

Introduction – The Effect of Depth

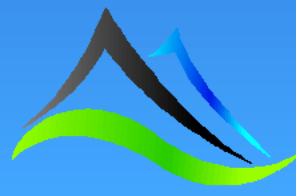
The following slides display the chargeability and resistivity results for the previously mentioned array designs on three manto-style mineralisation zones.

The two outer zones have been kept in a constant position throughout, but the centre zone has been reduced to a single lens and placed at various depths.

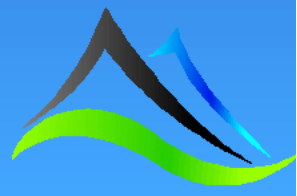
The 430m model has also had the uppermost lens removed with the remaining deeper lenses kept in place. This model was then altered so that the tops of all the stacks of mineralisation were at 430m.

The dip of the fault in these examples is 70° .

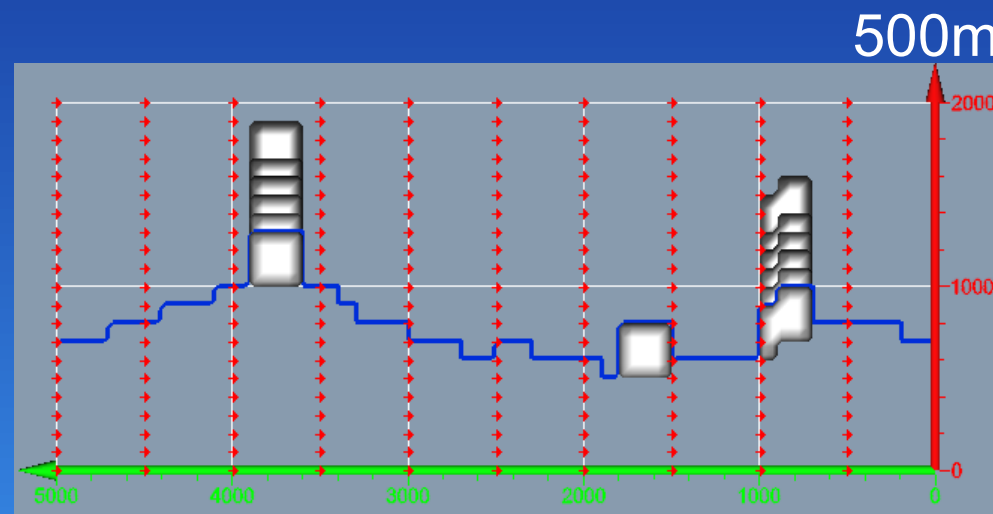
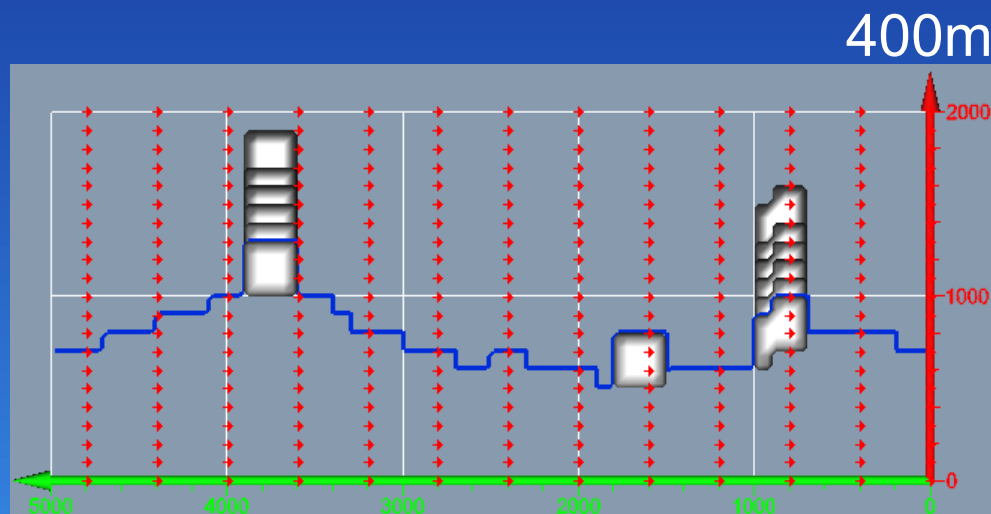
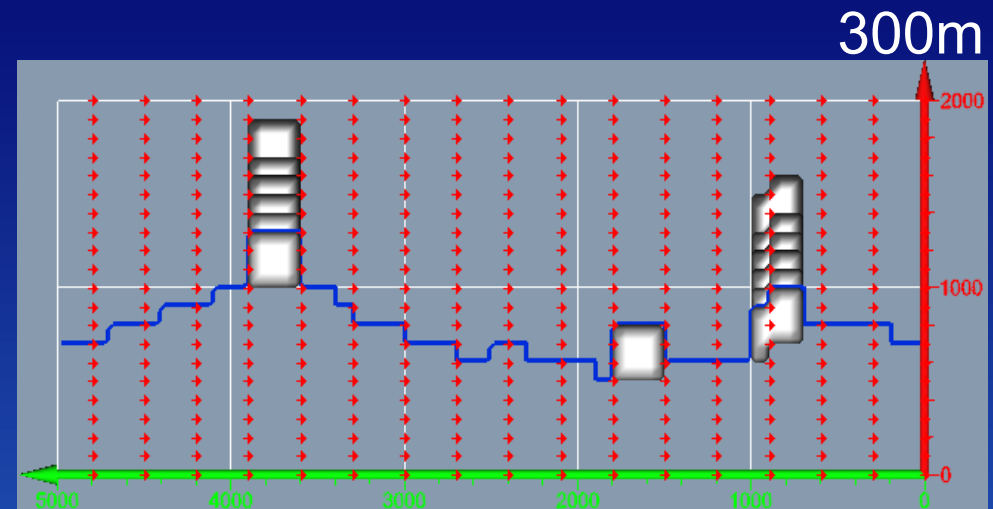
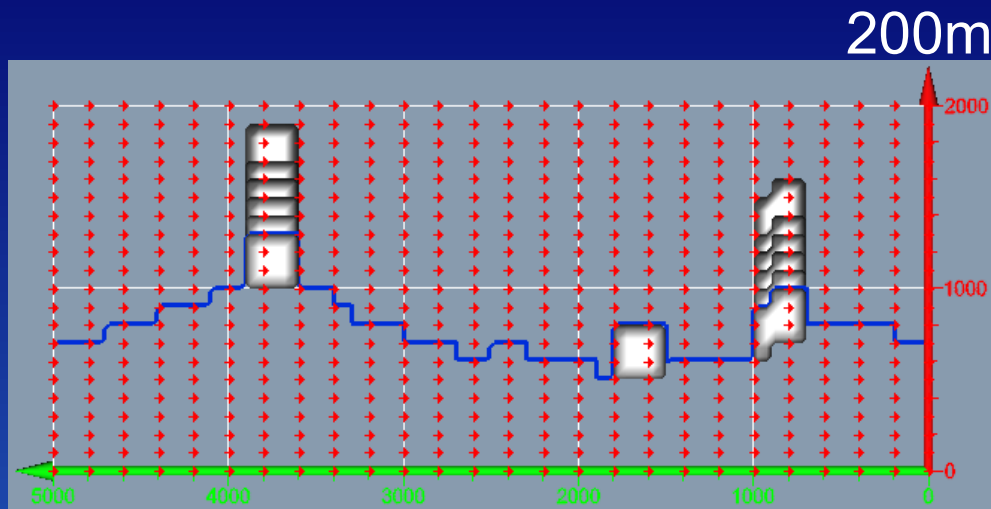
After each set of slides that relate to a single depth, a summary will be given, with an overall conclusion at the very end.



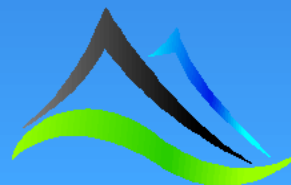
Fault 70° dip.
Single chargeable body at 235m depth.



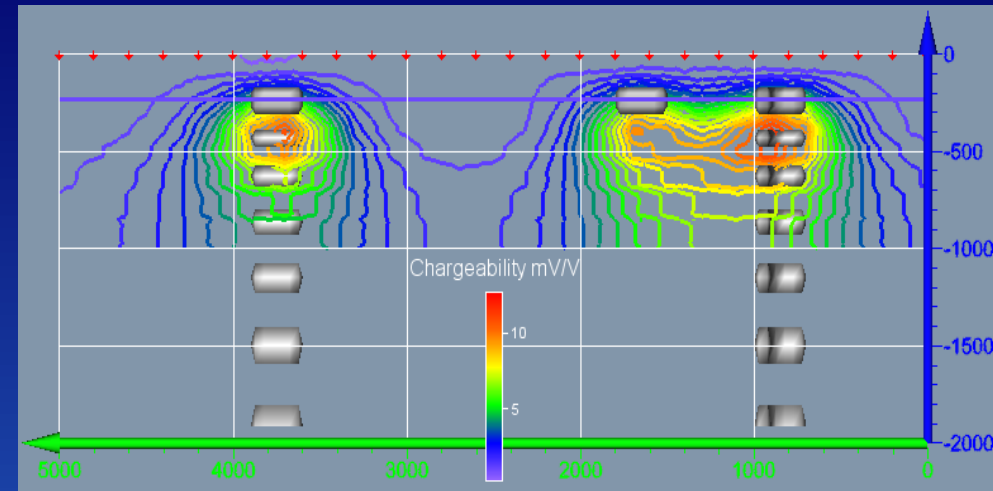
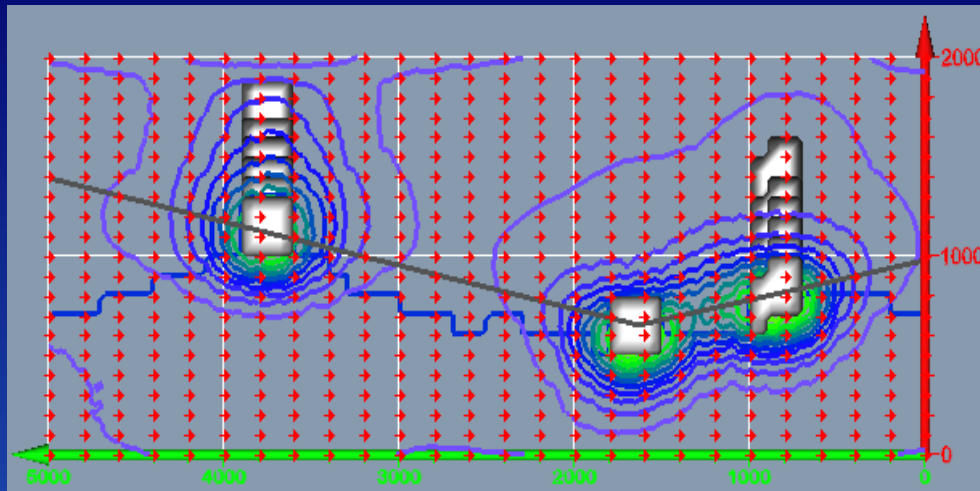
2D Dipole-Dipole with variable line spacing



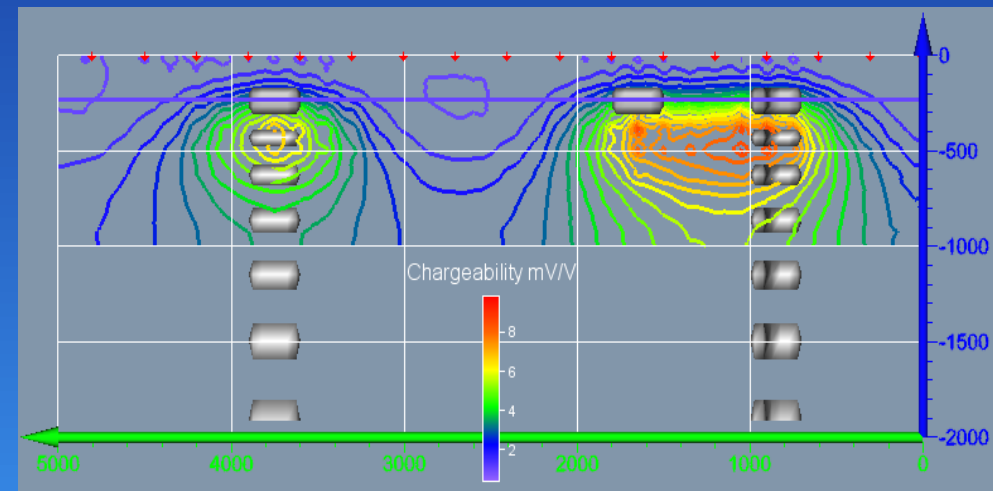
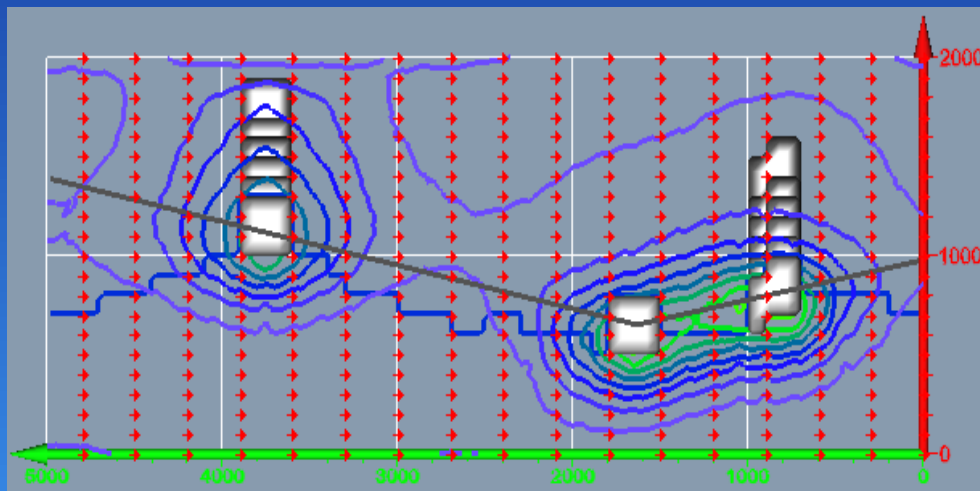
- 100m electrodes and 100m dipoles.
- 200m, 300m, 400m and 500m line spacing.
- Full line of 20 dipoles active each reading.



200m Chargeability

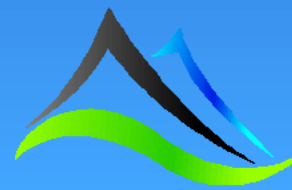


300m Chargeability

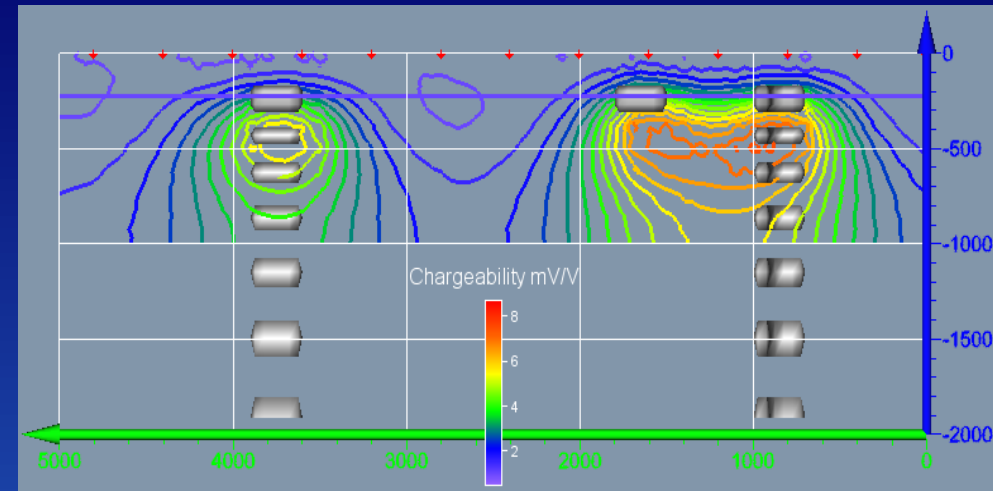
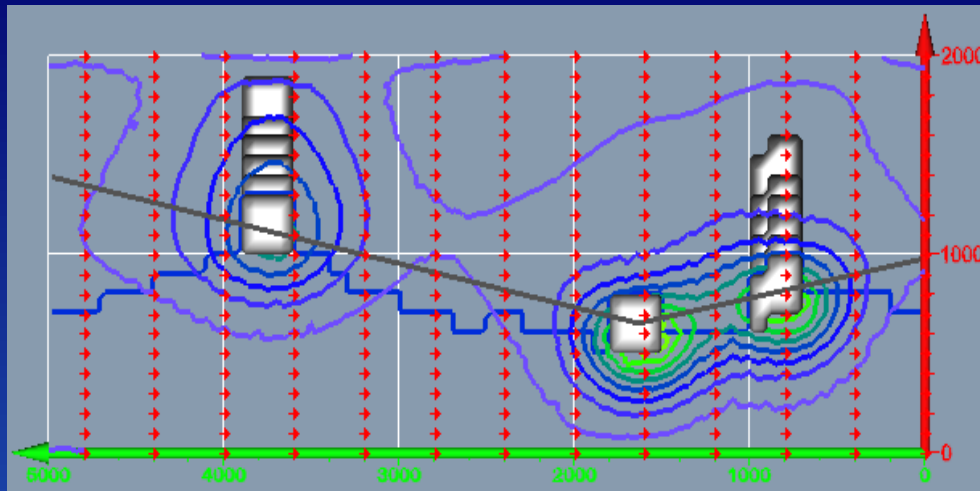


Plan view of contour slice at -200m

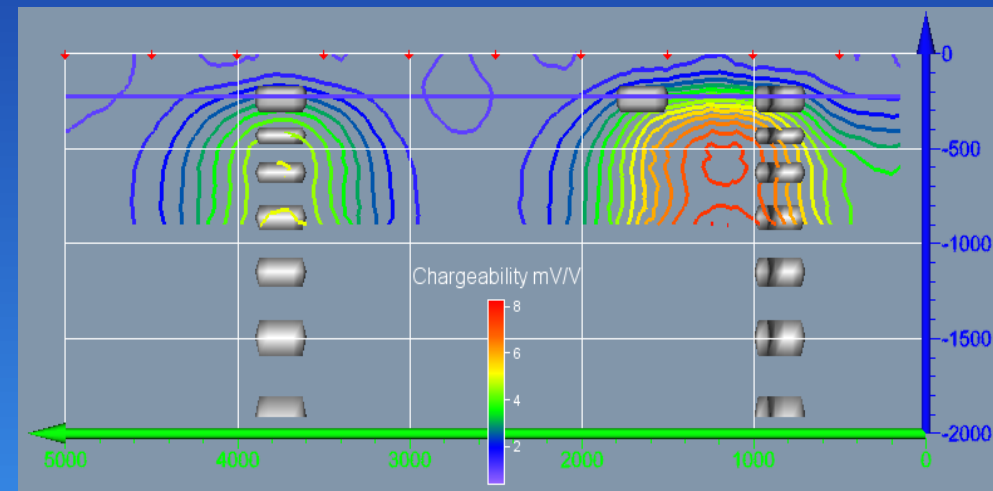
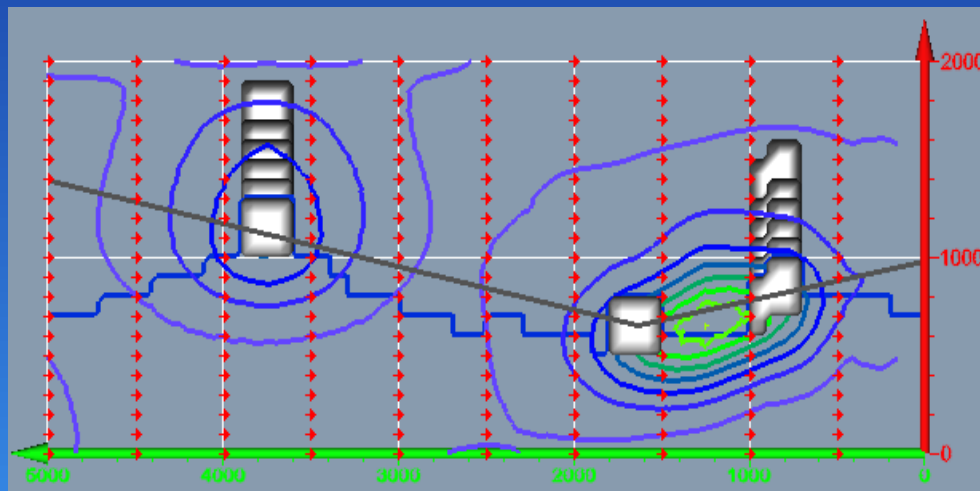
Bent and tilted long section view of contours through body centres



400m Chargeability

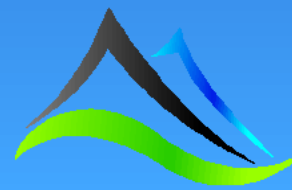


500m Chargeability

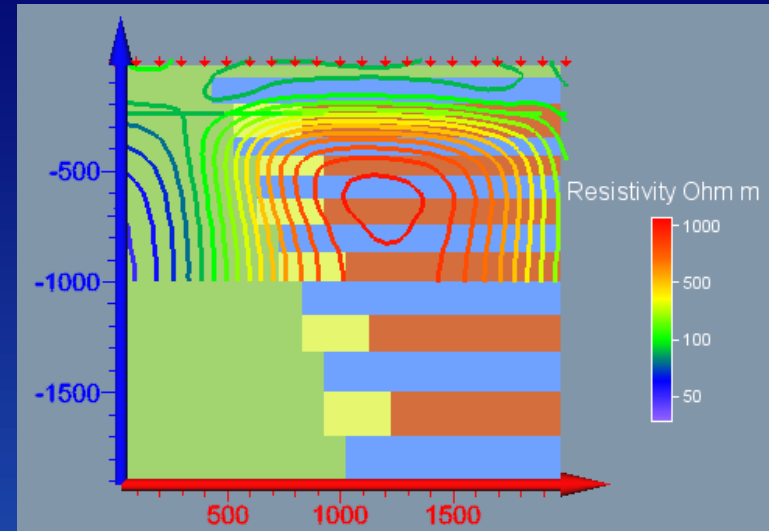
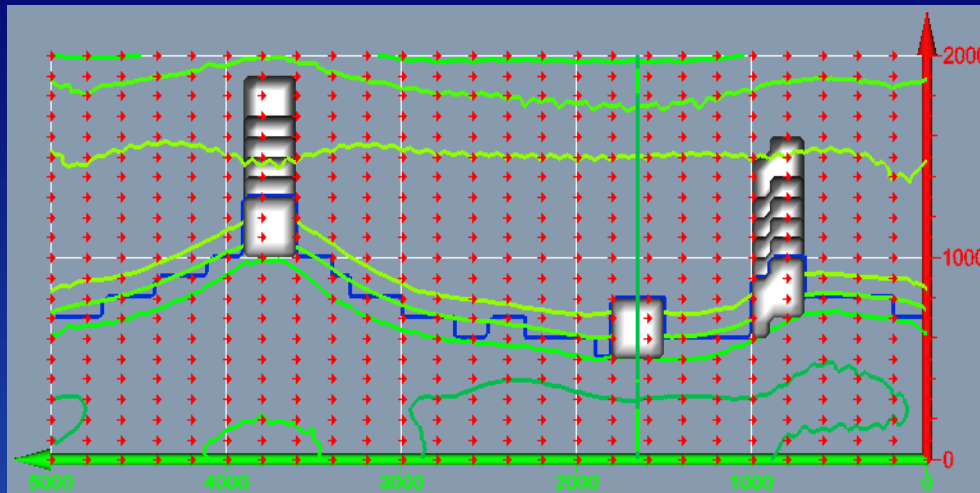


Plan view of contour slice at -200m

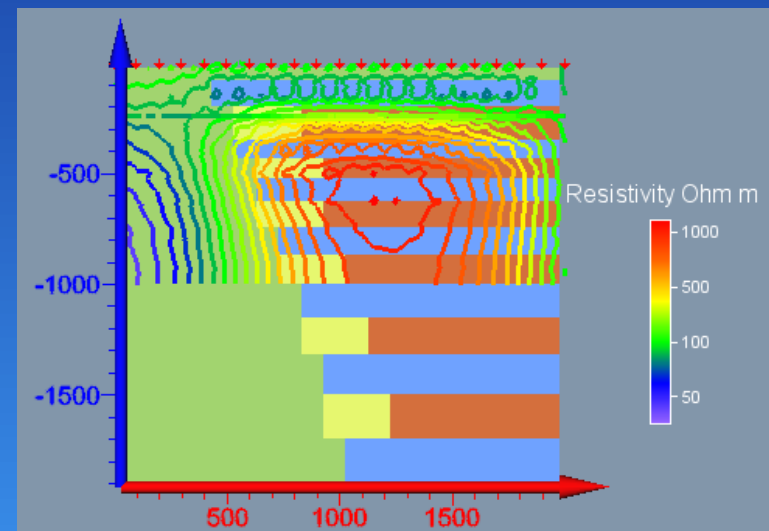
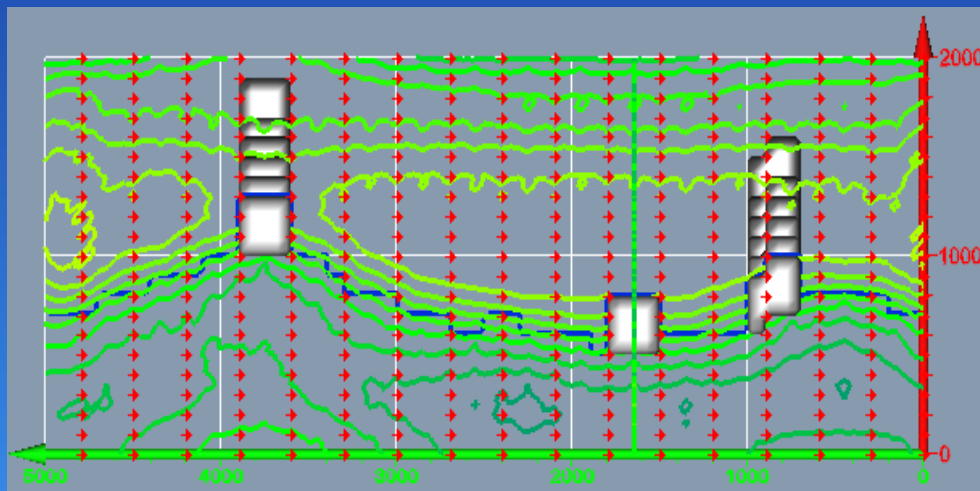
Bent and tilted long section view of contours through body centres



200m Resistivity

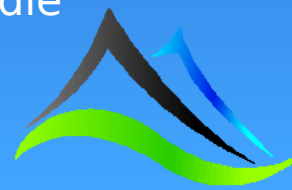


300m Resistivity

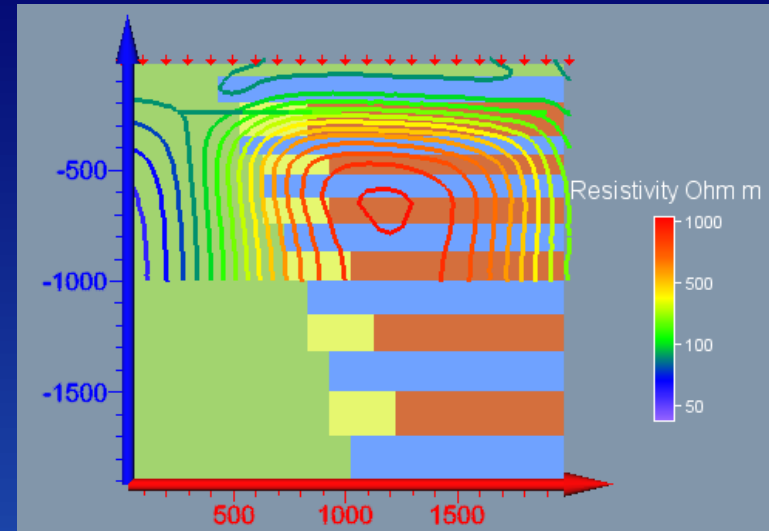
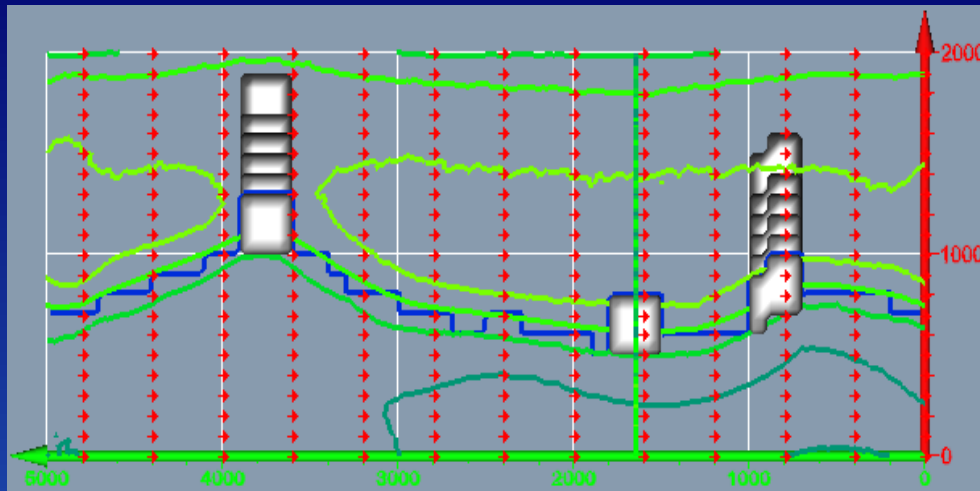


Plan view of contour slice through the middle of the chargeable centre body

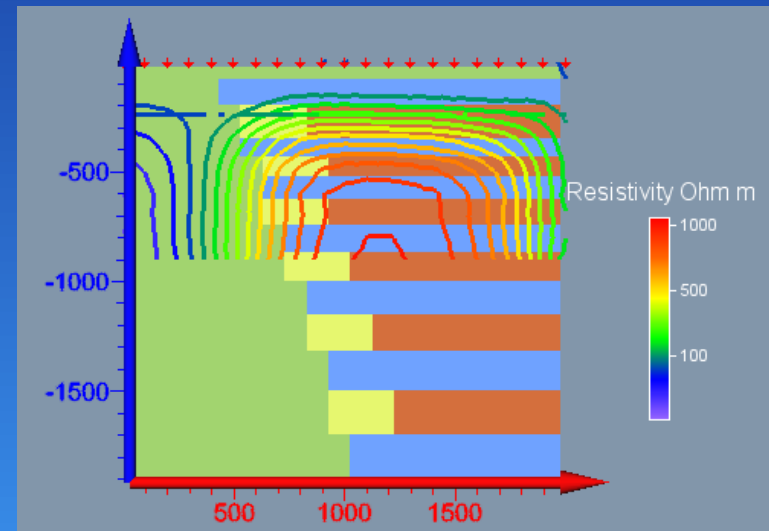
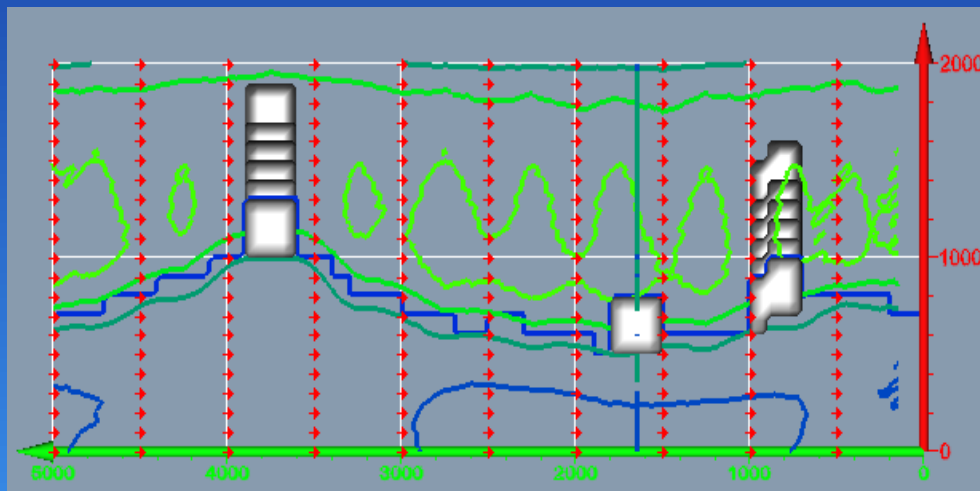
Cross section through the middle of the chargeable centre body



400m Resistivity

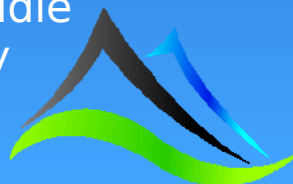


500m Resistivity

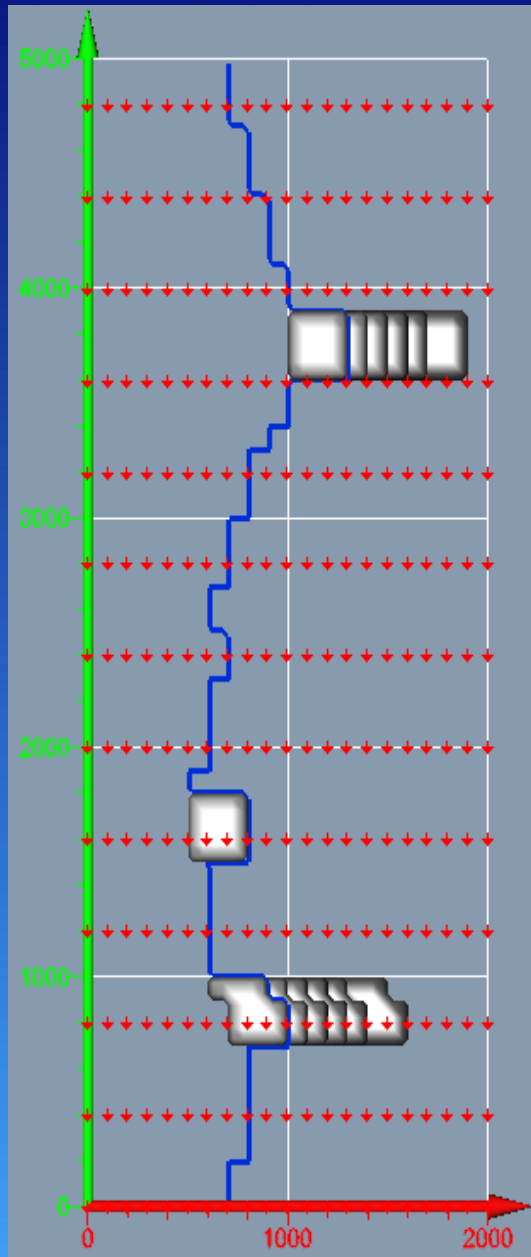


Plan view of contour slice through the middle of the chargeable centre body

Cross section through the middle of the chargeable centre body

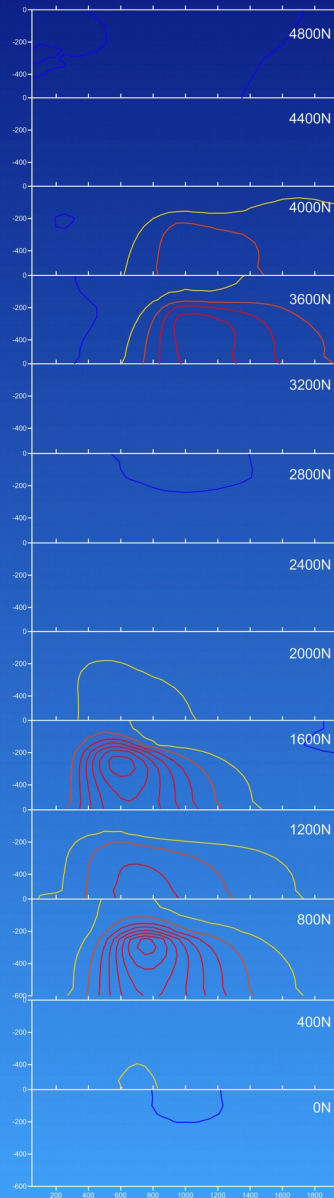


2D inversion sections



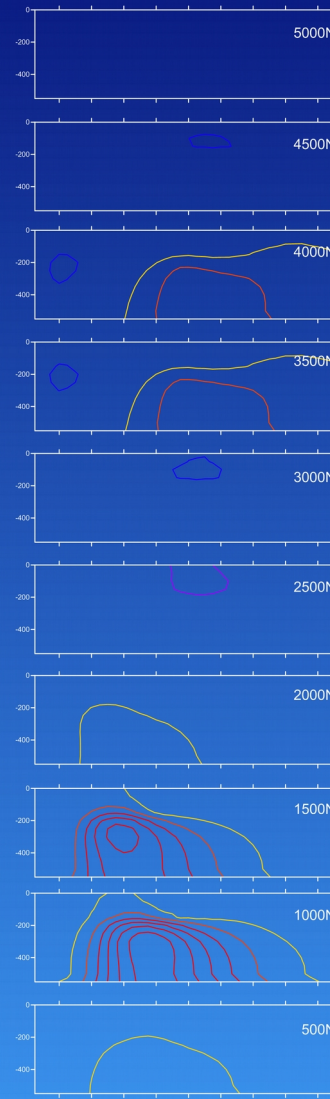
It = iteration

400m Chargeability

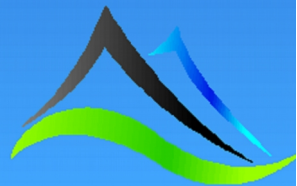
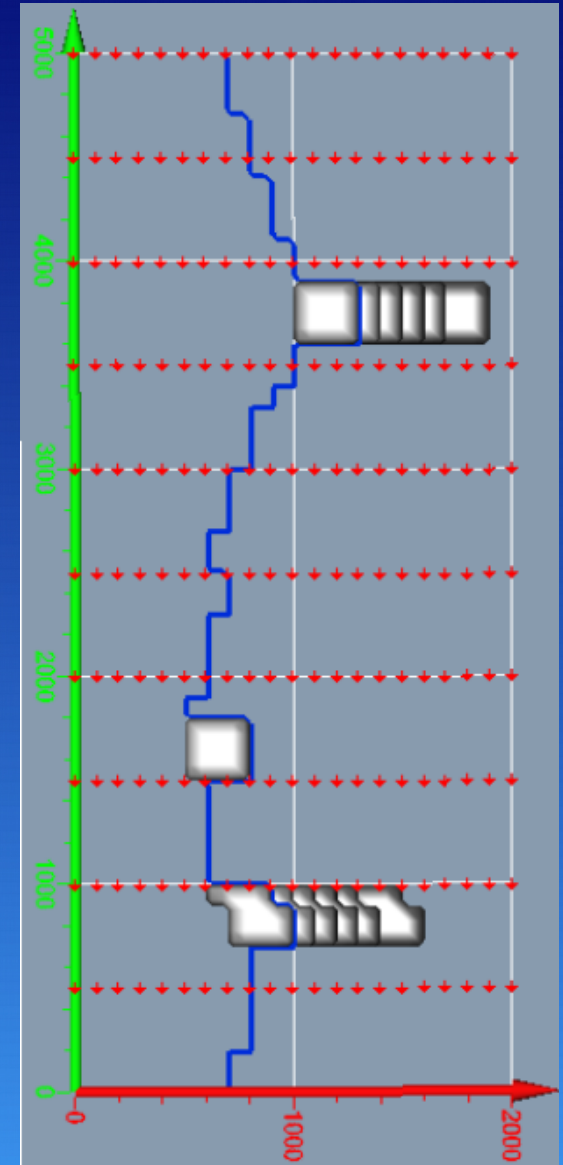


it4

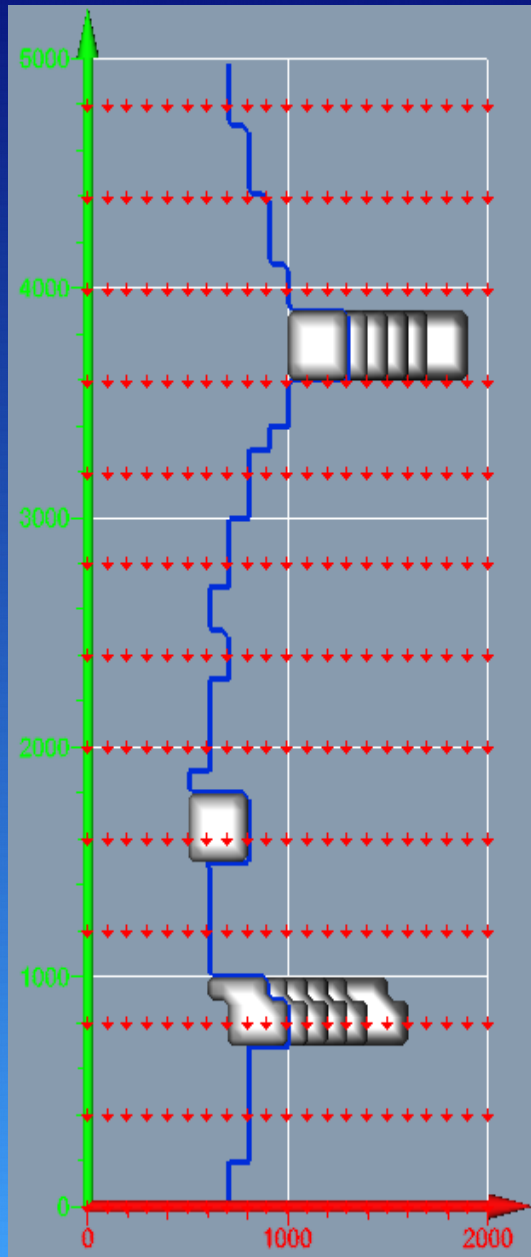
500m Chargeability



it4

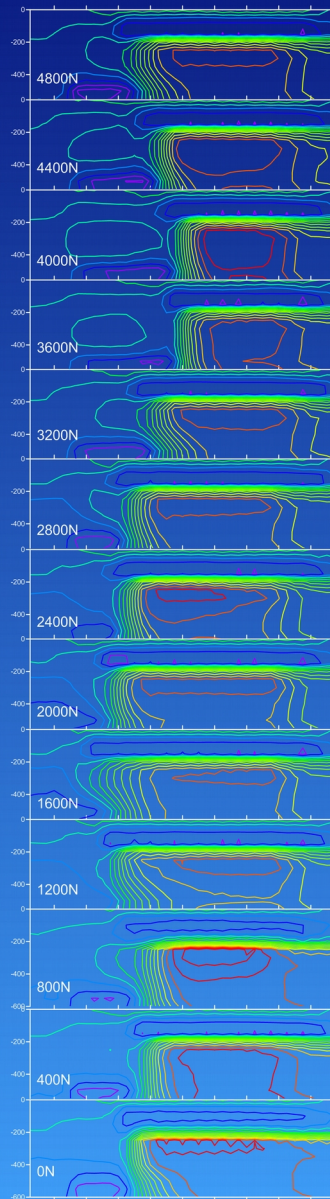


2D inversion sections



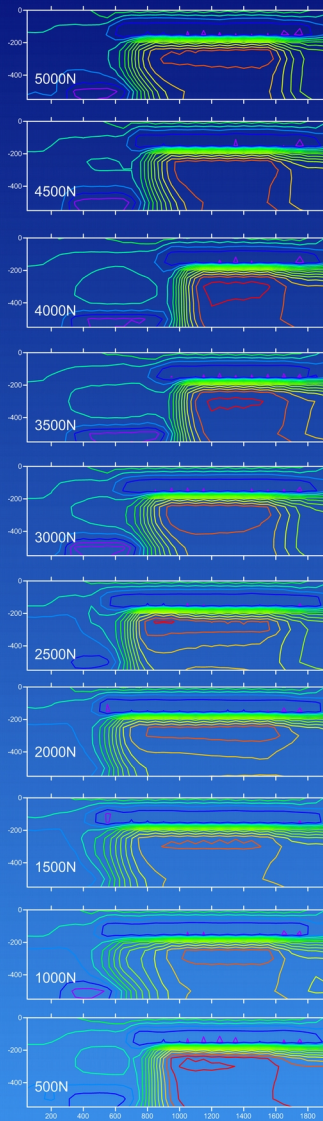
It = iteration

400m Resistivity

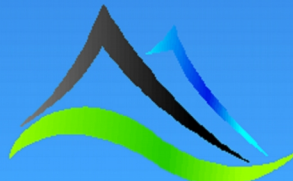
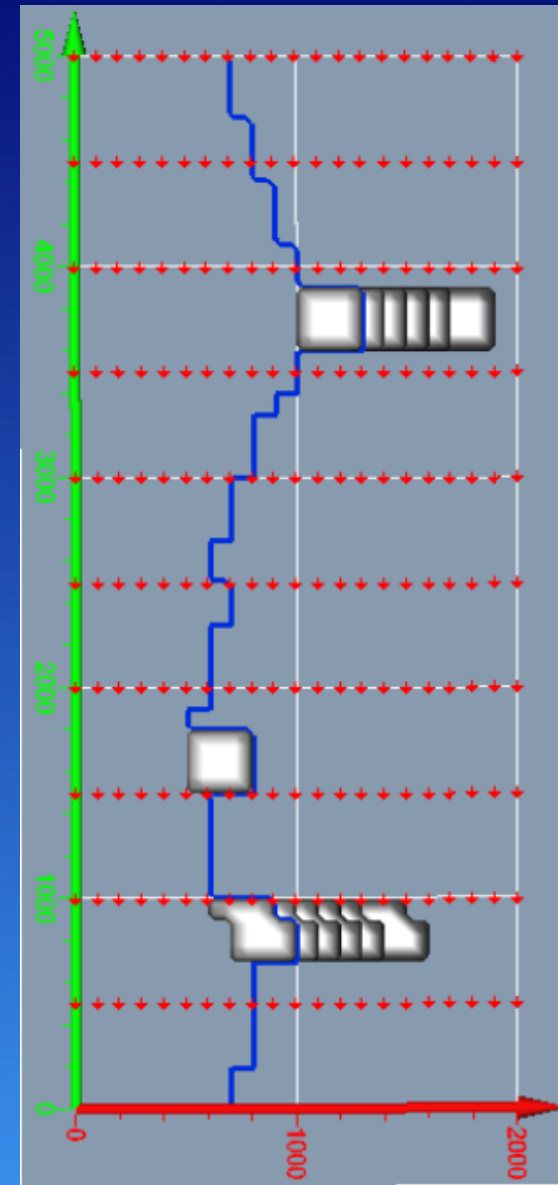


it4

500m Resistivity

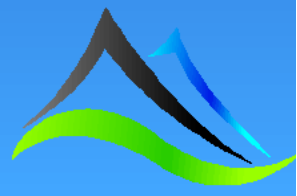


it4

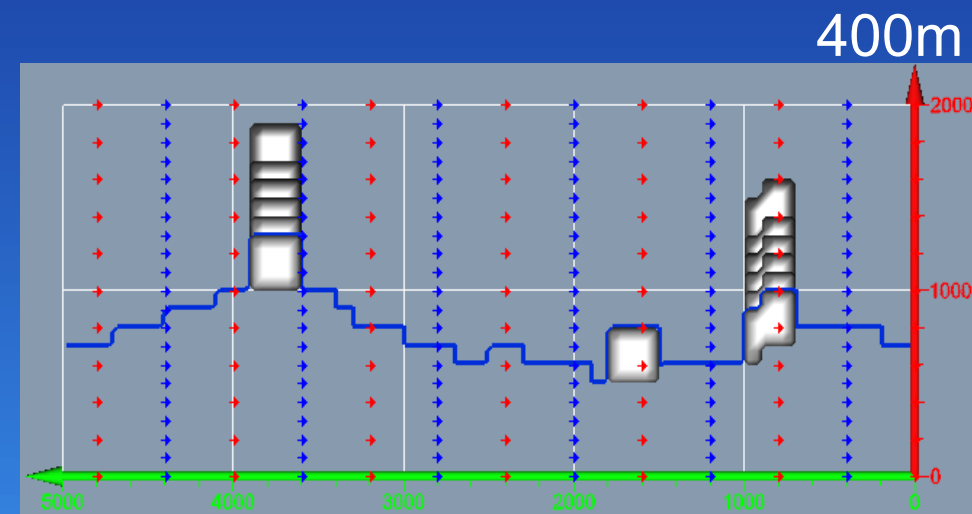
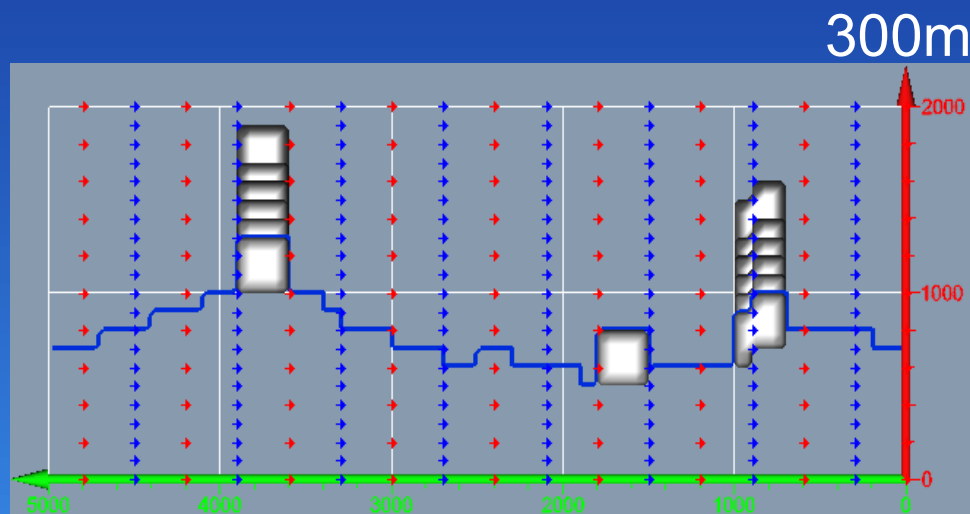
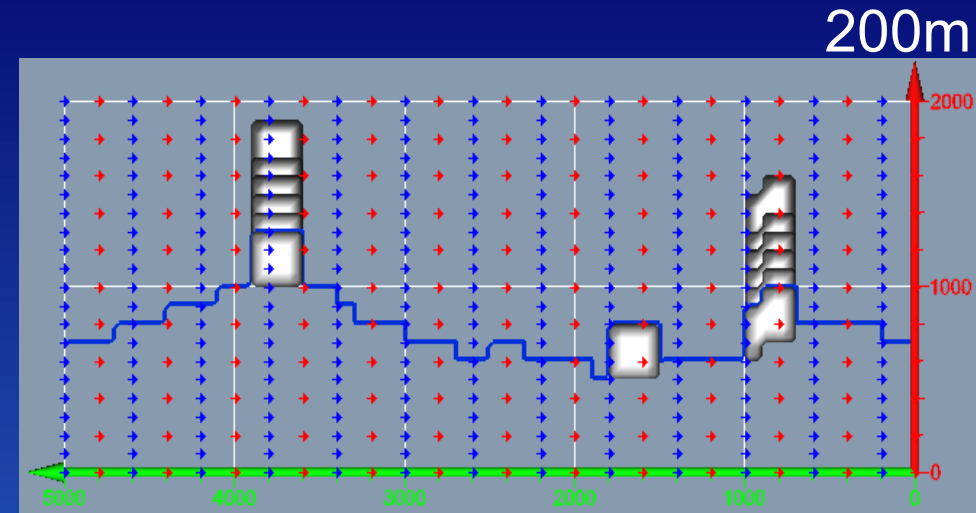
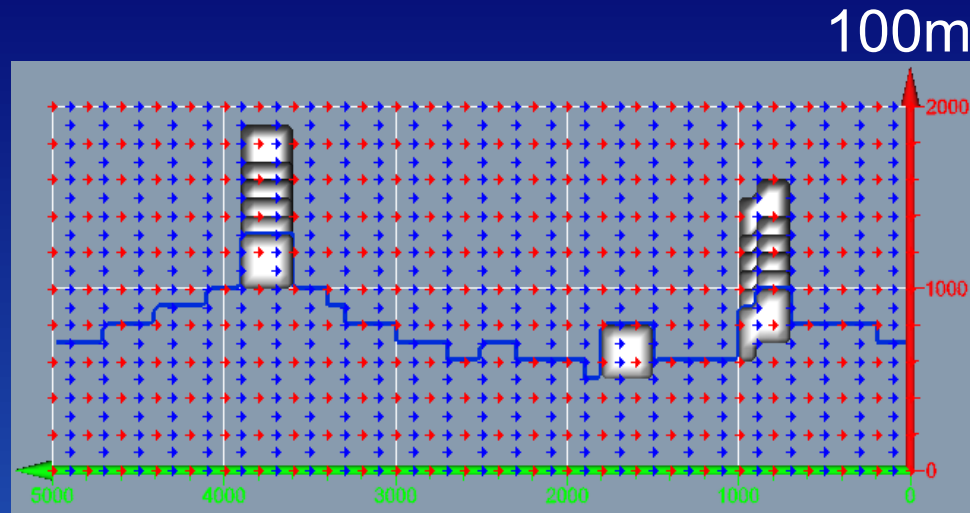


Observations – 235m depth 2D Dipole-Dipole

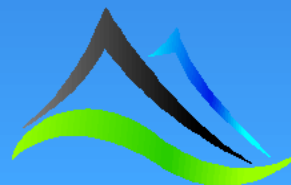
- The single shallow body pulls the chargeability contours up relative to the adjacent chargeable stack but still overestimates the depth to the body.

