

3D ZTEM Inversion Results

for
**Liberty Star
Tombstone
Arizona**

Project: GL130168

By
Geotech Ltd.

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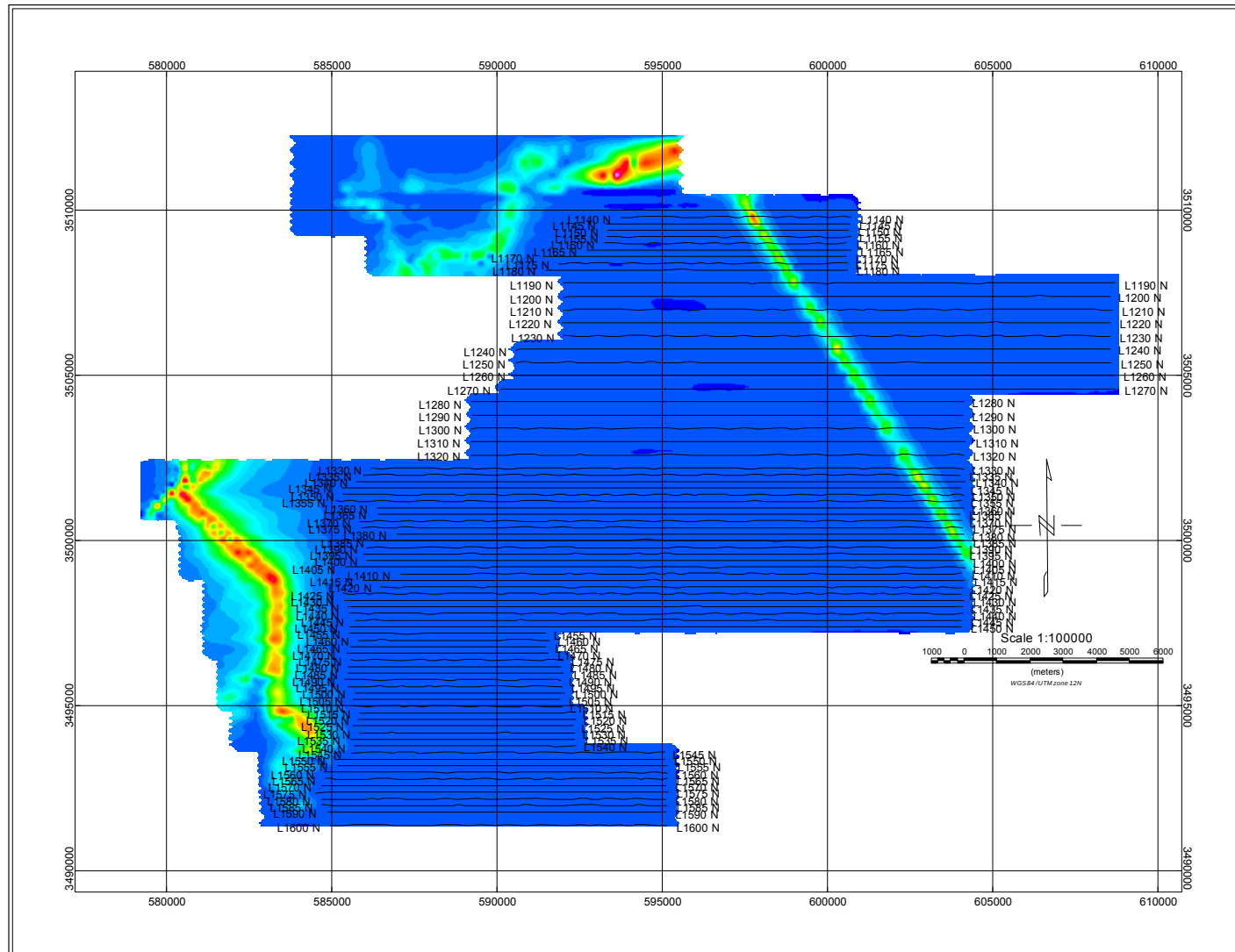


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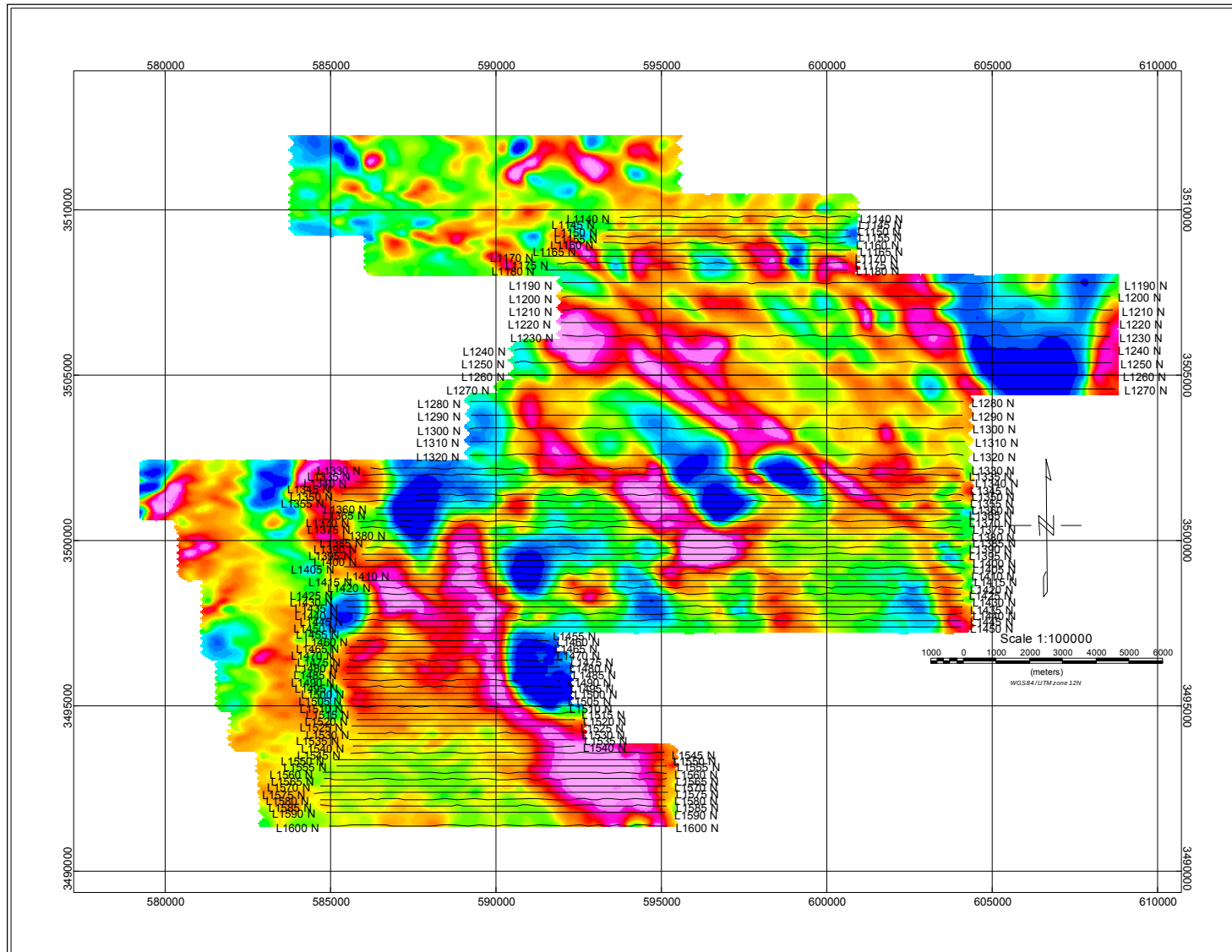
Summary

- ZTEM_MT3Dinv program was used to perform the inversion with topography and bird altitude effects considered.
- One block was used during inversion. The cell size in the core area is 100m x 100m x 20m, with vertical cell size geometrically increasing at depth below minimum topo. XIP, XQD, YIP, and YQD components at four frequencies of 45-360 Hz were used for the inversion.
- The starting model was a 300 ohm-m homogeneous half-space. The resistivity range was [1- 100000] ohm-m.
- A relative error of 40% was applied to the data. A tipper noise floor of 1% (absolute value) was assumed. The inversion converged after the 11th iteration.
- Slides 3 & 4 show the PLM and IP 090 Hz TPR images with location of flight path.
- Slide 5 shows the RTP image with location of flight path .
- Slide 6 shows a map with Mesh and DEM data used for 3D ZTEM inversion indicating the location of the Base Station (red cross symbol).
- Slides 7 to 10 show 3D views of the inversion results.
- Slides 12 to 88 show resistivity sections for each line, and are clipped at powerlines.
- Slides 90 to 105 show resistivity depth slices in the first 1500m on an interval of 100 m, and are clipped at powerlines.
- Slides 107 to 122 show tipper maps of field data and model responses for different frequency and components.
- Slide 123 shows the conclusions.
- Slide 124 shows references for 3D ZTEM inversion.

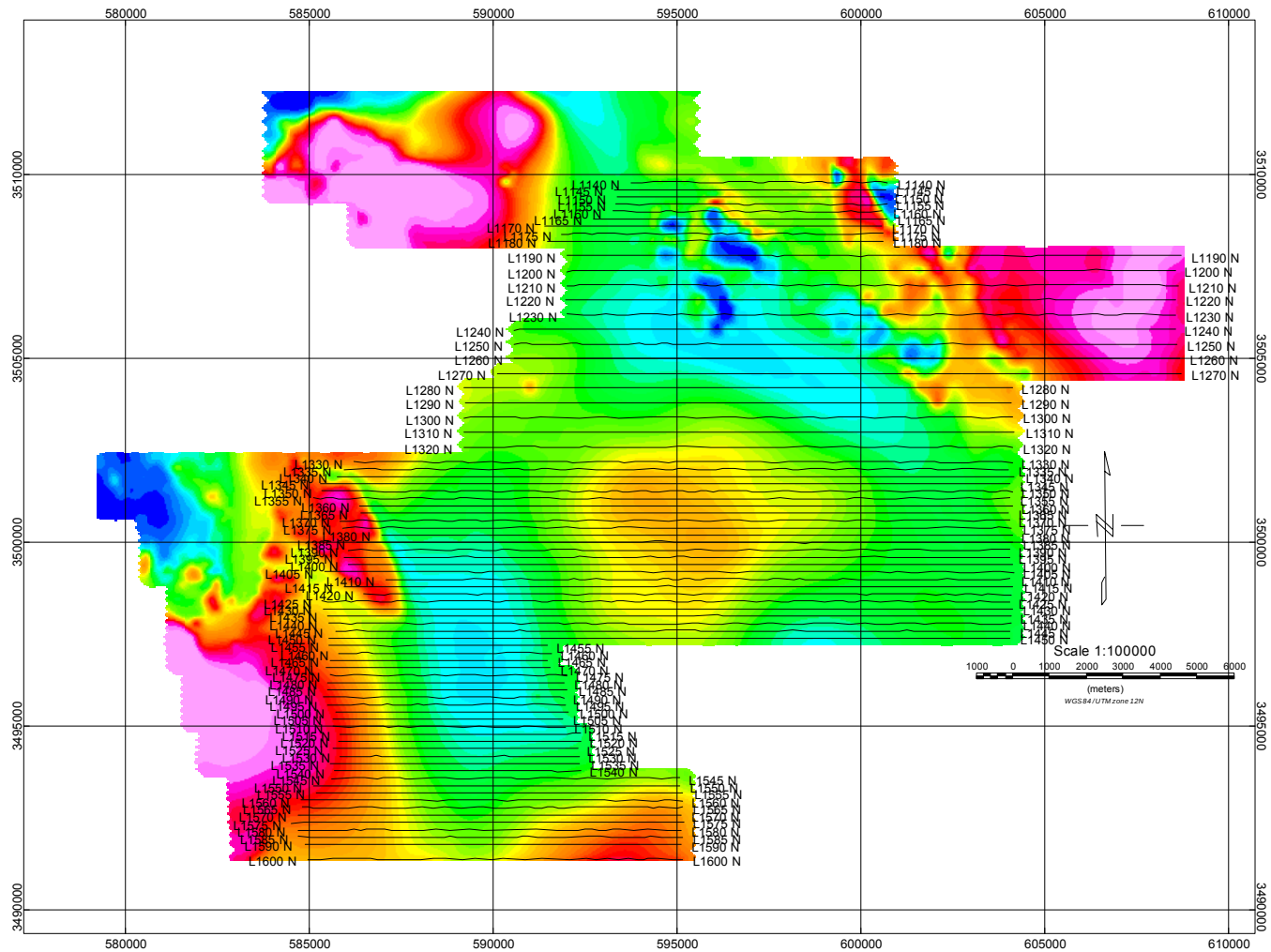
Flight Path over Power Line Monitor Image



Flight Path over IP 90Hz TPR Image



Flight Path over TMI Image

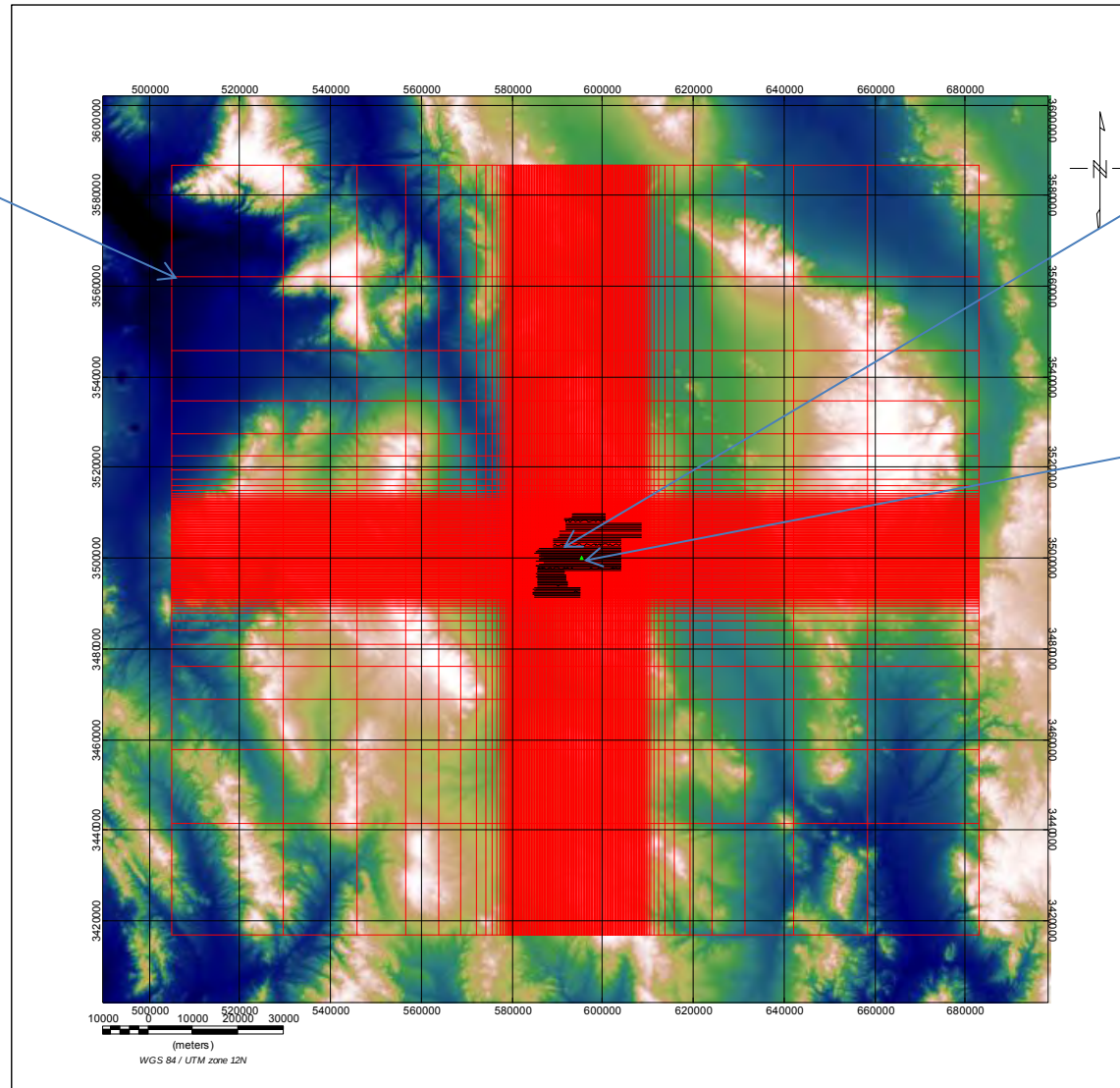


Mesh and SRTM used for 3D ZTEM inversion

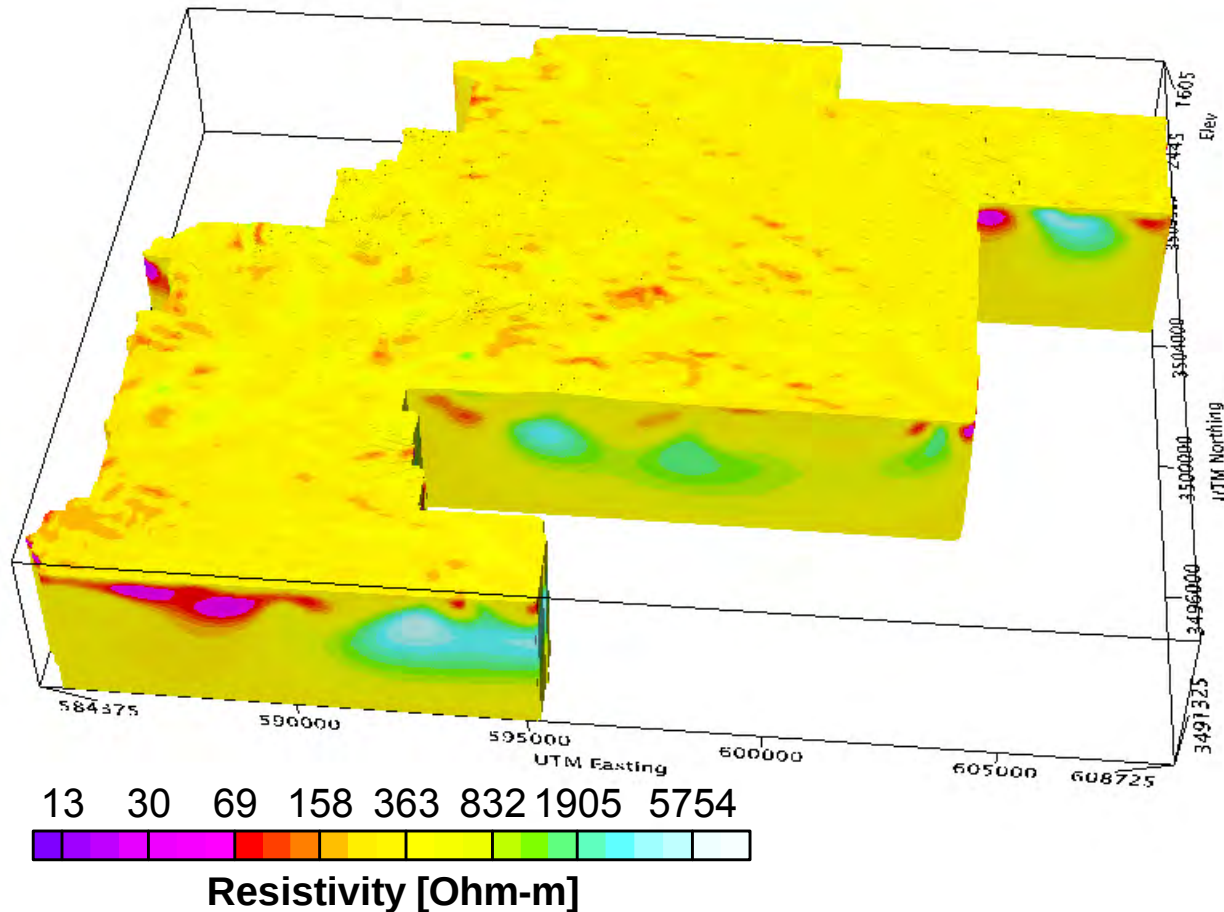
Mesh

Data

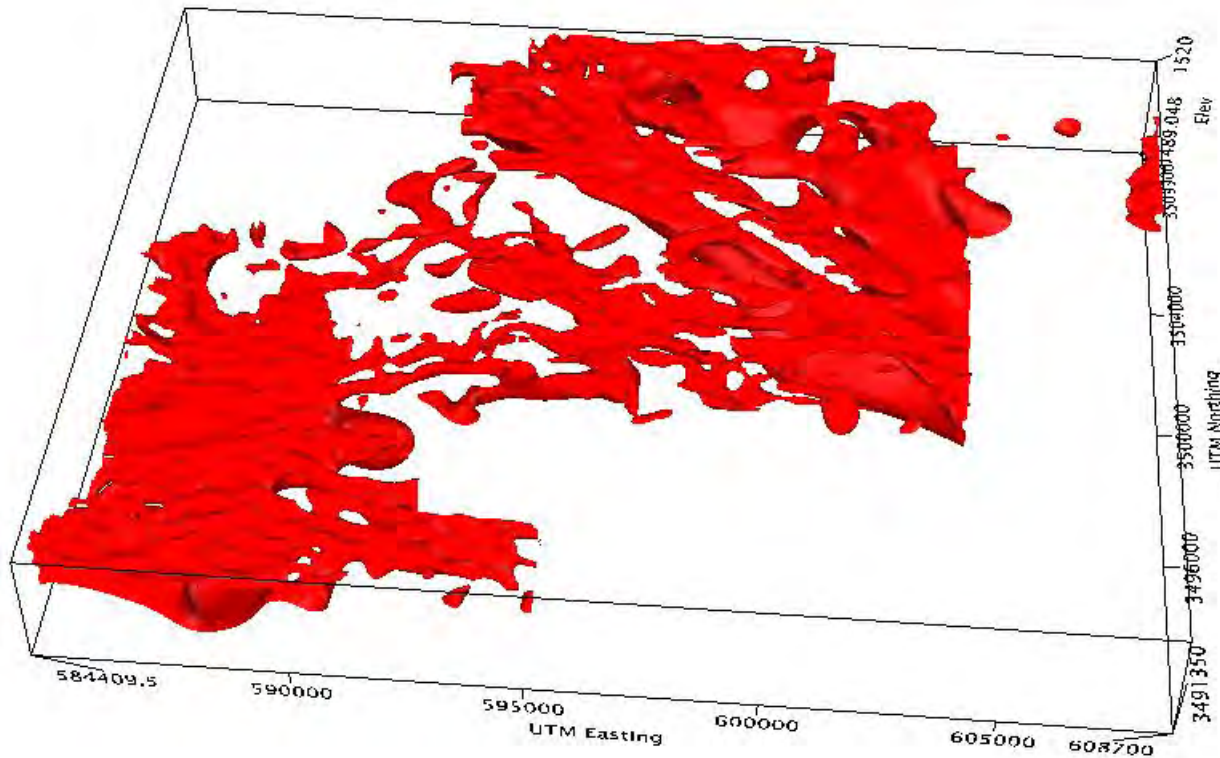
Base Station



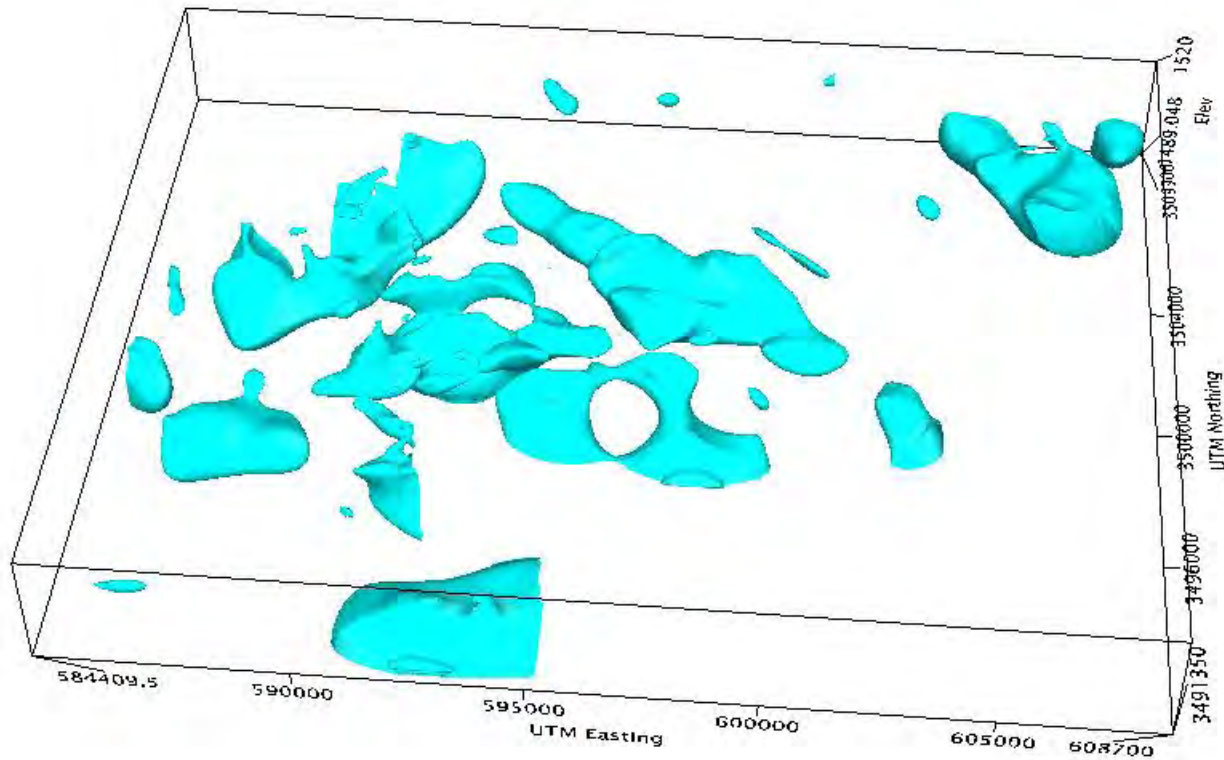
3D view of 3D ZTEM inversion Results



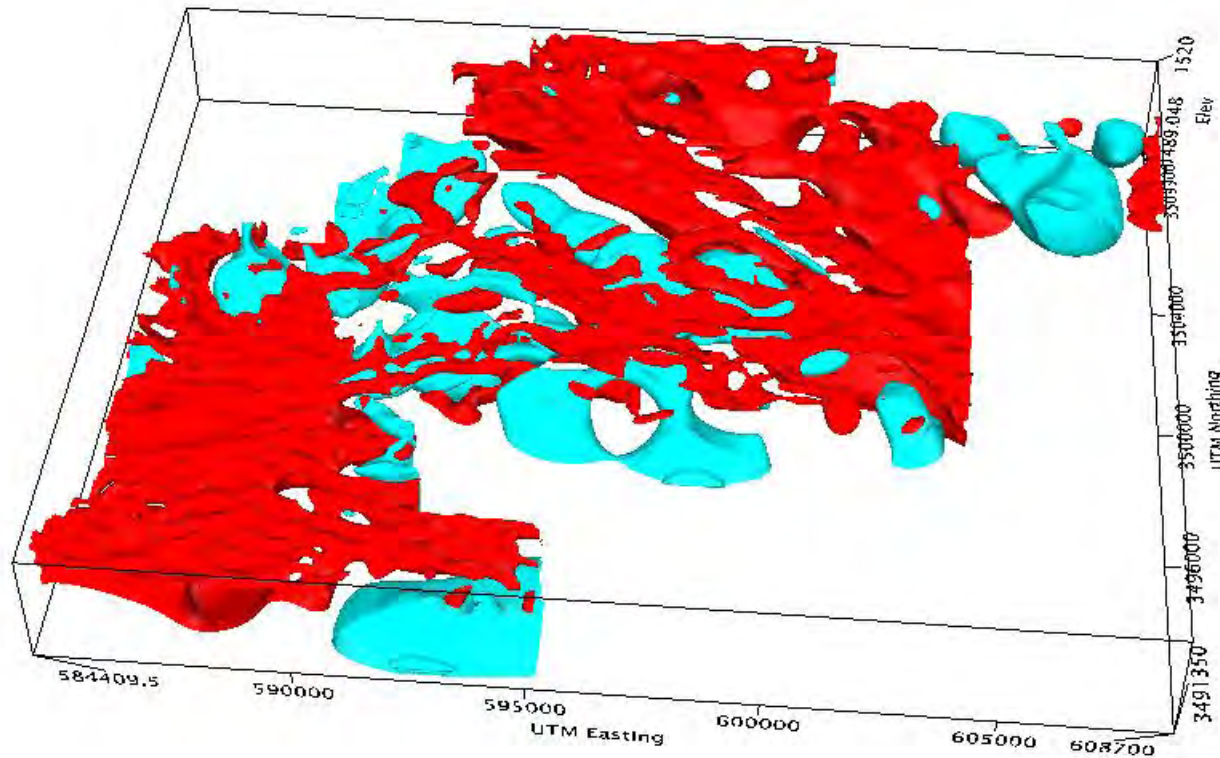
3D view of Iso-surface of 200 ohm-m



3D view of Iso-surface of 1000 ohm-m



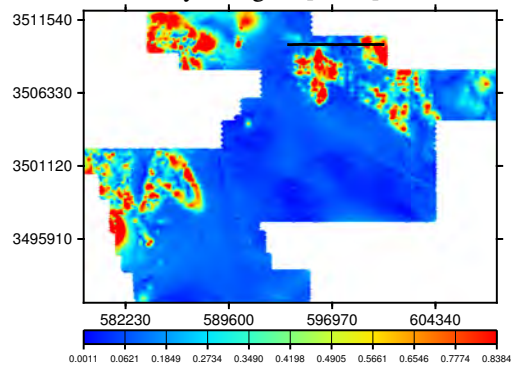
3D view of Iso-surfaces of 200 and 1000 ohm-m



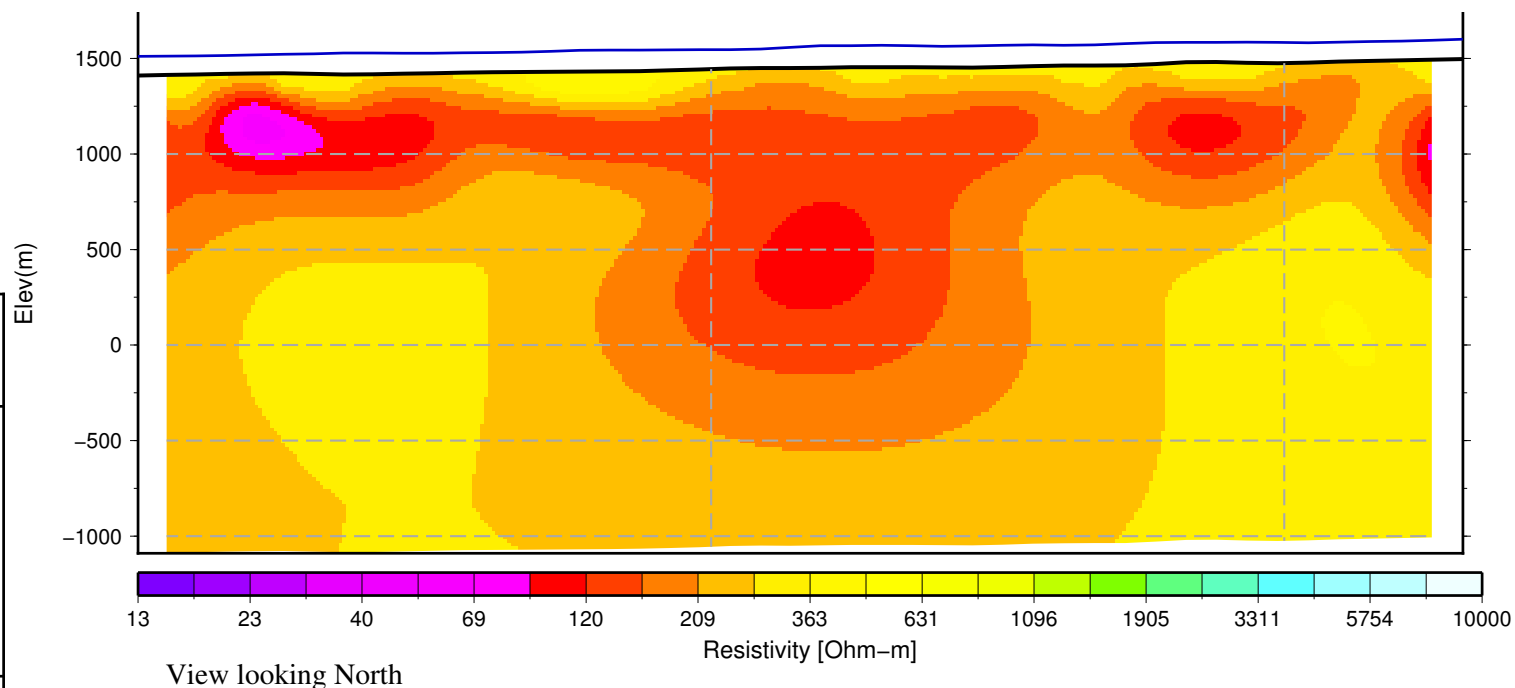
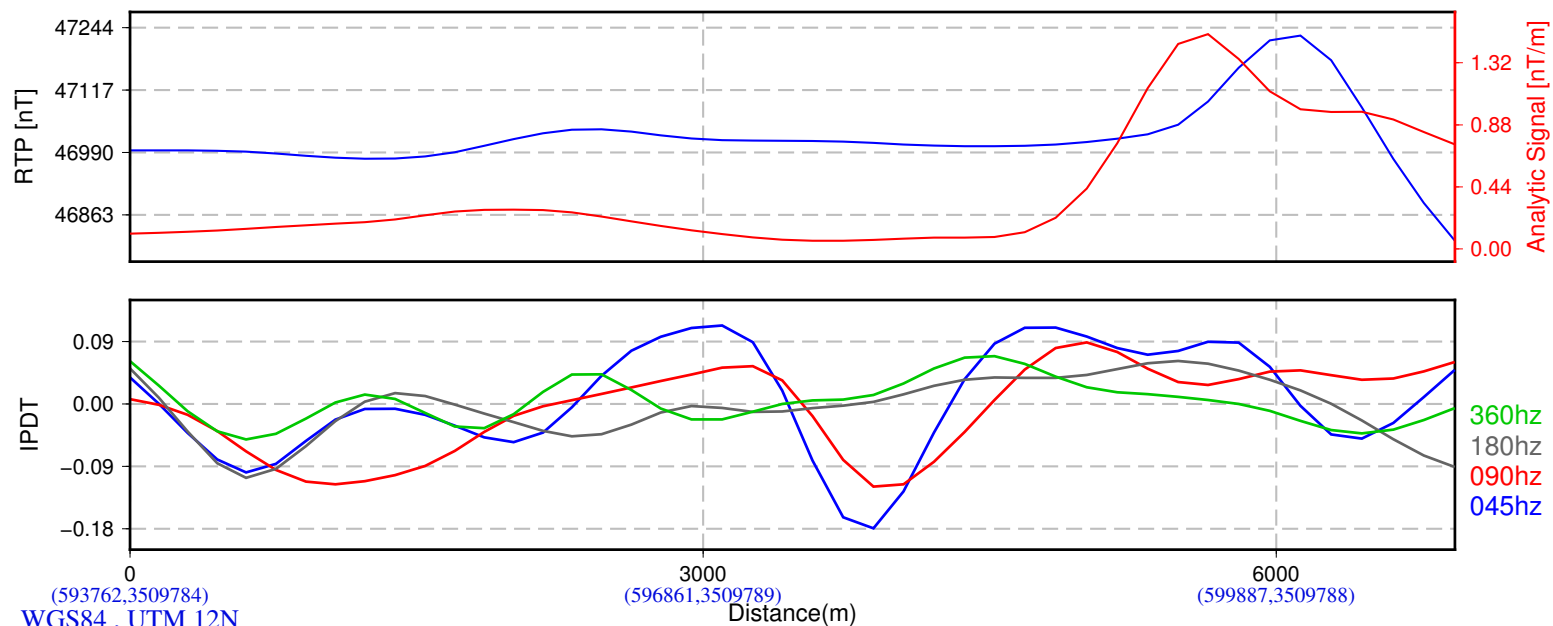
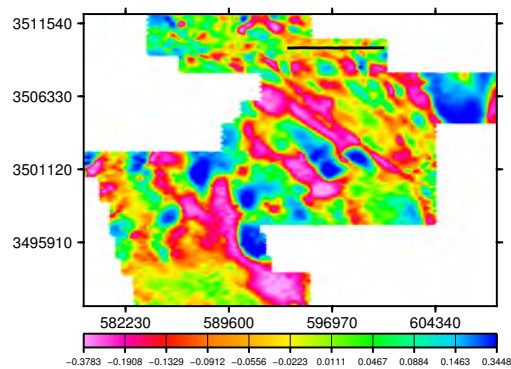
The following slides are resistivity sections

3D ZTEM Inversion: Resistivity Section for Line 1140

Analytic Signal [nT/m]



IP 090Hz DT



Liberty Star
Tombstone
Arizona

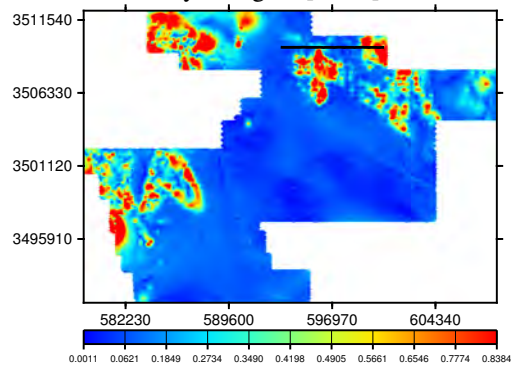
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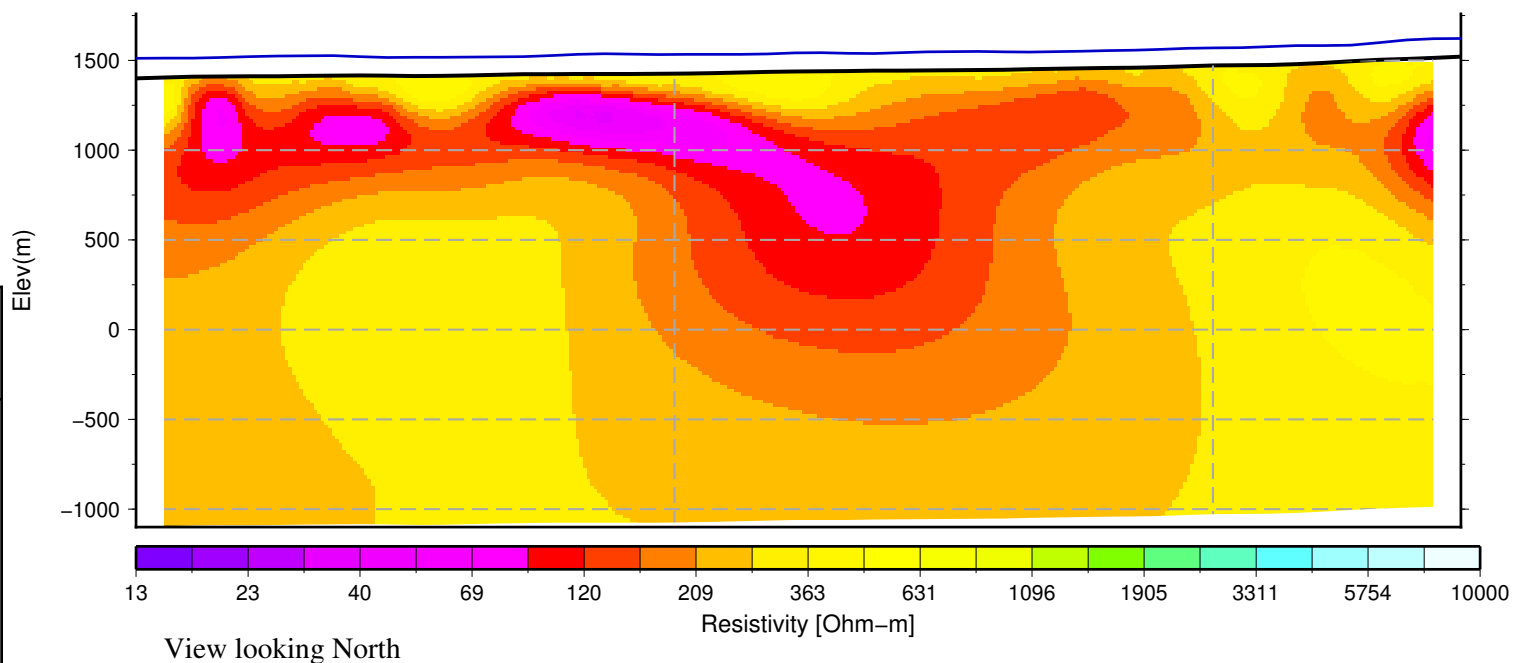
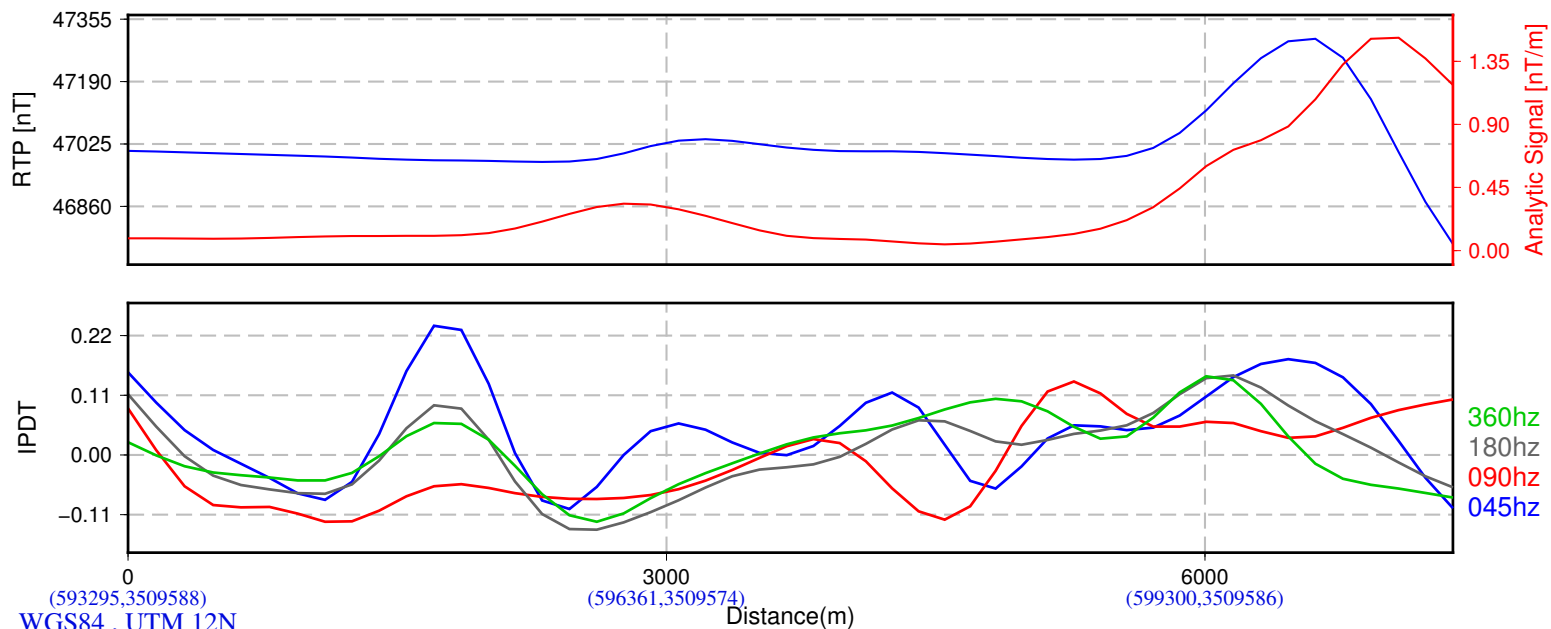
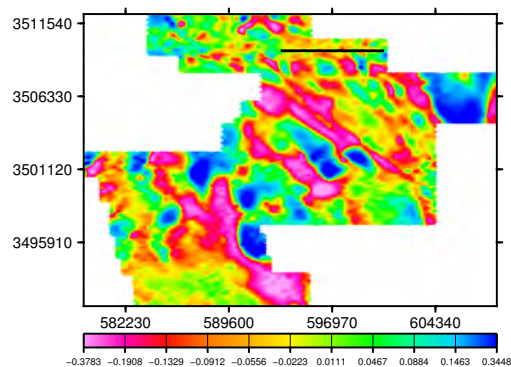
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3D ZTEM Inversion: Resistivity Section for Line 1145

Analytic Signal [nT/m]



