Adding topography to Res3DInv datasets
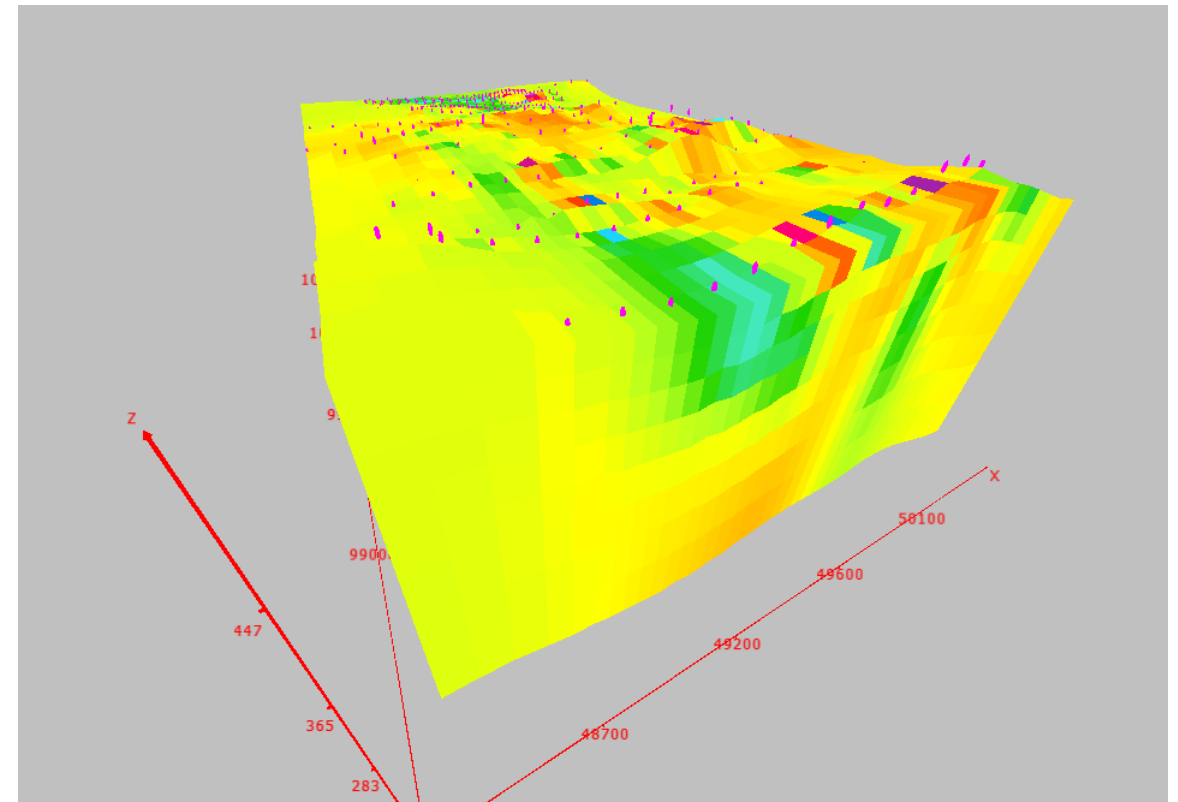
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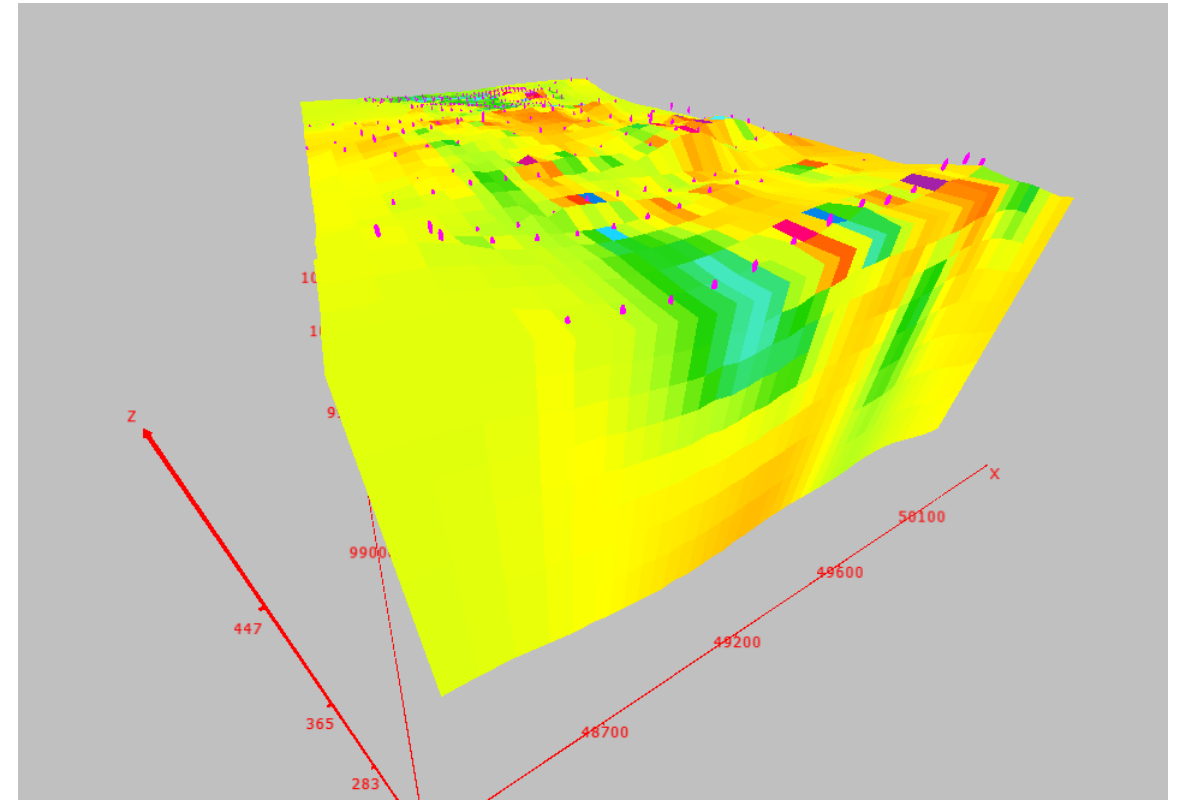
Program