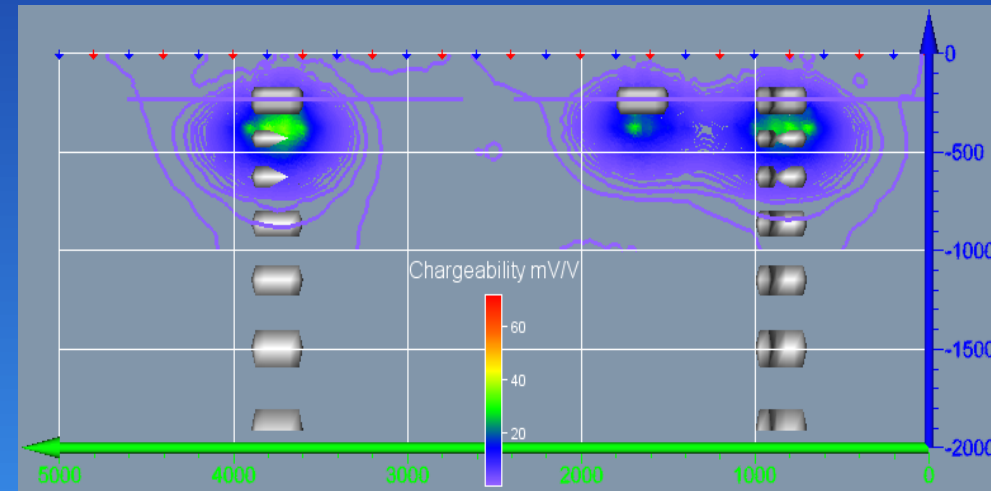
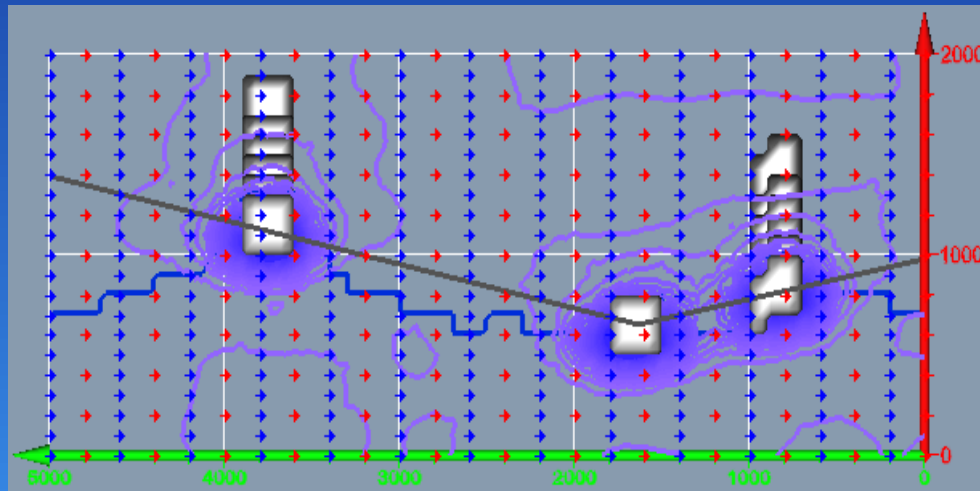
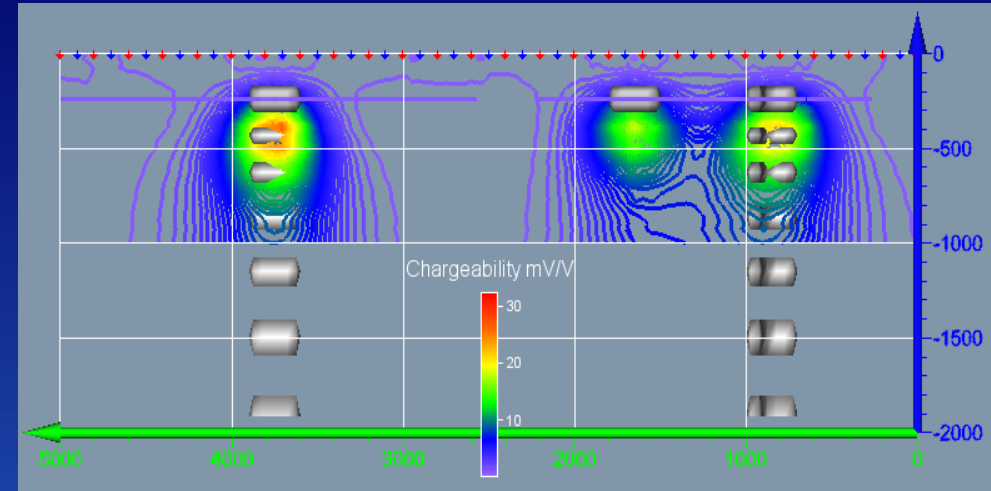
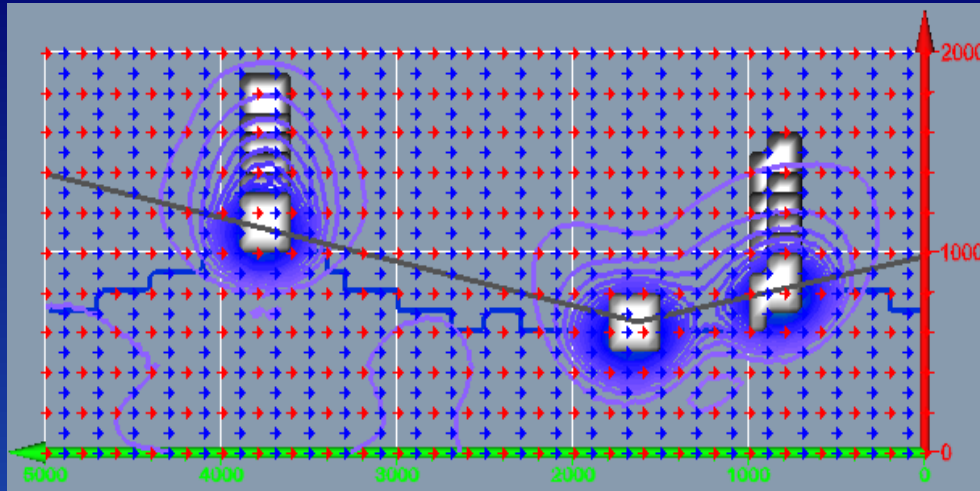


2.5D QODD with variable line spacing



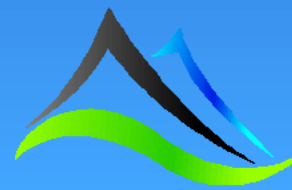
- 200m transmitter electrode spacing.
- 100m receiver electrode spacing.
- 100m, 200m, 300m and 400m line spacing.
- 4 lines of 20 dipoles active each reading.



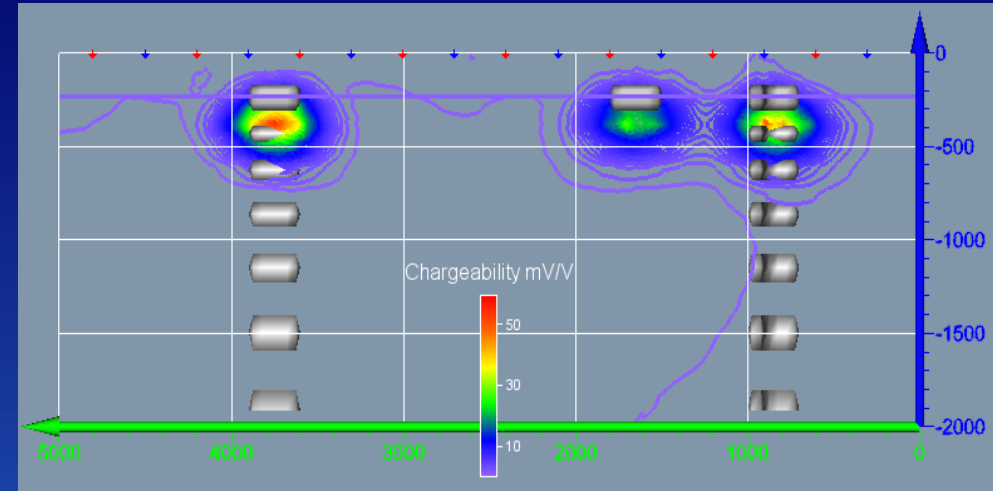
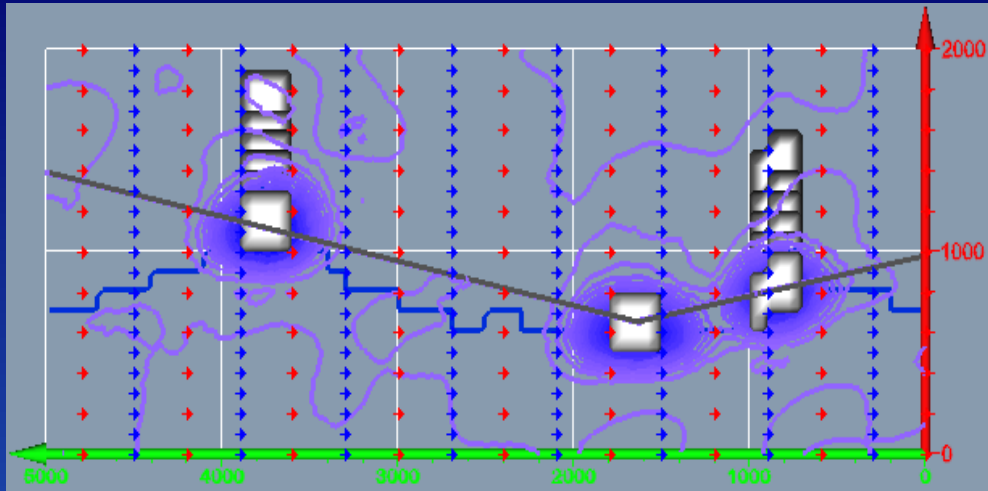


Plan view of contour slice at -200m

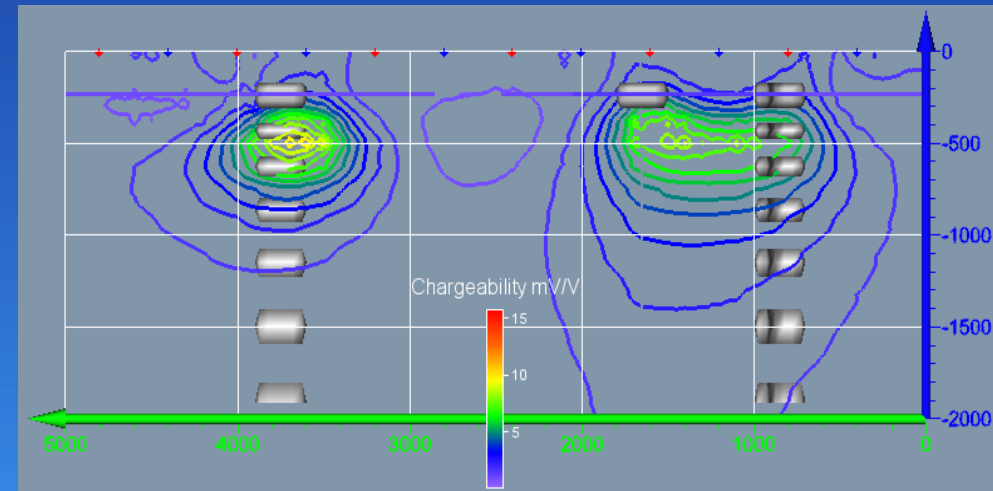
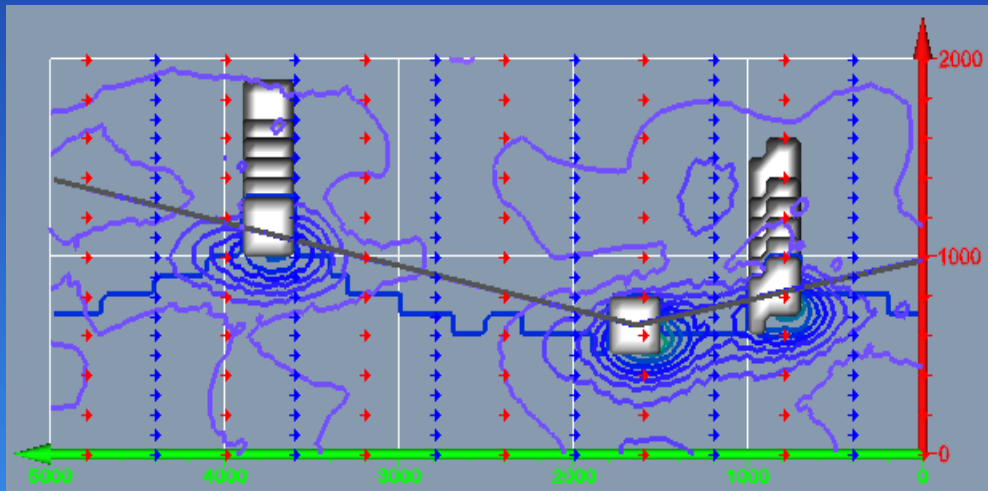
Bent and tilted long section view of contours through body centres



300m Chargeability

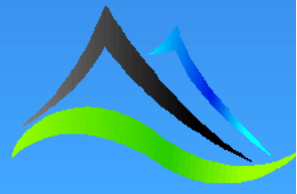


400m Chargeability



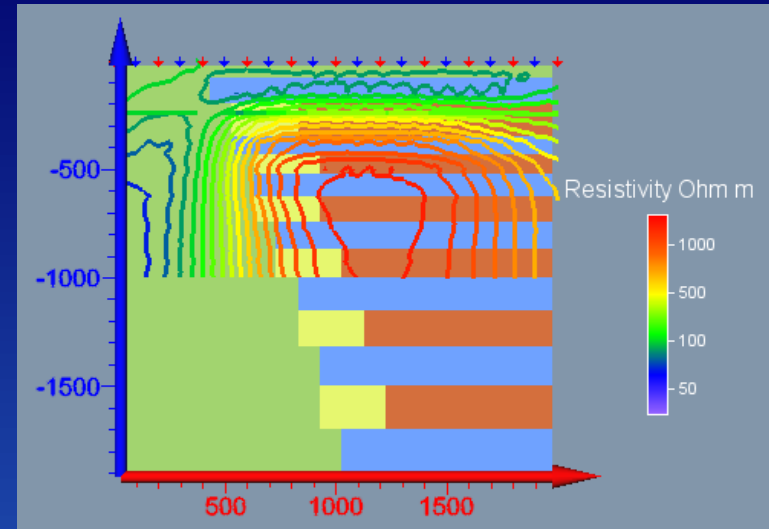
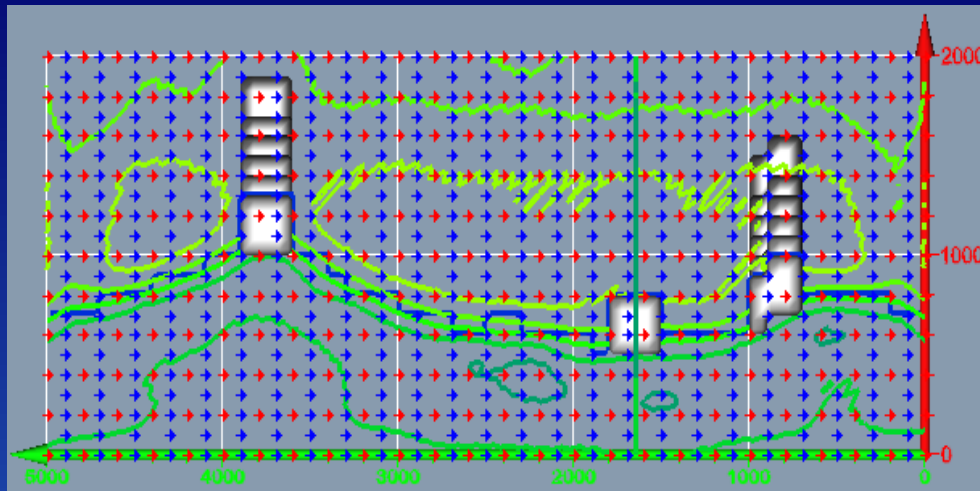
Plan view of contour slice at -200m

Bent and tilted long section view of contours through body centres

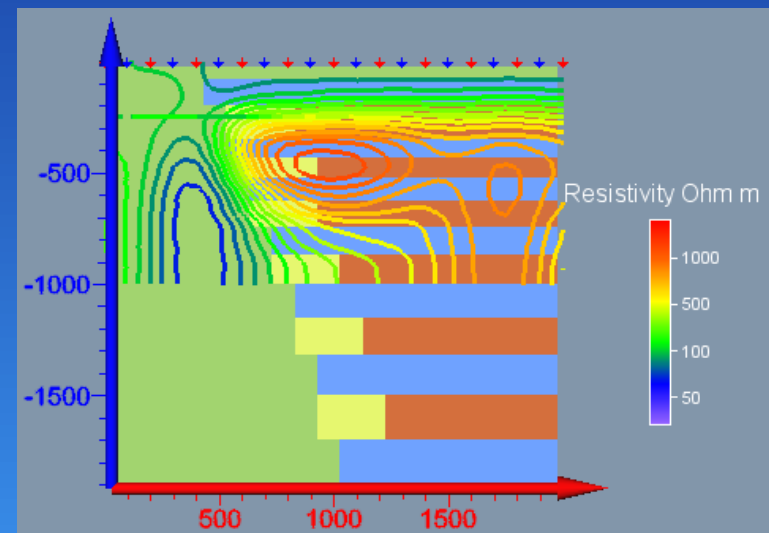
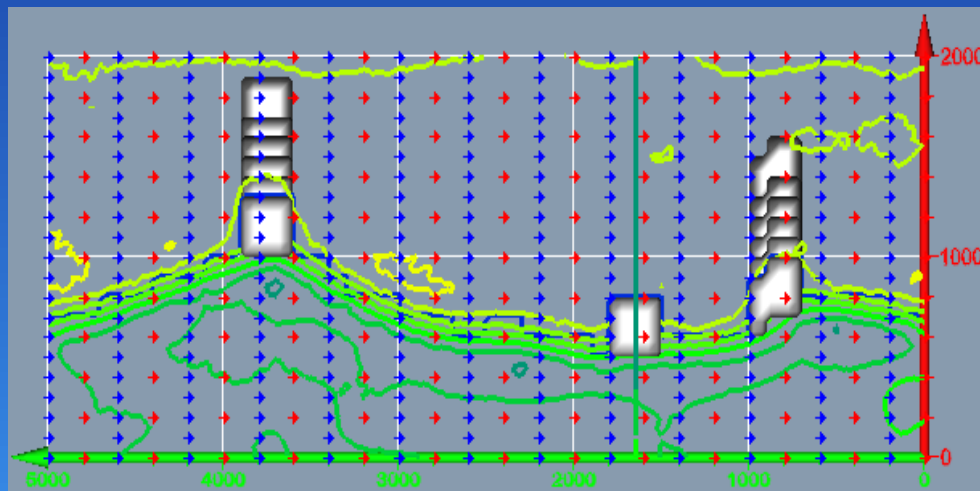


2.5D QODD

100m Resistivity

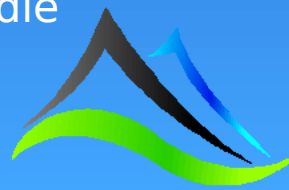


200m Resistivity



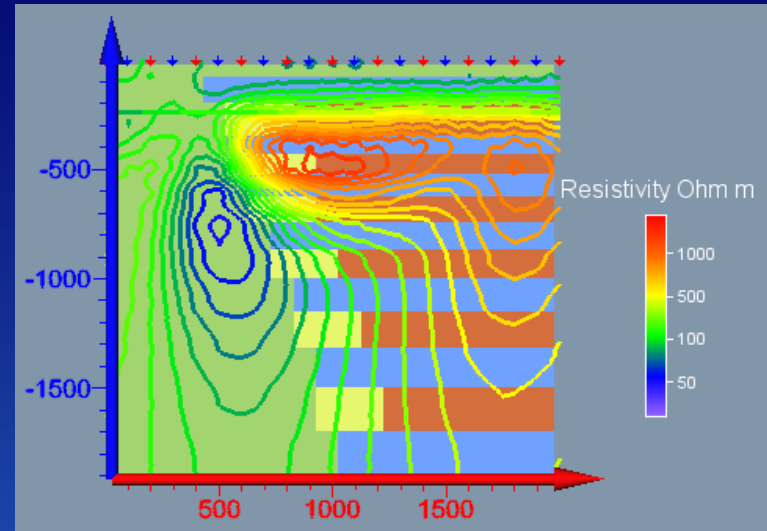
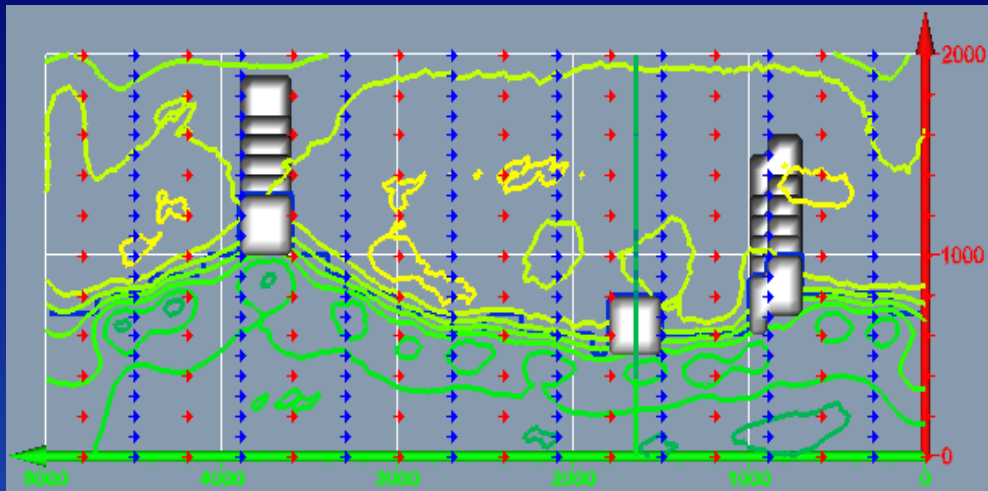
Plan view of contour slice through the middle of the chargeable centre body

Cross section through the middle of the chargeable centre body

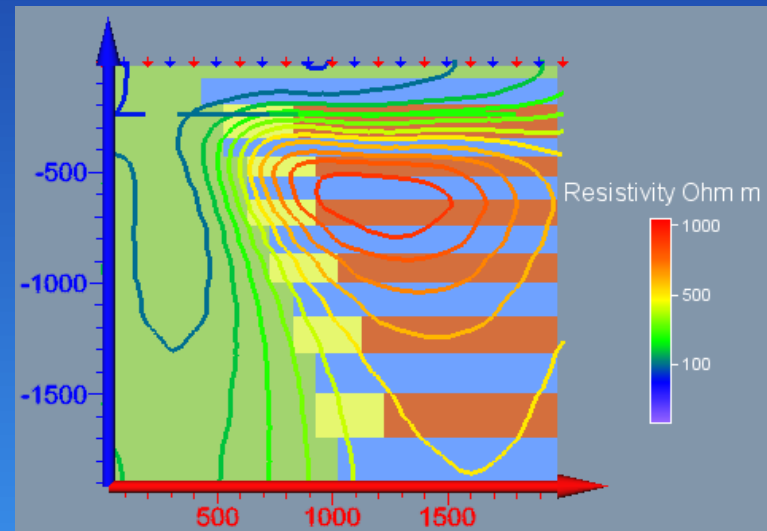
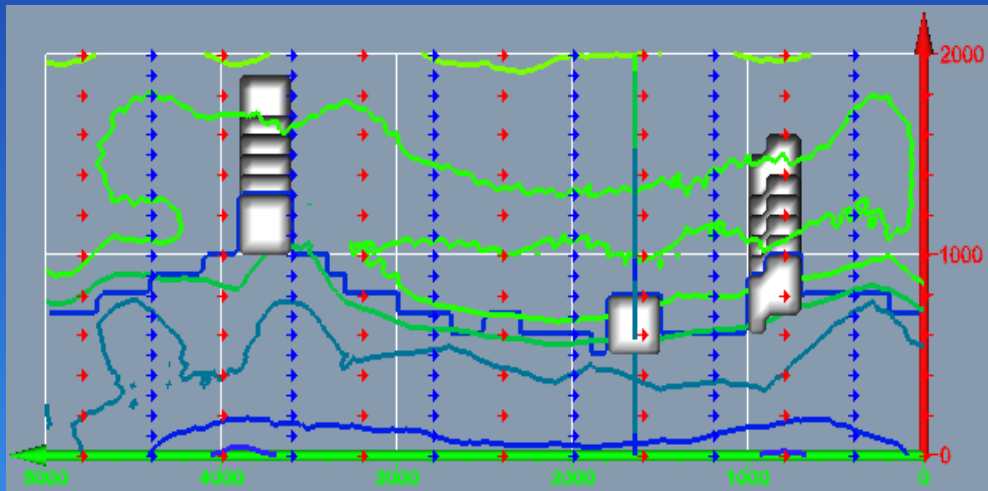


2.5D QODD

300m Resistivity

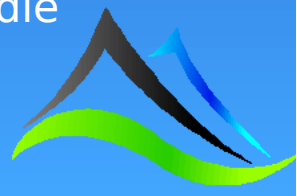


400m Resistivity



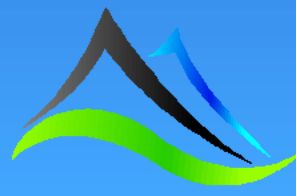
Plan view of contour slice through the middle of the chargeable centre body

Cross section through the middle of the chargeable centre body

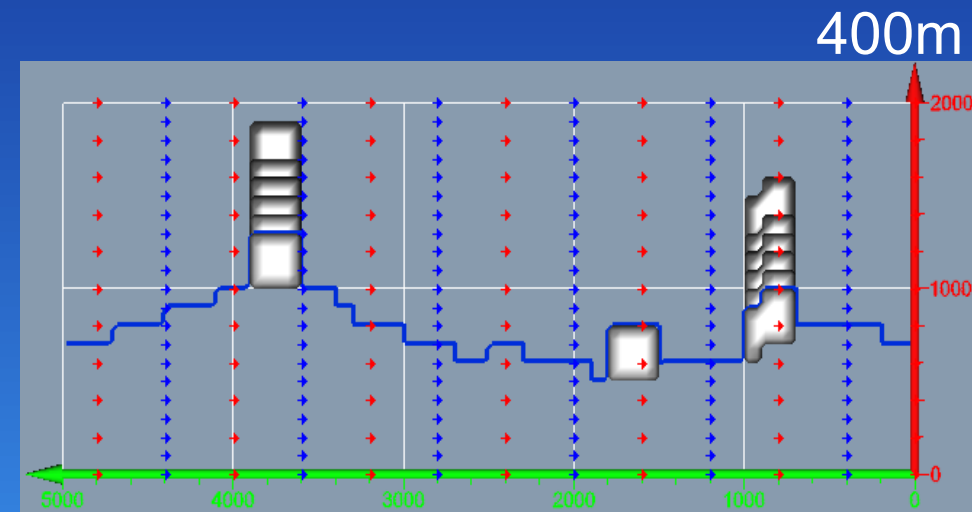
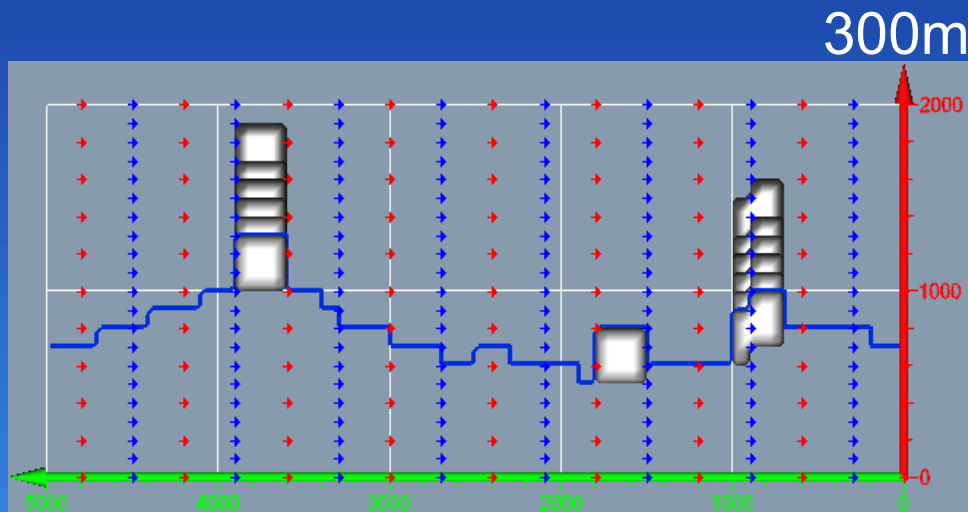
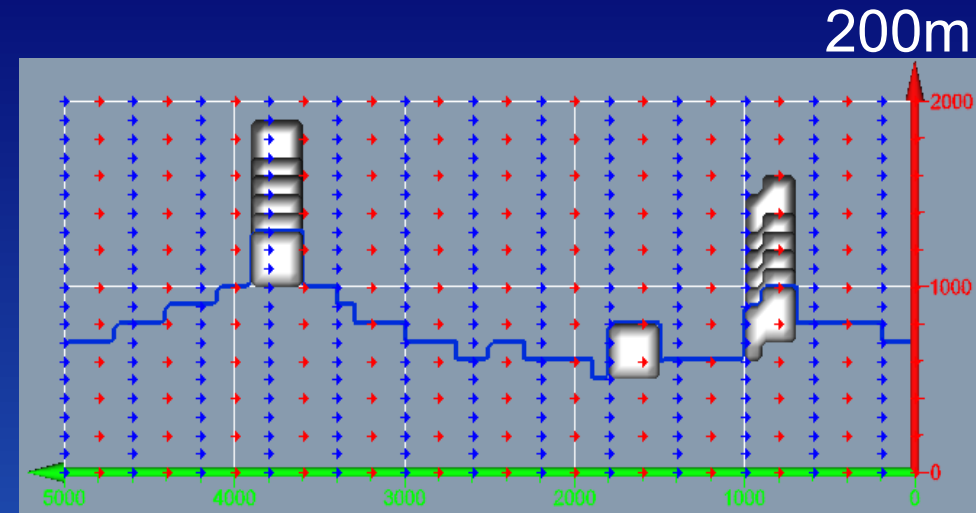
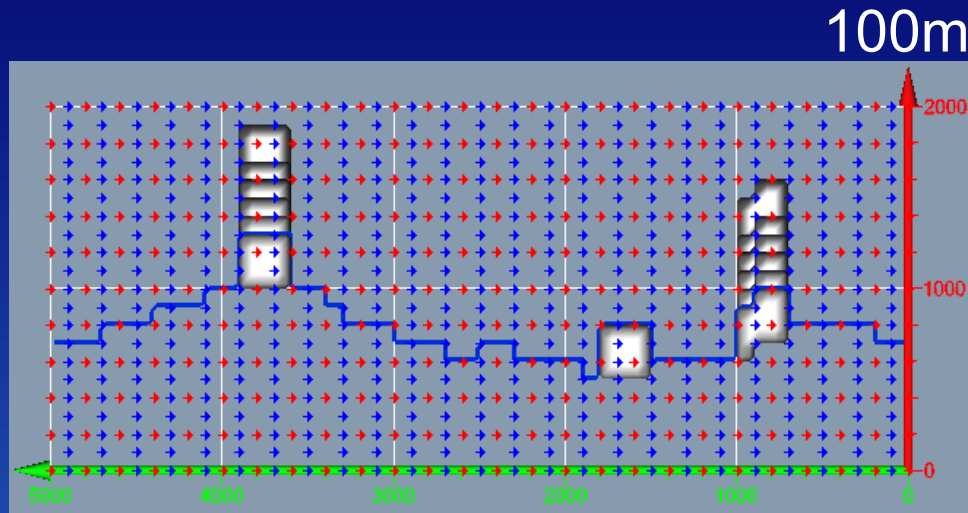


Observations – 235m depth 2.5D QODD

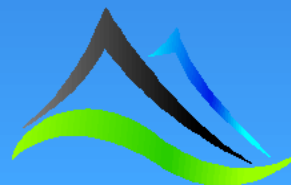
- The resistivity section clearly shows that it is not sensitive at depth. This is expected.
- The chargeability maximum is below the target.



2.5D Multipole QODD with variable line spacing

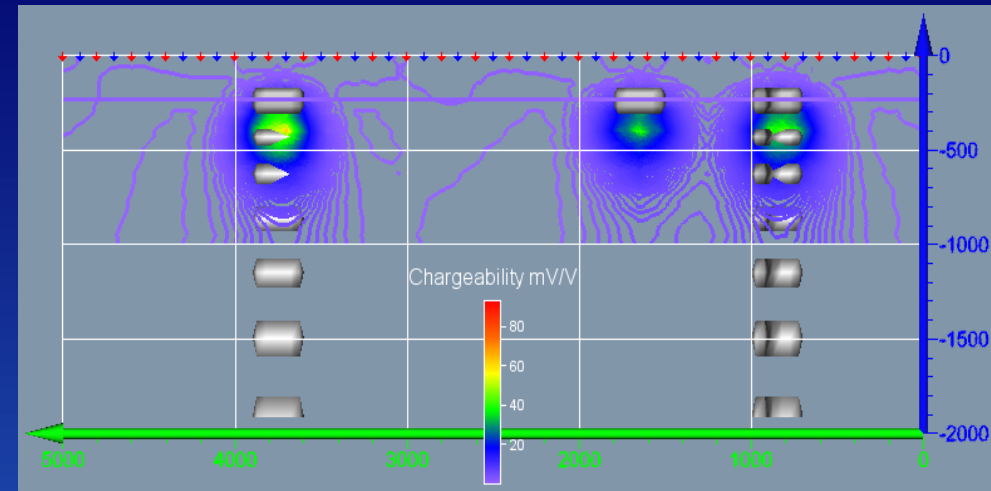
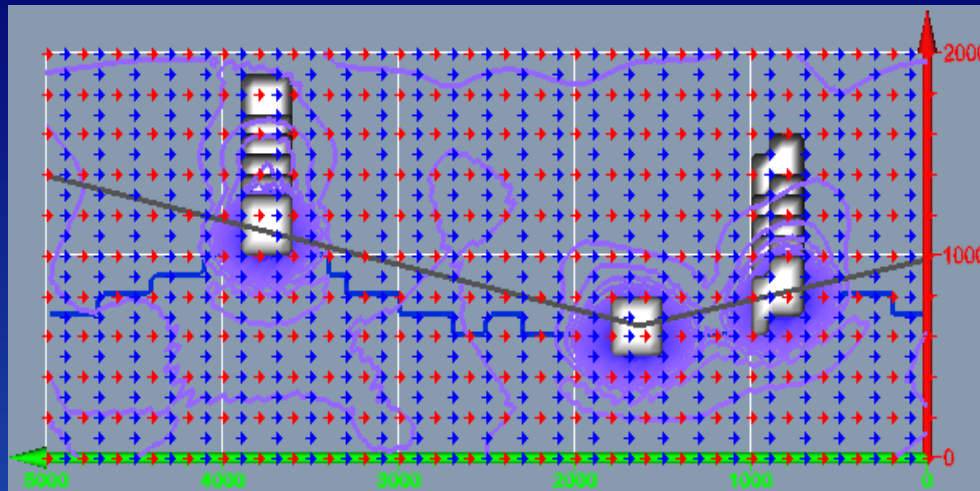


- 200m transmitter electrode spacing.
- 100m receiver electrode spacing with dipole sizes of 100m, 200m, 300m and 400m.
- 100m, 200m, 300m and 400m line spacing.
- 4 lines of 20 dipoles active each reading.

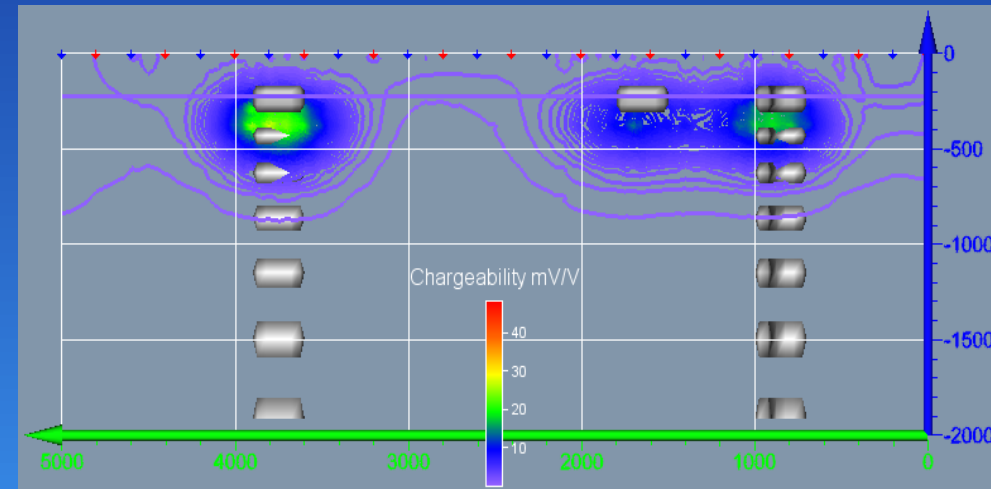
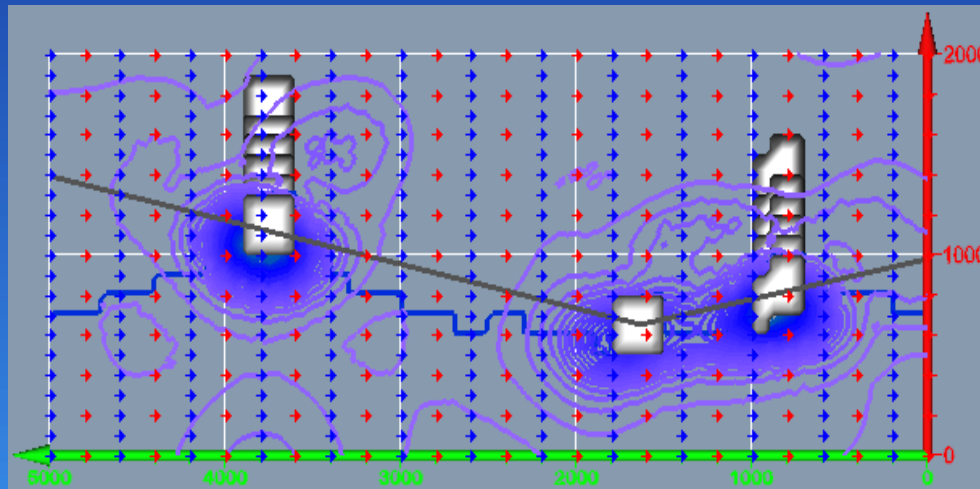


2.5D Multipole QODD

100m Chargeability

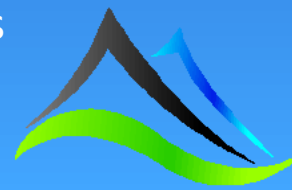


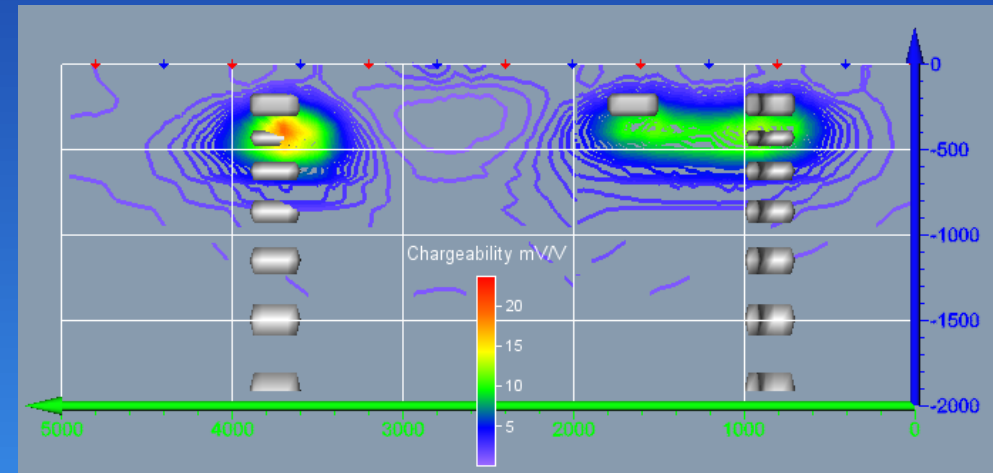
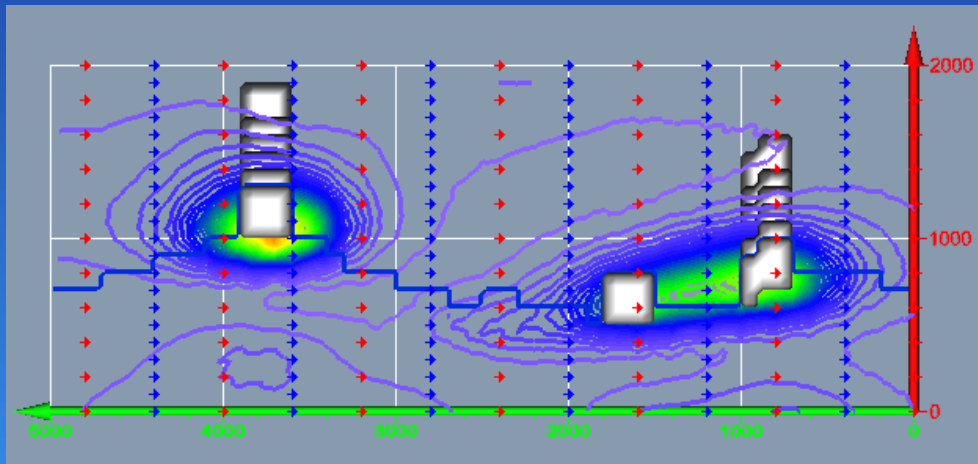
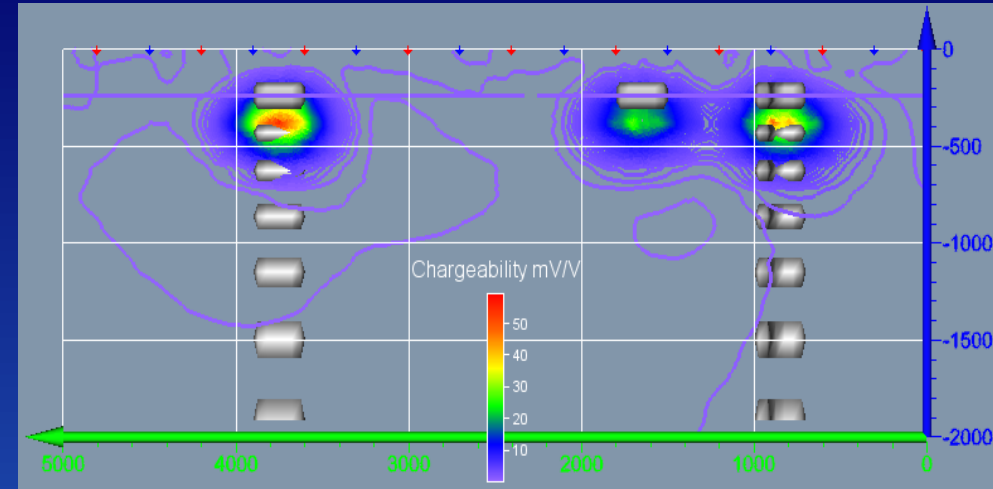
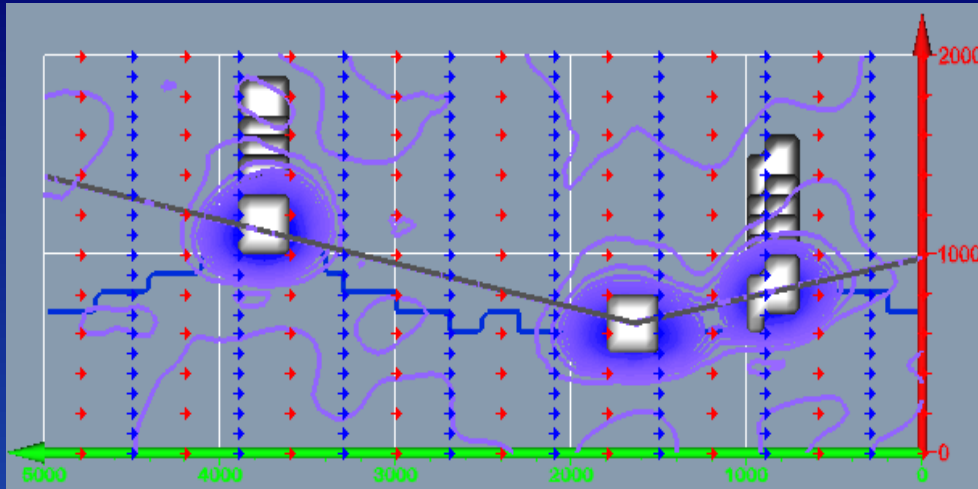
200m Chargeability



Plan view of contour slice at -200m

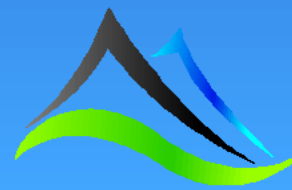
Bent and tilted long section view of contours through body centres





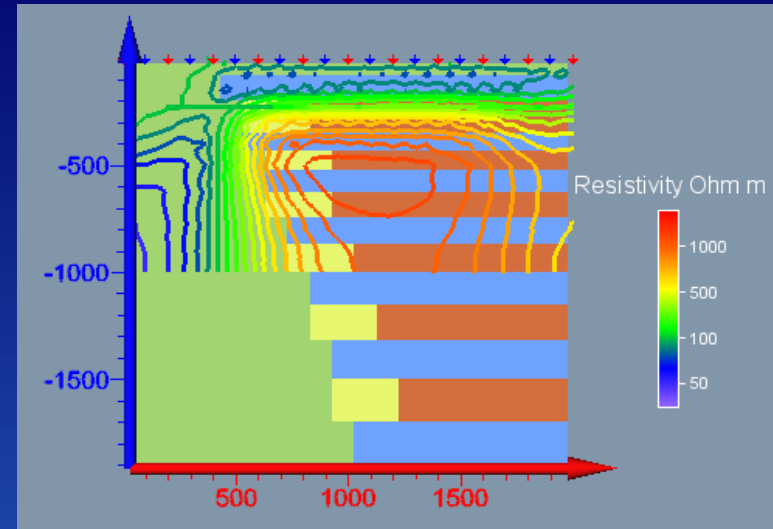
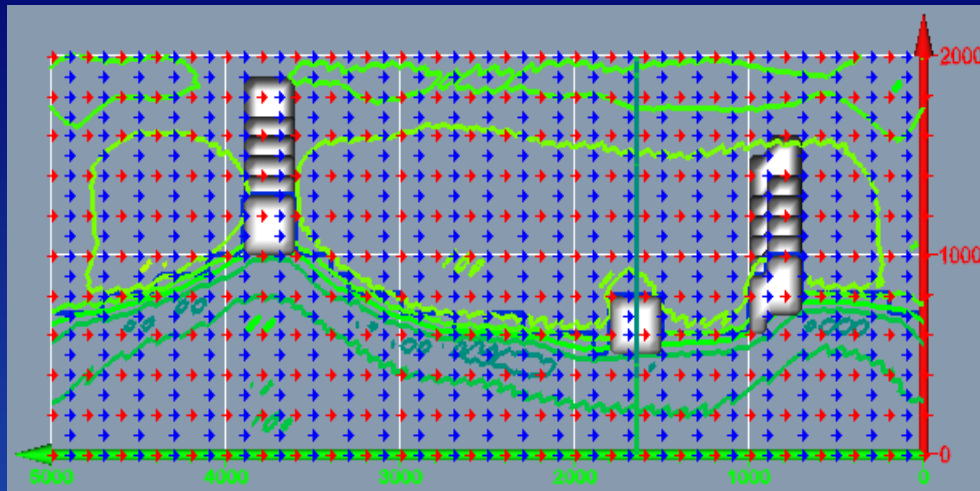
Plan view of contour slice at -200m