IP 090Hz DT



Liberty Star
Tombstone
Arizona

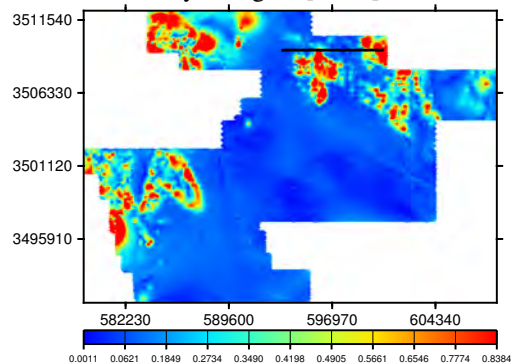
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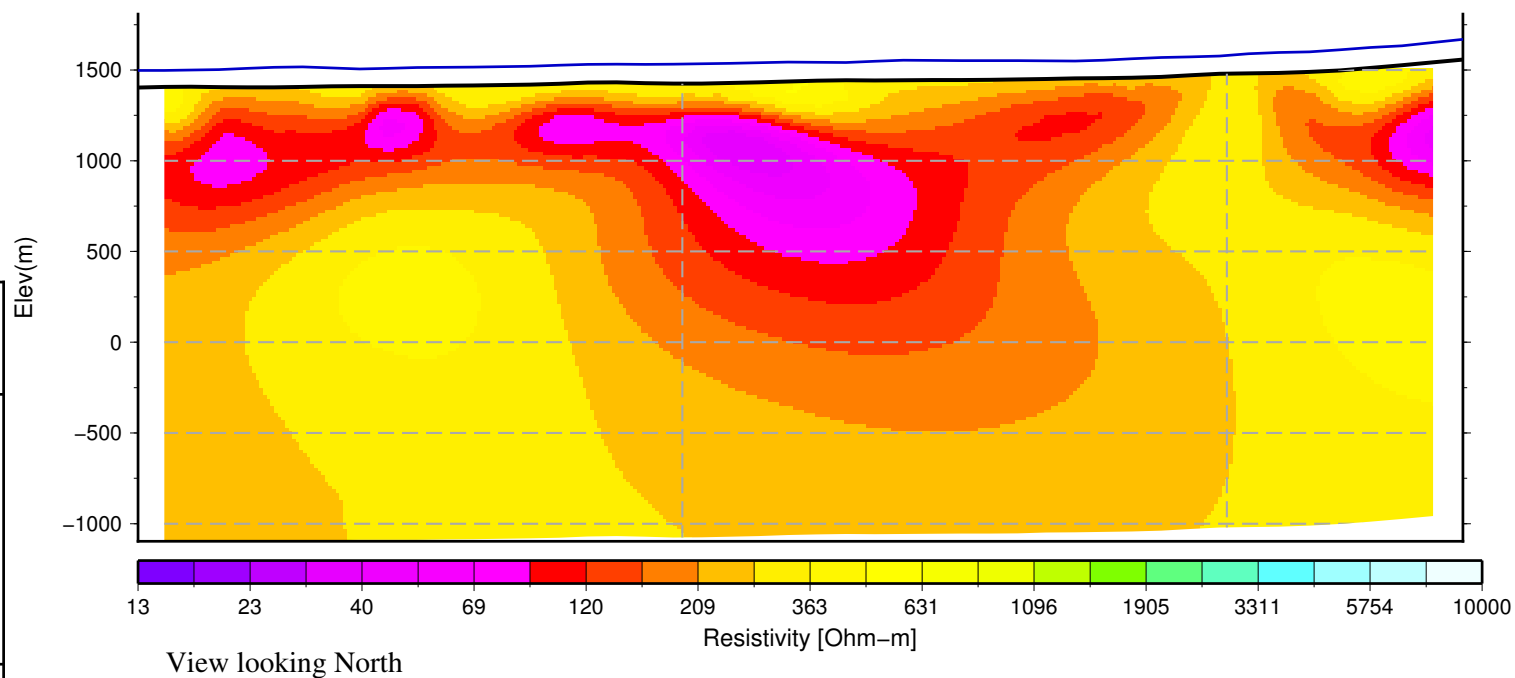
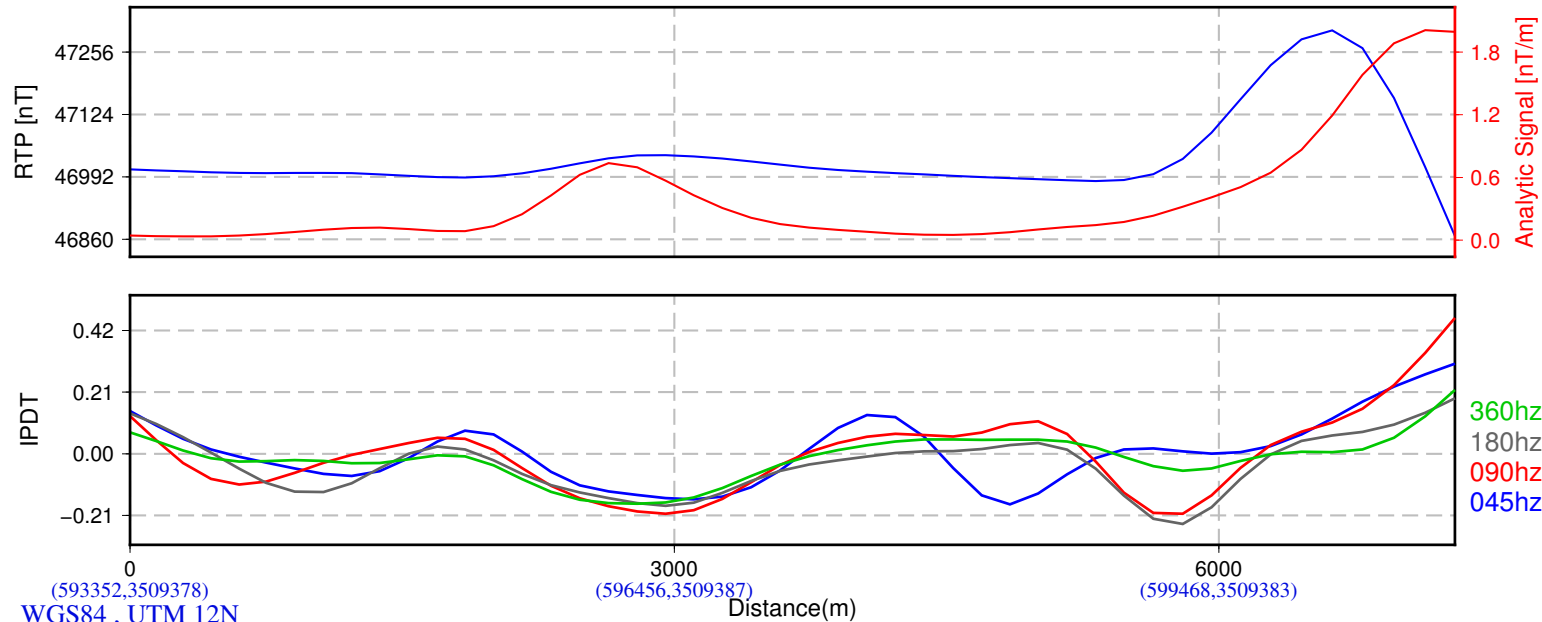
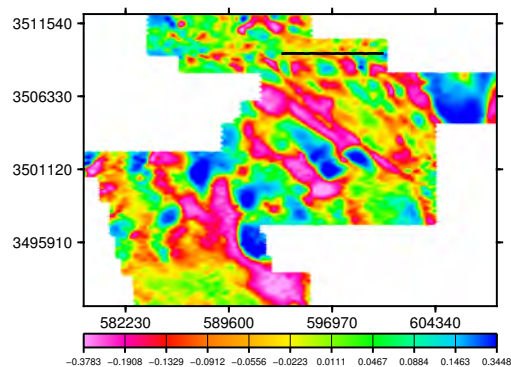
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3D ZTEM Inversion: Resistivity Section for Line 1150

Analytic Signal [nT/m]



IP 090Hz DT



Liberty Star
Tombstone
Arizona

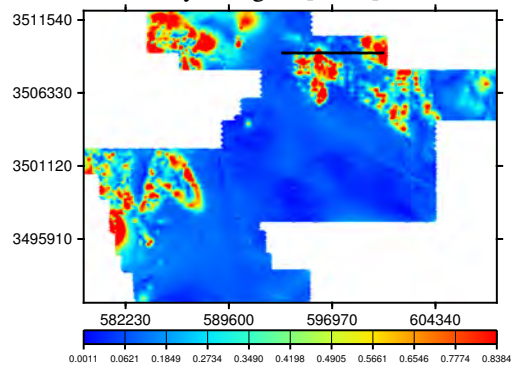
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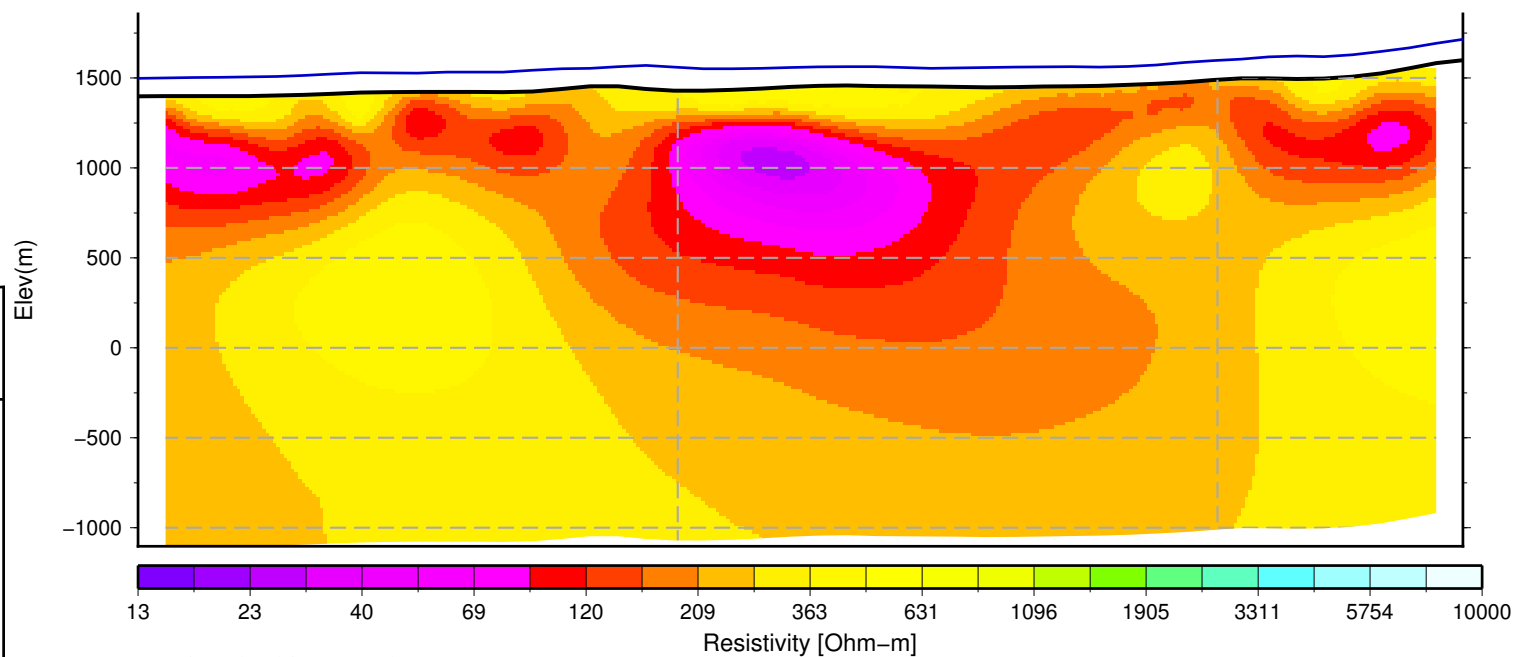
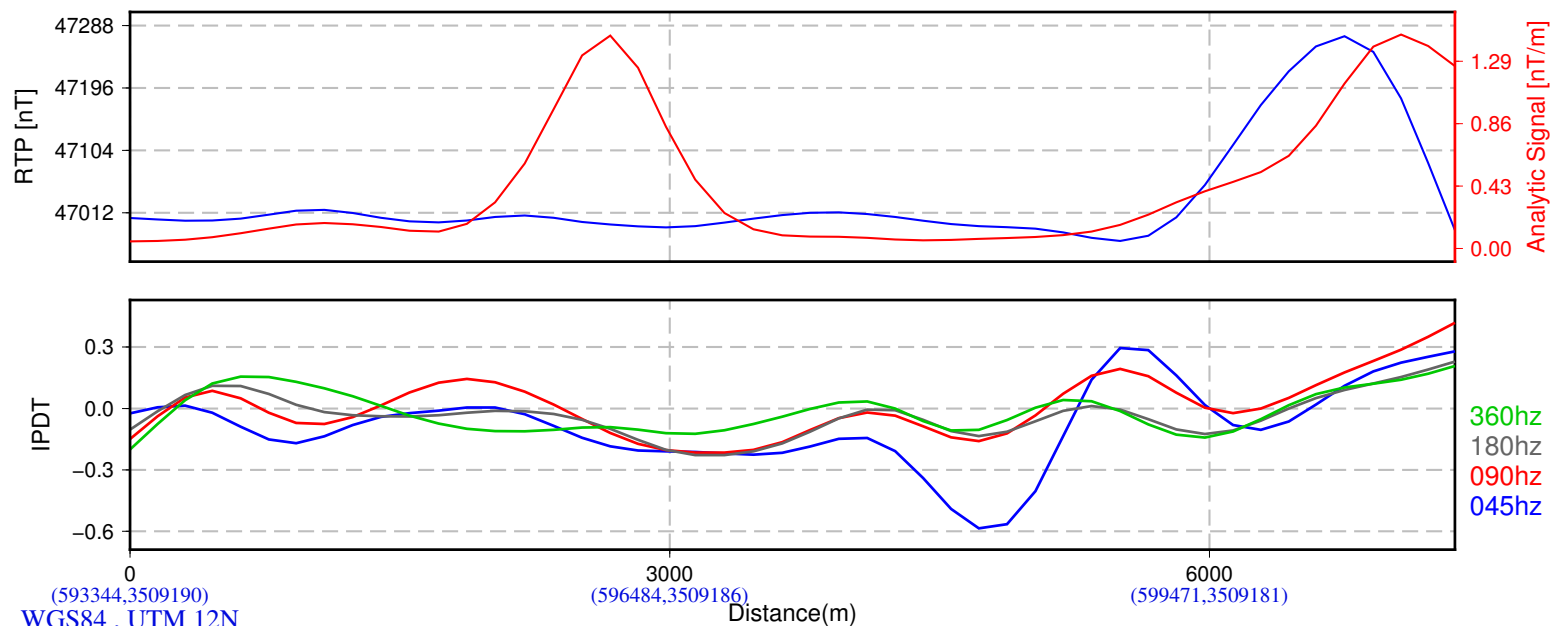
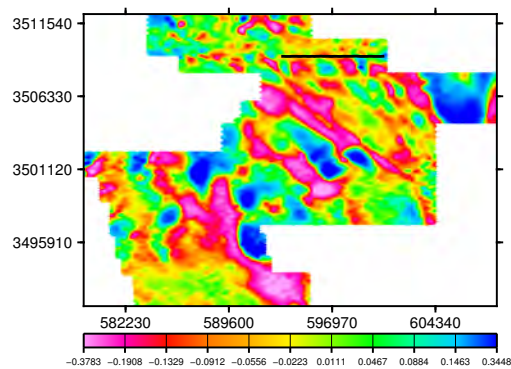
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3D ZTEM Inversion: Resistivity Section for Line 1155

Analytic Signal [nT/m]



IP 090Hz DT



View looking North

Liberty Star
Tombstone
Arizona

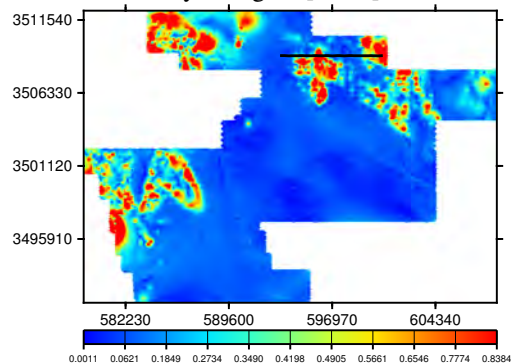
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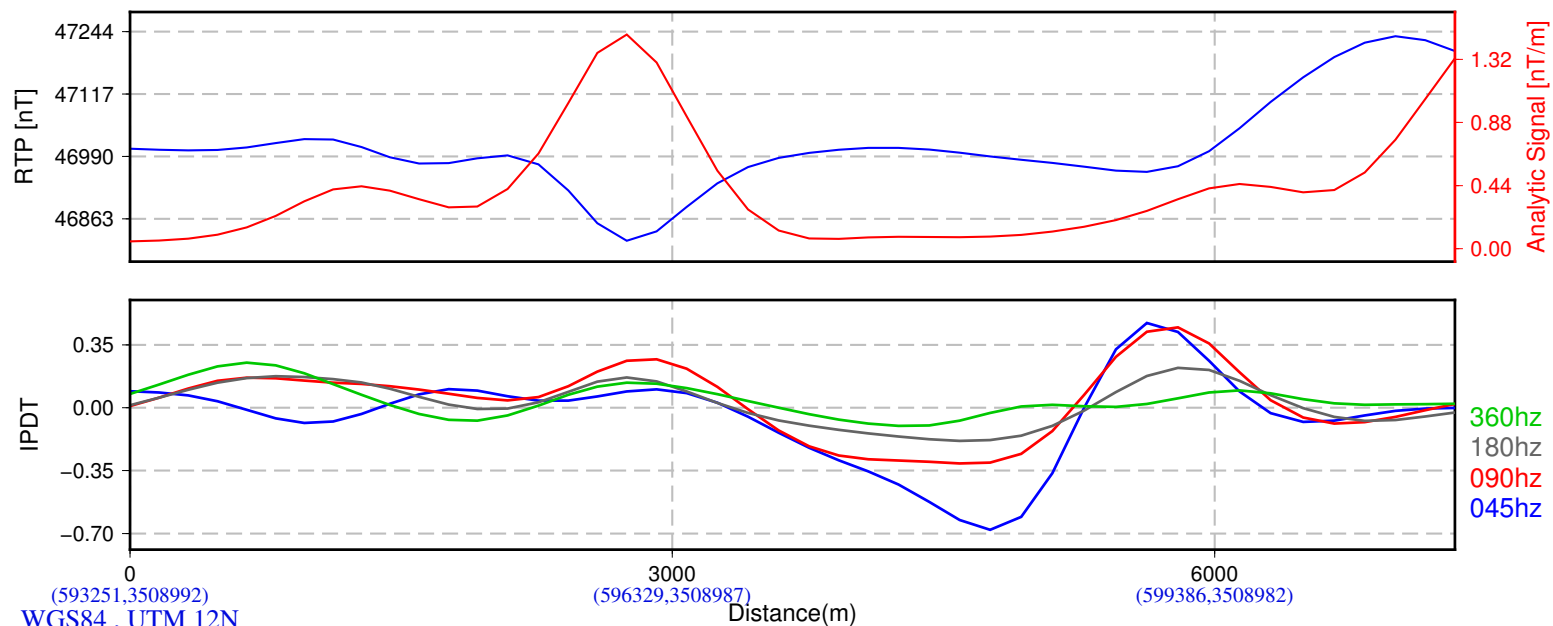
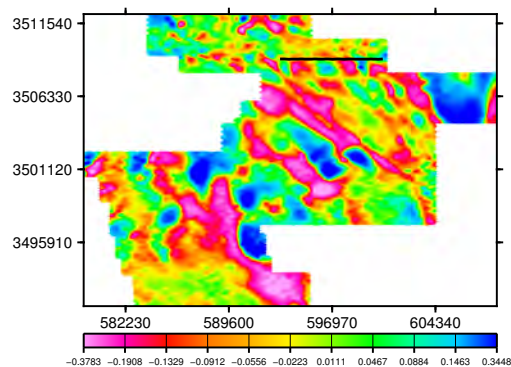
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3D ZTEM Inversion: Resistivity Section for Line 1160

Analytic Signal [nT/m]

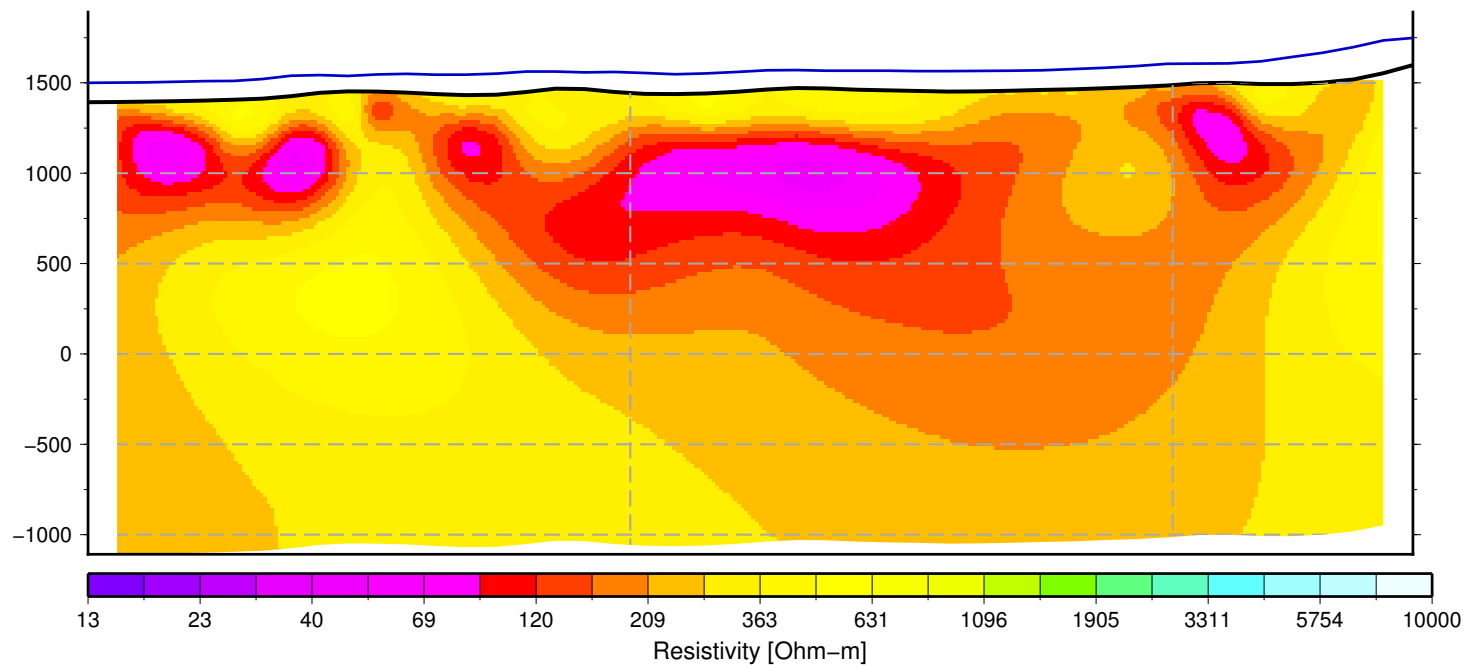


IP 090Hz DT



(593251,3508992)
WGS84 , UTM 12N

Elev(m)



View looking North

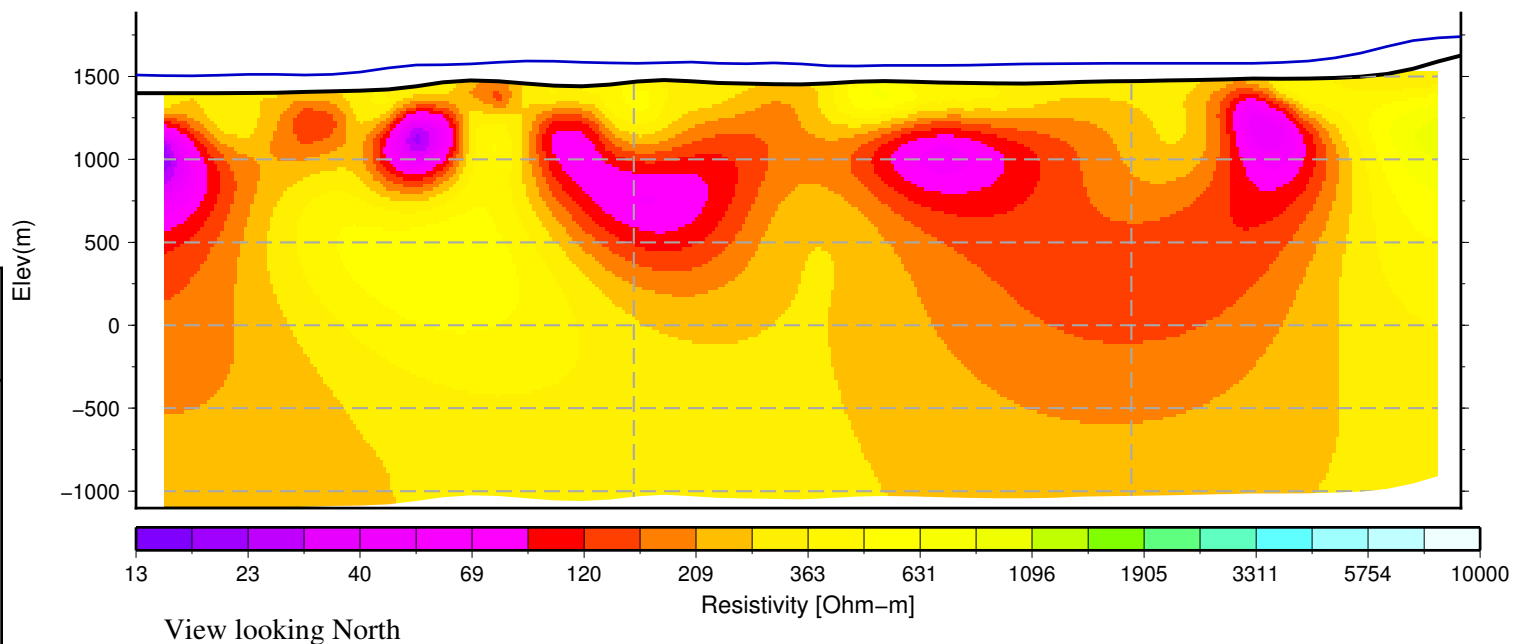
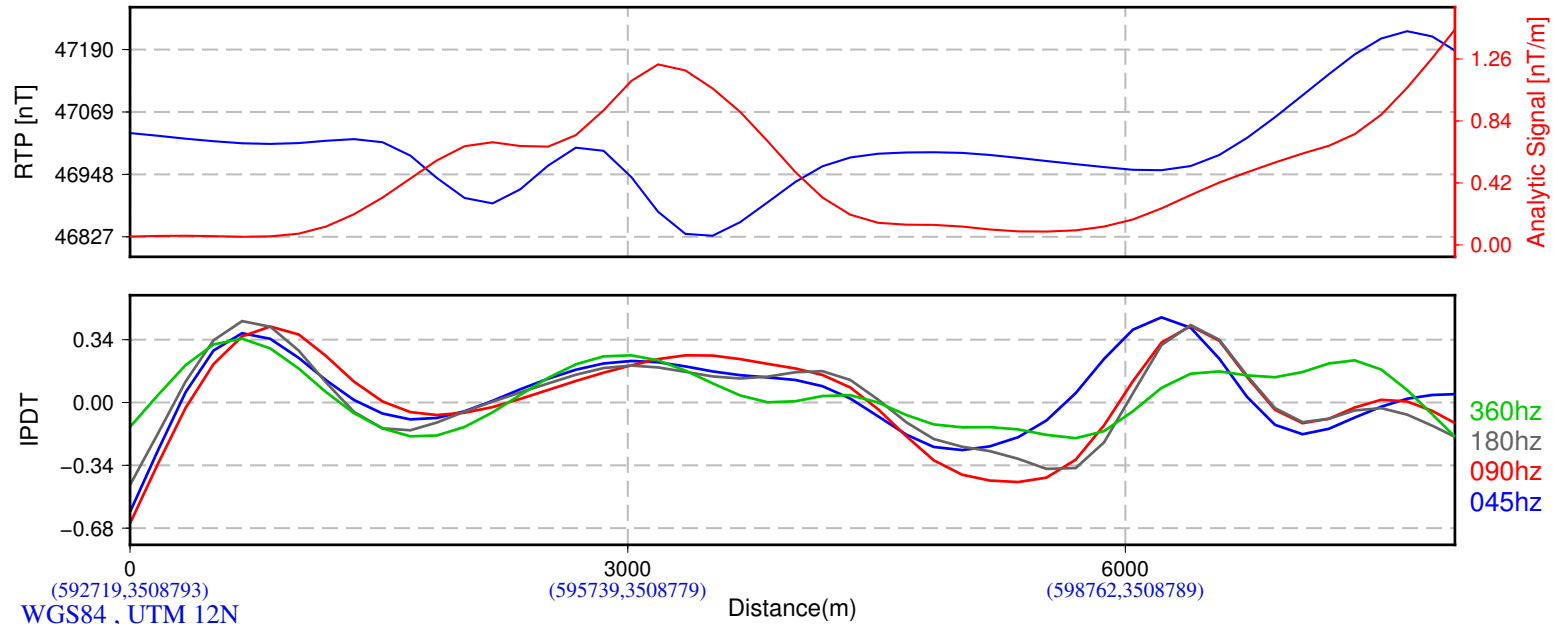
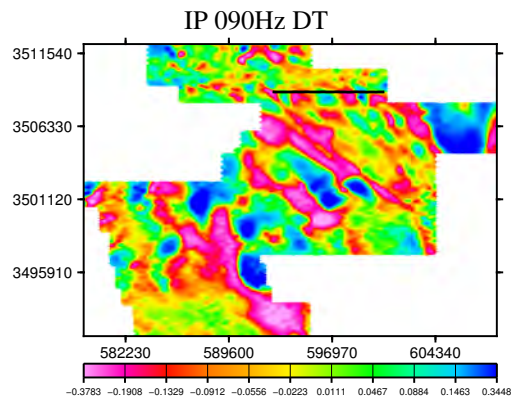
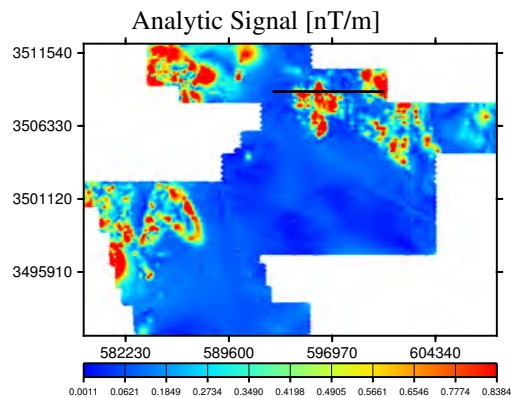
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3D ZTEM Inversion: Resistivity Section for Line 1165



Liberty Star
Tombstone
Arizona

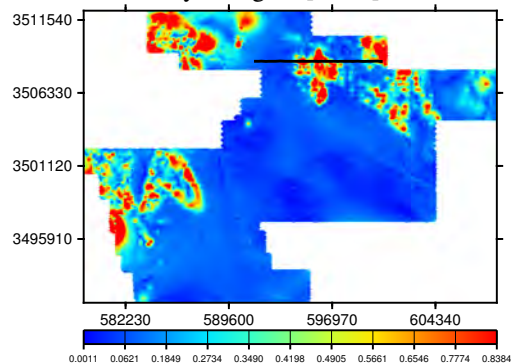
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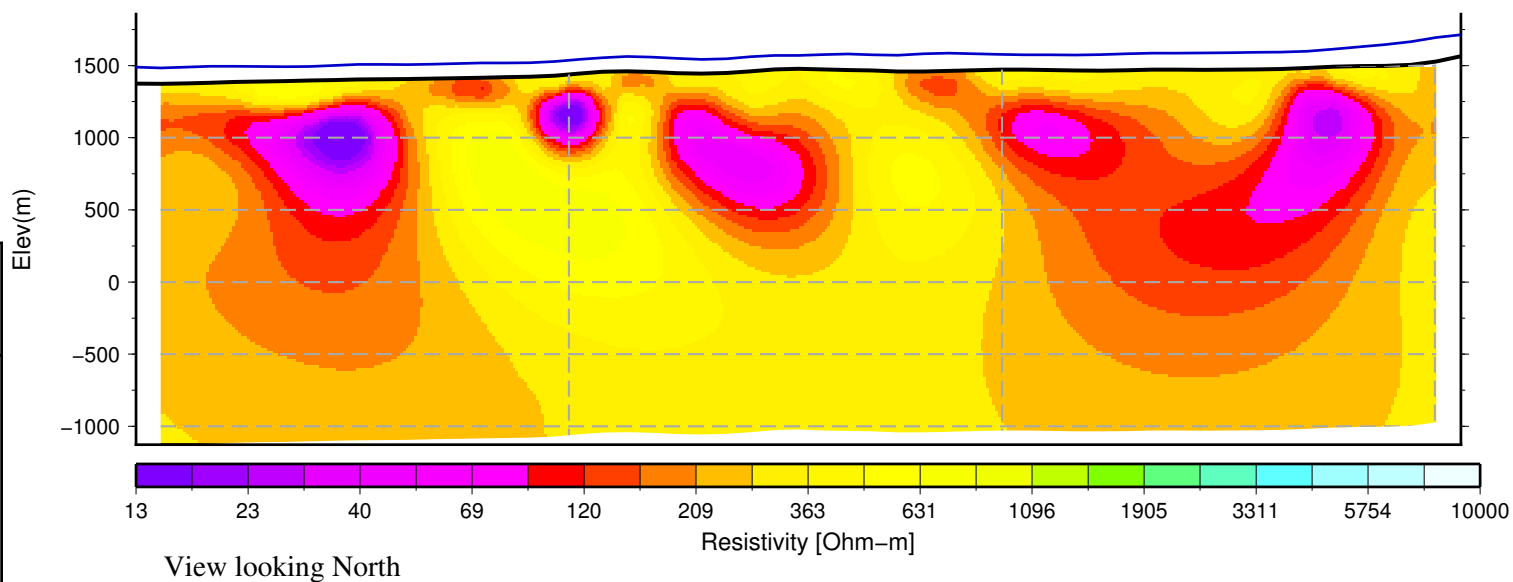
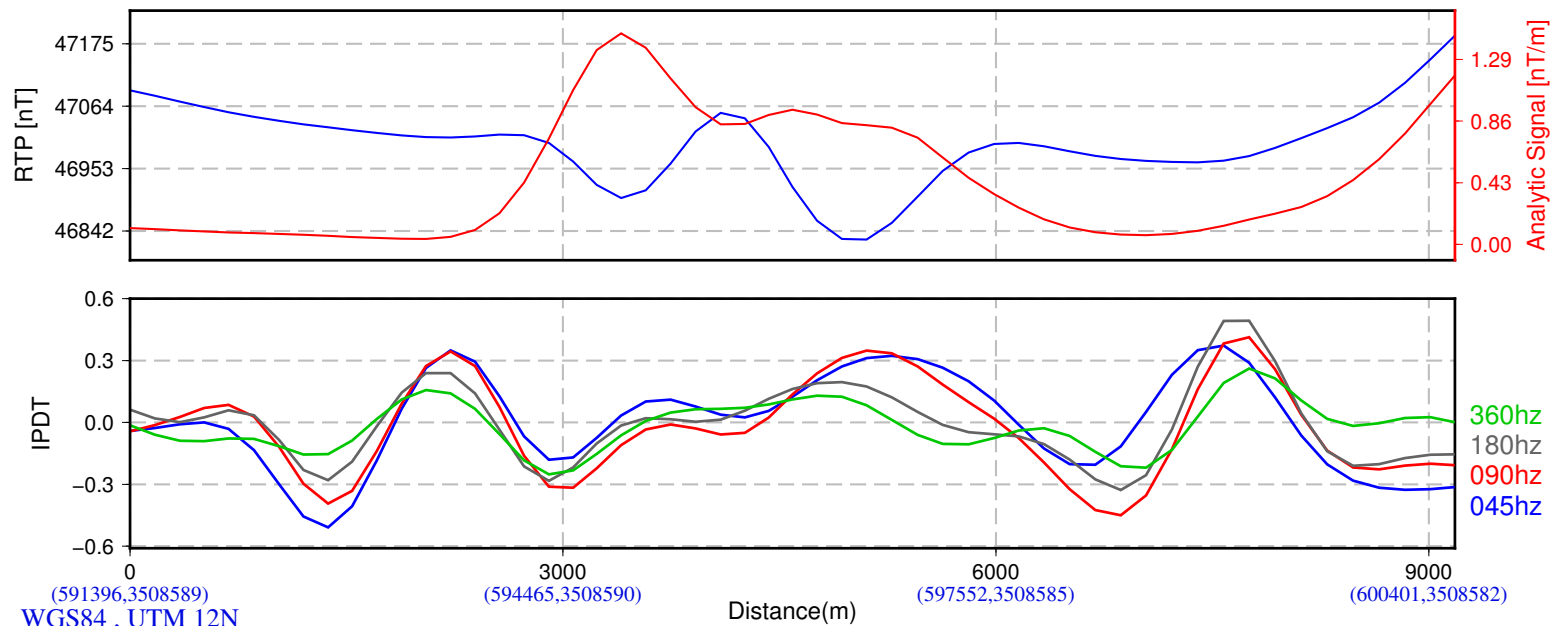
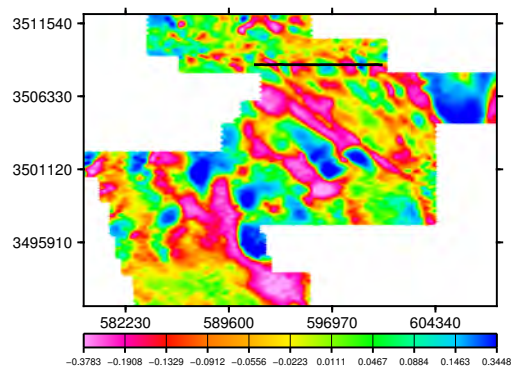
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3D ZTEM Inversion: Resistivity Section for Line 1170

Analytic Signal [nT/m]



IP 090Hz DT



Liberty Star
Tombstone
Arizona

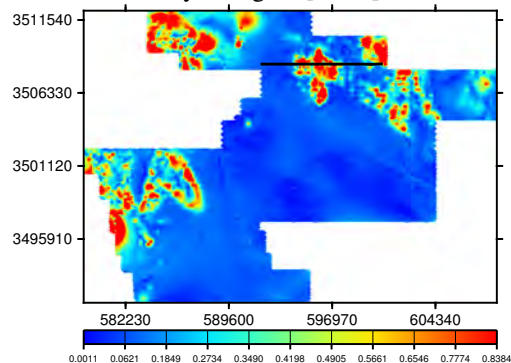
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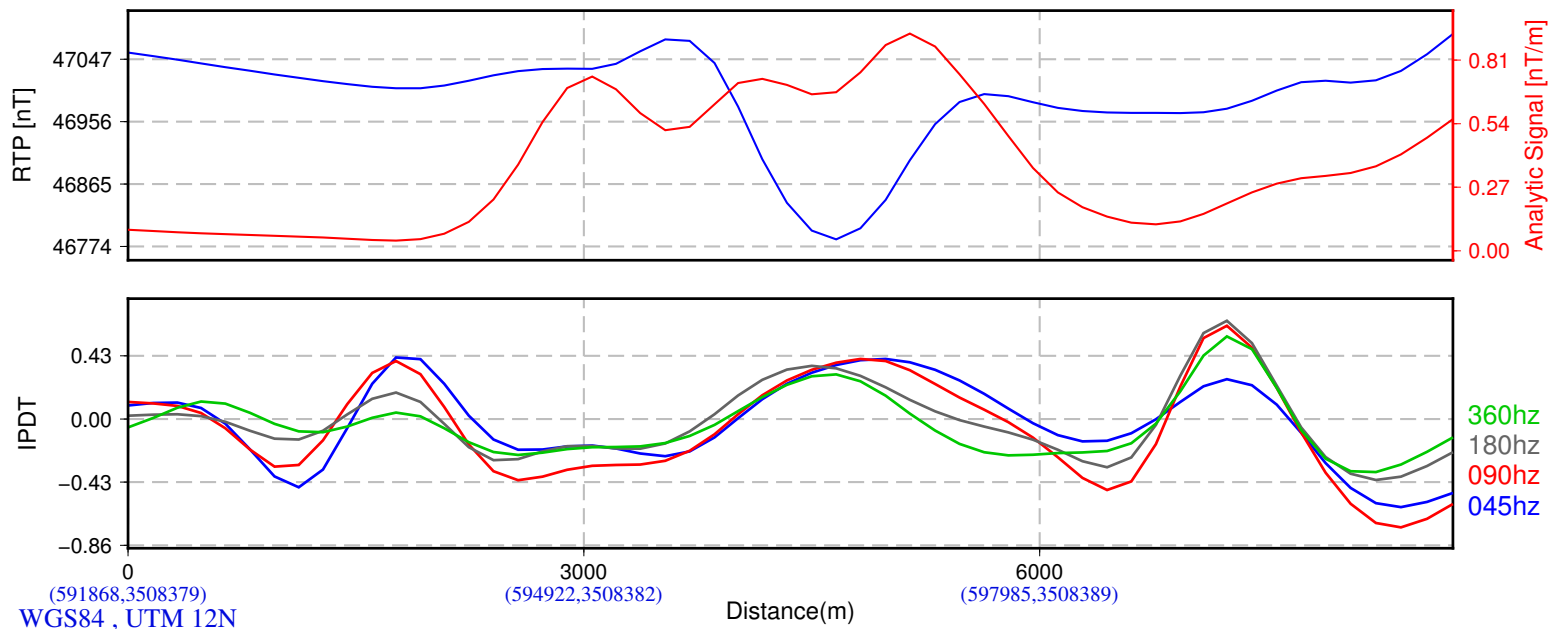
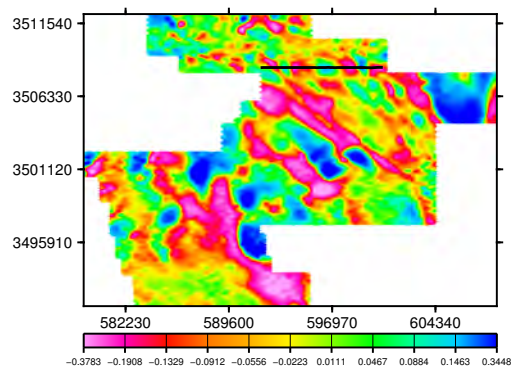
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3D ZTEM Inversion: Resistivity Section for Line 1175

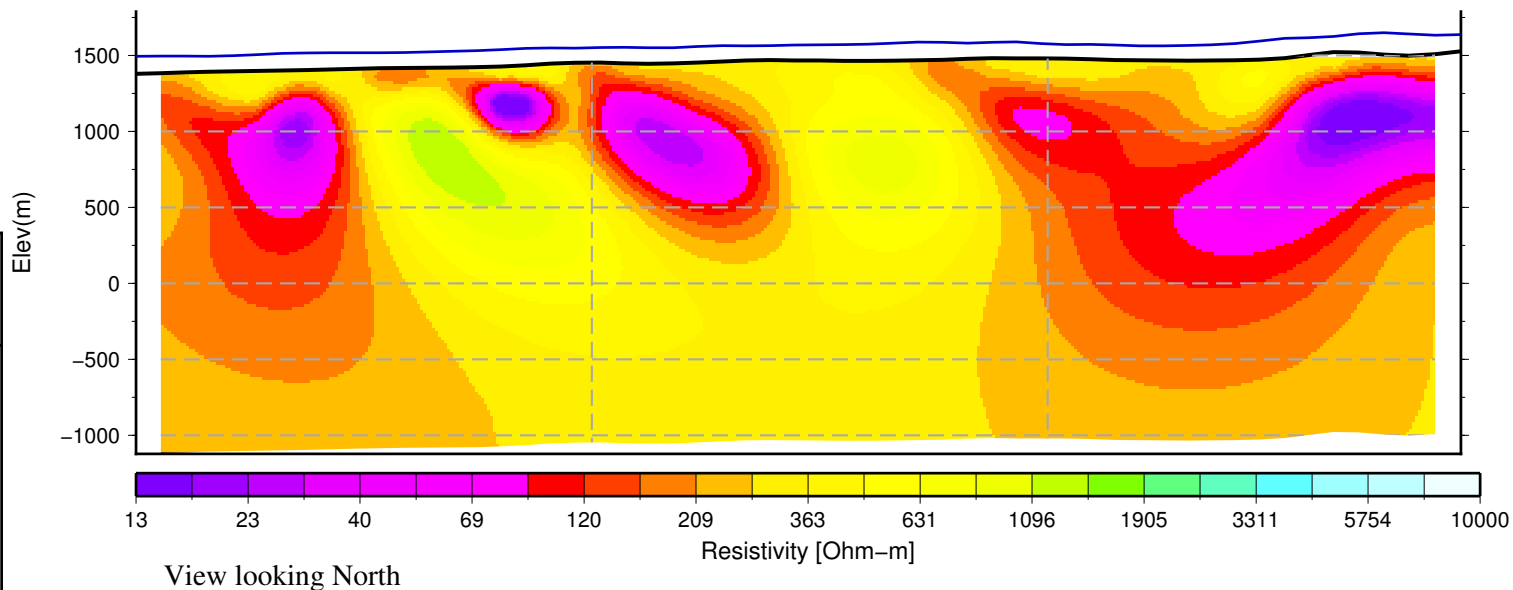
Analytic Signal [nT/m]