- **Motivation**
- **How to add topography to the .dat files**
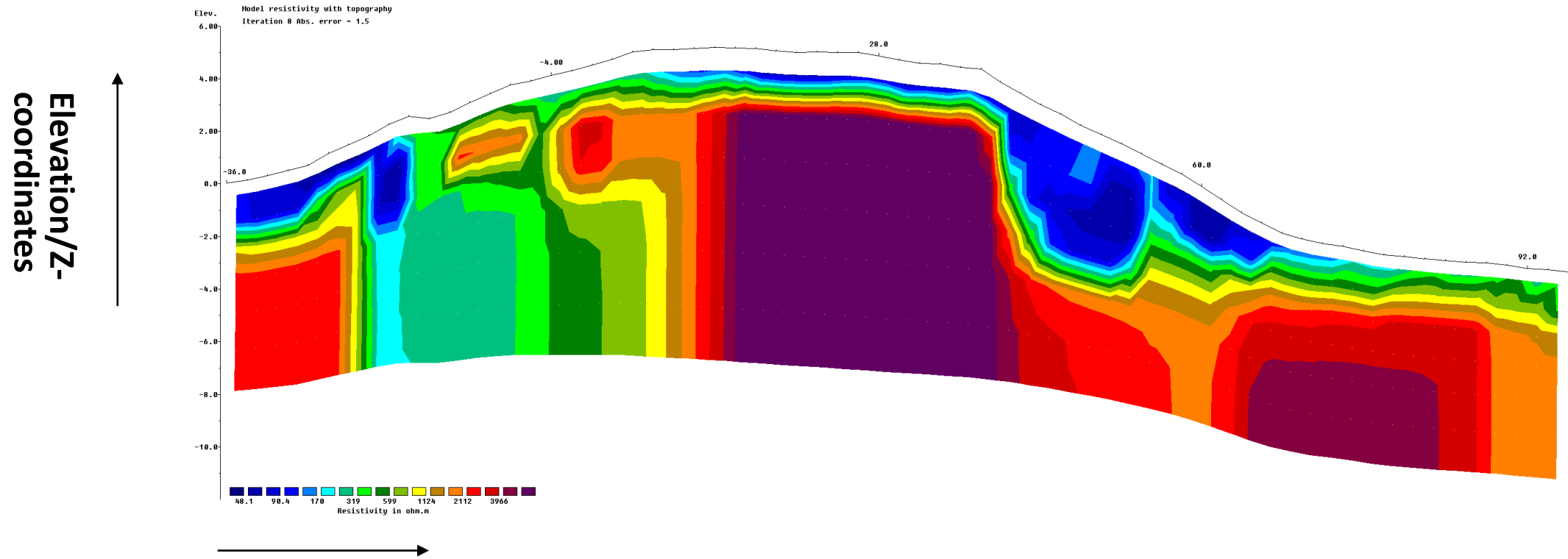- **Visualizing and exporting inversion results with topography**

Why add topography?