Bent and tilted long section view of contours through body centres

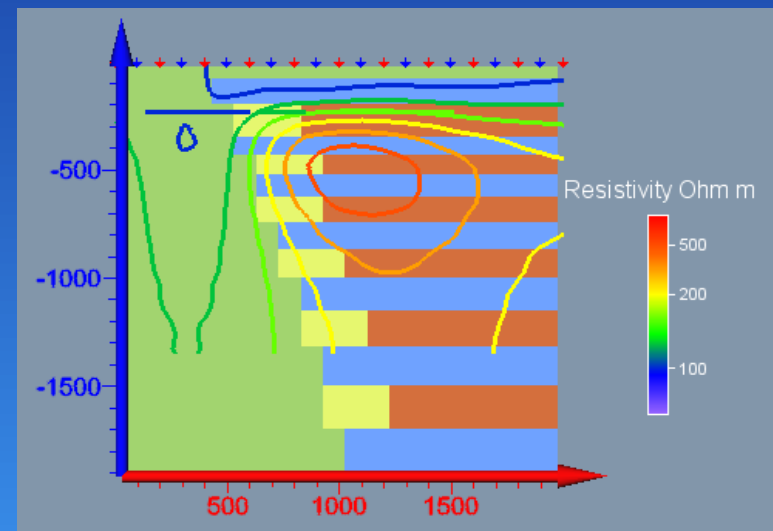
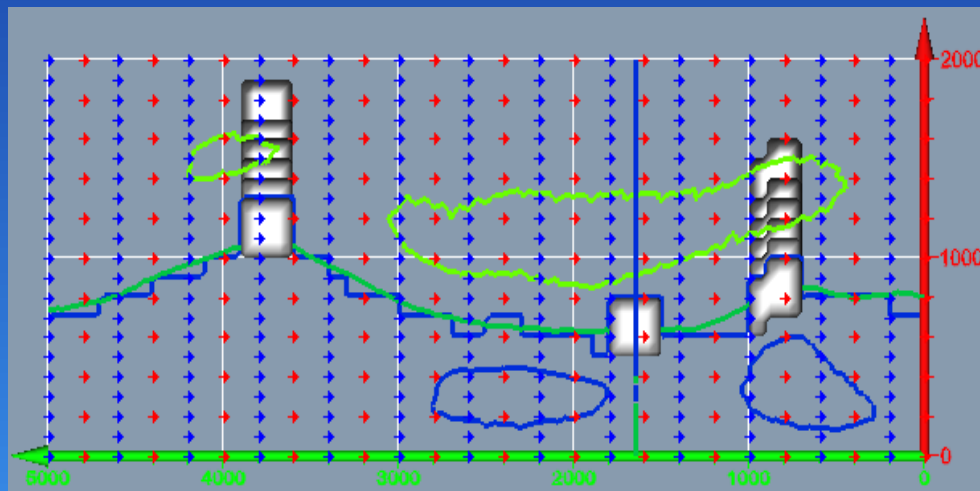


2.5D Multipole QODD

100m Resistivity

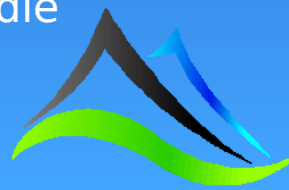


200m Resistivity



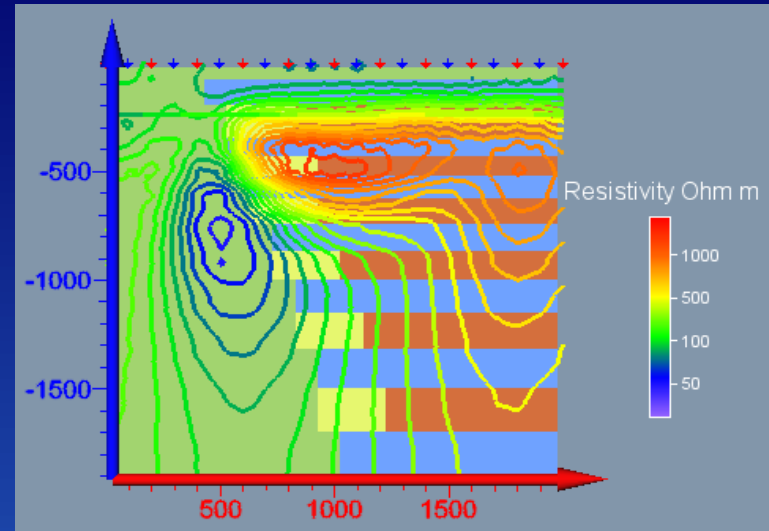
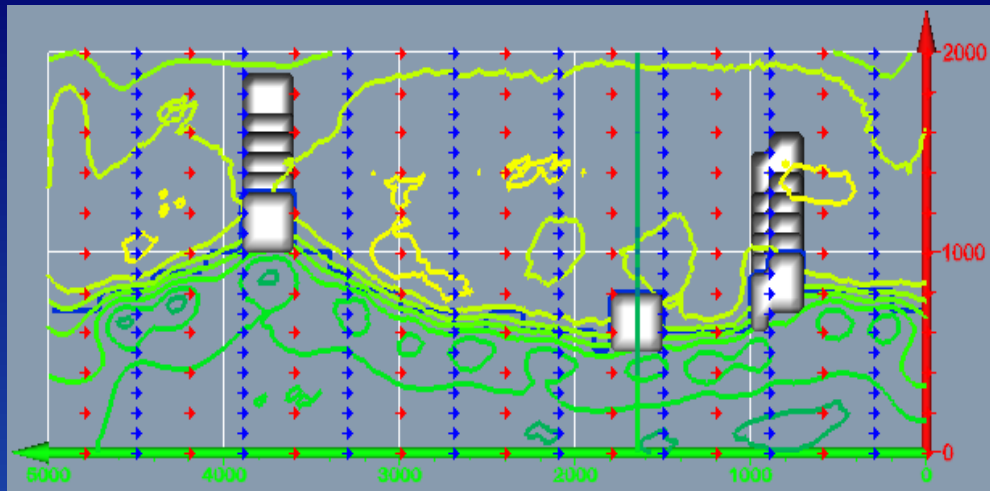
Plan view of contour slice through the middle of the chargeable centre body

Cross section through the middle of the chargeable centre body

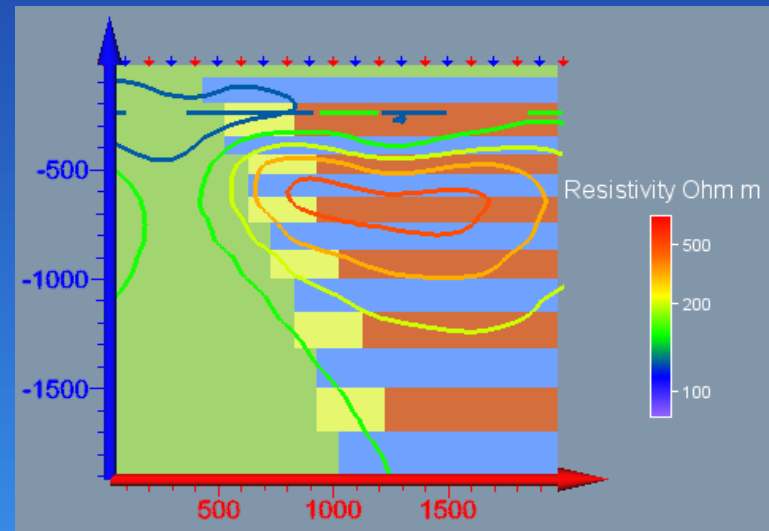
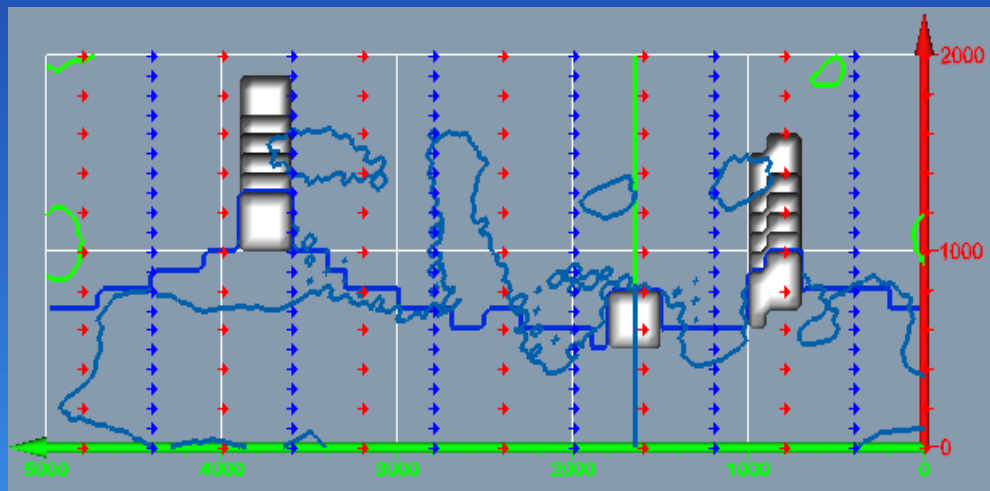


2.5D Multipole QODD

300m Resistivity

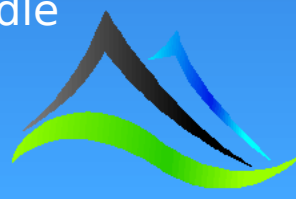


400m Resistivity



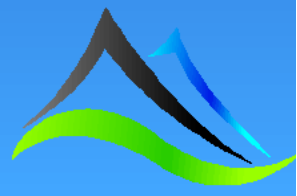
Plan view of contour slice through the middle of the chargeable centre body

Cross section through the middle of the chargeable centre body

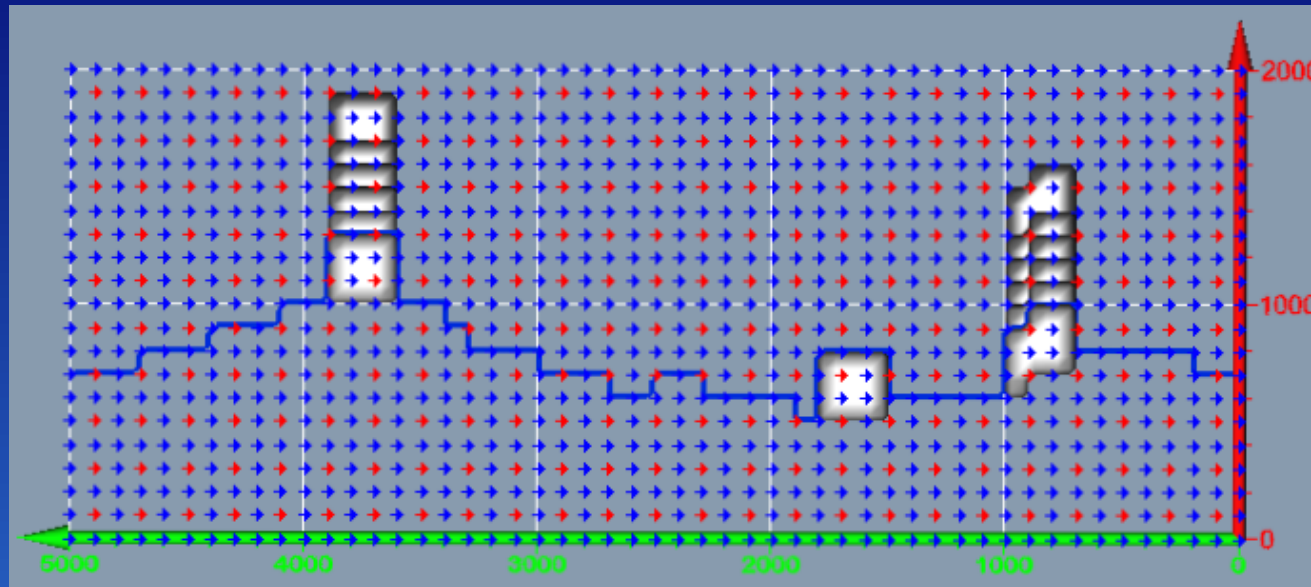


Observations – 235m depth 2.5D QODD Multipole

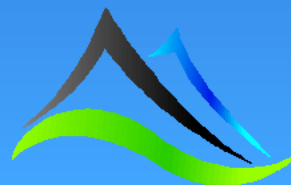
- As the line spacing increases, the chargeability inversion loses resolution.



3D Pole-Dipole

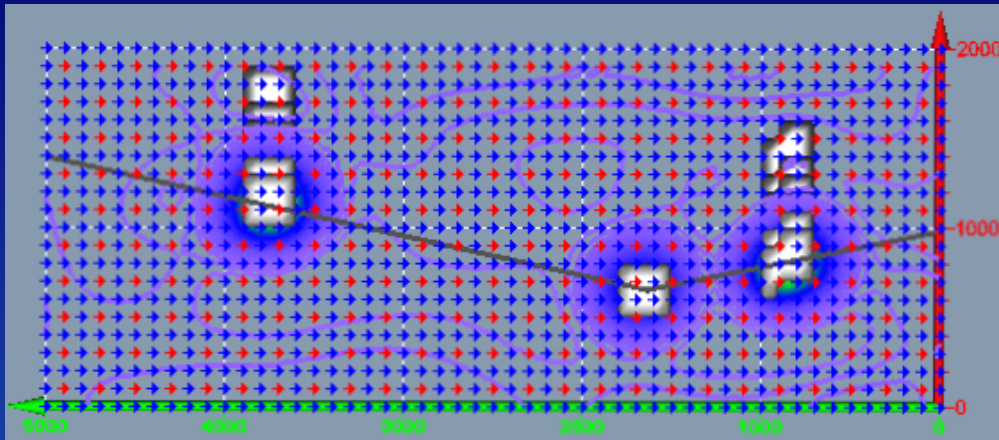


- 200m transmitter electrode spacing.
- 100m receiver electrode spacing.
- 100m line spacing.

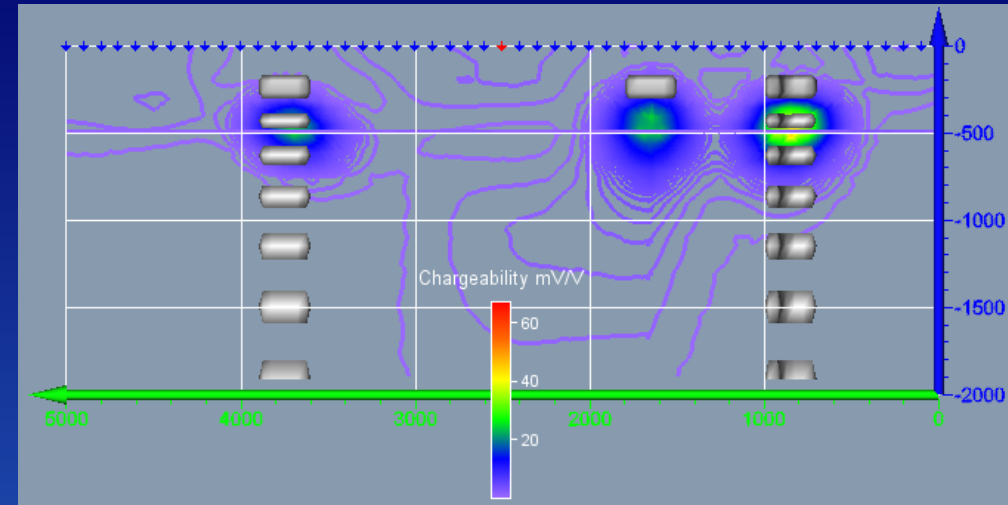


3D Pole-Dipole

Chargeability

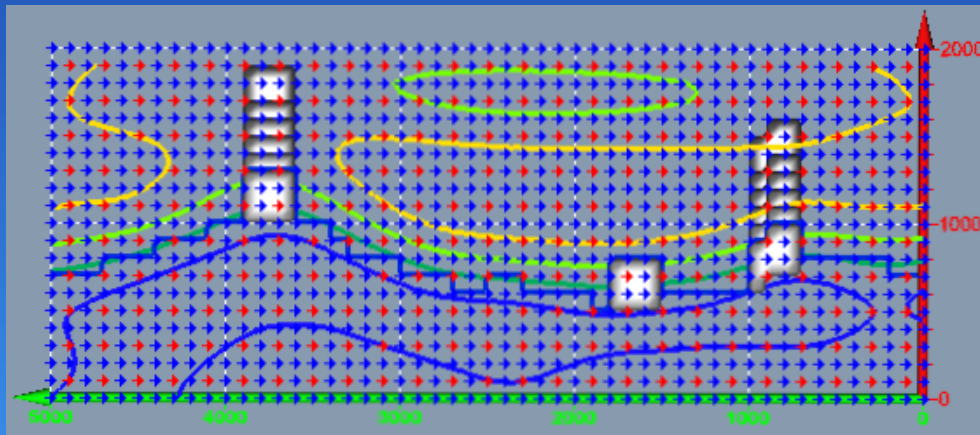


Plan view of contour slice through maximum response

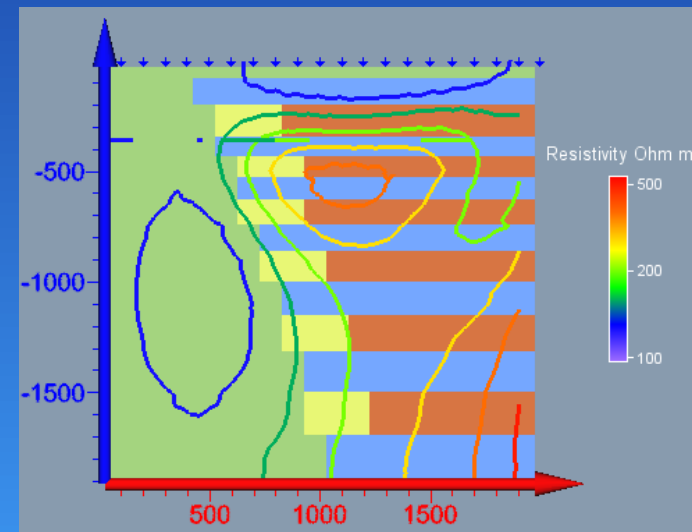


Bent and tilted long section view of contours through body centres

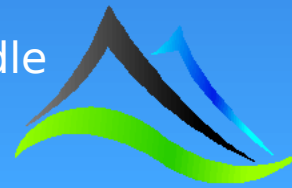
Resistivity



Plan view of contour slice at -400m

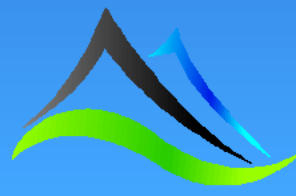


Cross section through the middle of the chargeable centre body

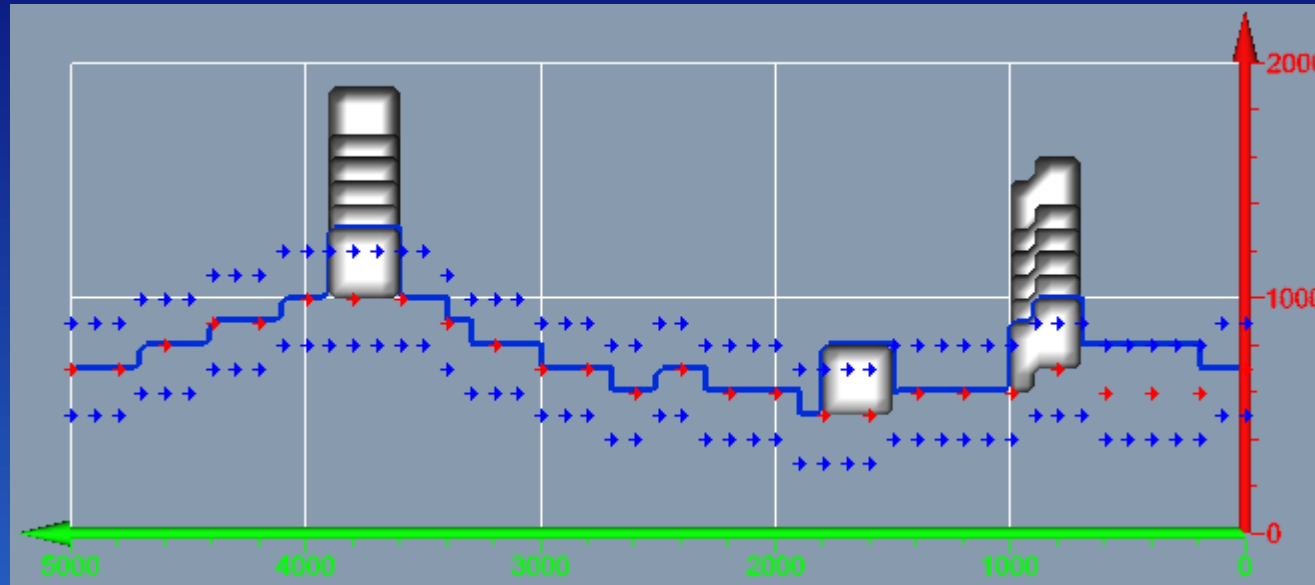


Observations – 235m depth 3D Pole-Dipole

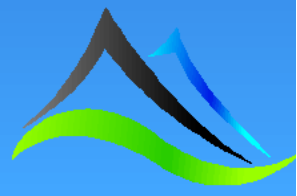
- Clear chargeability resolution, albeit the depth has been overestimated.



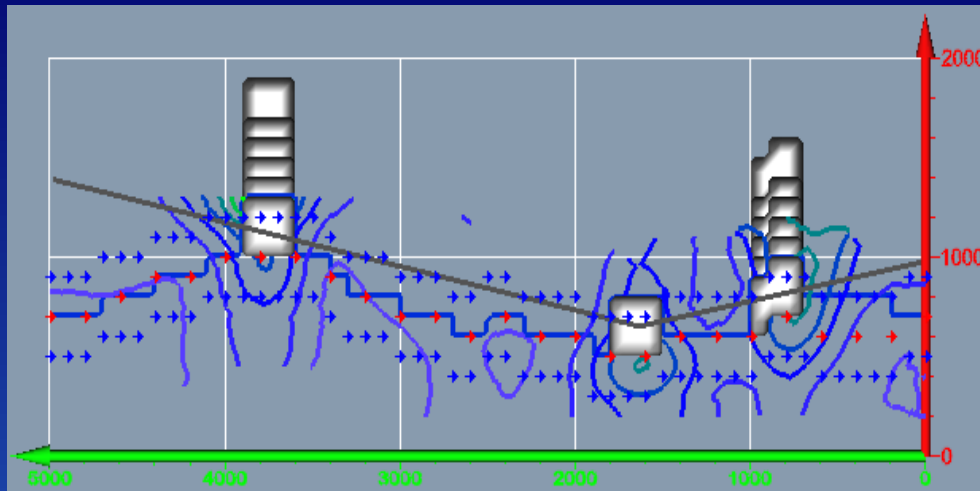
Strike parallel 2.5D Double Offset Dipole-Dipole



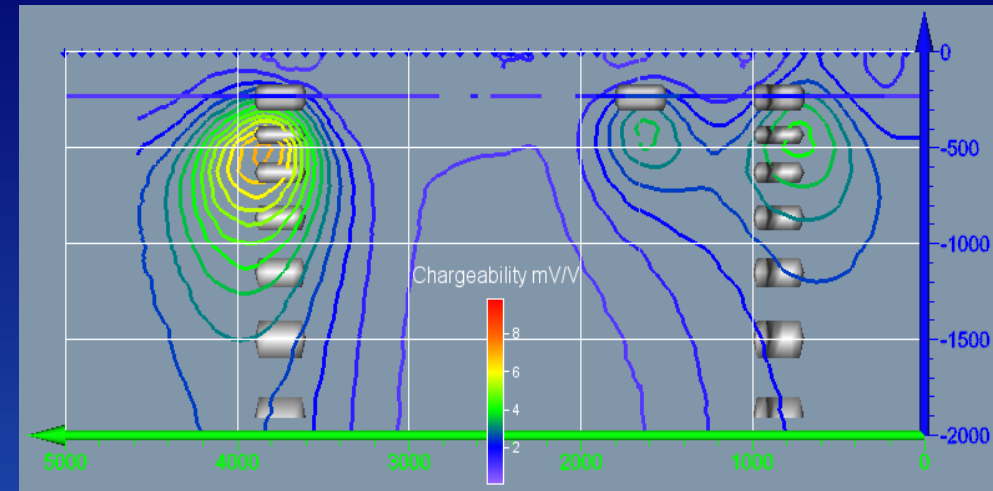
- 200m transmitter electrode spacing.
- 100m receiver electrode spacing.
- 200m line spacing.
- All electrodes active for each reading.
- Results masked in a window between $\pm 300\text{m}$ of the current electrodes line.



Chargeability

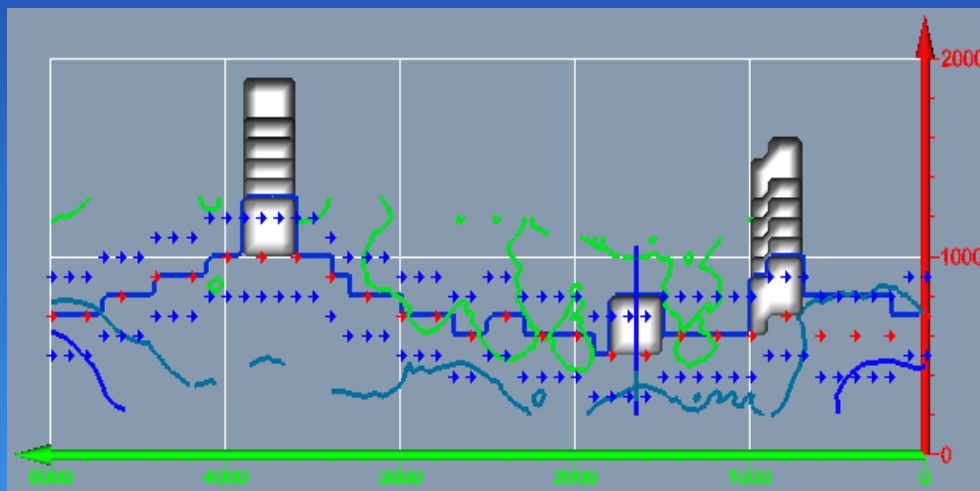


Plan view of contour slice at -200m

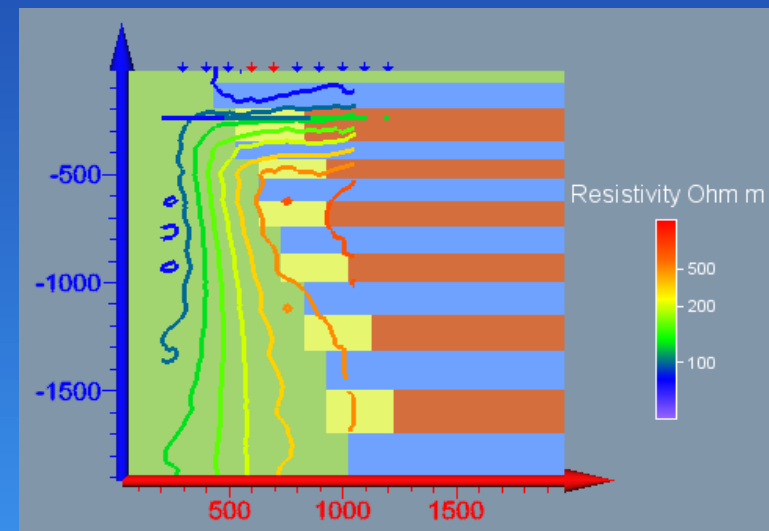


Bent and tilted long section view of contours through body centres

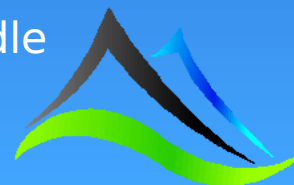
Resistivity



Plan view of contour slice through the middle of the chargeable centre body

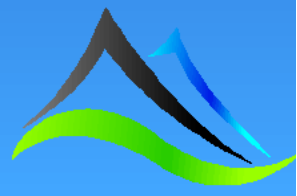


Cross section through the middle of the chargeable centre body

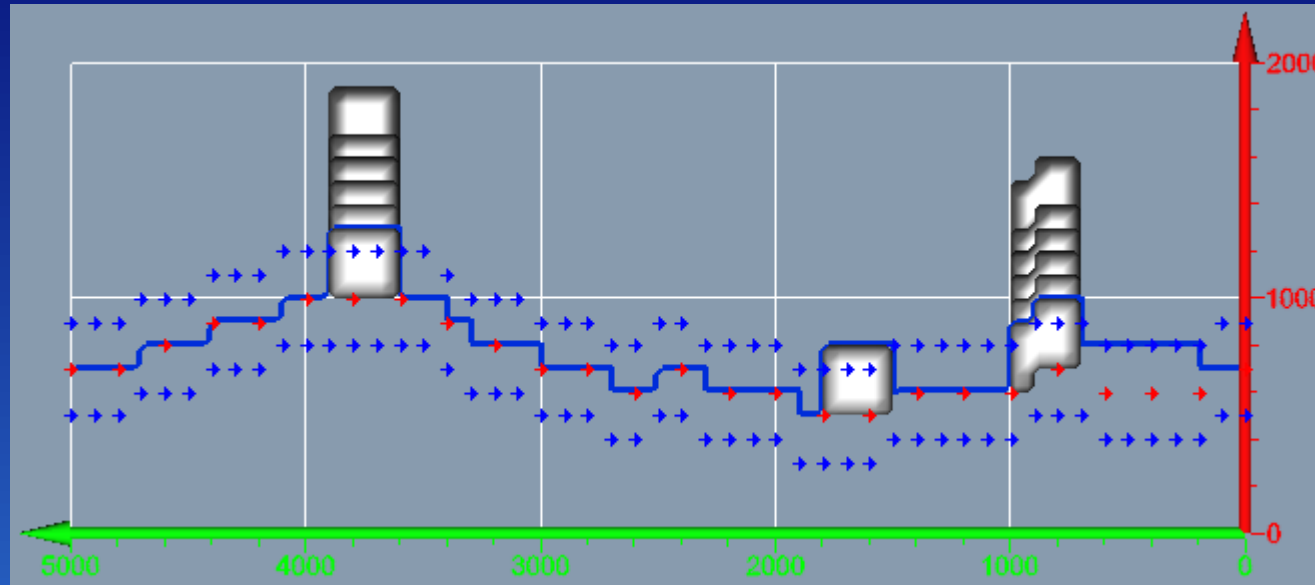


Observations – 235m depth Strike parallel 2.5D

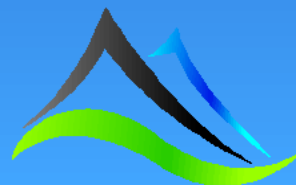
- The inversion correctly identified the shape and size of the single body, but was unable to accurately determine the horizontal and vertical location.
- The single body chargeability anomaly has been offset by approximately one line spacing from the body itself in plan view. This offset is not seen in the previous arrays and is not understood.



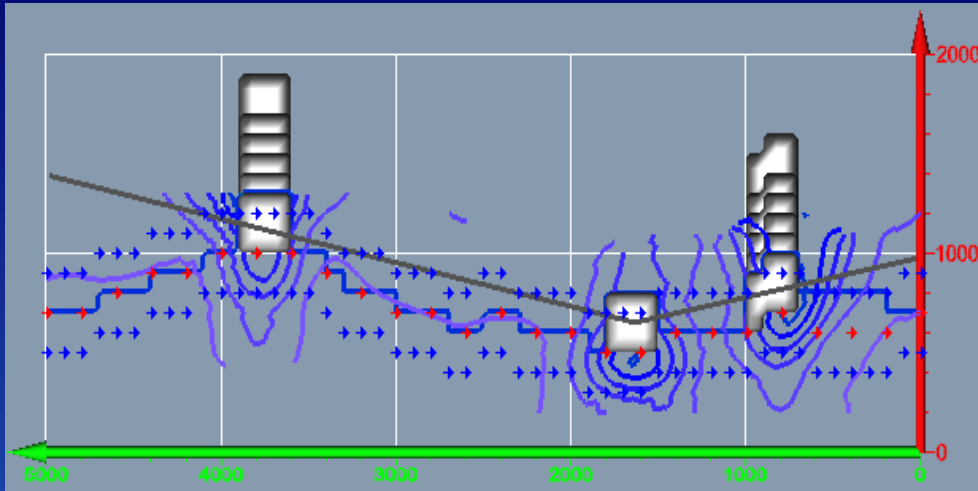
Strike parallel 2.5D Multipoles Double Offset Dipole-Dipole



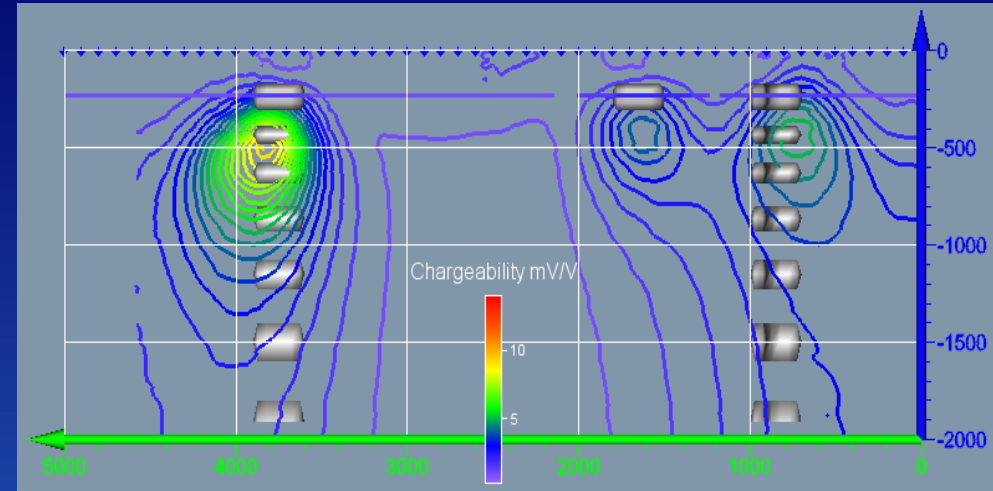
- 200m transmitter electrode spacing.
- 100m receiver electrode spacing with dipole sizes of 100m, 200m, 300m and 400m.
- 200m line spacing.
- All electrodes active for each reading.
- Results masked in a window between $\pm 300\text{m}$ of the current electrodes line.



Chargeability

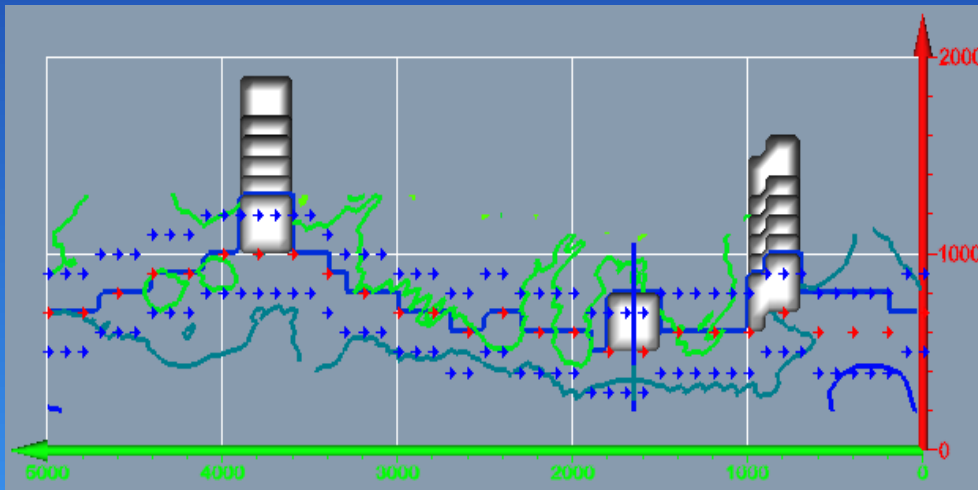


Plan view of contour slice at -200m

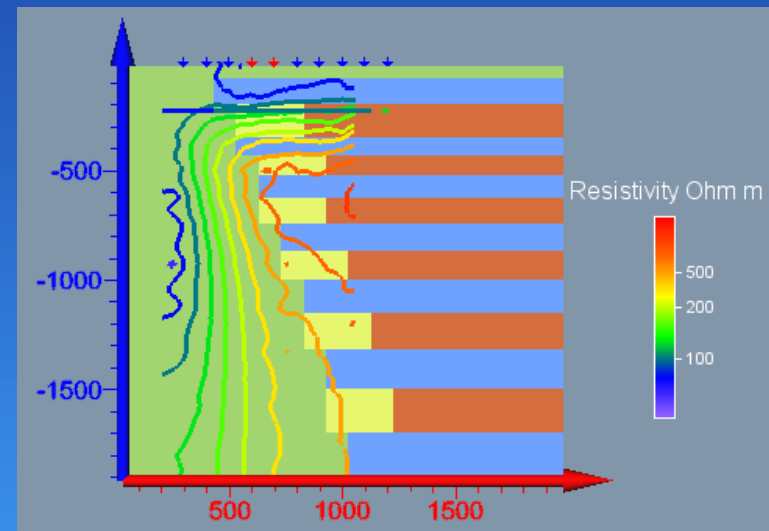


Bent and tilted long section view of contours through body centres

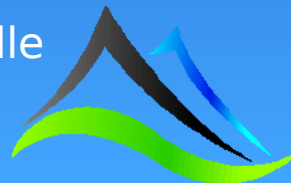
Resistivity



Plan view of contour slice through the middle of the chargeable centre body

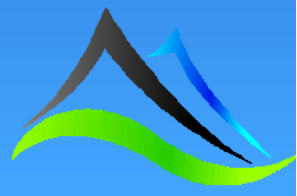


Cross section through the middle of the chargeable centre body



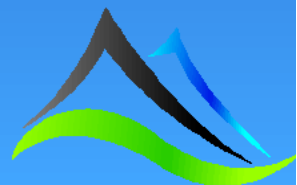
Observations – 235m depth Strike parallel 2.5D multipole

- This array provides better dip and chargeability resolution compared to the non-multipole array.
- As was the case with the non-multipole strike parallel array, the single body chargeability anomaly has been offset by one line spacing in plan view. Only the two strike parallel arrays show this offset.

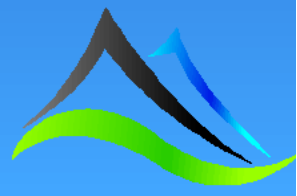


Summary – 235m depth

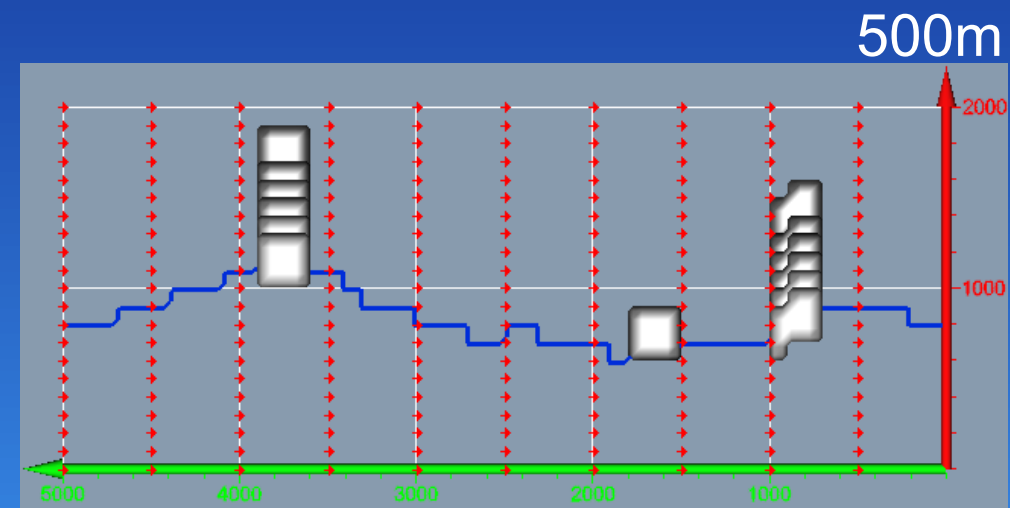
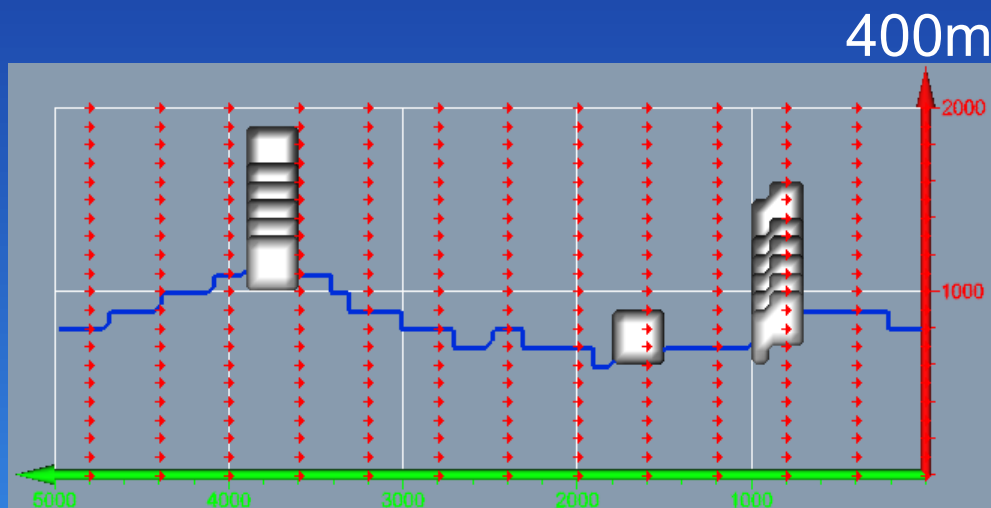
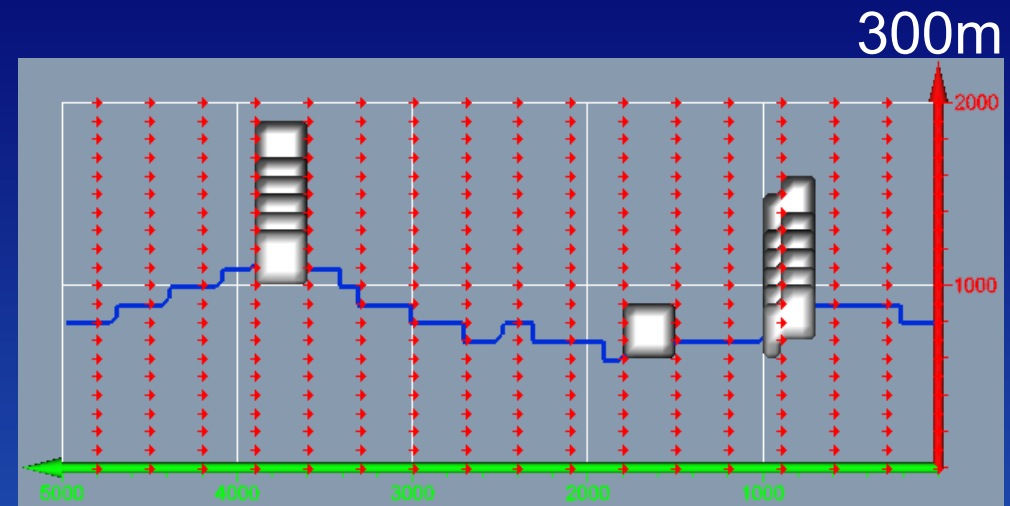
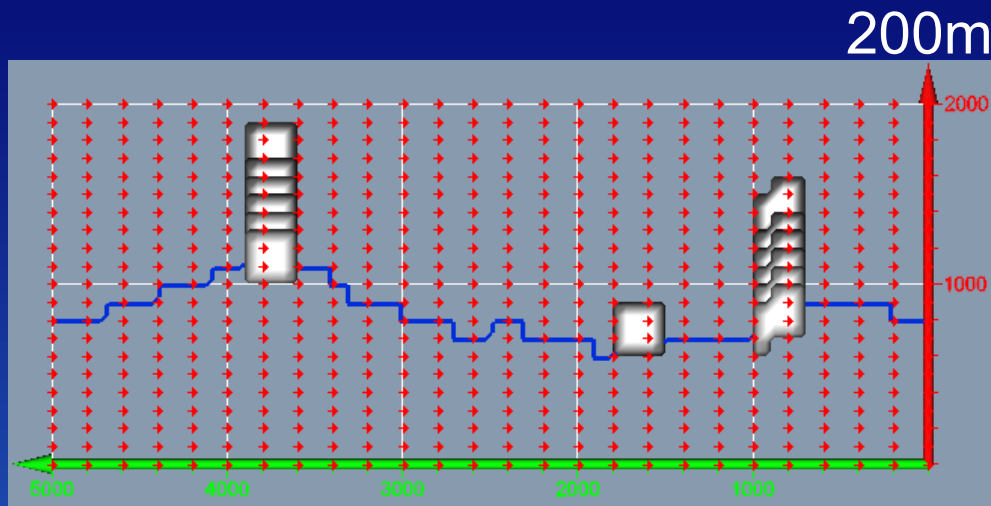
- The 2.5D QODD array shows better spatial resolution than the 2DDD array and is able to resolve the closely spaced zones for all models except the 400m section.
- As expected, the best resolution is found with the 2.5D multipole QODD.
- The 3D pole-dipole array did about as good a job as the 2.5D multipole QODD array with 300m line spacing, but considering the extra electrodes needed, this would not be an array of choice.
- Both strike parallel arrays were able to detect the two closely spaced zones, albeit with low dynamic range. The multipole array did slightly better.
- In all models and arrays, the depth to the targets were overestimated.



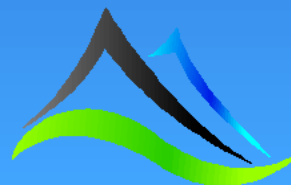
Fault 70° dip.
Chargeable body at 430m depth.



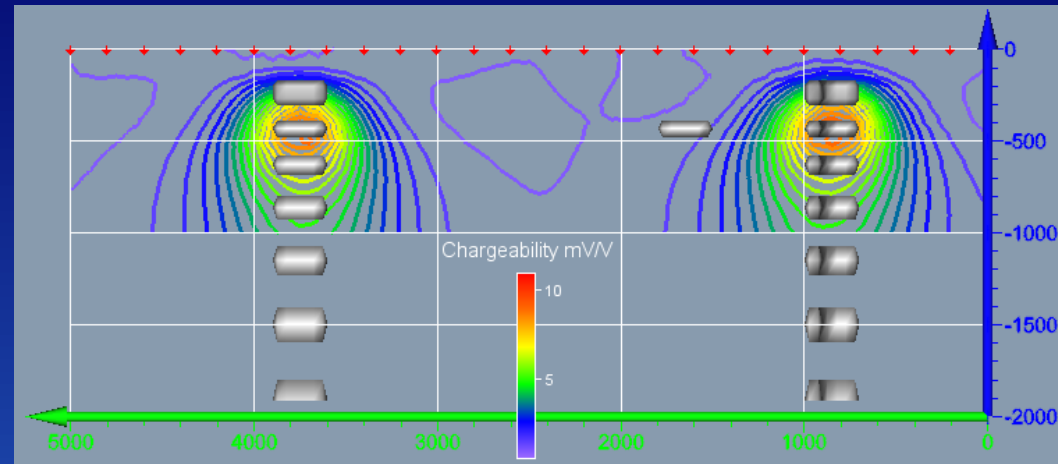
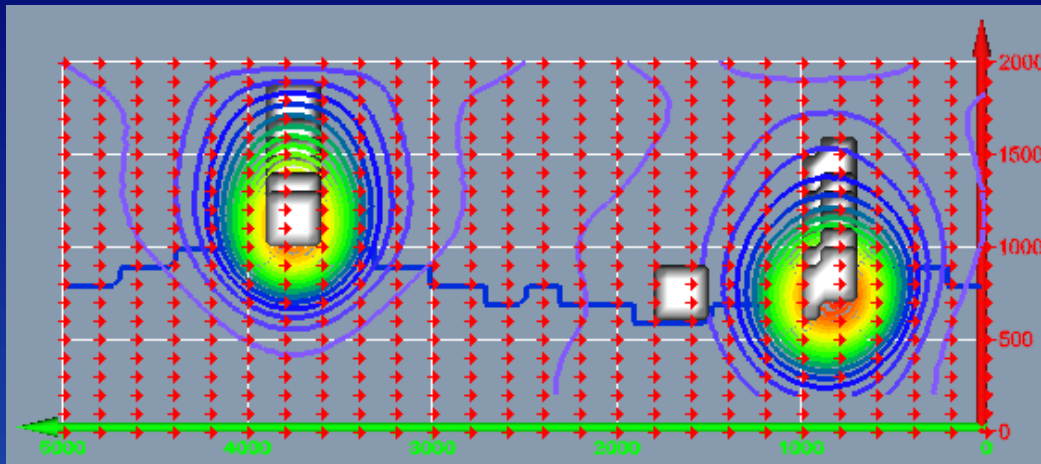
2D Dipole-Dipole with variable line spacing



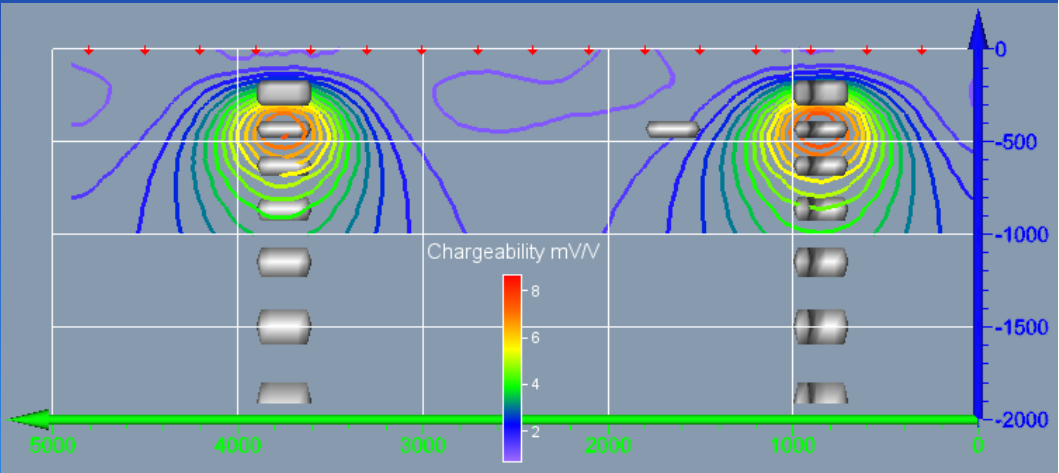
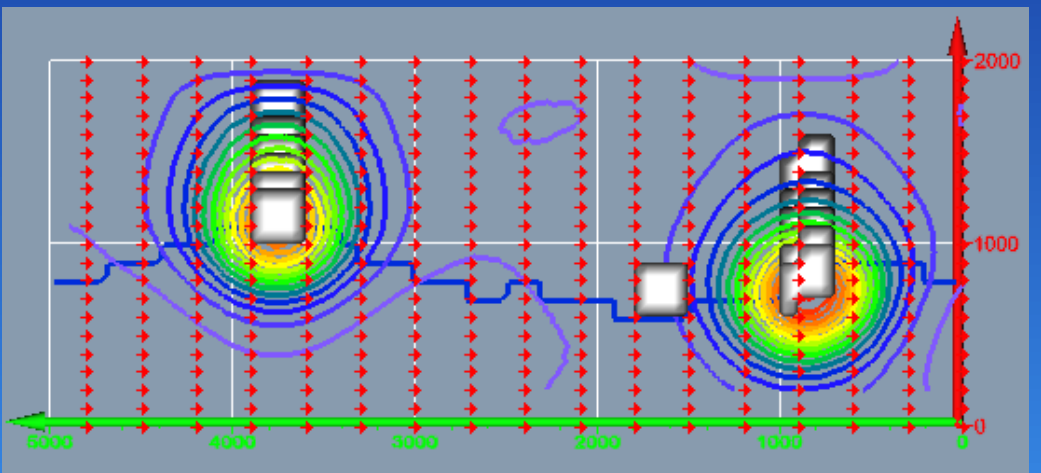
- 100m electrodes and 100m dipoles.
- 200m, 300m, 400m and 500m line spacing.
- Full line of 20 dipoles active each reading.