IP 090Hz DT



WGS84 , UTM 12N



Liberty Star
Tombstone
Arizona

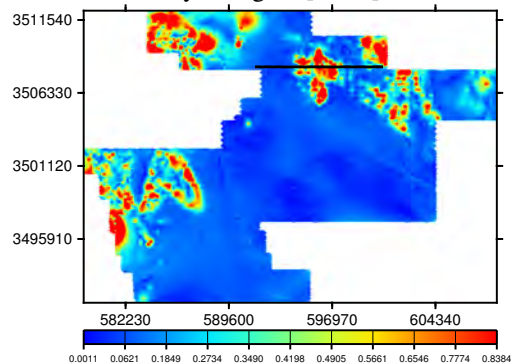
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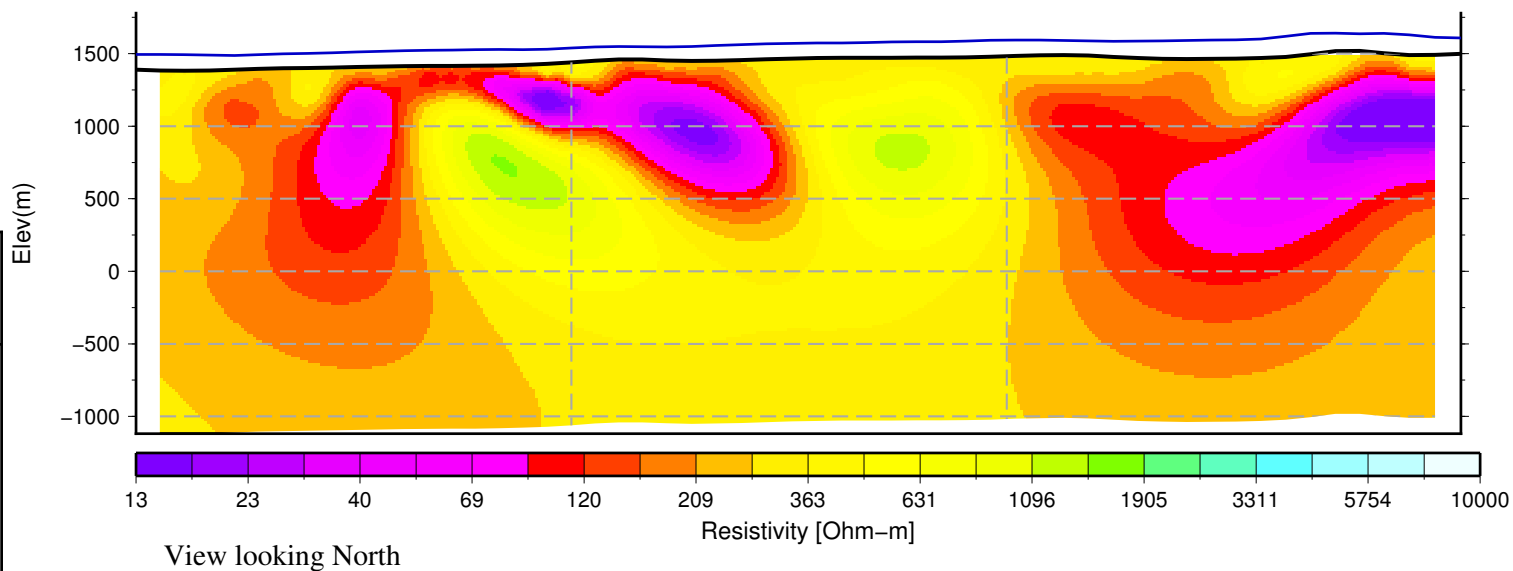
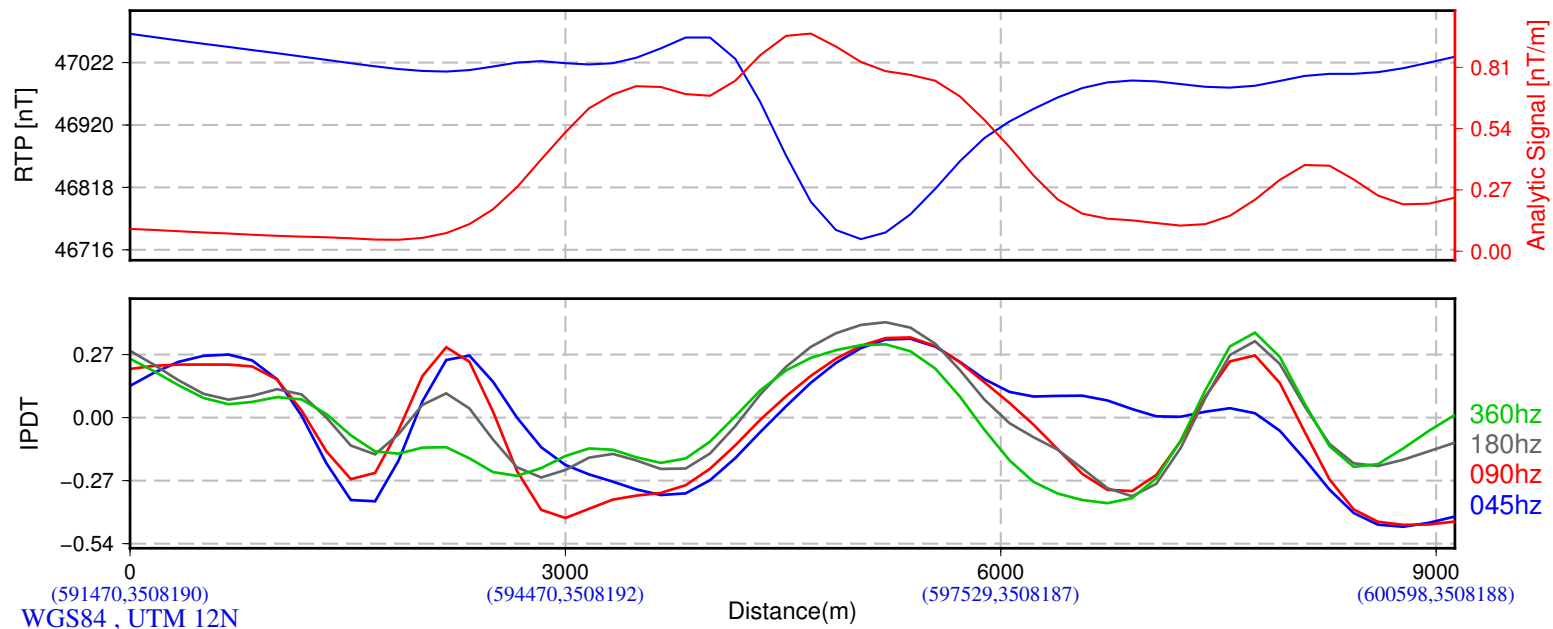
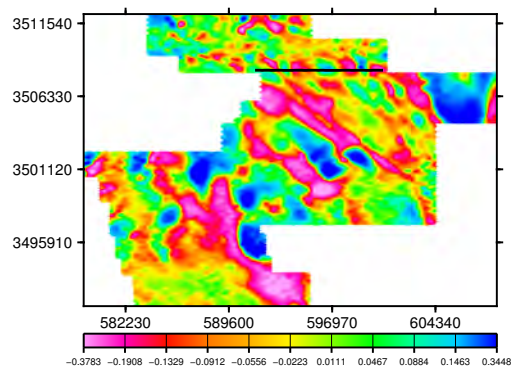
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3D ZTEM Inversion: Resistivity Section for Line 1180

Analytic Signal [nT/m]



IP 090Hz DT



Liberty Star
Tombstone
Arizona

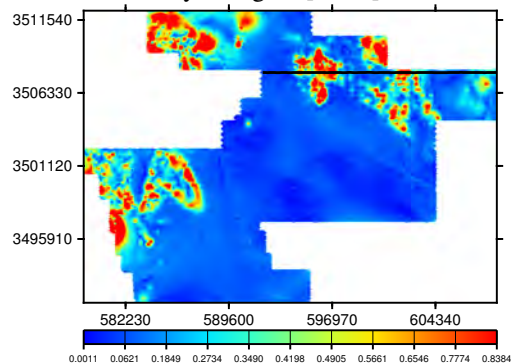
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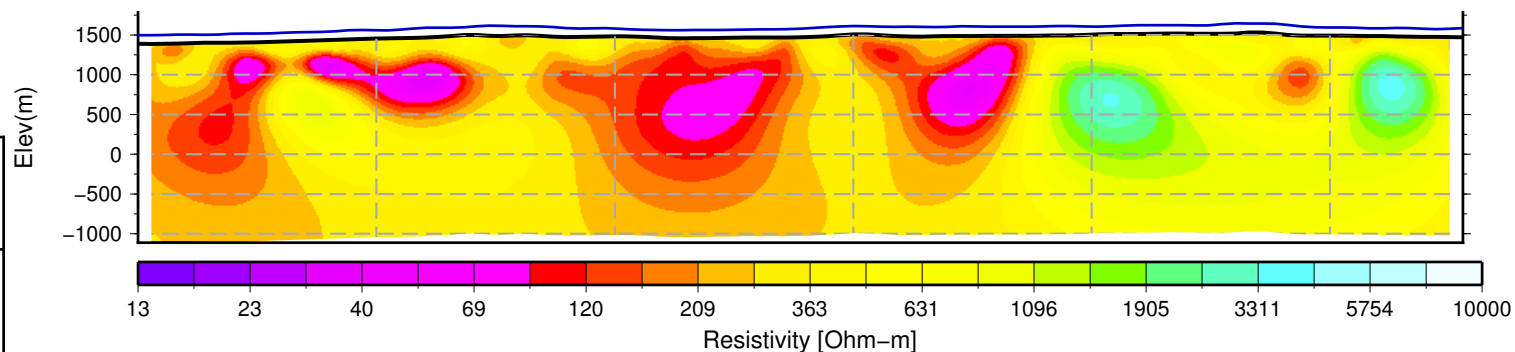
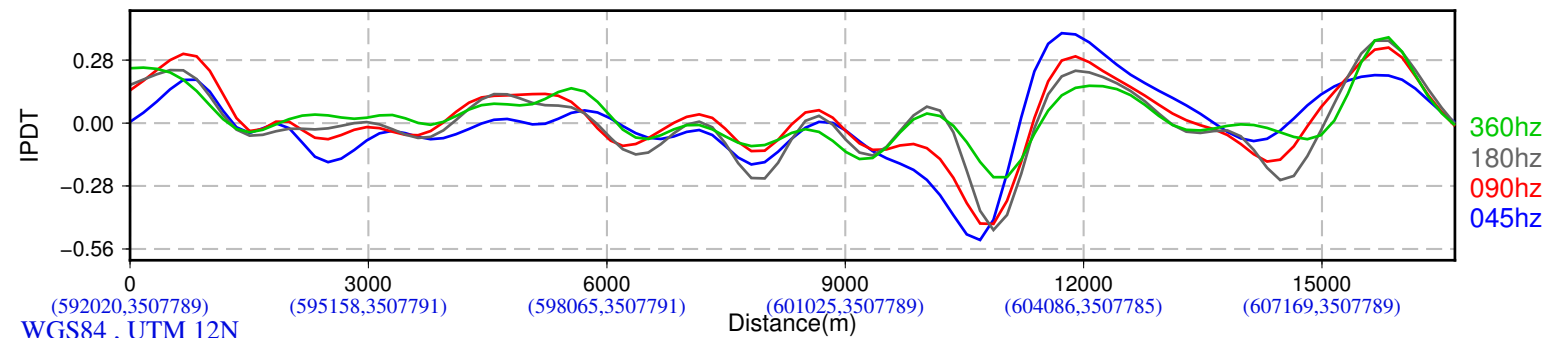
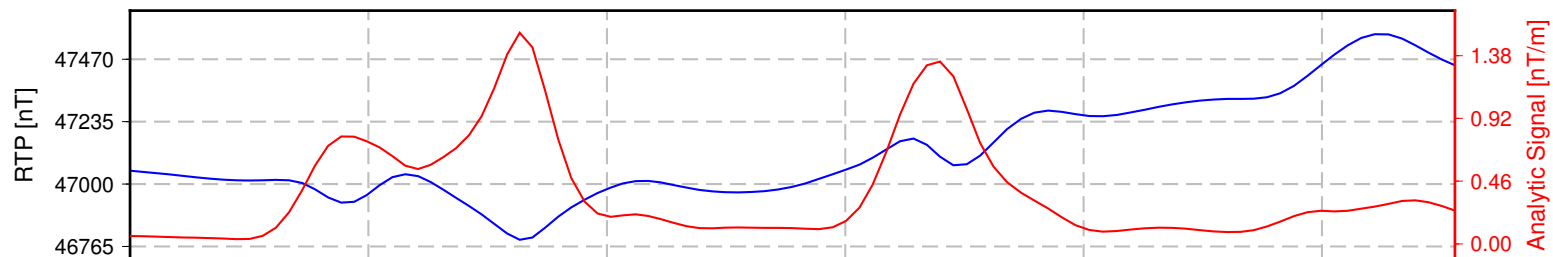
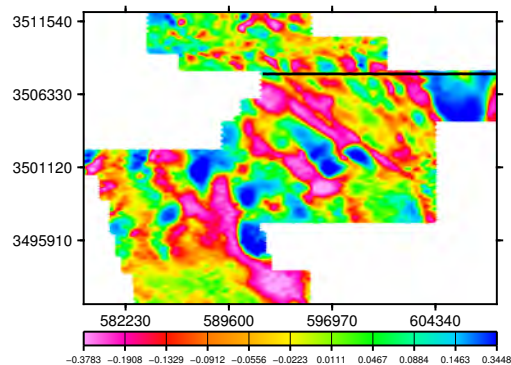
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3D ZTEM Inversion: Resistivity Section for Line 1190

Analytic Signal [nT/m]



IP 090Hz DT



Liberty Star
Tombstone
Arizona

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3D-ZTEM Inversion: Resistivity Sections

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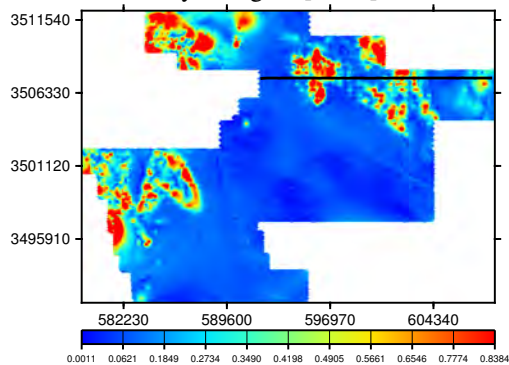
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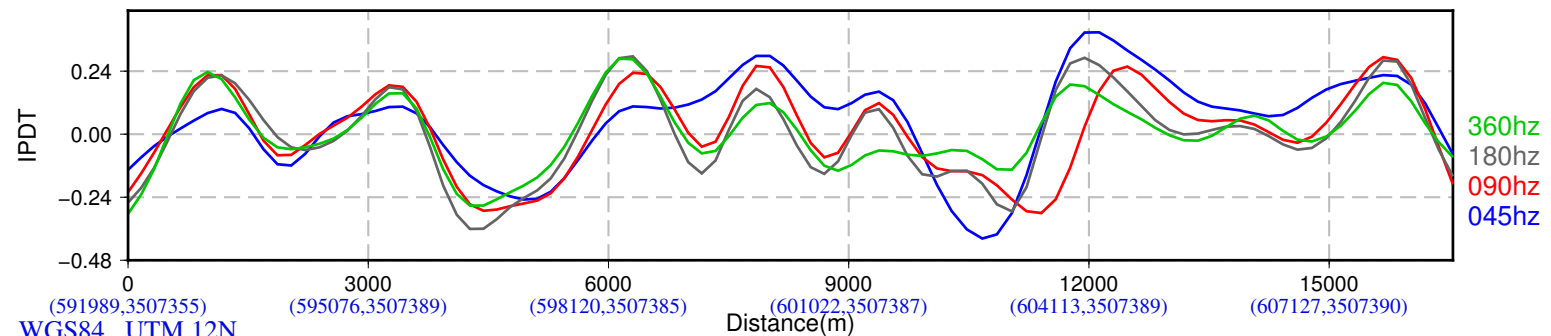
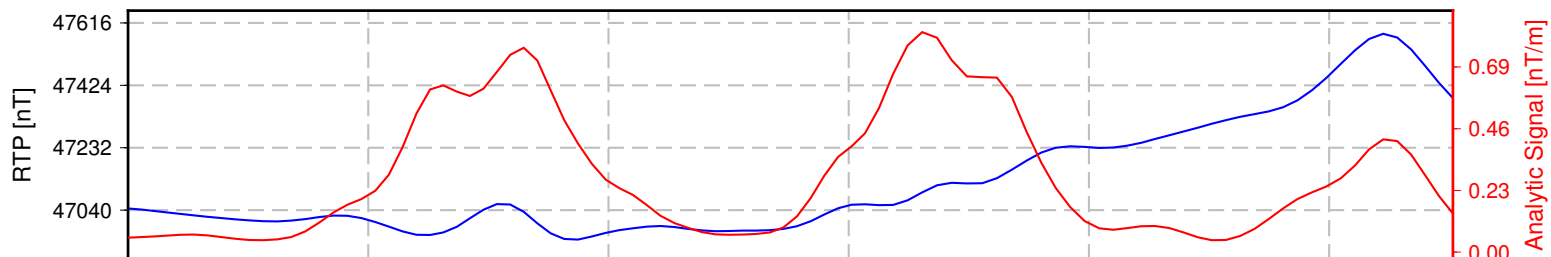
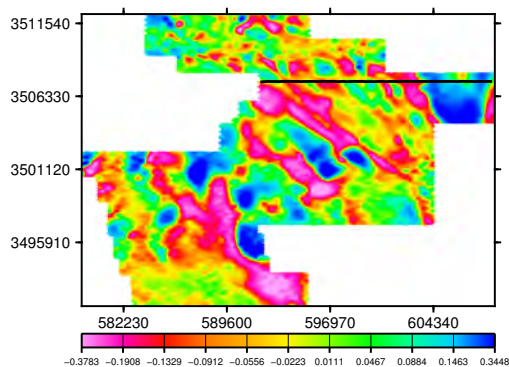
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3D ZTEM Inversion: Resistivity Section for Line 1200

Analytic Signal [nT/m]

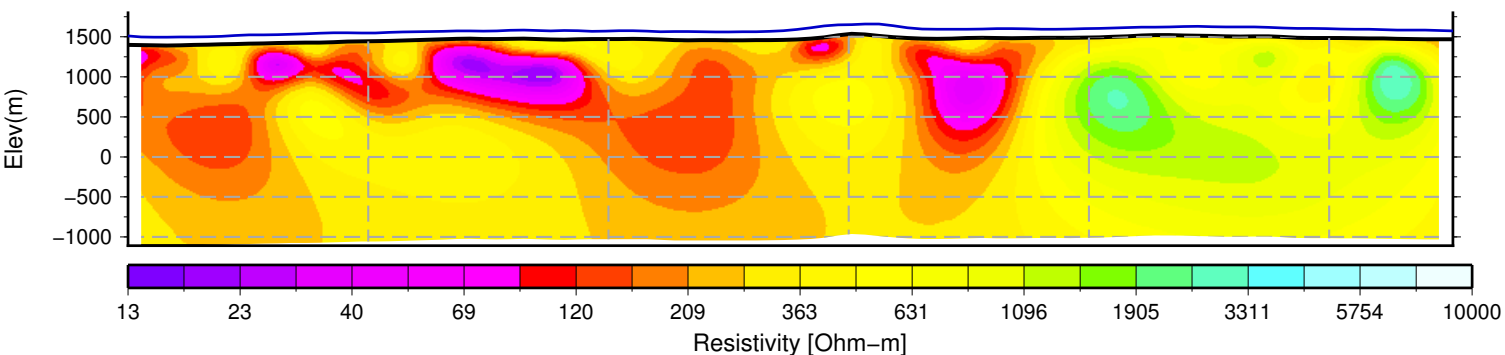


IP 090Hz DT



(591989,3507355)
WGS84 , UTM 12N

(595076,3507389) (598120,3507385) (601022,3507387) (604113,3507389) (607127,3507390)



View looking North

Liberty Star
Tombstone
Arizona

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3D-ZTEM Inversion: Resistivity Sections

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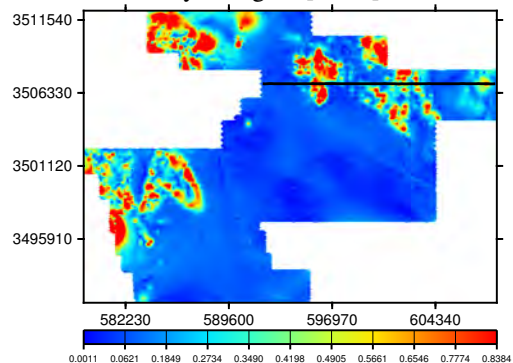
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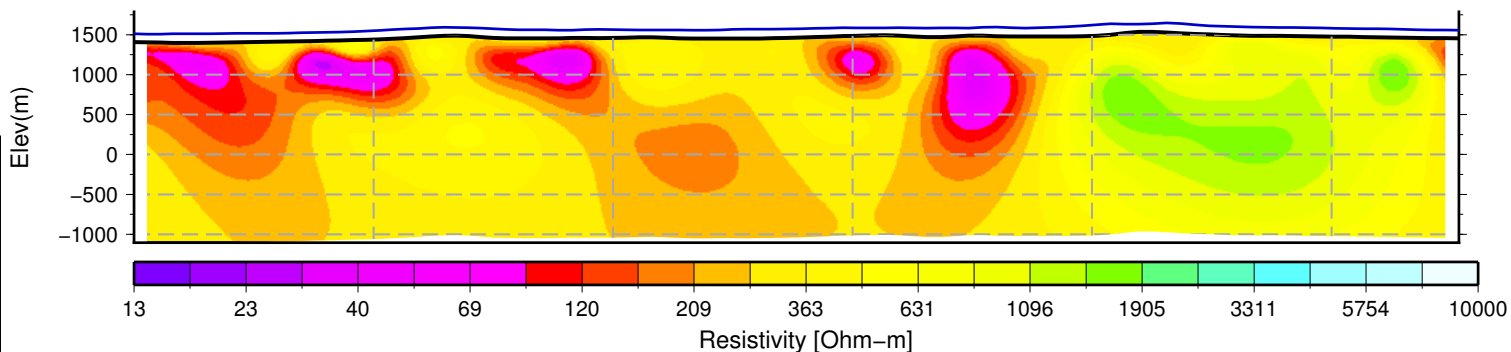
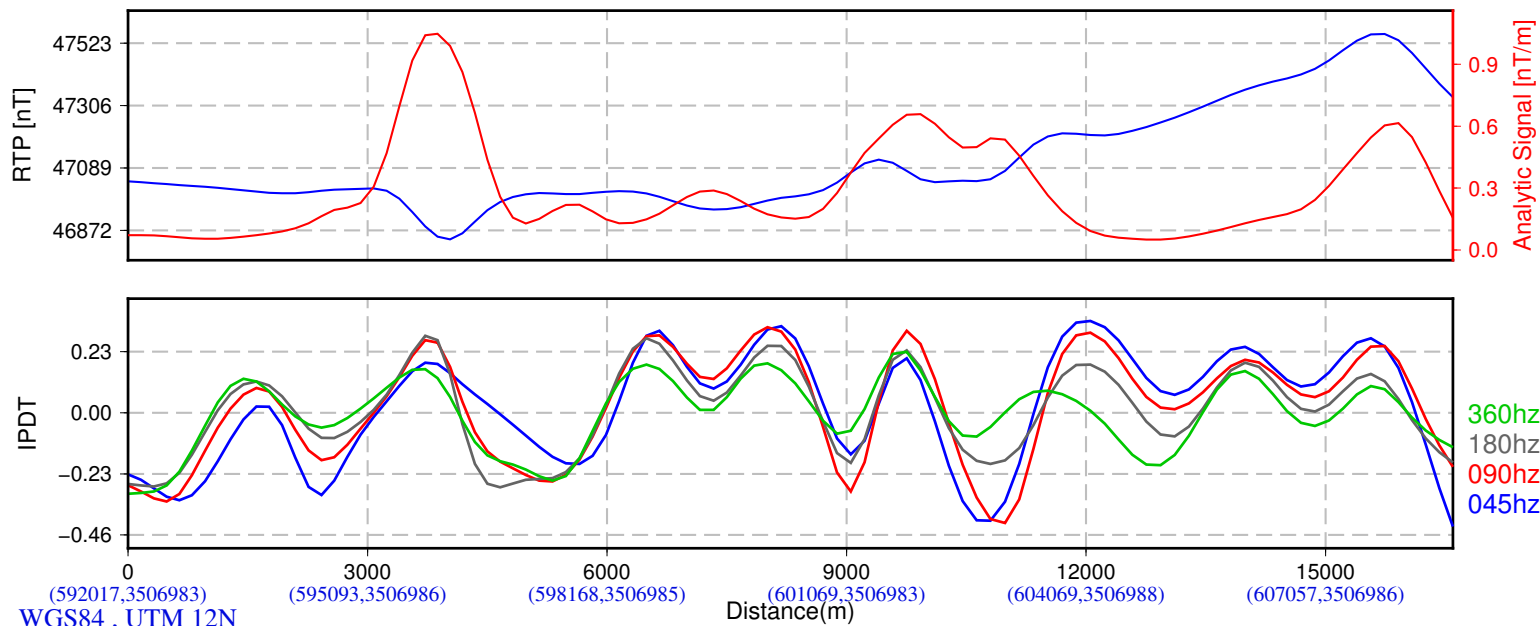
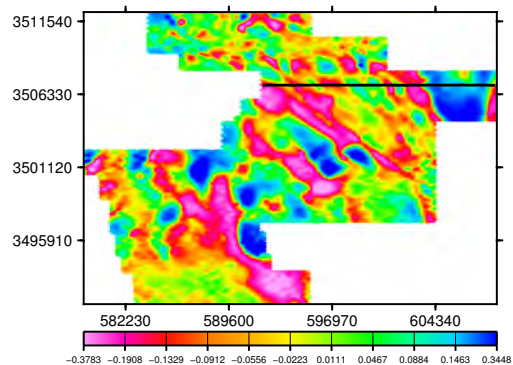
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3D ZTEM Inversion: Resistivity Section for Line 1210

Analytic Signal [nT/m]



IP 090Hz DT



Liberty Star
Tombstone
Arizona

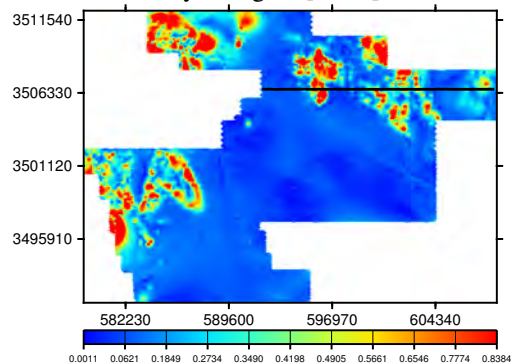
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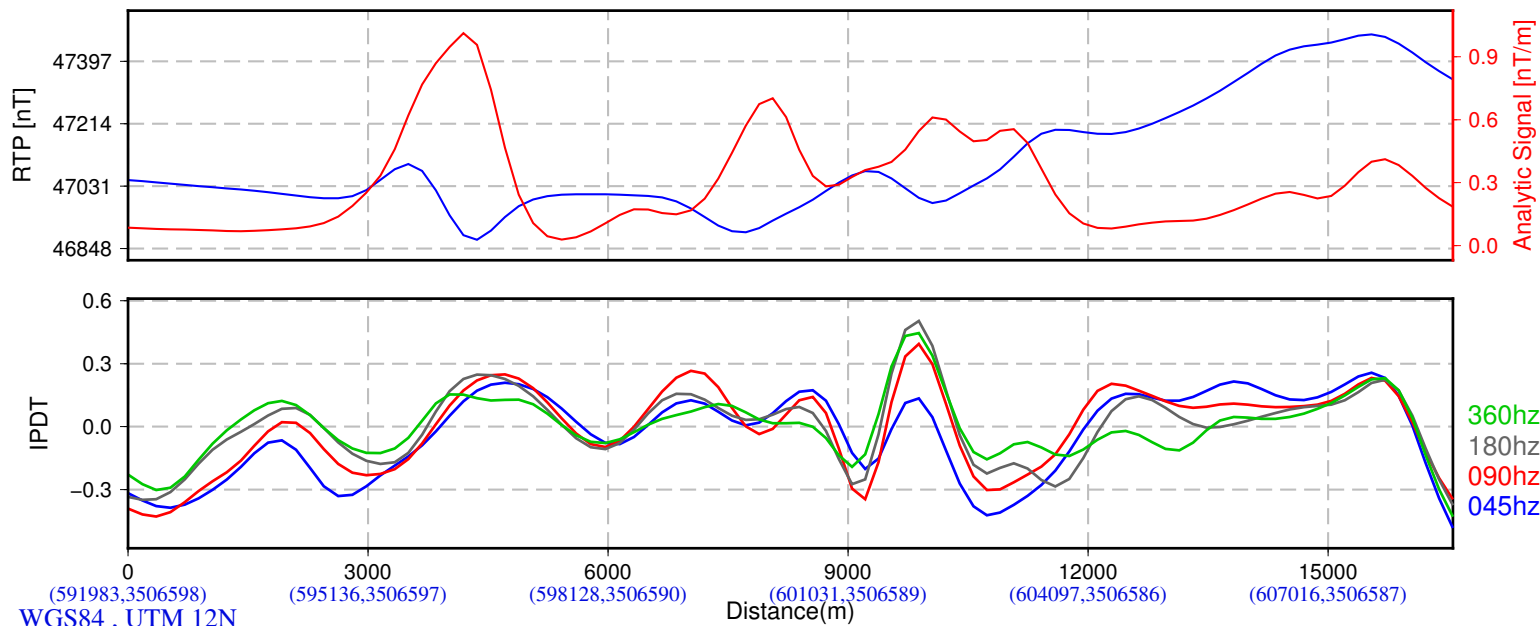
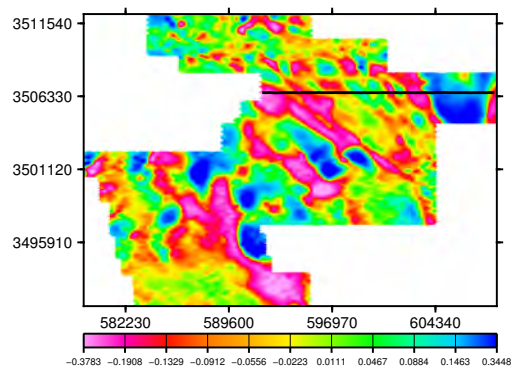
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3D ZTEM Inversion: Resistivity Section for Line 1220

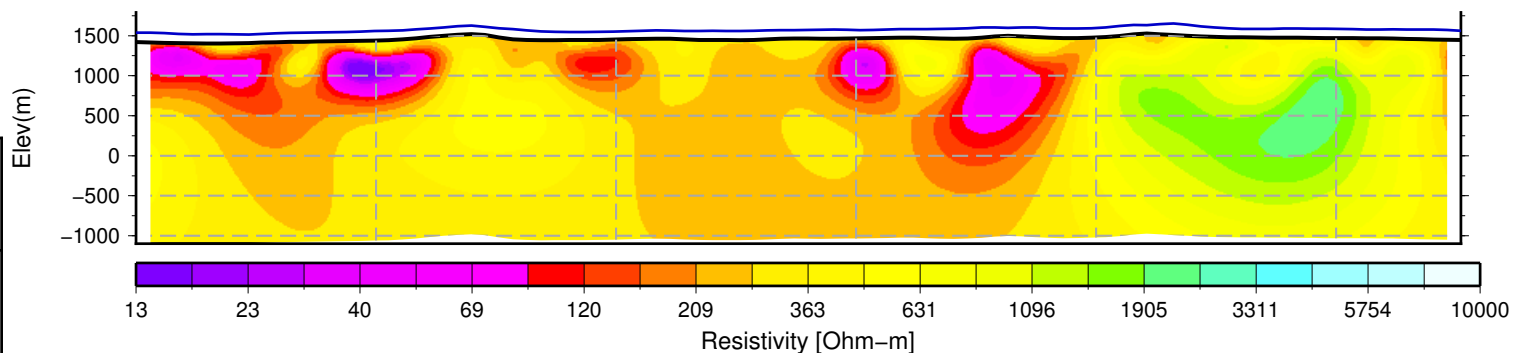
Analytic Signal [nT/m]



IP 090Hz DT



WGS84 , UTM 12N



View looking North

Liberty Star
Tombstone
Arizona

ZTEM System: Heliborne ZTEM

Job Number:GL130168

3D-ZTEM Inversion: Resistivity Sections

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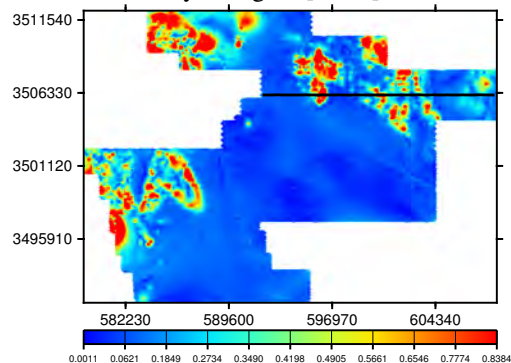
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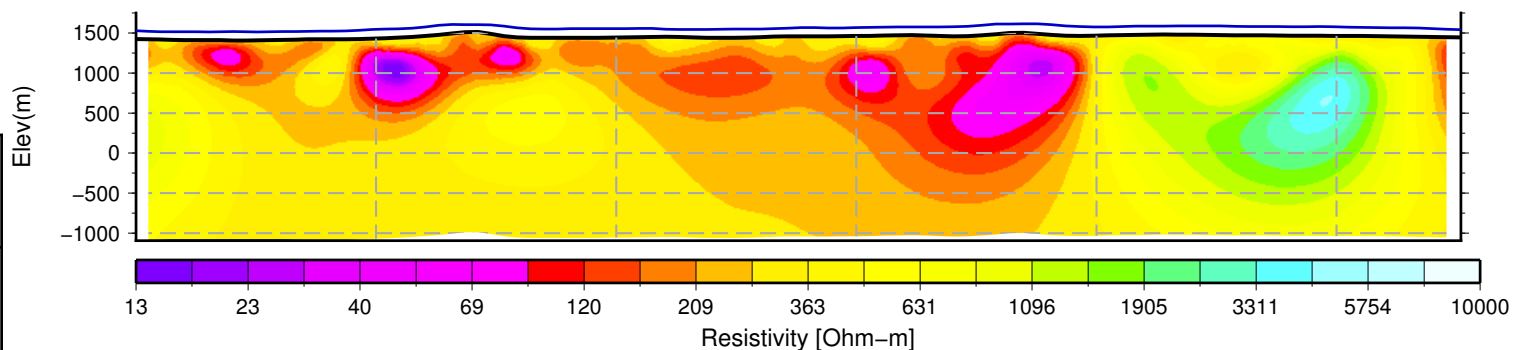
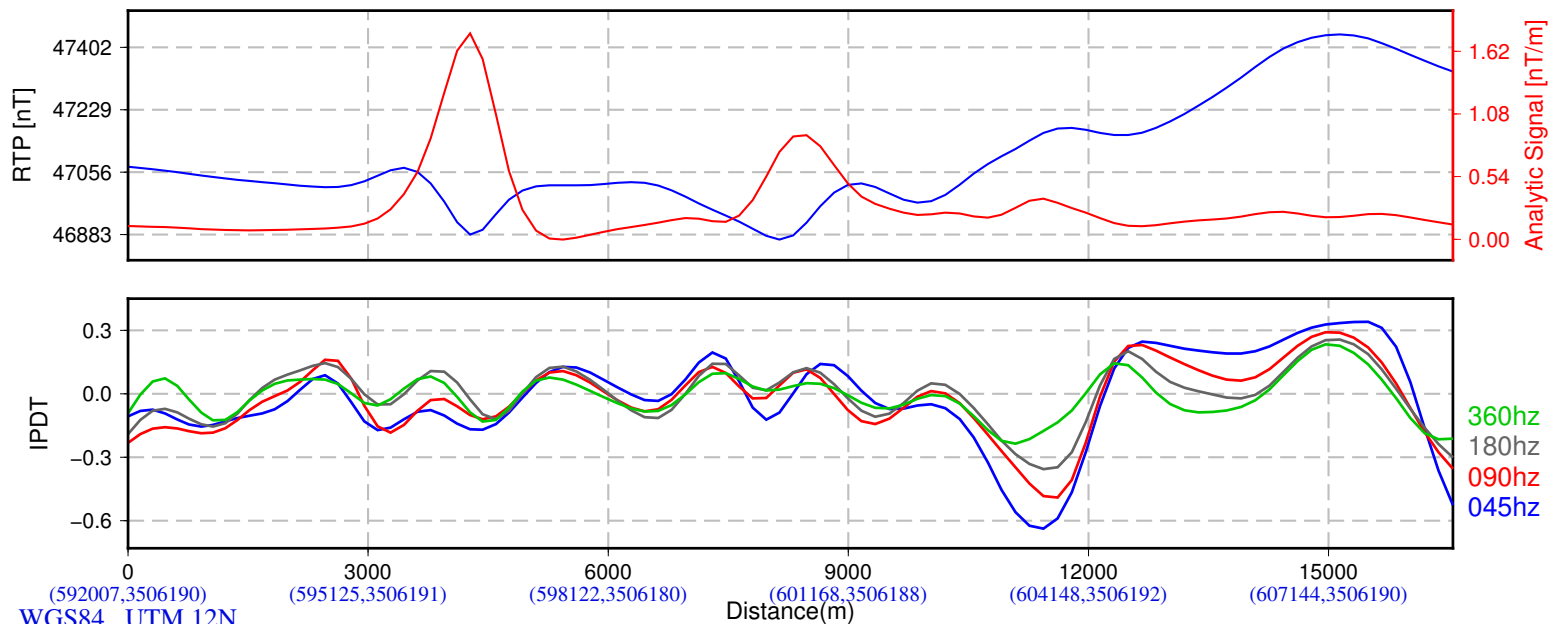
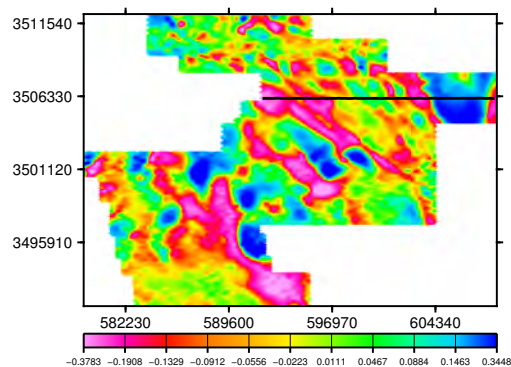
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3D ZTEM Inversion: Resistivity Section for Line 1230

Analytic Signal [nT/m]



IP 090Hz DT



Liberty Star
Tombstone
Arizona

ZTEM System: Heliborne ZTEM

Job Number: GL130168

3D-ZTEM Inversion: Resistivity Sections

Flown by Geotech Ltd

Processed by Geotech Ltd

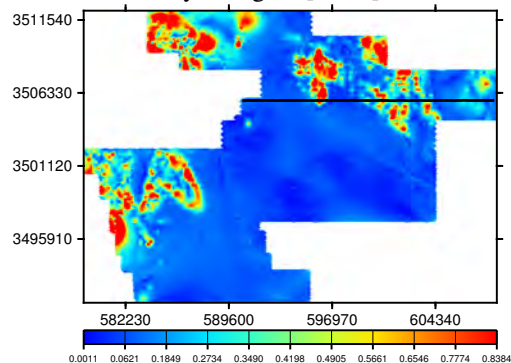
270 Industrial Parkway South
Aurora, Ontario, Canada L4G 3T9

www.geotech.ca

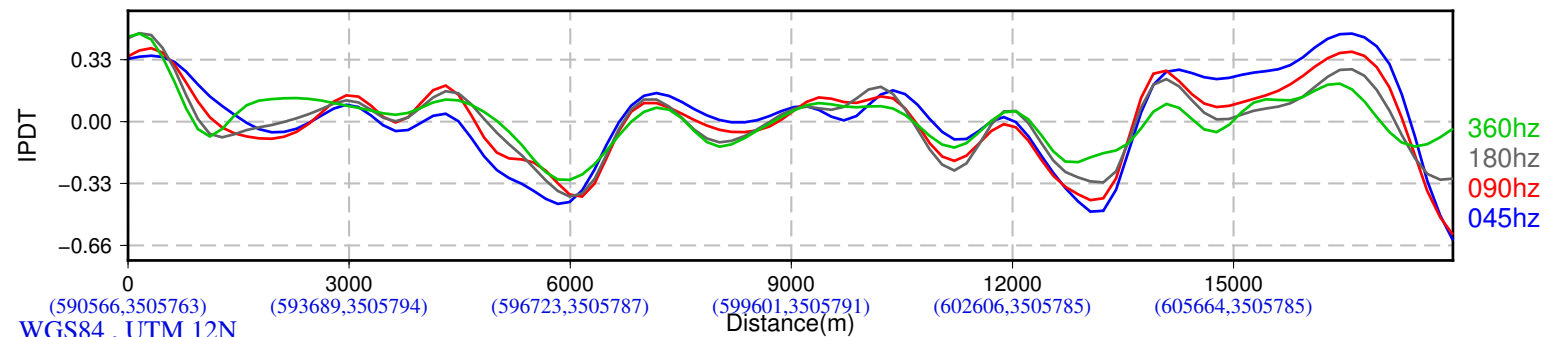
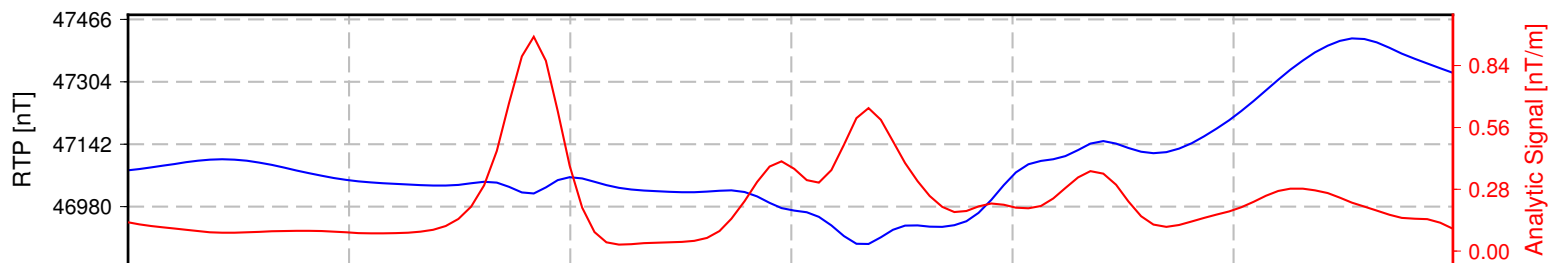
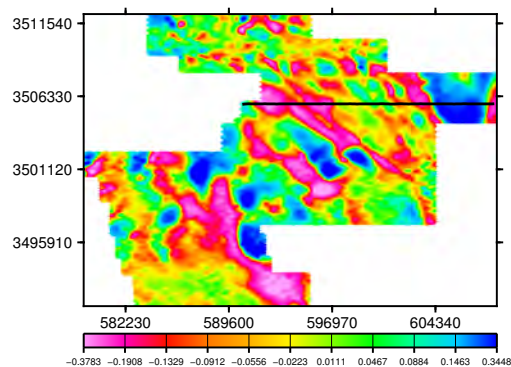
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1240

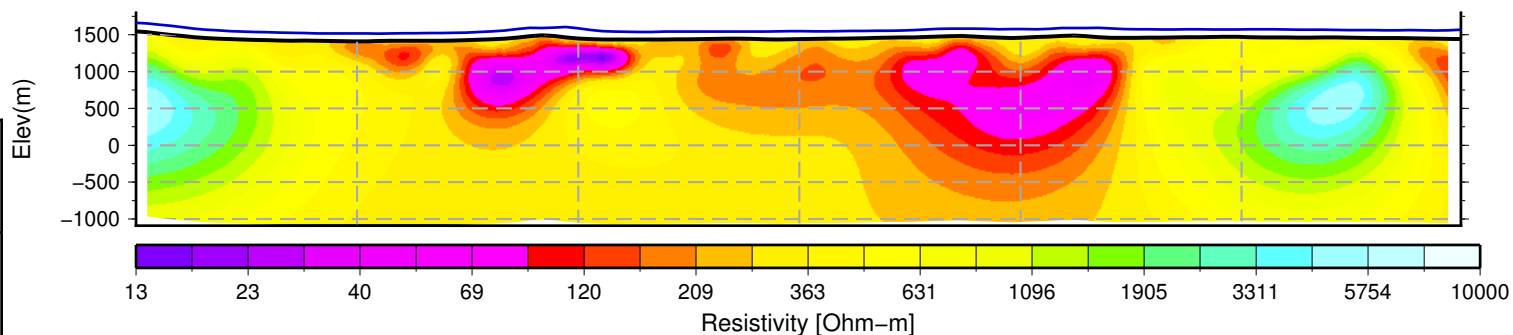
Analytic Signal [nT/m]



