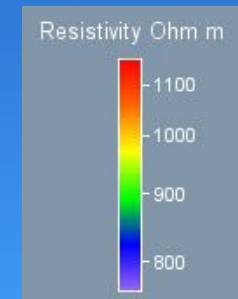
Long Section – 250



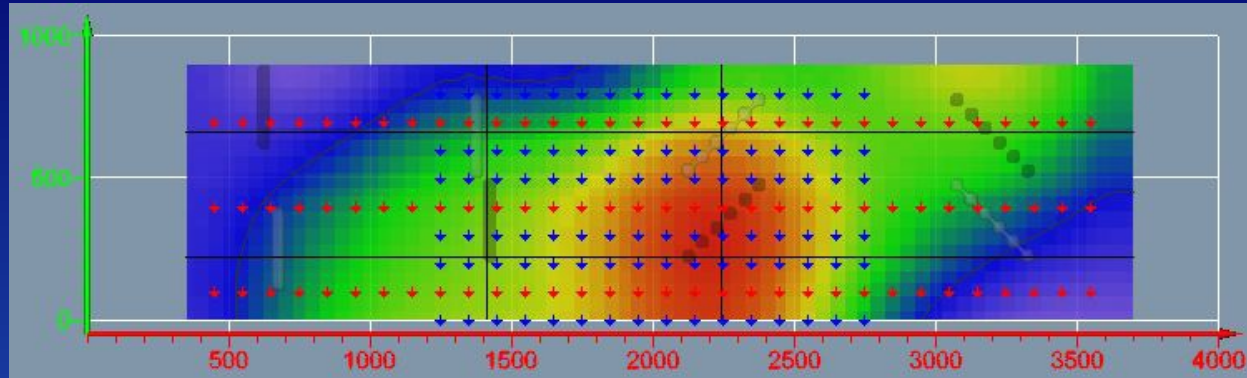
X-section – 2300



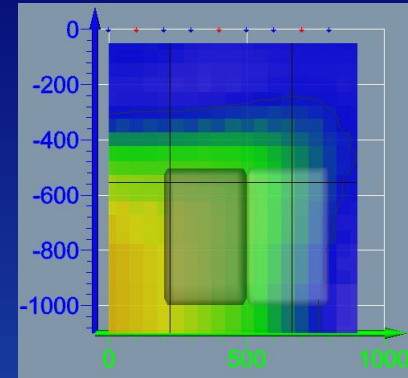
Long Section – 700



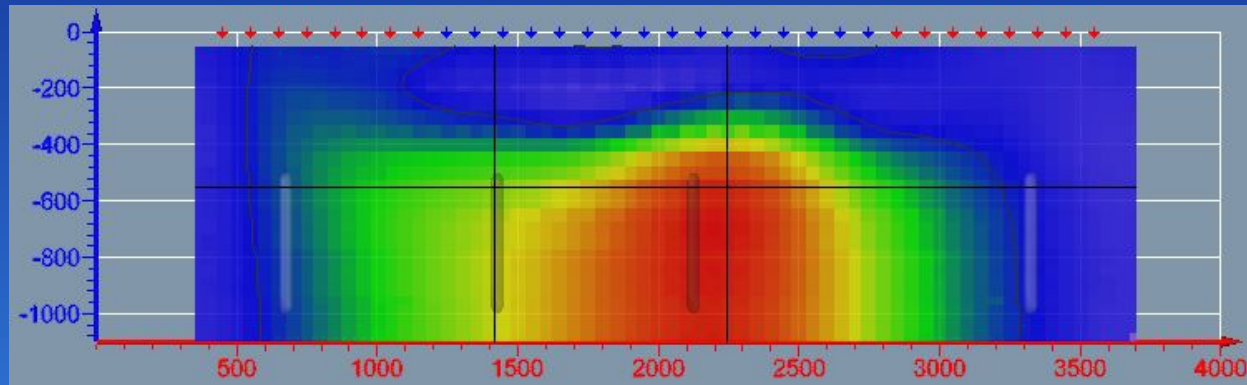
Type B – 5,000 Ωm and 10 Ωm in 1,000 Ωm 500m depth to top – Chargeability Inversion (MTxRx)



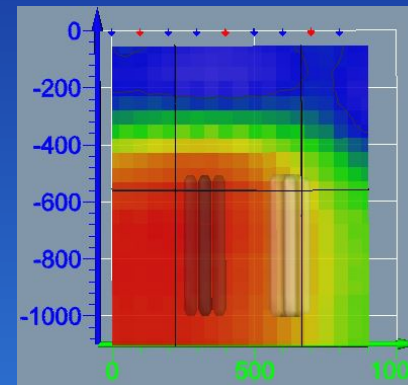
Plan View



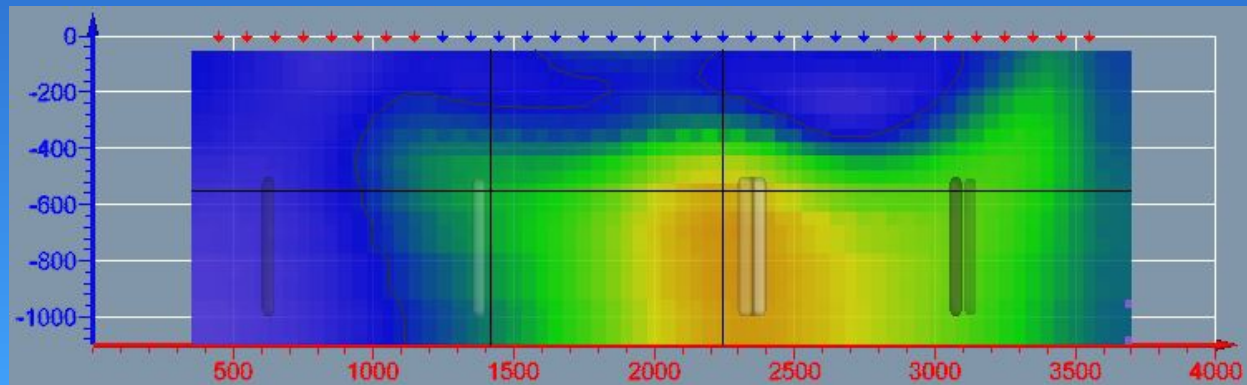
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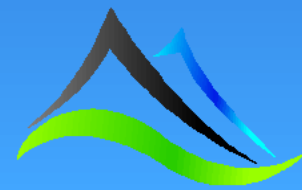
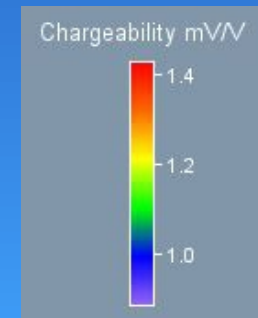
Long Section – 250