200m Chargeability

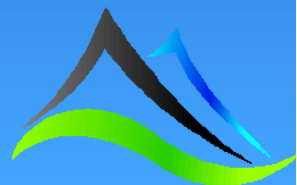


300m Chargeability

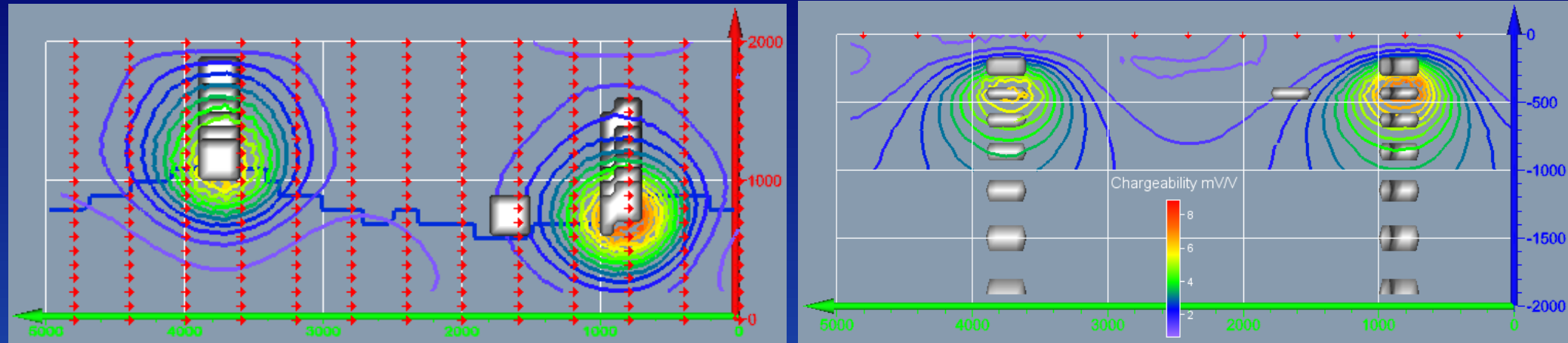


Plan view of contour slice at
arrow -600m

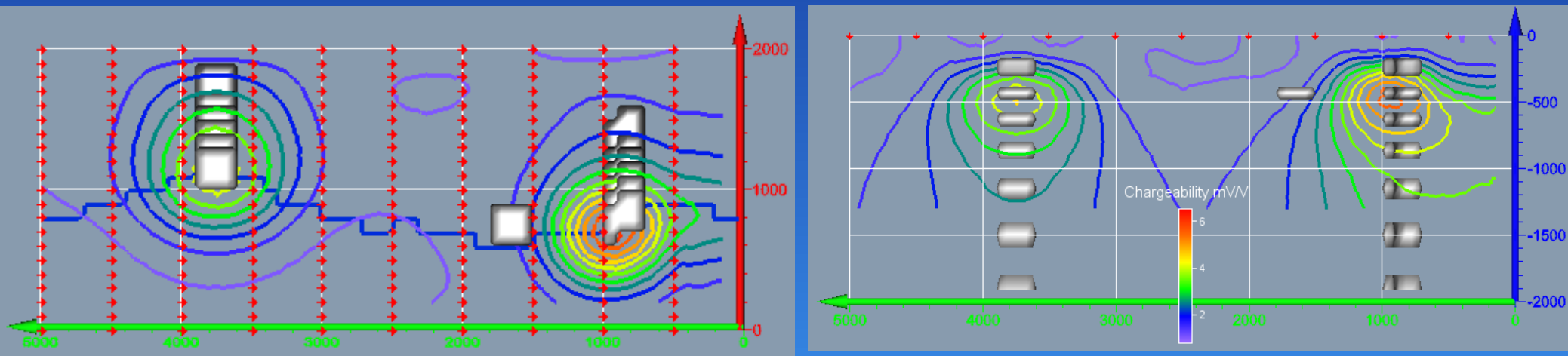
Bent and tilted long section view of
contours through body centres



400m Chargeability

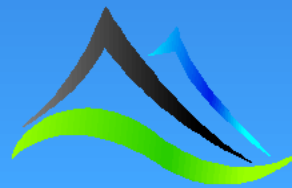


500m Chargeability

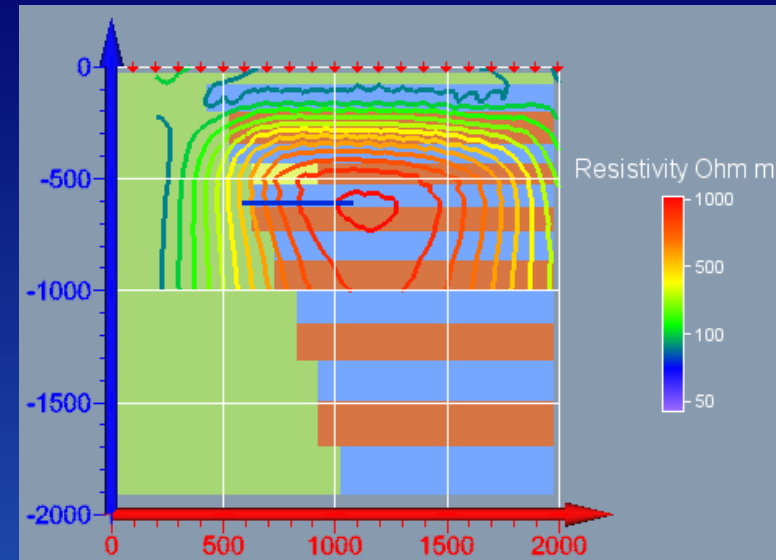
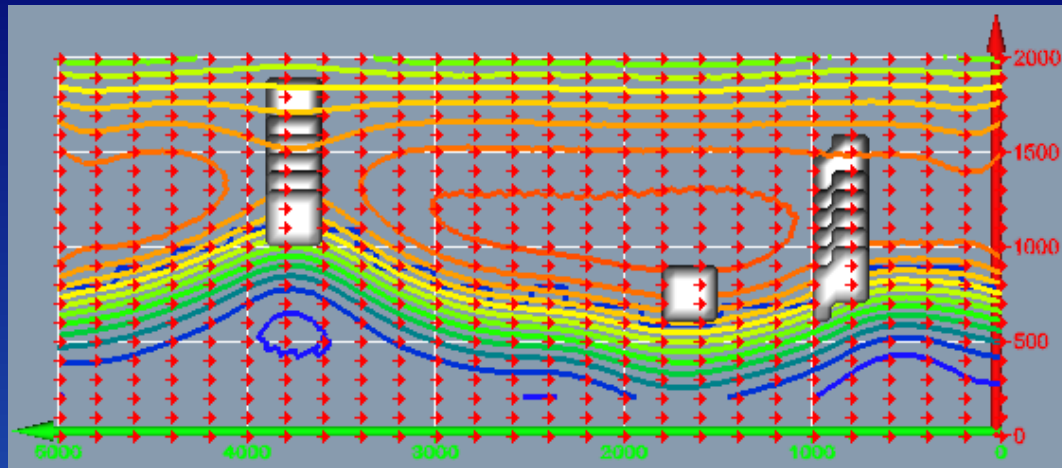


Plan view of contour slice through maximum response

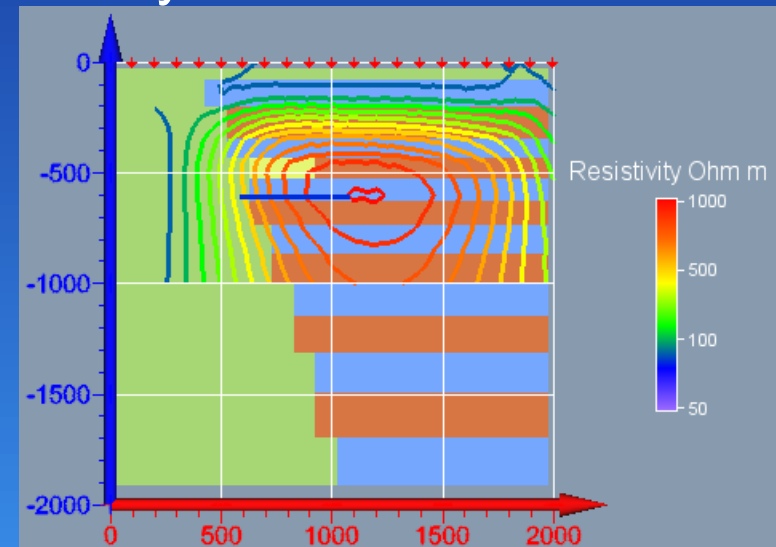
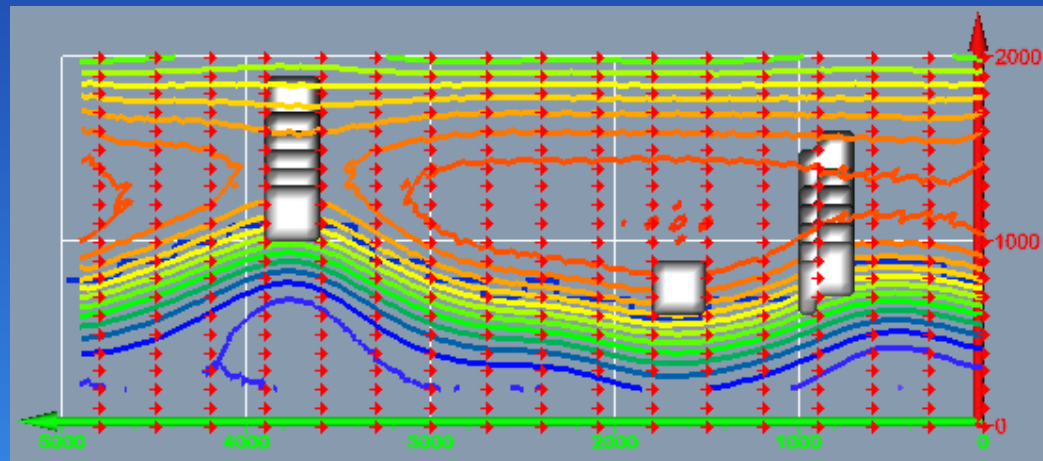
Bent and tilted long section view of contours through body centres



200m Resistivity

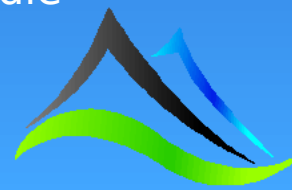


300m Resistivity

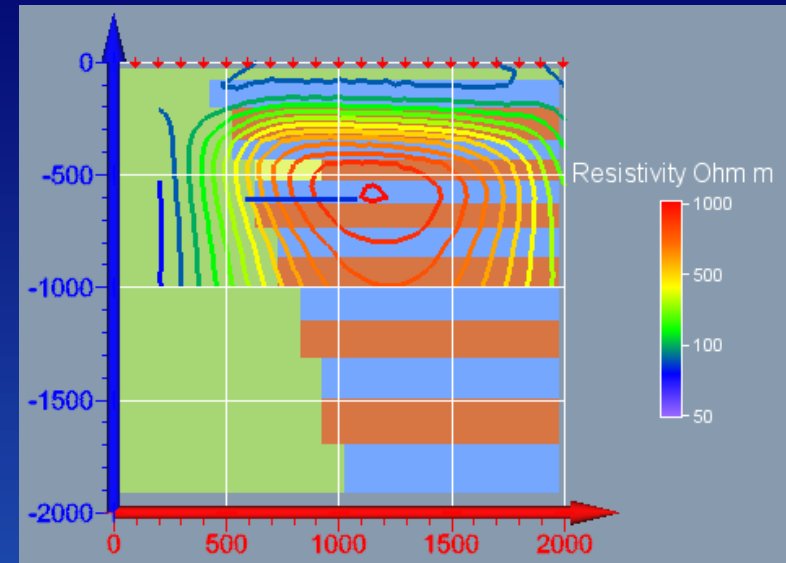
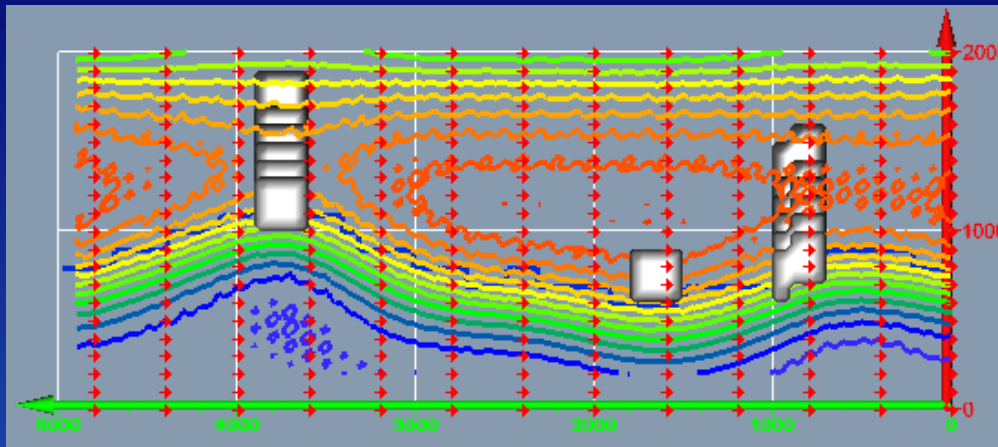


Plan view of contour slice through the middle of the chargeable centre body

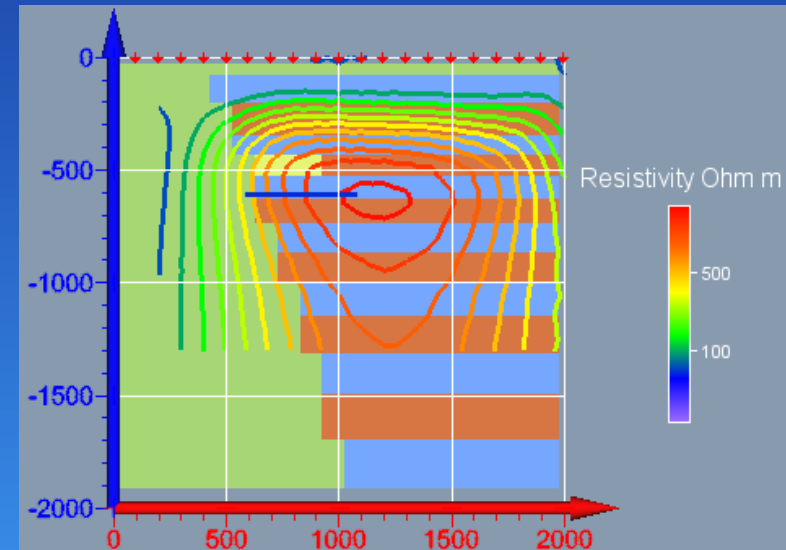
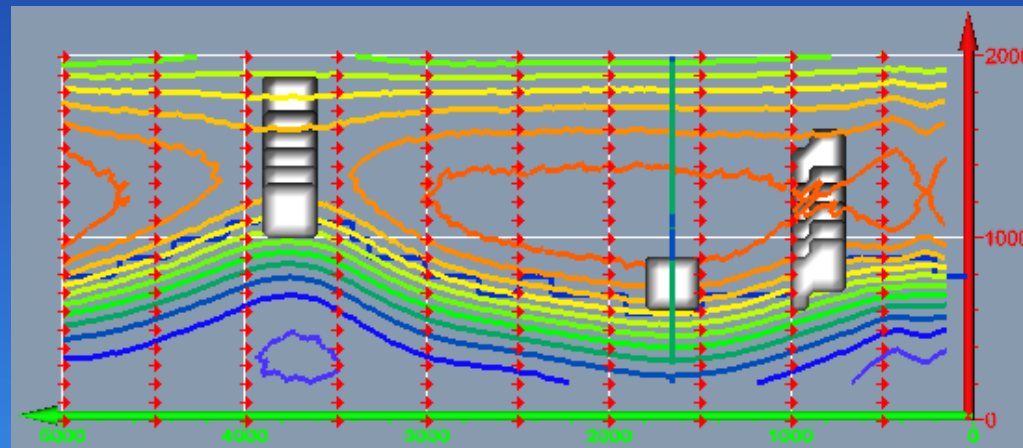
Cross section through the middle of the chargeable centre body



400m Resistivity

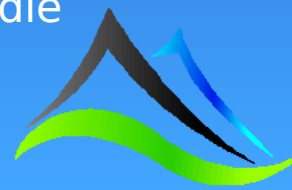


500m Resistivity



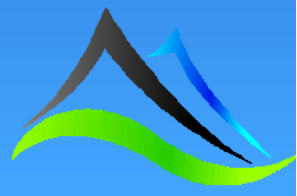
Plan view of contour slice through the middle of the chargeable centre body

Cross section through the middle of the chargeable centre body

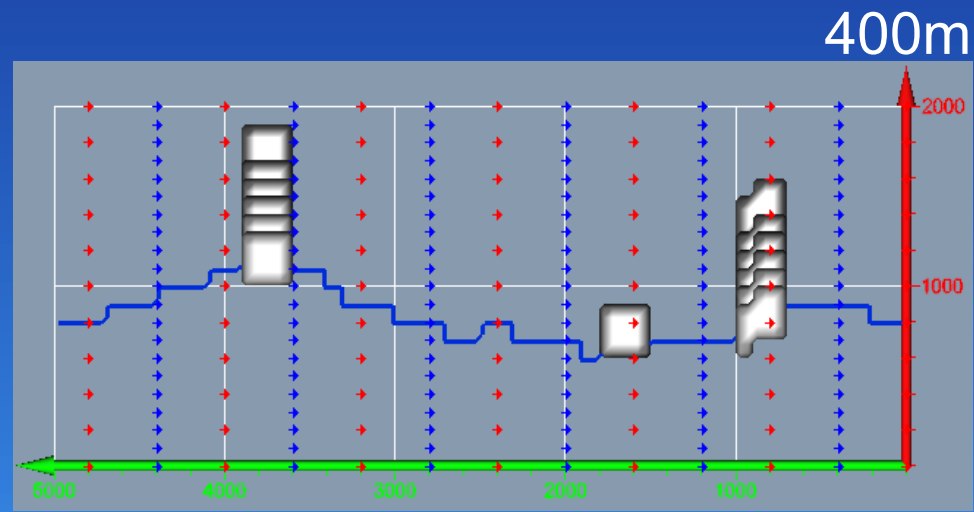
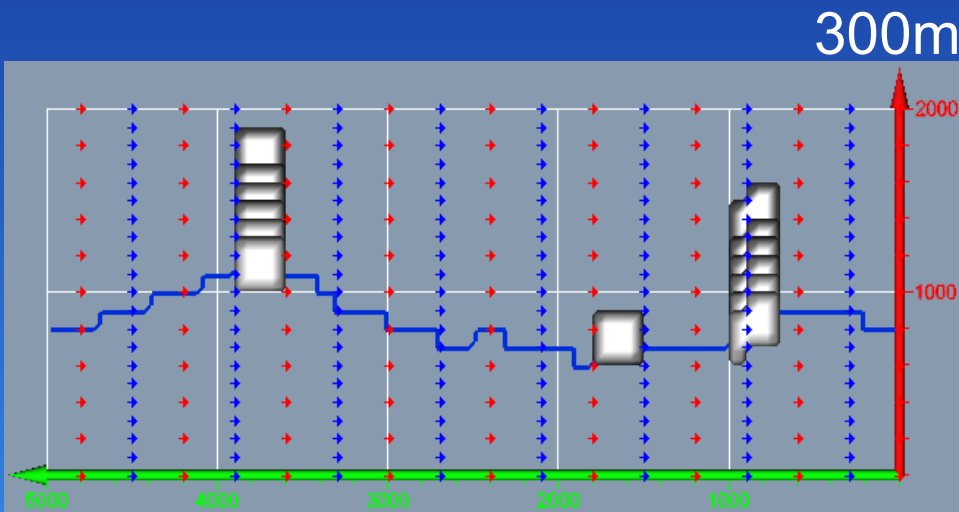
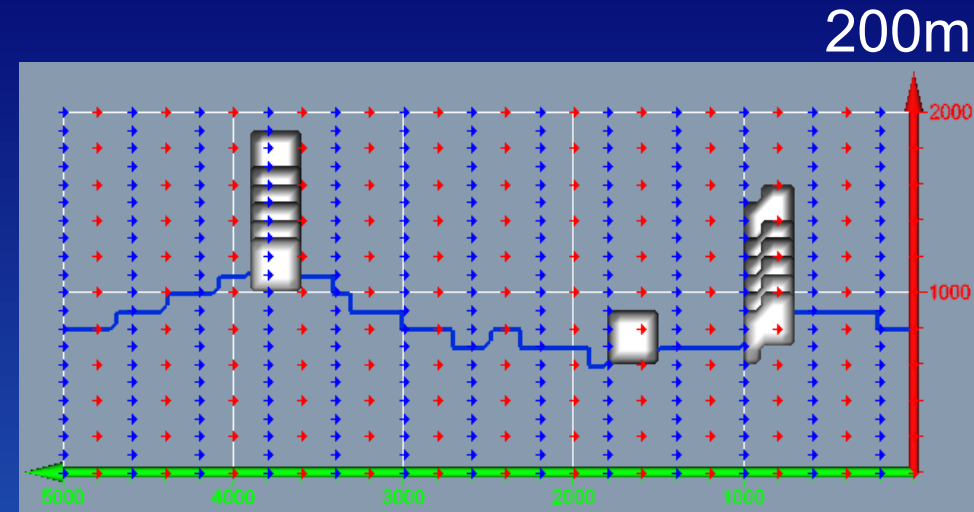
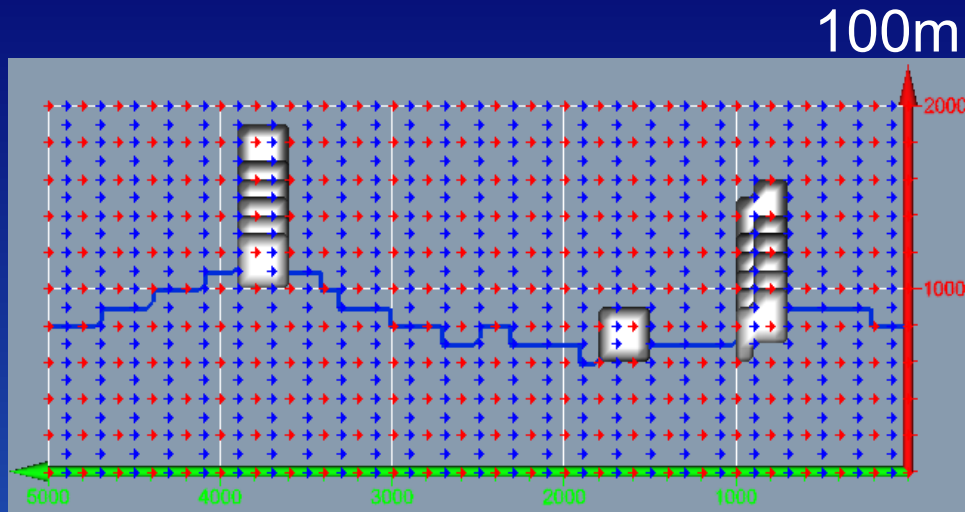


Observations – 430m depth 2D Dipole-Dipole

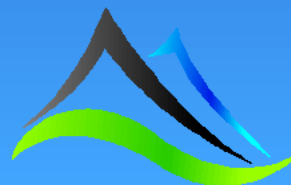
- The target is not resolved by any line spacing at this depth.



2.5D QODD with variable line spacing

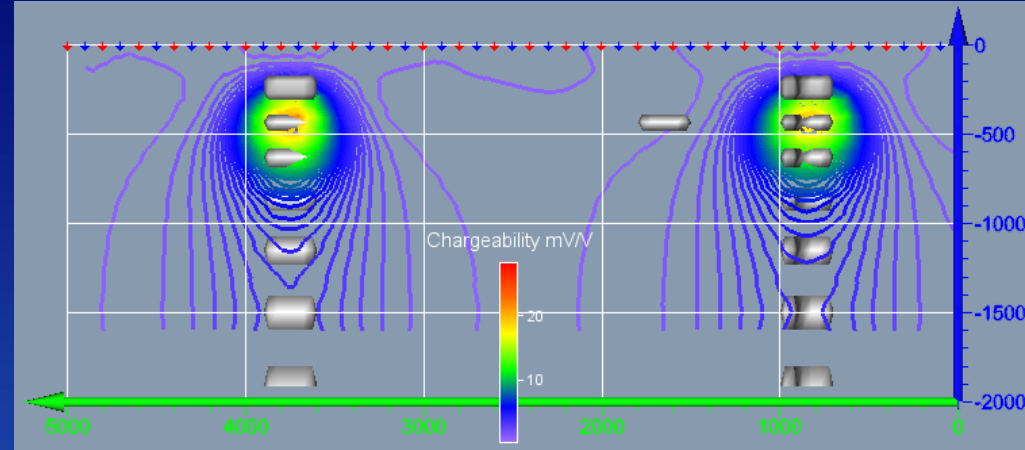
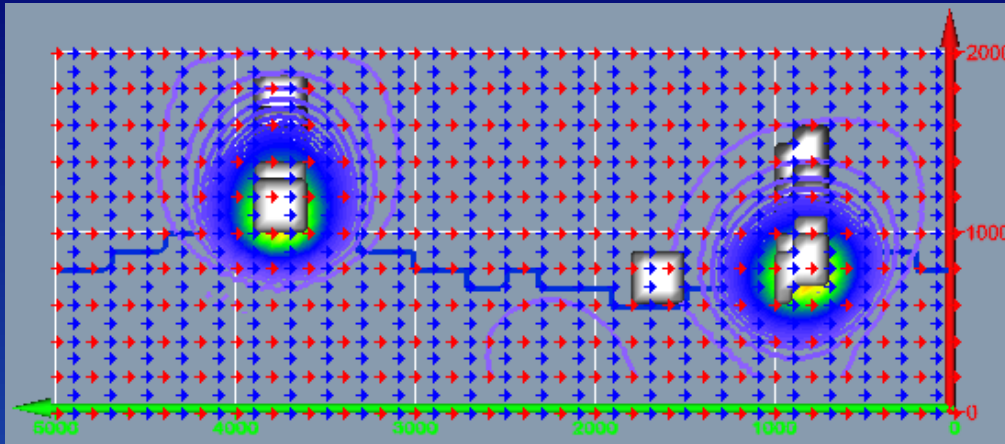


- 200m transmitter electrode spacing.
- 100m receiver electrode spacing.
- 100m, 200m, 300m and 400m line spacing.
- 4 lines of 20 dipoles active each reading.

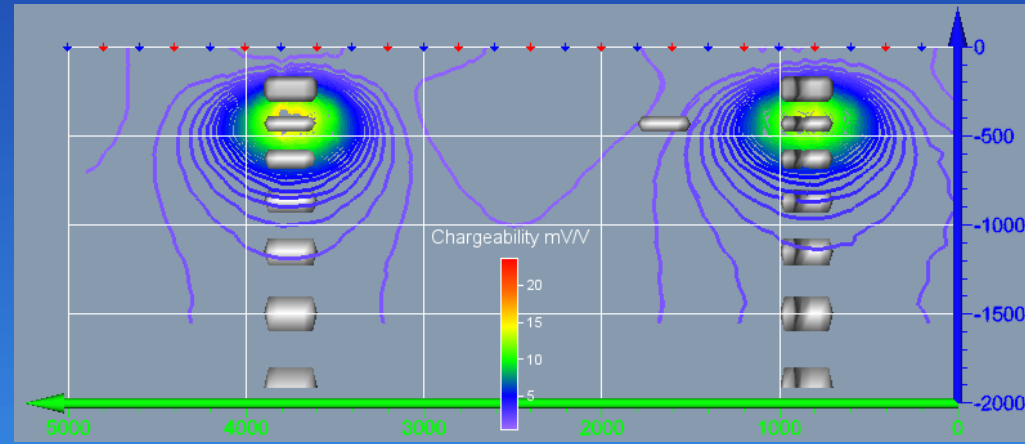
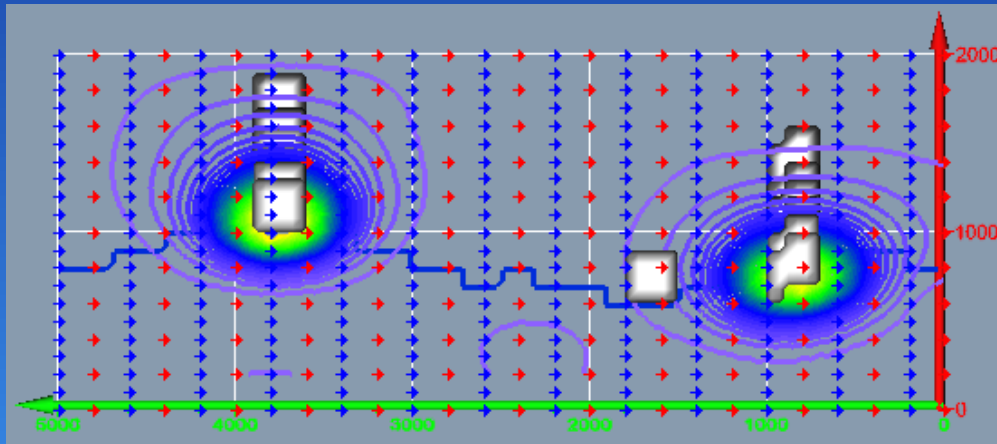


2.5D QODD

100m Chargeability

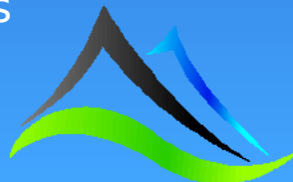


200m Chargeability



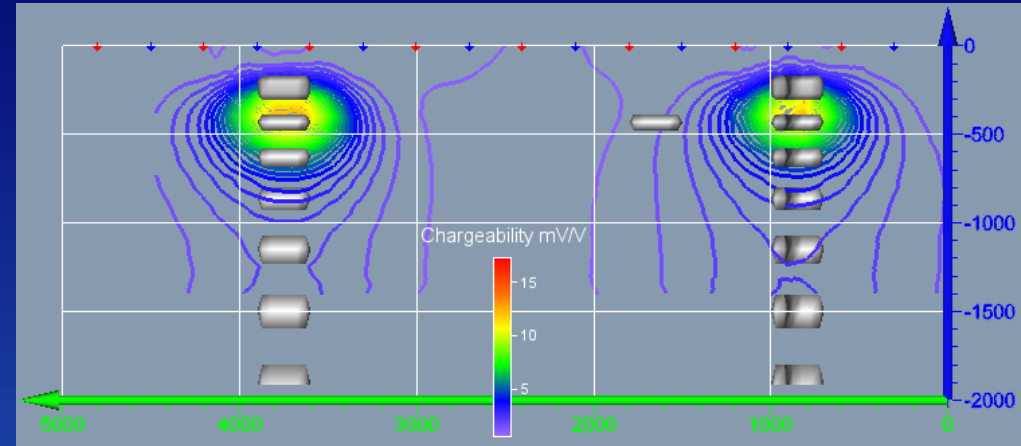
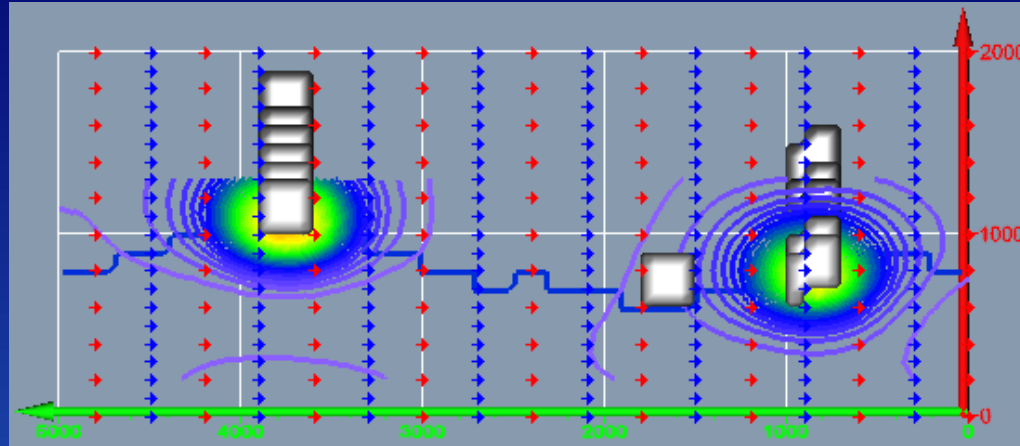
Plan view of contour slice through the middle of the chargeable centre body

Bent and tilted long section view of contours through body centres

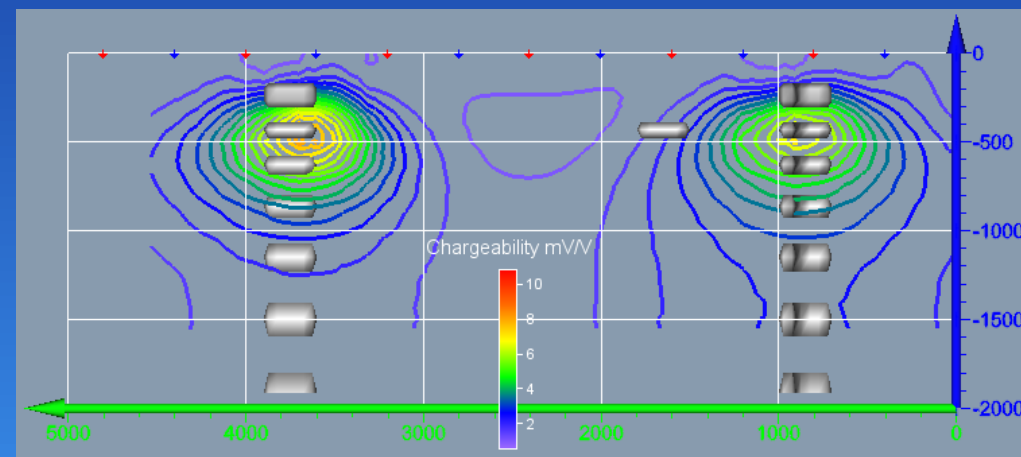
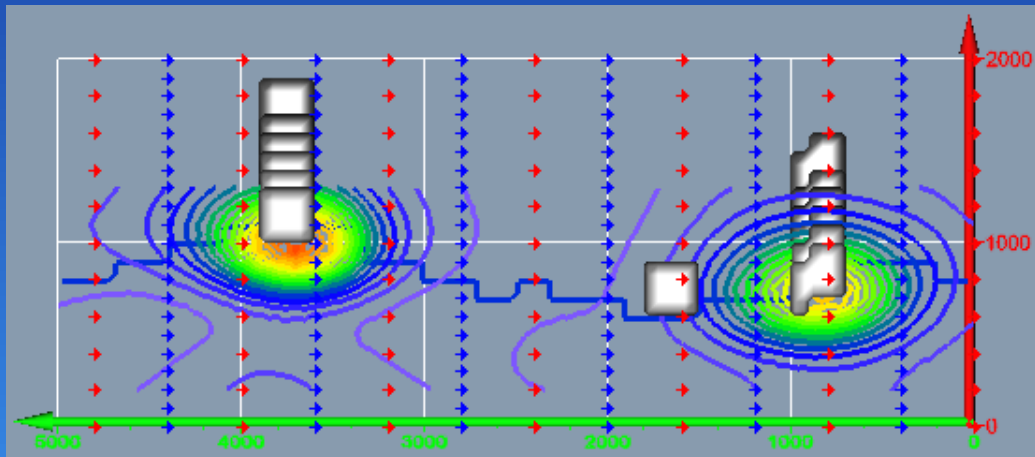


2.5D QODD

300m Chargeability

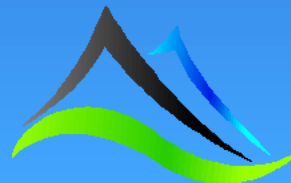


400m Chargeability



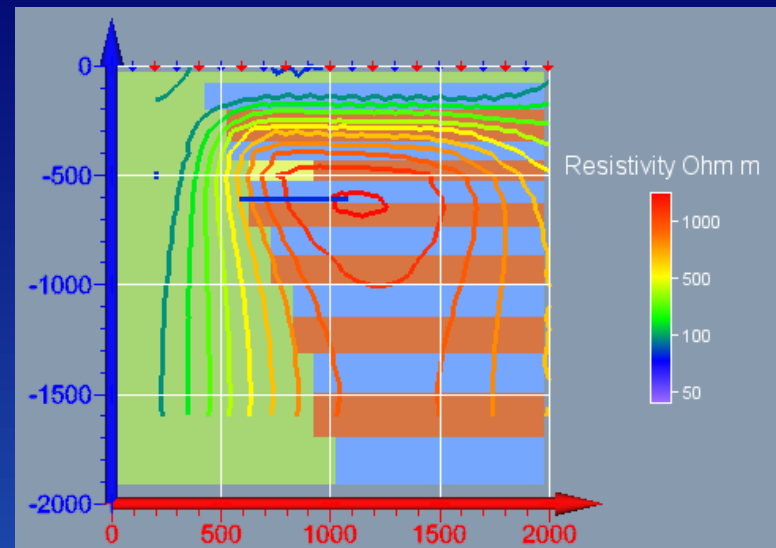
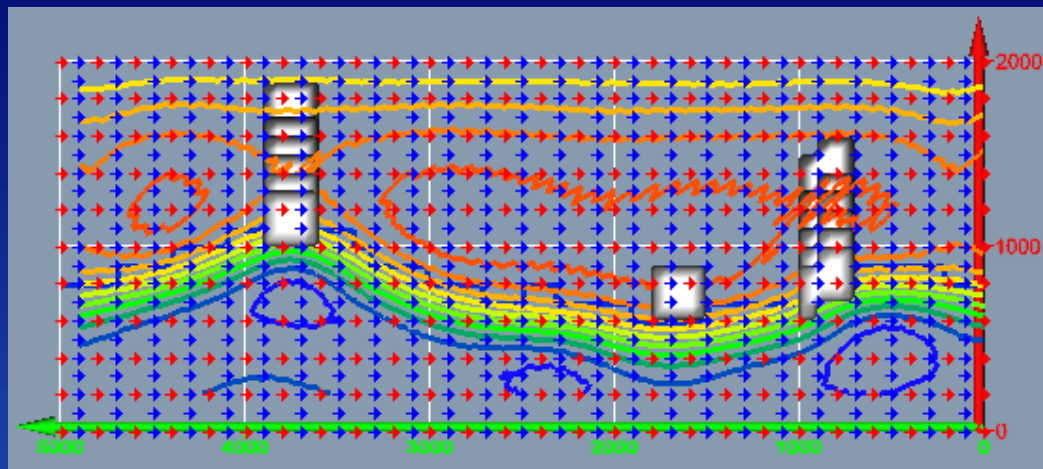
Plan view of contour slice through the middle of the chargeable centre body

Bent and tilted long section view of contours through body centres

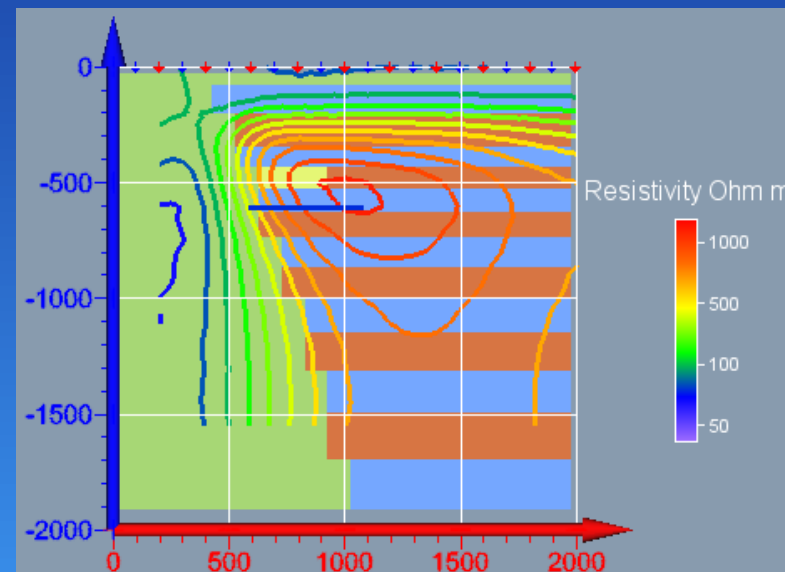
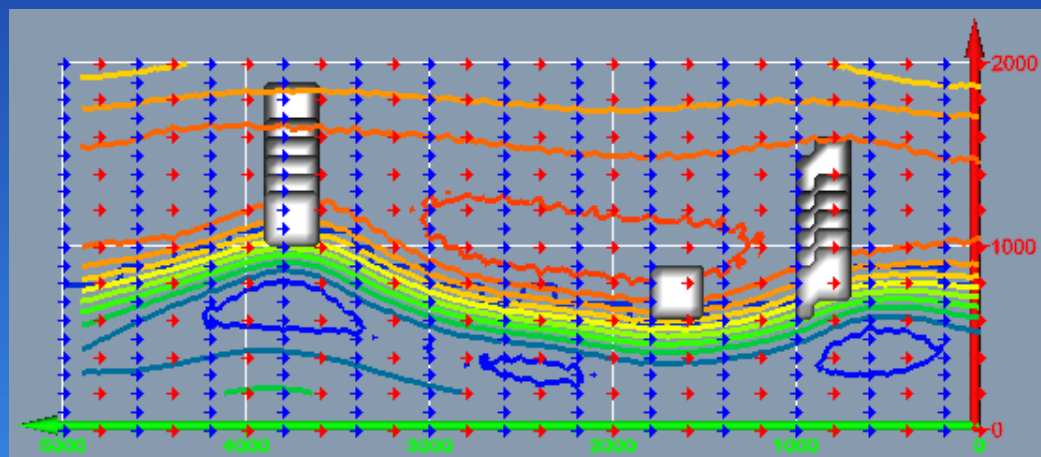


2.5D QODD

100m Resistivity

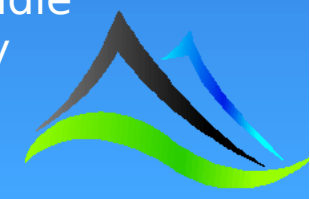


200m Resistivity



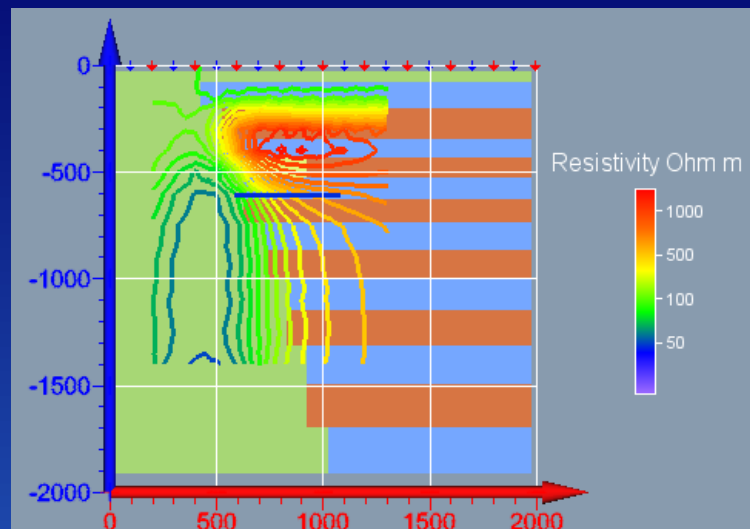
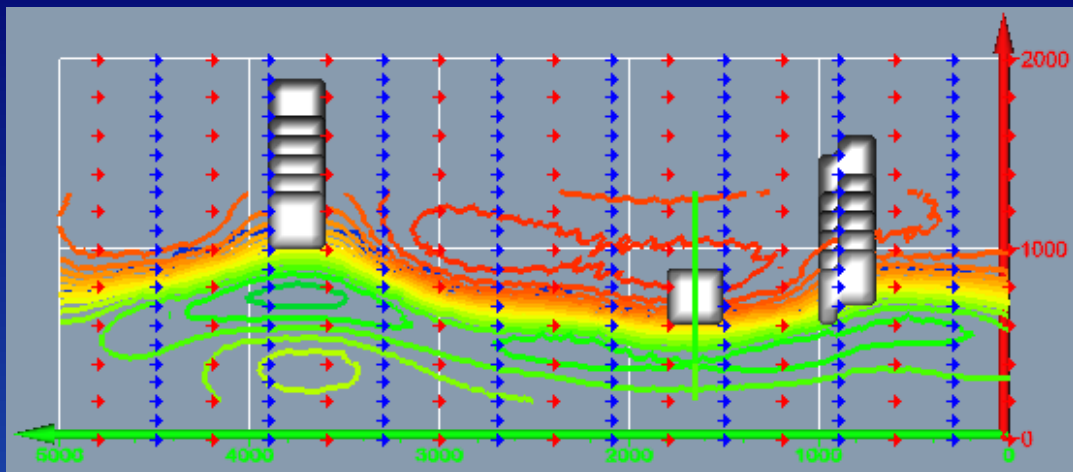
Plan view of contour slice through the middle of the chargeable centre body

Cross section through the middle of the chargeable centre body

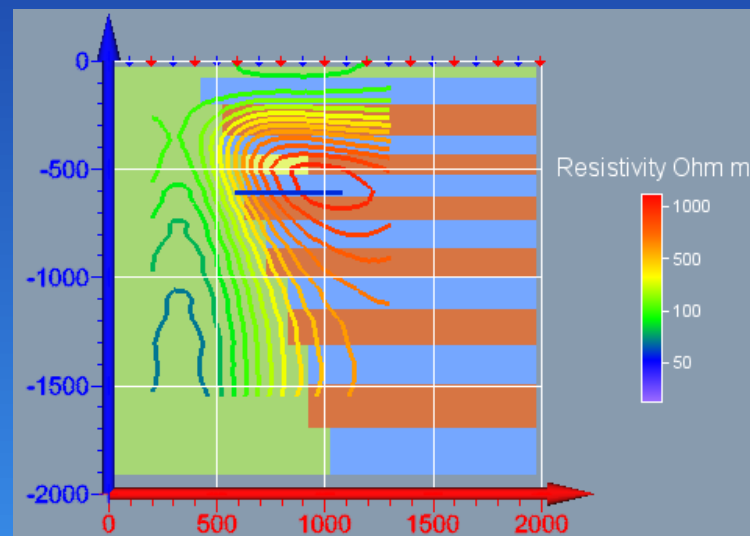
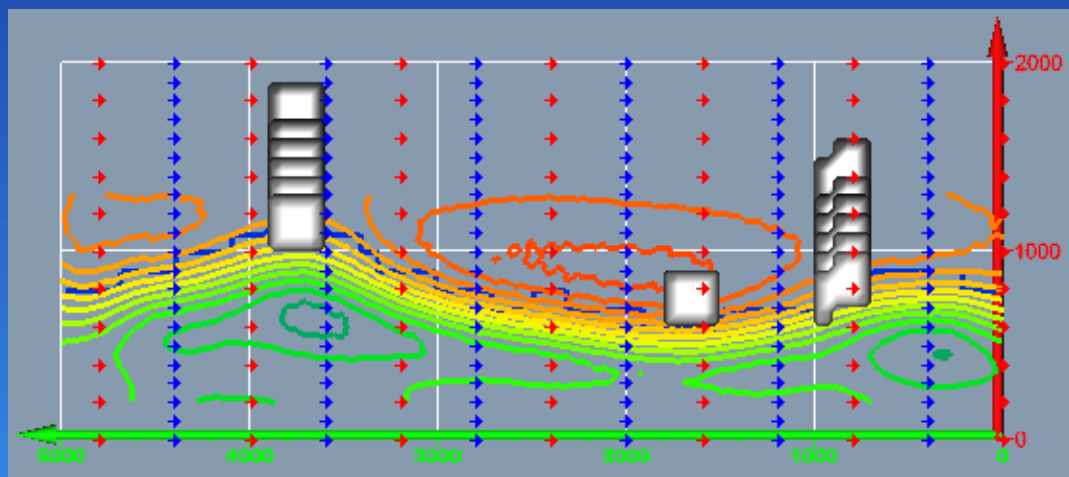


2.5D QODD

300m Resistivity

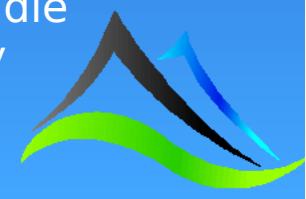


400m Resistivity



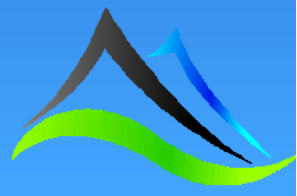
Plan view of contour slice through the middle of the chargeable centre body

Cross section through the middle of the chargeable centre body

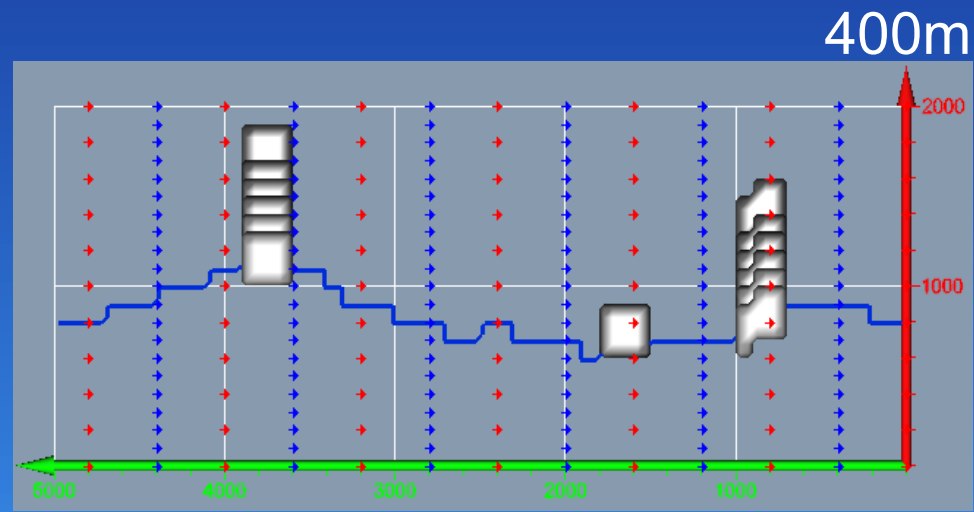
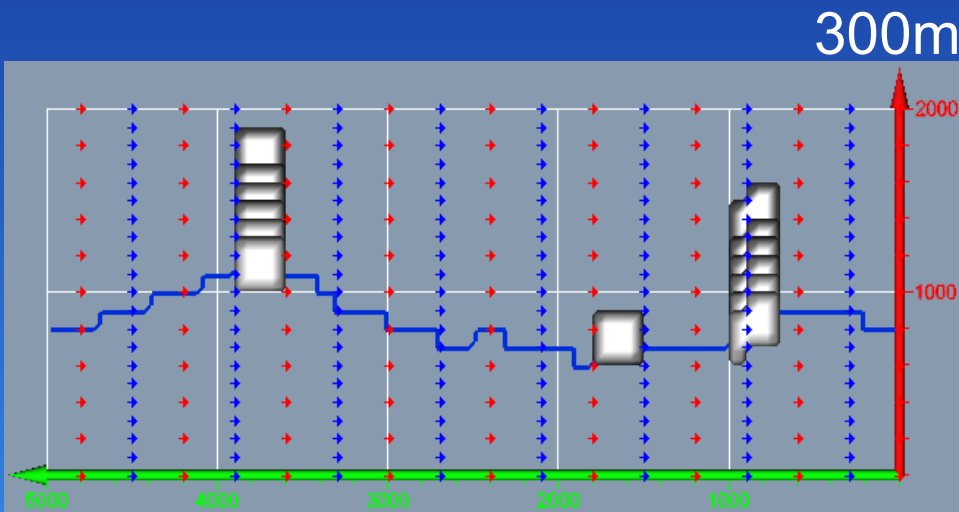
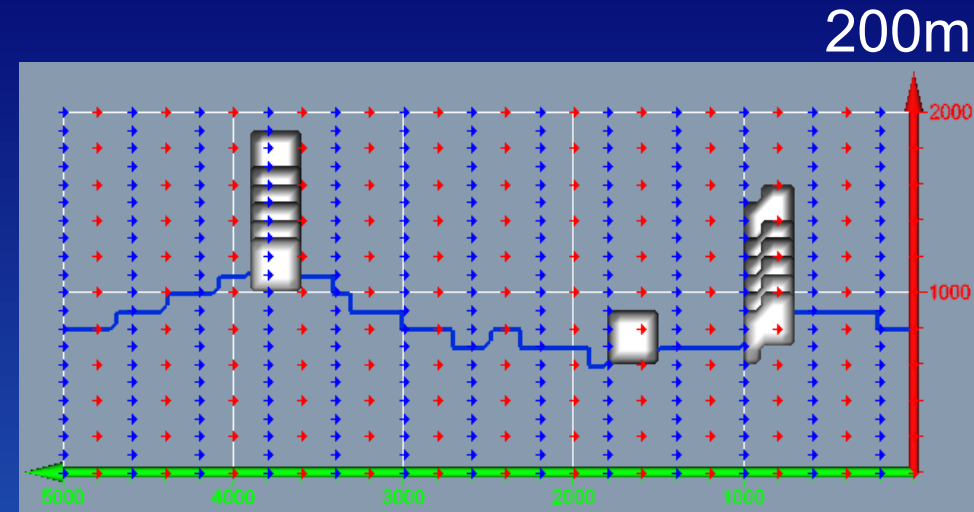
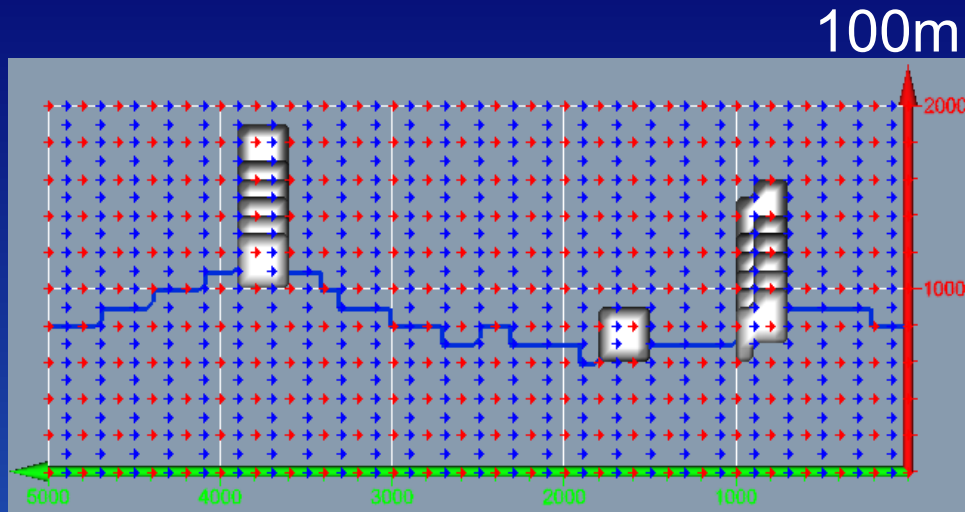


Observations – 430m depth 2.5D QODD

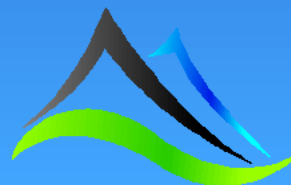
- As with 2D dipole-dipole, the target is not resolved by any line spacing at this depth with the chargeability inversion.