IP 090Hz DT



(590566,3505763) (593689,3505794) (596723,3505787) (599601,3505791) (602606,3505785) (605664,3505785)
WGS84 , UTM 12N



View looking North

Liberty Star
Tombstone
Arizona

ZTEM System: Heliborne ZTEM

Job Number:GL130168

3D-ZTEM Inversion: Resistivity Sections

Flown by Geotech Ltd

Processed by Geotech Ltd

270 Industrial Parkway South

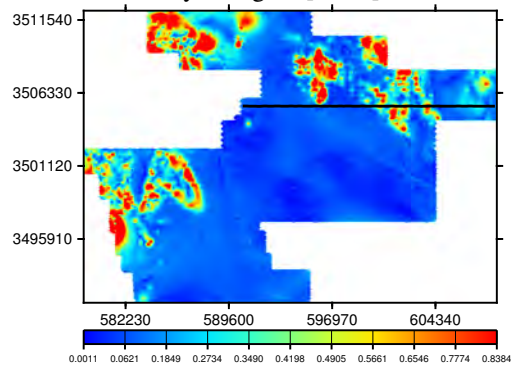
Aurora, Ontario, Canada L4G 3T9

www.geotech.ca

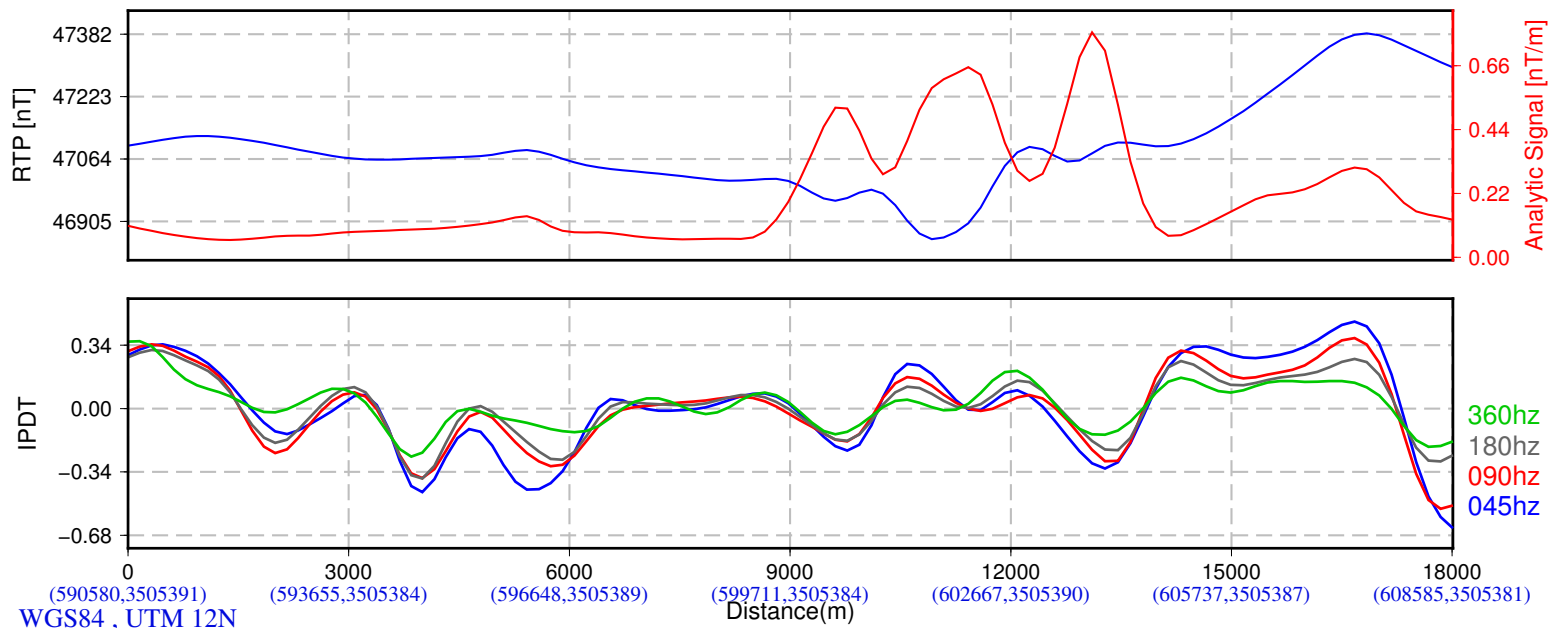
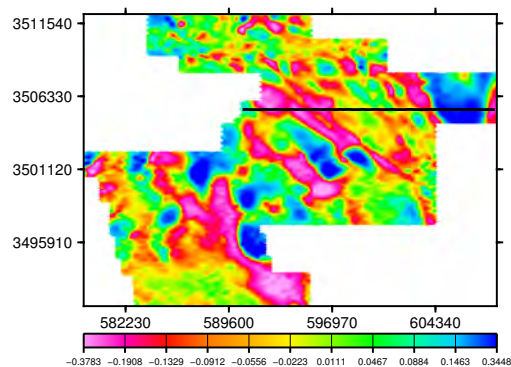
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1250

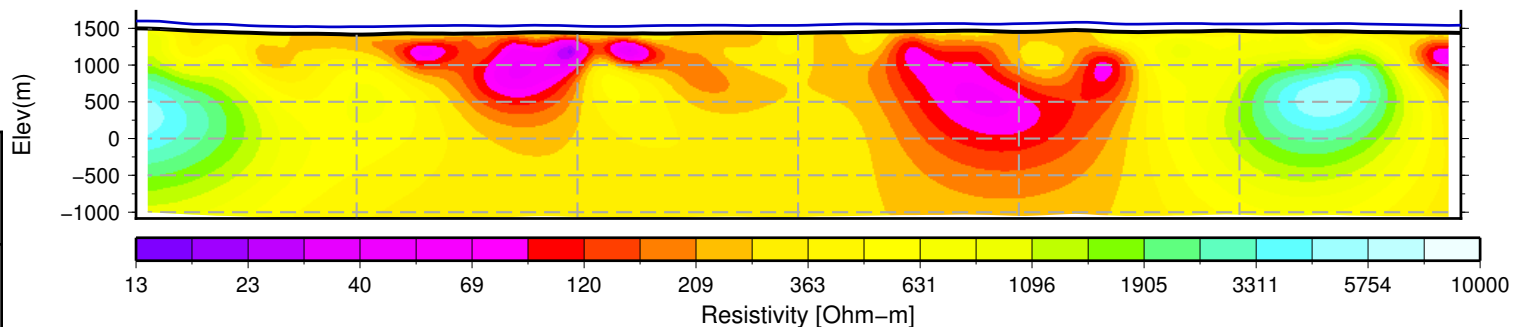
Analytic Signal [nT/m]



IP 090Hz DT



WGS84 , UTM 12N



View looking North

Liberty Star
Tombstone
Arizona

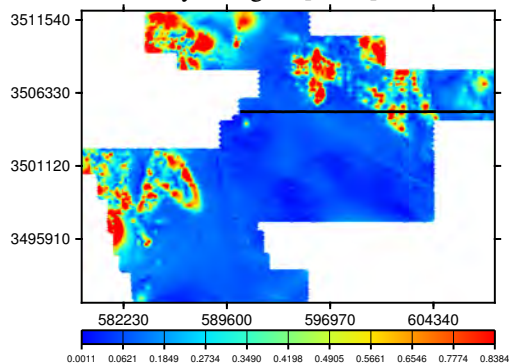
ZTEM System: Heliborne ZTEM
Job Number: GL130168

3D-ZTEM Inversion: Resistivity Sections
Flown by Geotech Ltd
Processed by Geotech Ltd
270 Industrial Parkway South
Aurora, Ontario, Canada L4G 3T9
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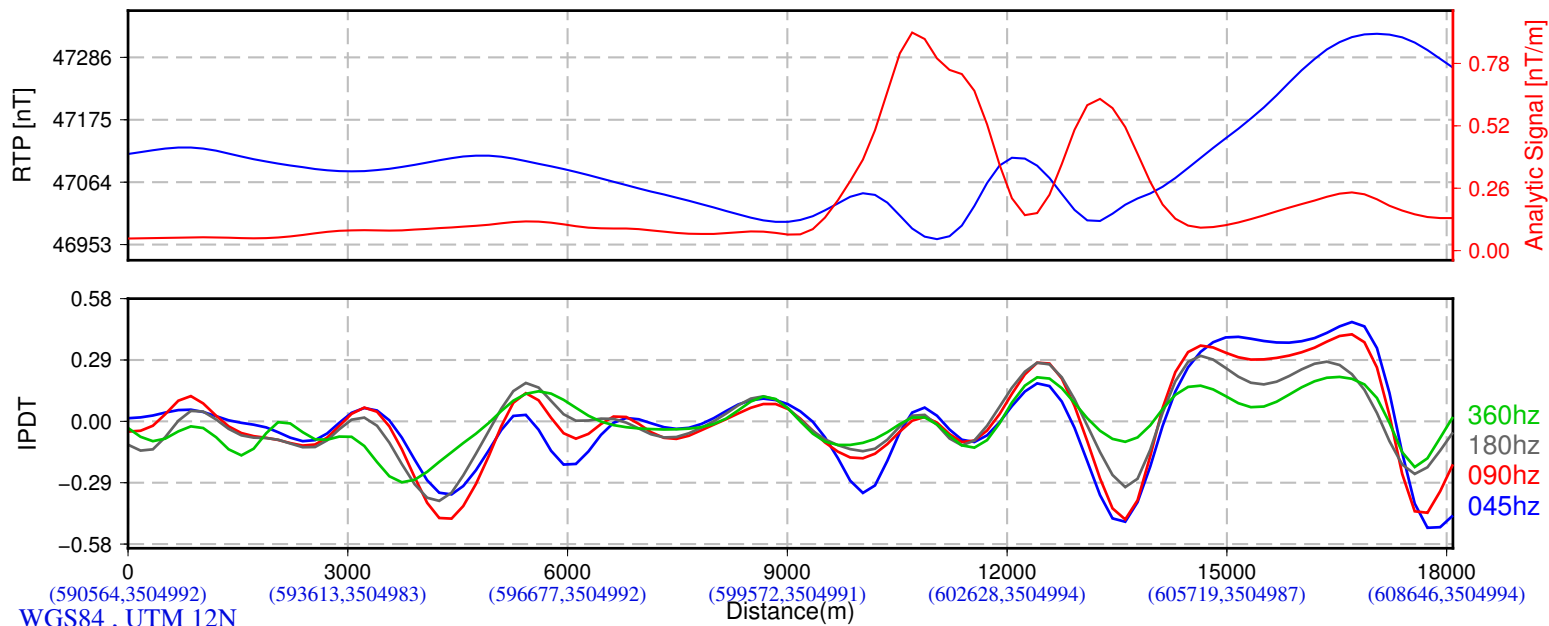
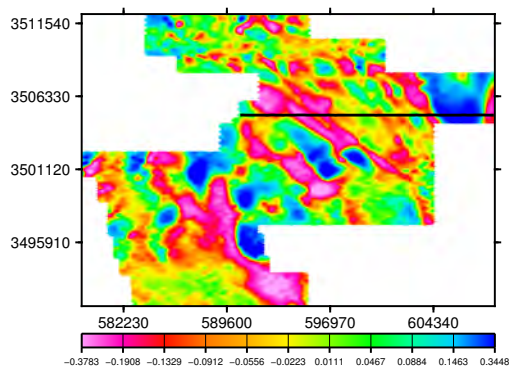
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1260

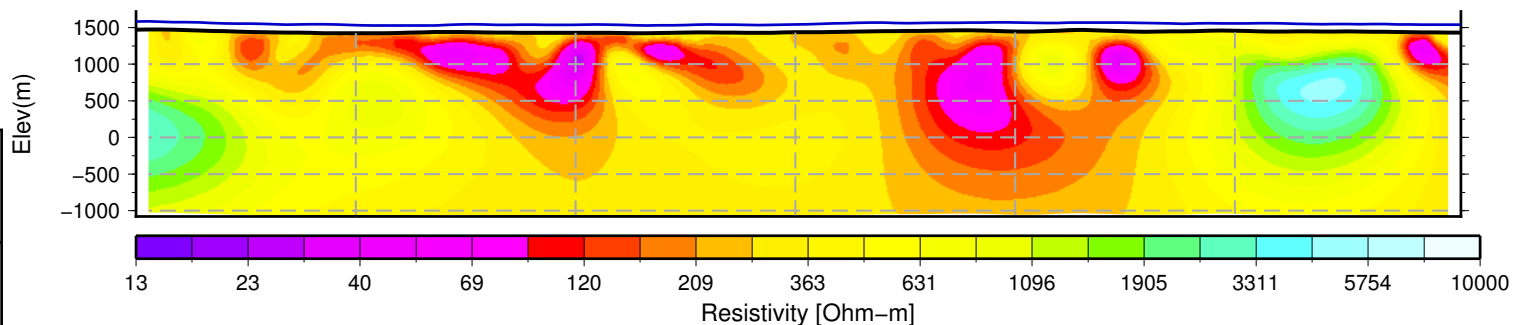
Analytic Signal [nT/m]



IP 090Hz DT



Liberty Star
Tombstone
Arizona



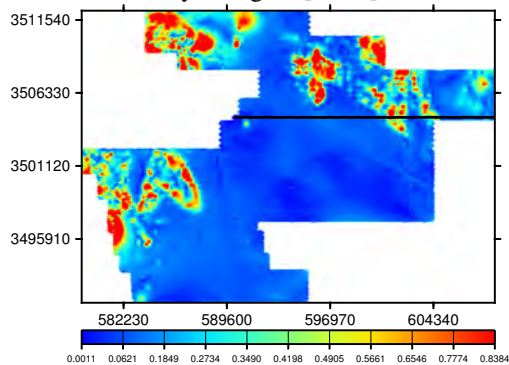
ZTEM System: Heliborne ZTEM
Job Number: GL130168

3D-ZTEM Inversion: Resistivity Sections
Flown by Geotech Ltd
Processed by Geotech Ltd
270 Industrial Parkway South
Aurora, Ontario, Canada L4G 3T9
www.geotech.ca

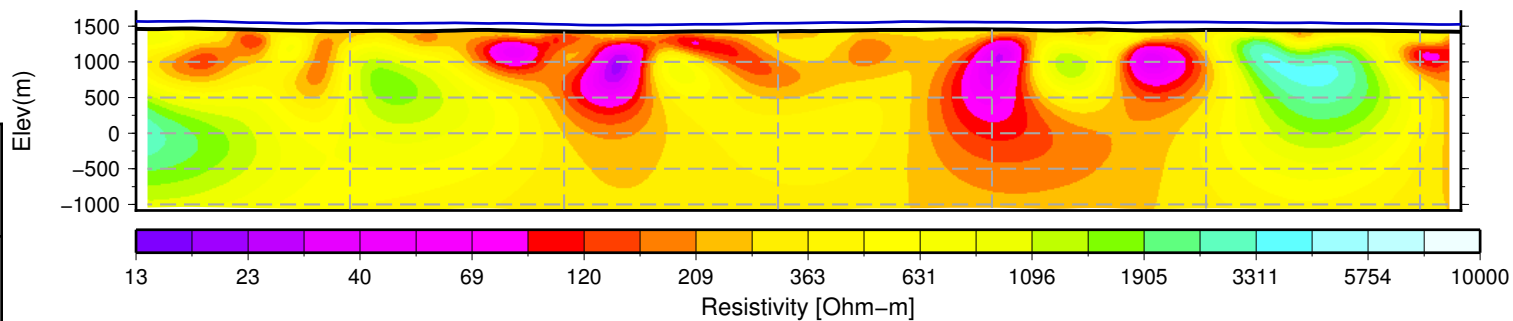
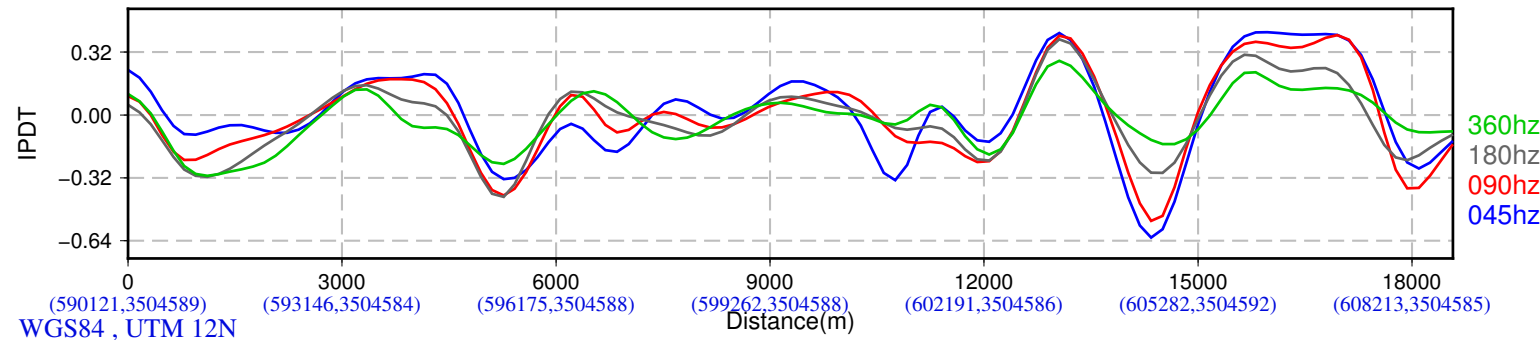
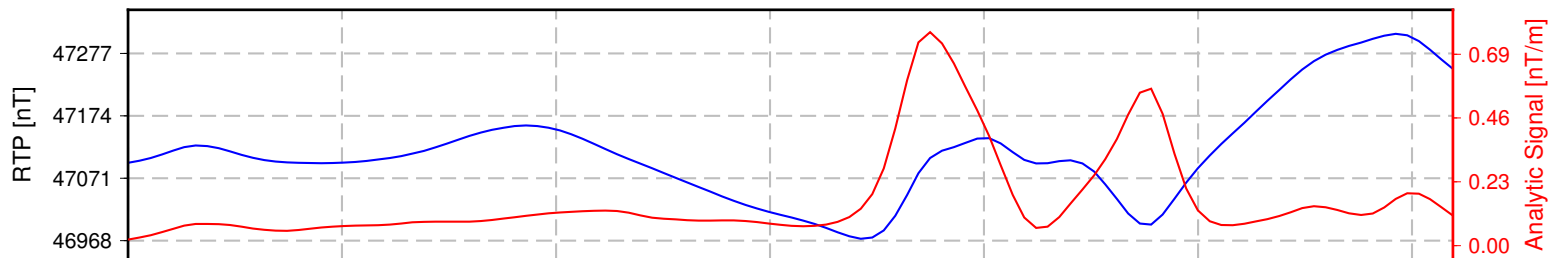
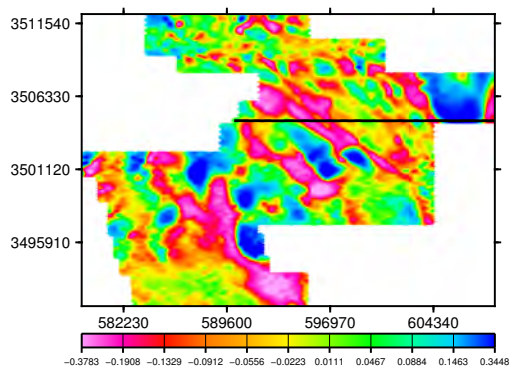
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1270

Analytic Signal [nT/m]



IP 090Hz DT



Liberty Star
Tombstone
Arizona

ZTEM System: Heliborne ZTEM
Job Number: GL130168

3D-ZTEM Inversion: Resistivity Sections

Flown by Geotech Ltd

Processed by Geotech Ltd

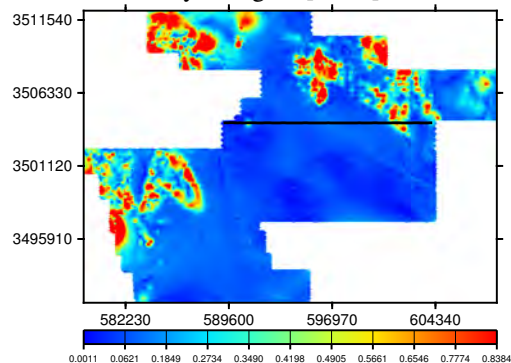
270 Industrial Parkway South
Aurora, Ontario, Canada L4G 3T9

www.geotech.ca

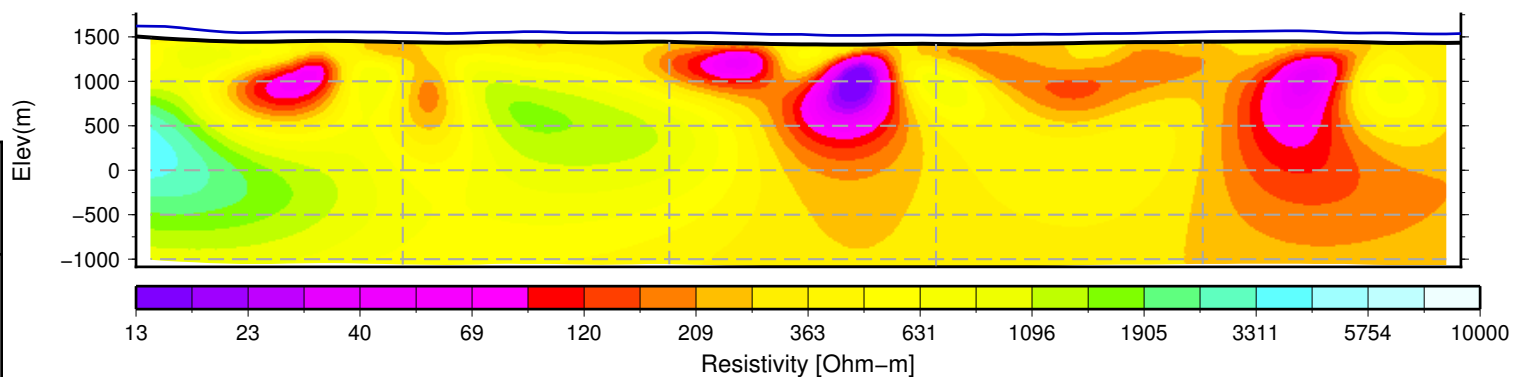
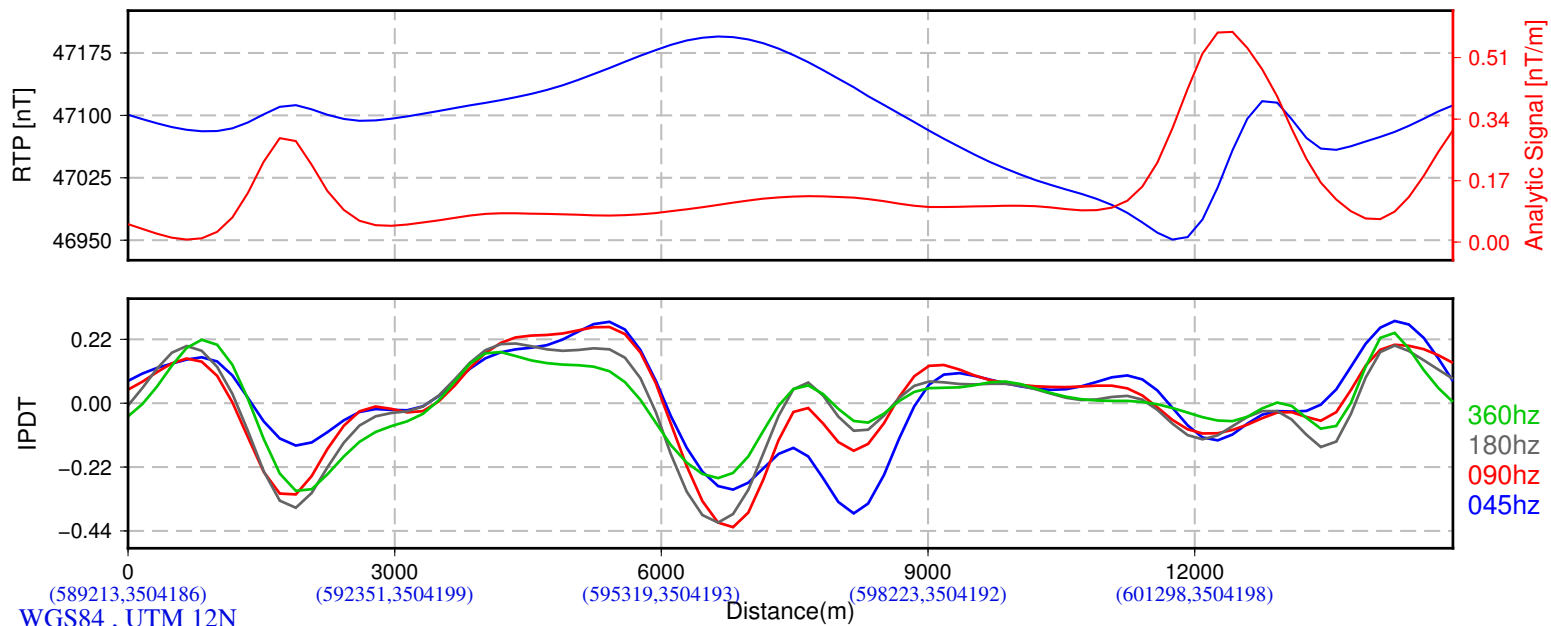
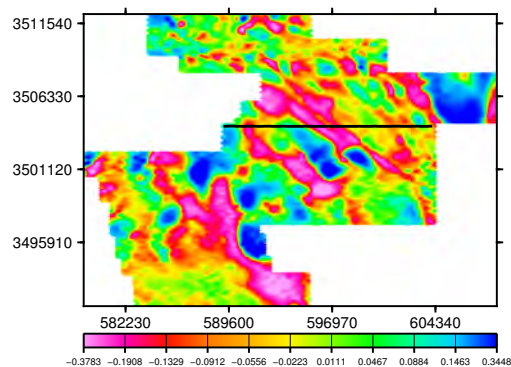
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1280

Analytic Signal [nT/m]



IP 090Hz DT



View looking North

Liberty Star
Tombstone
Arizona

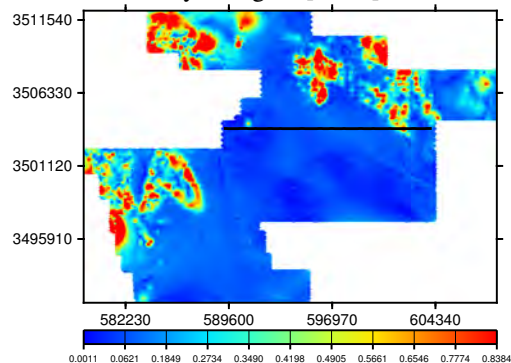
ZTEM System: Heliborne ZTEM
Job Number: GL130168

3D-ZTEM Inversion: Resistivity Sections
Flown by Geotech Ltd
Processed by Geotech Ltd
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Aurora, Ontario, Canada L4G 3T9
www.geotech.ca

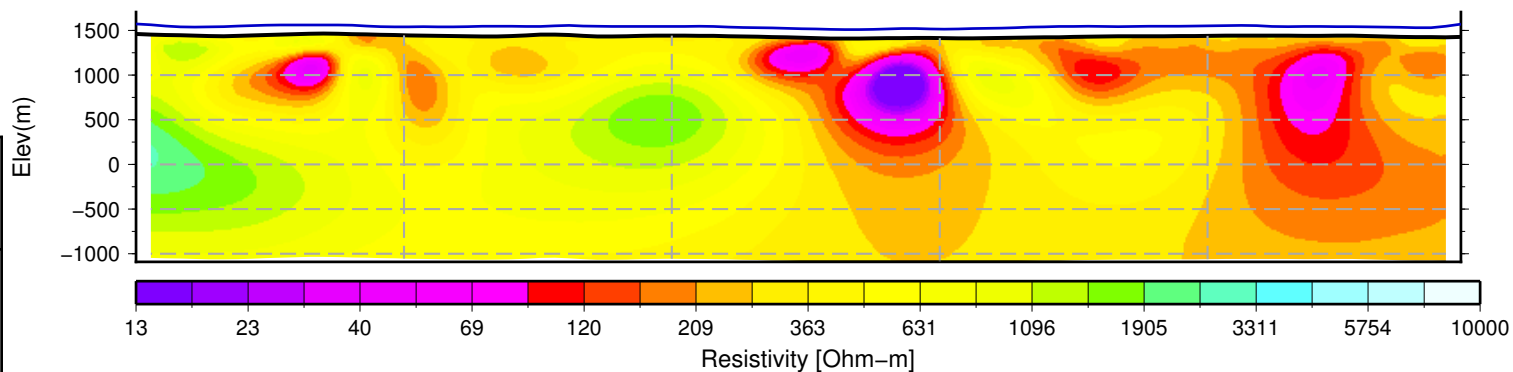
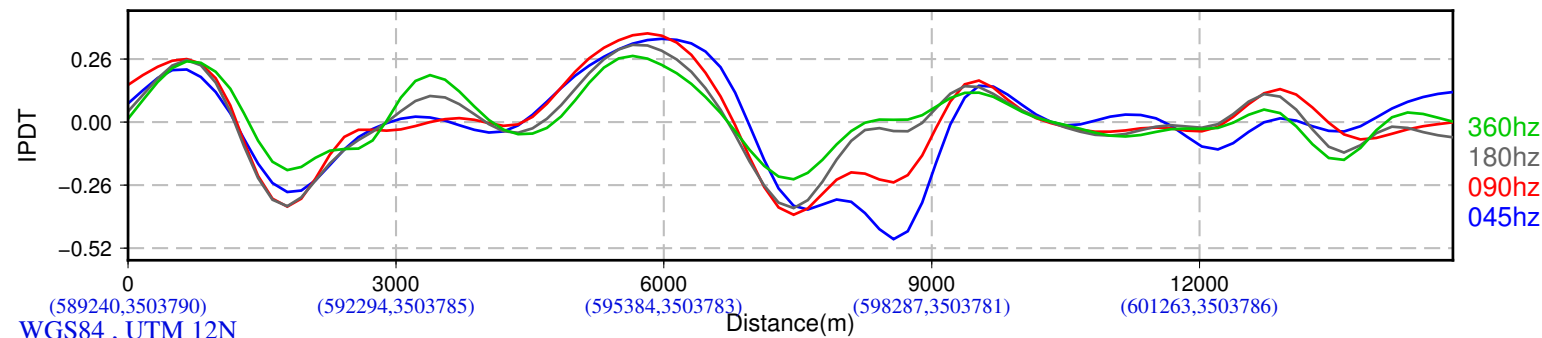
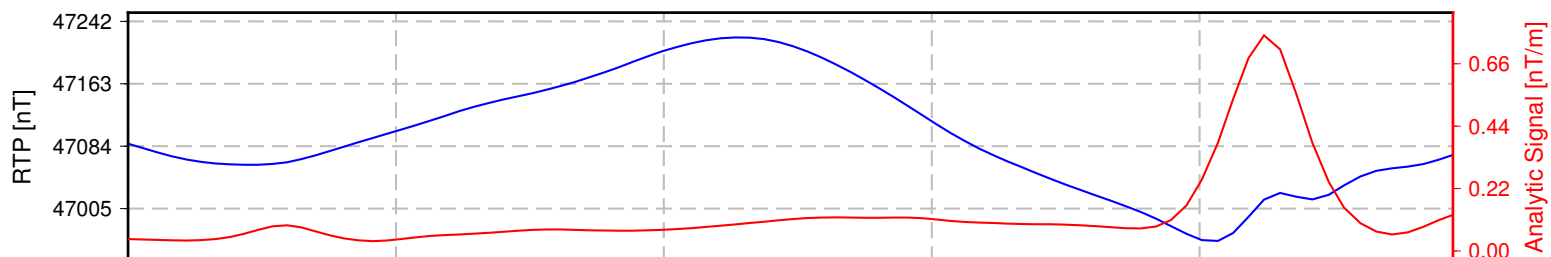
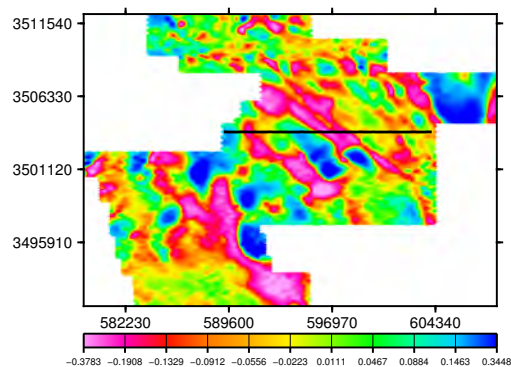
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1290

Analytic Signal [nT/m]



IP 090Hz DT



View looking North

Liberty Star
Tombstone
Arizona

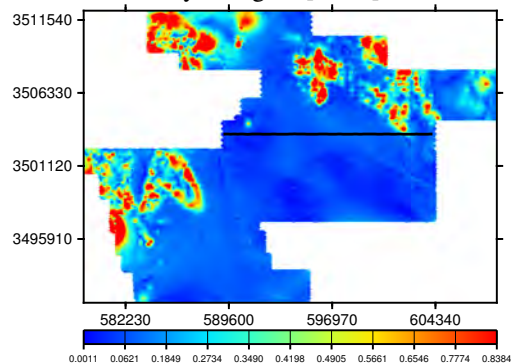
ZTEM System: Heliborne ZTEM
Job Number: GL130168

3D-ZTEM Inversion: Resistivity Sections
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Processed by Geotech Ltd
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Aurora, Ontario, Canada L4G 3T9
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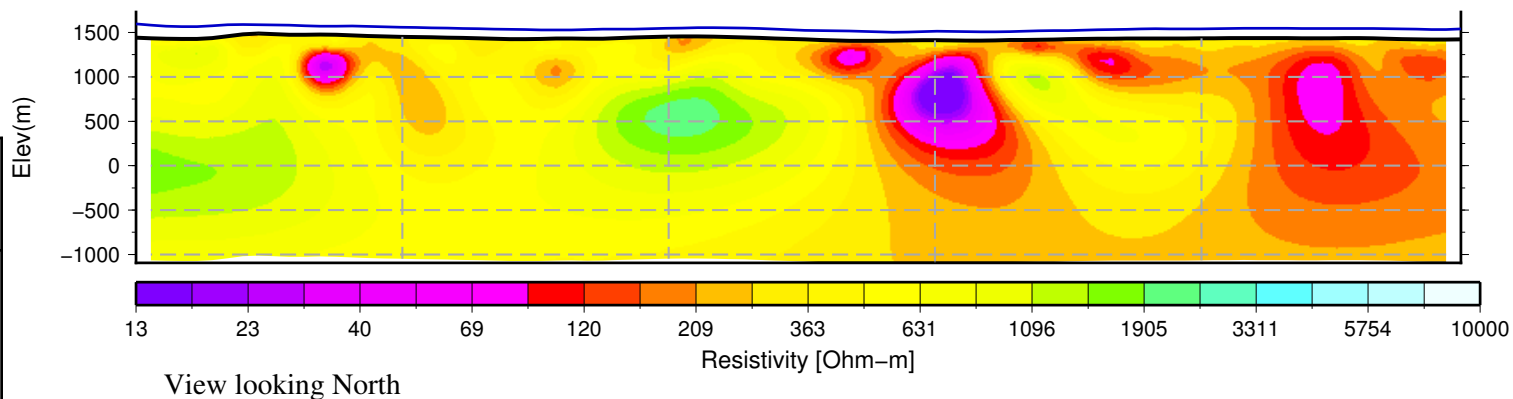
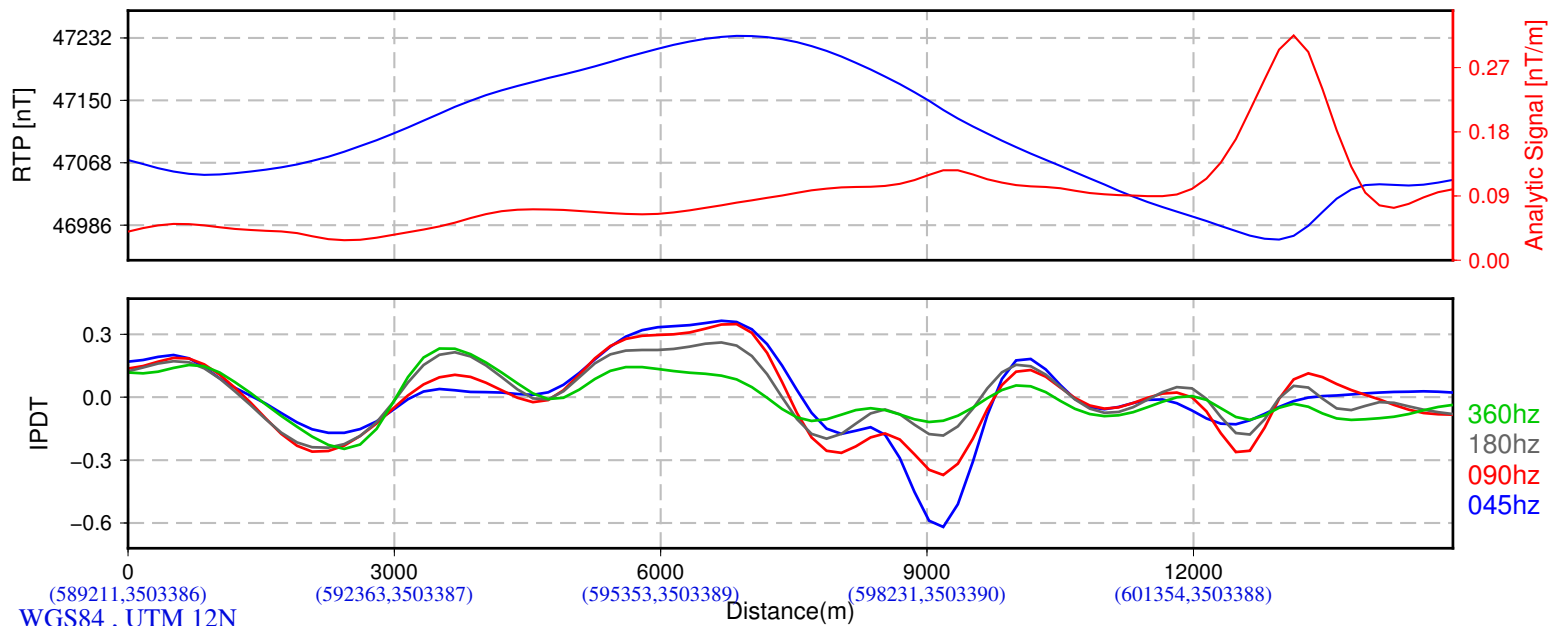
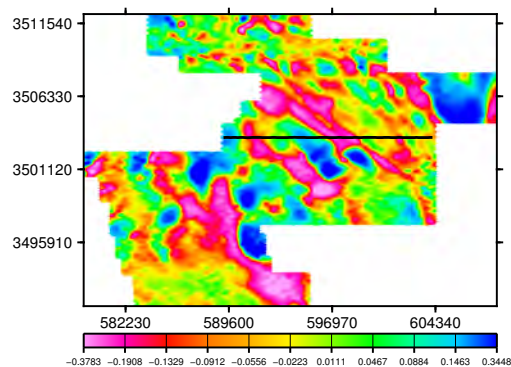
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1300

Analytic Signal [nT/m]



IP 090Hz DT



View looking North

Liberty Star
Tombstone
Arizona

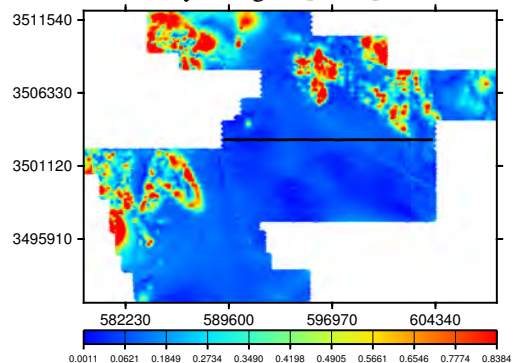
ZTEM System: Heliborne ZTEM
Job Number: GL130168

3D-ZTEM Inversion: Resistivity Sections
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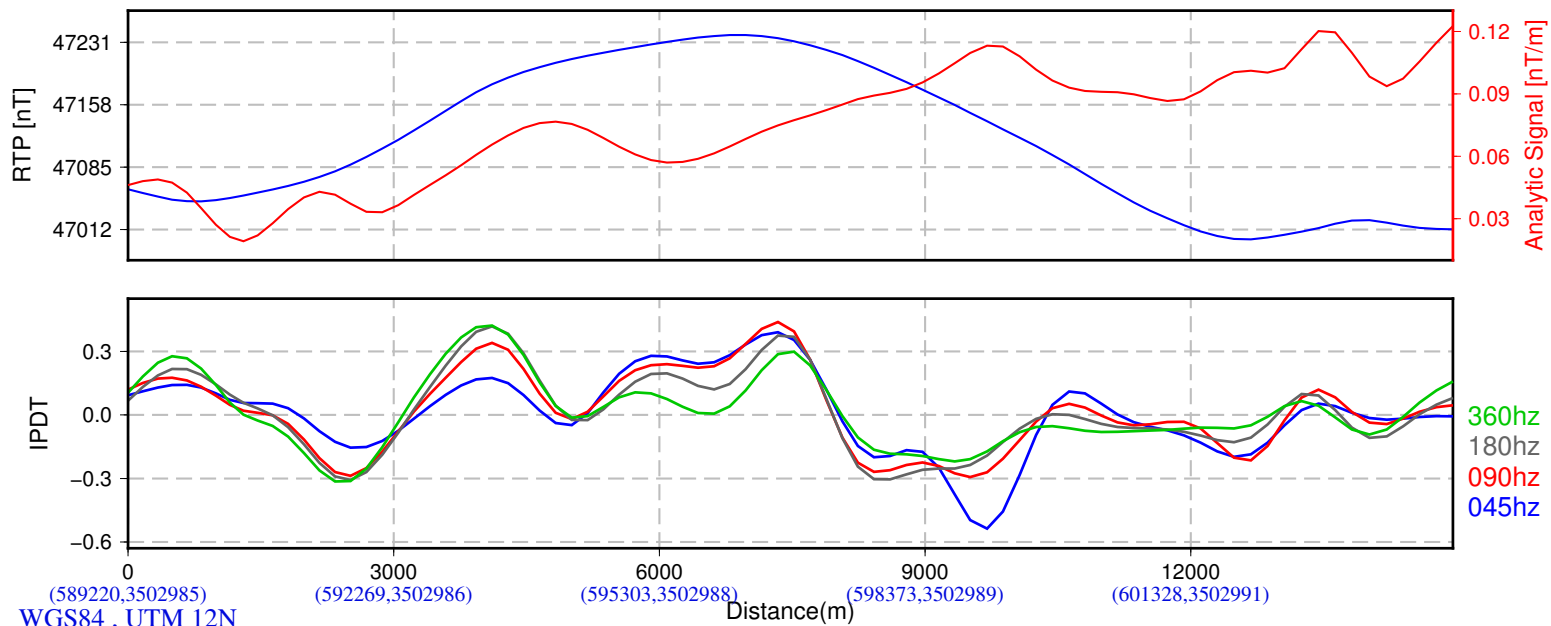
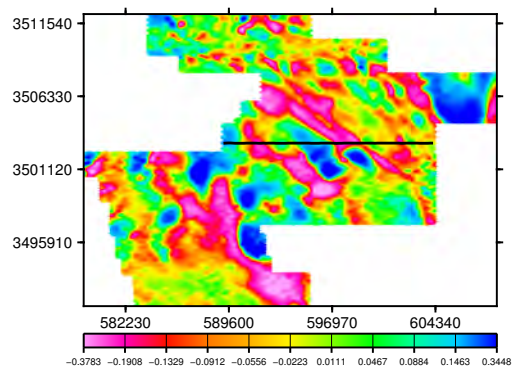
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1310

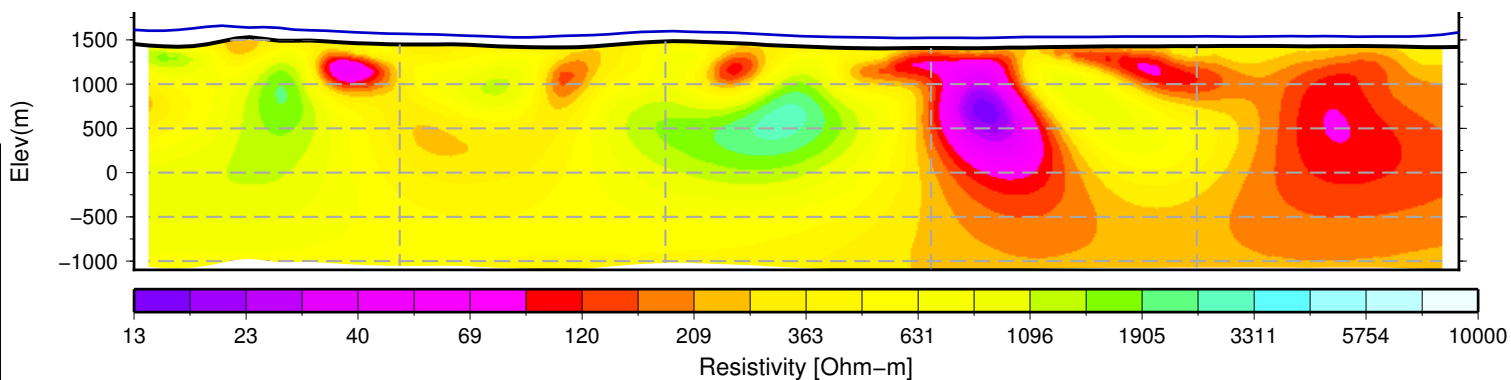
Analytic Signal [nT/m]