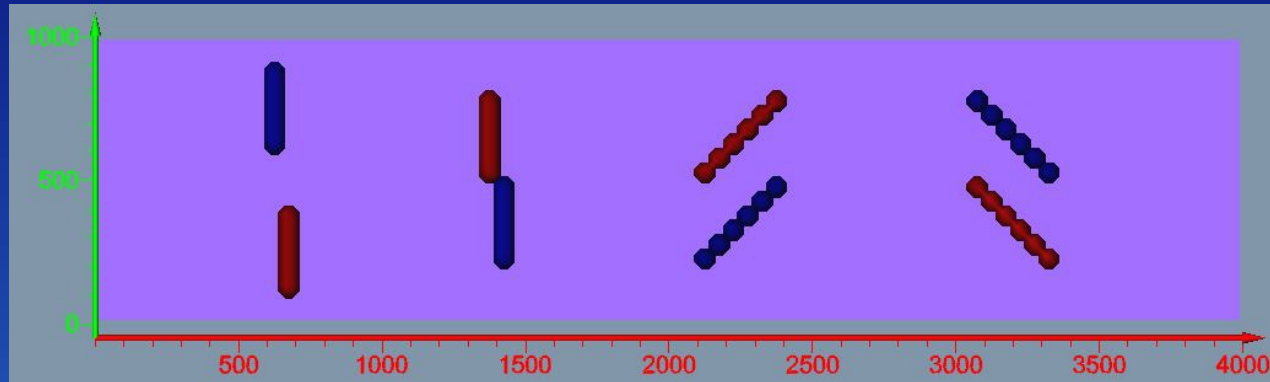
X-section - 2300



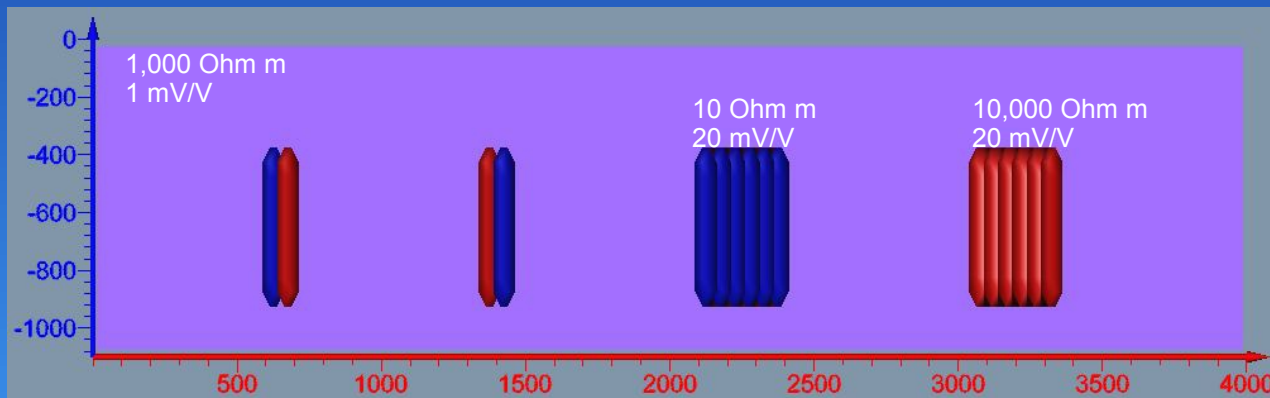
Long Section – 700



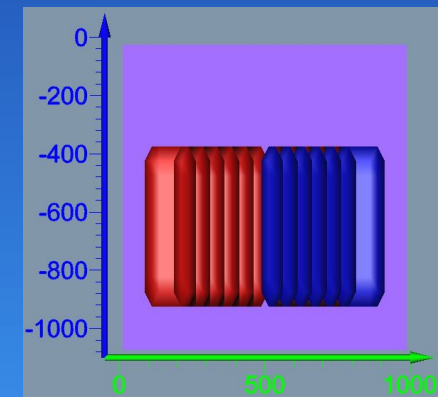
Model: Type B – 10,000 Ωm resistors and 10 Ωm conductors in a 1,000 Ωm half space