2.5D Multipole QODD with variable line spacing

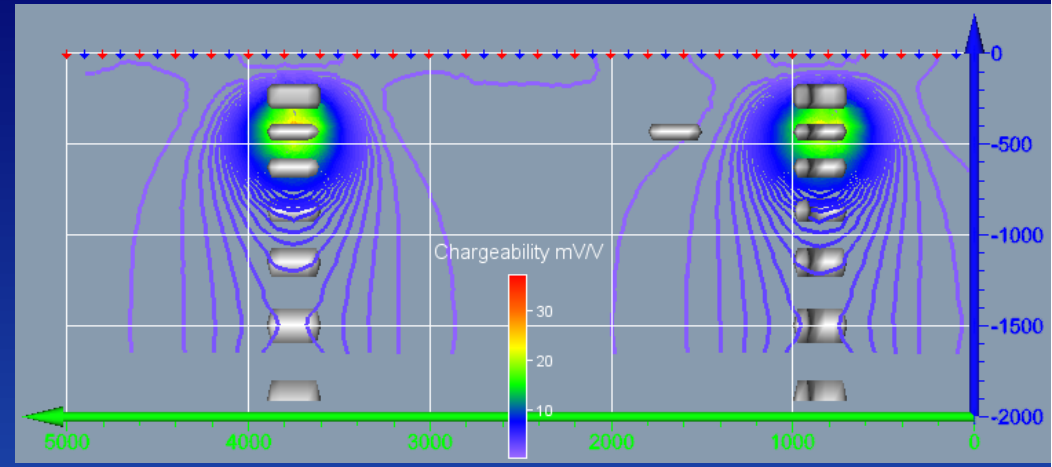
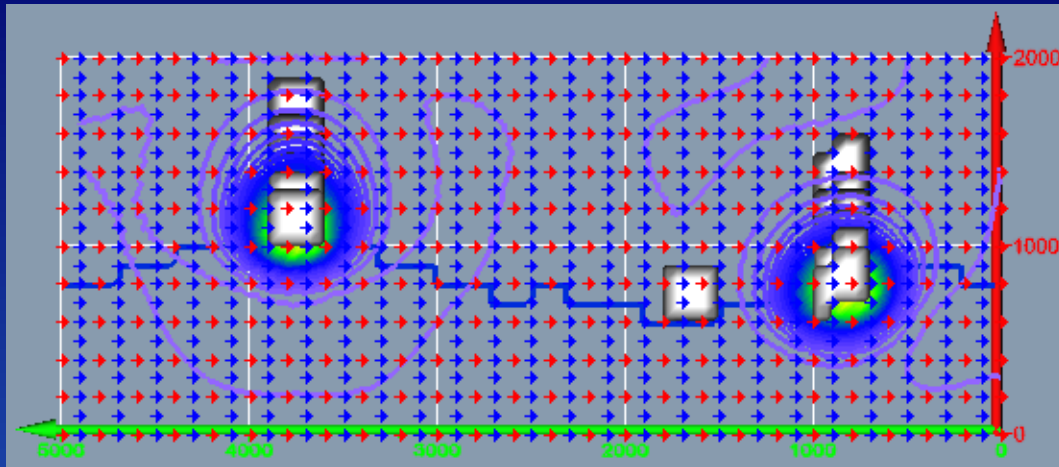


- 200m electrode spacing.
- 100m receiver electrode spacing with dipole sizes of 100m, 200m, 300m and 400m.
- 100m, 200m, 300m and 400m line spacing.
- 4 lines of 20 dipoles active each reading.

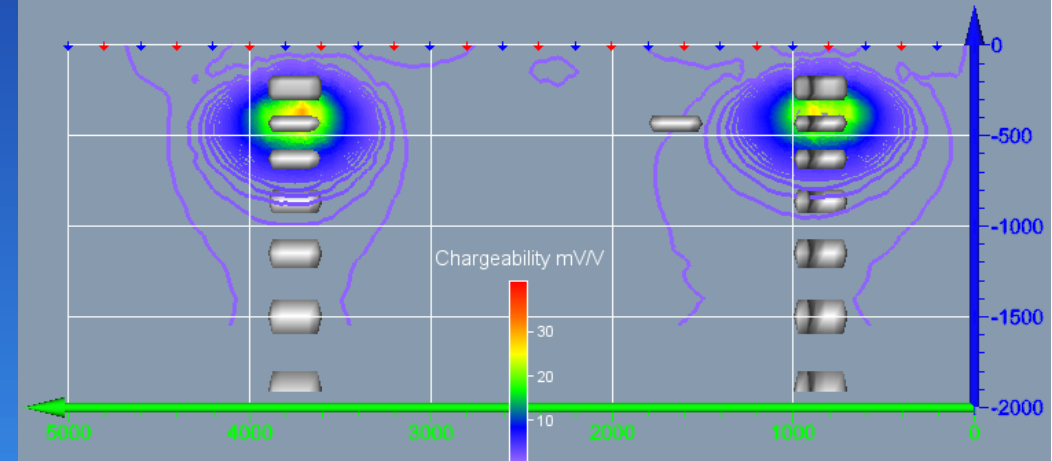
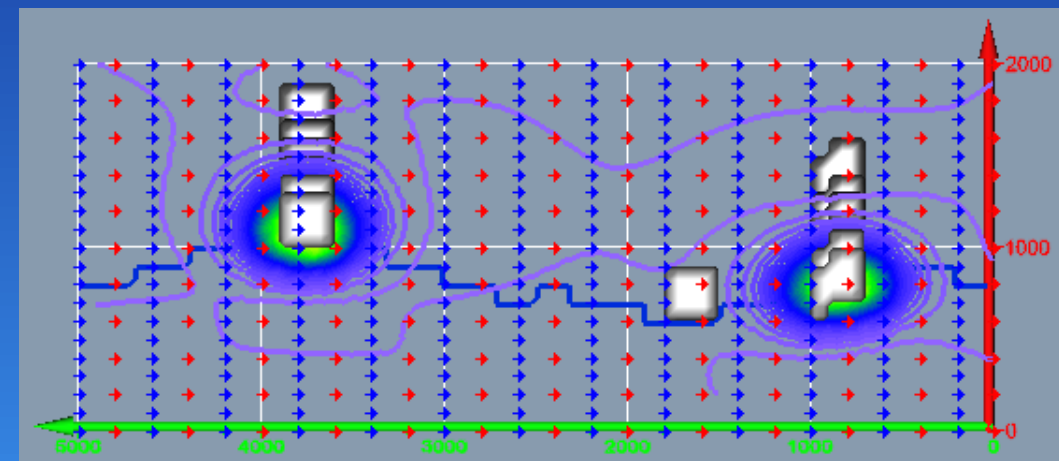


Multipole QODD

100m Chargeability

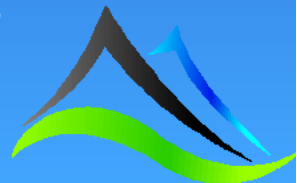


200m Chargeability



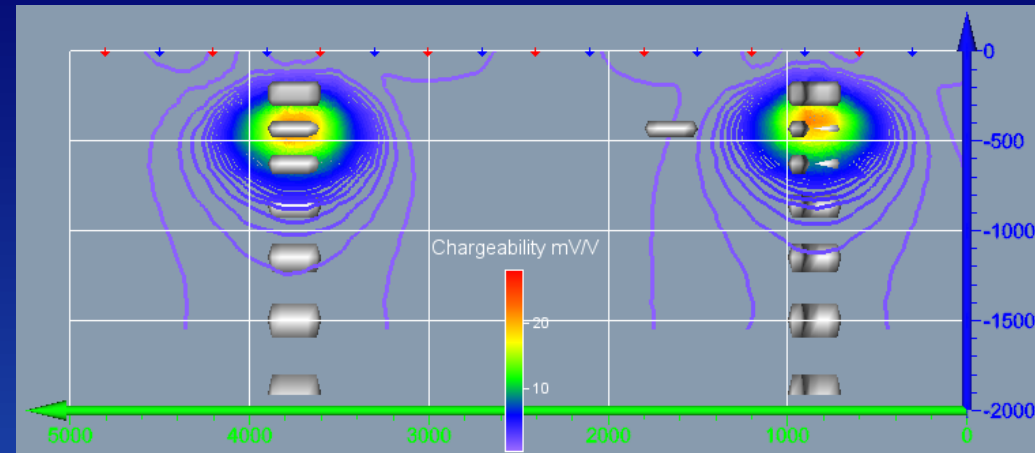
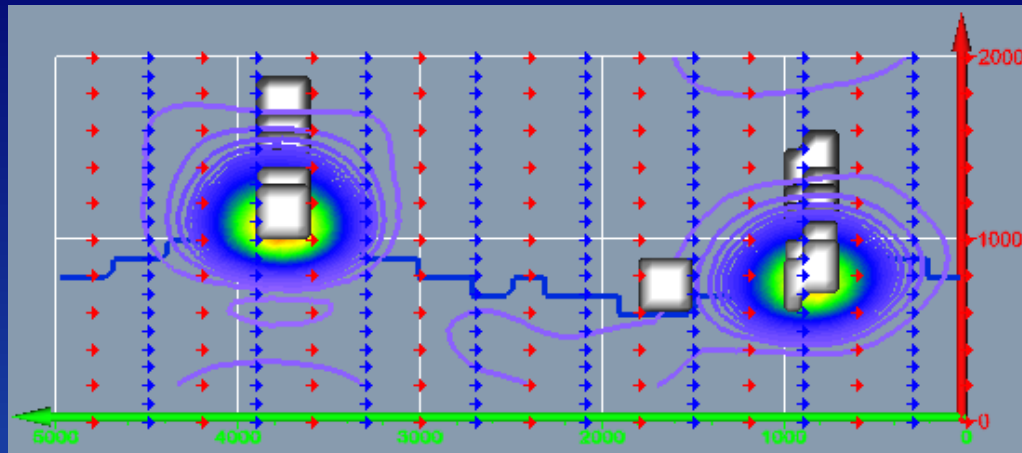
Plan view of contour slice through the middle of the chargeable centre body

Bent and tilted long section view of contours through body centres

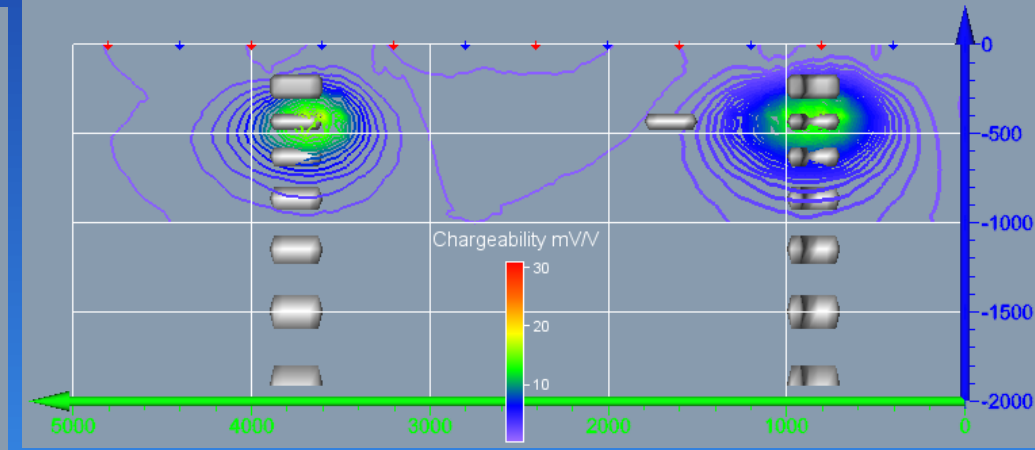
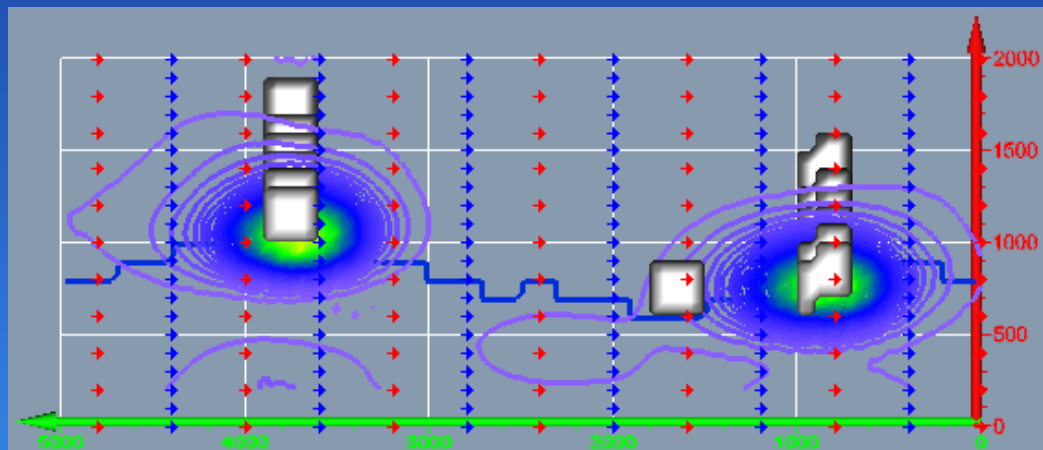


Multipole QODD

300m Chargeability

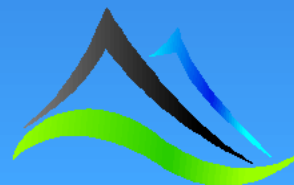


400m Chargeability



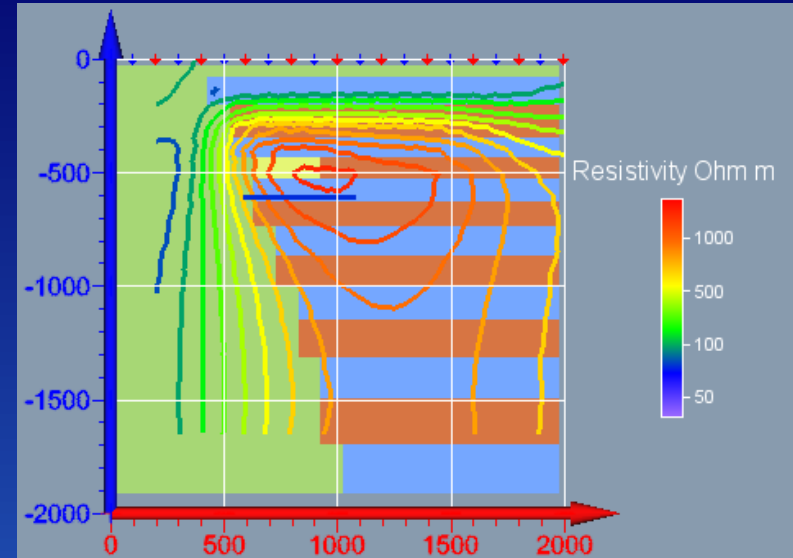
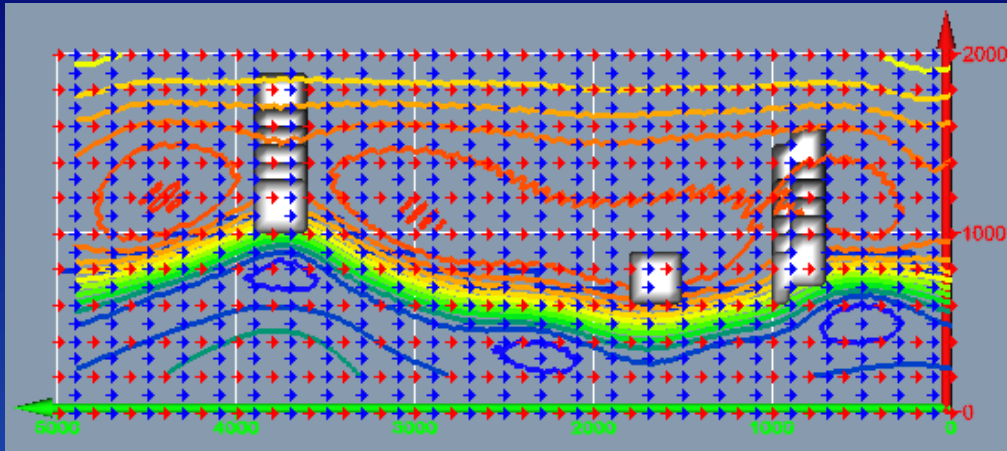
Plan view of contour slice through the middle of the chargeable centre body

Bent and tilted long section view of contours through body centres

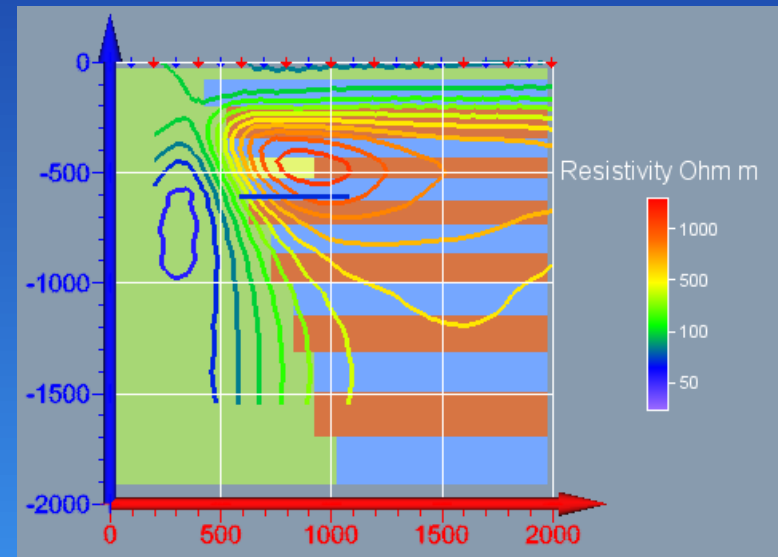
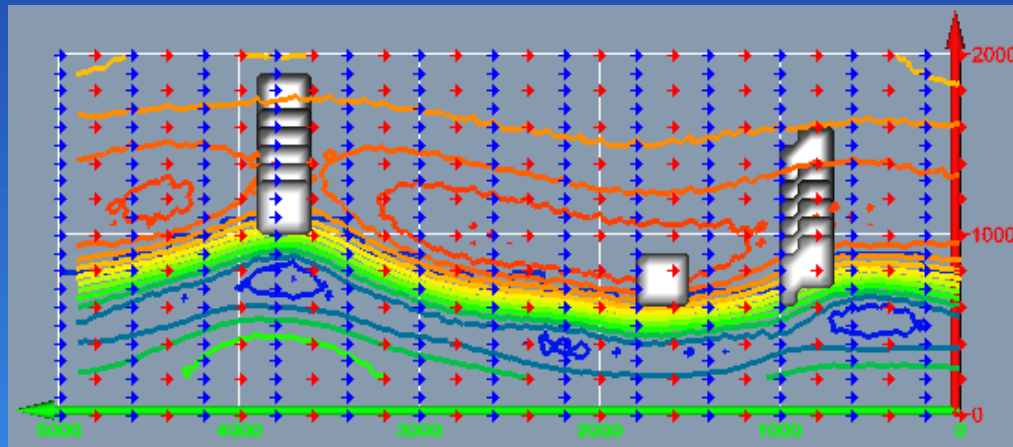


Multipole QODD

100m Resistivity

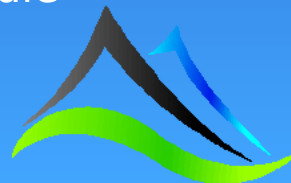


200m Resistivity



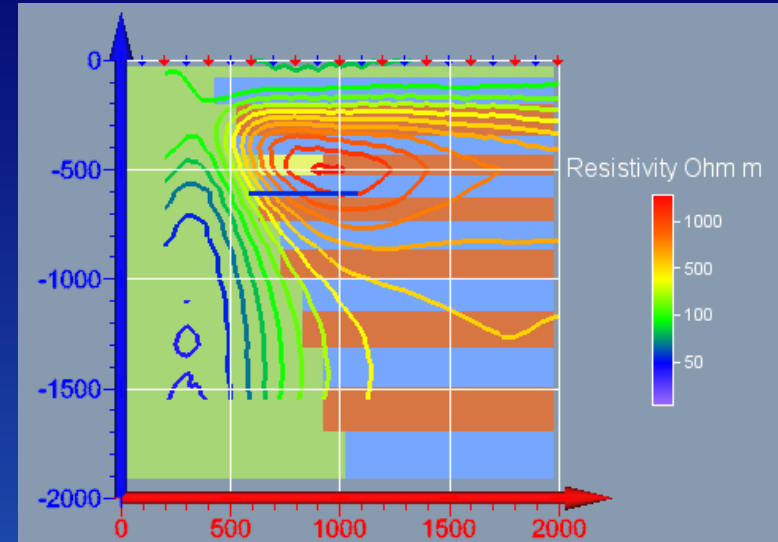
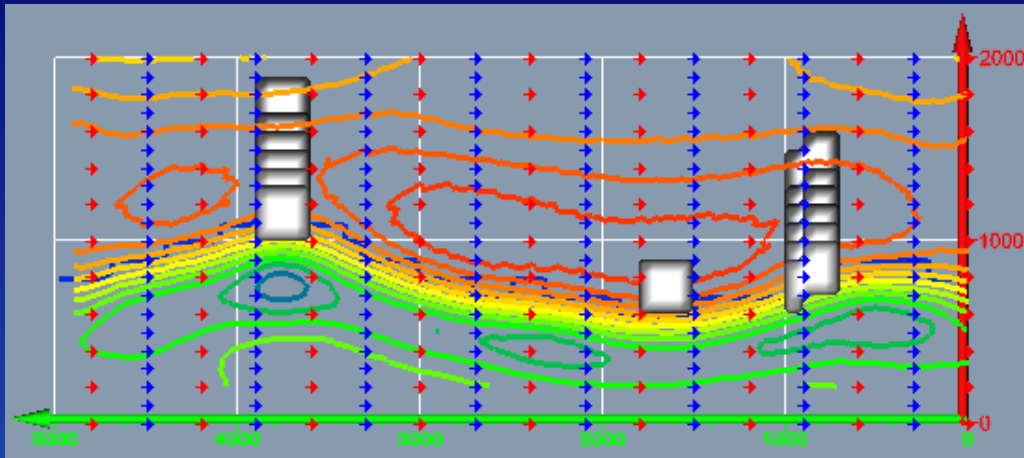
Plan view of contour slice through the middle of the chargeable centre body

Cross section through the middle of the chargeable centre body

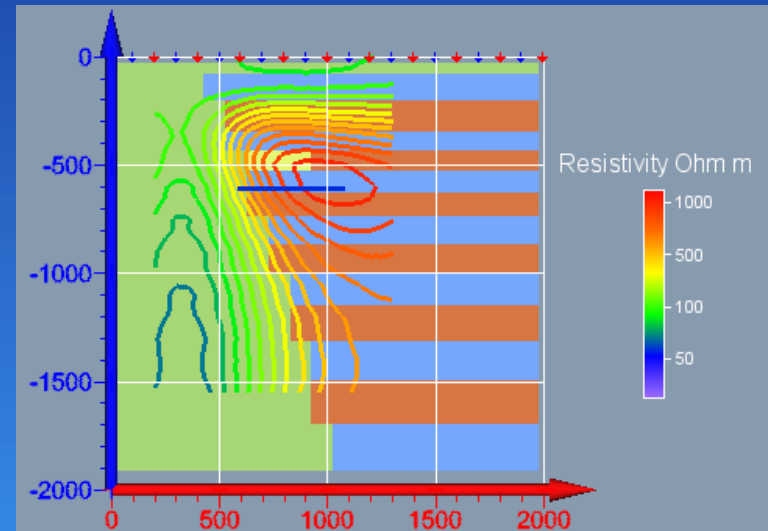
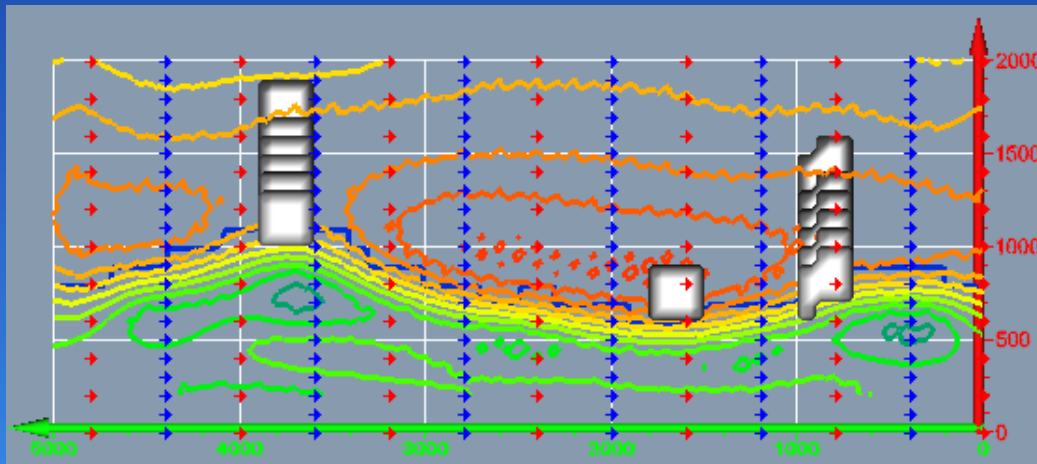


Multipole QODD

300m Resistivity

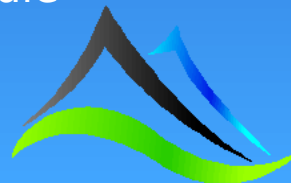


400m Resistivity



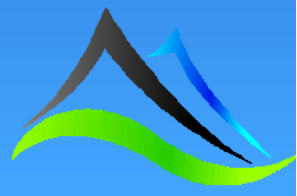
Plan view of contour slice through
the middle of the chargeable
centre body

Cross section through the middle
of the chargeable centre body

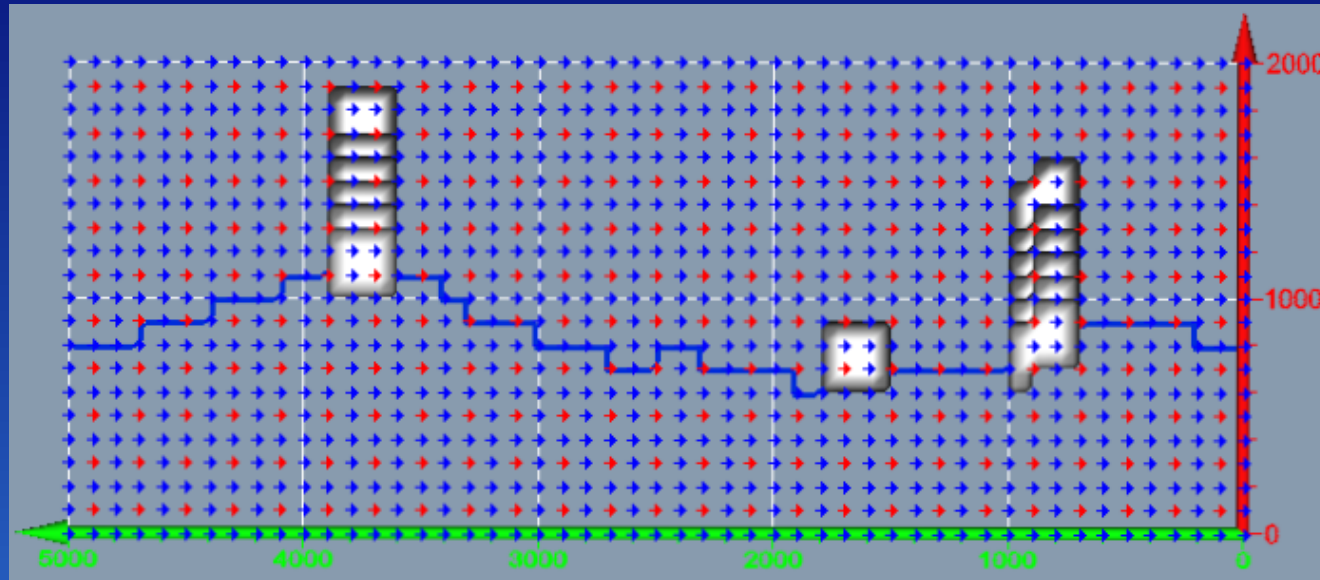


Observations – 430m depth 2.5D Multipole QODD

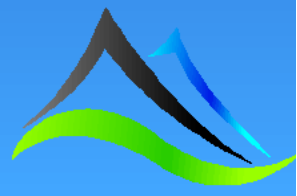
- As with the two previous arrays, the target is not resolved by any line spacing at this depth with the chargeability inversion.



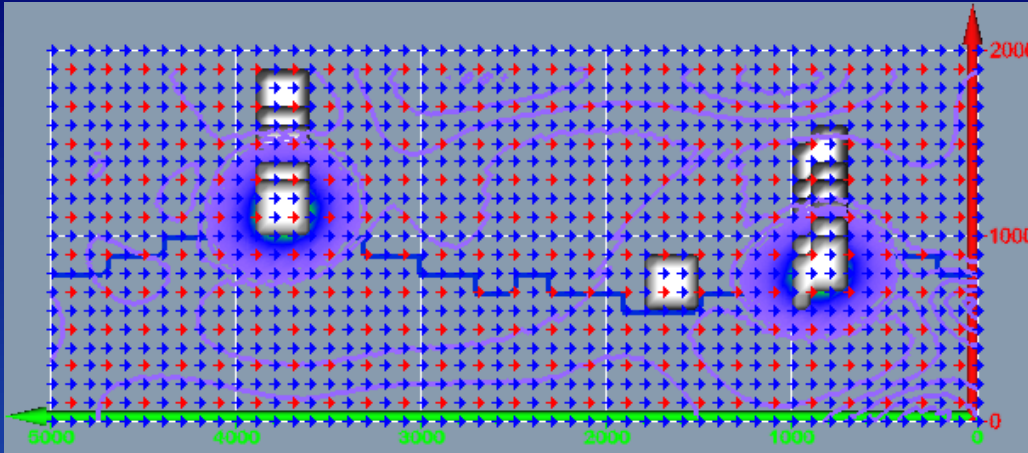
3D Pole-Dipole



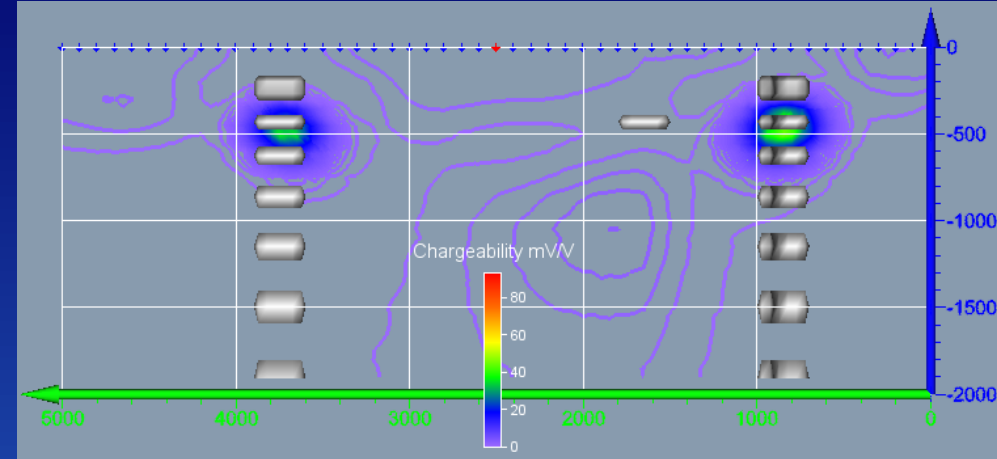
- 200m transmitter electrode spacing.
- 100m receiver electrode spacing.
- 100m line spacing.



Chargeability

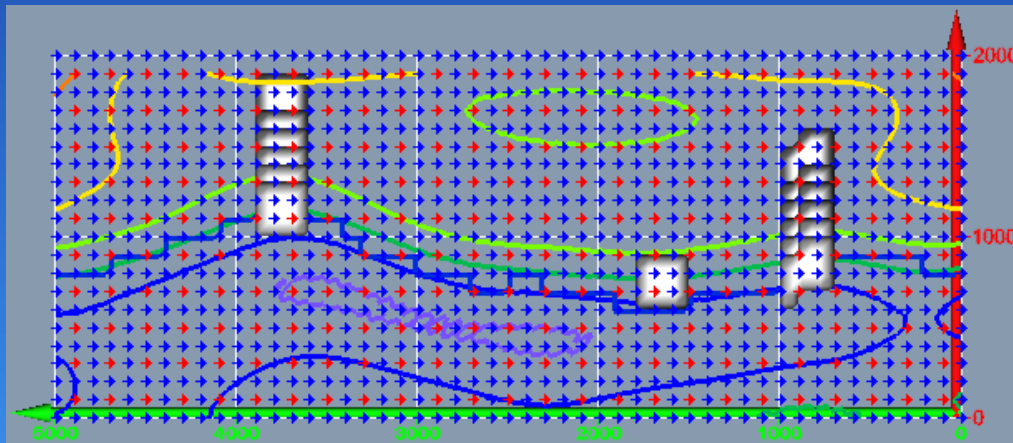


Plan view of contour slice through maximum response

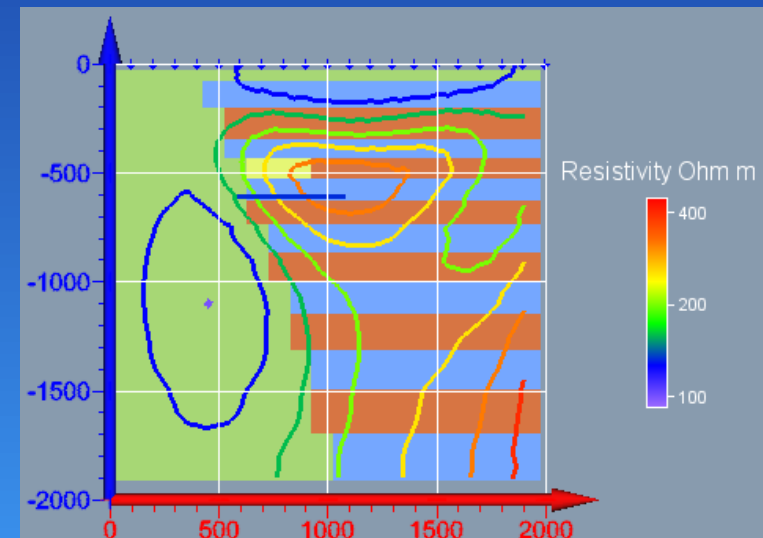


Bent and tilted long section view of contours through body centres

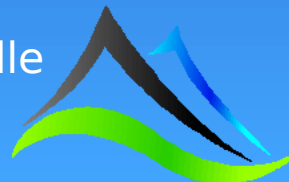
Resistivity



Plan view of contour slice at -400m

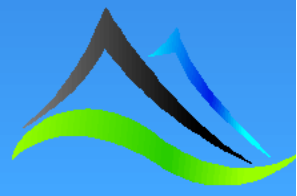


Cross section through the middle of the chargeable centre body

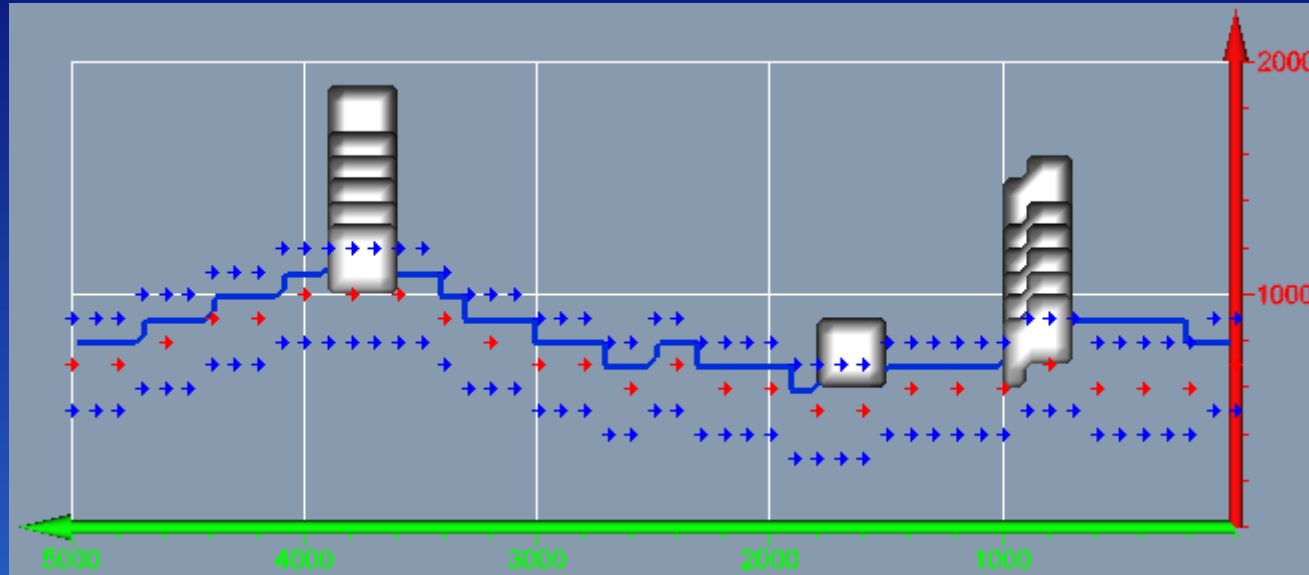


Observations – 430m depth 3D Pole-Dipole

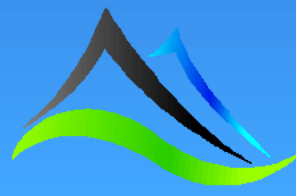
- The single body is not resolved but a very deep, weak response can be seen. This response would not be useful in any way in a practical setting.



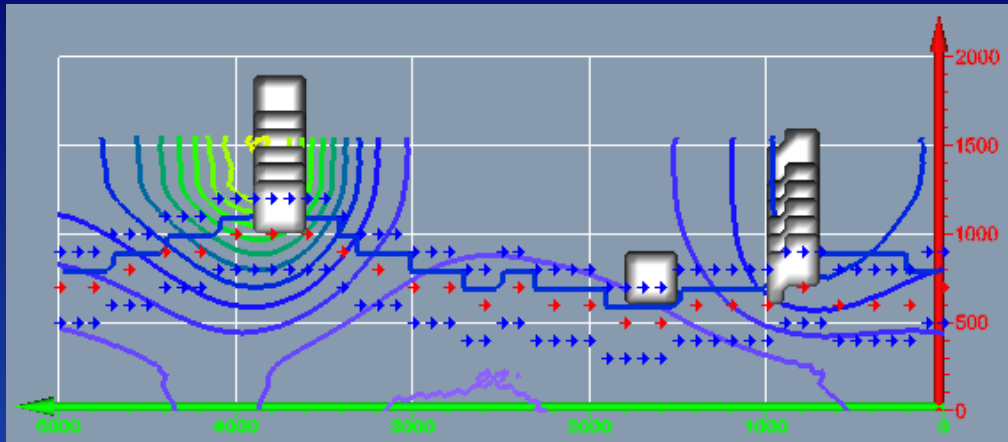
Strike parallel 2.5D Double Offset Dipole-Dipole



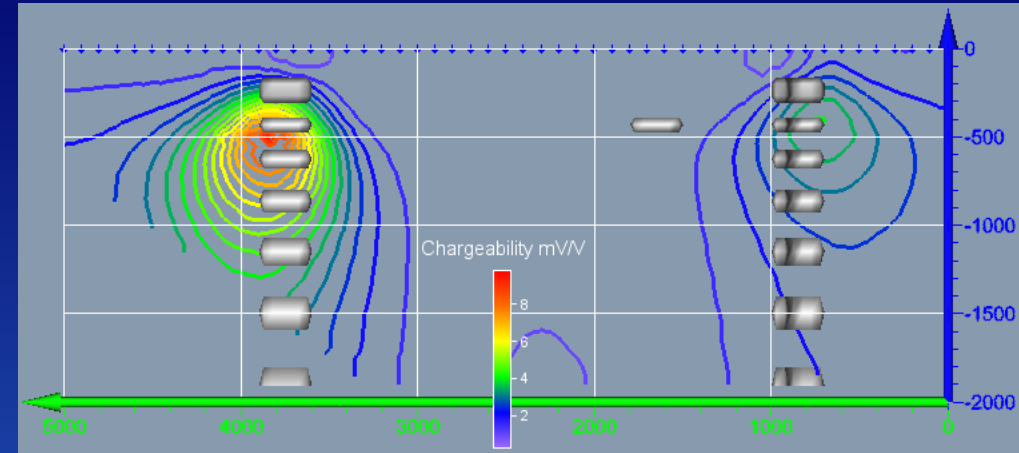
- 200m transmitter electrode spacing.
- 100m receiver electrode spacing.
- 200m line spacing.
- All electrodes active for each reading.
- Results masked in a window between $\pm 300\text{m}$ of the current electrodes line.



Chargeability

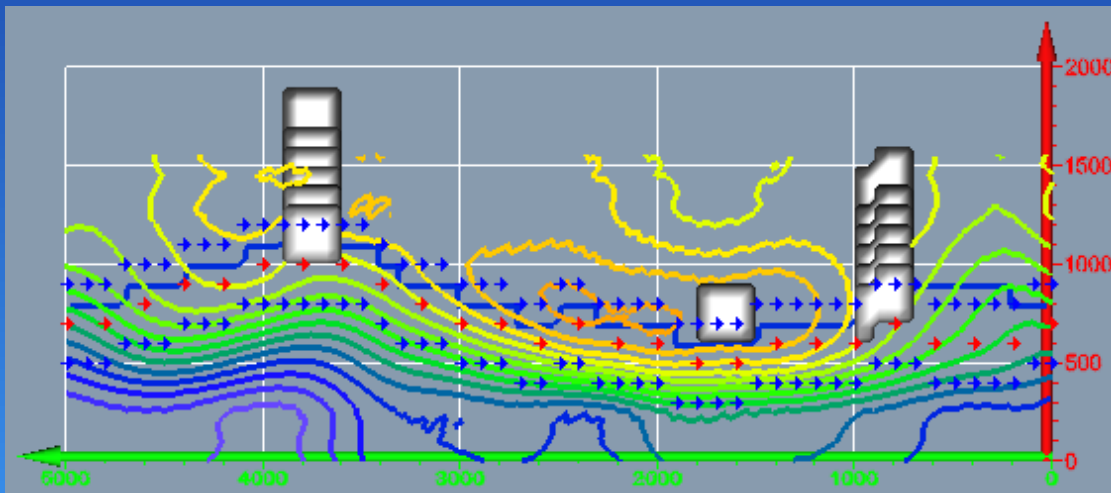


Plan view of contour slice through the middle of the chargeable centre body

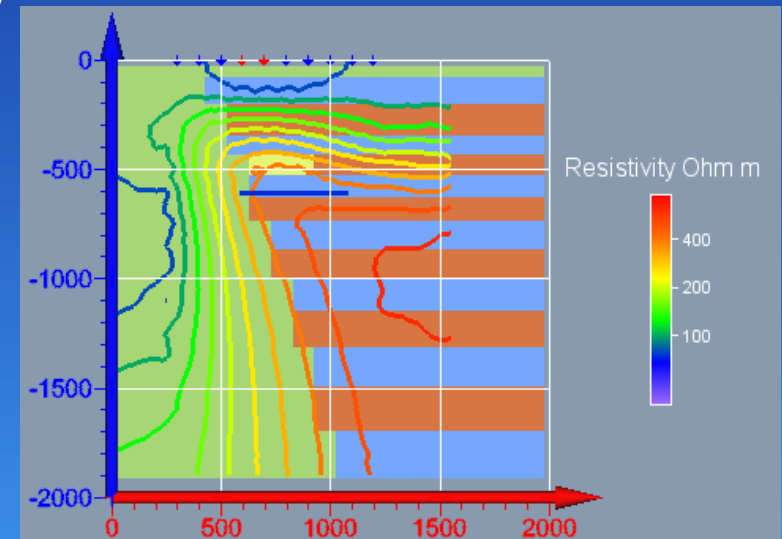


Bent and tilted long section view of contours through body centres

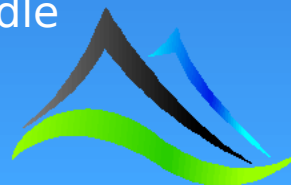
Resistivity



Plan view of contour slice through the middle of the chargeable centre body

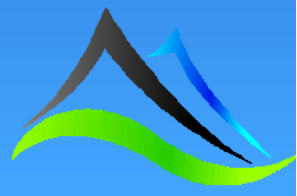


Cross section through the middle of the chargeable centre body



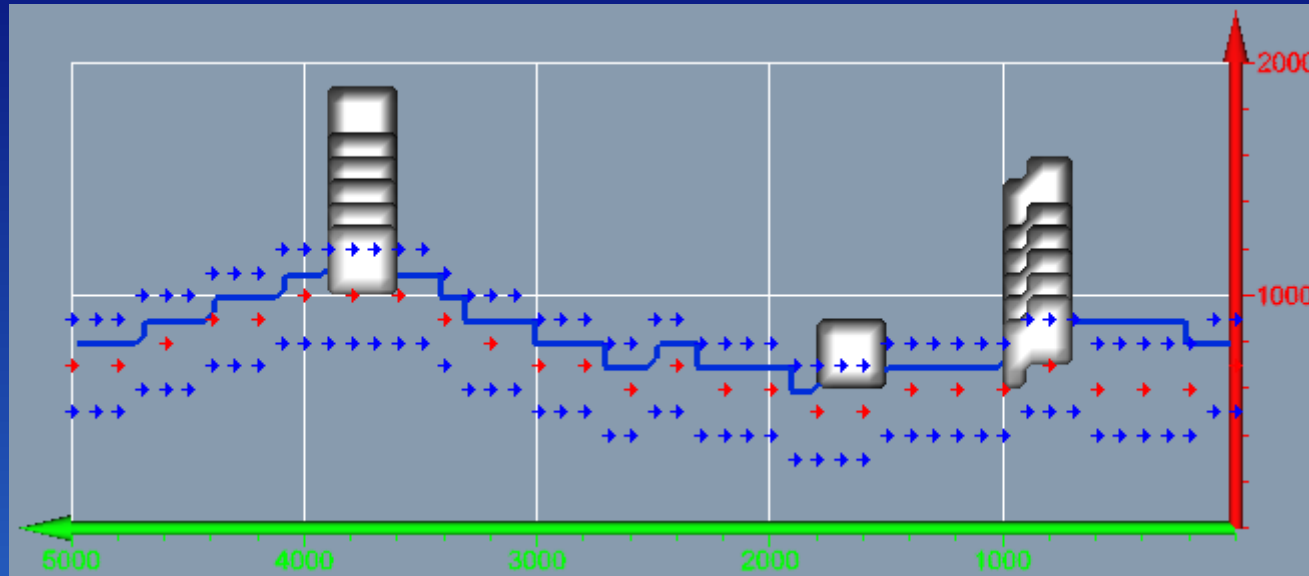
Observations – 430m depth Strike parallel 2.5D

- As with all previous arrays, the target is not resolved with the chargeability inversion and the resistivity inversion has such a low response that it is not reliable.