IP 090Hz DT



(589220,3502985)
WGS84 , UTM 12N



View looking North

Liberty Star
Tombstone
Arizona

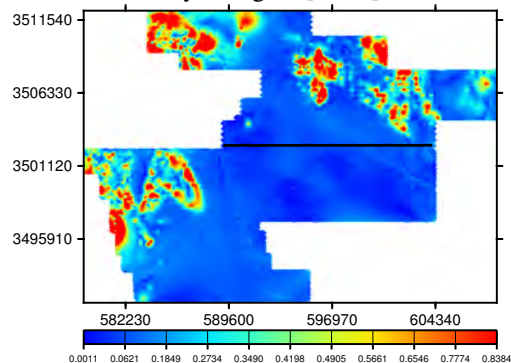
ZTEM System: Heliborne ZTEM
Job Number:GL130168

3D-ZTEM Inversion: Resistivity Sections
Flown by Geotech Ltd
Processed by Geotech Ltd
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Aurora, Ontario, Canada L4G 3T9
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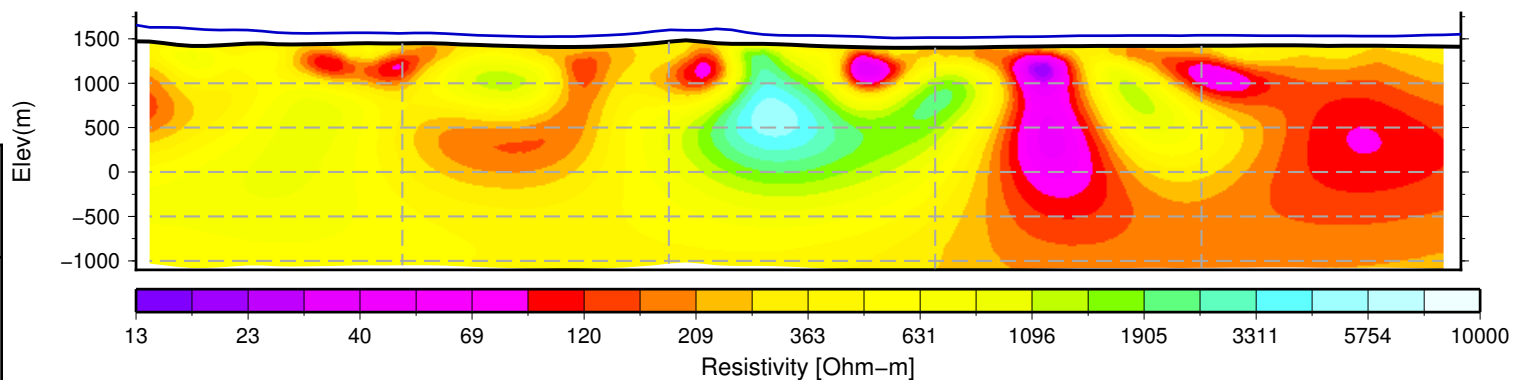
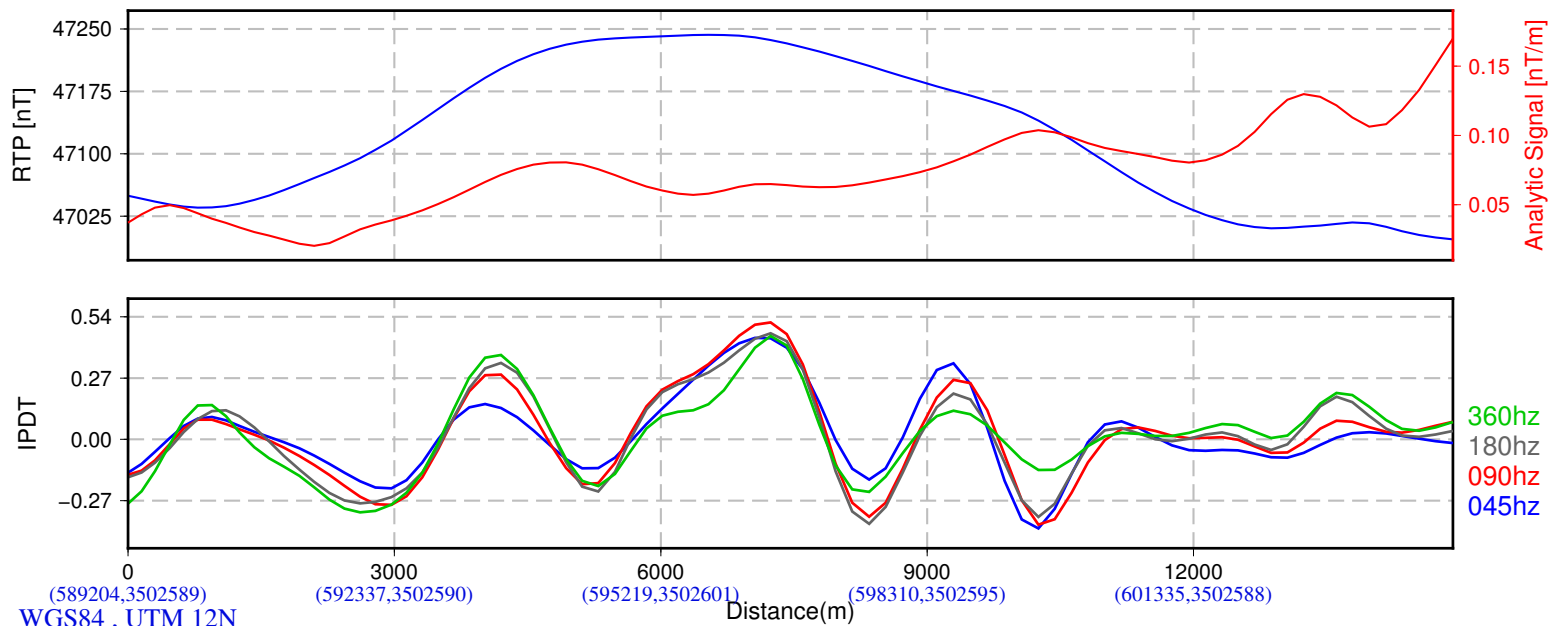
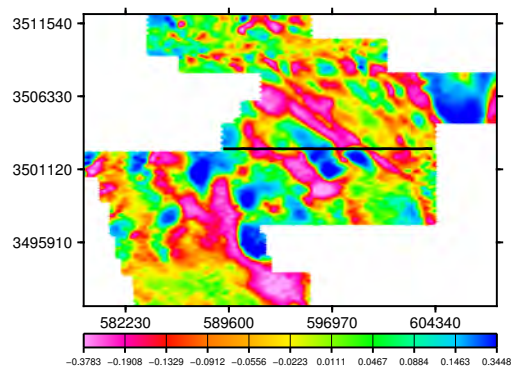
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1320

Analytic Signal [nT/m]



IP 090Hz DT



Liberty Star
Tombstone
Arizona

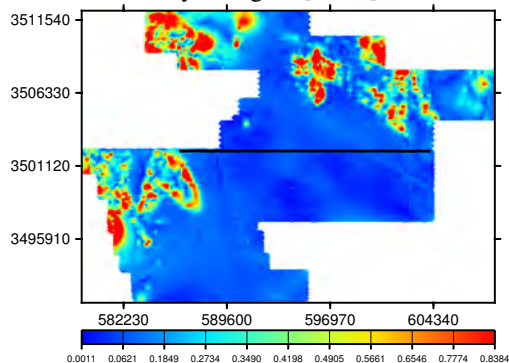
ZTEM System: Heliborne ZTEM
Job Number: GL130168

3D-ZTEM Inversion: Resistivity Sections
Flown by Geotech Ltd
Processed by Geotech Ltd
270 Industrial Parkway South
Aurora, Ontario, Canada L4G 3T9
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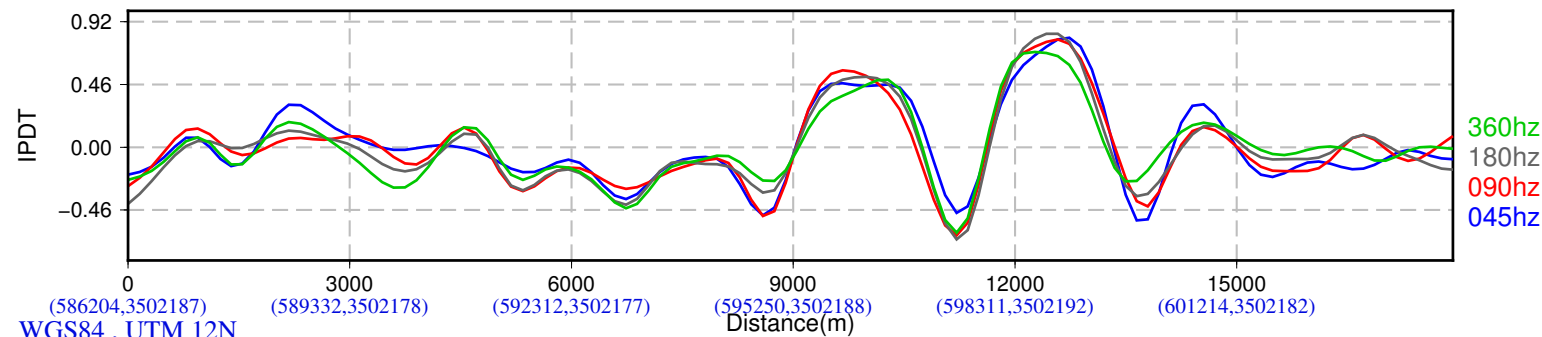
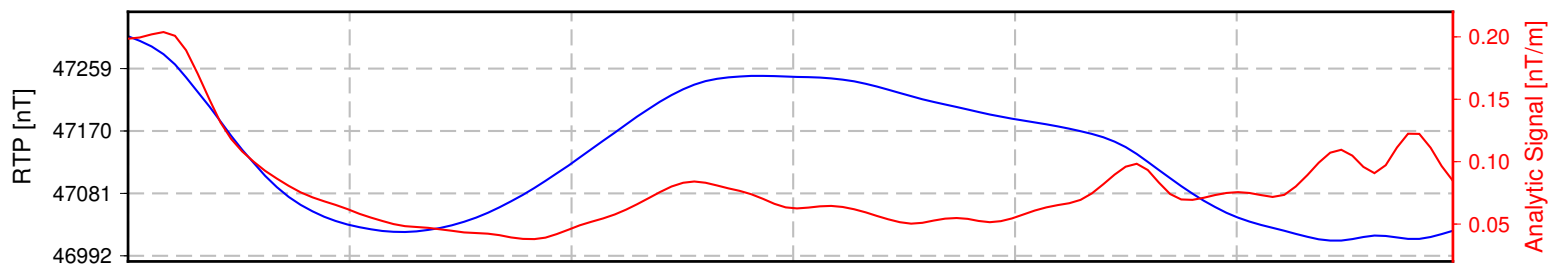
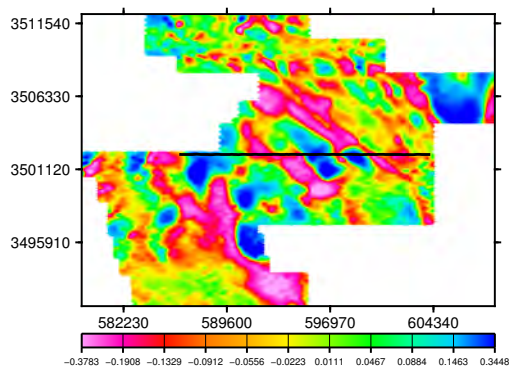
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1330

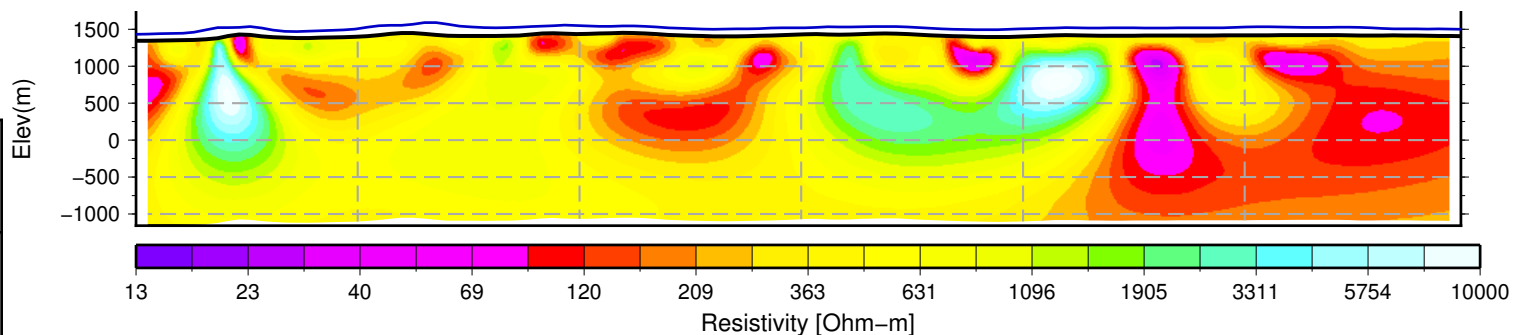
Analytic Signal [nT/m]



IP 090Hz DT



(586204,3502187) (589332,3502178) (592312,3502177) (595250,3502188) (598311,3502192) (601214,3502182)
WGS84 , UTM 12N



View looking North

Liberty Star
Tombstone
Arizona

ZTEM System: Heliborne ZTEM

Job Number:GL130168

3D-ZTEM Inversion: Resistivity Sections

Flown by Geotech Ltd

Processed by Geotech Ltd

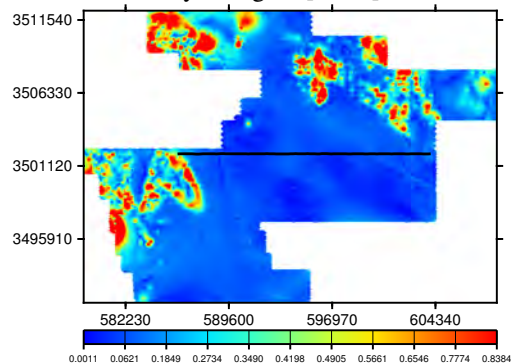
270 Industrial Parkway South
Aurora, Ontario, Canada L4G 3T9

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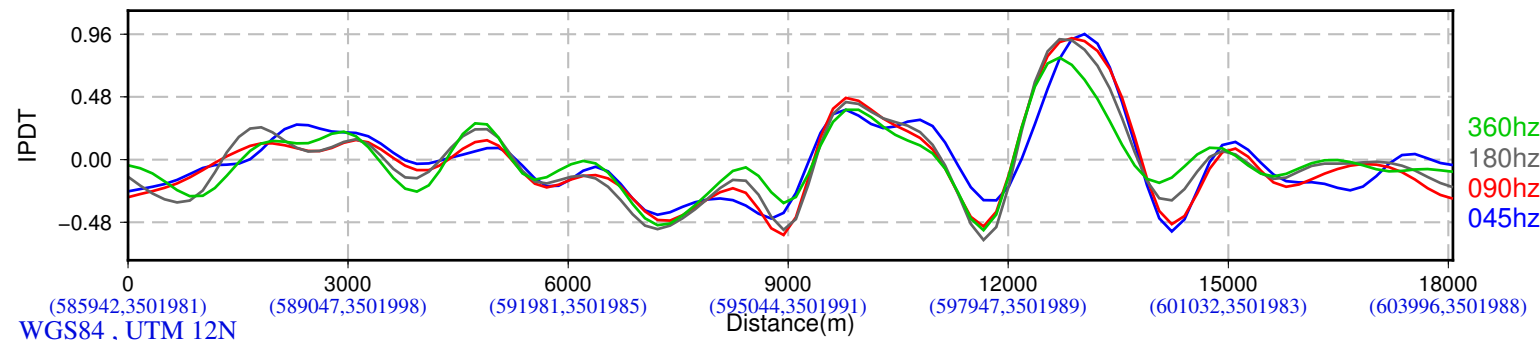
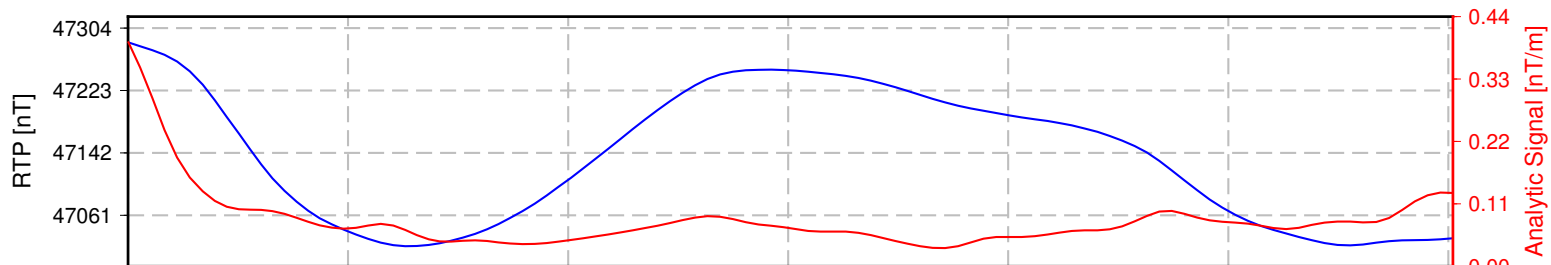
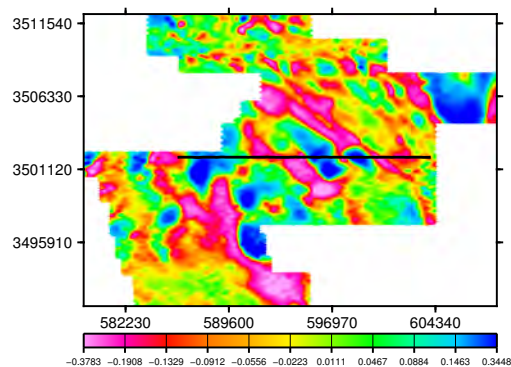
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1335

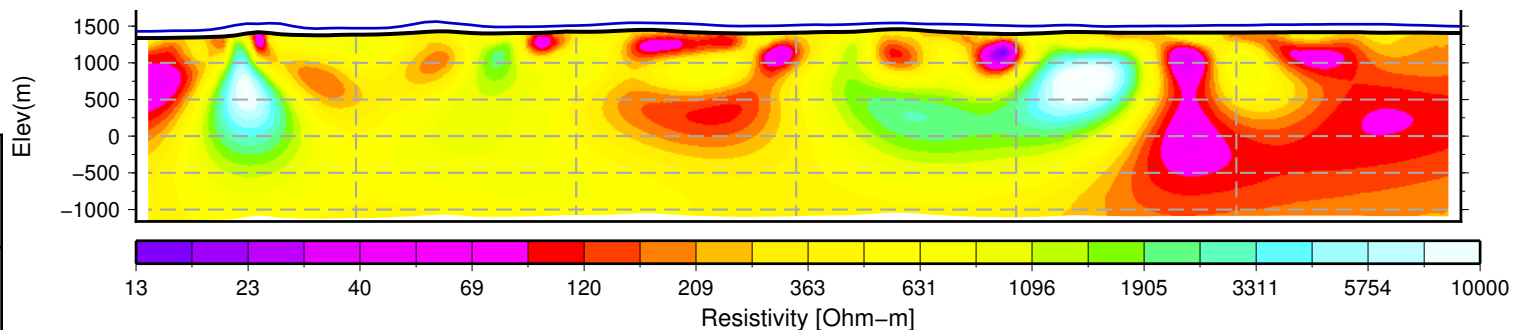
Analytic Signal [nT/m]



IP 090Hz DT



WGS84, UTM 12N



View looking North

Liberty Star
Tombstone
Arizona

ZTEM System: Heliborne ZTEM
Job Number: GL130168

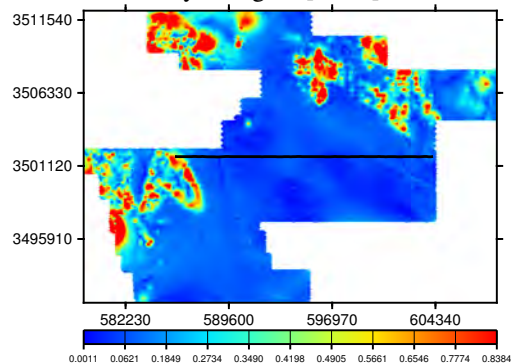
3D-ZTEM Inversion: Resistivity Sections

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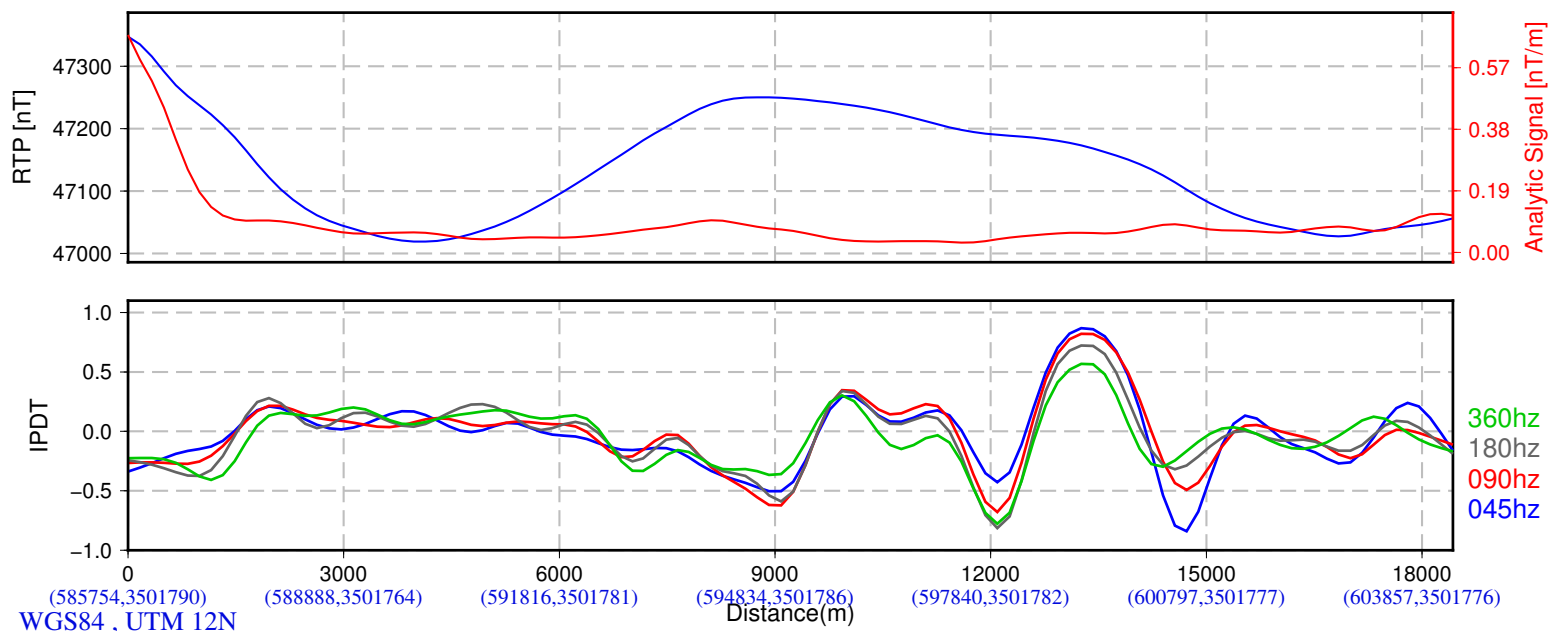
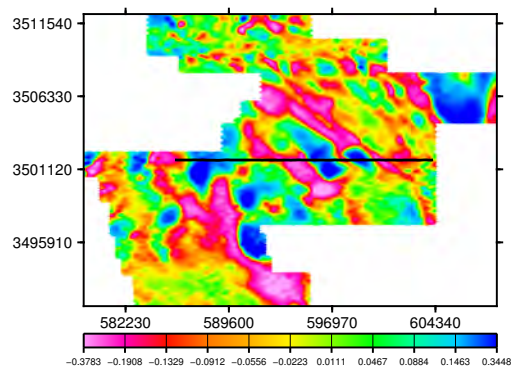
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1340

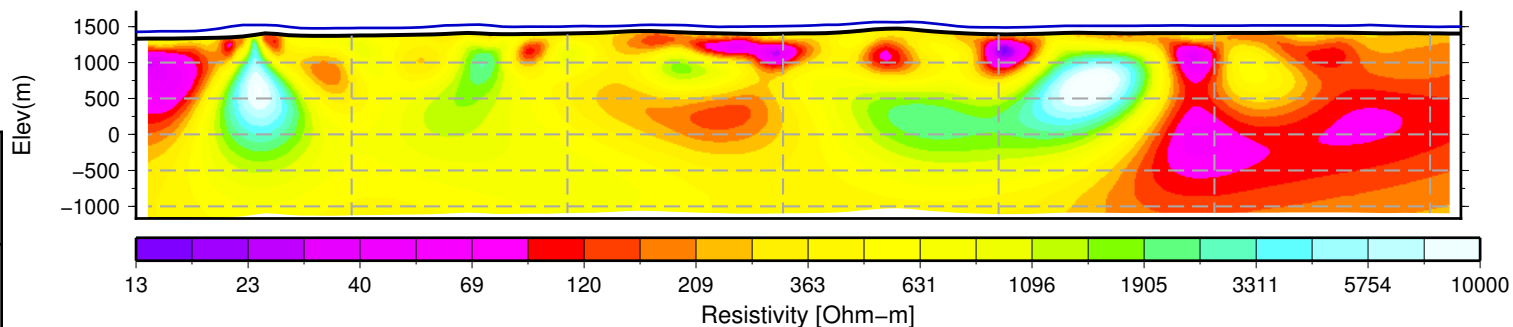
Analytic Signal [nT/m]



IP 090Hz DT



Liberty Star
Tombstone
Arizona



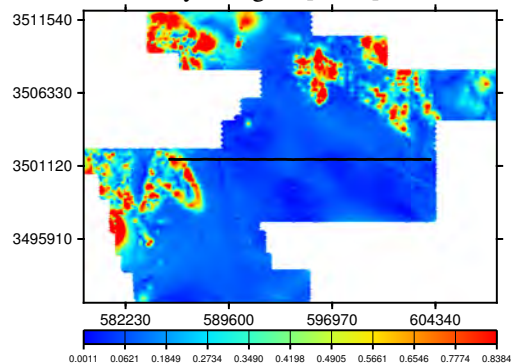
ZTEM System: Heliborne ZTEM
Job Number: GL130168

3D-ZTEM Inversion: Resistivity Sections
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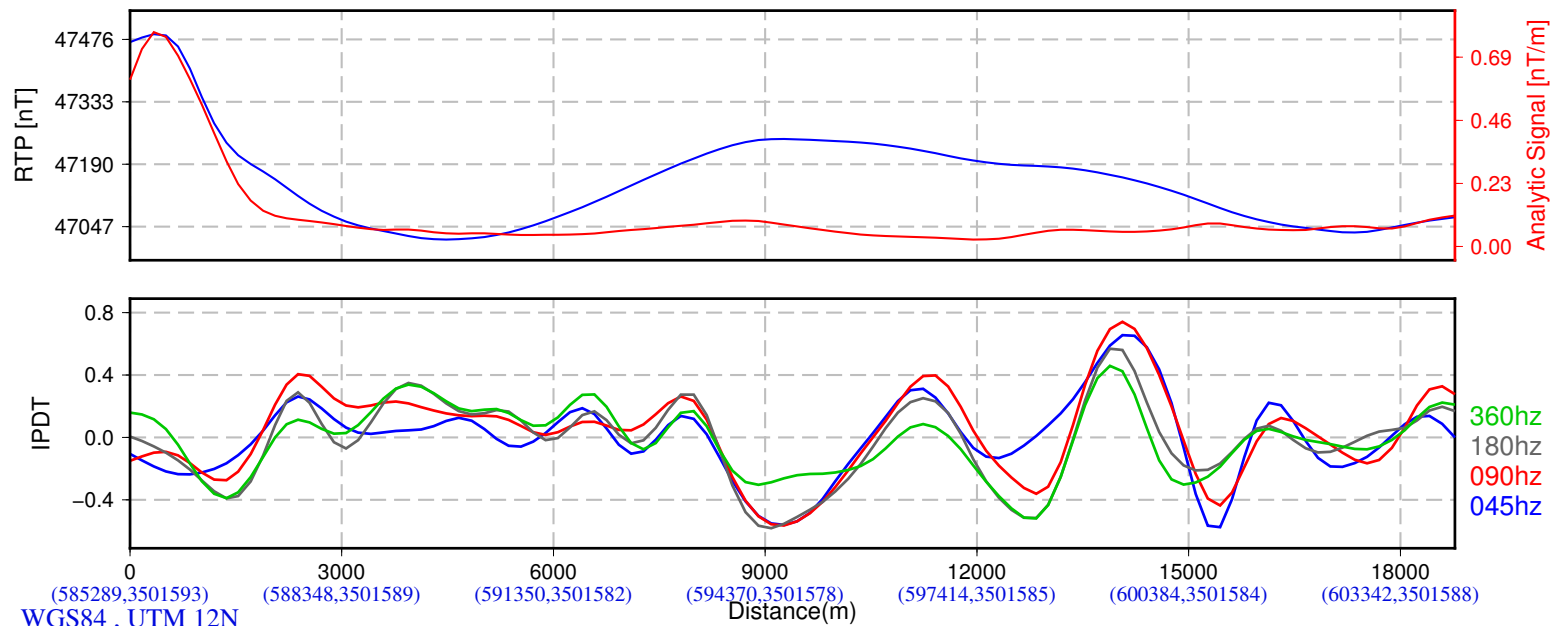
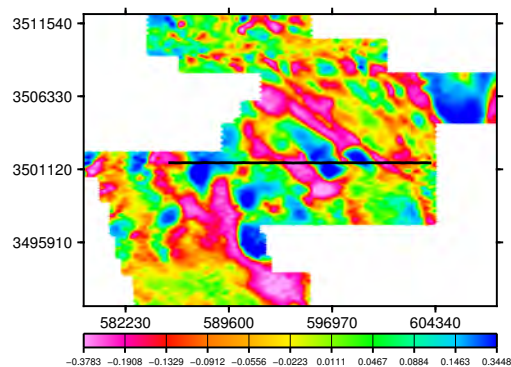
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1345

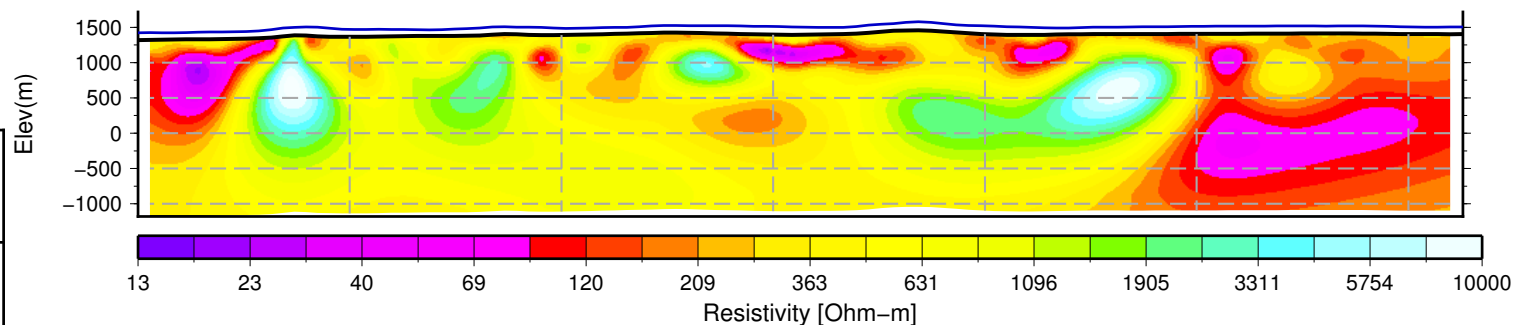
Analytic Signal [nT/m]



IP 090Hz DT



WGS84 , UTM 12N



View looking North

Liberty Star
Tombstone
Arizona

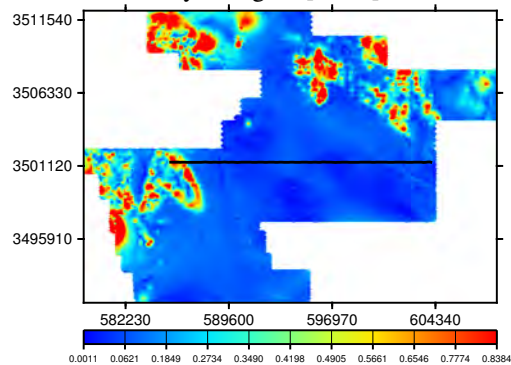
ZTEM System: Heliborne ZTEM
Job Number: GL130168

3D-ZTEM Inversion: Resistivity Sections
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Aurora, Ontario, Canada L4G 3T9
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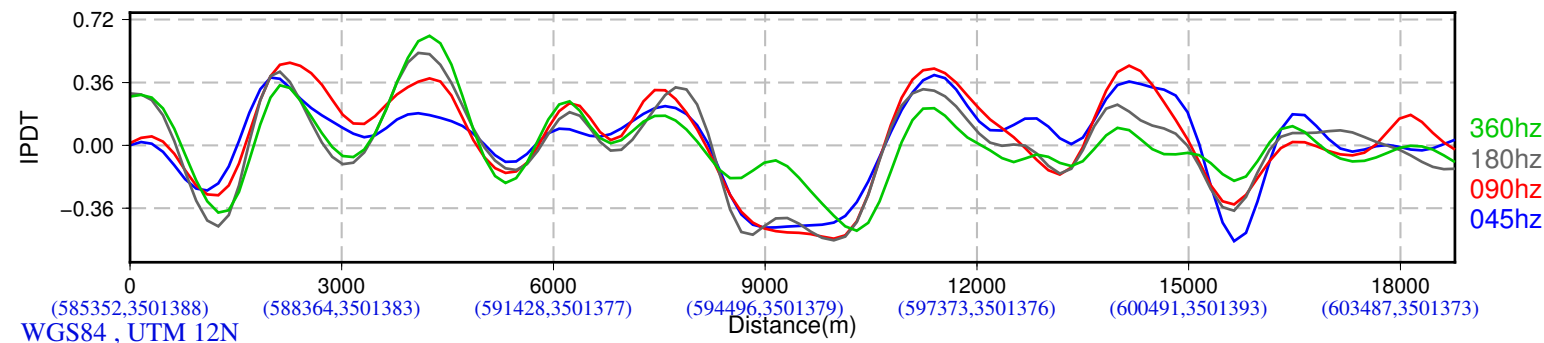
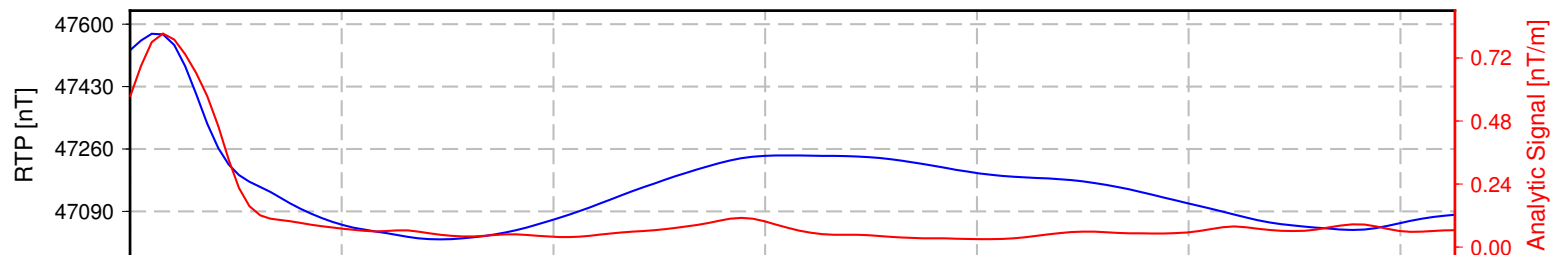
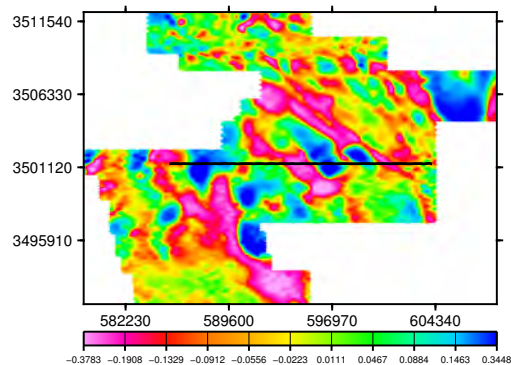
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1350

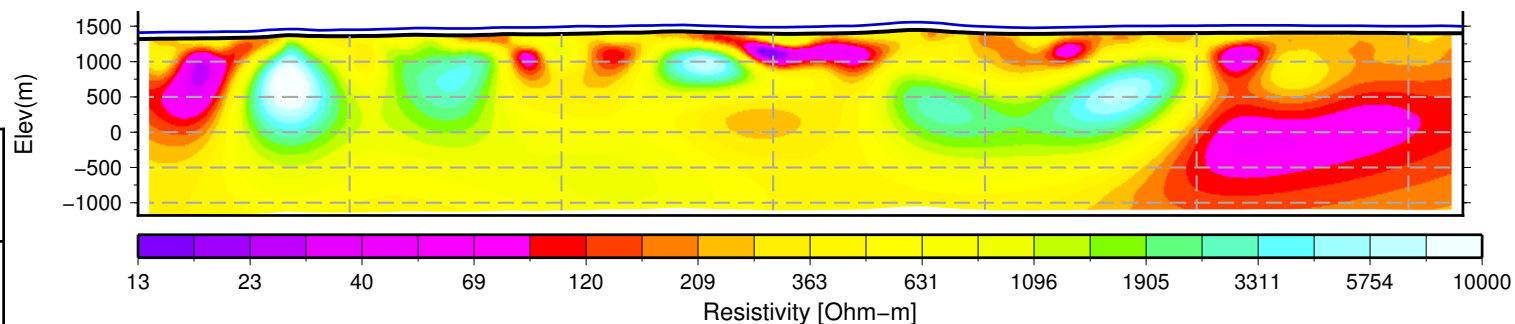
Analytic Signal [nT/m]



IP 090Hz DT



WGS84 , UTM 12N



View looking North

Liberty Star
Tombstone
Arizona

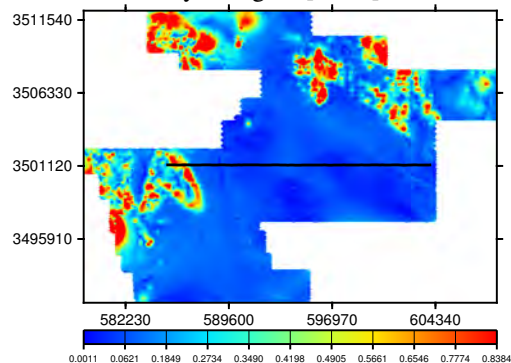
ZTEM System: Heliborne ZTEM
Job Number: GL130168

3D-ZTEM Inversion: Resistivity Sections
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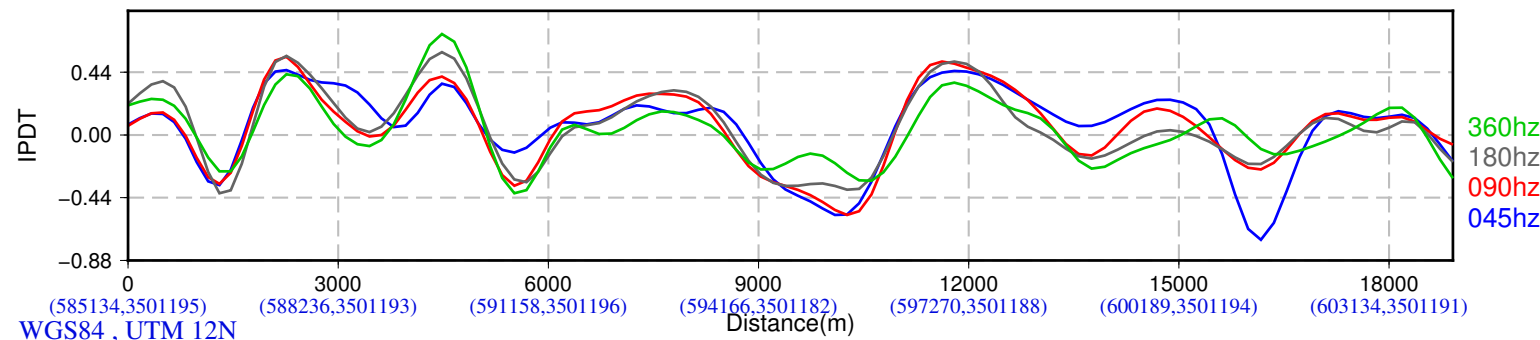
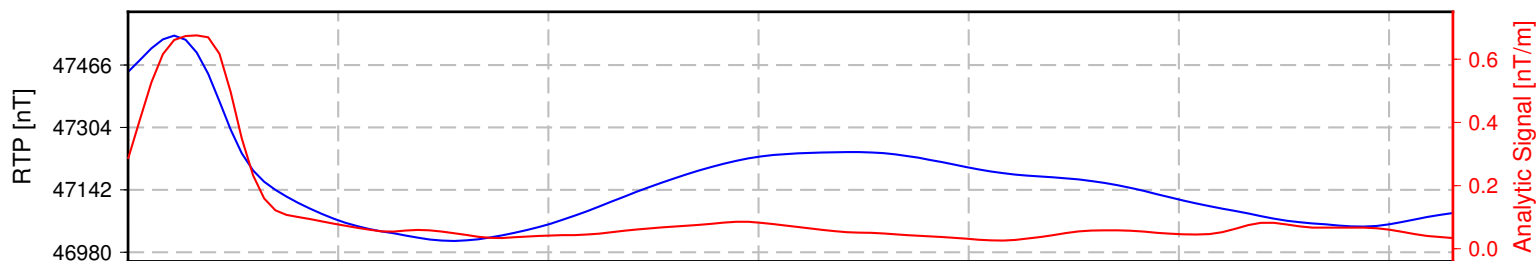
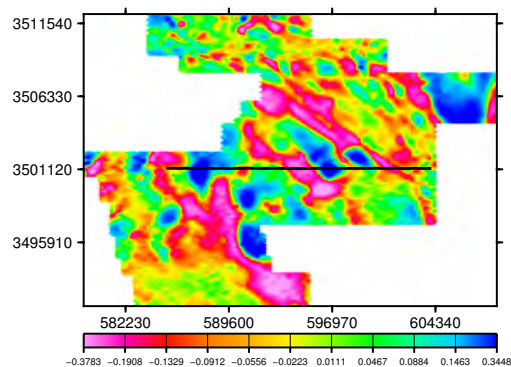
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1355

Analytic Signal [nT/m]



IP 090Hz DT



(585134,3501195)
WGS84, UTM 12N

(588236,3501193)

(591158,3501196)

(594166,3501182)

(597270,3501188)

(600189,3501194)

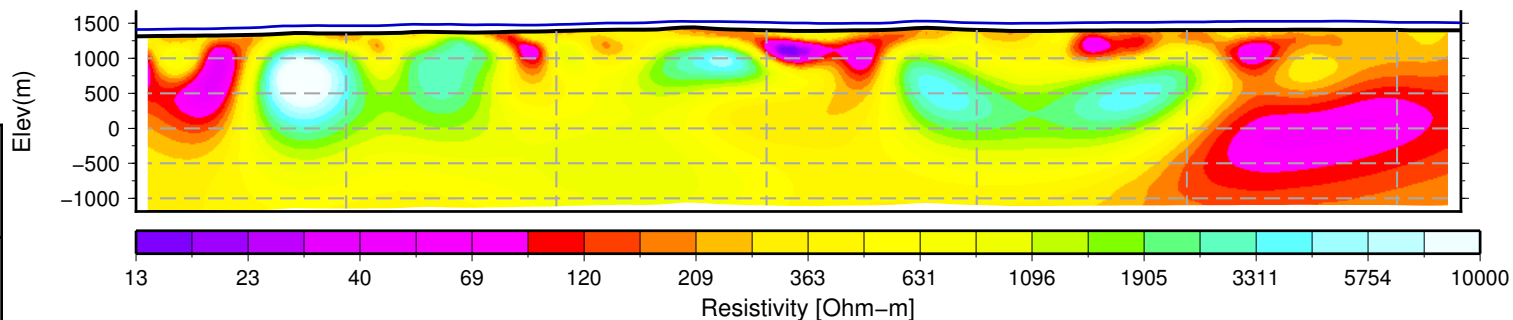
(603134,3501191)