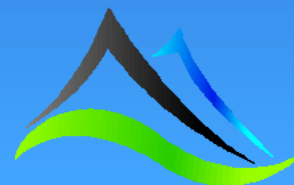
Top



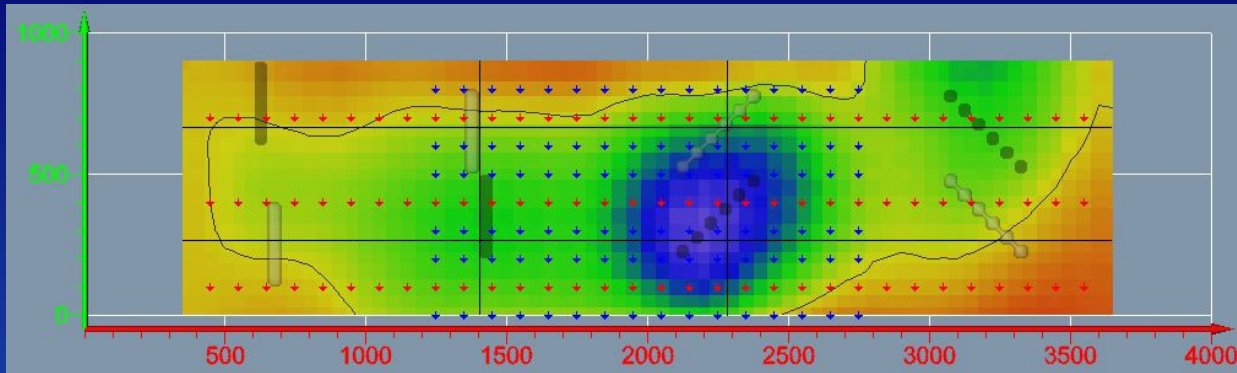
Front



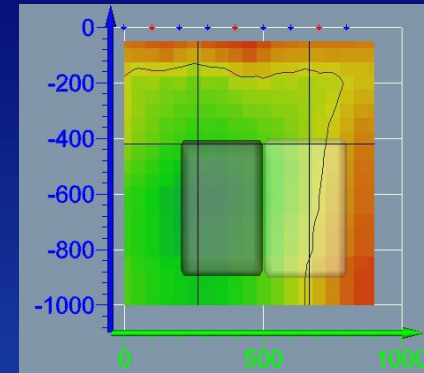
Right



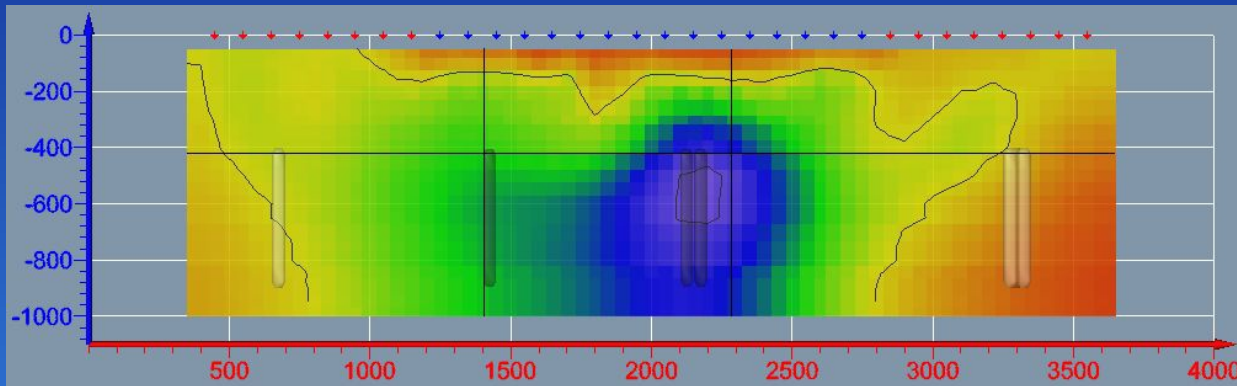
Type B – 10,000 Ωm and 10 Ωm in 1,000 Ωm – Resistivity Inversion (DODD)



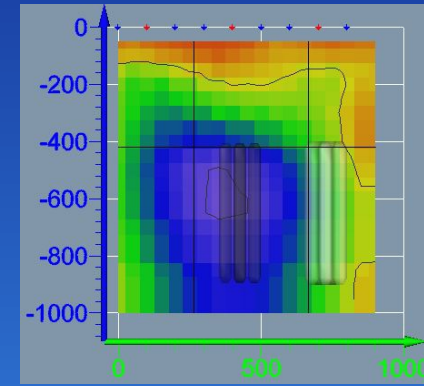
Plan View



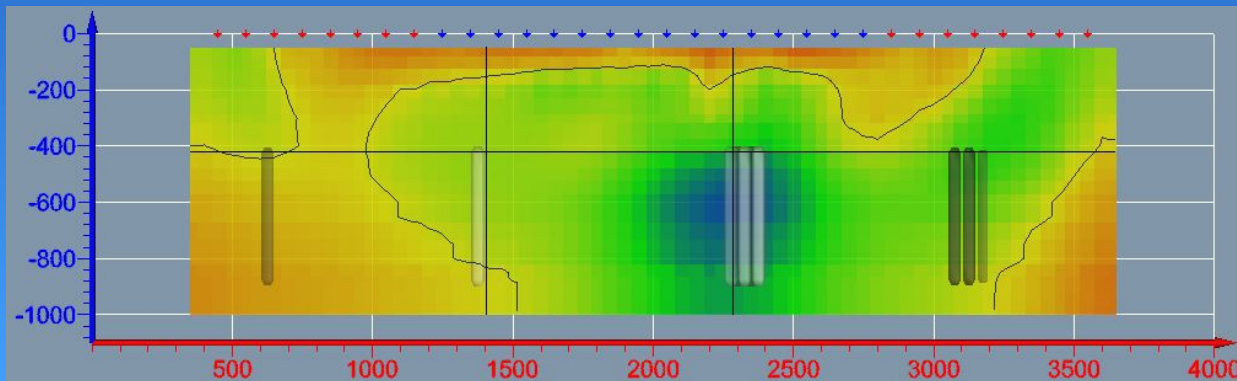
X-section - 1400



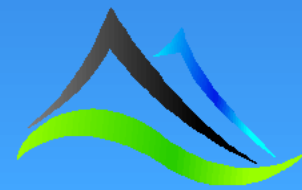
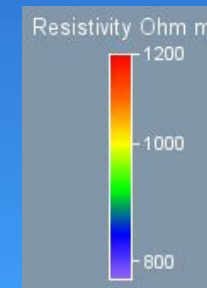
Long Section – 250



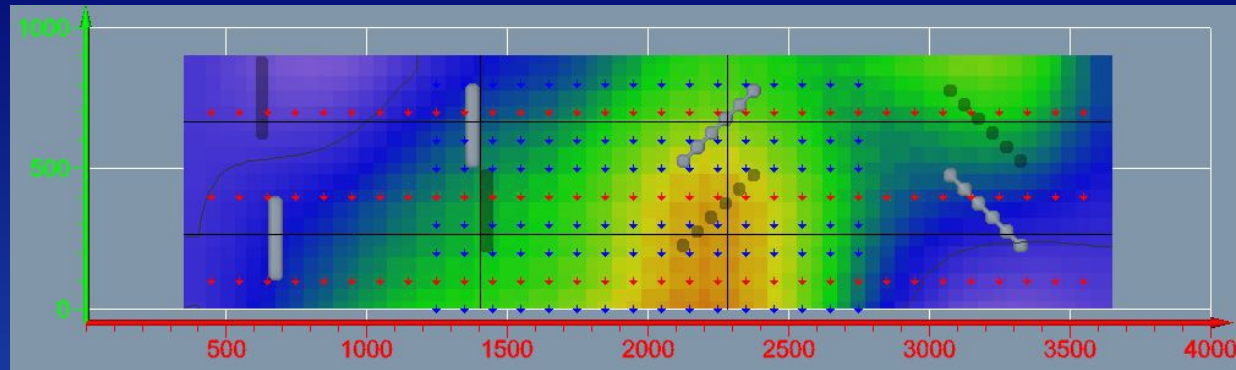
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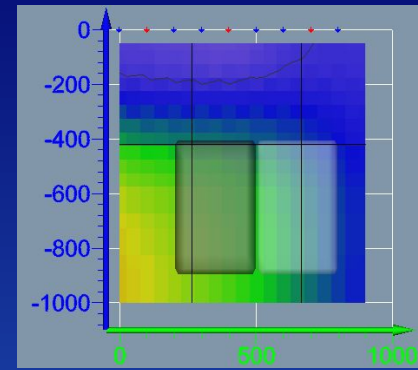
Long Section – 700