- **The topography is fully modelled in the forward response ->**
  More accurate inversion results
- **More accurate and easier to understand visualizations**
- **Easier interpretation**

Coordinate systems

Profile distances/X-coordinates

Two options !
Ground distances: what you will measure with a tape measure on the ground

True horizontal distances: What you would measure on a map without accounting for topography

Many different options depending on survey layout!

- **Topography in separate list at end of file – if you only learn one, make it this one!**

- **Special format for rectangular grids**
- **Special format for trapezoidal grids**
- **Special format for surveys with point electrodes**

Topography in separate list

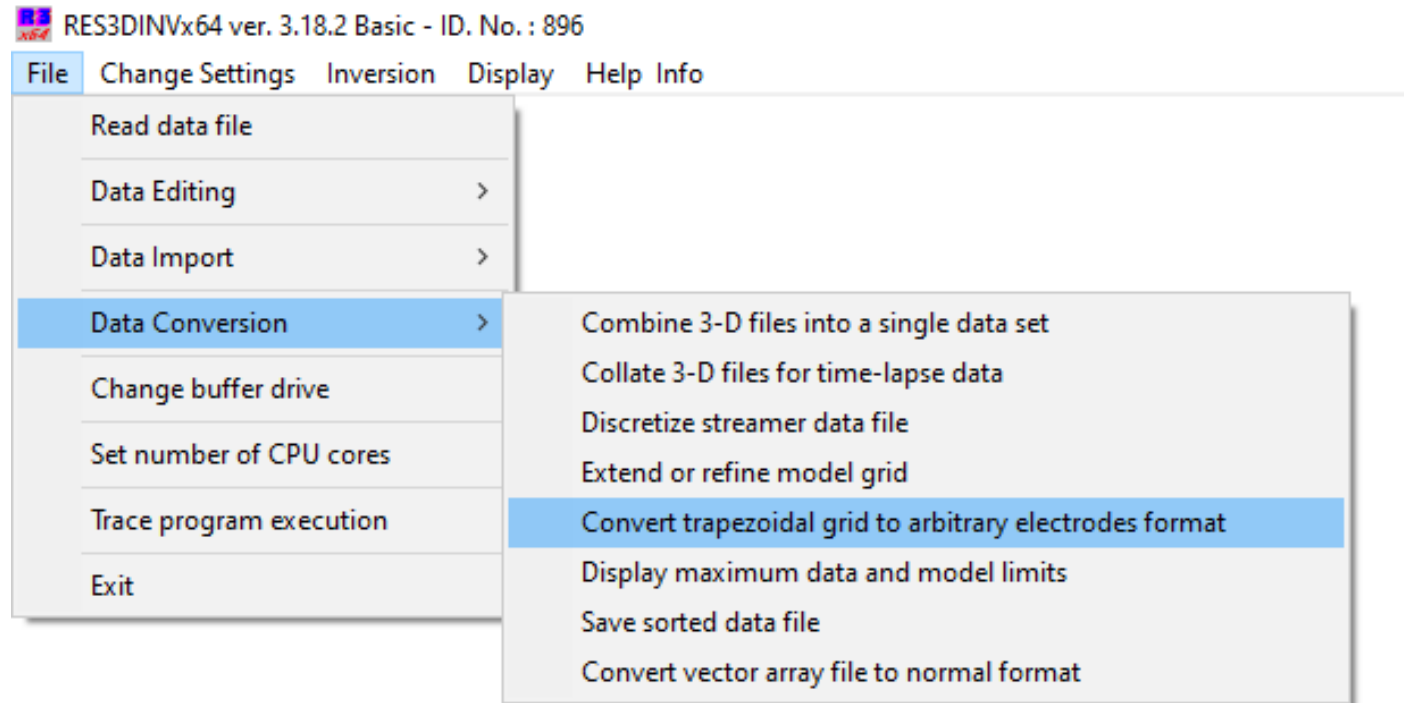Works for all .dat fil formats, except for the trapezoidal grid fomat!

```
7264      7.000    10.000    10.000    10.000 120.3522
7265      8.000    10.000     9.000    10.000 115.0855 ⎫
7266      8.000    10.000    10.000    10.000 113.3131 ⎬ Last 3 data lines
7267      9.000    10.000    10.000    10.000 102.7262 ⎭
7268  Topography   Header
7269  2            Flag for surface (2) or true horizontal distances (1)
7270  Topography in unstructured list  Header
7271  Number of topography data points Header
7272  121   Number of topography points
7273  Topography data points (index,x,y,z)  Header
7274  1      0.0   0.0 0.00    Topography data lines: index, X-coordinate,, Y-coordinate Z-coordinate
7275  2      1.0   0.0   0.00
7276  3      2.0   0.0   0.00
```

```
7391  118   7.0 10.0  -0.50
7392  119   8.0 10.0   0.00
7393  120   9.0 10.0   0.00
7394  121 10.0 10.0   0.00    Last topography data lines
7395  0    End of file
7396  0
7397  0
```