Liberty Star
Tombstone
Arizona

ZTEM System: Heliborne ZTEM
Job Number: GL130168

3D-ZTEM Inversion: Resistivity Sections
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Aurora, Ontario, Canada L4G 3T9
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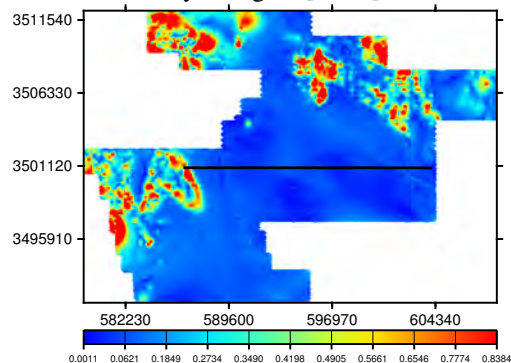
2019/11/20



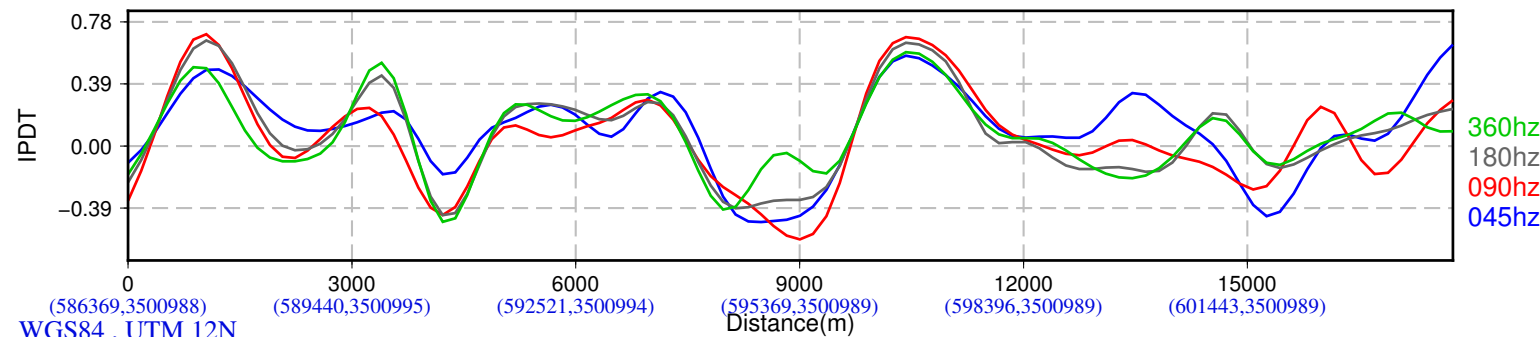
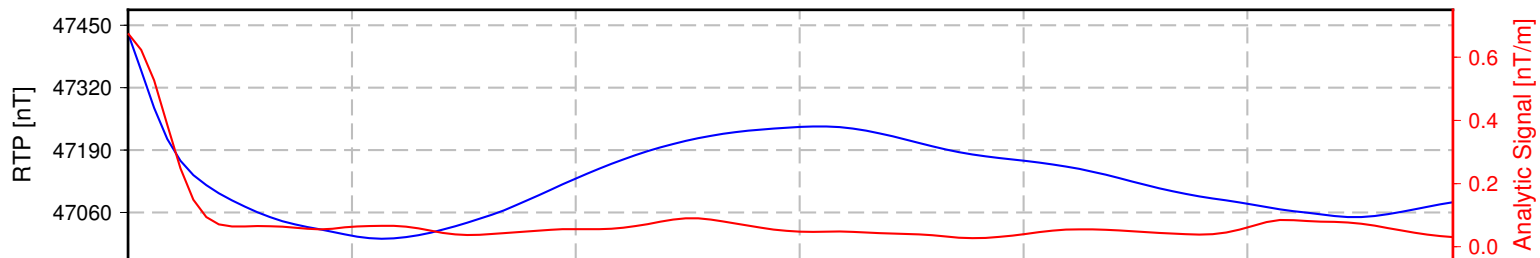
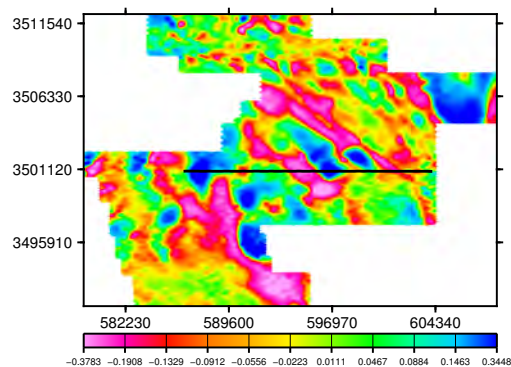
View looking North

3D ZTEM Inversion: Resistivity Section for Line 1360

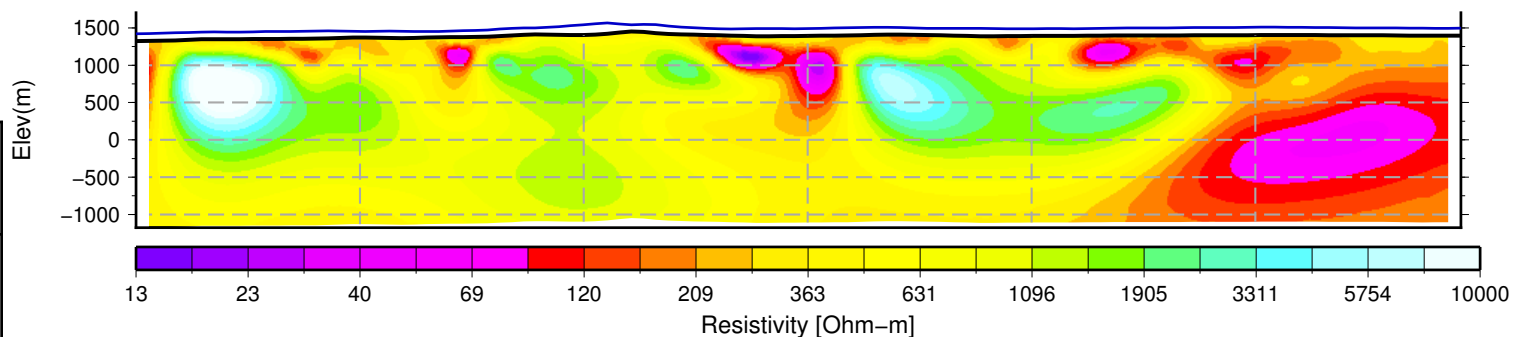
Analytic Signal [nT/m]



IP 090Hz DT



(586369,3500988) (589440,3500995) (592521,3500994) (595369,3500989) (598396,3500989) (601443,3500989)
WGS84, UTM 12N



View looking North

Liberty Star
Tombstone
Arizona

ZTEM System: Heliborne ZTEM

Job Number: GL130168

3D-ZTEM Inversion: Resistivity Sections

Flown by Geotech Ltd

Processed by Geotech Ltd

270 Industrial Parkway South

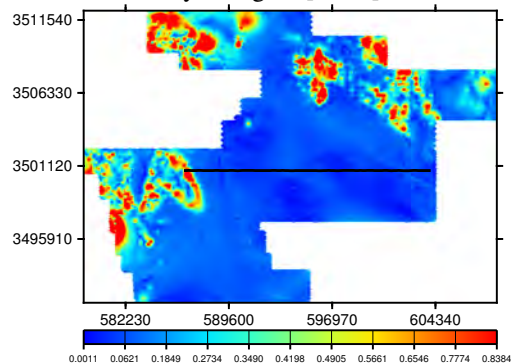
Aurora, Ontario, Canada L4G 3T9

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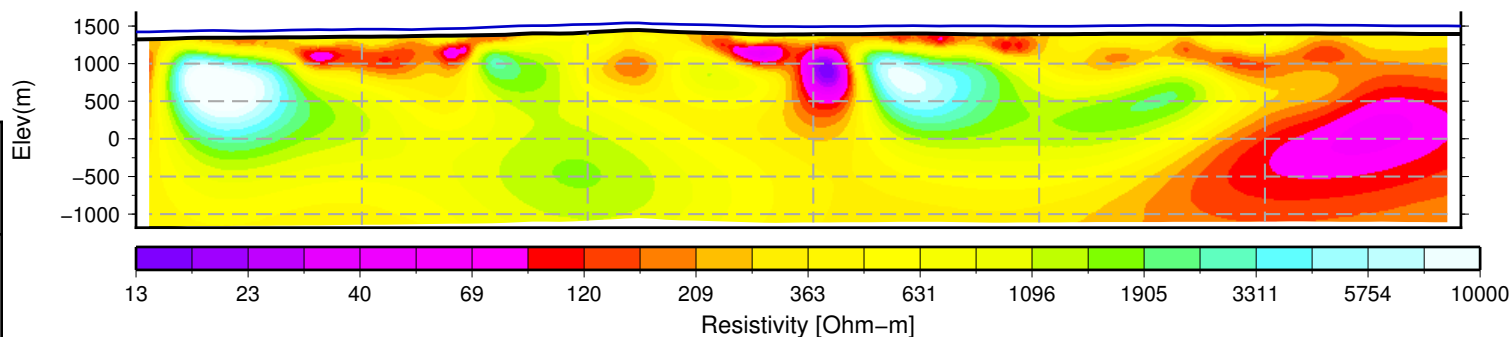
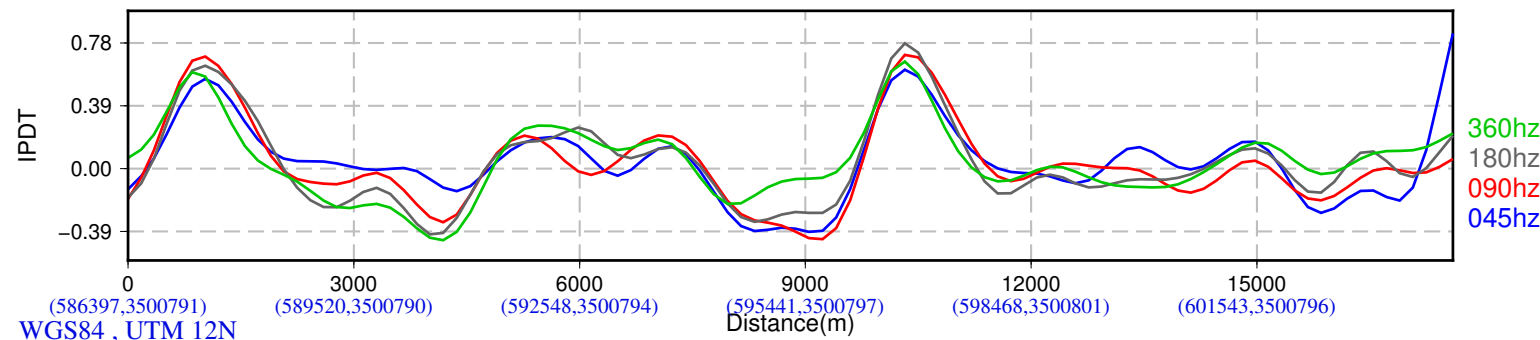
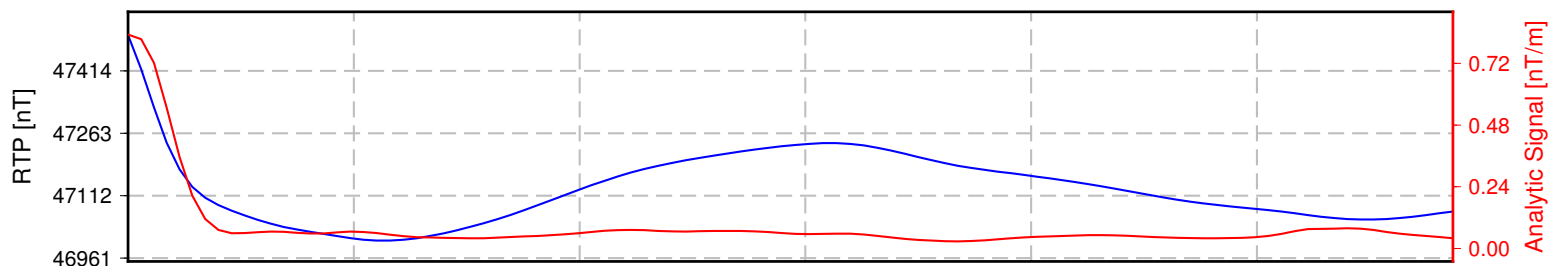
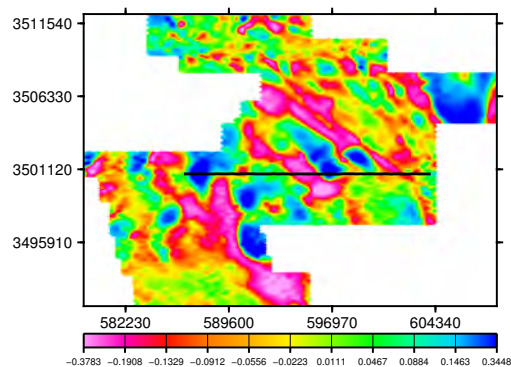
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1365

Analytic Signal [nT/m]



IP 090Hz DT



Liberty Star
Tombstone
Arizona

ZTEM System: Heliborne ZTEM

Job Number: GL130168

3D-ZTEM Inversion: Resistivity Sections

Flown by Geotech Ltd

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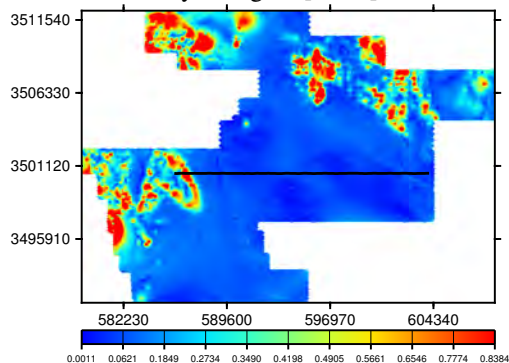
270 Industrial Parkway South
Aurora, Ontario, Canada L4G 3T9

www.geotech.ca

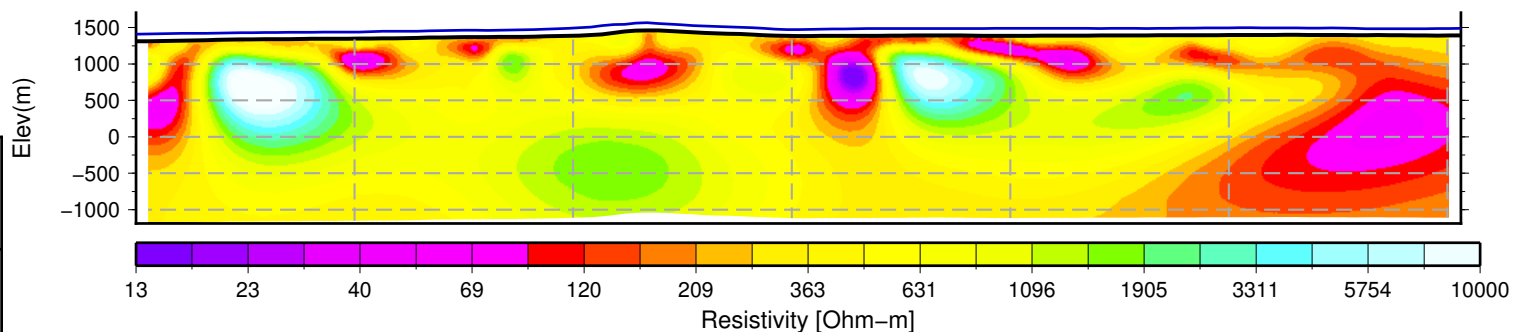
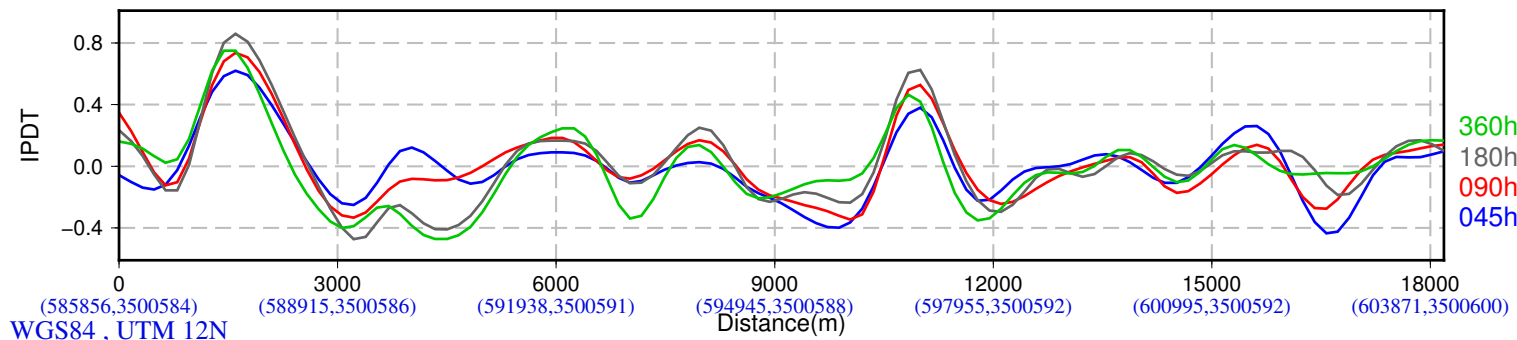
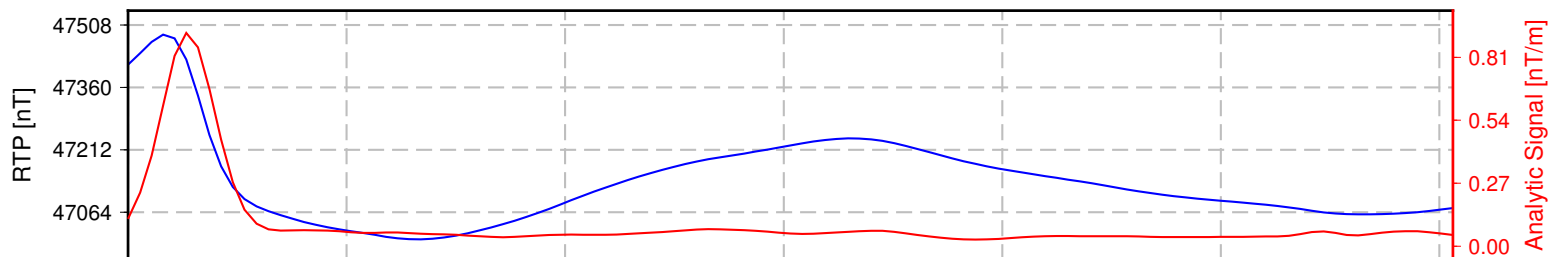
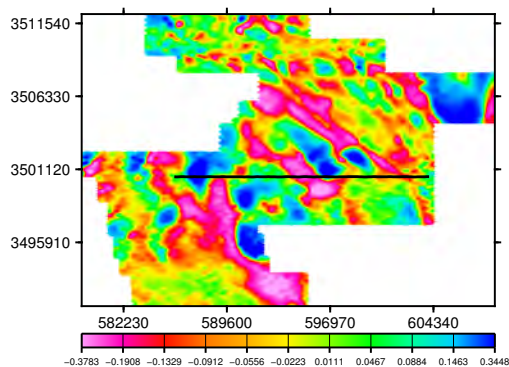
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1370

Analytic Signal [nT/m]



IP 090Hz DT



Liberty Star
Tombstone
Arizona

ZTEM System: Heliborne ZTEM
Job Number: GL130168

3D-ZTEM Inversion: Resistivity Sections

Flown by Geotech Ltd

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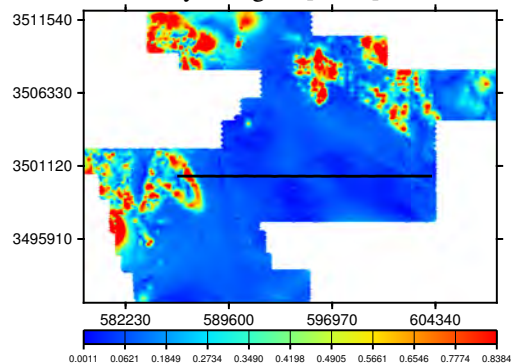
270 Industrial Parkway South
Aurora, Ontario, Canada L4G 3T9

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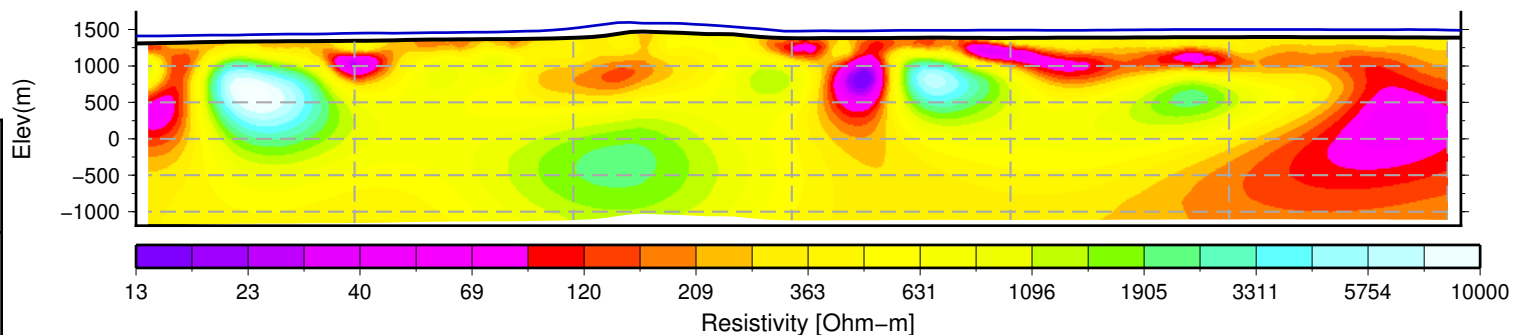
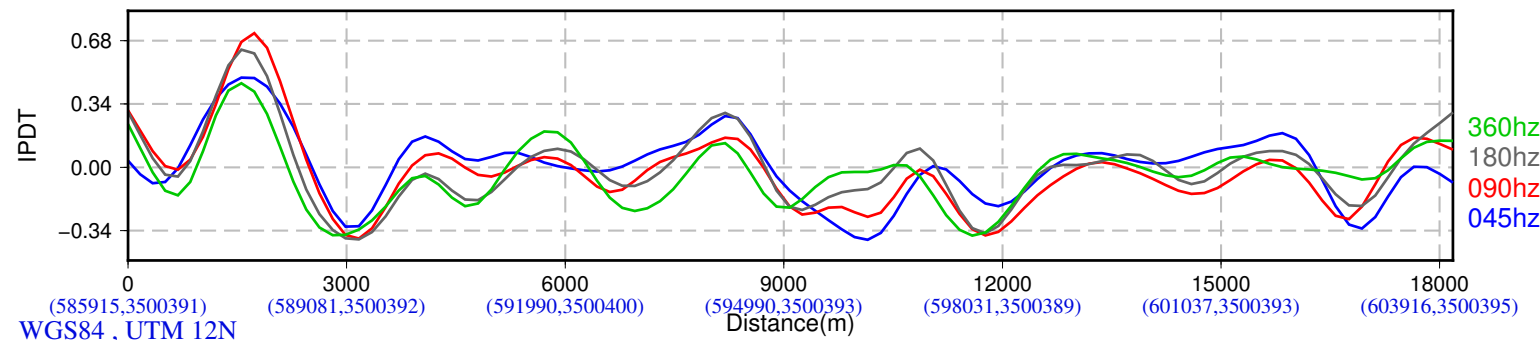
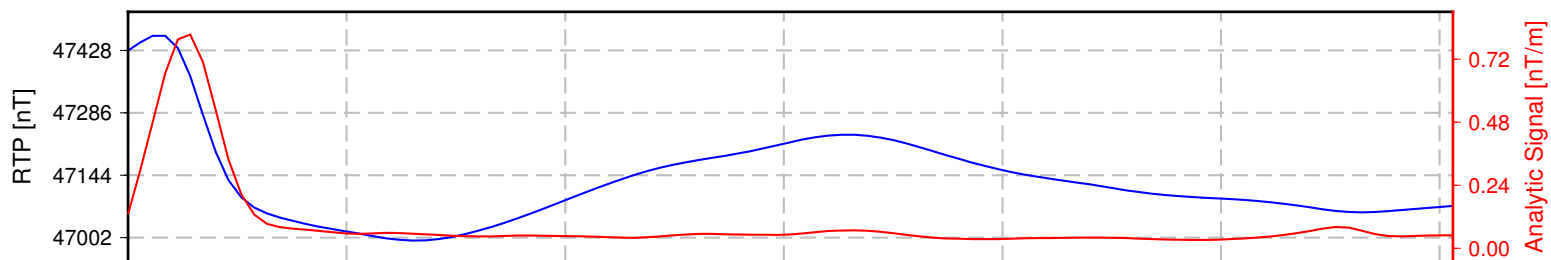
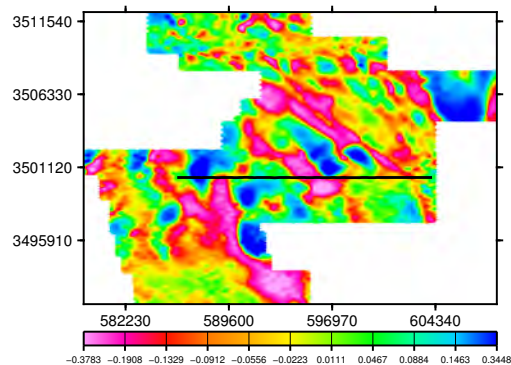
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1375

Analytic Signal [nT/m]



IP 090Hz DT



Liberty Star
Tombstone
Arizona

ZTEM System: Heliborne ZTEM

Job Number: GL130168

3D-ZTEM Inversion: Resistivity Sections

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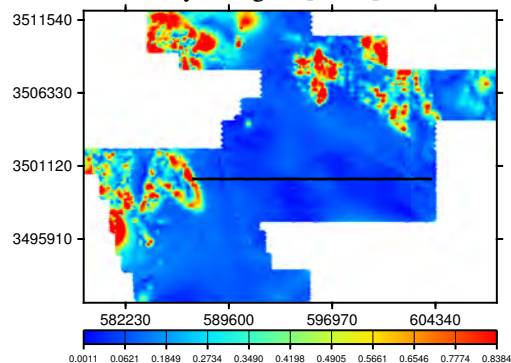
270 Industrial Parkway South
Aurora, Ontario, Canada L4G 3T9

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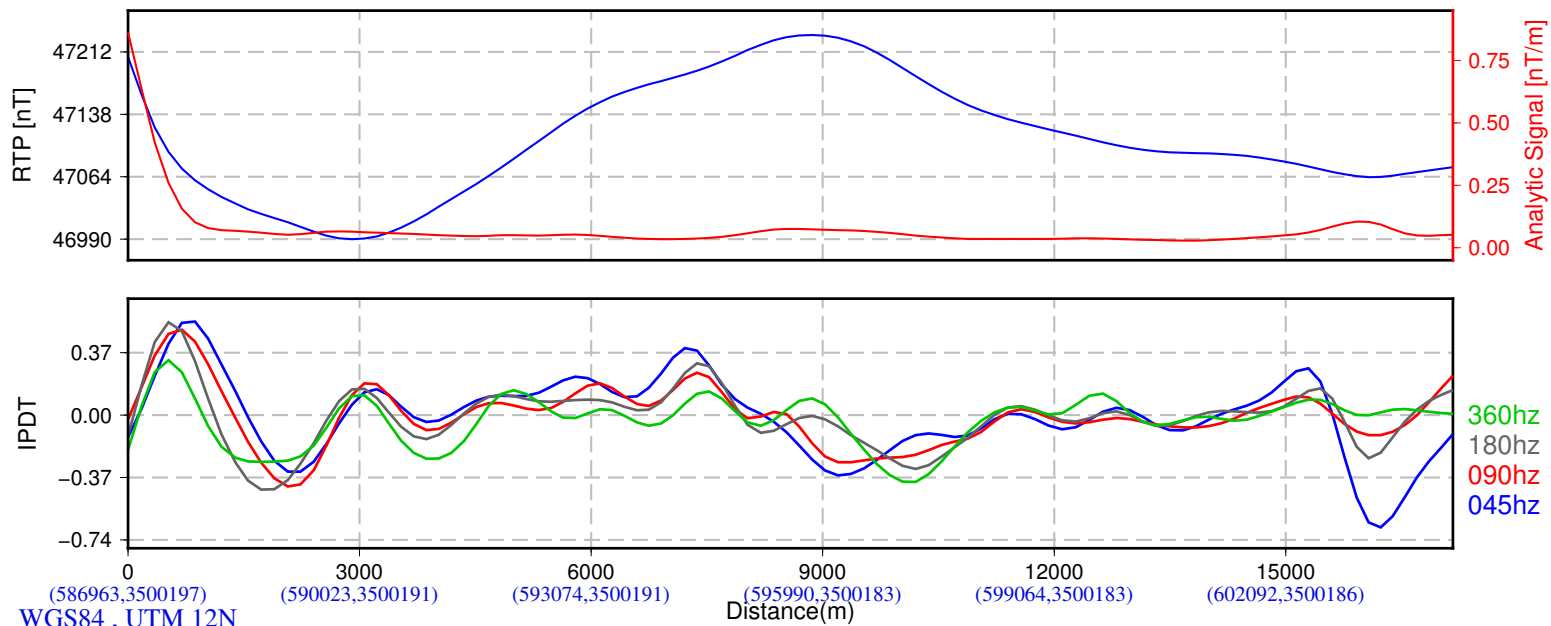
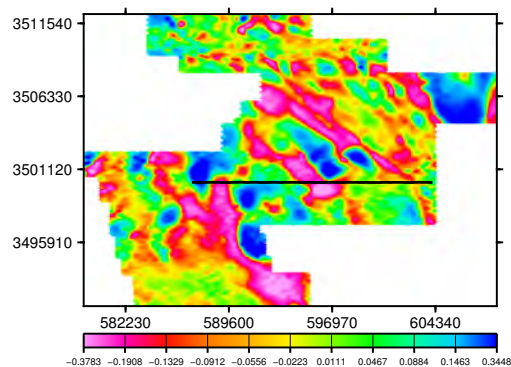
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1380

Analytic Signal [nT/m]



IP 090Hz DT



Liberty Star
Tombstone
Arizona

ZTEM System: Heliborne ZTEM

Job Number: GL130168

3D-ZTEM Inversion: Resistivity Sections

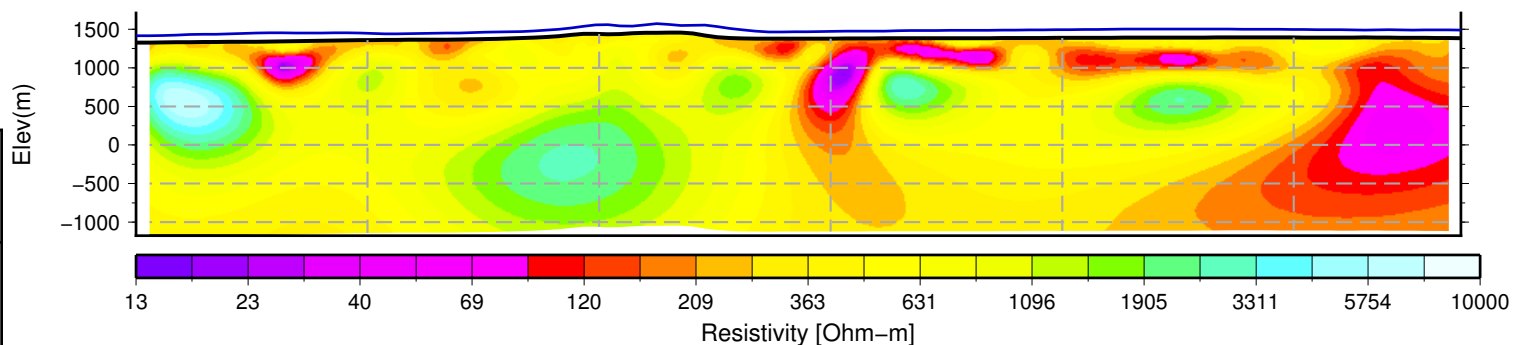
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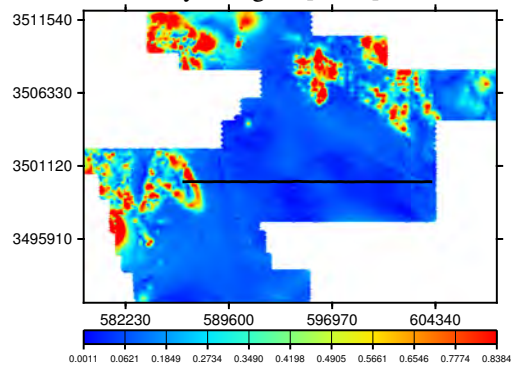
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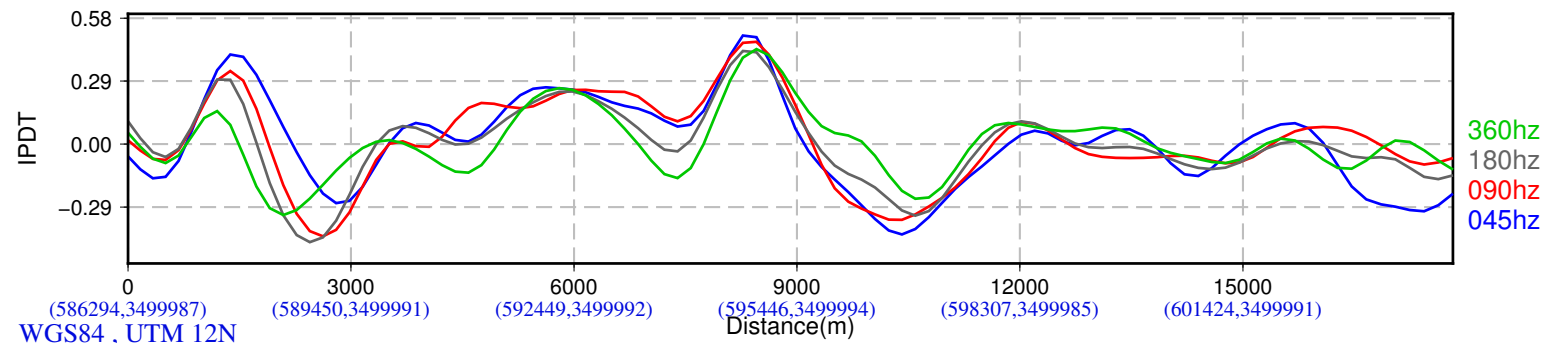
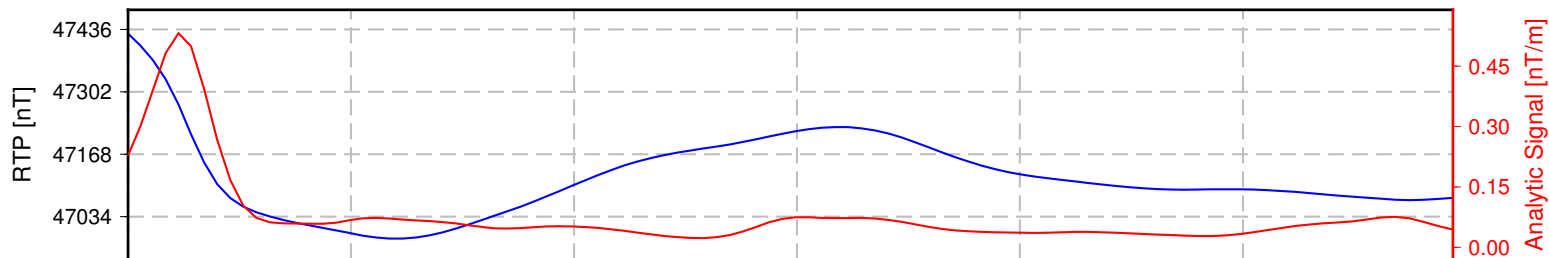
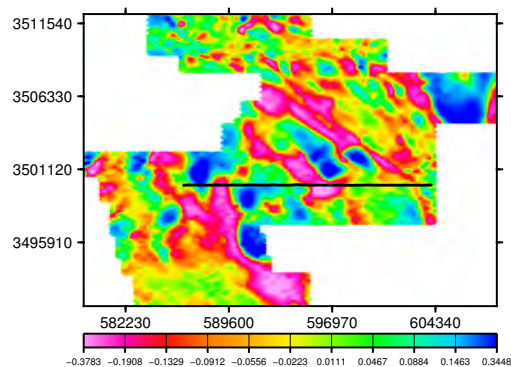
View looking North

3D ZTEM Inversion: Resistivity Section for Line 1385

Analytic Signal [nT/m]



IP 090Hz DT



(586294,3499987)
WGS84 , UTM 12N

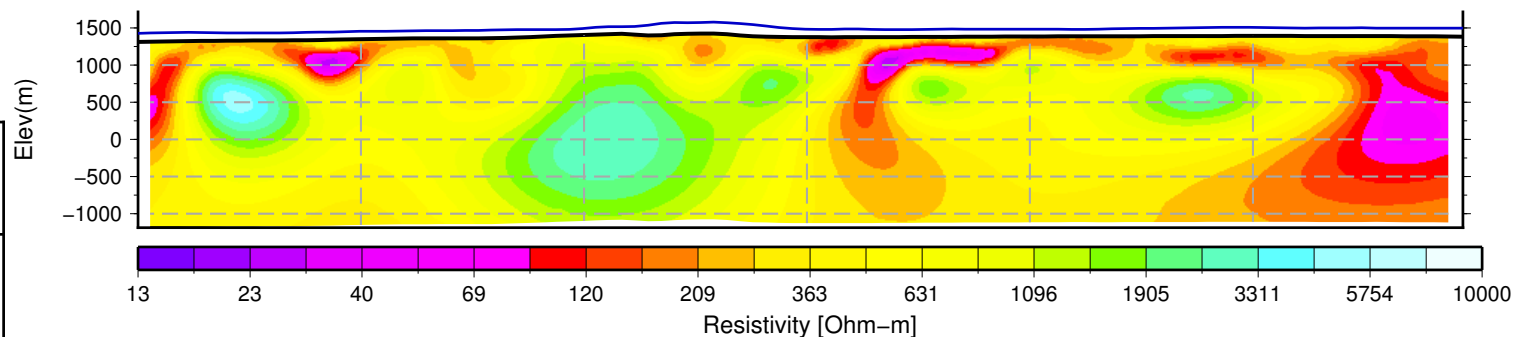
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(601424,3499991)



View looking North

Liberty Star
Tombstone
Arizona

ZTEM System: Heliborne ZTEM

Job Number:GL130168

3D-ZTEM Inversion: Resistivity Sections

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270 Industrial Parkway South

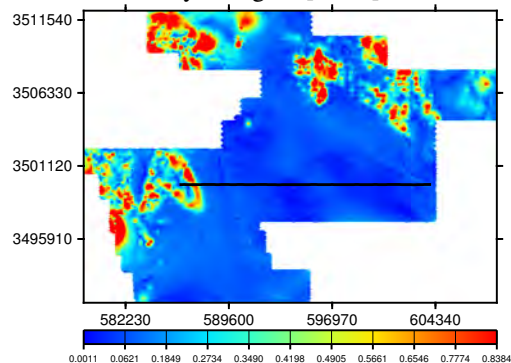
Aurora, Ontario, Canada L4G 3T9

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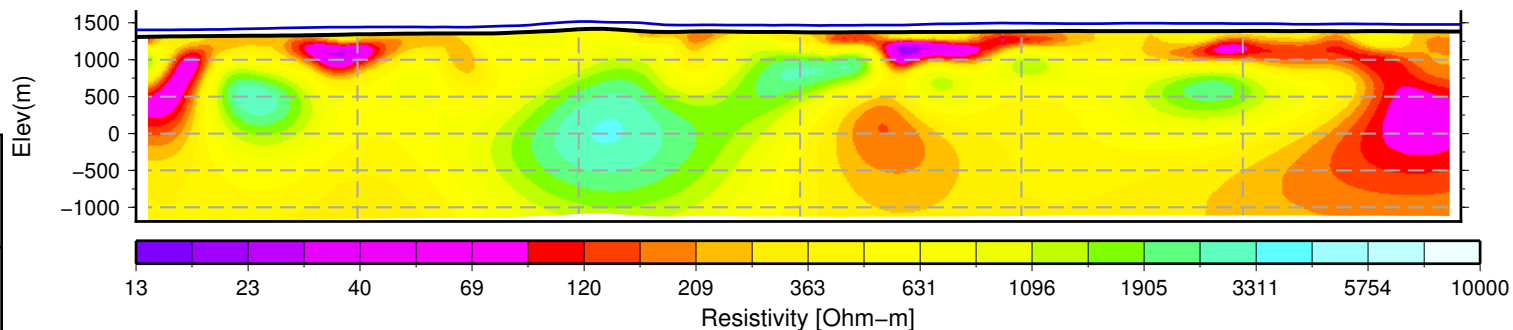
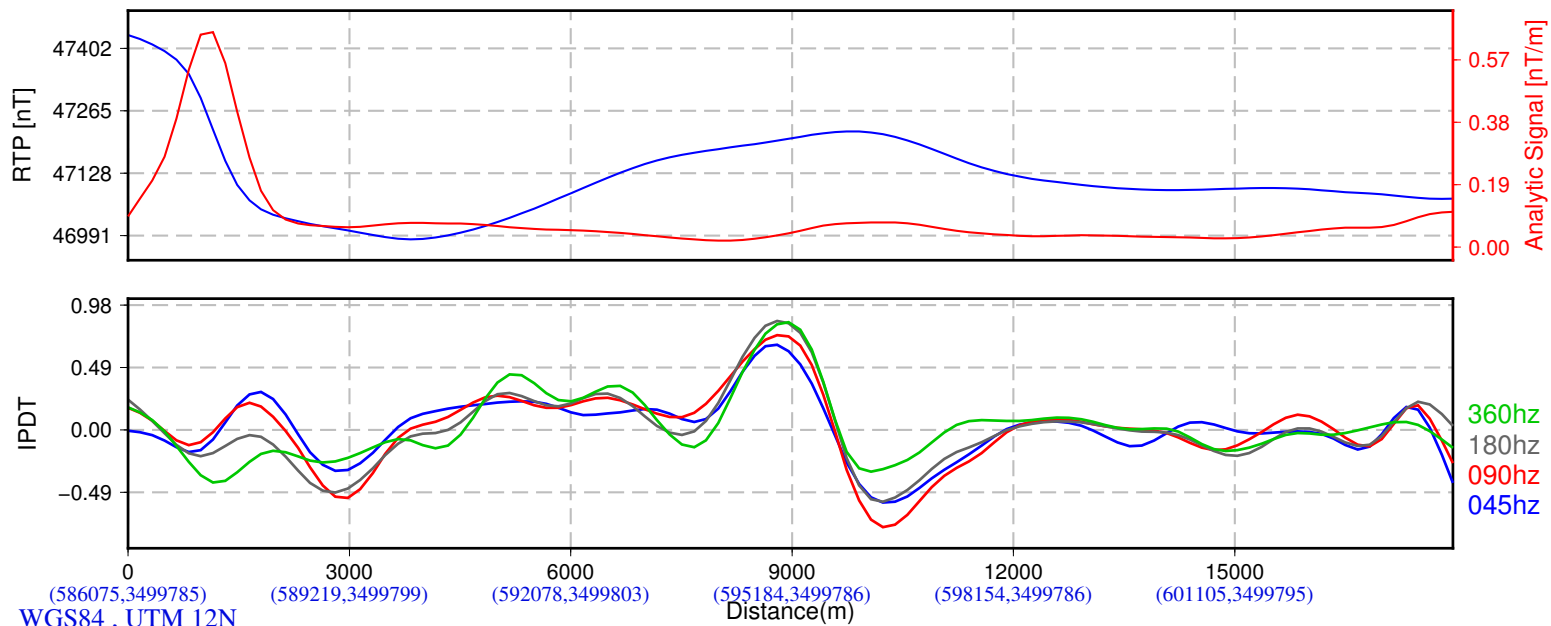
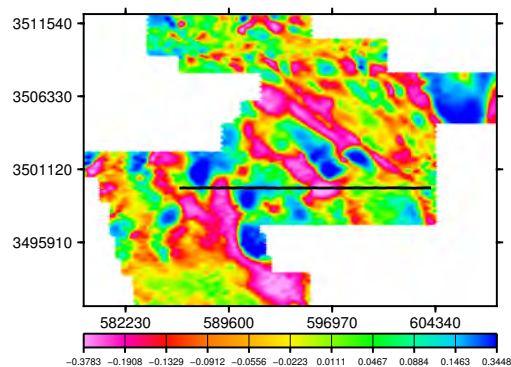
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1390

Analytic Signal [nT/m]



IP 090Hz DT



View looking North

Liberty Star
Tombstone
Arizona

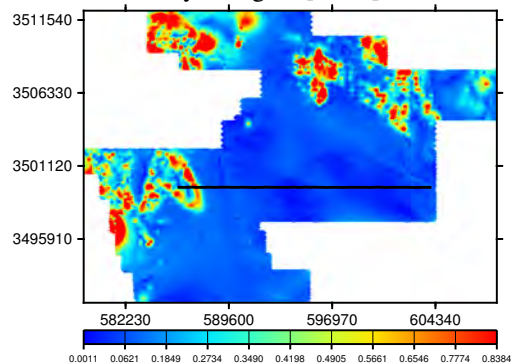
ZTEM System: Heliborne ZTEM
Job Number: GL130168