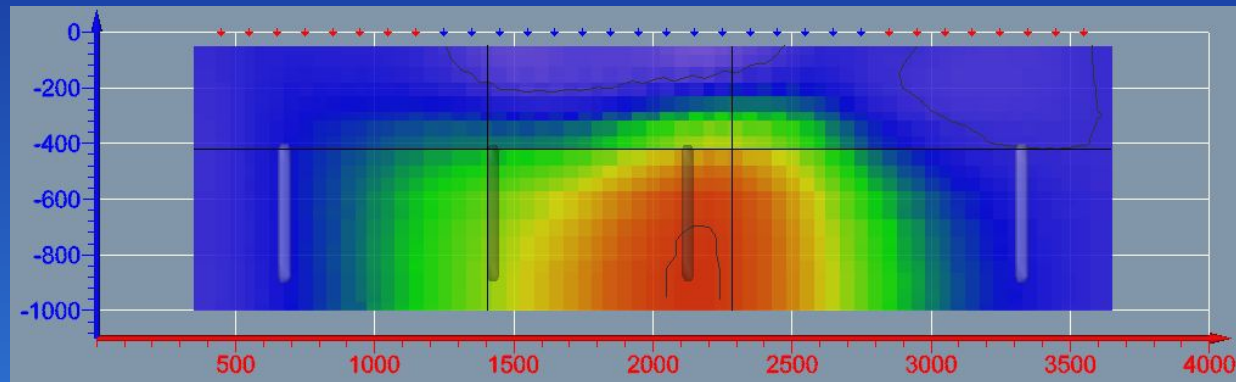
Type B – 10,000 Ωm and 10 Ωm in 1,000 Ωm – Chargeability Inversion (DODD)



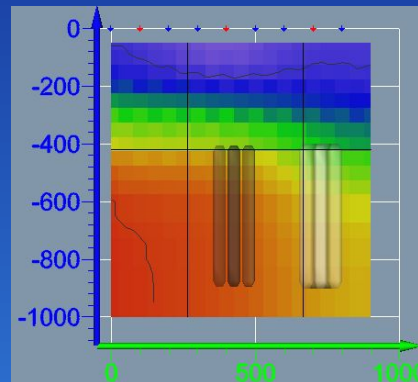
Plan View



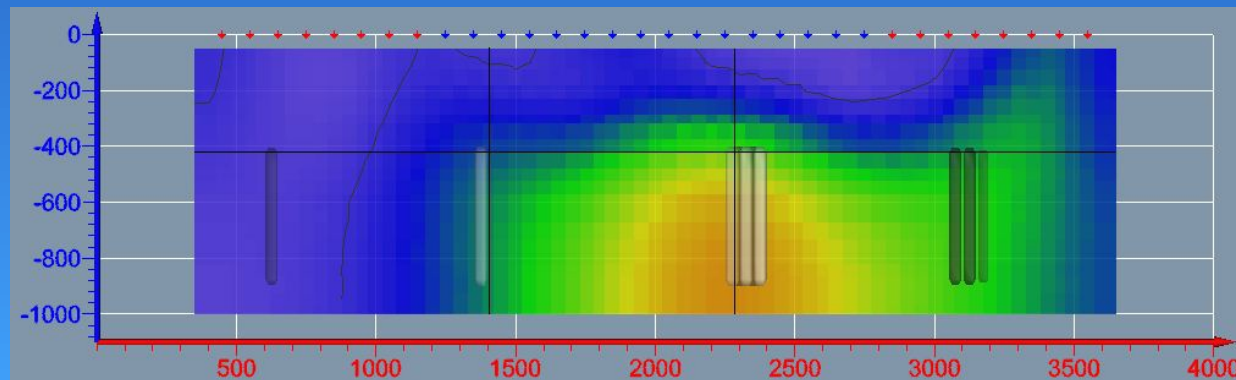
X-section - 1400



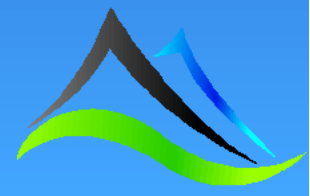
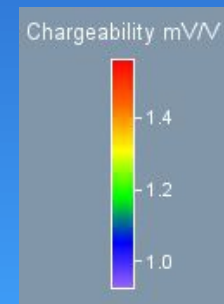
Long Section – 250