Converting trapezoidal to general array format

Special format for rectangular grids

```
 1   2 BLOCKS (with topography)
 2   11
 3   11          11 Grid lines in each direction
 4       1.00
 5       1.00
 6   2
 7   7260
 8       0.000      0.000      1.000      0.000 103.0997
 9       0.000      0.000      2.000      0.000 114.3002
10       0.000      0.000      3.000      0.000 121.8460
11       0.000      0.000      4.000      0.000 116.9145
12       0.000      0.000      5.000      0.000 101.9447
13       0.000      0.000      6.000      0.000  92.0474
```

11 Grid lines in each direction

```
7263       7.000     10.000      9.000     10.000 124.2985
7264       7.000     10.000     10.000     10.000 120.3522
7265       8.000     10.000      9.000     10.000 115.0855
7266       8.000     10.000     10.000     10.000 113.3131
7267       9.000     10.000     10.000     10.000 102.7262
7268   Topography          Topography header
7269   2                   Flag for surface (1) or true horizontal distances (2)
7270   0.00 0.00 0.00 -0.50 -1.00 -1.50 -1.00 -0.50 0.00 0.00 0.00        11 by 11 Grid containing topography for all
7271   0.00 0.00 0.00 -0.50 -1.00 -1.50 -1.00 -0.50 0.00 0.00 0.00        electrode locations
7272   0.00 0.00 0.00 -0.50 -1.00 -1.50 -1.00 -0.50 0.00 0.00 0.00
7273   0.00 0.00 0.00 -0.50 -1.00 -1.50 -1.00 -0.50 0.00 0.00 0.00
7274   0.00 0.00 0.00 -0.50 -1.00 -1.50 -1.00 -0.50 0.00 0.00 0.00
7275   0.00 0.00 0.00 -0.50 -1.00 -1.50 -1.00 -0.50 0.00 0.00 0.00
7276   0.00 0.00 0.00 -0.50 -1.00 -1.50 -1.00 -0.50 0.00 0.00 0.00
7277   0.00 0.00 0.00 -0.50 -1.00 -1.50 -1.00 -0.50 0.00 0.00 0.00
7278   0.00 0.00 0.00 -0.50 -1.00 -1.50 -1.00 -0.50 0.00 0.00 0.00
7279   0.00 0.00 0.00 -0.50 -1.00 -1.50 -1.00 -0.50 0.00 0.00 0.00
7280   0.00 0.00 0.00 -0.50 -1.00 -1.50 -1.00 -0.50 0.00 0.00 0.00
7281   0                   End of file
7282   0
7283   0
```

Special format for trapezoidal grids

```
 1  2 BLOCKS with Shifted Y lines
 2  14
 3  14
 4  Trapezoidal Grid used
 5  Location of electrodes given line by line
 6  Line 1
 7   0.0,0.0,0.0
 8   3.0,0.0,0.0
 9   6.0,0.0,0.0
10   9.0,0.0,0.0
11  12.0,1.0,0.0
12  15.0,1.0,0.0
13  18.0,1.0,0.0
14  21.0,0.0,0.0
15  24.0,0.0,0.0
16  27.0,0.0,0.0
17  30.0,0.0,0.0
18  33.0,0.0,0.0
19  36.0,0.0,0.0
20  39.0,0.0,0.0
21  Line 2
22   0.0,3.0,0.0
23   3.0,3.0,0.0
24   6.0,3.0,0.0
25   9.0,3.0,0.0
26  12.0,4.0,0.0
27  15.0,4.0,0.0
28  18.0,4.0,0.0
29  21.0,3.0,0.0
30  24.0,3.0,0.0
31  27.0,3.0,0.0
32  30.0,3.0,0.0
33  33.0,3.0,0.0
34  36.0,3.0,0.0
35  39.0,3.0,0.0
36  Line 3
37   0.0,6.0,0.0
```