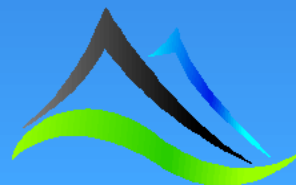


Strike parallel 2.5D

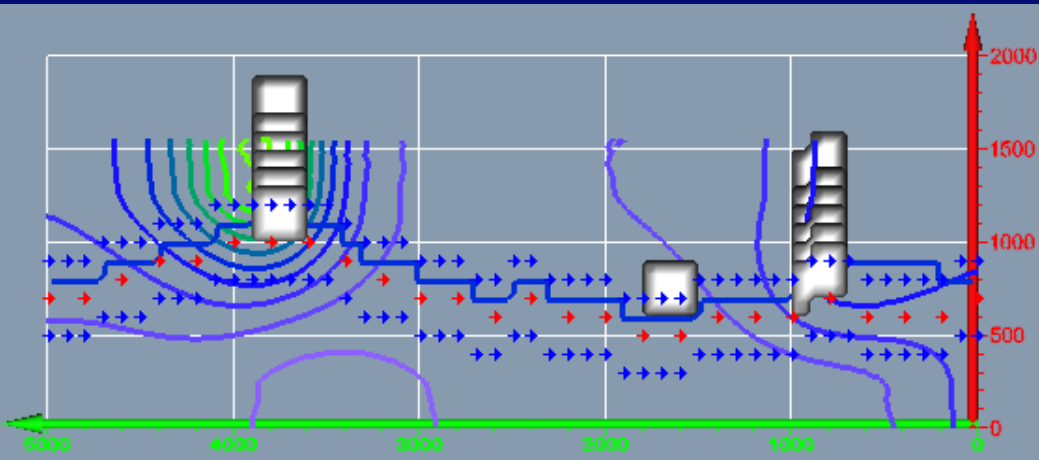
Multipoles Double Offset Dipole-Dipole



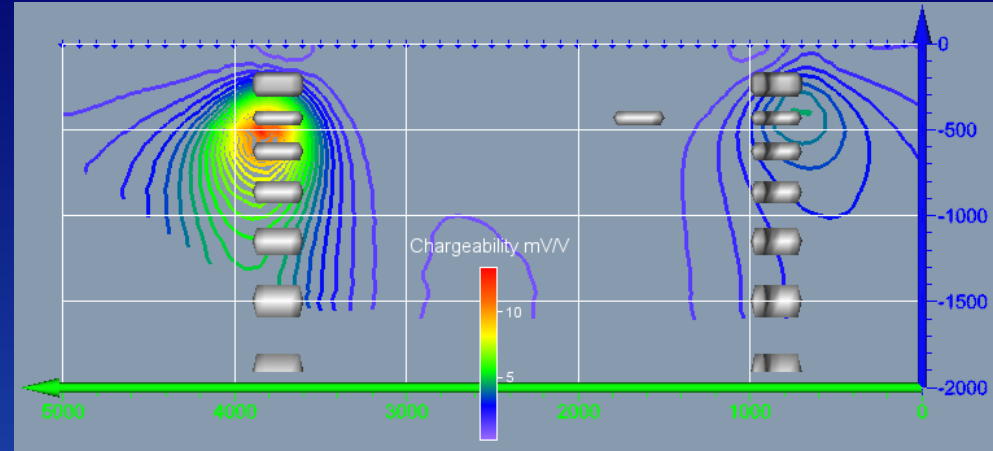
- 200m transmitter electrode spacing.
- 100m receiver electrode spacing with dipole sizes of 100m, 200m, 300m and 400m.
- 200m line spacing.
- All electrodes active for each reading.
- Results masked in a window between $\pm 300\text{m}$ of the current electrodes line.



Chargeability

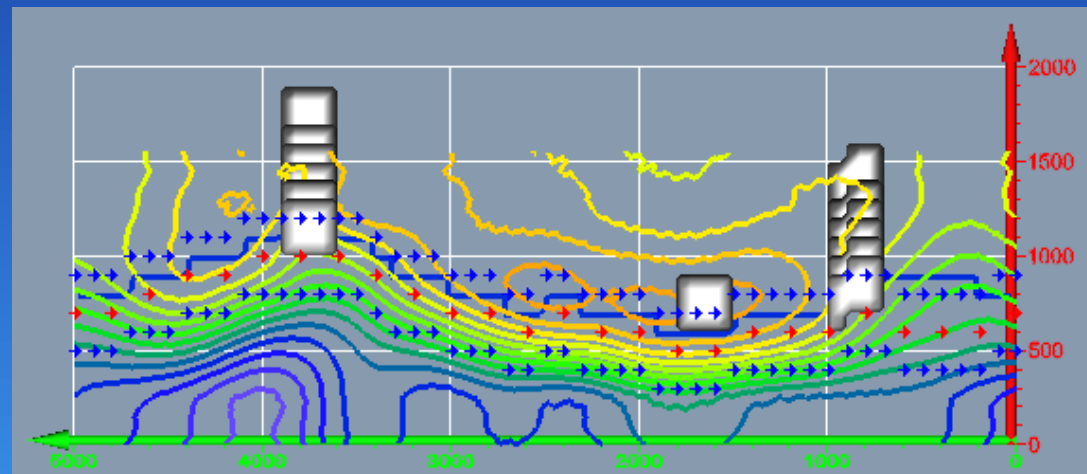


Plan view of contour slice through the middle of the chargeable centre body

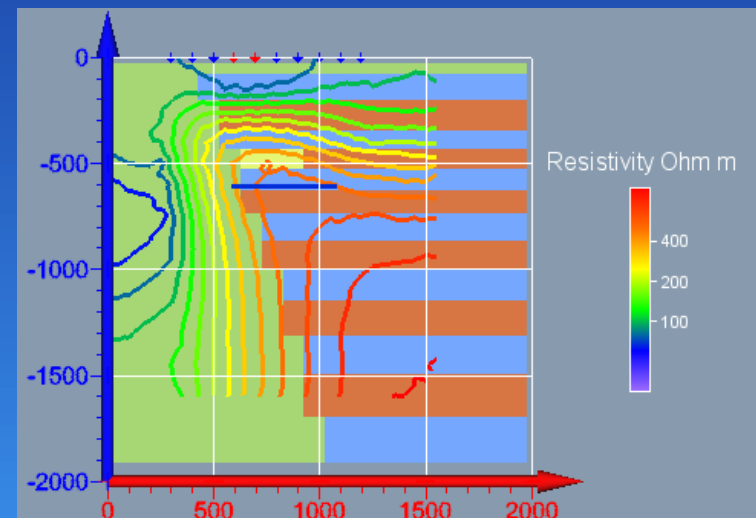


Bent and tilted long section view of contours through body centres

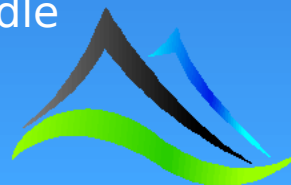
Resistivity



Plan view of contour slice through the middle of the chargeable centre body

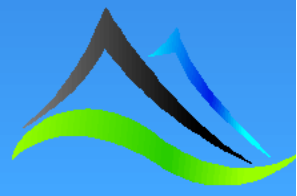


Cross section through the middle of the chargeable centre body



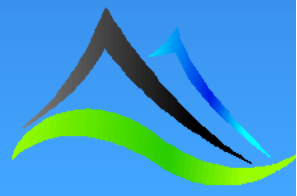
Observations – 430m depth Strike parallel 2.5D Multipole

- As with all previous arrays, the target is not resolved with the chargeability inversion and the resistivity inversion has such a low response that it is not reliable.

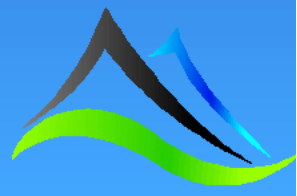


Summary – Single body at 430m depth

- No array was able to see the central deep target, only responding to the the two shallower zones.
- Both strike parallel arrays show the left zone to have much clearer resolution than the right zone, suggesting that the body is modifying the forward modelled data but that the inversion can not reconstruct it.
- In all models and arrays, the depth to the targets were overestimated.

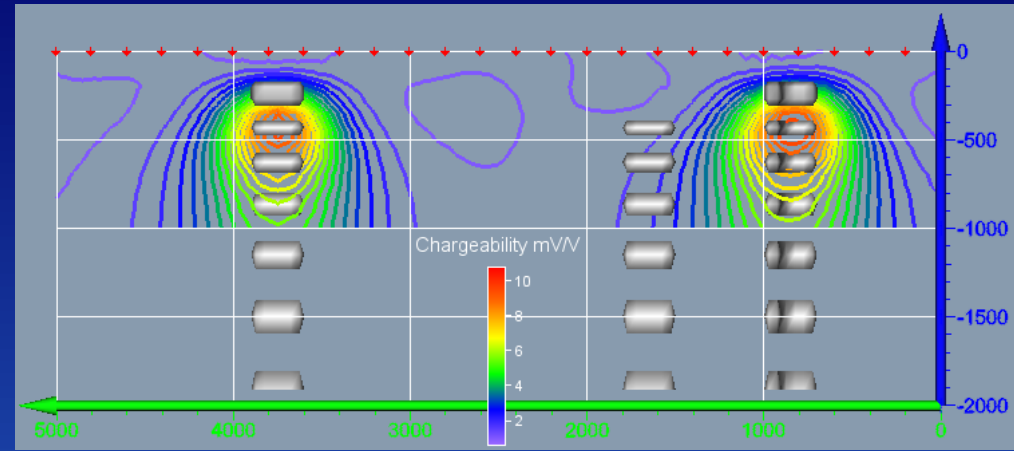
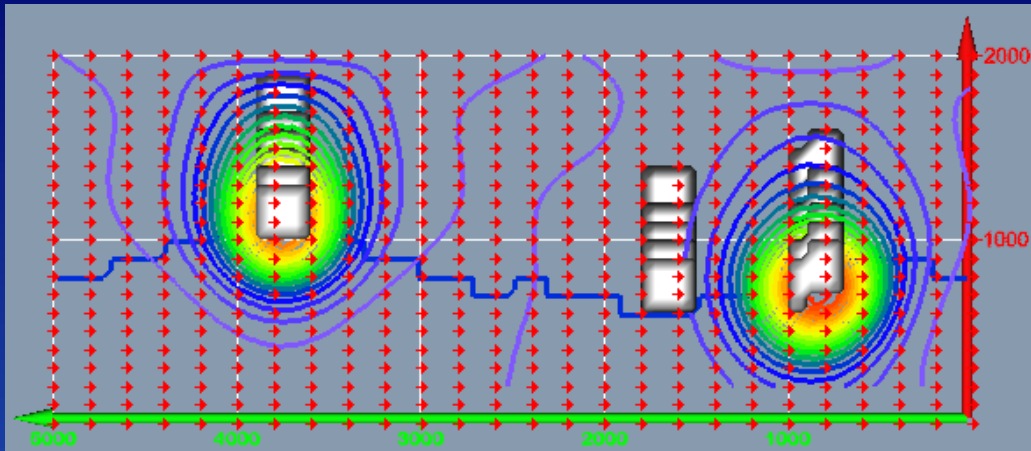


Fault 70° dip.
Chargeable stack at 430m depth.

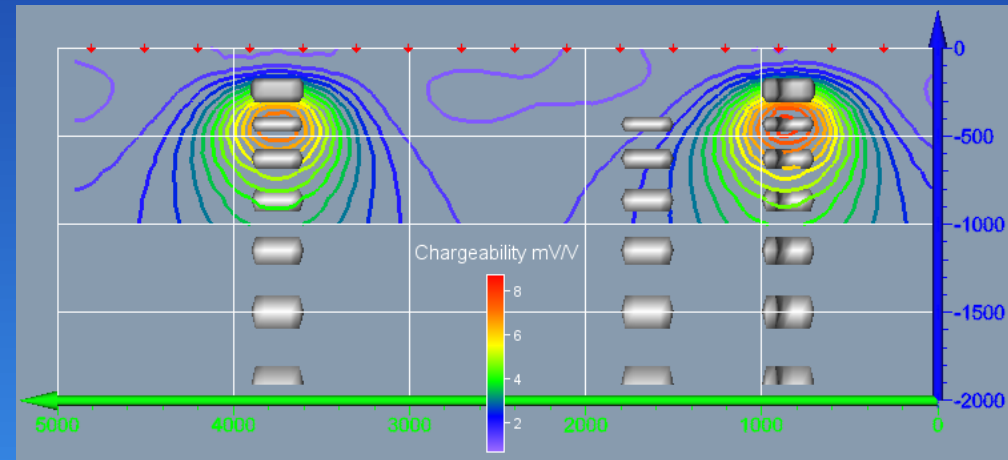
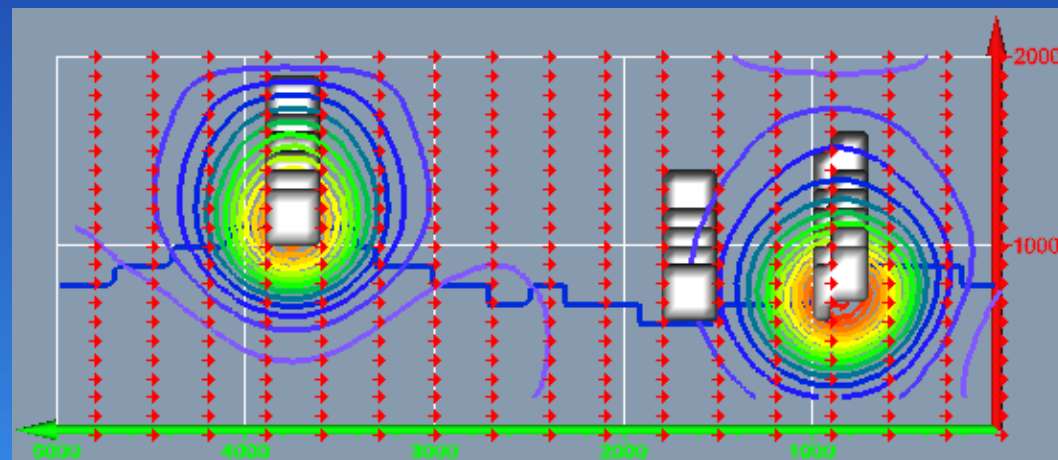


2DDD

200m Chargeability

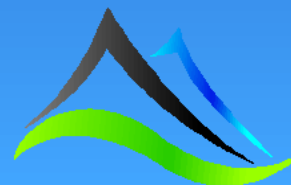


300m Chargeability



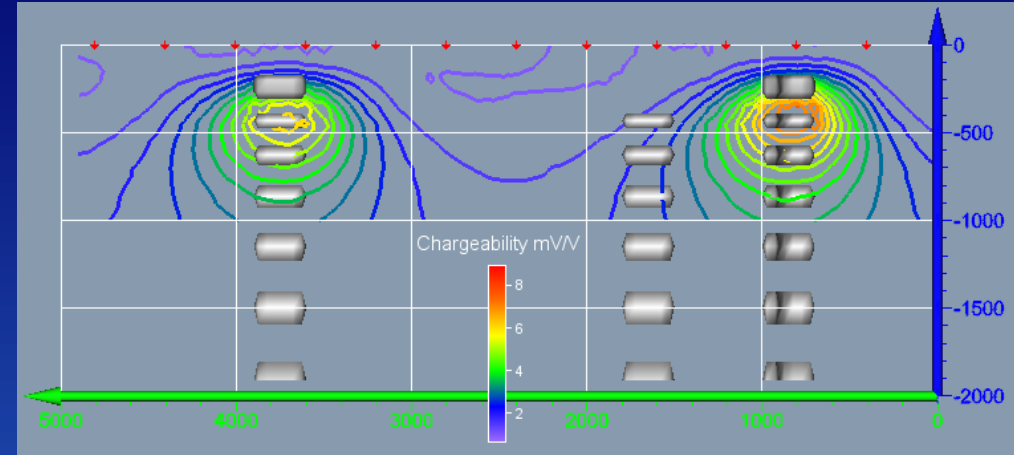
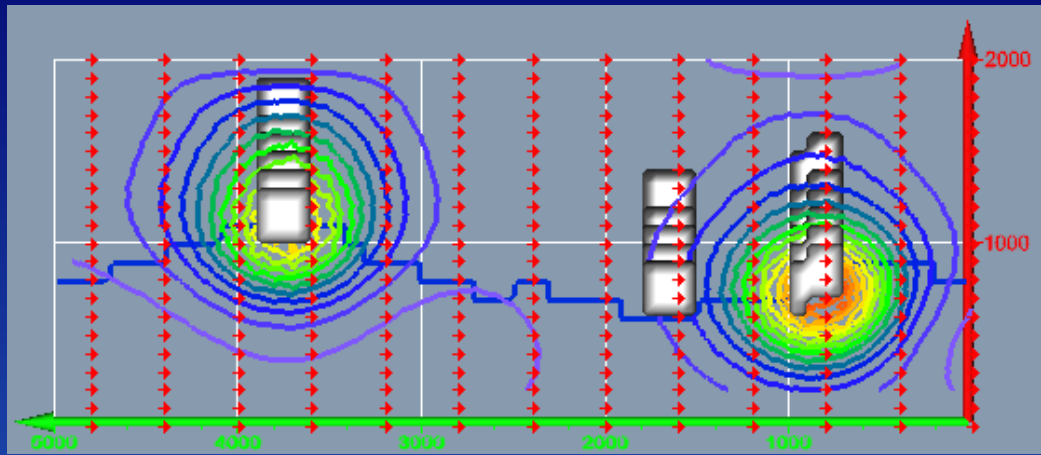
Plan view of contour slice at -450m

Bent and tilted long section view of contours through body centres

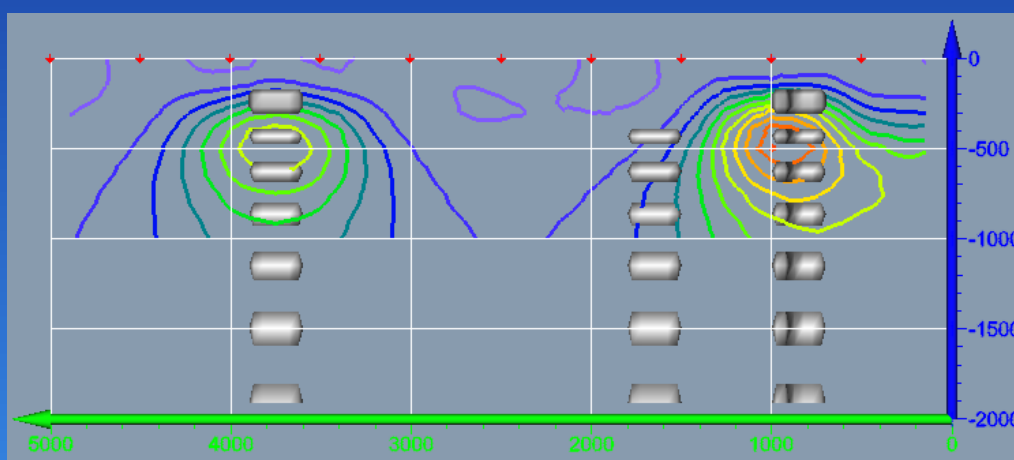
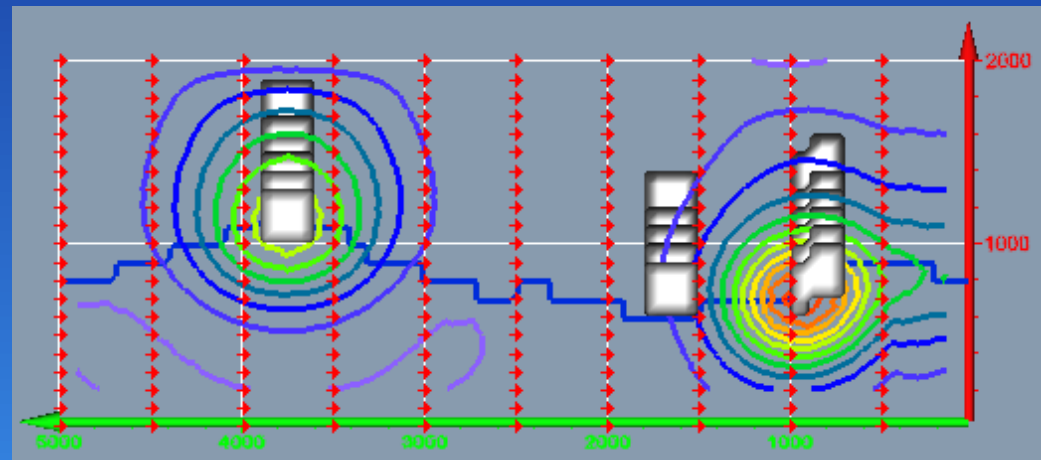


2DDD

400m Chargeability

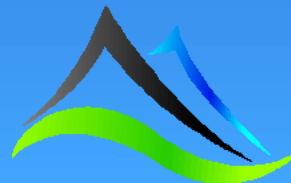


500m Chargeability



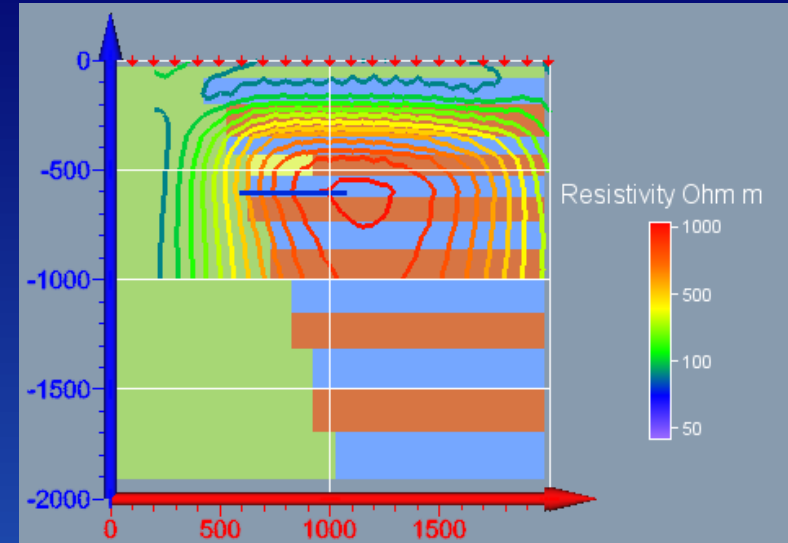
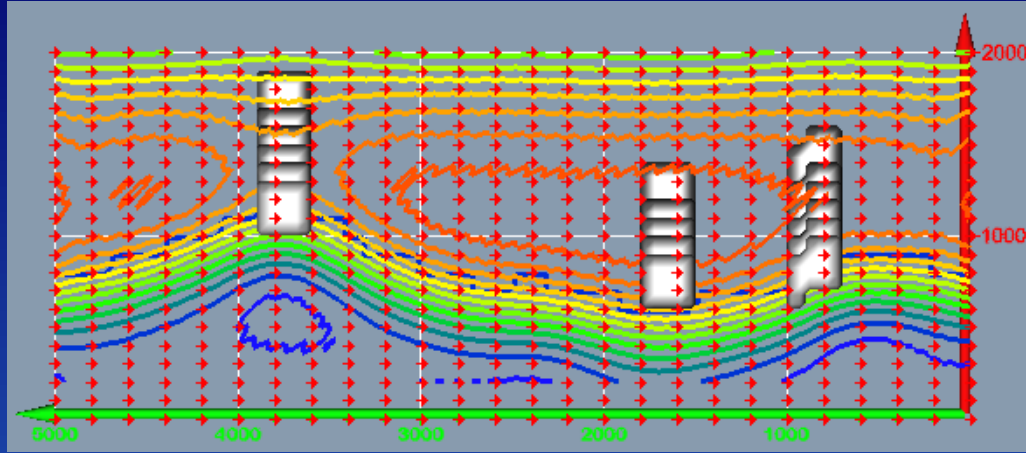
Plan view of contour slice at -450m

Bent and tilted long section view of contours through body centres

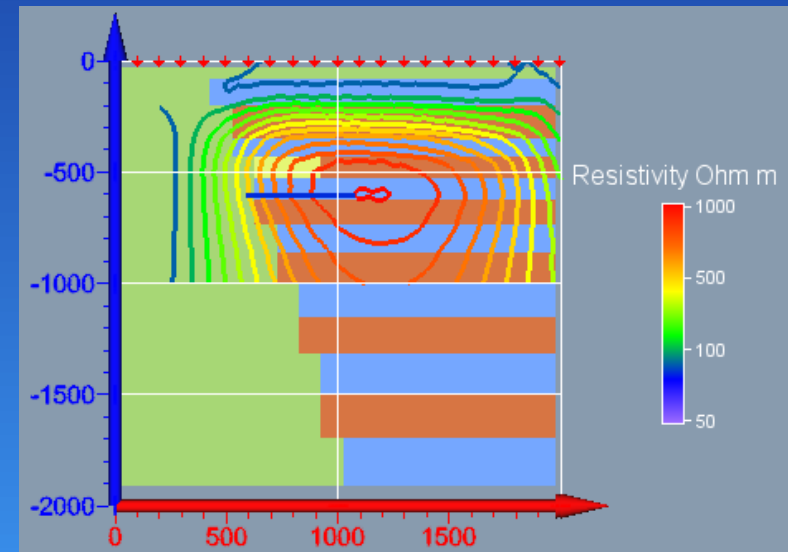
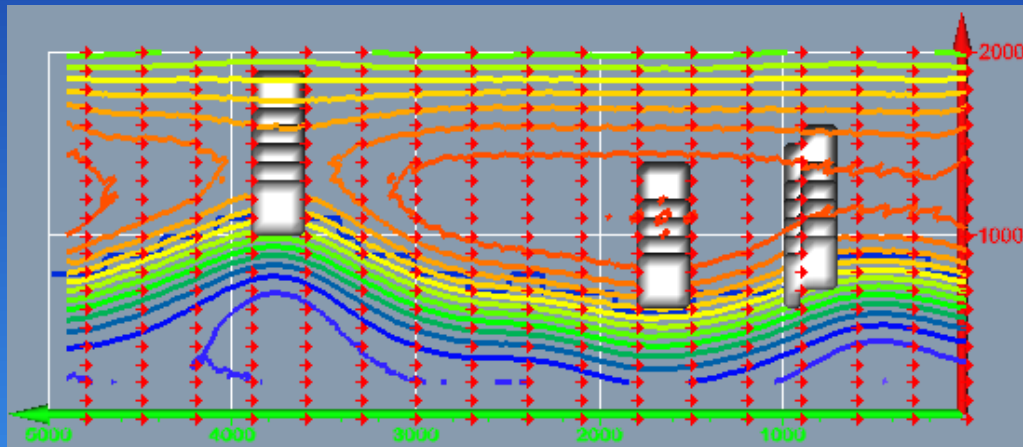


2DDD

200m Resistivity

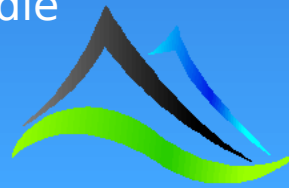


300m Resistivity



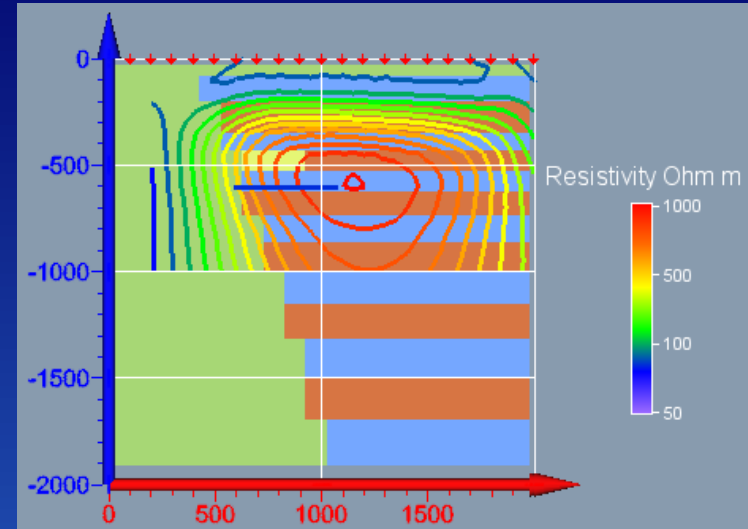
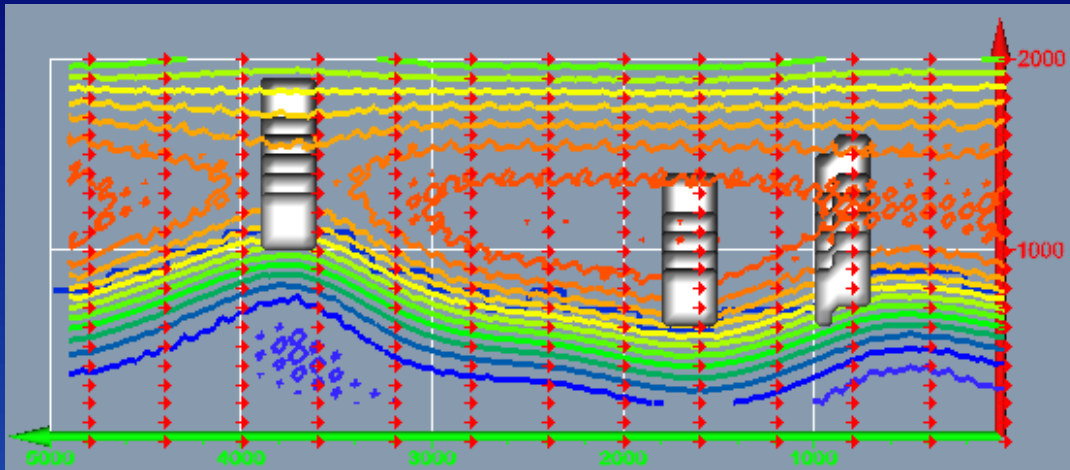
Plan view of contour slice through the middle of the chargeable centre body

Cross section through the middle of the chargeable centre body

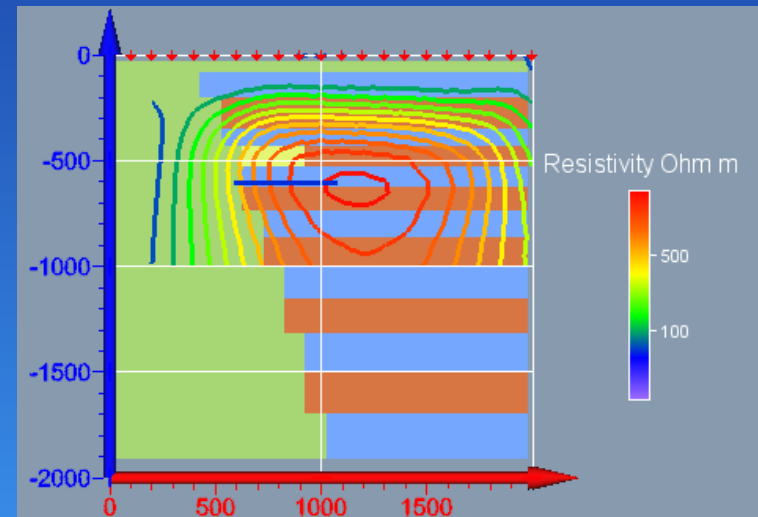
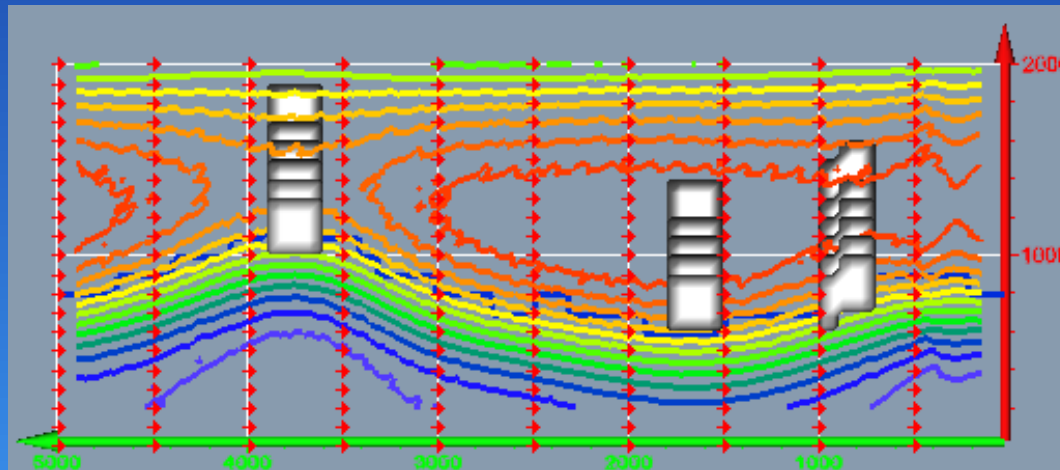


2DDD

400m Resistivity

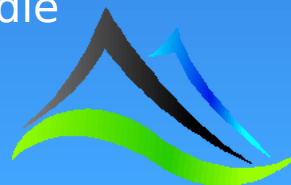


500m Resistivity

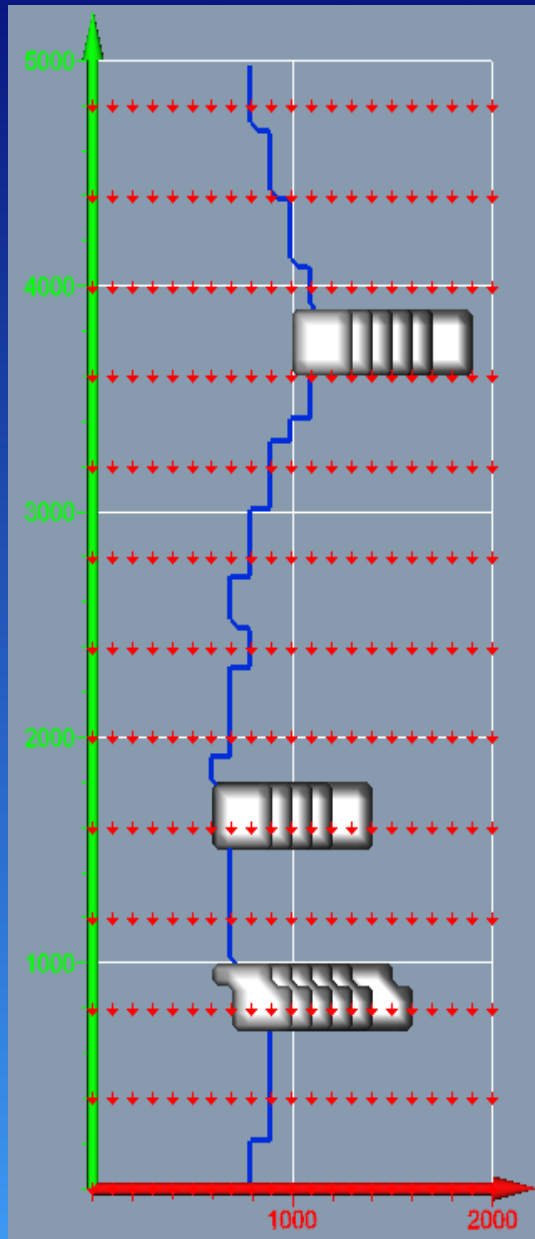


Plan view of contour slice through the middle of the chargeable centre body

Cross section through the middle of the chargeable centre body

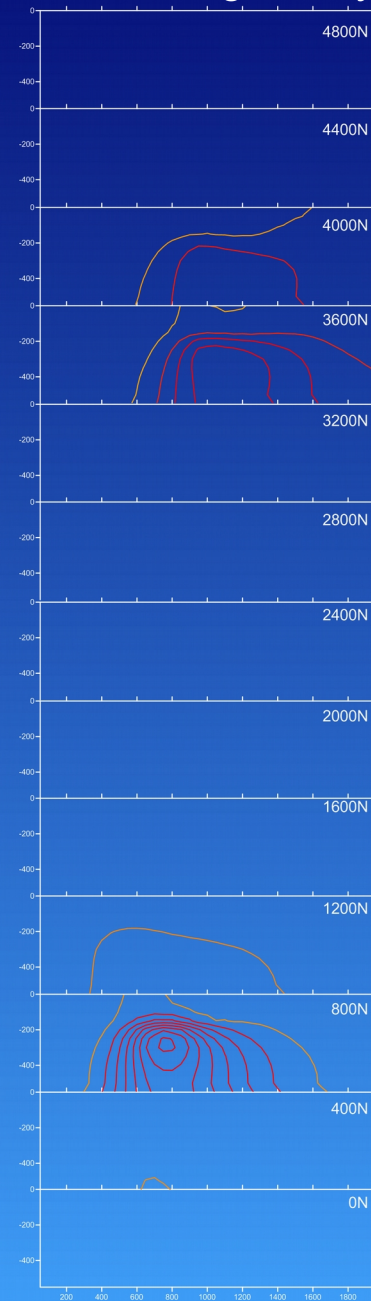


2D inversion sections



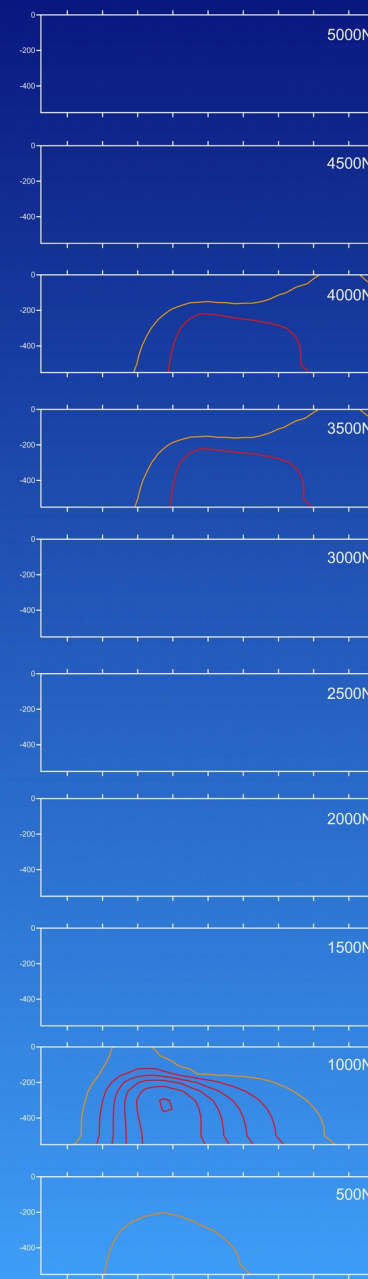
It = Iteration

400m Chargeability

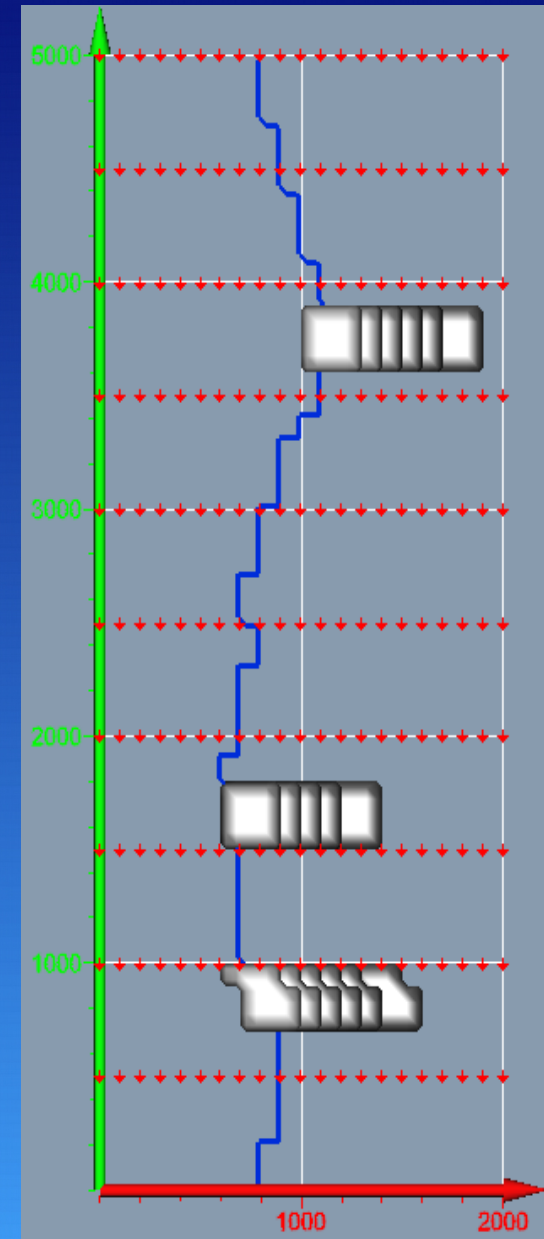


it4

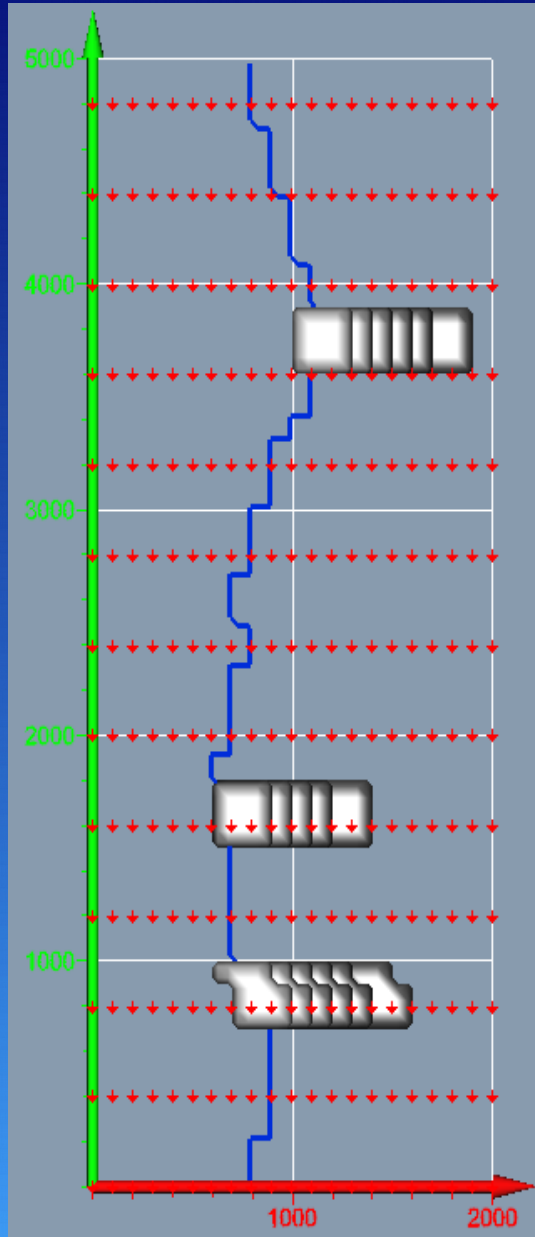
500m Chargeability



it4

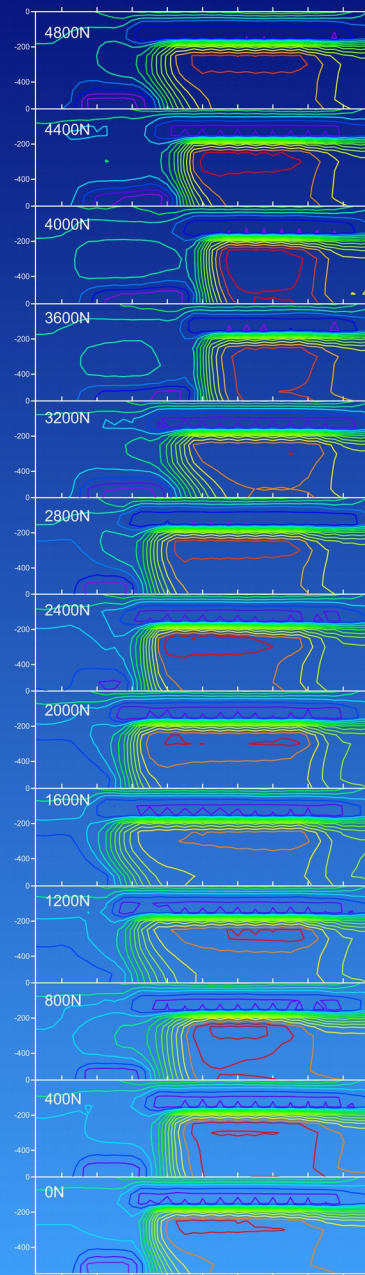


2D inversion sections



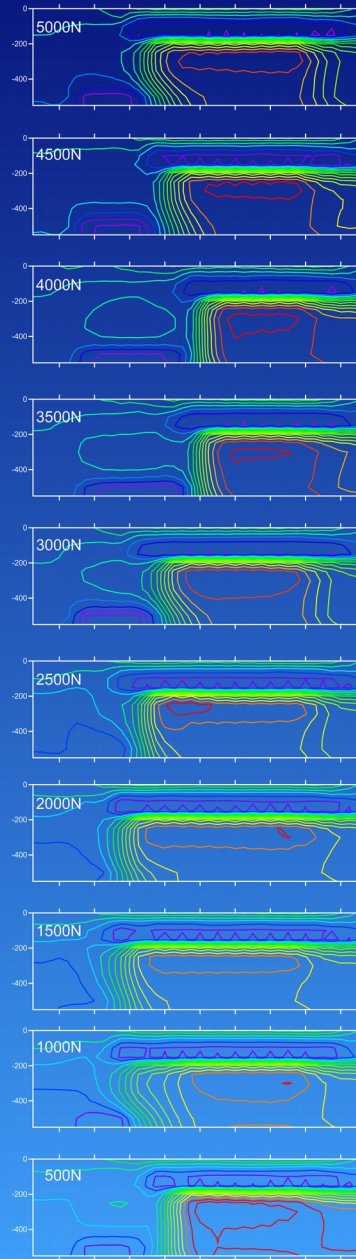
It = Iteration

400m Resistivity

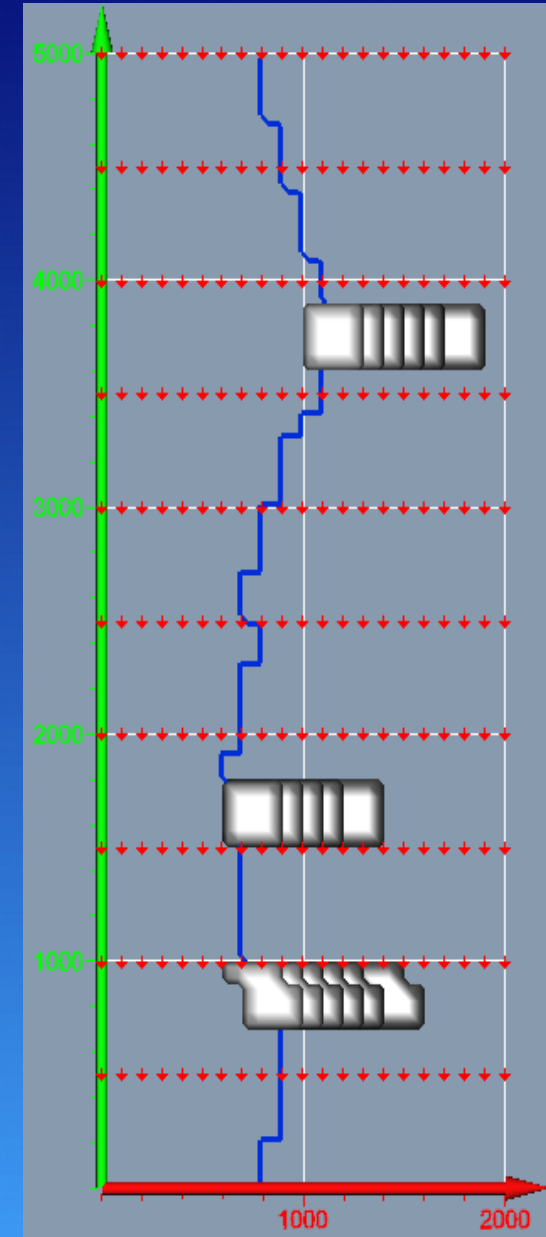


it4

500m Resistivity

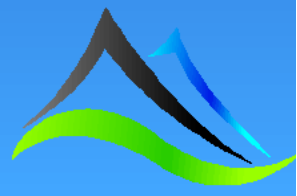


it4

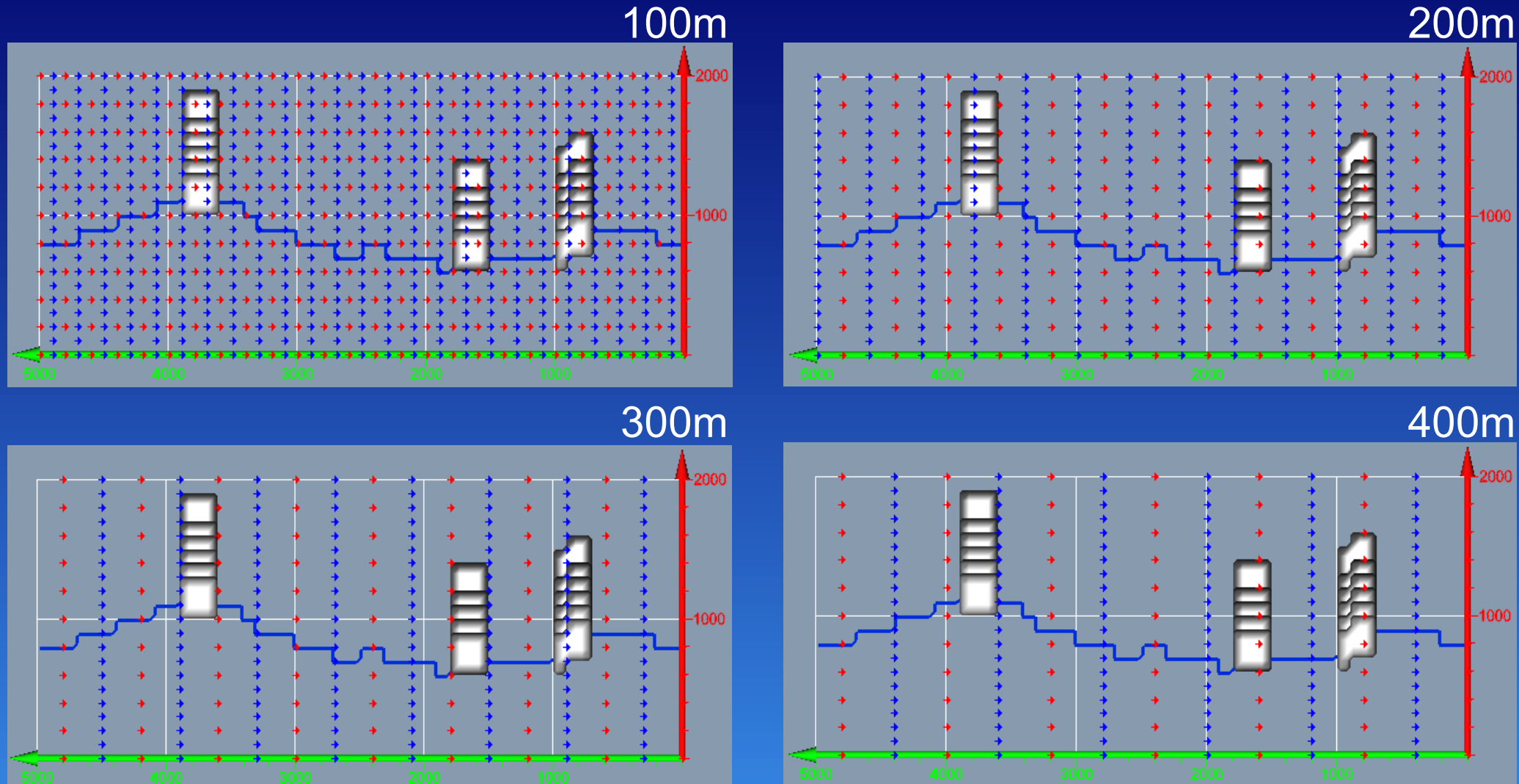


Observations – 430m depth stack 2D Dipole-Dipole

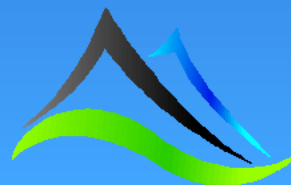
- The target is not resolved by any line spacing at this depth.