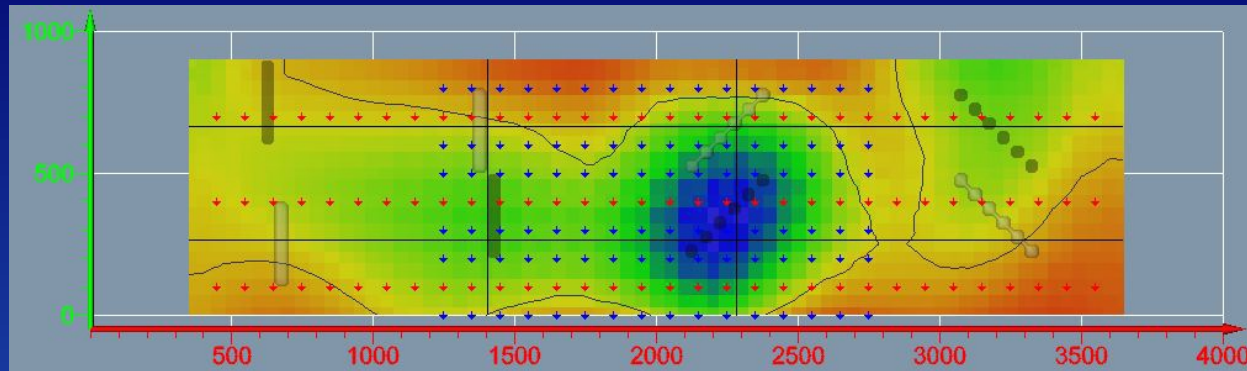
X-section - 2300



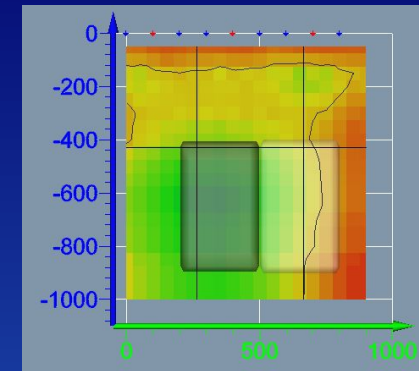
Long Section – 700



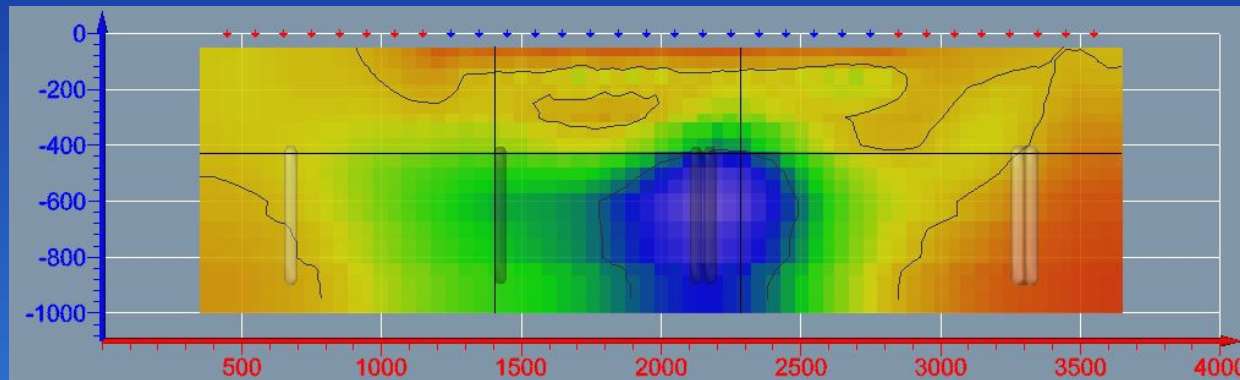
Type B – 10,000 Ωm and 10 Ωm in 1,000 Ωm – Resistivity Inversion (MRx)



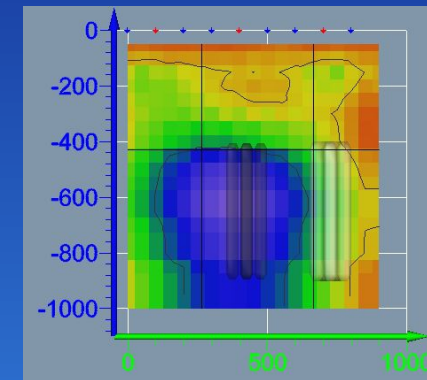
Plan View



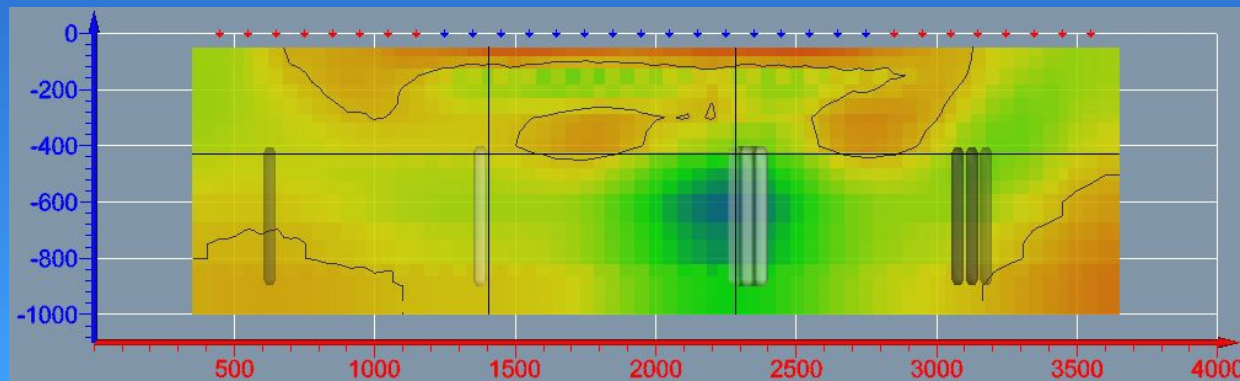
X-section - 1400



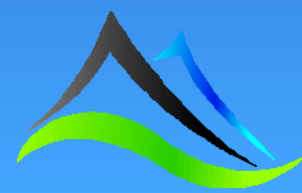
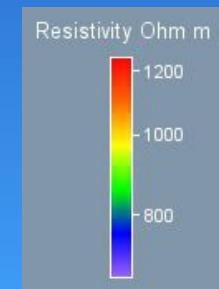
Long Section – 250