Location of each electrode: X-coordinate, Y-coordinate, Z-coordinate

Special format for surveys with point electrodes


```
 1  1966_Res_data_all_final_nodtm.BDB
 2  37        Number of X and Y grid lines
 3  50
 4  Nonuniform grid
 5  x-location of grid-lines
 6  48300 48400 48500 48600 48675 48750 48800 48850 48900 48950   Location of each X grid line
 7  49000 49050 49100 49150 49200 49250 49300 49350 49400 49450
 8  49500 49550 49600 49650 49700 49750 49800 49850 49900 49950
 9  50000 50050 50125 50200 50300 50400 50500
10  y-location of grid-lines
11   98250   98350   98450   98550   98650   98750   98850   98950   99050   99150   Location of each Y grid line
12   99250   99350   99450   99550   99650   99750   99850   99950  100050  100150
13  100250 100350 100450 100550 100650 100725 100800 100850 100900 100950 101000
14  101050 101100 101150 101200 101250 101300 101350 101400 101450 101500
15  101550 101600 101650 101700 101750 101800 101850 101900 101950
16  11
17  0
18  Type of data (0=apparent resistivity,1=resistance)
19  0
20  Point Electrodes outside grid present     Header for point electrodes
21  Number of point electrodes
22  1218
23  Compressed format used for point electrodes coordinates
24      1    48860.02    98251.06    483.0757   Point electrode information: index, X-coordinate, Y-coordinate,
25      2    48933.47    98257.91    479.8773   elevation/topography
26      3    48951.55    98251.06    478.7271
27      4    48984.83    98271.55    477.7546
28      5    49008.12    98271.55    477.0950
29      6    49056.48    98265.41    481.2366
30      7    49073.02    98280.86    477.0503
31      8    49104.64    98280.86    477.3997
32      9    49127.94    98278.99    478.4919
33     10    49156.23    98278.99    479.5769
34     11    49180.44    98274.66    486.5527
35     12    49224.45    98277.13    482.6164
36     13    49252.74    98282.72    484.6414
```

Running an inversion with topography

Is exactly line running a regular inversion
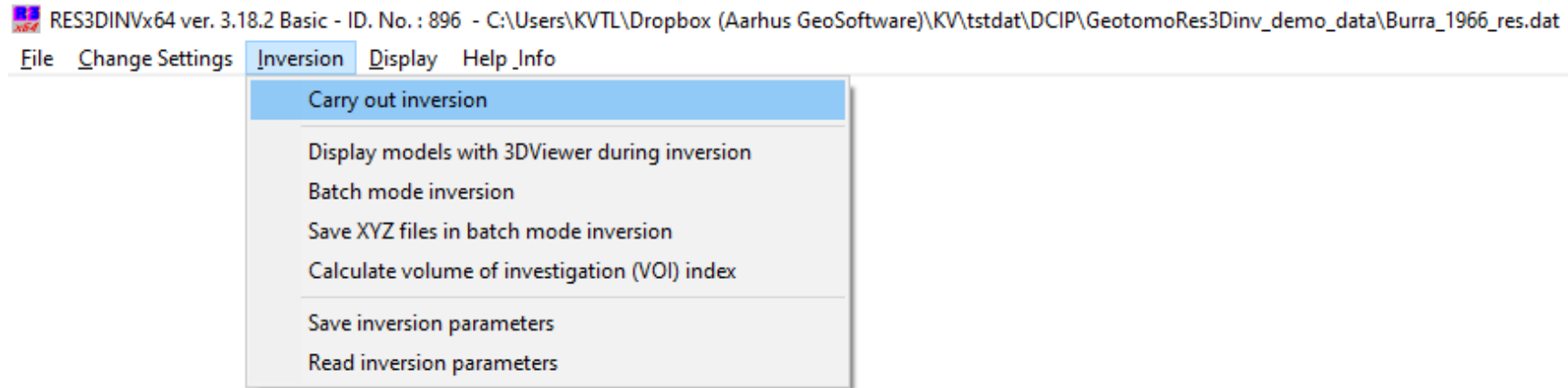
Visualizing and exporting inversion results with topography