3D-ZTEM Inversion: Resistivity Sections
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Processed by Geotech Ltd
270 Industrial Parkway South
Aurora, Ontario, Canada L4G 3T9
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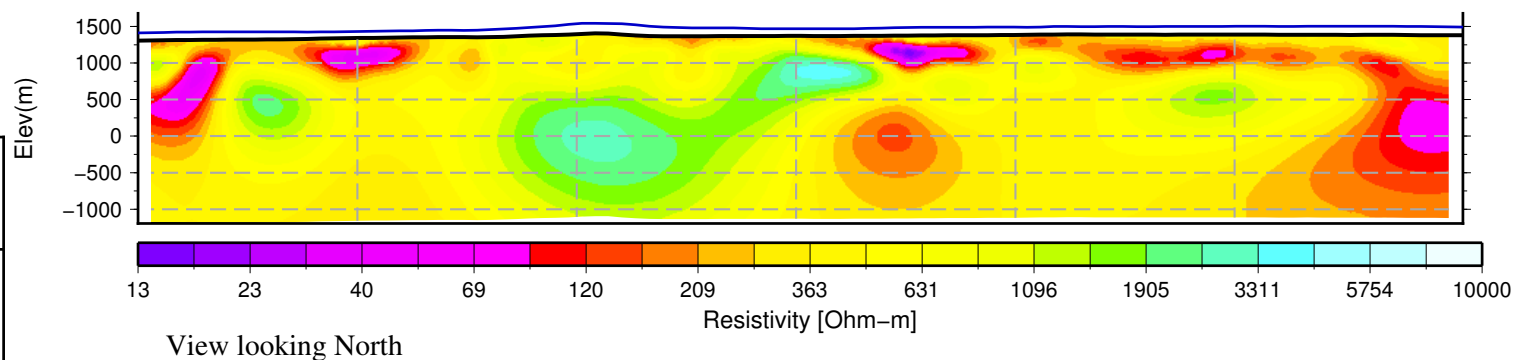
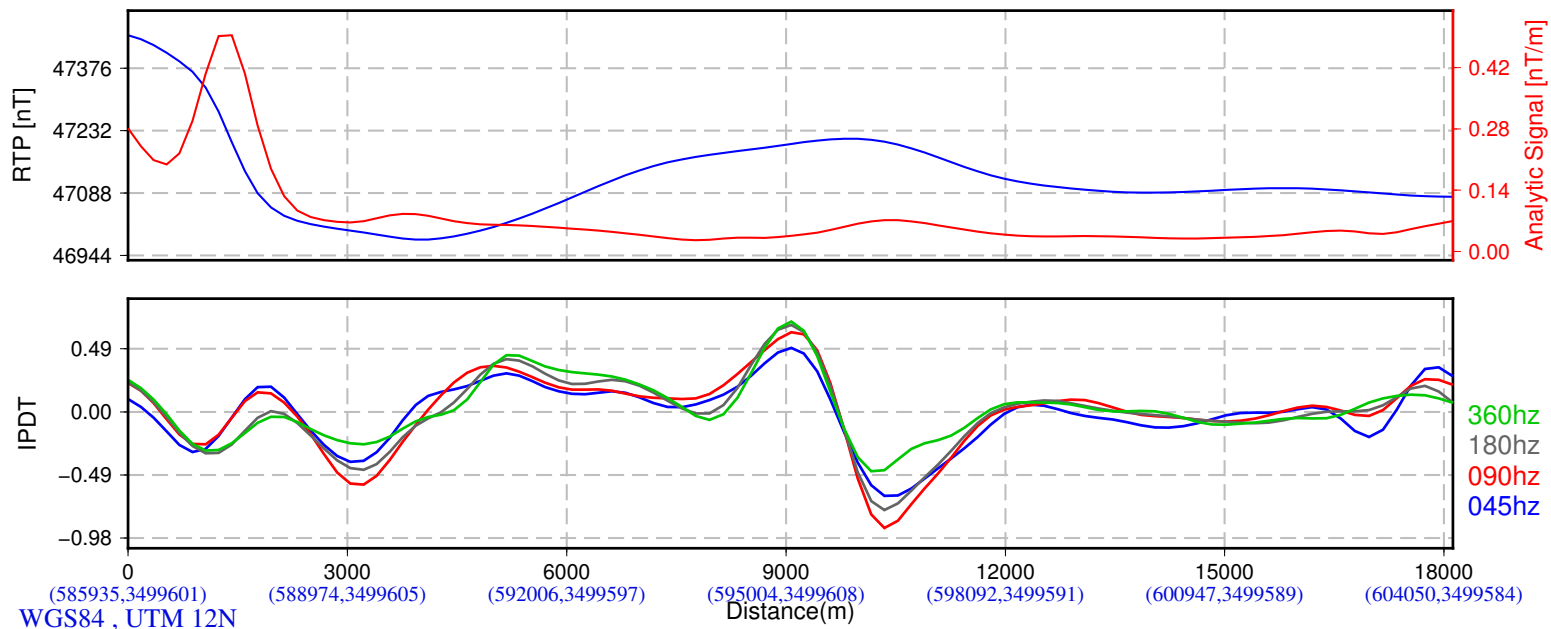
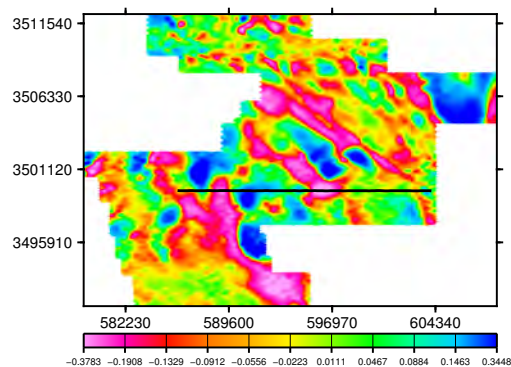
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1395

Analytic Signal [nT/m]



IP 090Hz DT



Liberty Star
Tombstone
Arizona

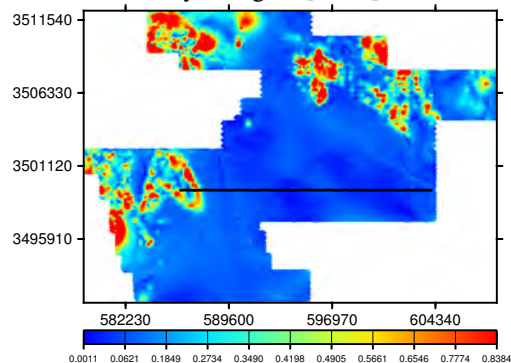
ZTEM System: Heliborne ZTEM
Job Number: GL130168

3D-ZTEM Inversion: Resistivity Sections
Flown by Geotech Ltd
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Aurora, Ontario, Canada L4G 3T9
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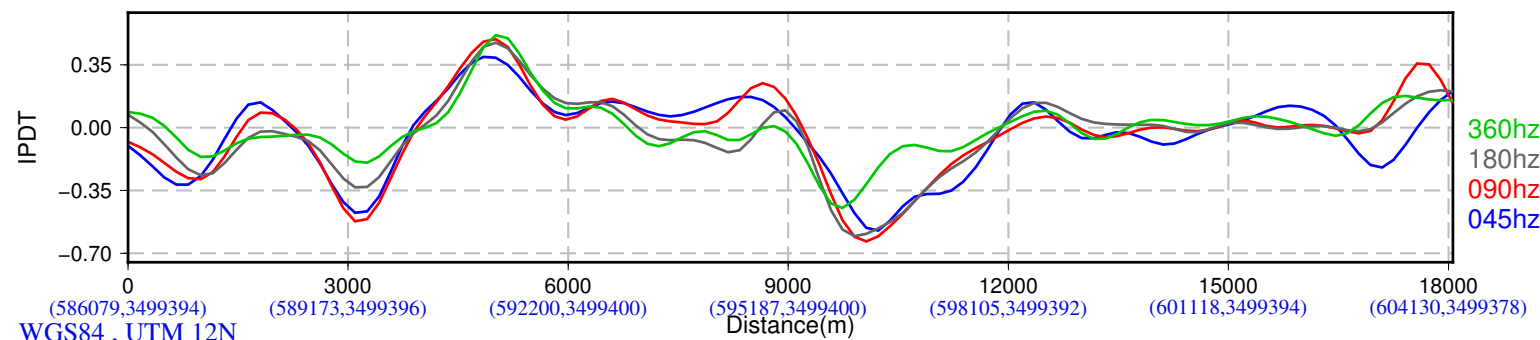
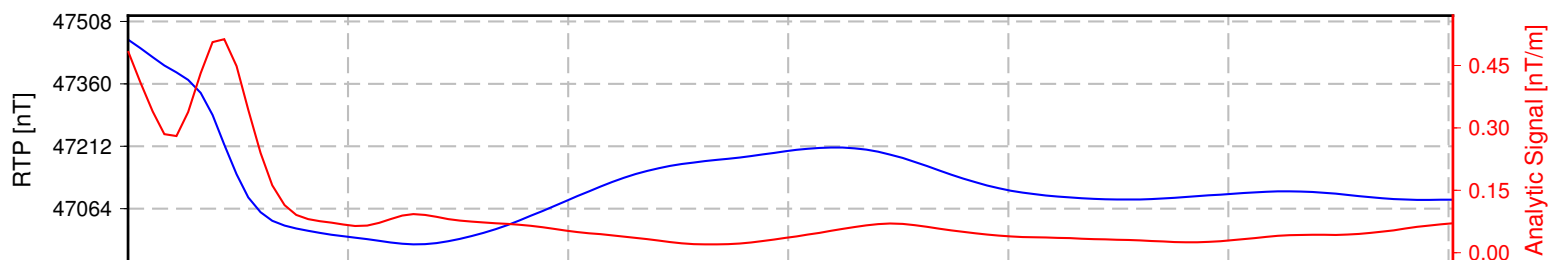
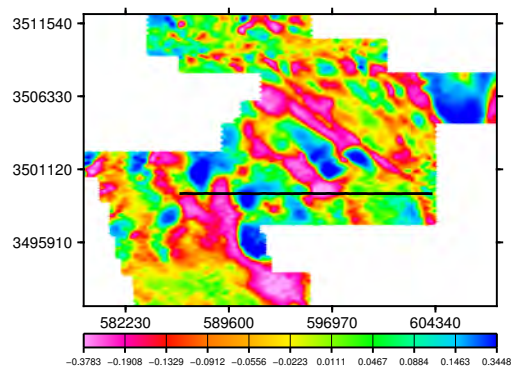
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1400

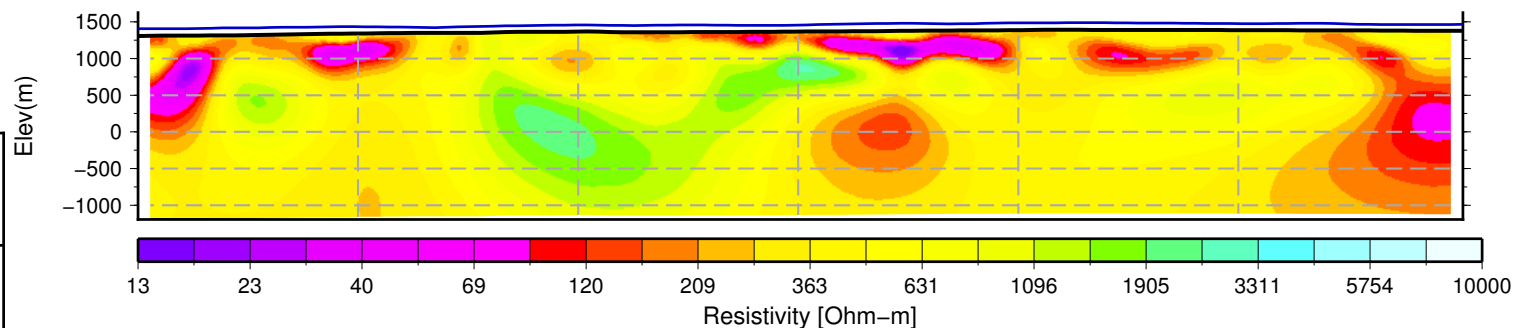
Analytic Signal [nT/m]



IP 090Hz DT



WGS84 , UTM 12N



View looking North

Liberty Star
Tombstone
Arizona

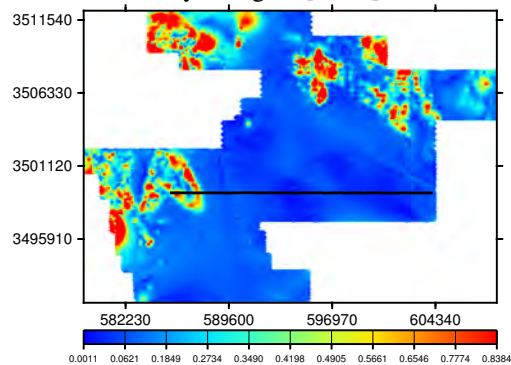
ZTEM System: Heliborne ZTEM
Job Number: GL130168

3D-ZTEM Inversion: Resistivity Sections
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Processed by Geotech Ltd
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Aurora, Ontario, Canada L4G 3T9
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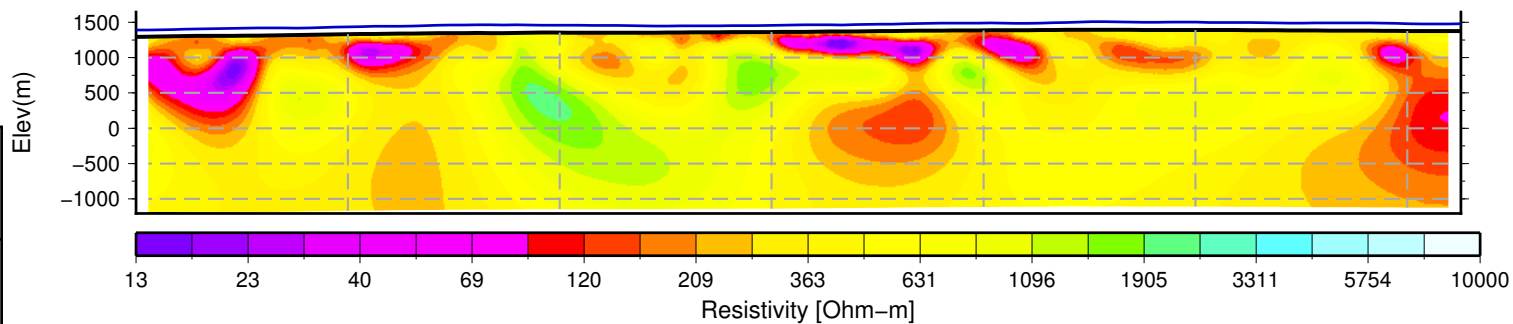
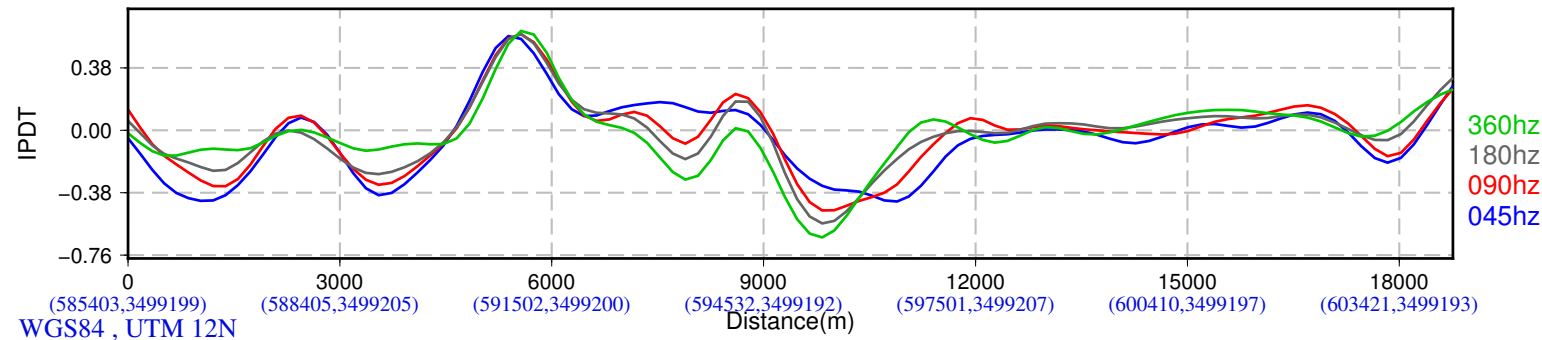
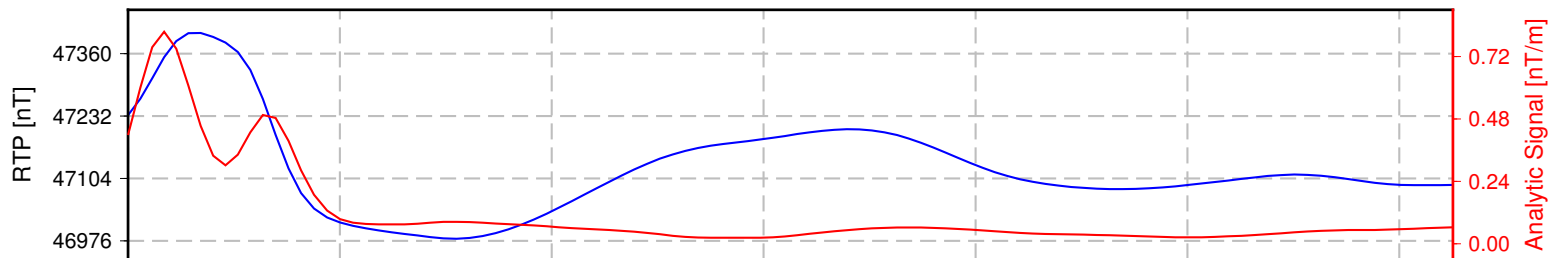
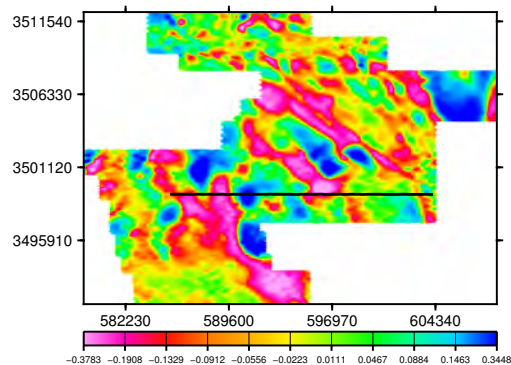
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1405

Analytic Signal [nT/m]



IP 090Hz DT



View looking North

Liberty Star
Tombstone
Arizona

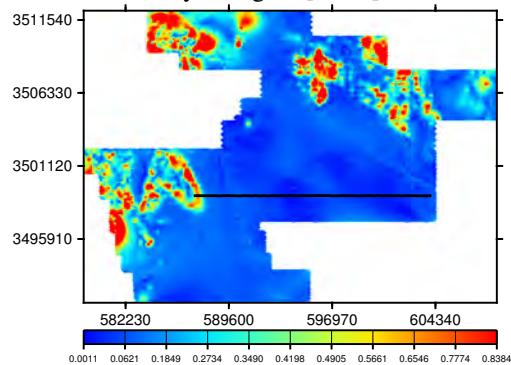
ZTEM System: Heliborne ZTEM
Job Number: GL130168

3D-ZTEM Inversion: Resistivity Sections
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270 Industrial Parkway South
Aurora, Ontario, Canada L4G 3T9
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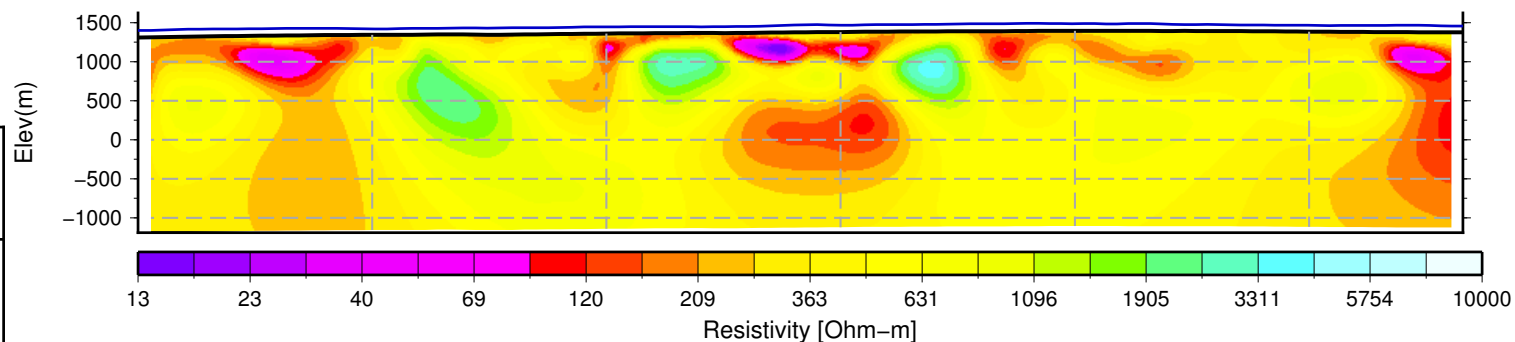
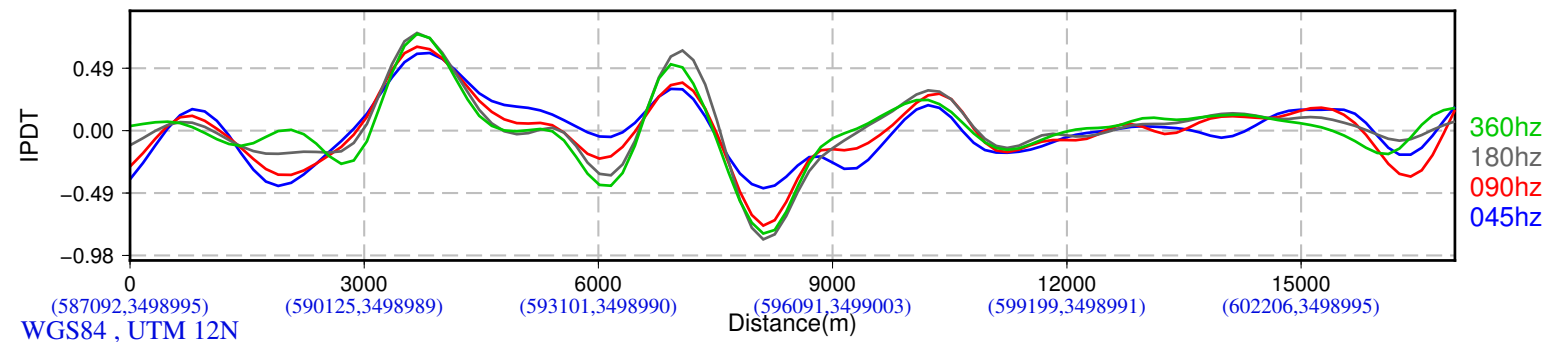
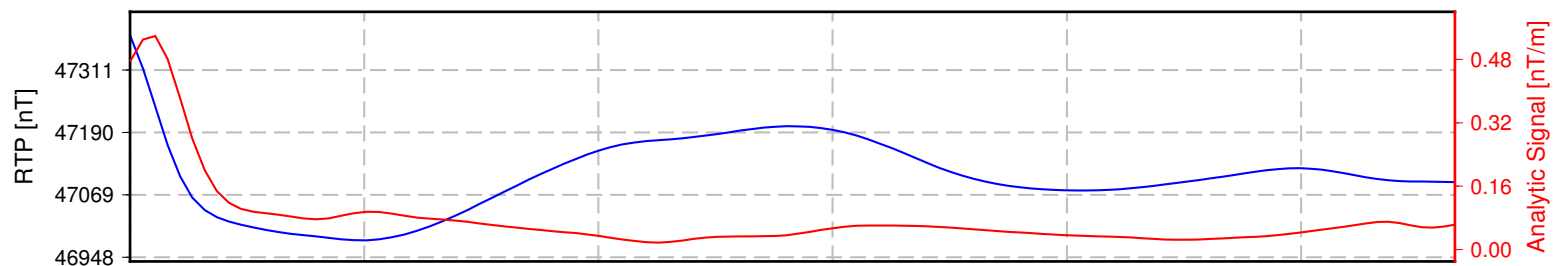
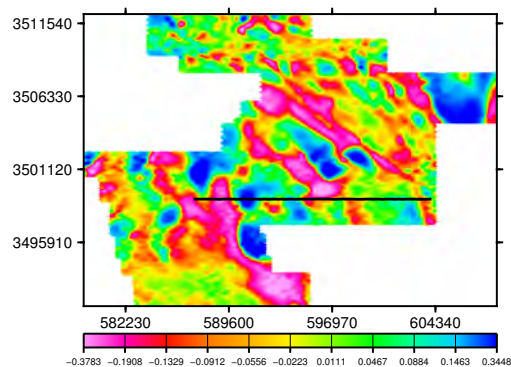
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1410

Analytic Signal [nT/m]



IP 090Hz DT



View looking North

Liberty Star
Tombstone
Arizona

ZTEM System: Heliborne ZTEM

Job Number: GL130168

3D-ZTEM Inversion: Resistivity Sections

Flown by Geotech Ltd

Processed by Geotech Ltd

270 Industrial Parkway South

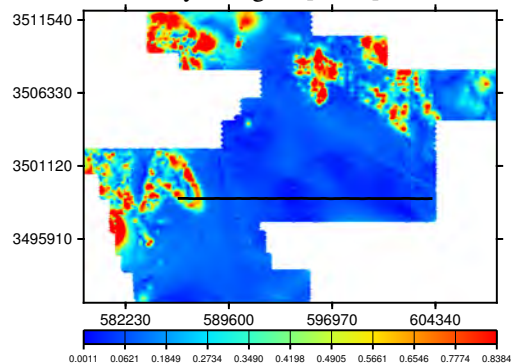
Aurora, Ontario, Canada L4G 3T9

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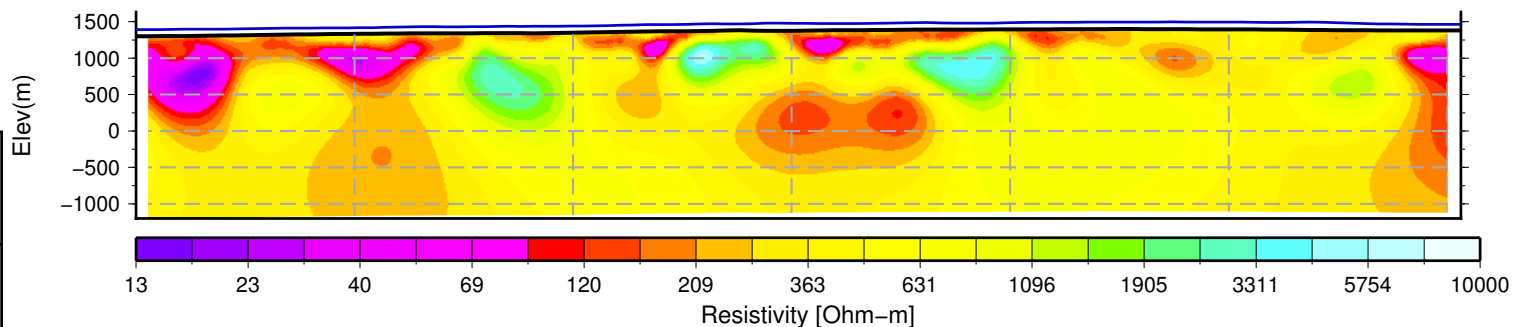
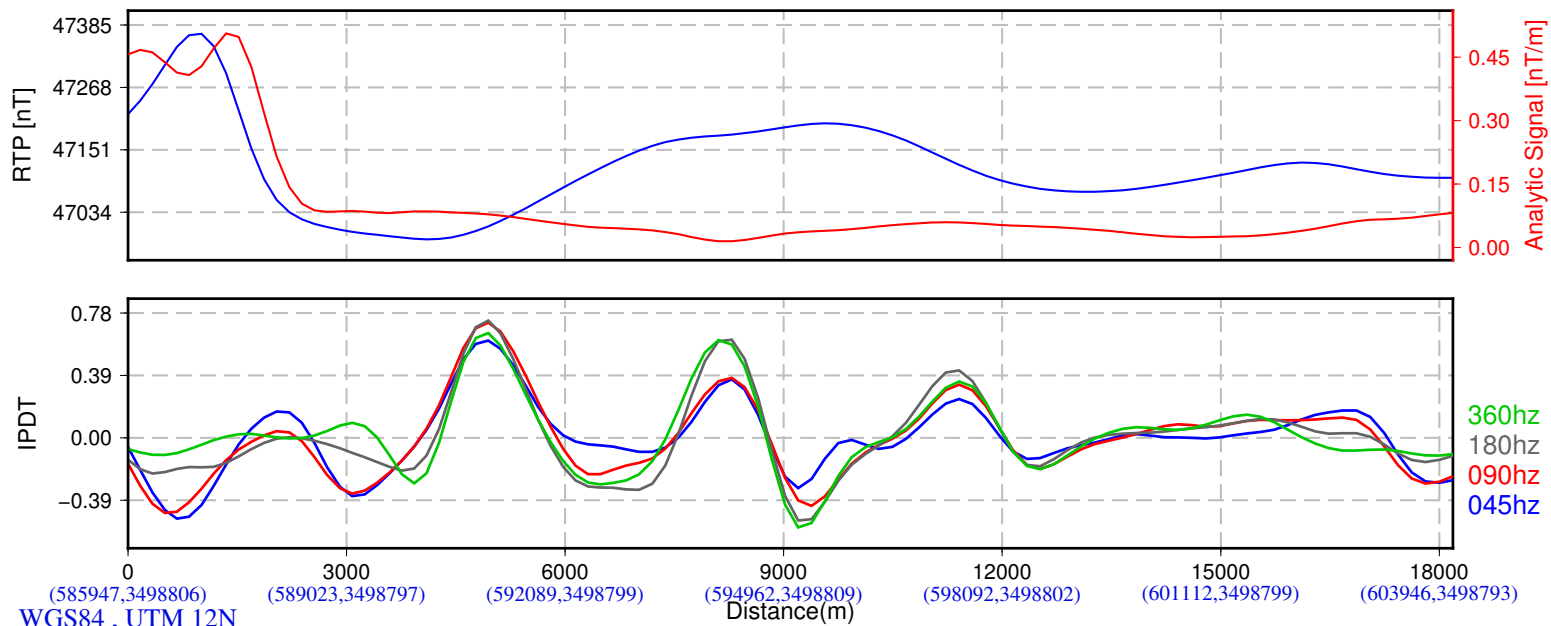
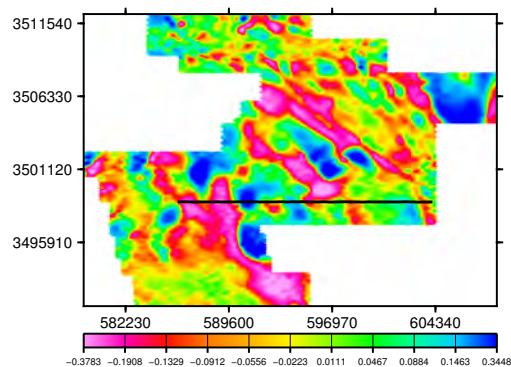
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1415

Analytic Signal [nT/m]



IP 090Hz DT



Liberty Star
Tombstone
Arizona

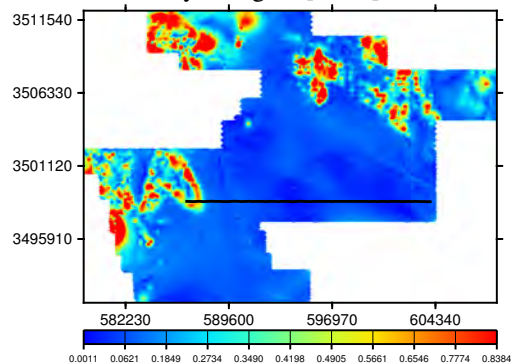
ZTEM System: Heliborne ZTEM
Job Number: GL130168

3D-ZTEM Inversion: Resistivity Sections
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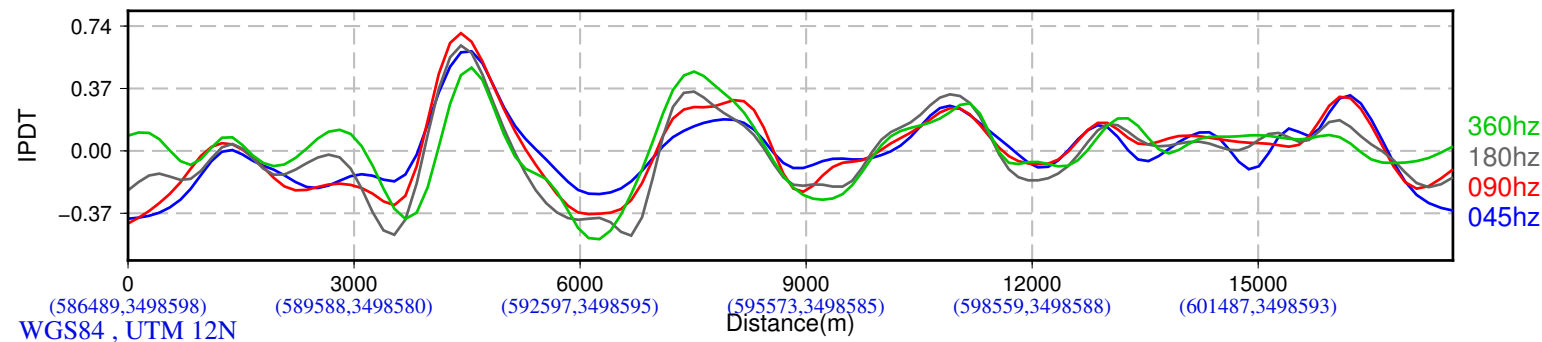
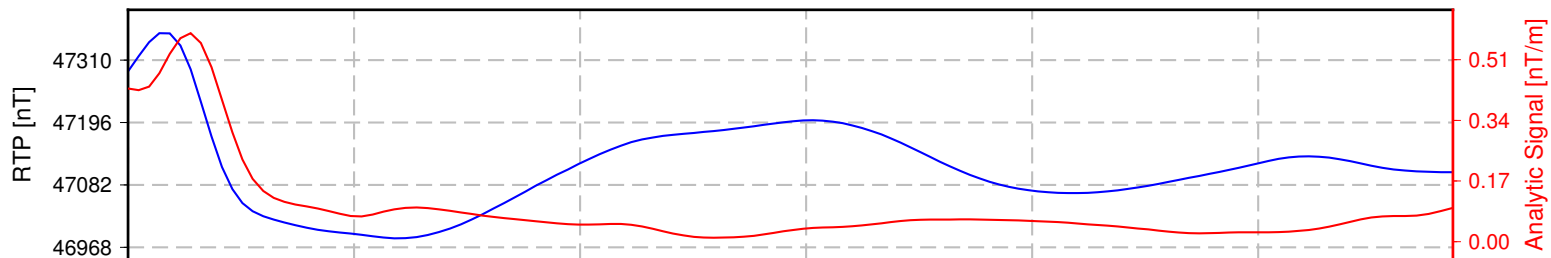
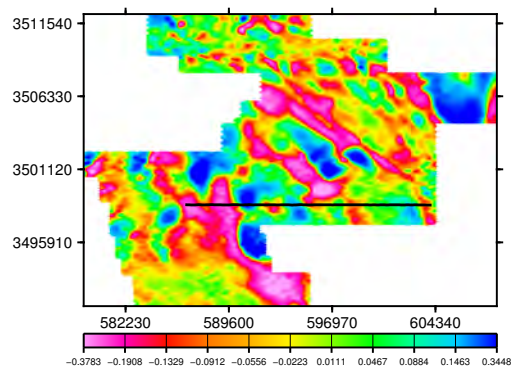
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1420

Analytic Signal [nT/m]



IP 090Hz DT



(586489,3498598)
WGS84 , UTM 12N

(589588,3498580)

(592597,3498595)

(595573,3498585)

(598559,3498588)

(601487,3498593)

Liberty Star
Tombstone
Arizona

ZTEM System: Heliborne ZTEM

Job Number:GL130168

3D-ZTEM Inversion: Resistivity Sections

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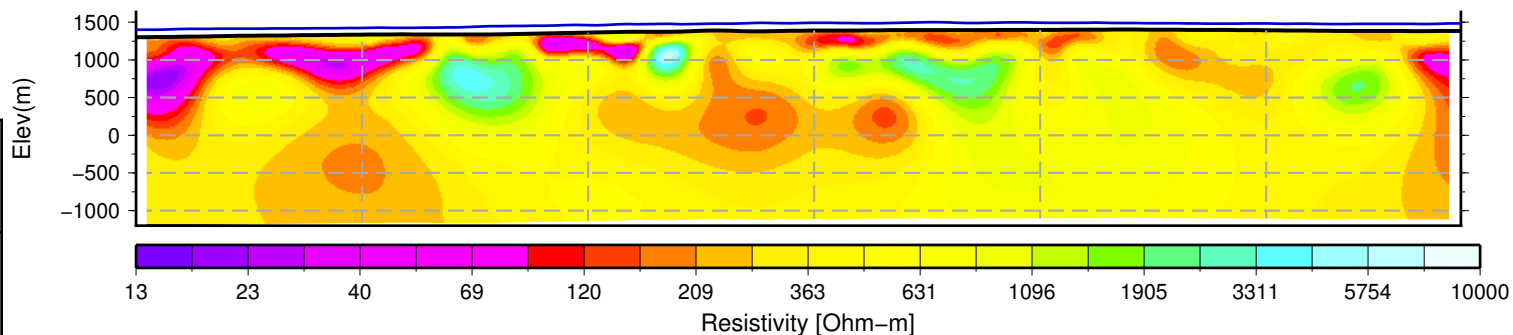
Processed by Geotech Ltd

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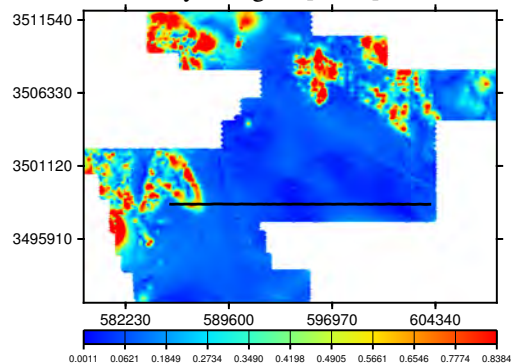
2019/11/20



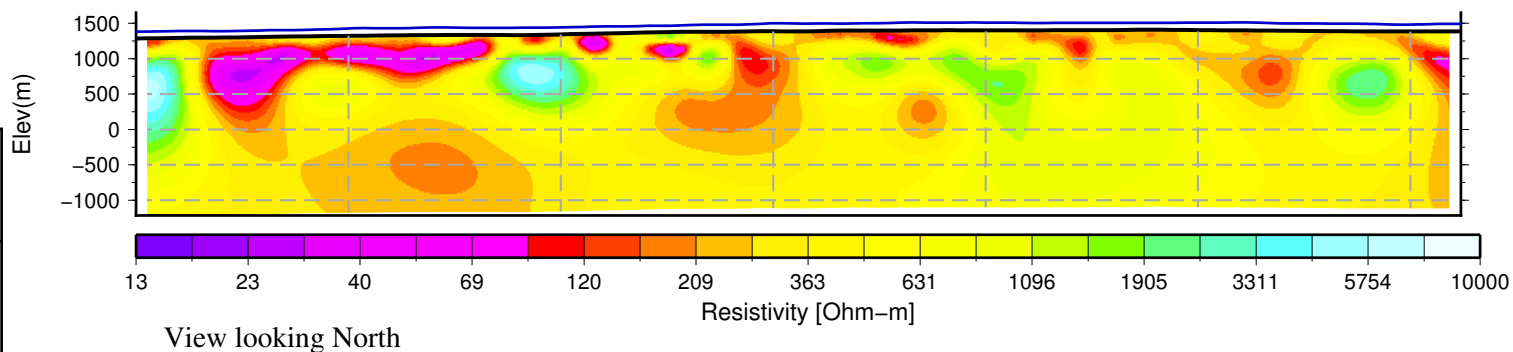
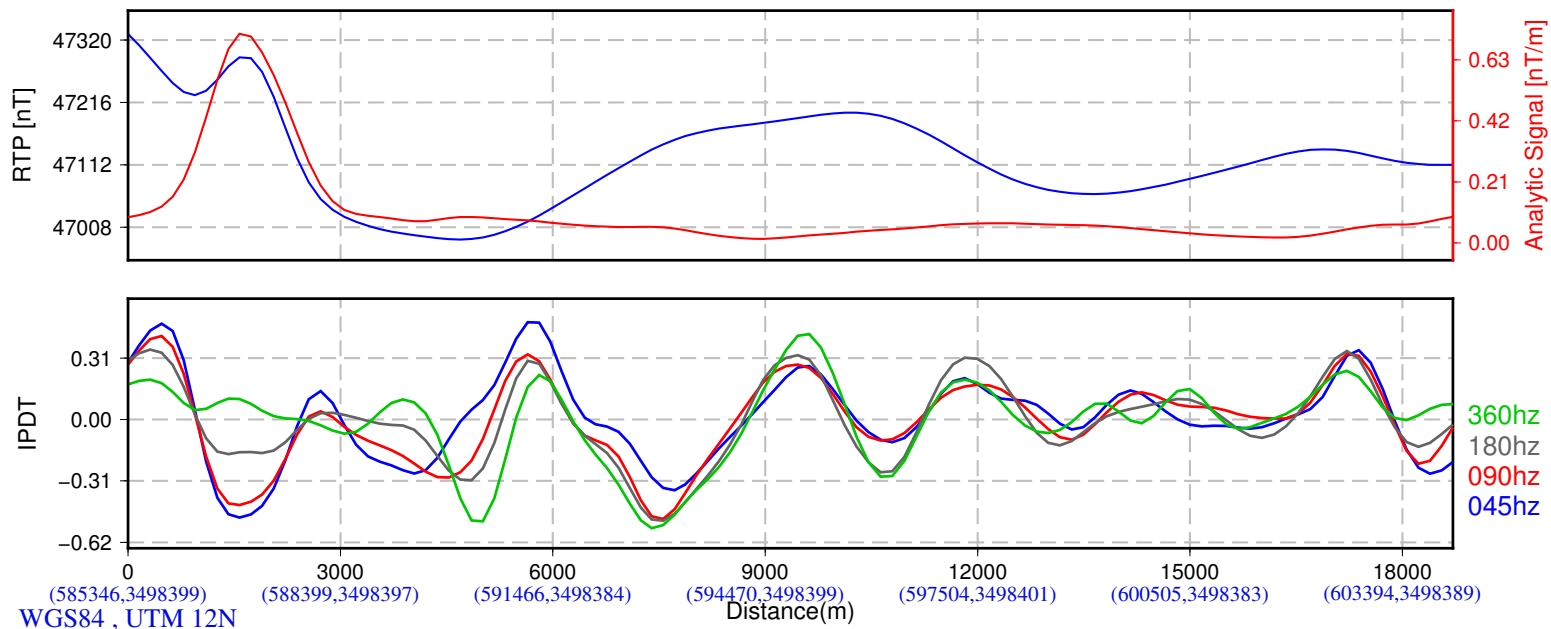
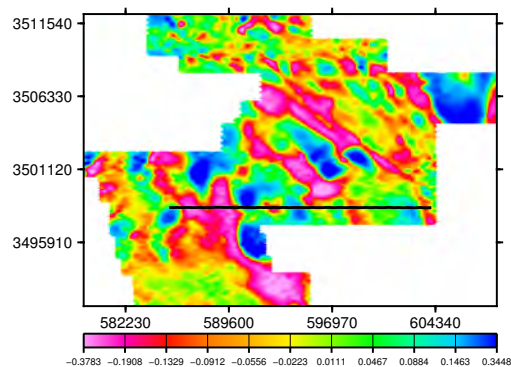
View looking North

3D ZTEM Inversion: Resistivity Section for Line 1425

Analytic Signal [nT/m]



IP 090Hz DT



Liberty Star
Tombstone
Arizona

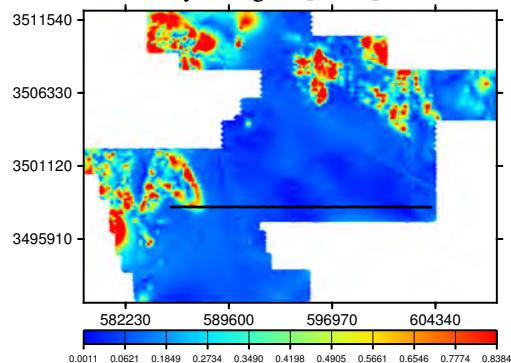
ZTEM System: Heliborne ZTEM
Job Number: GL130168