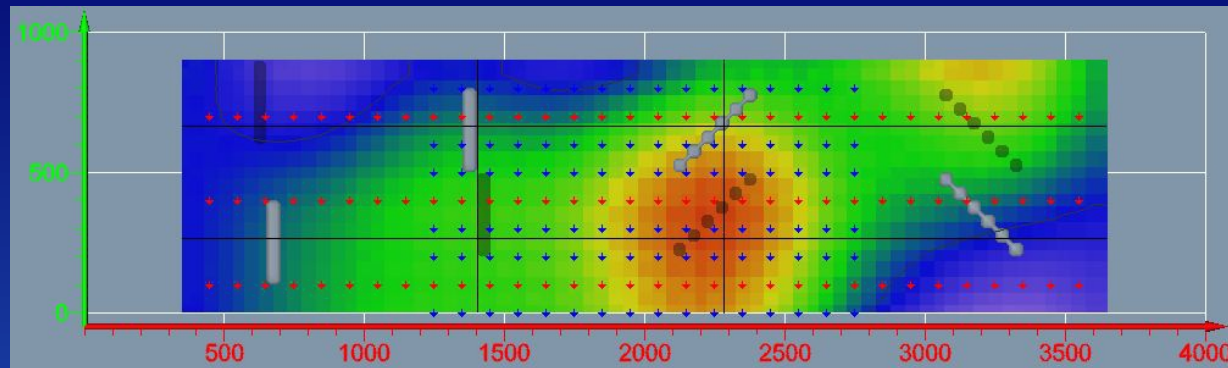
X-section – 2300



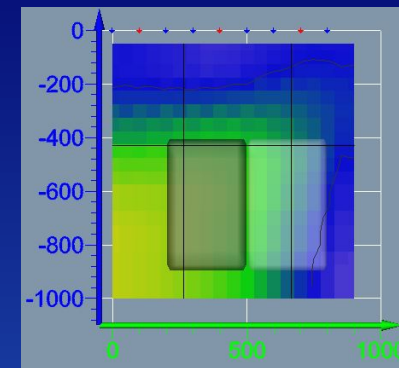
Long Section – 700



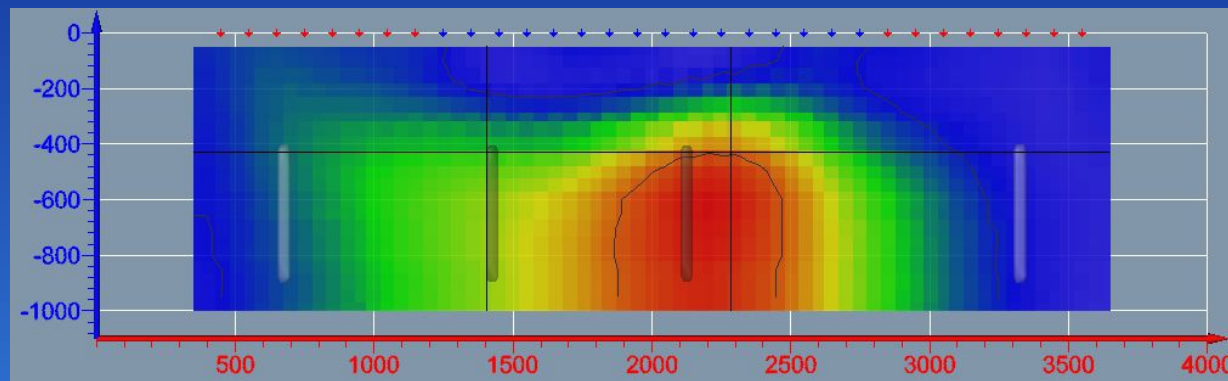
Type B – 10,000 Ωm and 10 Ωm in 1,000 Ωm – Chargeability Inversion (MRx)



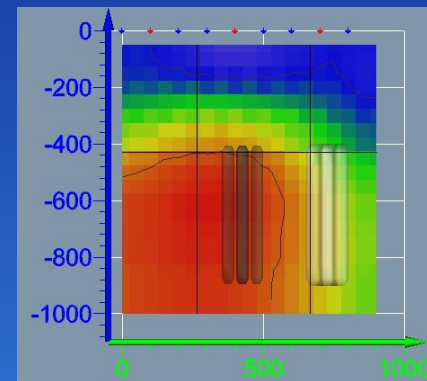
Plan View



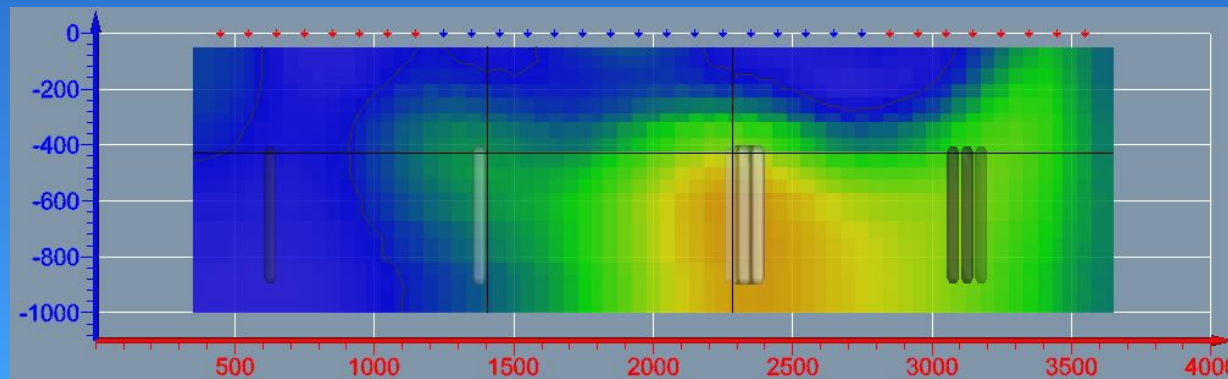
X-section - 1400



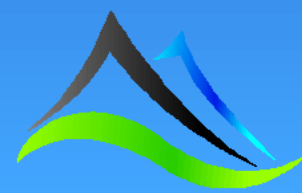
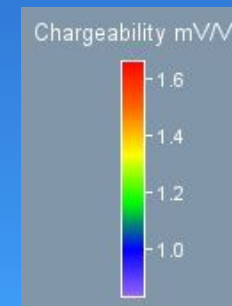
Long Section – 250