- **Classic build in visualization**
- **Visualization in 3D viewer**
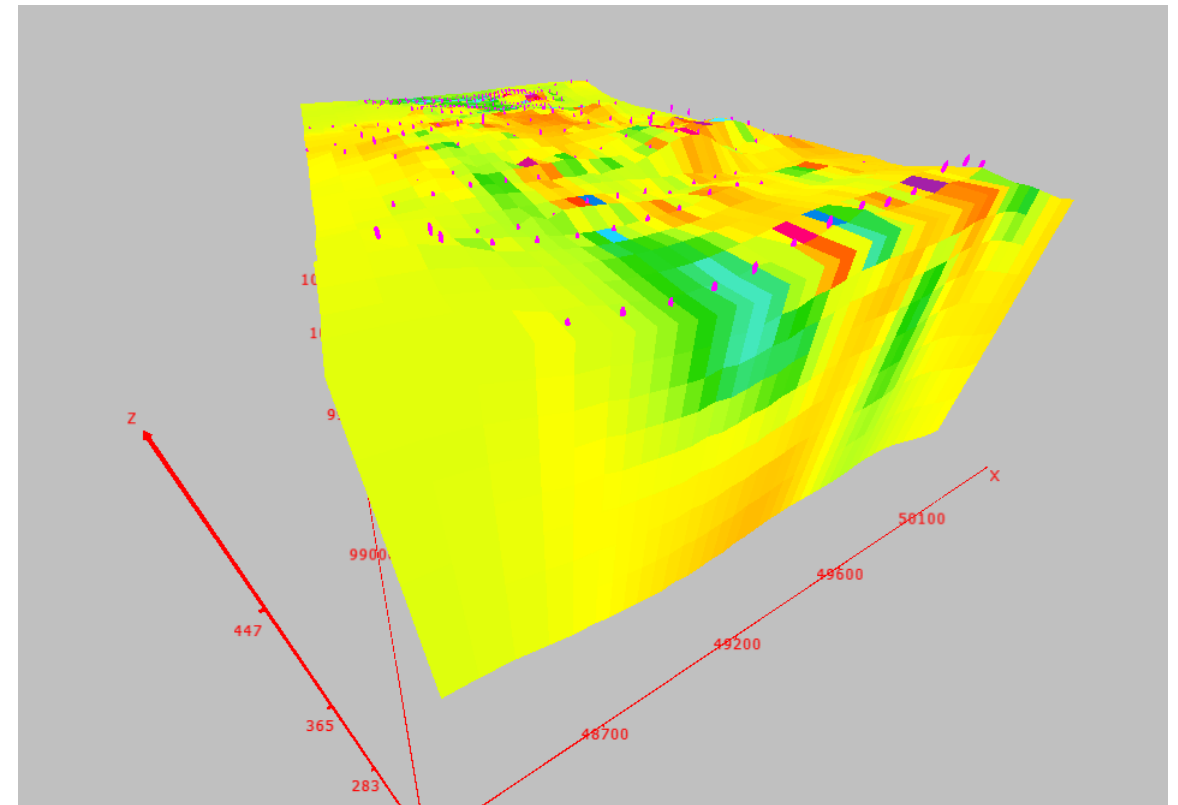- **Export for visualization in other programs**
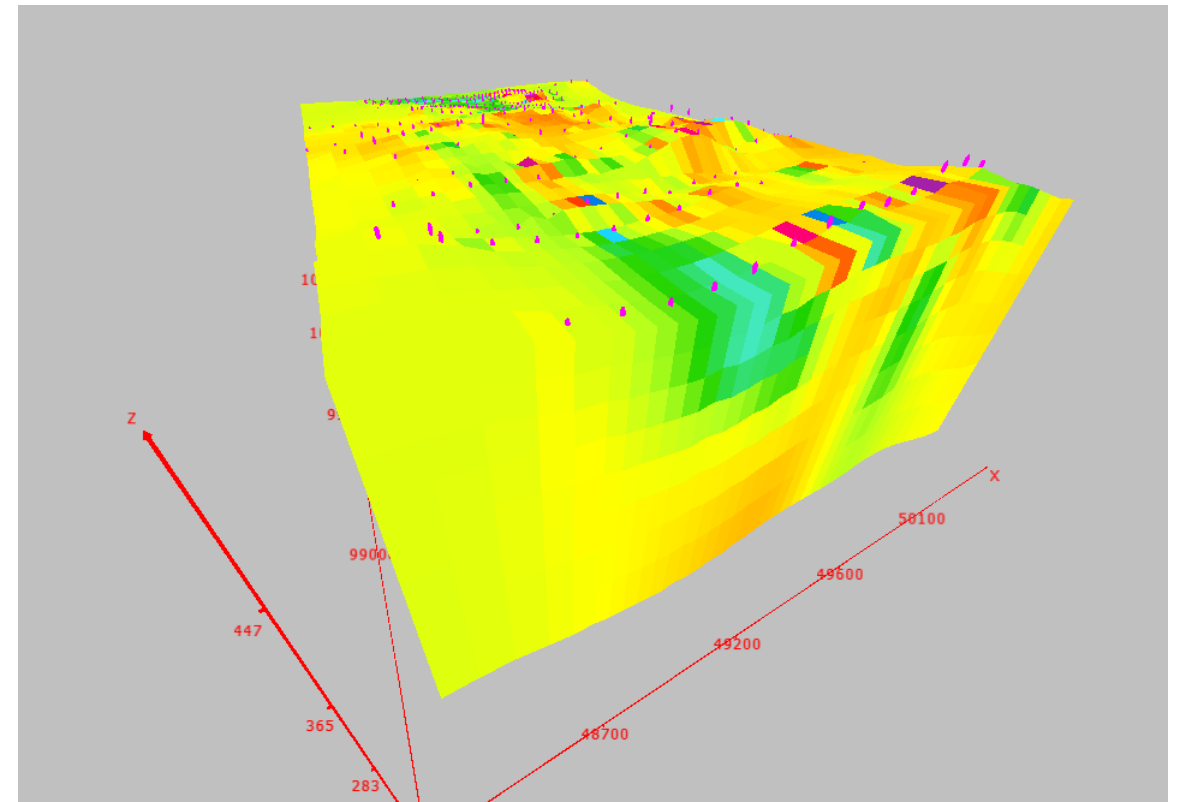