2.5D QODD with variable line spacing

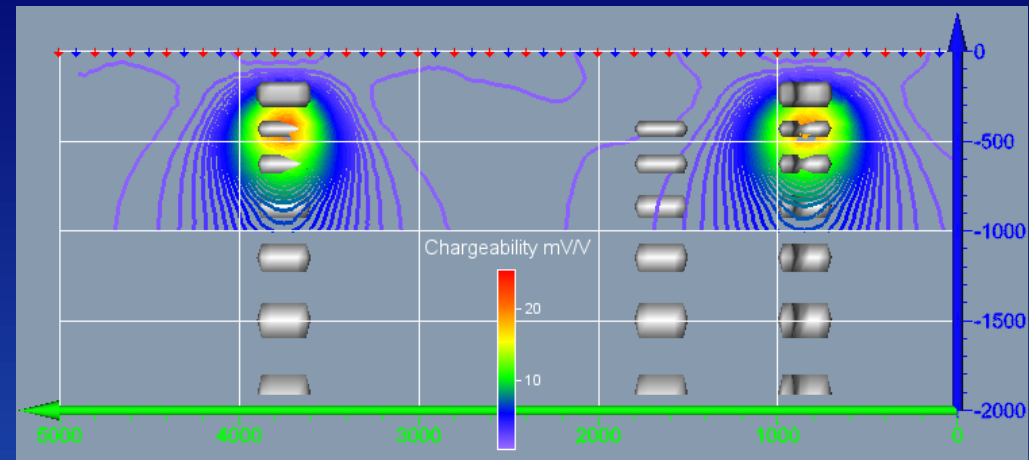
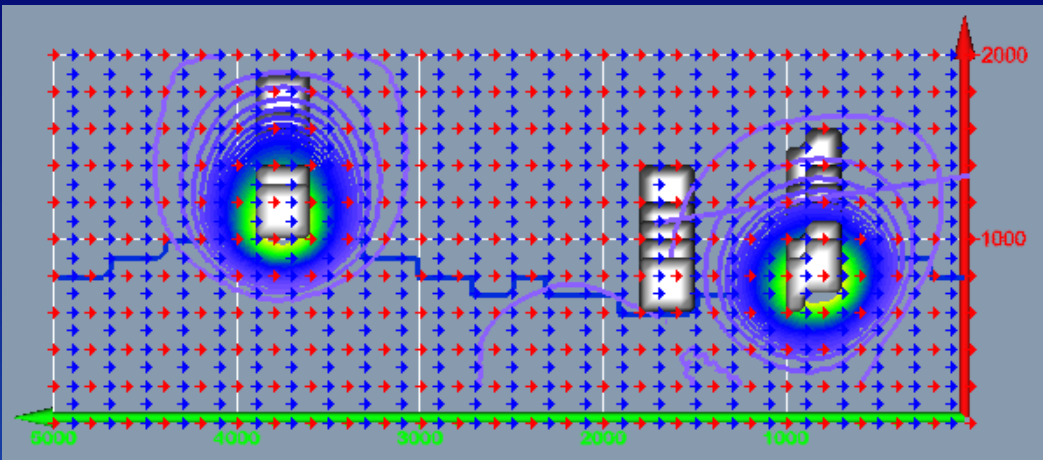


- 200m transmitter electrode spacing.
- 100m receiver electrode spacing.
- 100m, 200m, 300m and 400m line spacing.
- 4 lines of 20 dipoles active each reading.

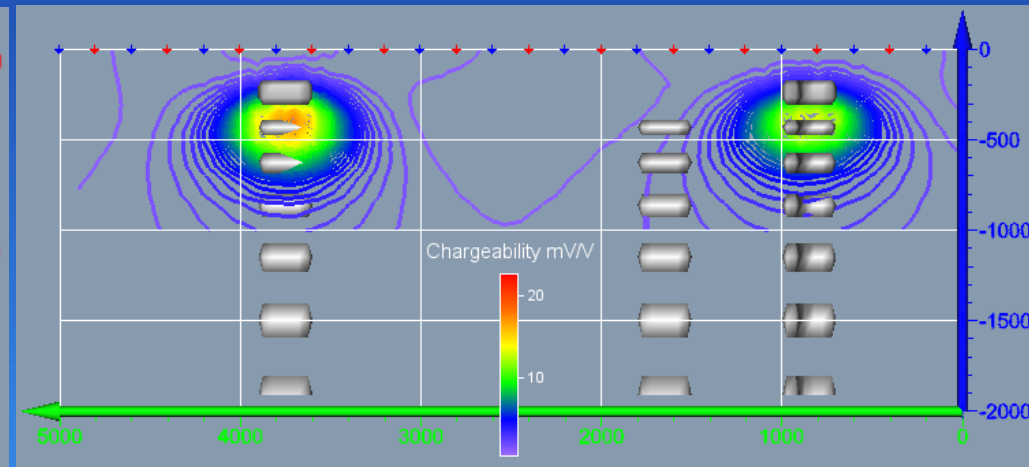
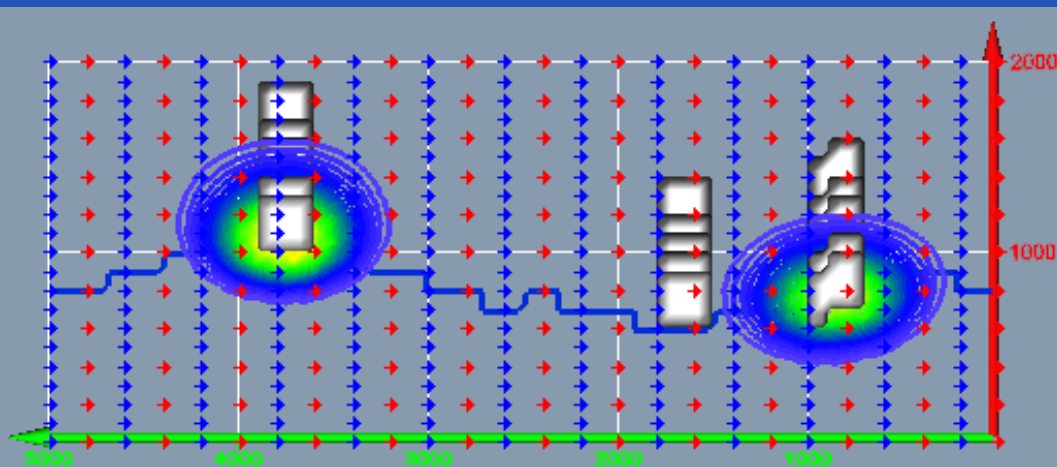


2.5D QODD

100m Chargeability

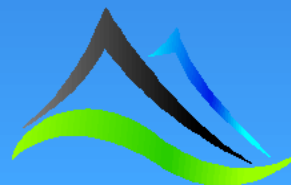


200m Chargeability



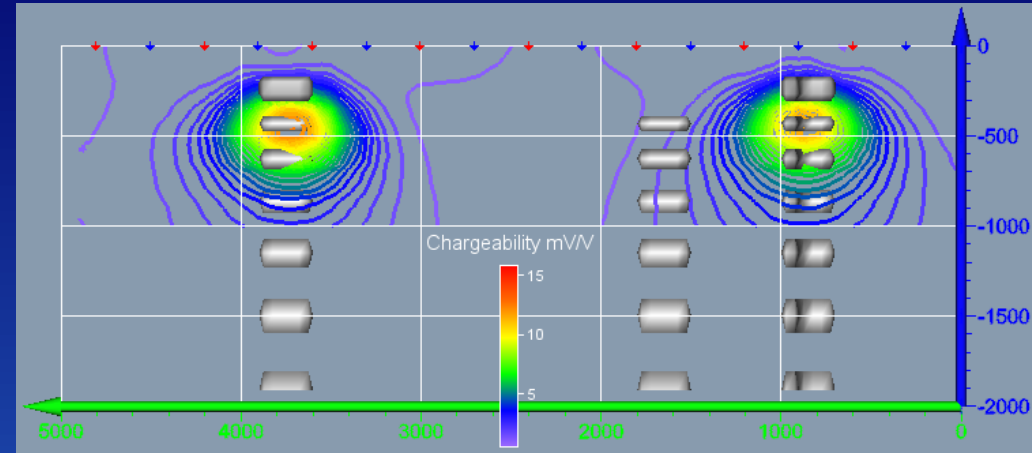
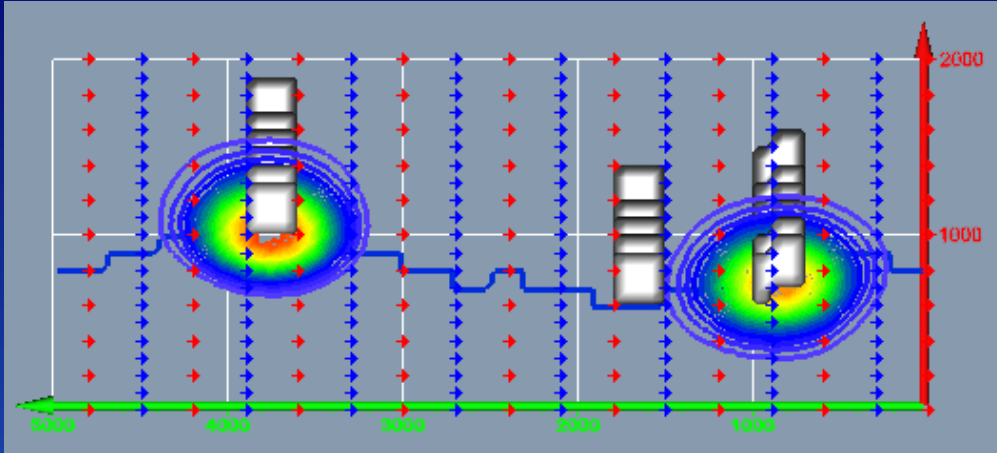
Plan view of contour slice at -450m

Bent and tilted long section view of
contours through body centres

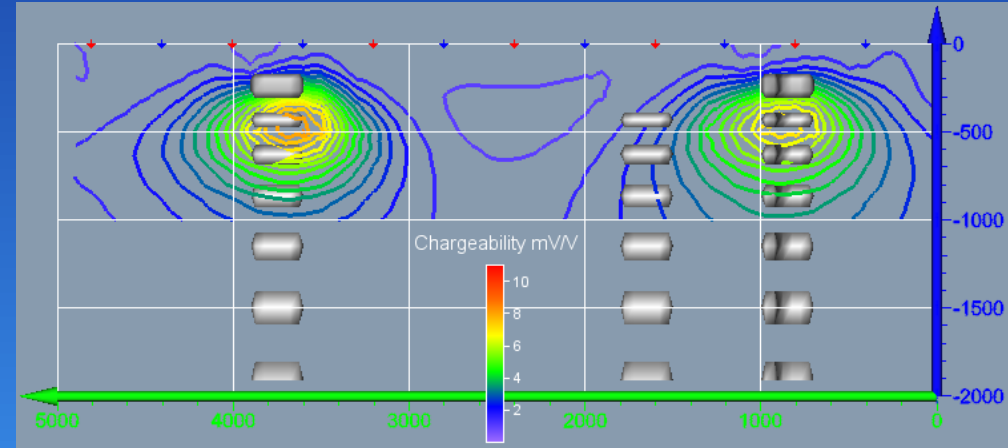
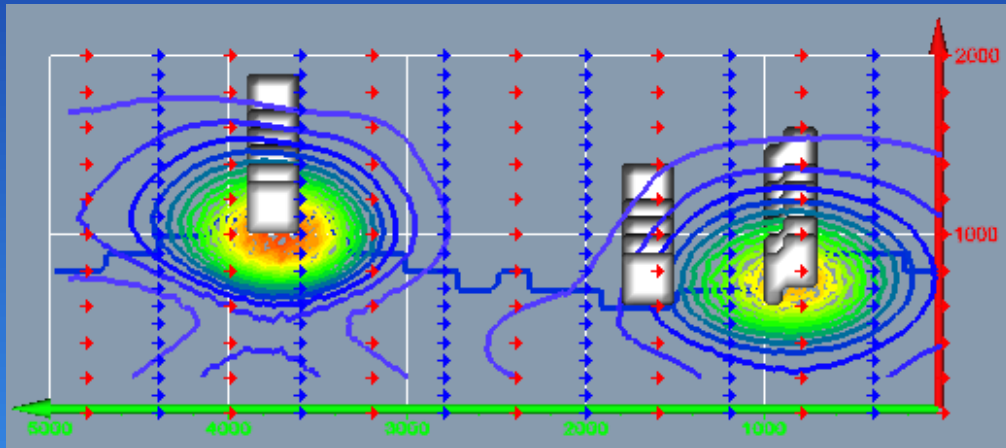


2.5D QODD

300m Chargeability

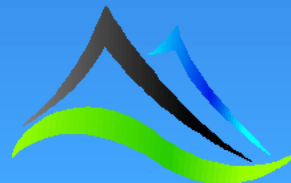


400m Chargeability



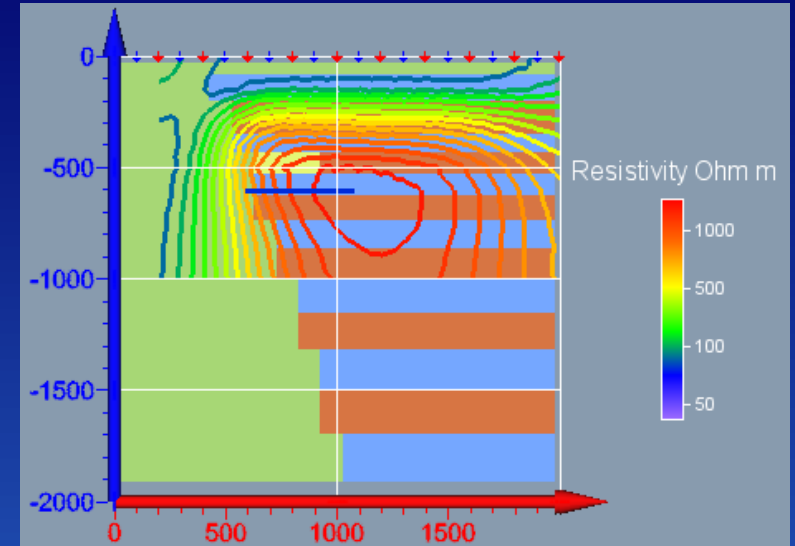
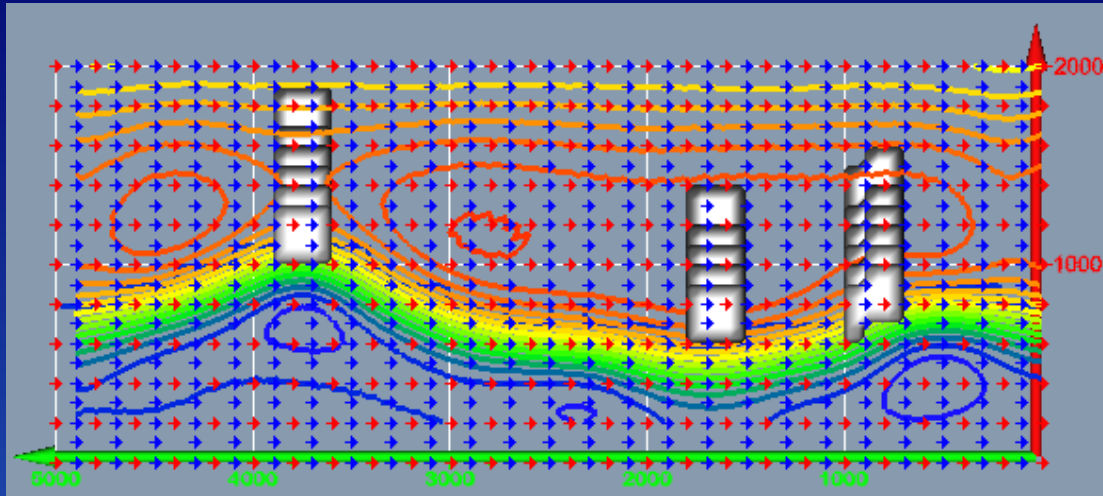
Plan view of contour slice at -450m

Bent and tilted long section view of contours through body centres

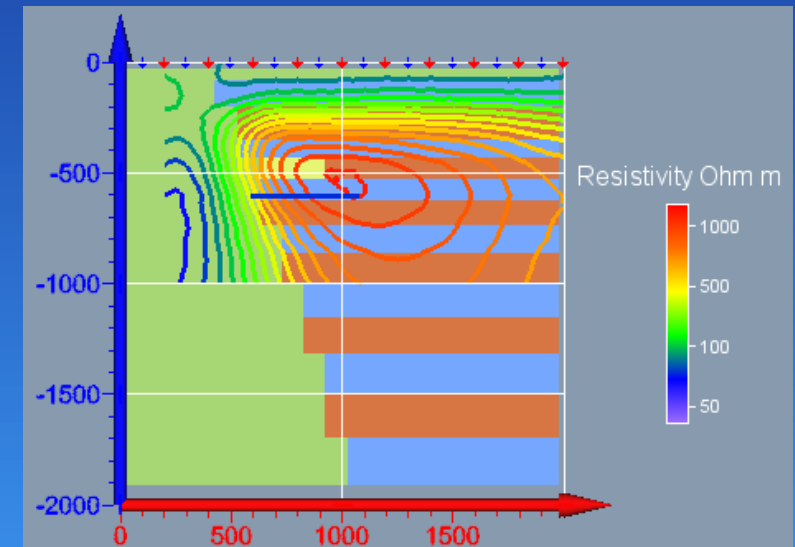
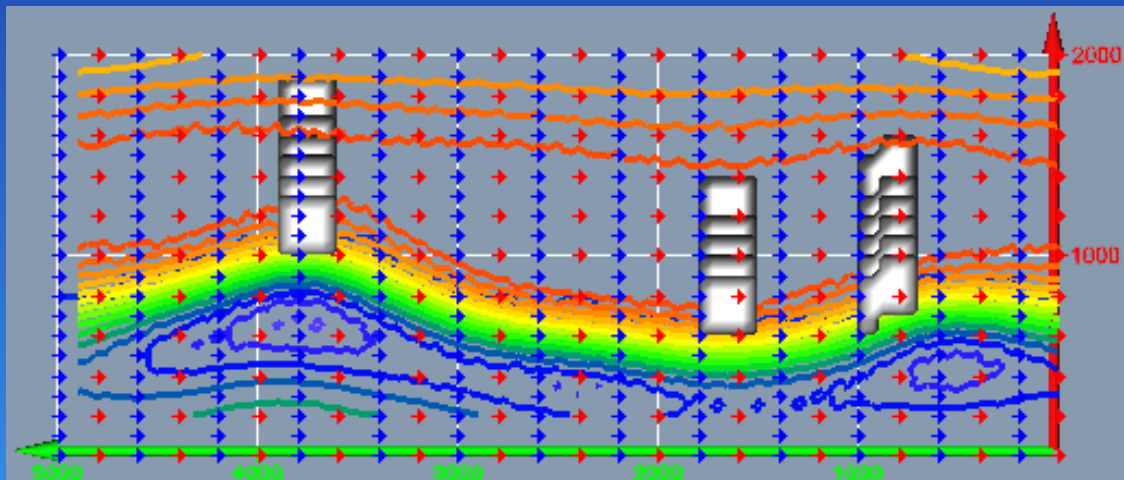


2.5D QODD

100m Resistivity

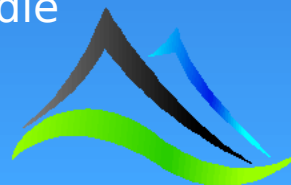


200m Resistivity



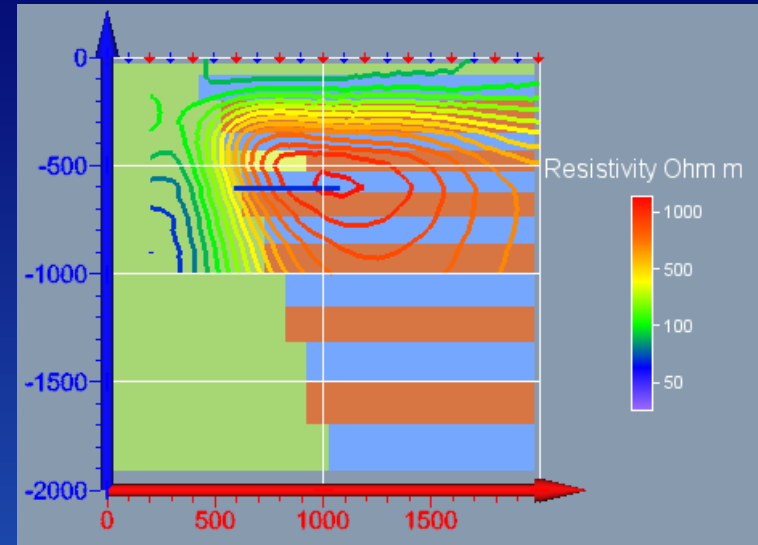
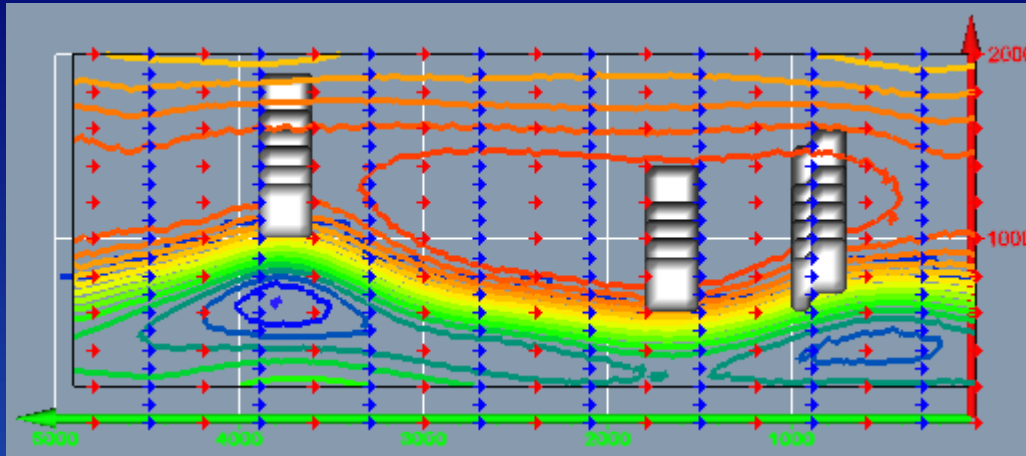
Plan view of contour slice through the middle of the chargeable centre body

Cross section through the middle of the chargeable centre body

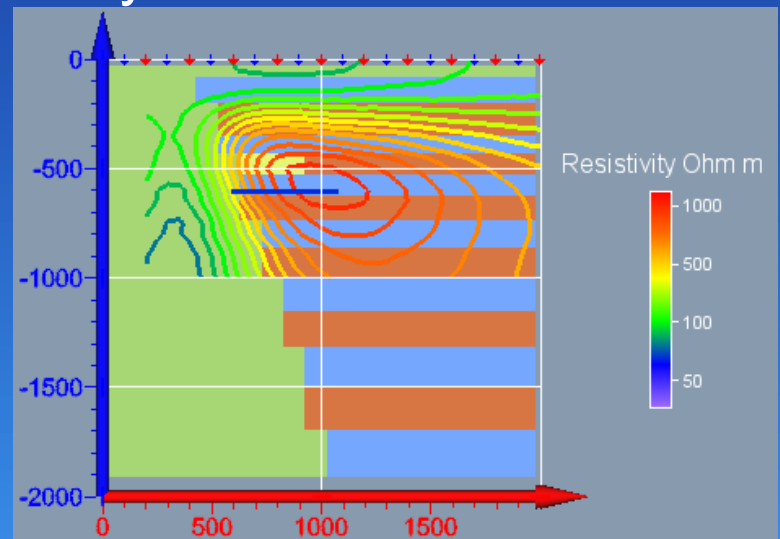
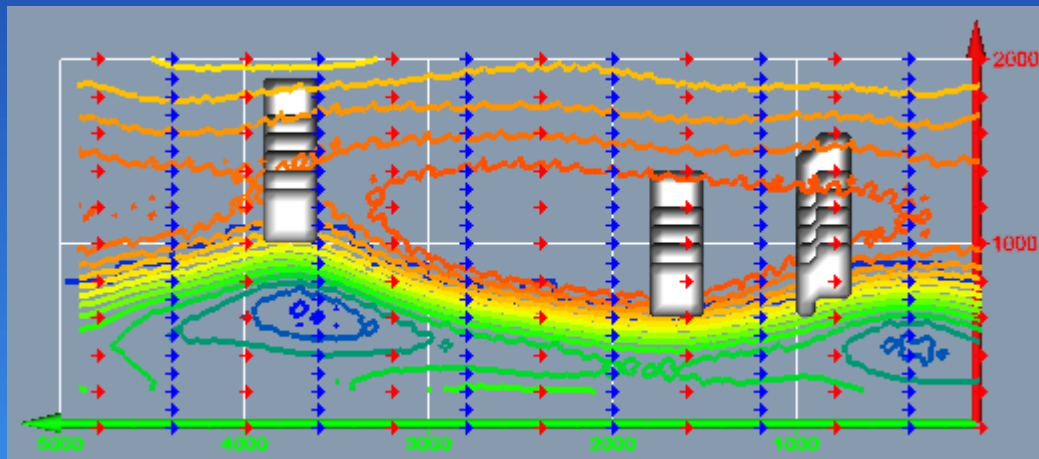


2.5D QODD

300m Resistivity

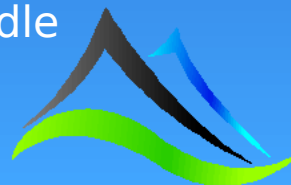


400m Resistivity



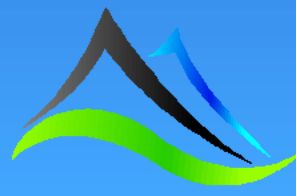
Plan view of contour slice through the middle of the chargeable centre body

Cross section through the middle of the chargeable centre body

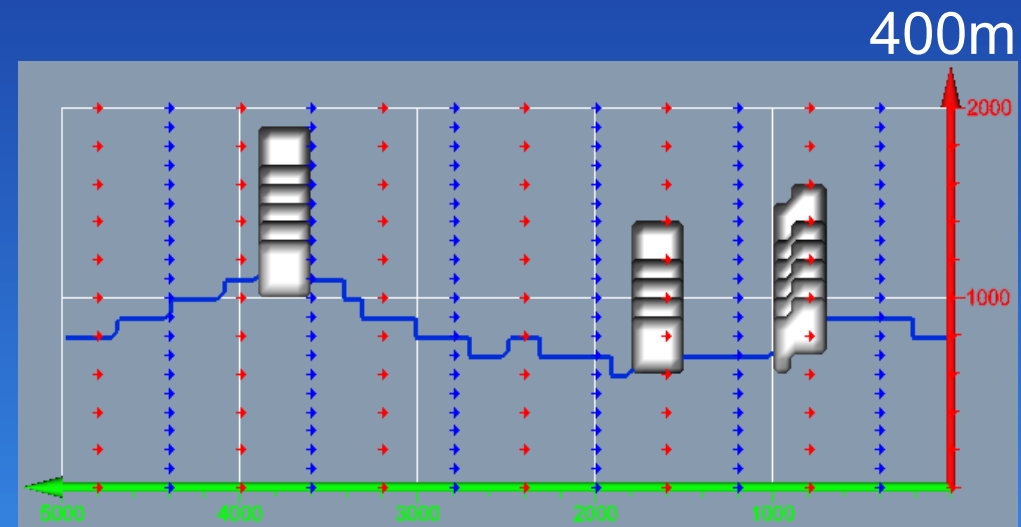
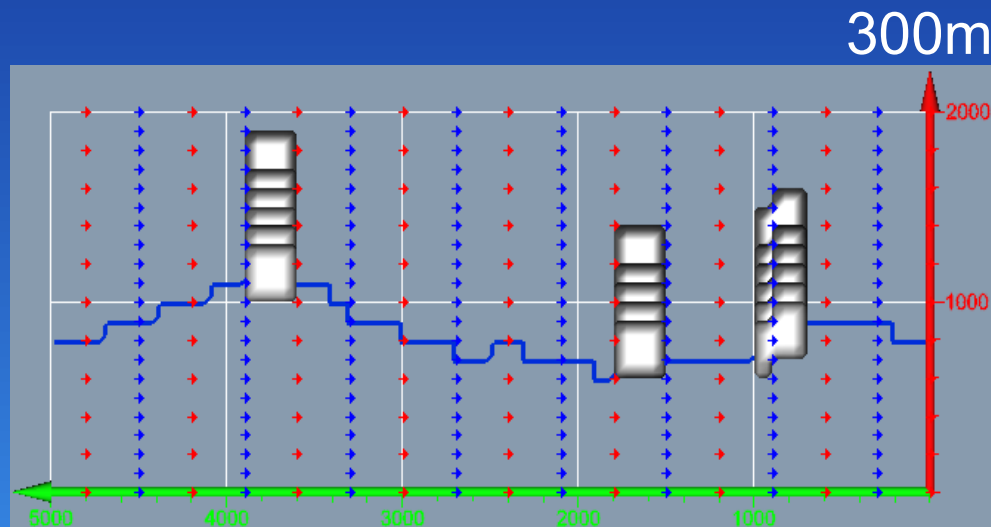
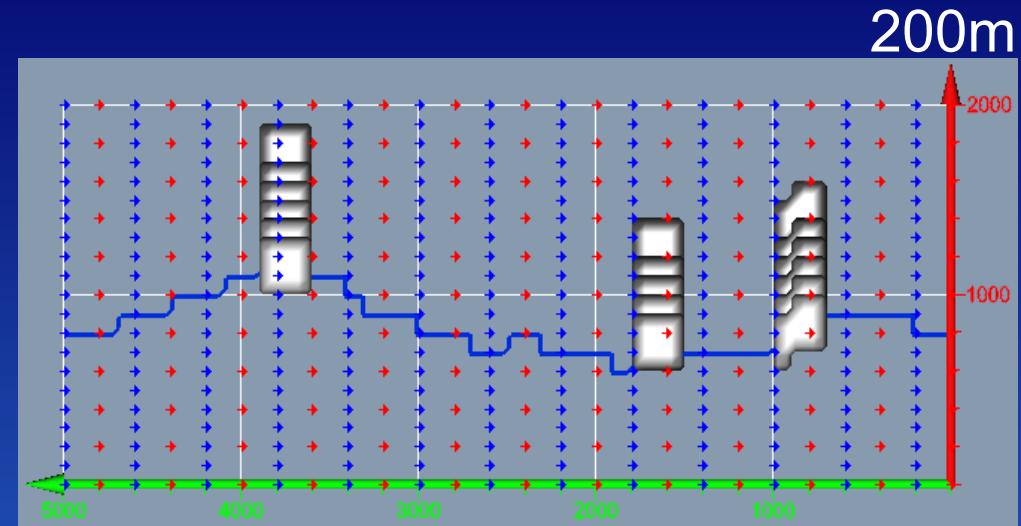
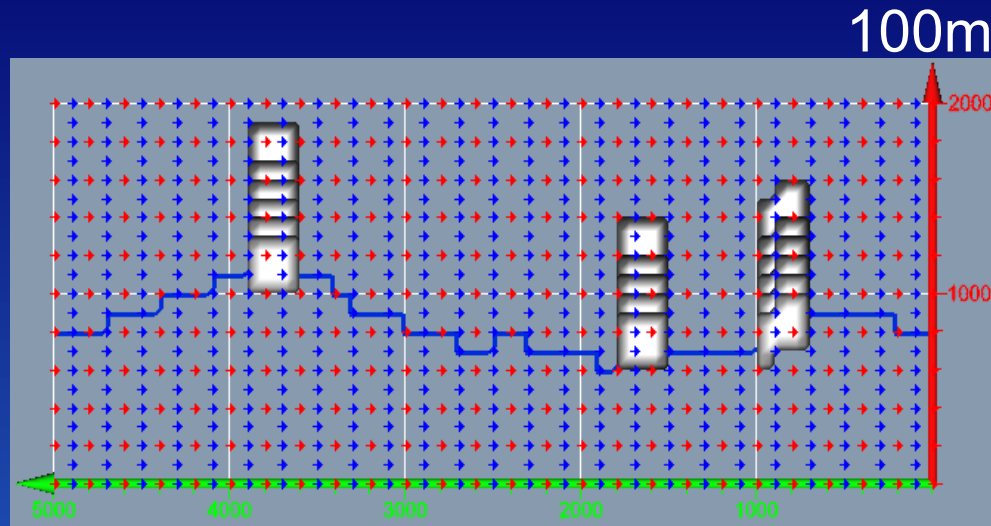


Observations – 430m depth stack 2.5D QODD

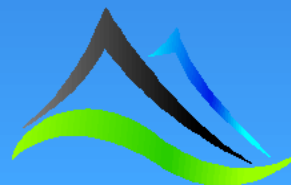
- As with 2D dipole-dipole, the target is not resolved by any line spacing at this depth.



2.5D Multipole QODD with variable line spacing

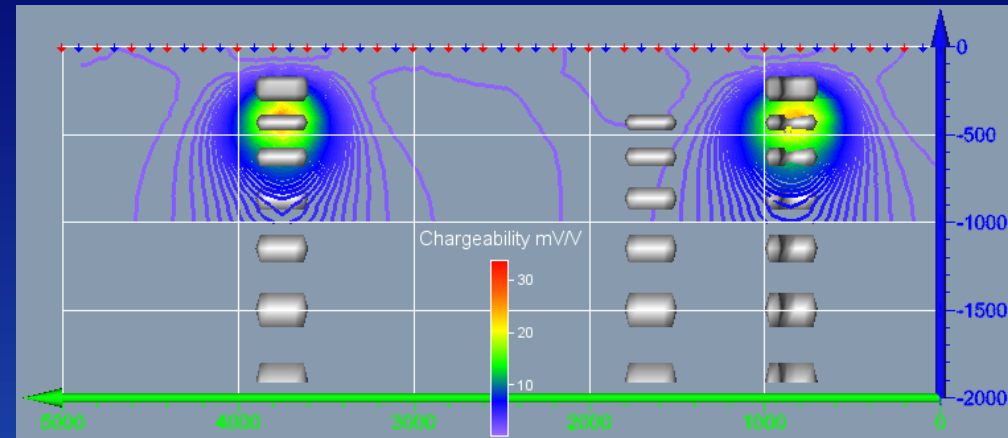
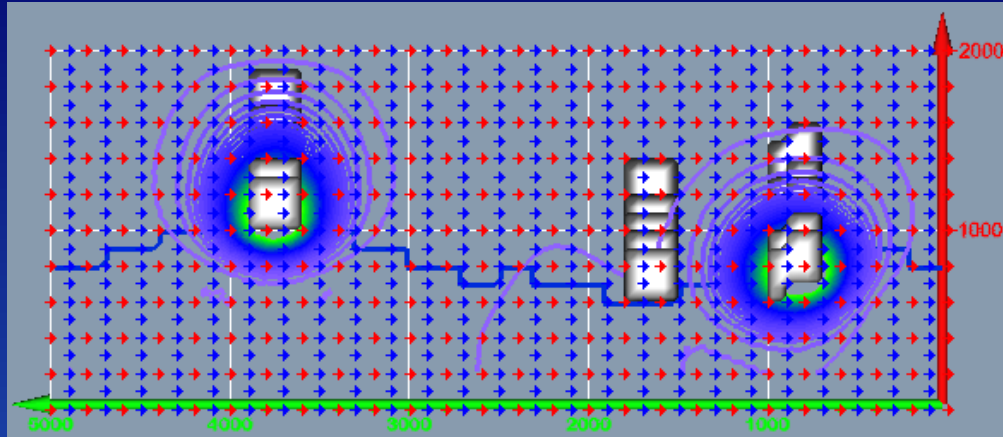


- 200m transmitter electrode spacing.
- 100m receiver electrode spacing with dipole sizes of 100m, 200m, 300m and 400m.
- 100m, 200m, 300m and 400m line spacing.
- 4 lines of 20 dipoles active each reading.

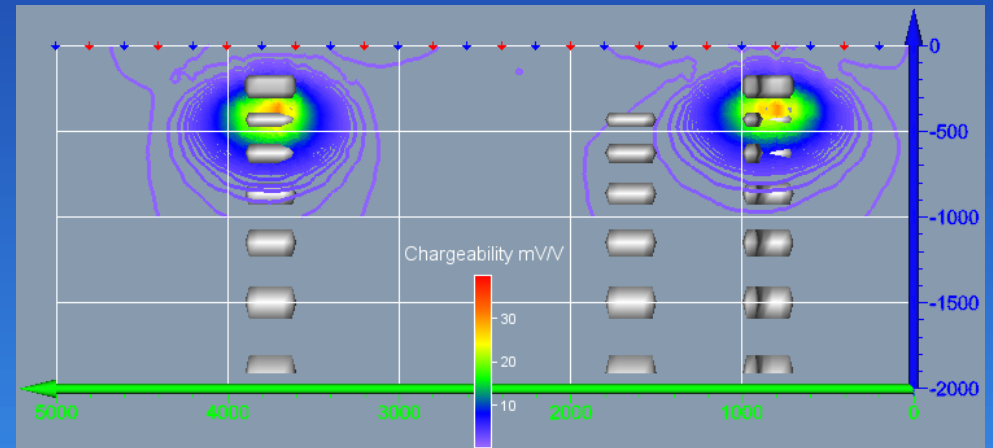
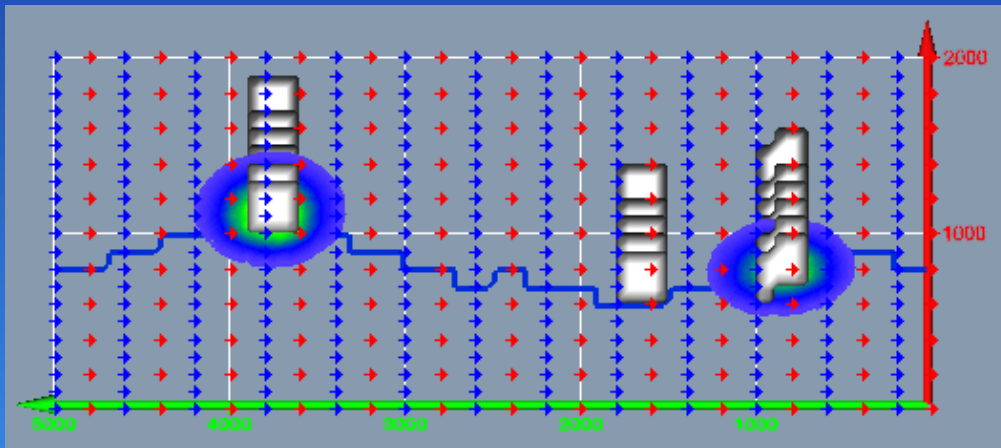


Multipole QODD

100m Chargeability

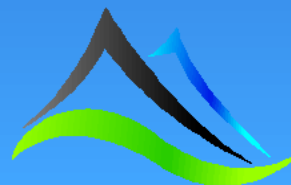


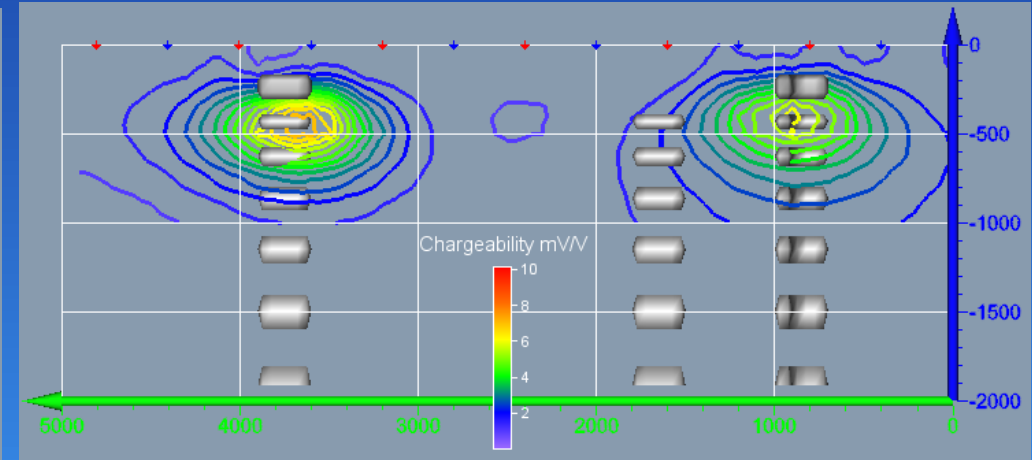
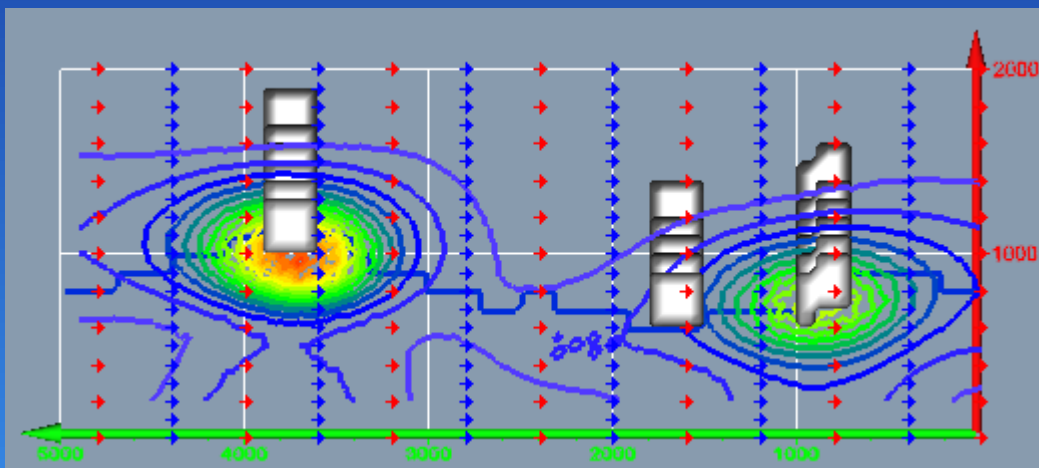
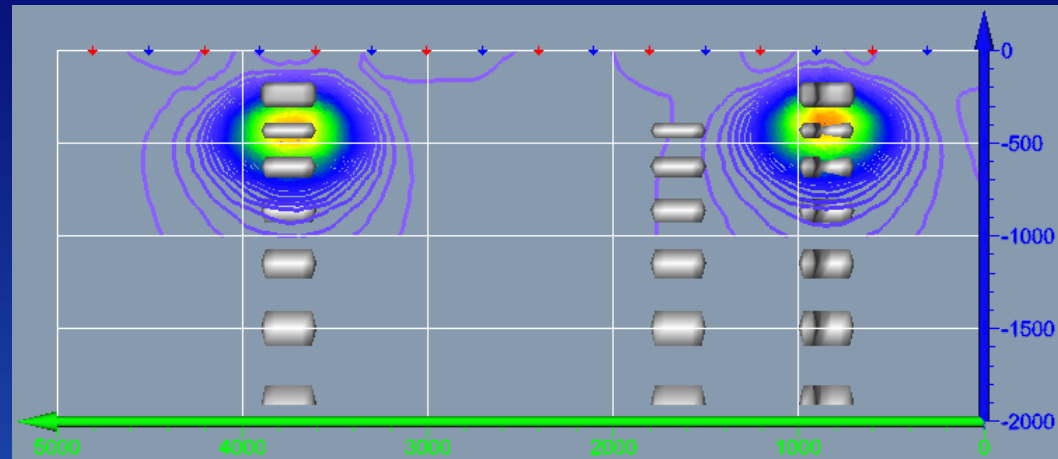
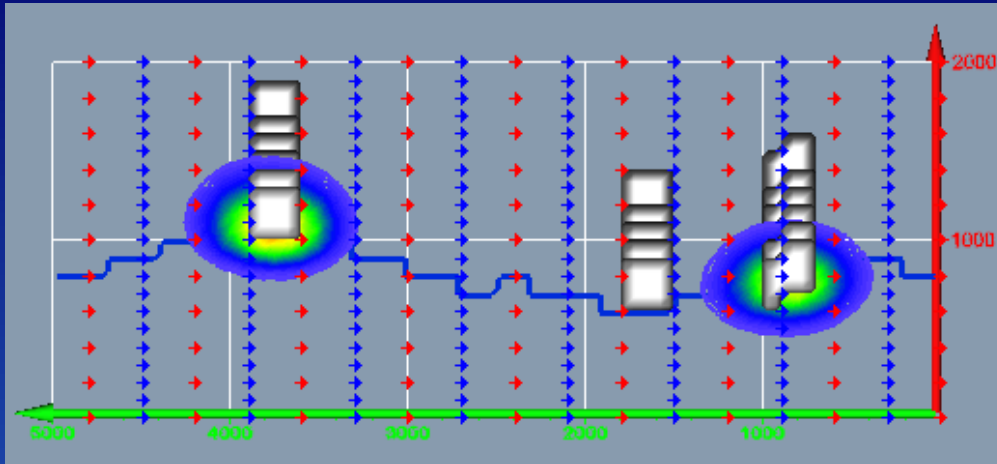
200m Chargeability



Plan view of contour slice at -450m

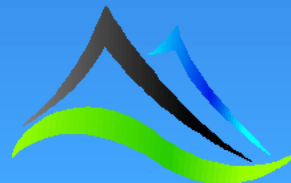
Bent and tilted long section view of
contours through body centres





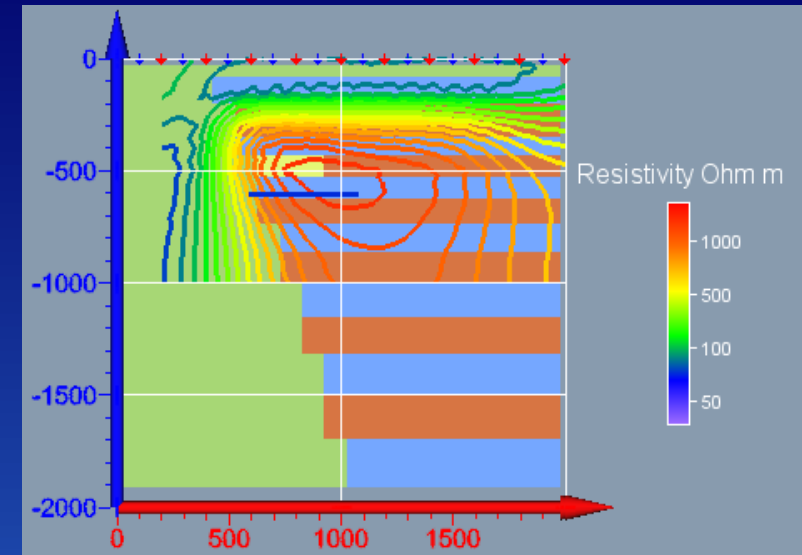
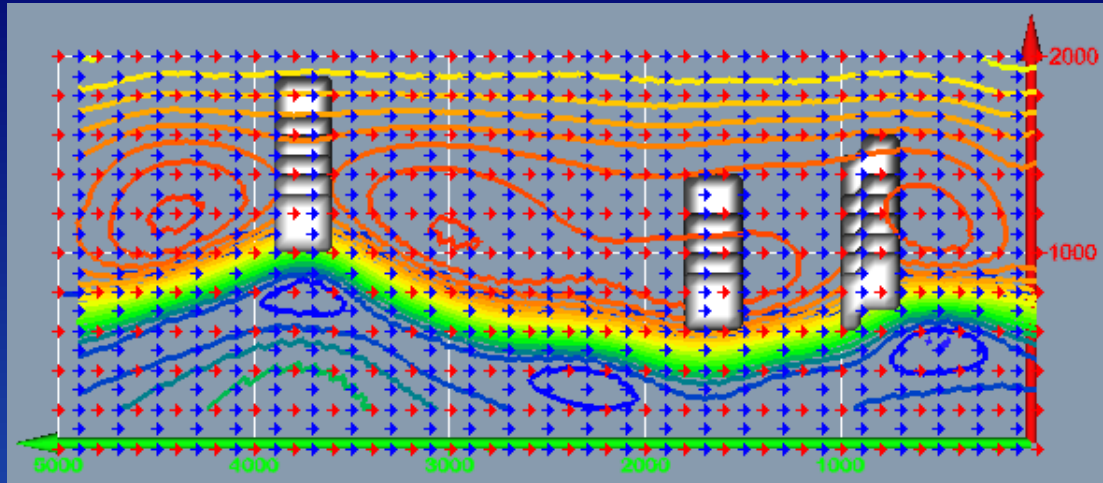
Plan view of contour slice at -450m

Bent and tilted long section view of contours through body centres

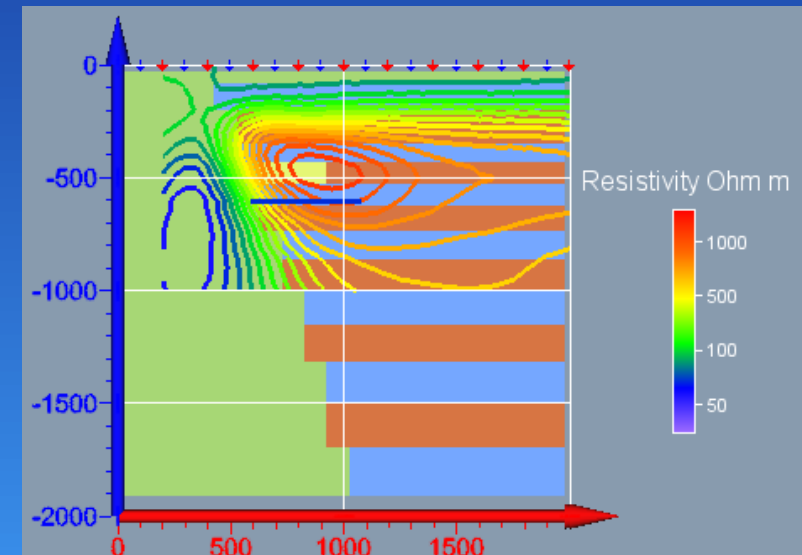
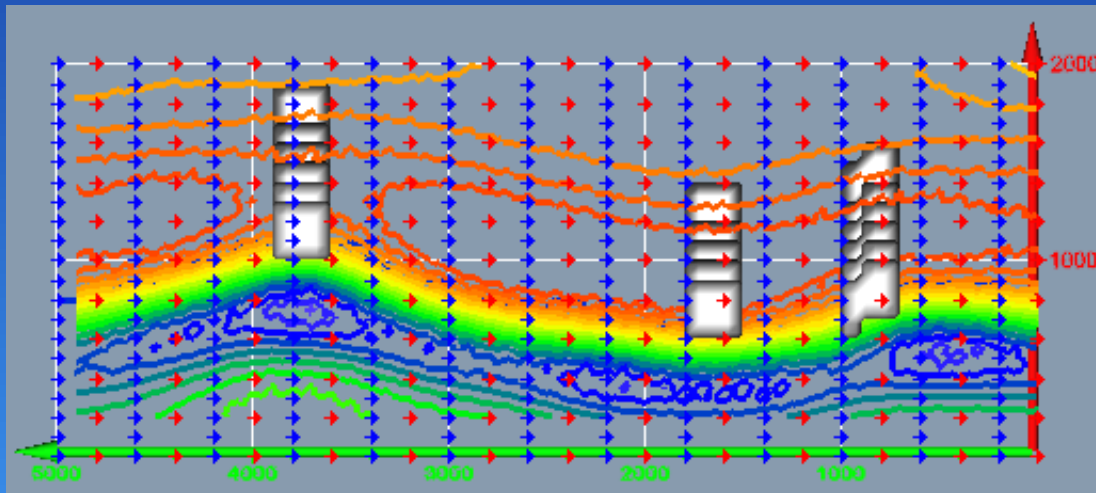