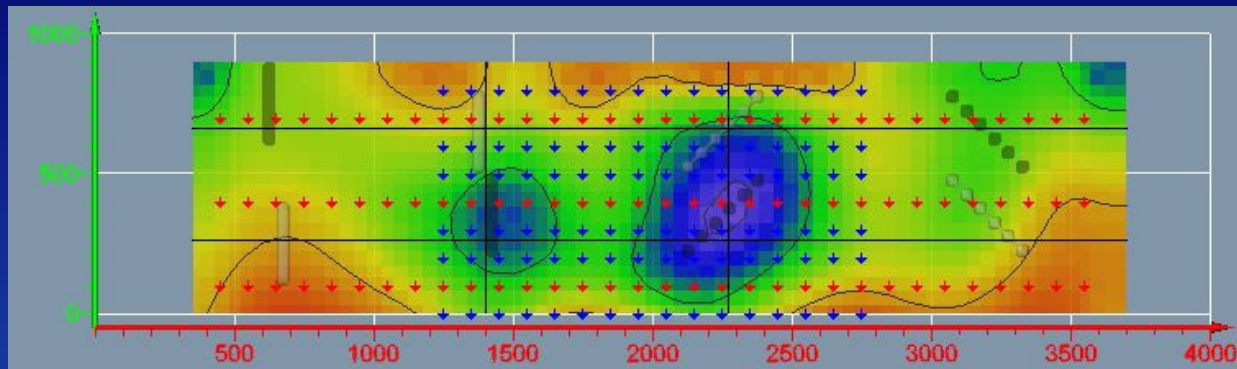
X-section - 2300



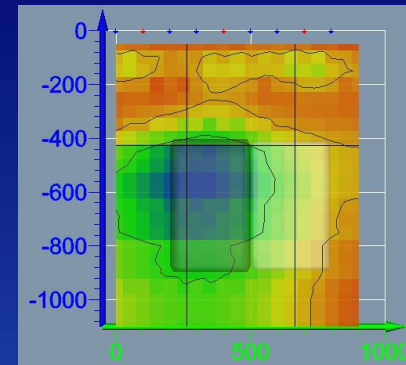
Long Section – 700



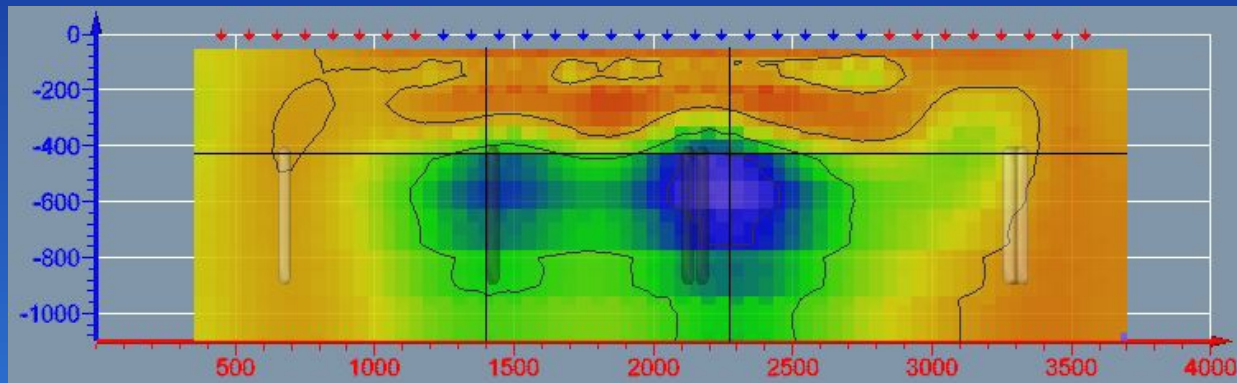
Type B – 10,000 Ωm and 10 Ωm in 1,000 Ωm – Resistivity Inversion (MTxRx)



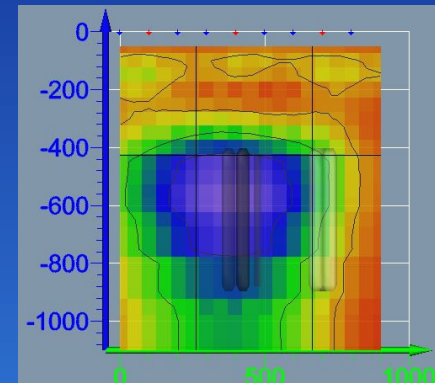
Plan View



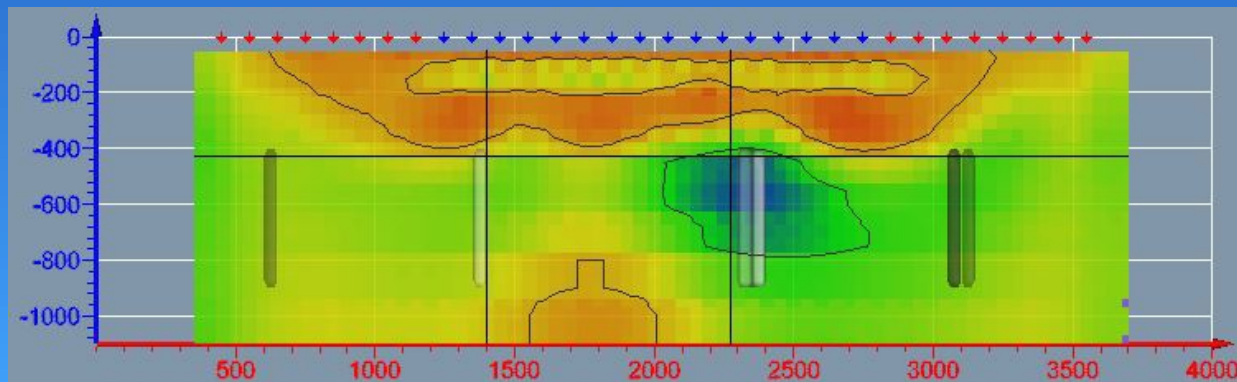
X-section - 1400



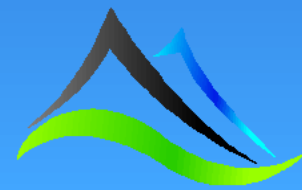
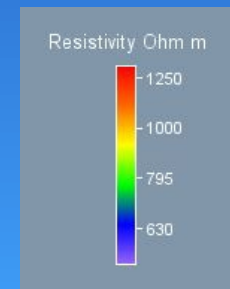
Long Section – 250