Classic build in visualization
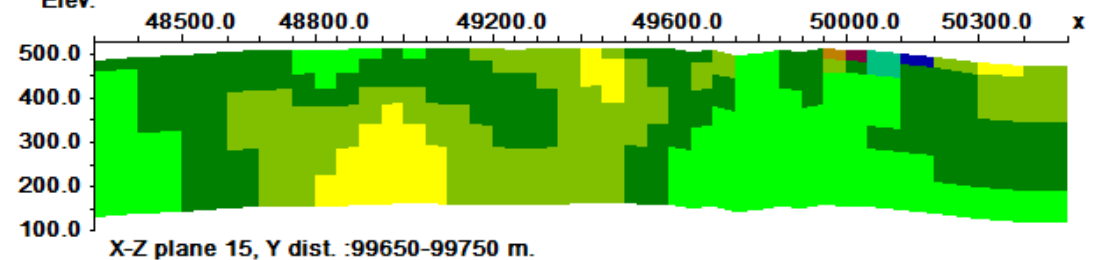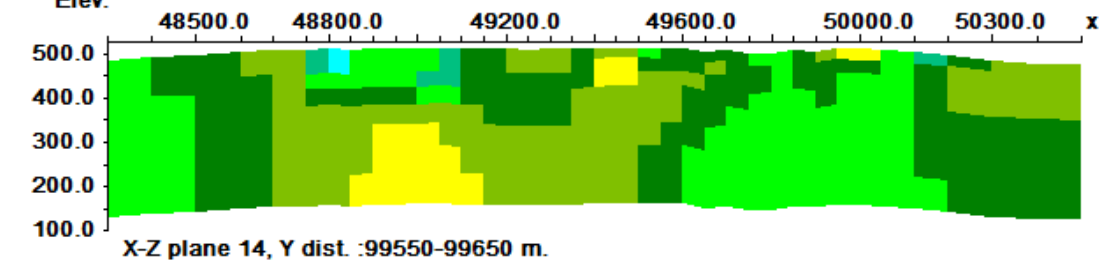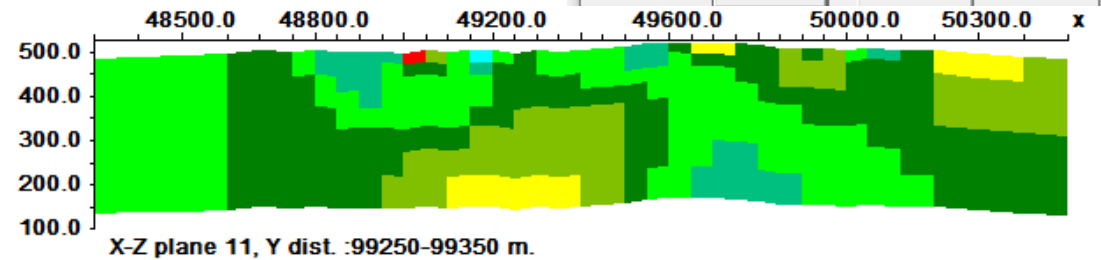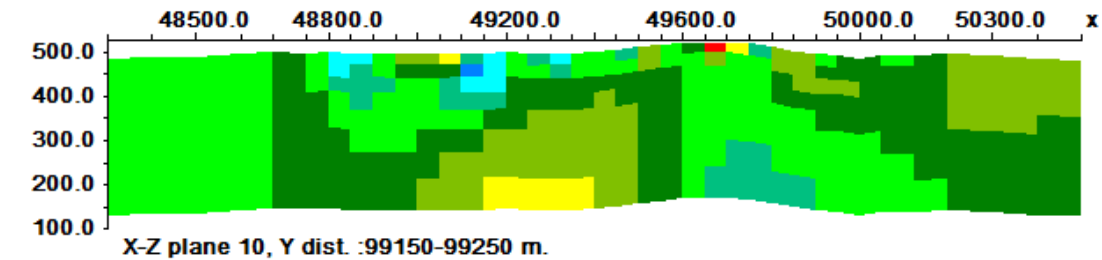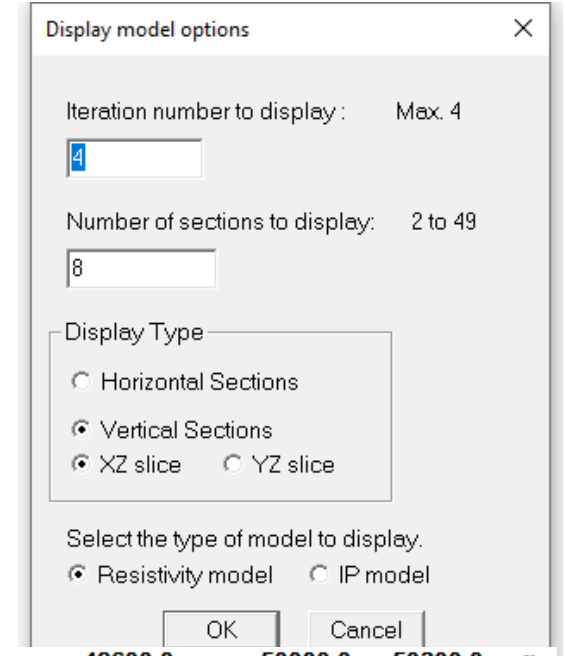