Multipole QODD

100m Resistivity

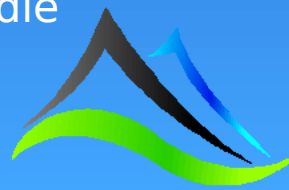


200m Resistivity



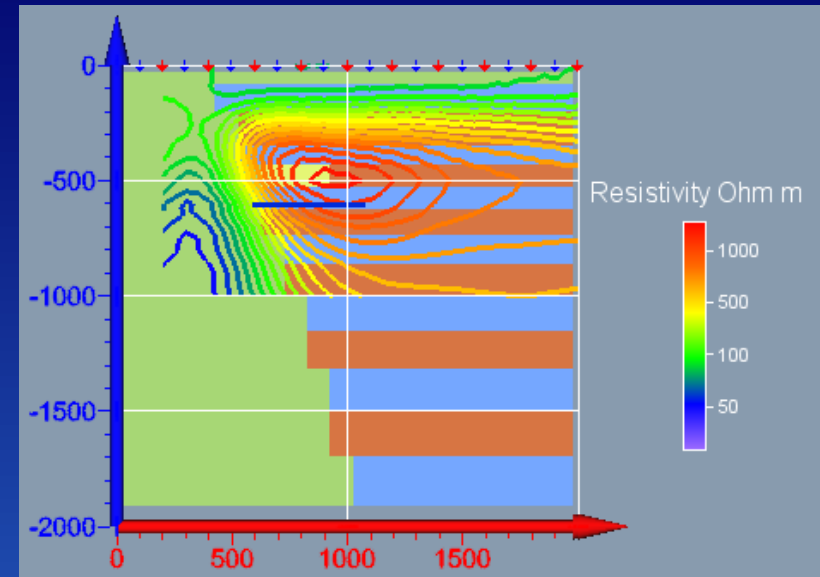
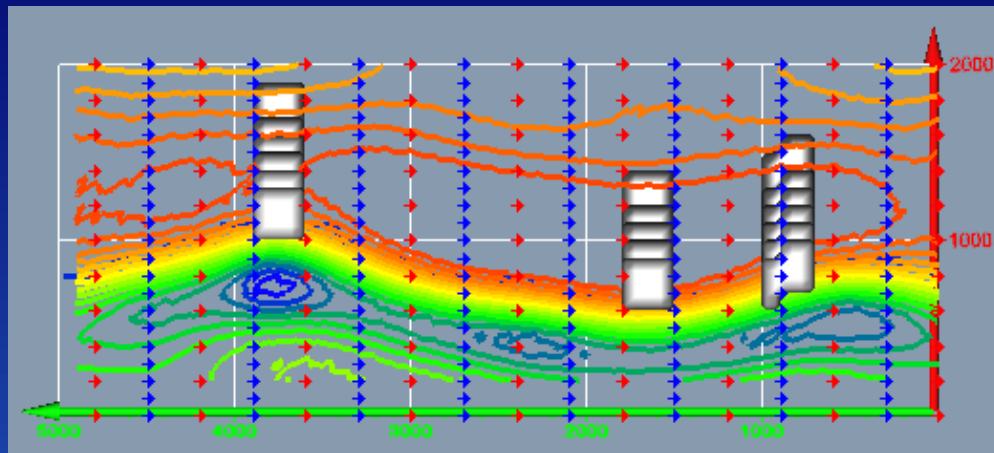
Plan view of contour slice through the middle of the chargeable centre body

Cross section through the middle of the chargeable centre body

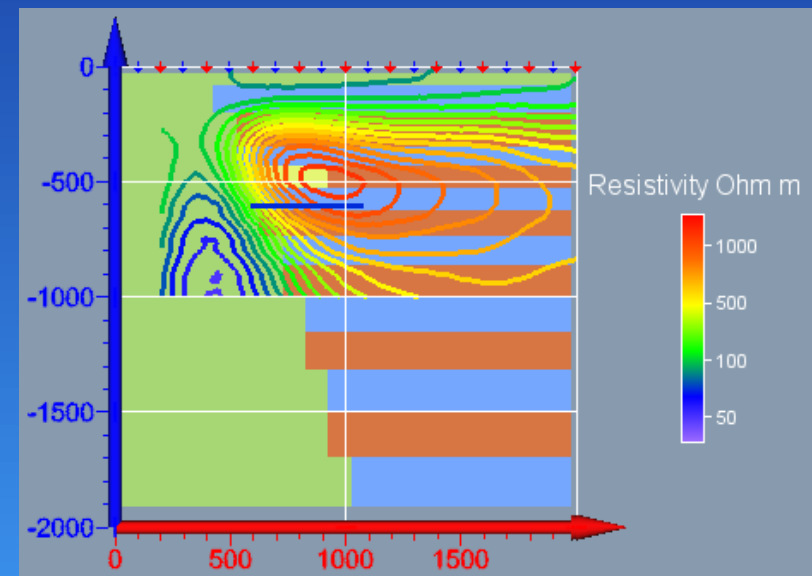
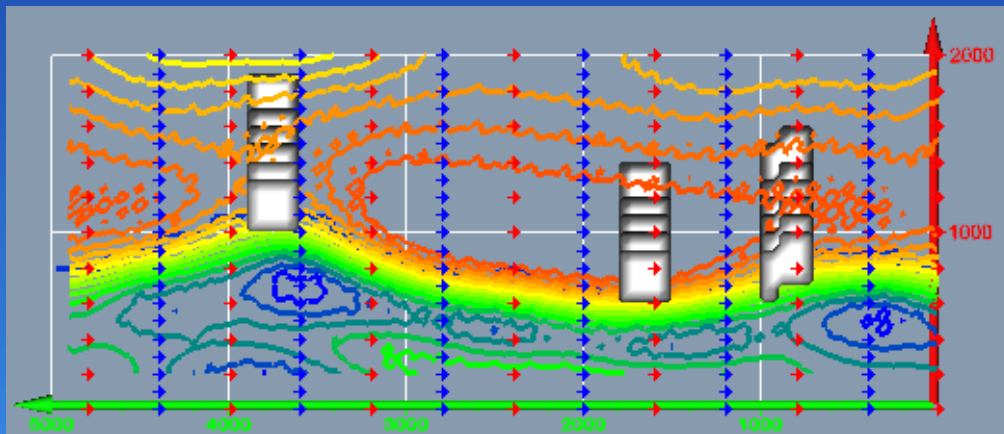


Multipole QODD

300m Resistivity

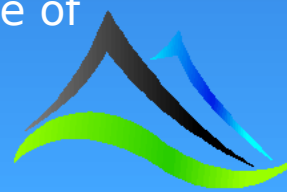


400m Resistivity



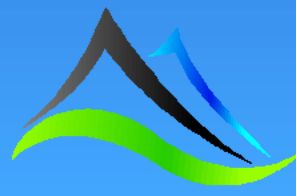
Plan view of contour slice through the middle of the chargeable centre body

E-W section through the middle of the chargeable centre body

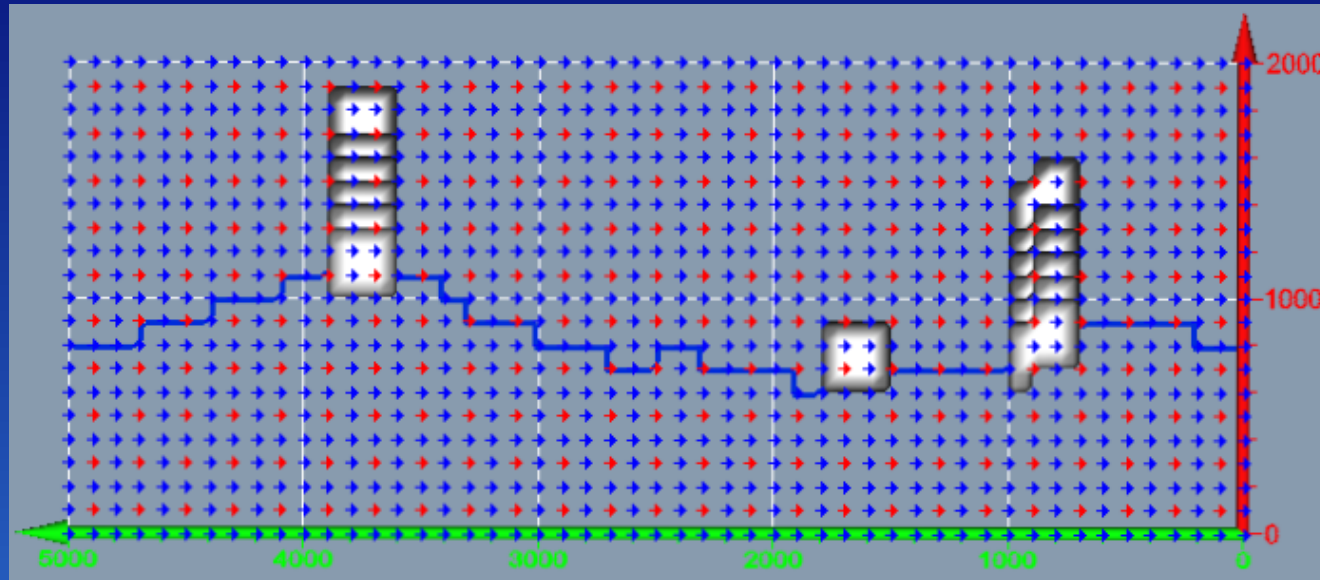


Observations – 430m depth stack 2.5D Multipole QODD

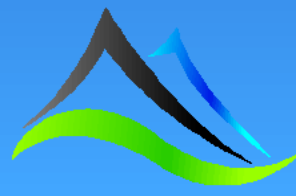
- As with 2D dipole-dipole and 2.5D QODD, the target is not resolved by any line spacing at this depth.



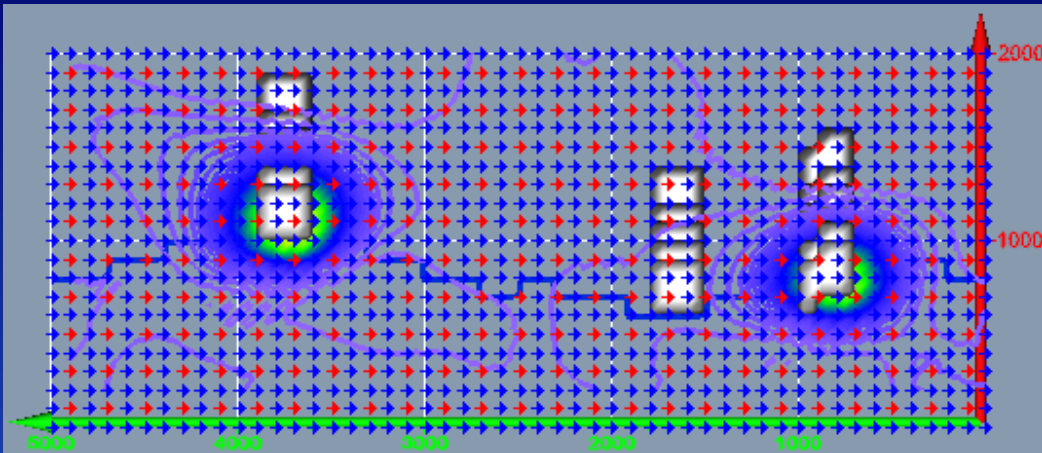
3D Pole-Dipole



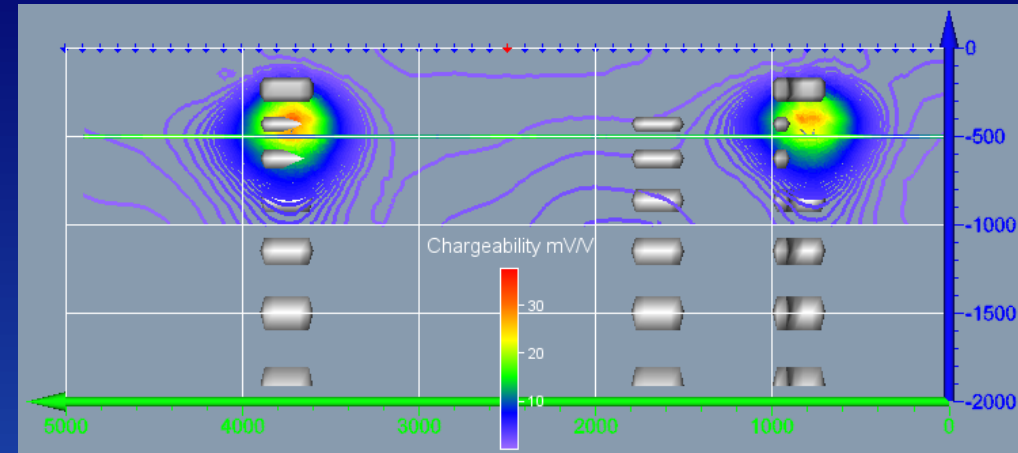
- 200m transmitter electrode spacing.
- 100m receiver electrode spacing.
- 100m line spacing.



Chargeability

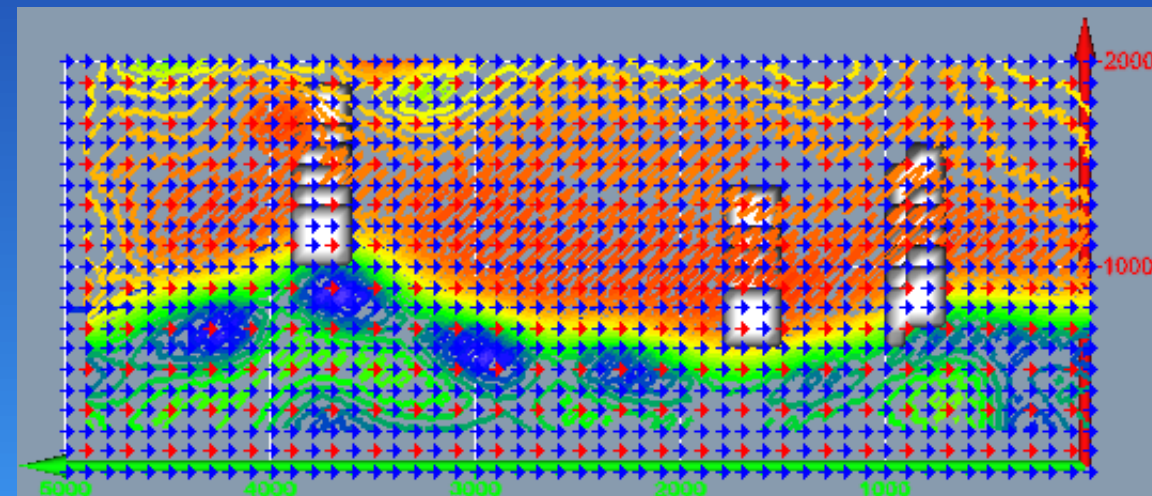


Plan view of contour slice through maximum response

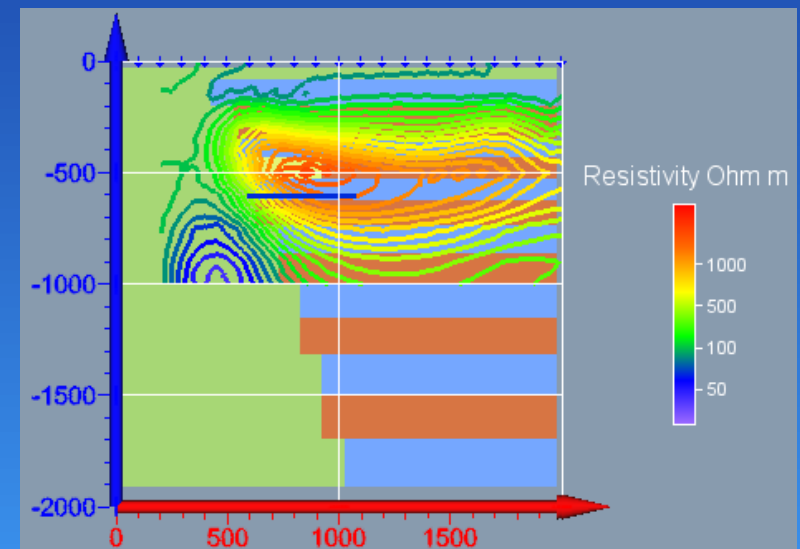


Bent and tilted long section view of contours through body centres

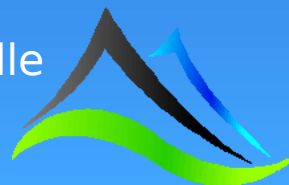
Resistivity



Plan view of contour slice at -450m

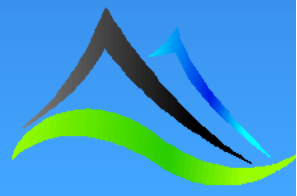


Cross section through the middle of the chargeable centre body

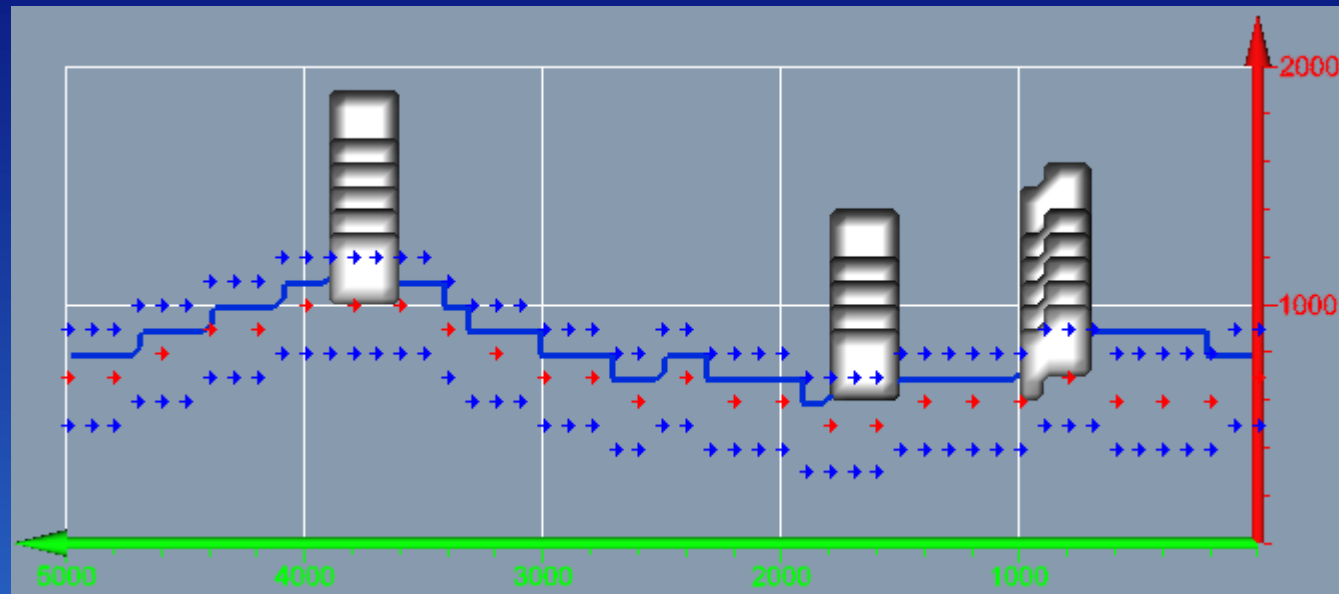


Observations – 430m depth stack 3D Pole-Dipole

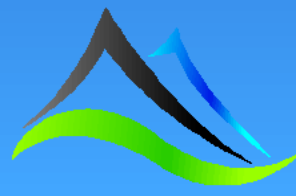
- As with 2D dipole-dipole and 2.5D QODD, the target is not resolved by any line spacing at this depth.



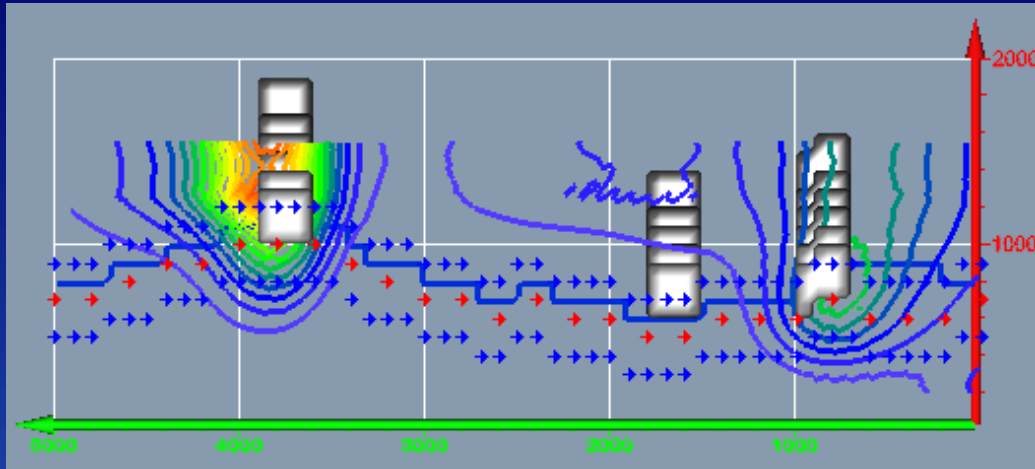
Strike parallel 2.5D Double Offset Dipole-Dipole



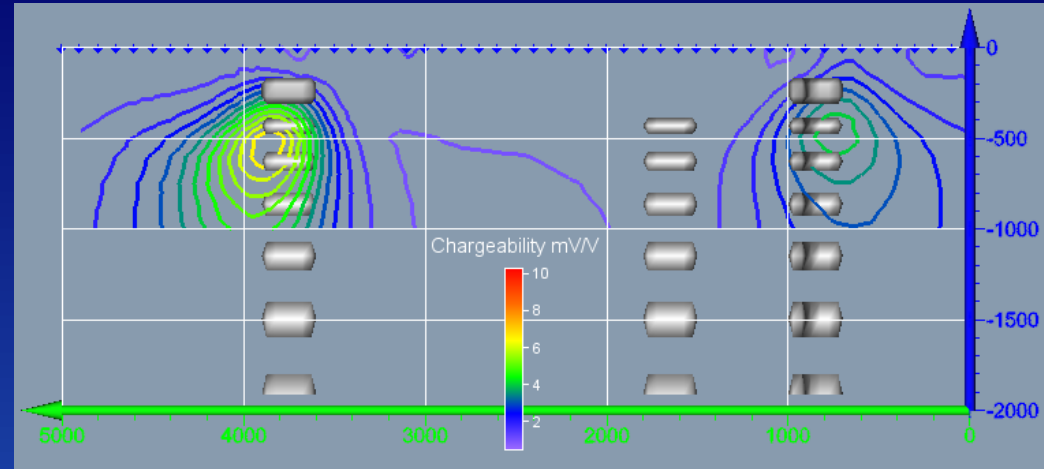
- 200m transmitter electrode spacing.
- 100m receiver electrode spacing.
- 200m line spacing.
- All electrodes active for each reading.
- Results masked in a window between $\pm 300\text{m}$ of the current electrodes line.



Chargeability

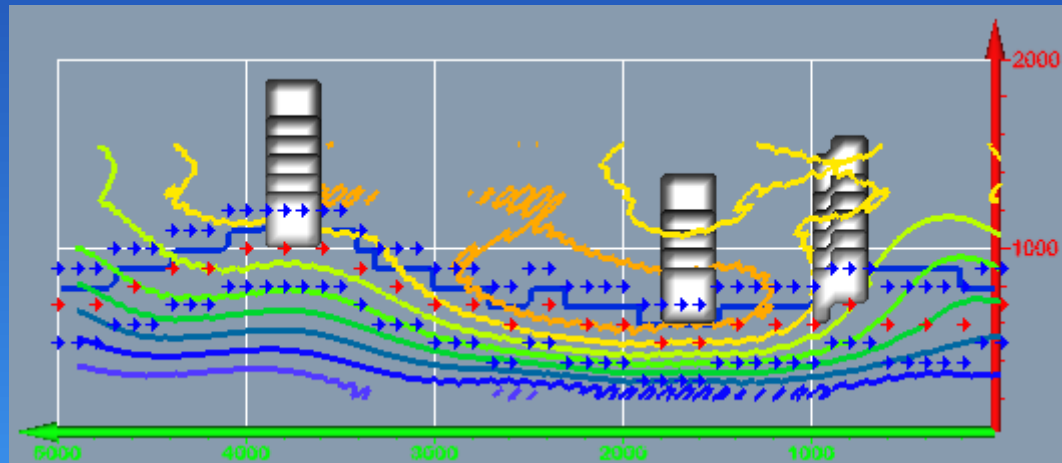


Plan view of contour slice at -450m

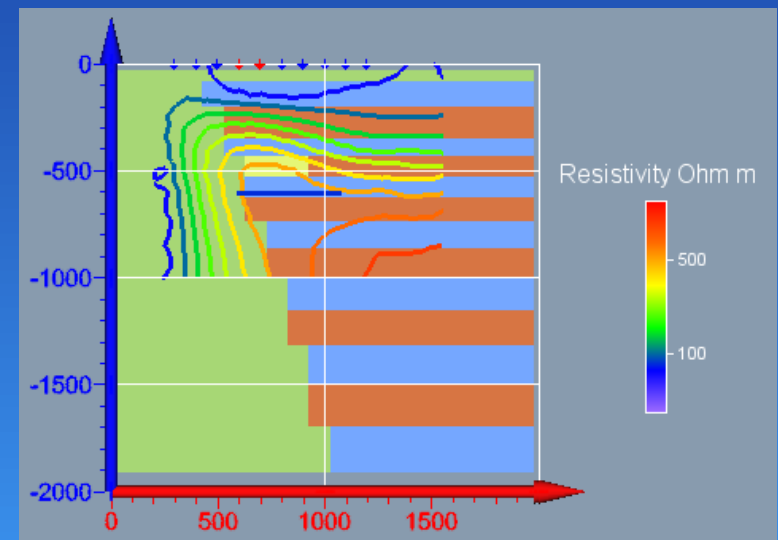


Bent and tilted long section view of contours through body centres

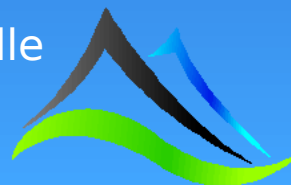
Resistivity



Plan view of contour slice through the middle of the chargeable centre body

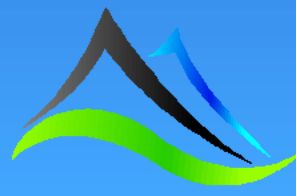


Cross section through the middle of the chargeable centre body



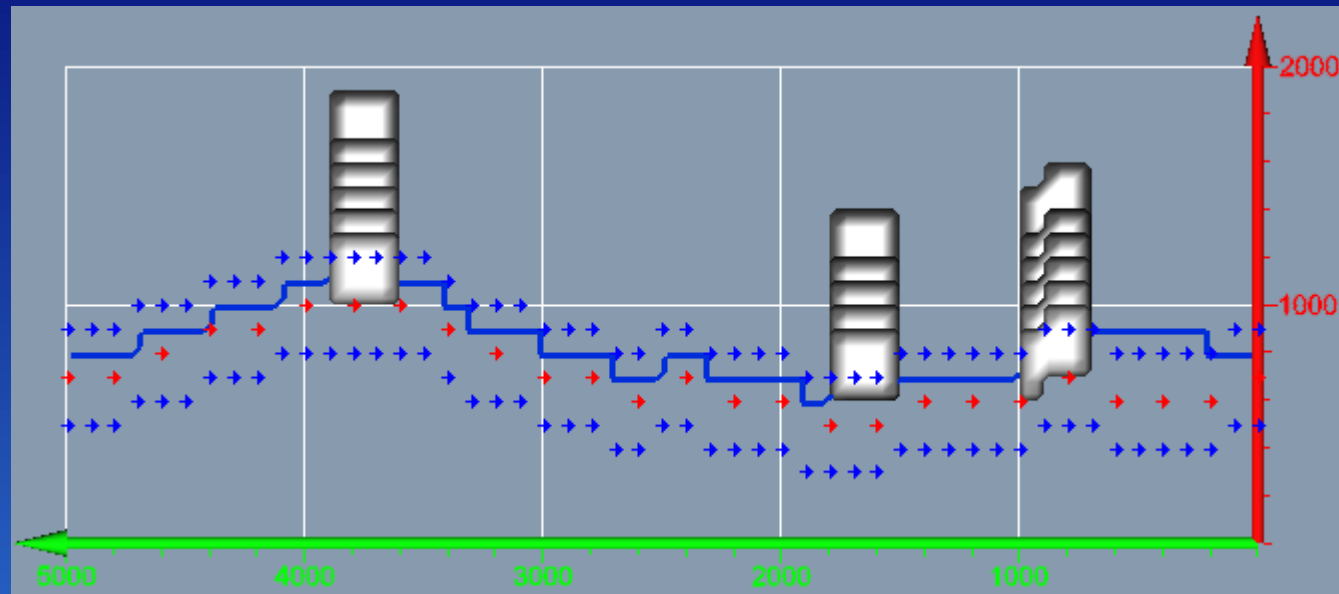
Observations – 430m depth stack Strike parallel 2.5D

- As with all previous arrays, the target is not resolved.

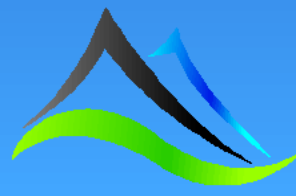


Strike parallel 2.5D

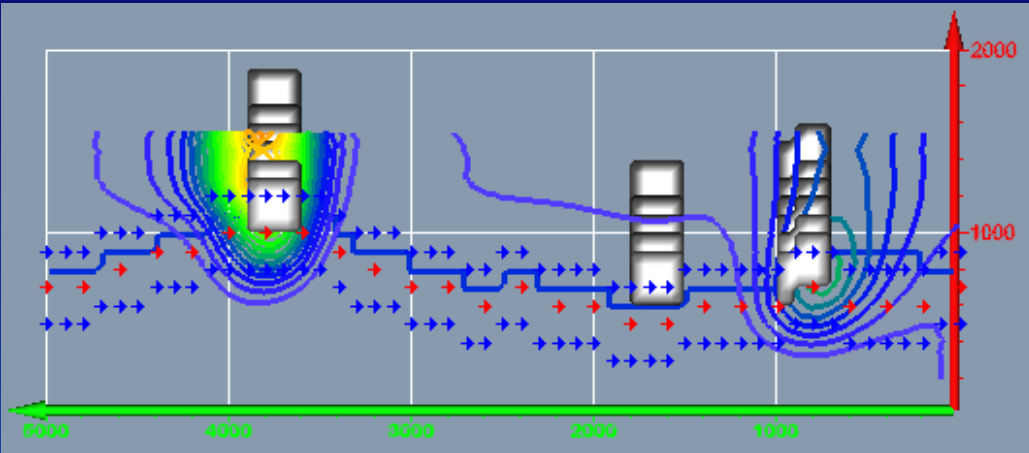
Multipoles Double Offset Dipole-Dipole



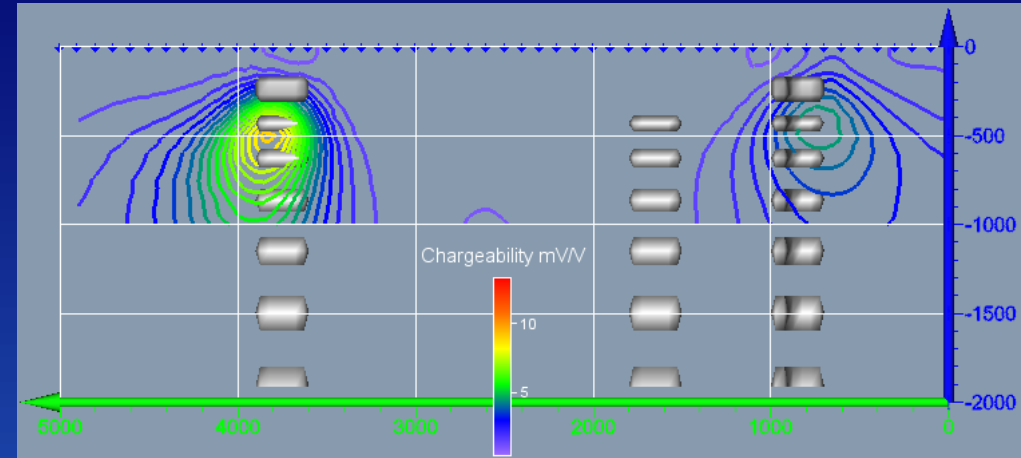
- 200m transmitter electrode spacing.
- 100m receiver electrode spacing with dipole sizes of 100m, 200m, 300m and 400m.
- 200m line spacing.
- All electrodes active for each reading.
- Results masked in a window between $\pm 300\text{m}$ of the current electrodes line.



Chargeability

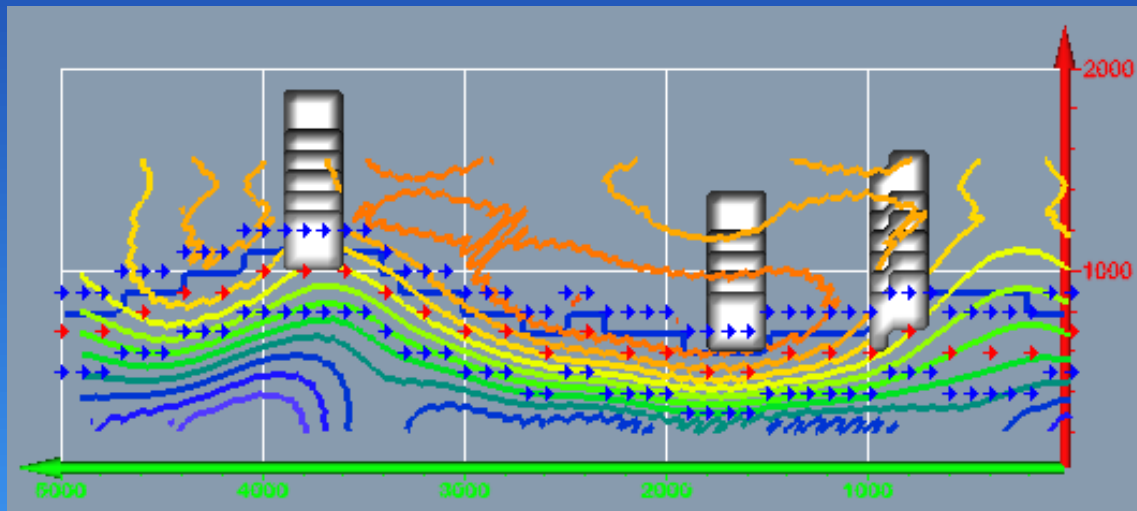


Plan view of contour slice at -450m

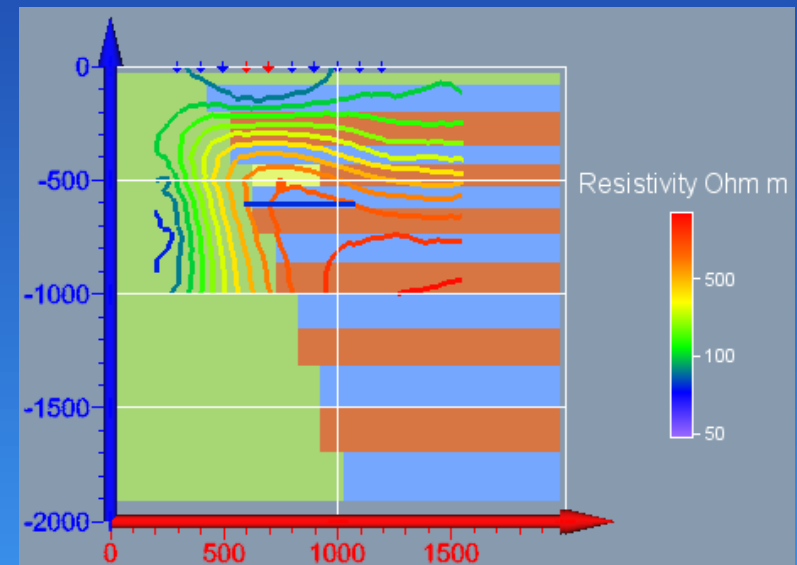


Bent and tilted long section view of contours through body centres

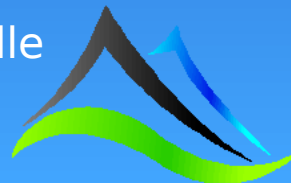
Resistivity



Plan view of contour slice through the middle of the chargeable centre body

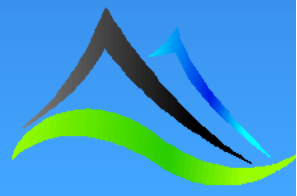


Cross section through the middle of the chargeable centre body



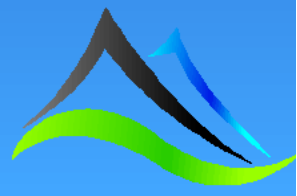
Observations – 430m depth stack Strike parallel 2.5D Multipole

- As with all previous arrays, the target is not resolved.

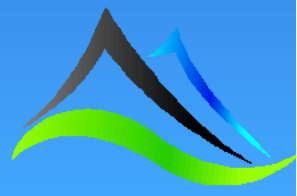


Summary – Stack at 430m depth

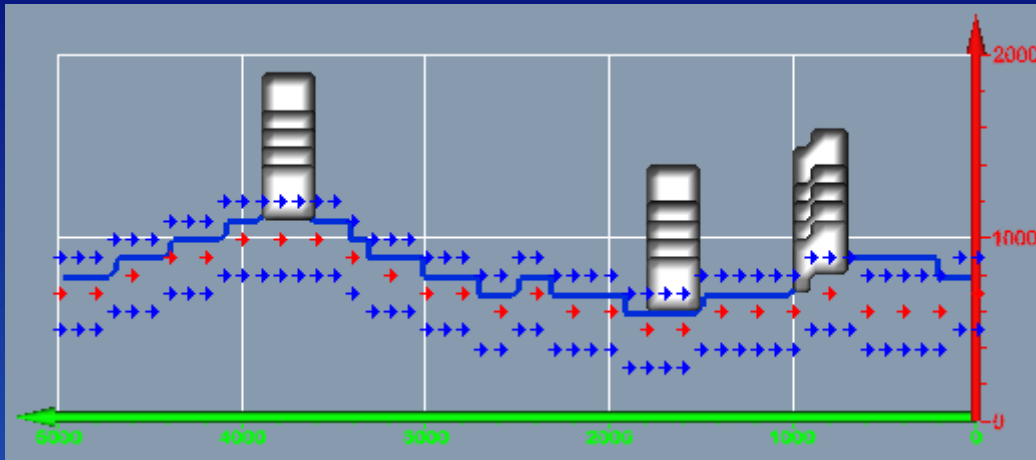
- Since no array could resolve a single body at 430m depth, this model was created to examine if stacked bodies at 430m depth could be resolved. No array was able to see the central deep stack, only responding to the two shallower stacks.
- Both strike parallel arrays show the left zone to have much clearer resolution than the right zone.
- In all models and arrays, the depth to the targets were overestimated.



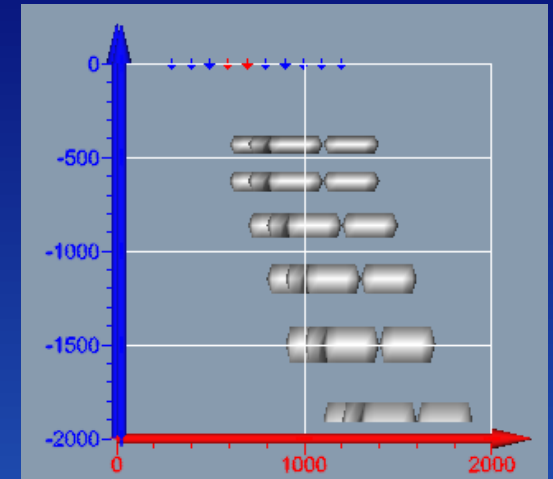
Fault 70° dip.
All stacks at 430m depth.



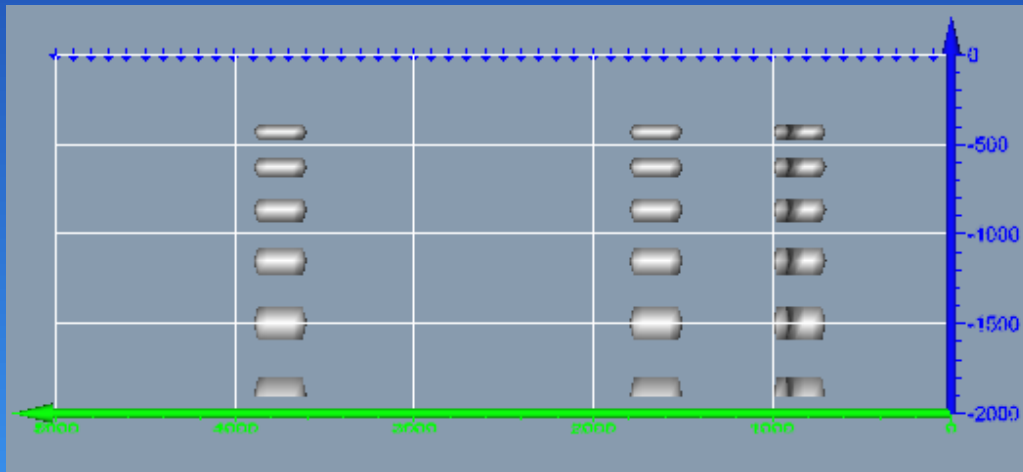
Forward model of stacks - 430m depth



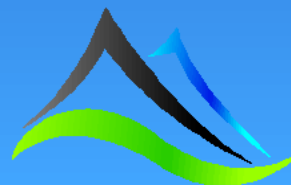
Plan view



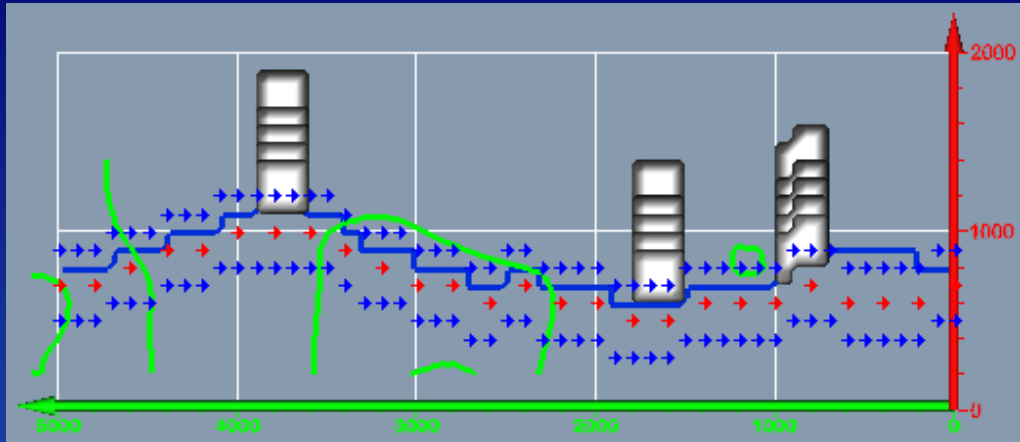
Cross-section view



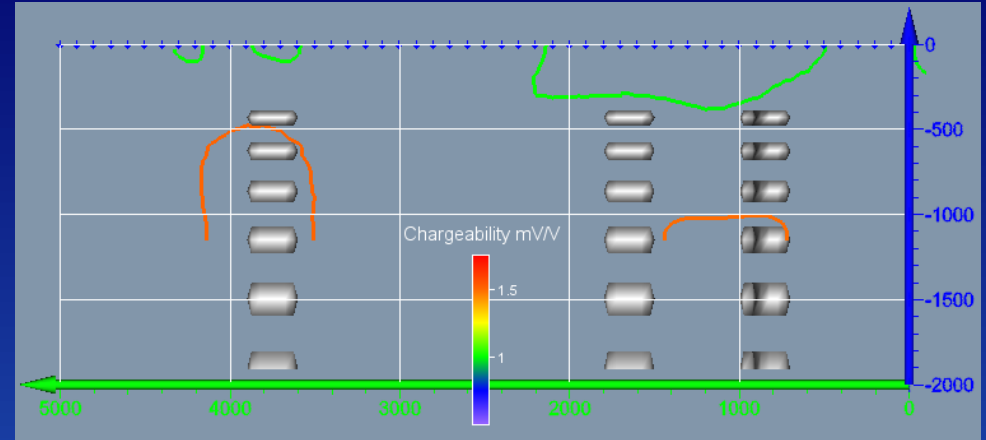
Long section view



Chargeability

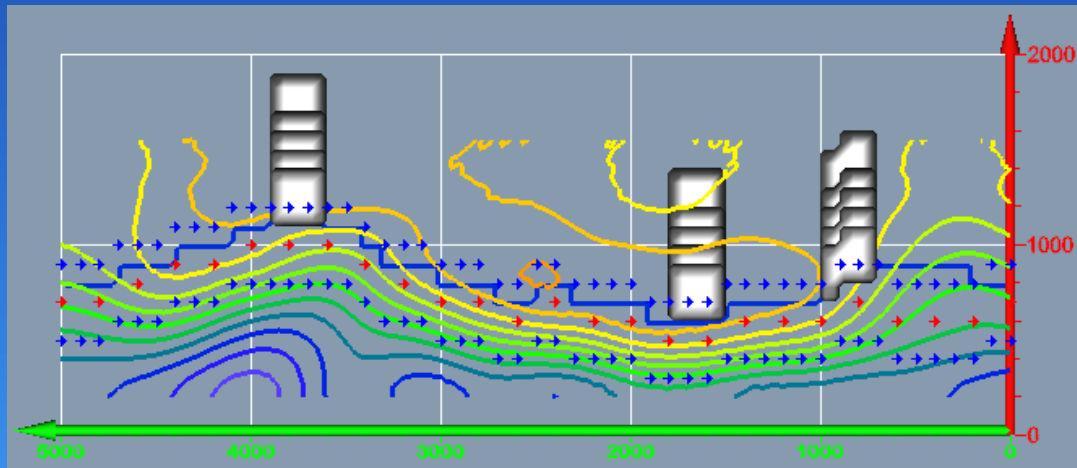


Plan view of contour slice through maximum response

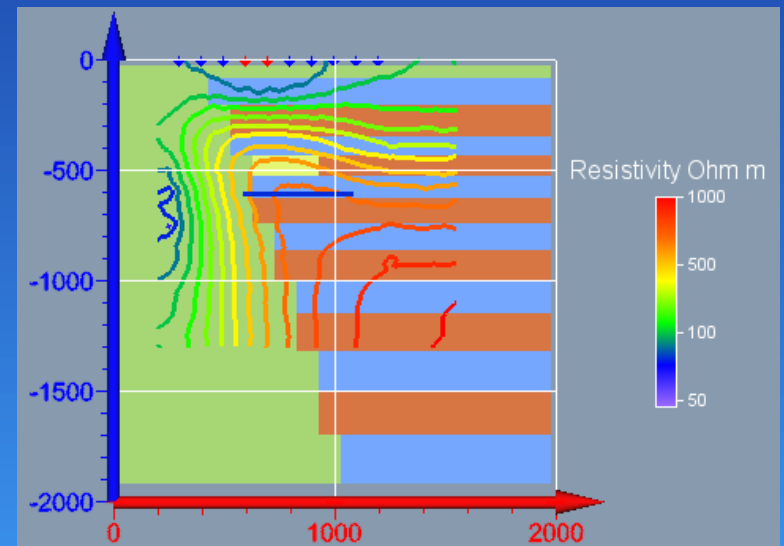


Bent and tilted long section view of contours through body centres

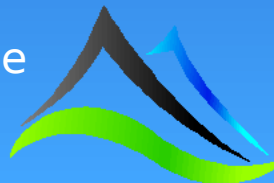
Resistivity



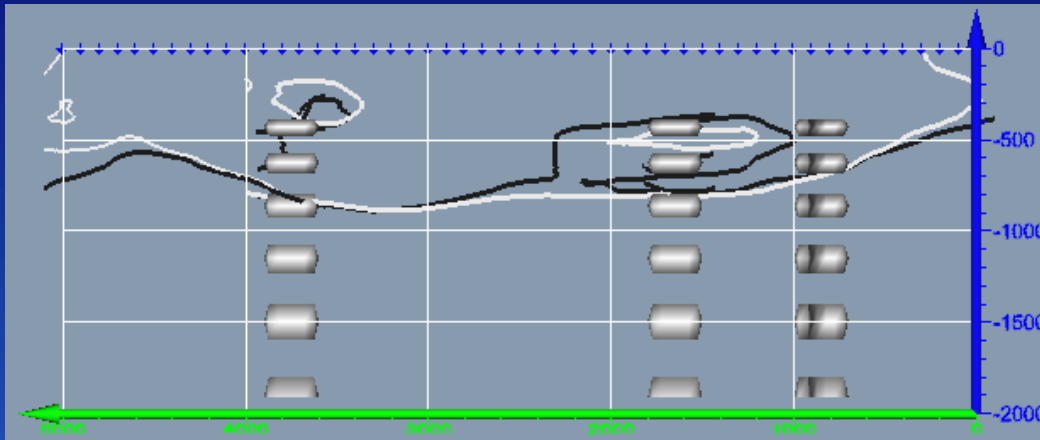
Plan view of contour slice at -450m



Cross section through the middle of the chargeable centre body



VOI Multipole Double Offset Dipole-Dipole



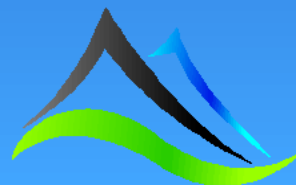
Long section view of the VOI index.

White: ExploreGeo formula 10% limit

Black: Oldenburg & Li formula 5% limit

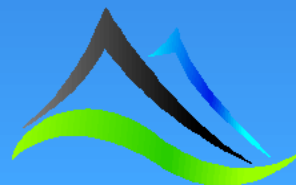
Being unable to resolve any of the bodies at 430m depth, we decided to do a VOI of resistivity on the array which gave the best results.

We can see that the two formula used give very similar results, giving a maximum depth of resistivity around 800m, the resolution for the chargeability is expected to be shallower.



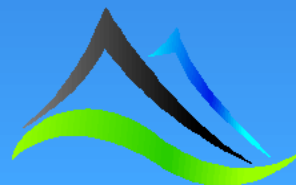
Observations – All stacks at 570m depth

- The previous two slides show the inversion results of the array which obtained the highest chargeability range. This is the 2.5D Multipole Double Offset Dipole-Dipole array.
- The chargeability range of this example is just above 1.2mV/V so only two contour lines can be seen. This is clearly not enough resolution to consider these results useful.
- The dip of the bodies was able to be resolved quite well to the depth of investigation with the resistivity inversion.



Summary – All stacks at 570m depth

- Since no array could resolve a stack of bodies at 430m next to stacks of bodies closer to the surface, this model was created to examine if we could obtain any resolution with all the stacked bodies starting at 430m.
- The arrays gave minimum and maximum chargeabilities of around 1mV/V which is equal to the background chargeability of the forward model. Since the average range is only 0.6mV/V and data is considered to be reliable with a precision of 0.5mV/V, none of the results obtained by inversion were able to resolve any of the bodies, the best we could do with the results is to say that there is probably something underneath, but we can't estimate its position or depth correctly.



Conclusions – The Effect of Depth

- In all examples, the parallel-strike arrays did just as well as any of the other arrays at spatially resolving the chargeable bodies, albeit with lower dynamic range. The multipole parallel-strike array had a slightly higher dynamic range than the non-multipole parallel strike array.
- The 3D pole-dipole array resolved the target almost as well as the 2.5D multipole QODD array but requires many more electrodes.
- Considering the results obtained, the small number of electrodes used, and subsequently the reduced labour costs, the most appropriate array to use in this situation is the multipole parallel-strike array.