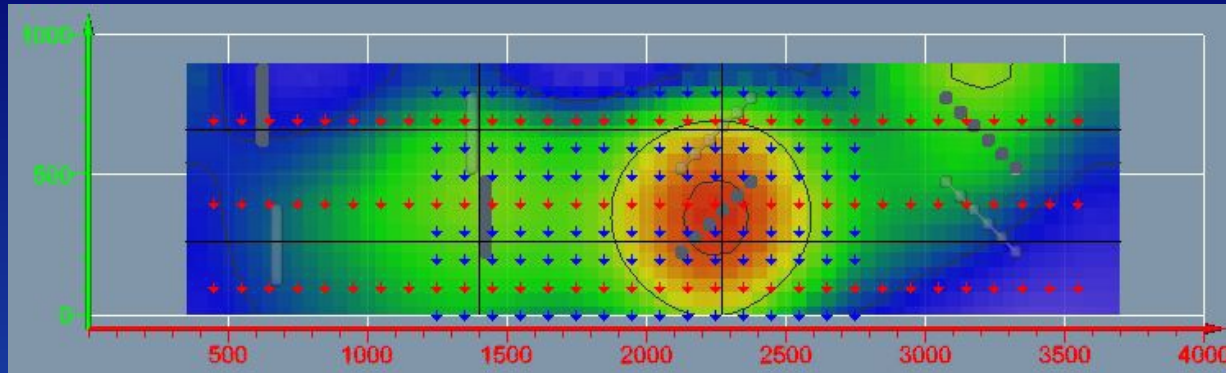
X-section – 2300



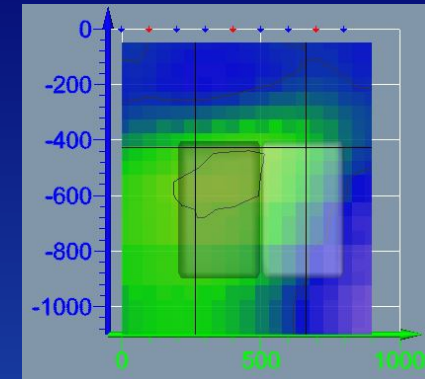
Long Section – 700



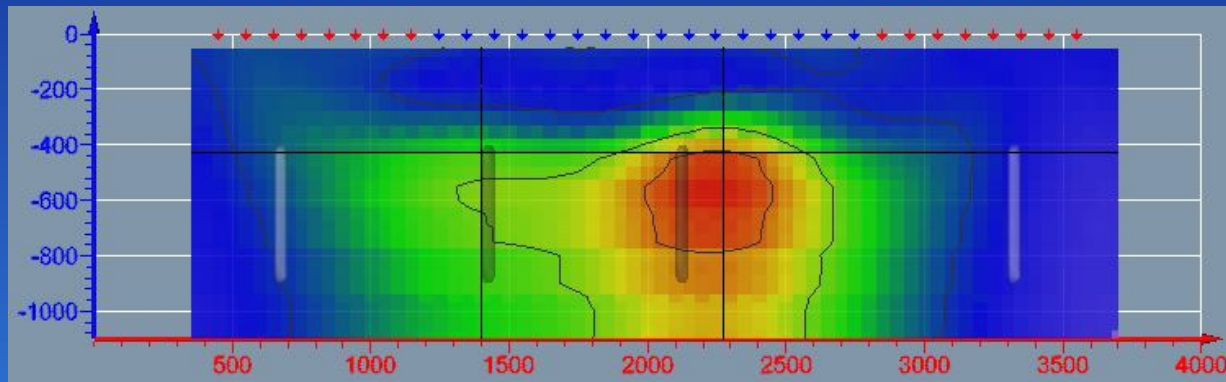
Type B – 10,000 Ωm and 10 Ωm in 1,000 Ωm – Chargeability Inversion (MTxRx)



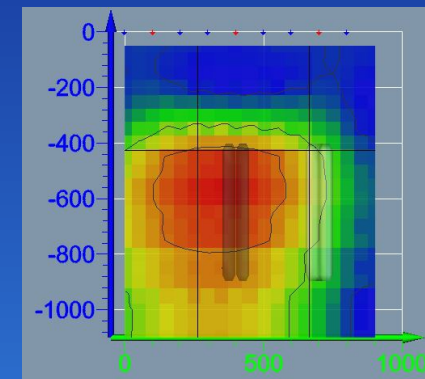
Plan View



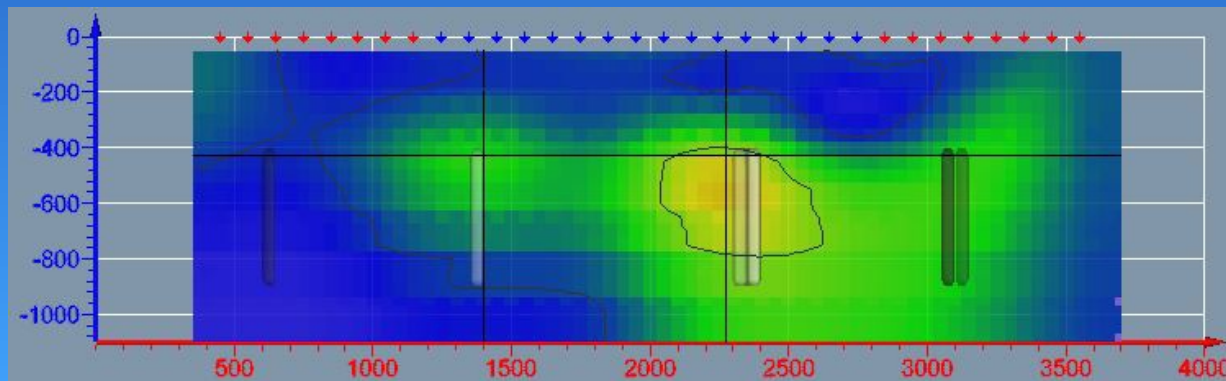
X-section - 1400



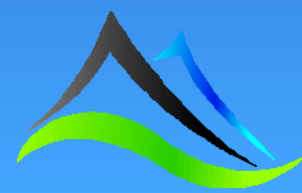
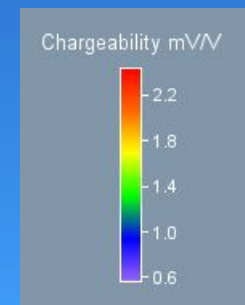
Long Section – 250



X-section - 2300

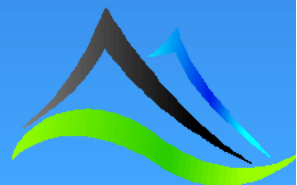


Long Section – 700



Summary: Type B – Resistors and 10 Ωm conductors in a 1,000 Ωm half space

- For both the IP and resistivity inversions, only the conductors are resolved. This is true for all arrays at all depths for all resistivity contrasts.
- All inversions placed the anomalies directly over the conductor except for the two cases in which the conductor lies outside of the receiver electrode area. For these two conductors, the inversions have offset the anomalies to the north-east.
- In all cases, MTxRx resolves the conductors better than MRx and DODD.
- In comparing all resistivity contrasts at 400m, as the veins become more resistive, the resolution decreases.
- In the 5,000 Ωm case, the best resolution is seen at shallower depths and resolution starts to become unclear at 400m. MTxRx helps resolve the conductors at 400m but appears to have no effect at 500m.



Conclusions

- When two bodies are closely spaced, the inversion may not be able to separate them, especially if their spacing is one dipole or less. A body separation of two dipoles or more is needed to isolate the bodies.
- At large resistivity contrasts, a lower resistivity surface layer is placed above the bodies. Similarly, the inversion does not weight the chargeability to depth and smears chargeable material through the upper part of the model
- Resistors are best resolved when they are oriented strike perpendicular to the survey lines, while conductors respond best when they are oriented strike parallel.
- Resistors that lie outside of the receiver electrode area cannot be resolved and conductors in the same area are resolved but are offset from their true position.
- Conductors are easier to resolve than resistors and when conductors and resistors are present together, the inversion struggles to resolve the resistors.



Conclusions – continued

- Using a variable receiver multipole array (MRx) provides some extra resolution over the standard DODD array, but in the preceding examples, MRx did not provide any clear depth advantage.
- The variable transmitter/receiver multipole array (MTxRx) not only provided extra resolution over MRx and DODD, it was also able to see deeper.
- Serious consideration should be given to using a multipole array if the extra cost is not too significant.