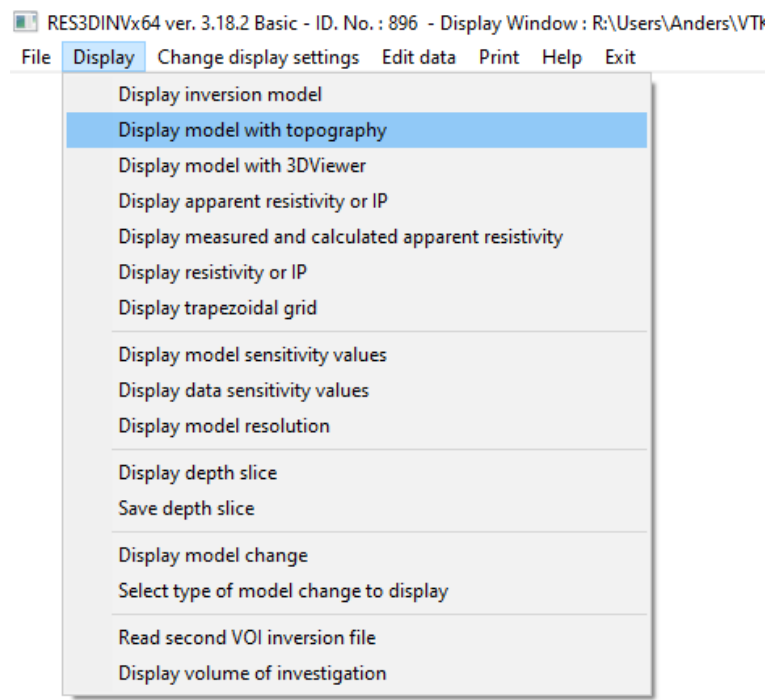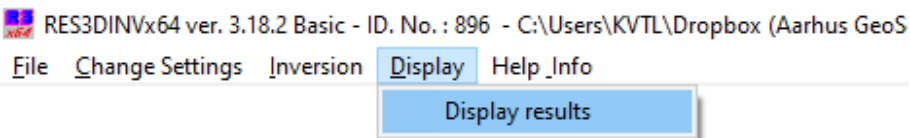
Visualization in 3D viewer

- **Live demo!**

Export for visualization in other programs

Thank you for listening!