3D-ZTEM Inversion: Resistivity Sections
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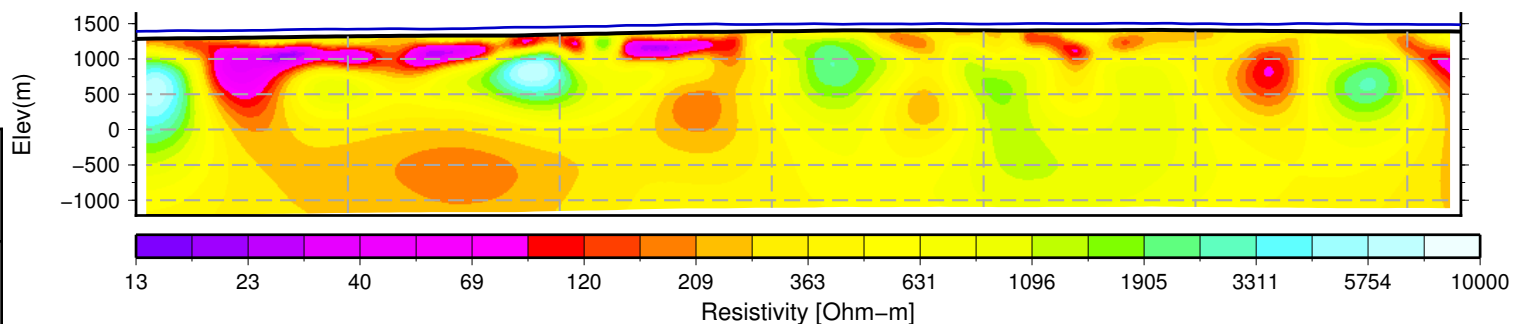
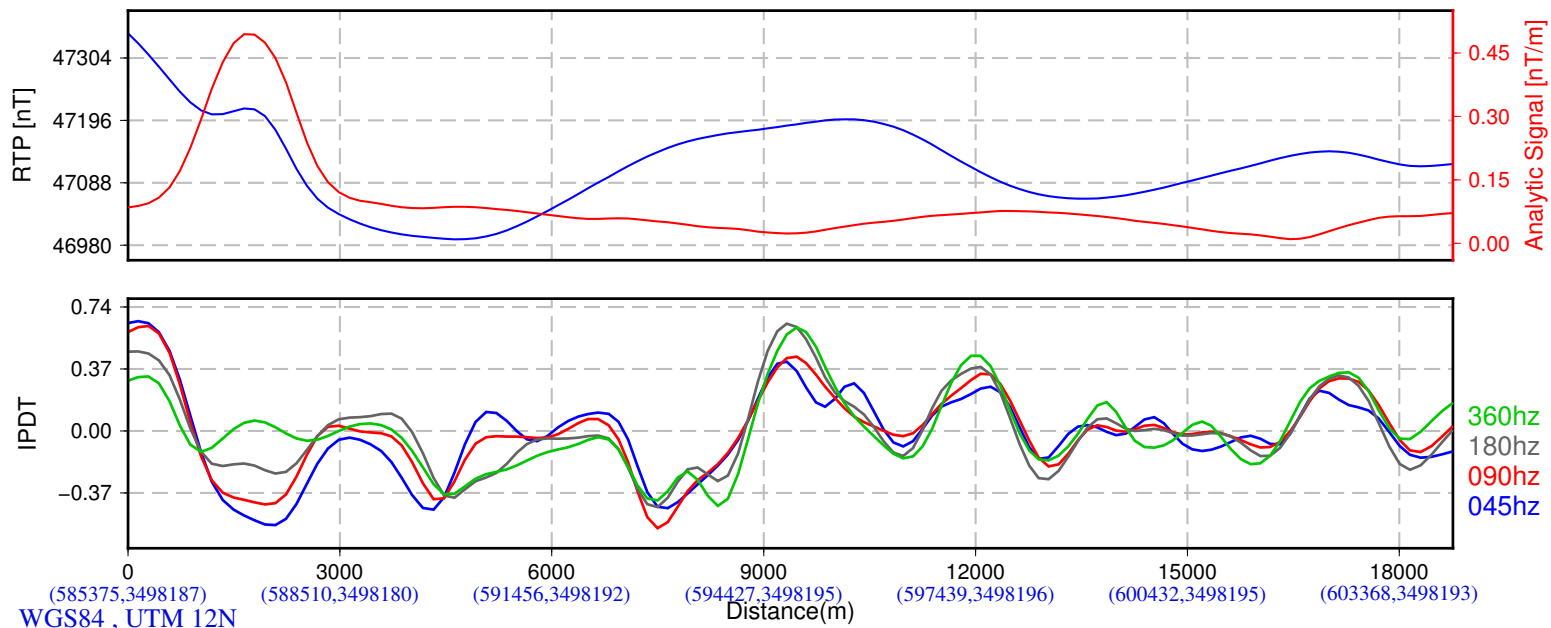
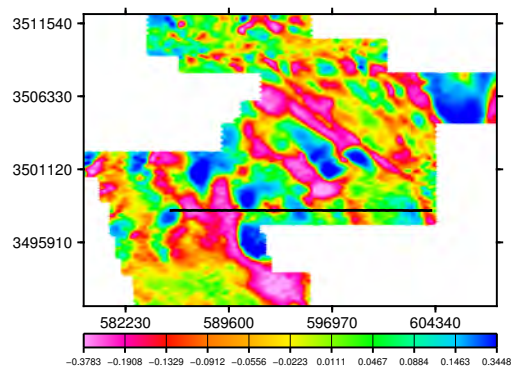
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1430

Analytic Signal [nT/m]



IP 090Hz DT



Liberty Star
Tombstone
Arizona

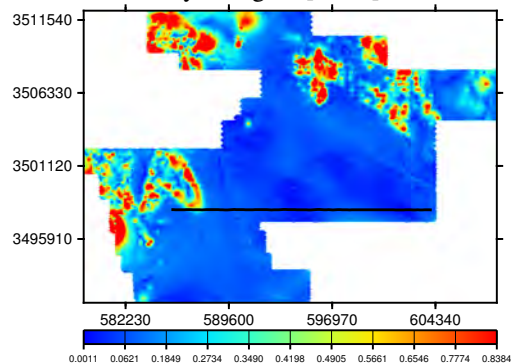
ZTEM System: Heliborne ZTEM
Job Number: GL130168

3D-ZTEM Inversion: Resistivity Sections
Flown by Geotech Ltd
Processed by Geotech Ltd
270 Industrial Parkway South
Aurora, Ontario, Canada L4G 3T9
www.geotech.ca

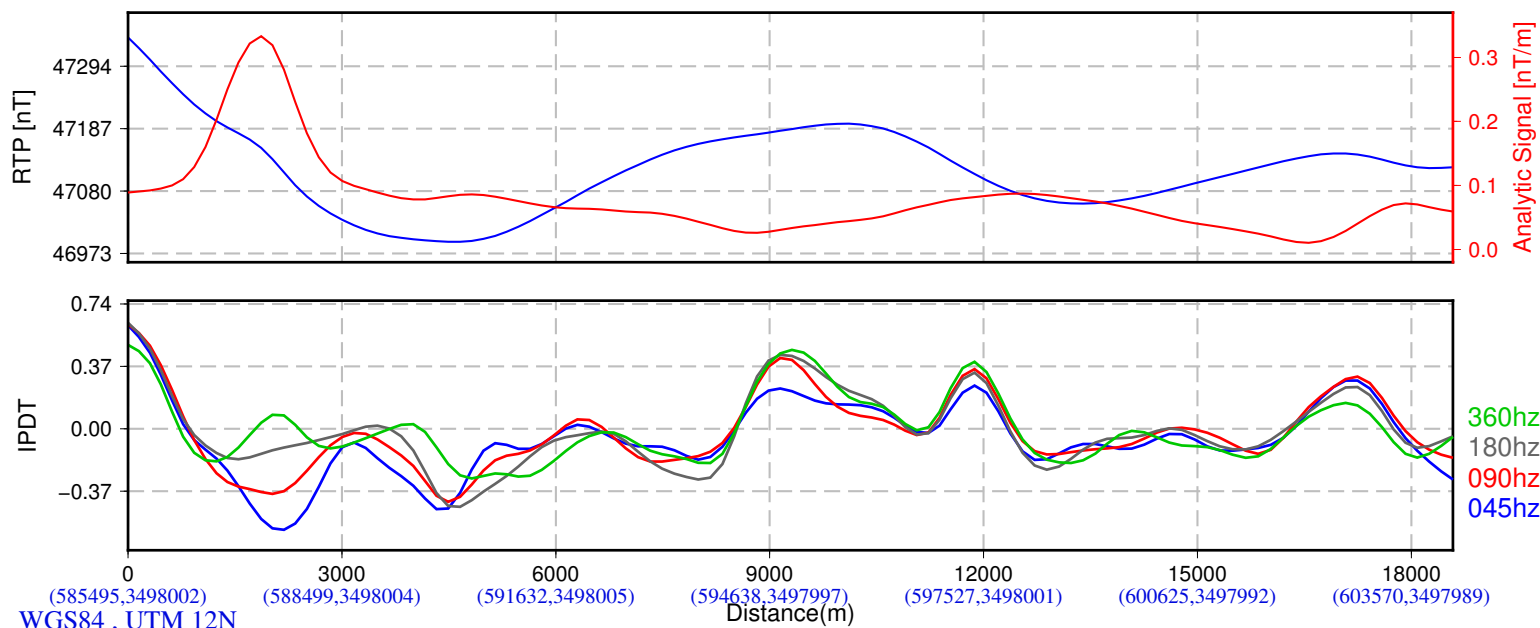
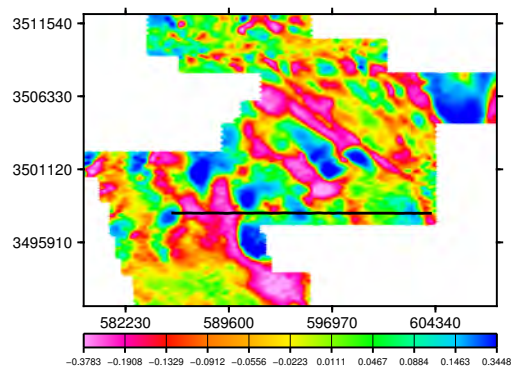
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1435

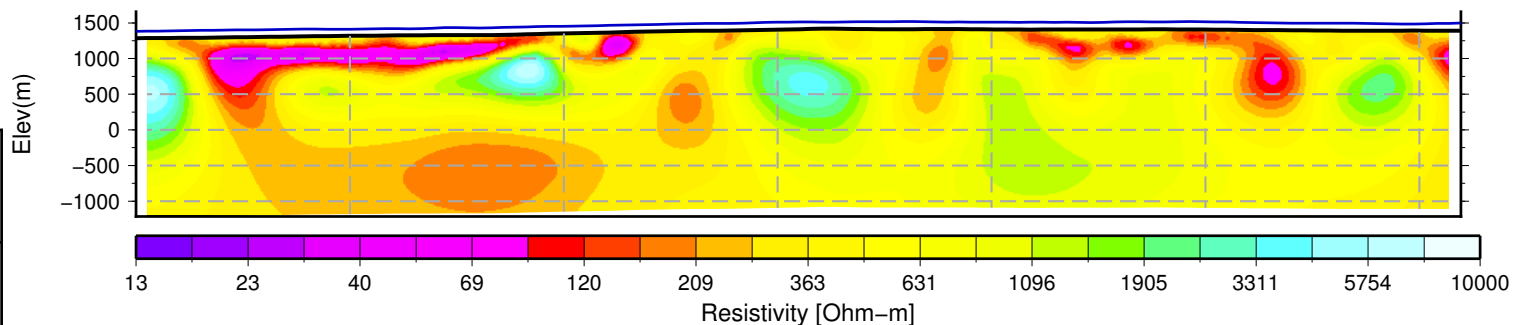
Analytic Signal [nT/m]



IP 090Hz DT



WGS84, UTM 12N



View looking North

Liberty Star
Tombstone
Arizona

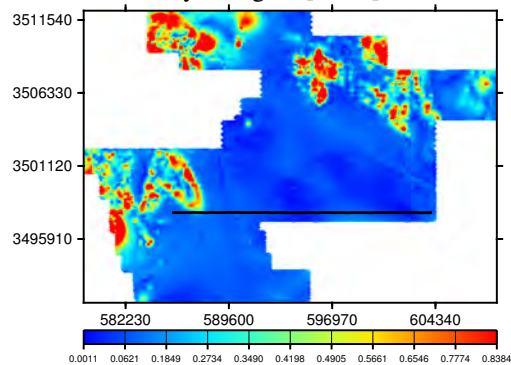
ZTEM System: Heliborne ZTEM
Job Number: GL130168

3D-ZTEM Inversion: Resistivity Sections
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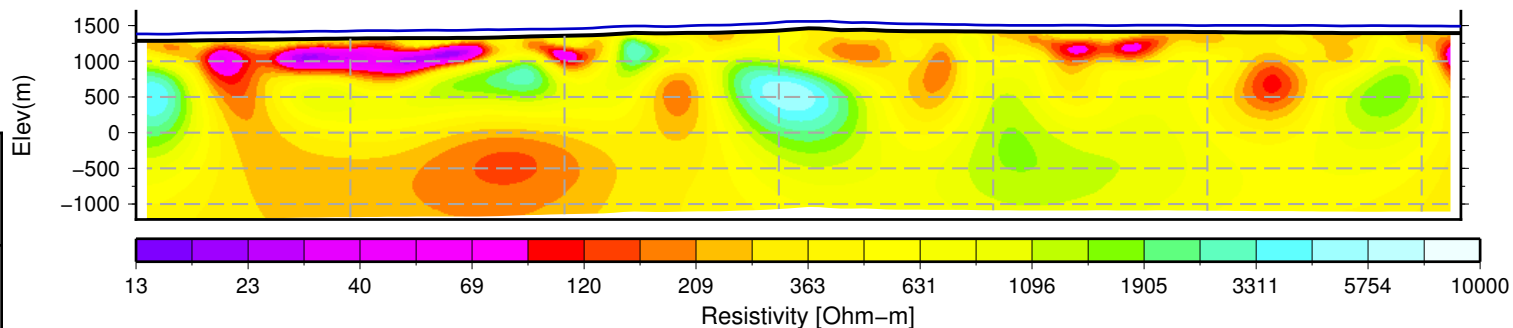
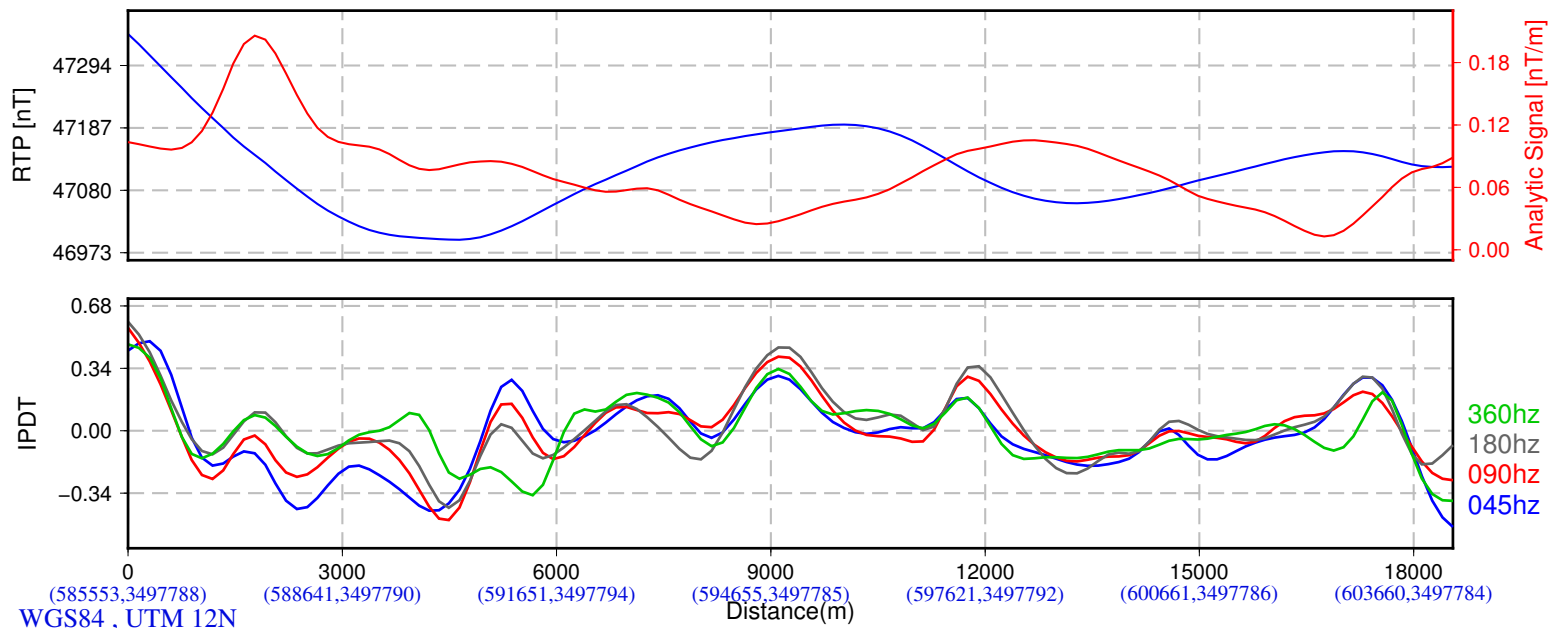
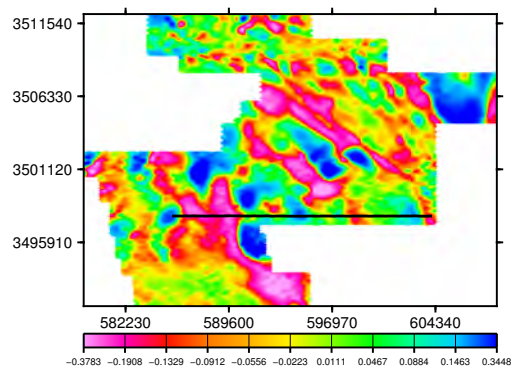
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1440

Analytic Signal [nT/m]



IP 090Hz DT



Liberty Star
Tombstone
Arizona

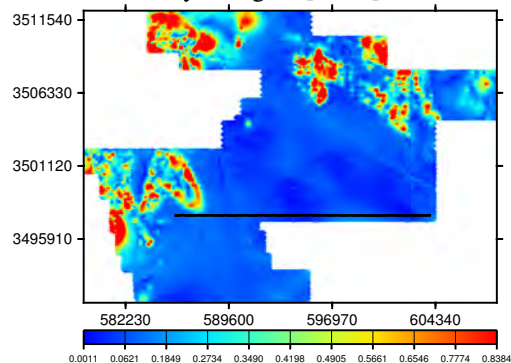
ZTEM System: Heliborne ZTEM
Job Number: GL130168

3D-ZTEM Inversion: Resistivity Sections
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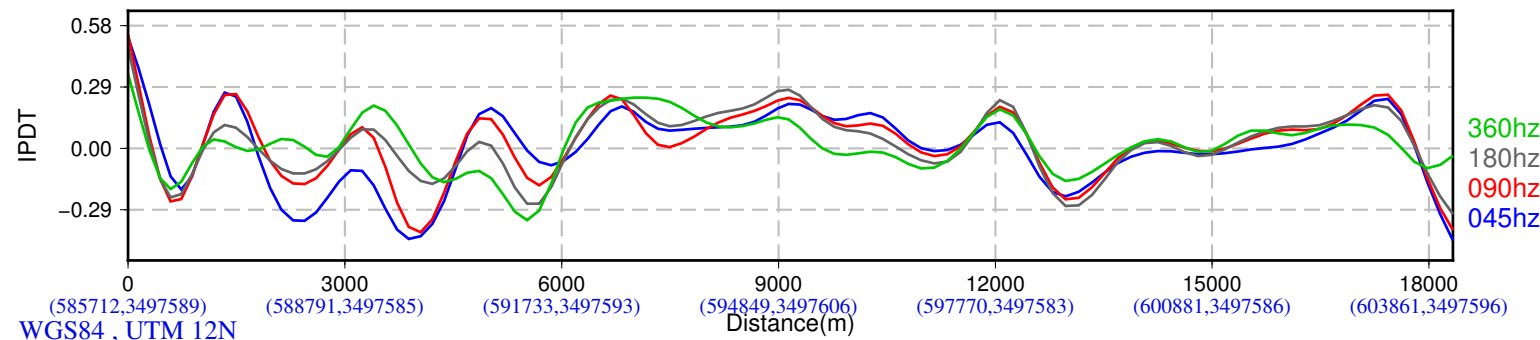
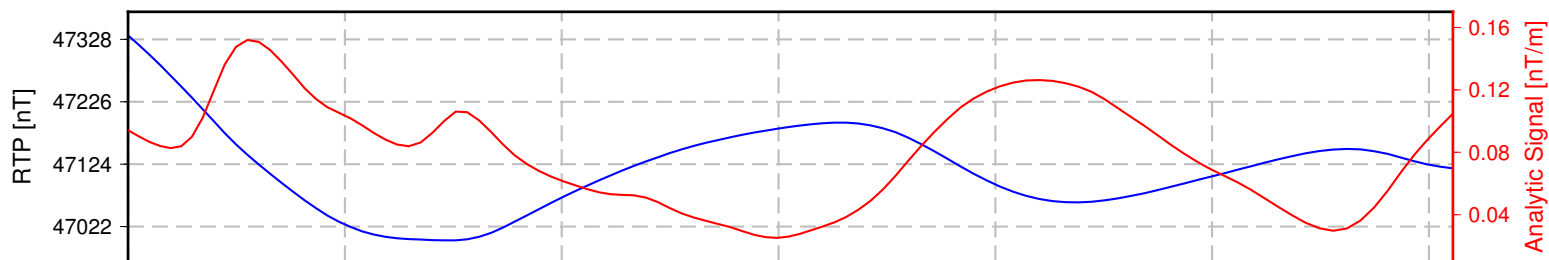
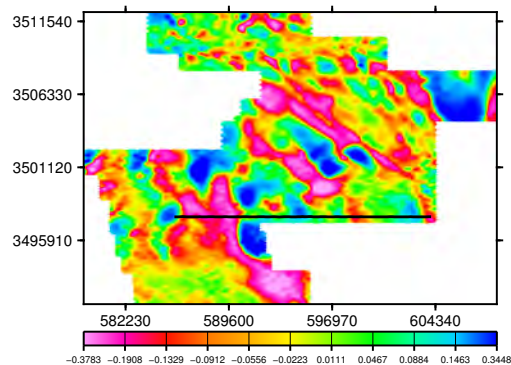
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1445

Analytic Signal [nT/m]



IP 090Hz DT



(585712,3497589)
WGS84 , UTM 12N

(588791,3497585)

(591733,3497593)

(594849,3497606)

(597770,3497583)

(600881,3497586)

(603861,3497596)

Liberty Star
Tombstone
Arizona

ZTEM System: Heliborne ZTEM

Job Number:GL130168

3D-ZTEM Inversion: Resistivity Sections

Flown by Geotech Ltd

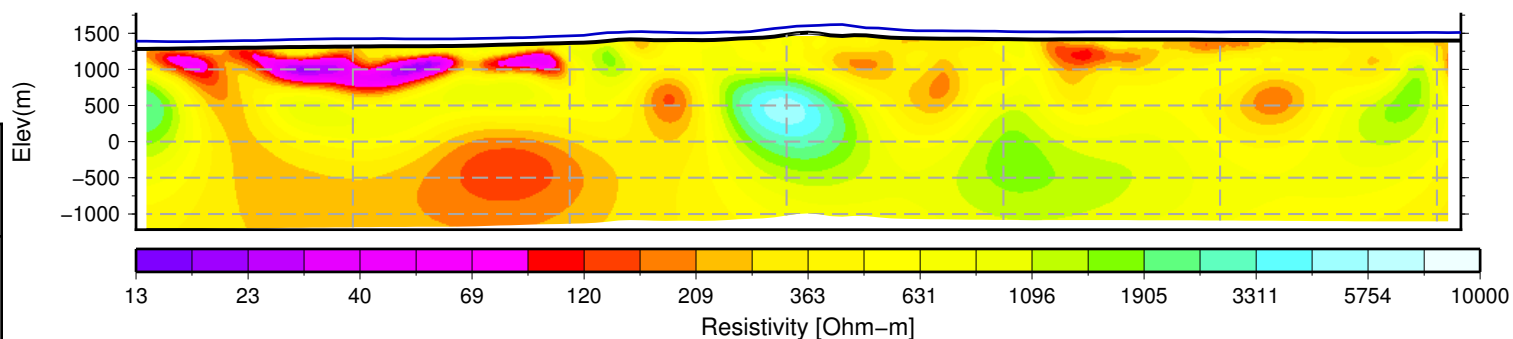
Processed by Geotech Ltd

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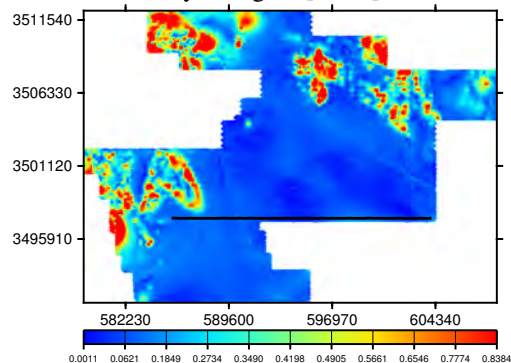
2019/11/20



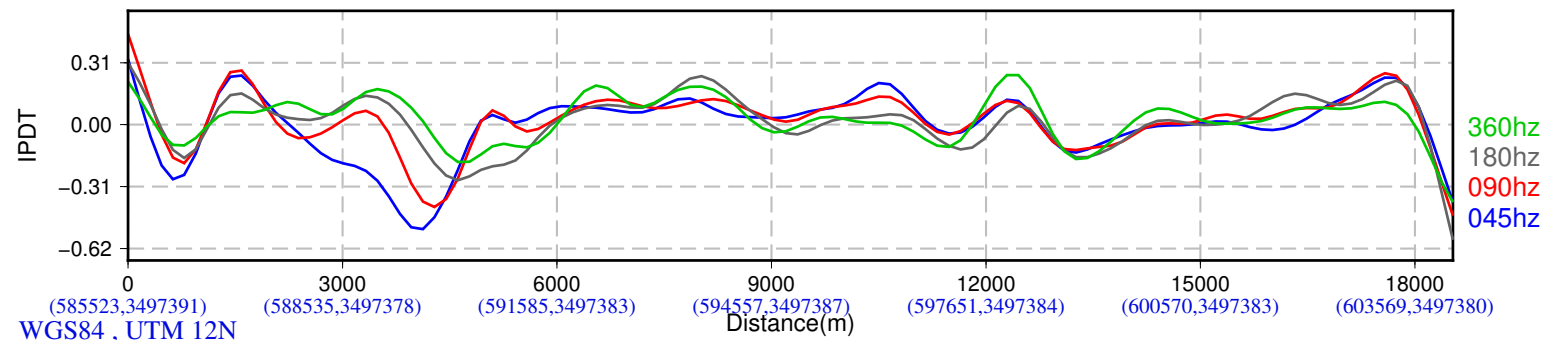
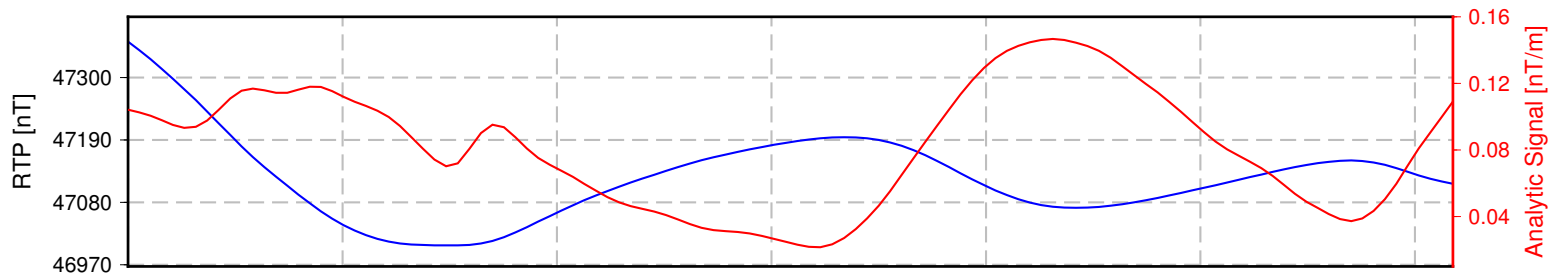
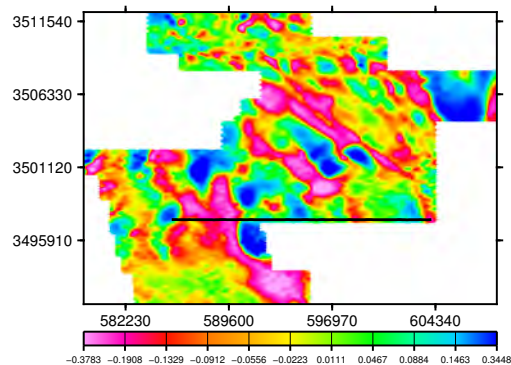
View looking North

3D ZTEM Inversion: Resistivity Section for Line 1450

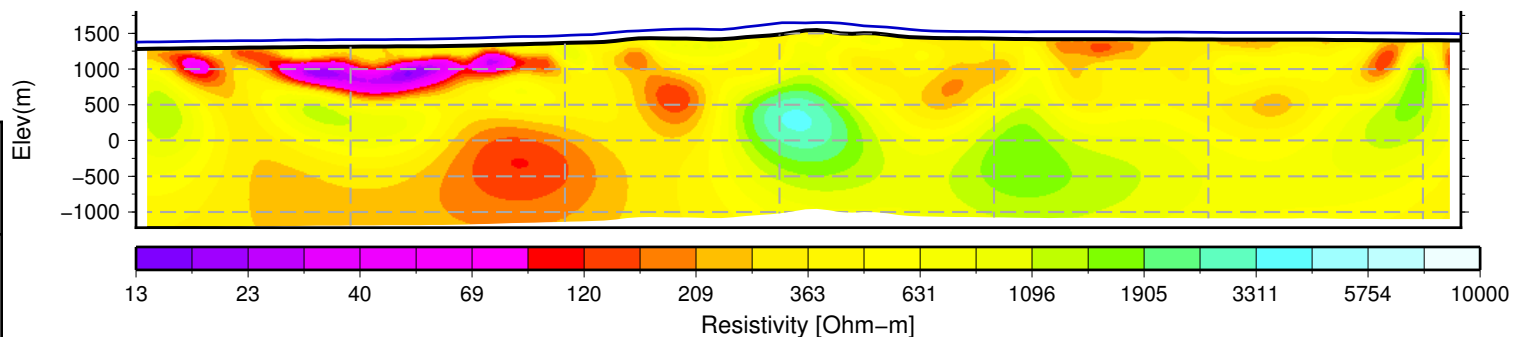
Analytic Signal [nT/m]



IP 090Hz DT



(585523,3497391) (588535,3497378) (591585,3497383) (594557,3497387) (597651,3497384) (600570,3497383) (603569,3497380)
WGS84 , UTM 12N



View looking North

Liberty Star
Tombstone
Arizona

ZTEM System: Heliborne ZTEM

Job Number:GL130168

3D-ZTEM Inversion: Resistivity Sections

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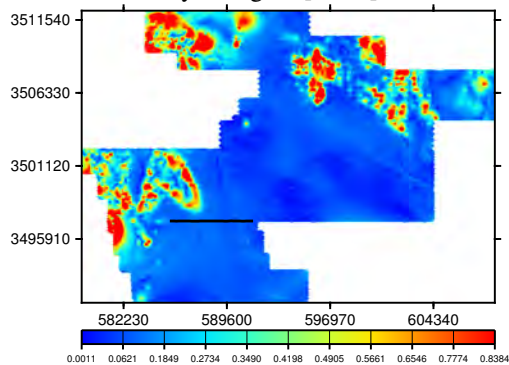
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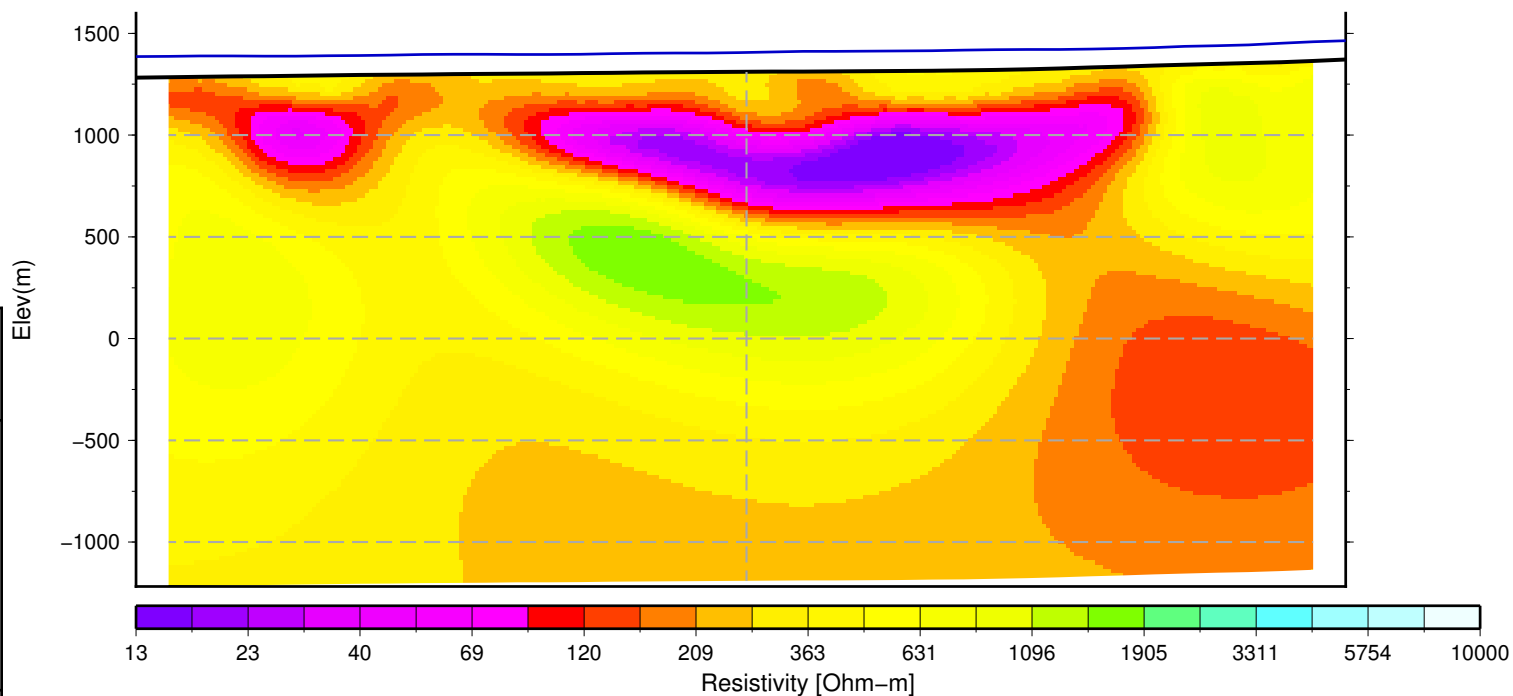
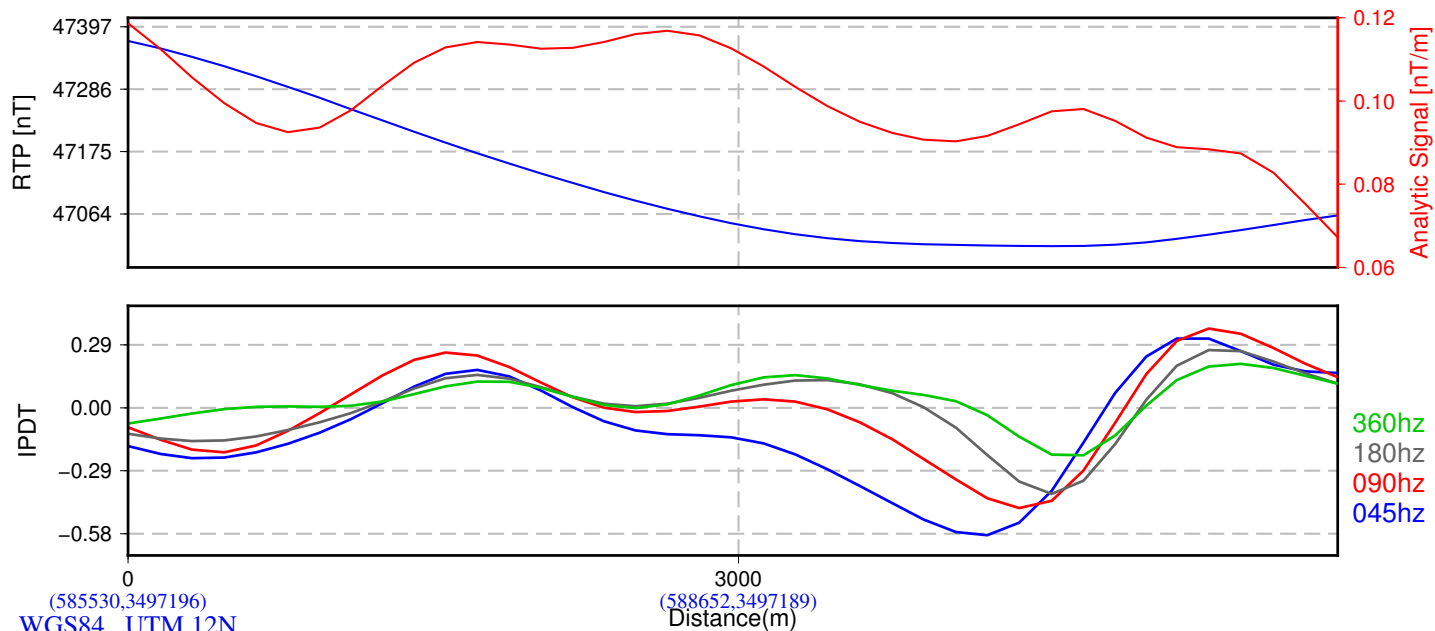
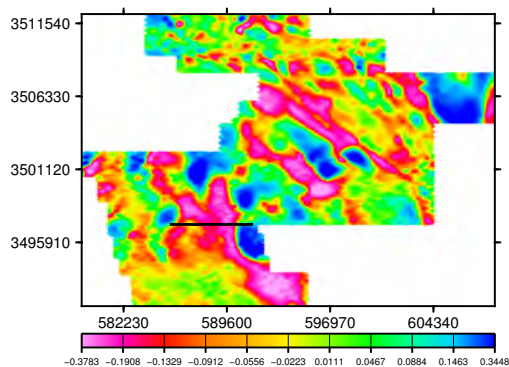
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1455

Analytic Signal [nT/m]



IP 090Hz DT



Liberty Star
Tombstone
Arizona

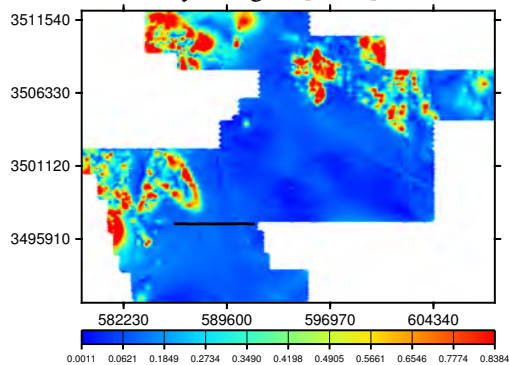
ZTEM System: Heliborne ZTEM
Job Number: GL130168

3D-ZTEM Inversion: Resistivity Sections
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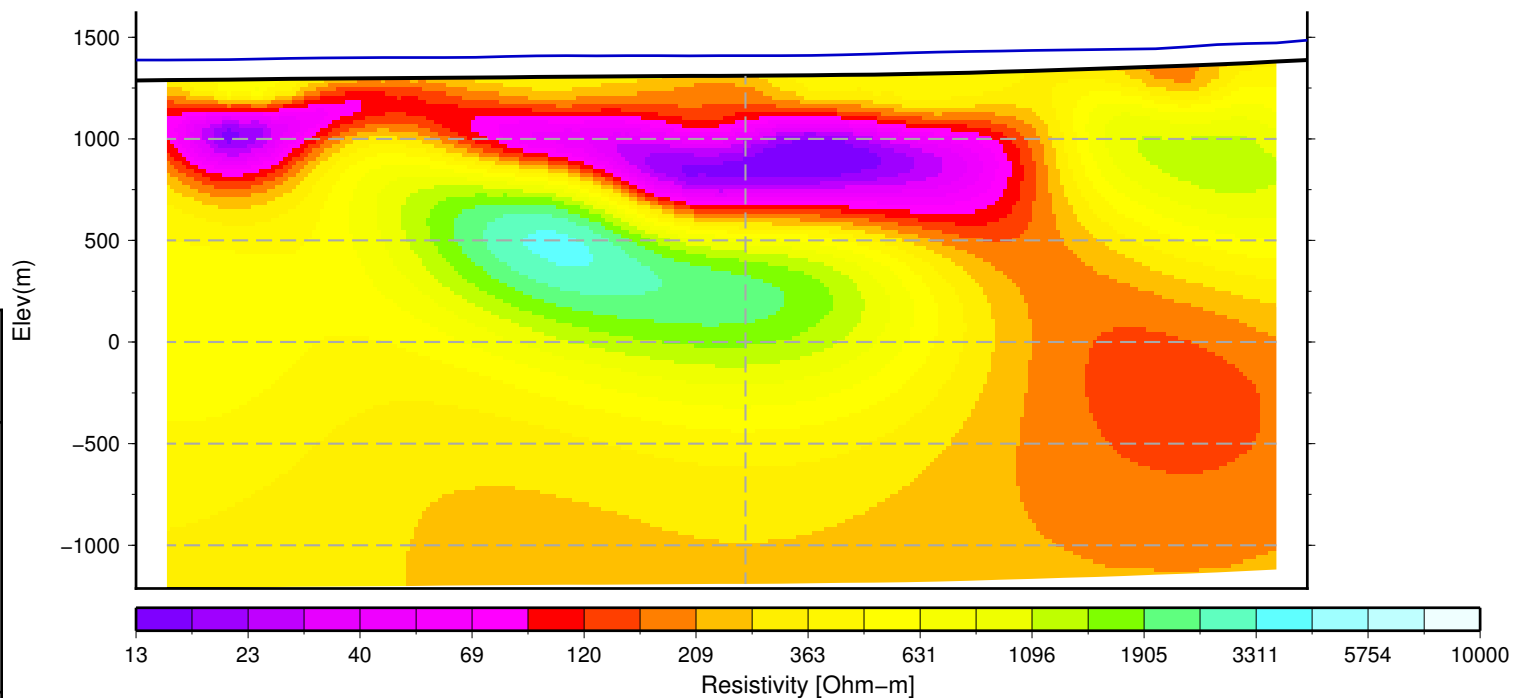
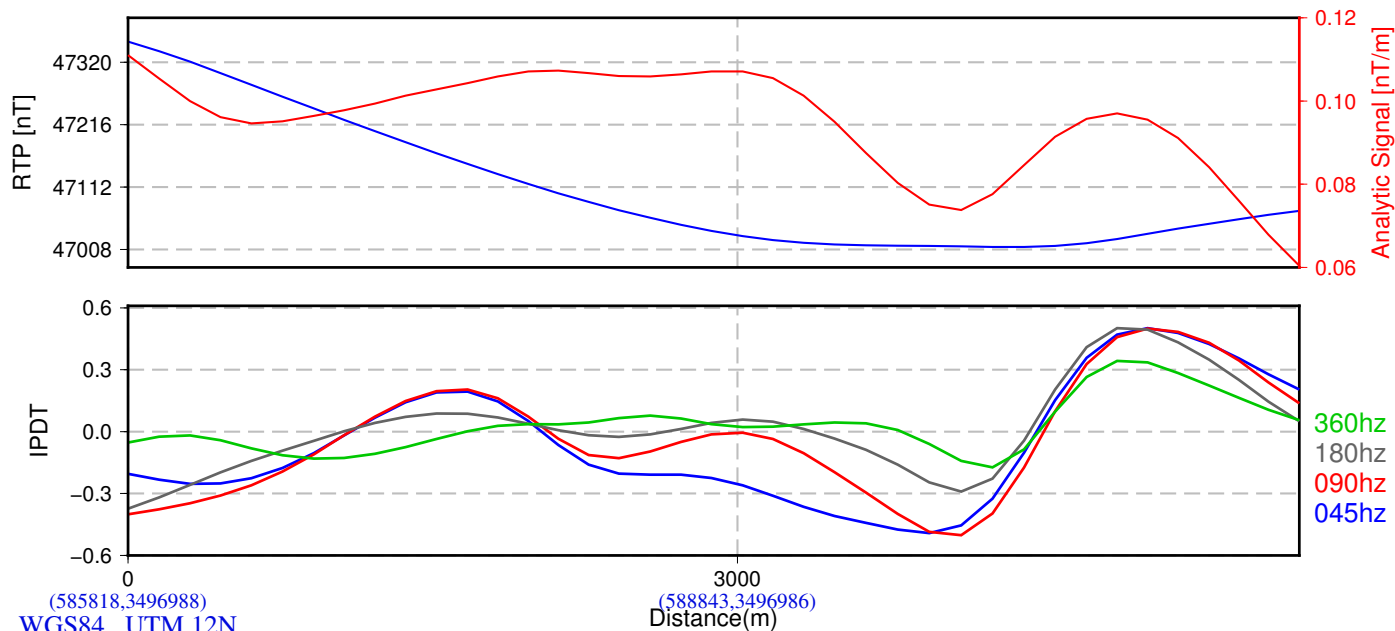
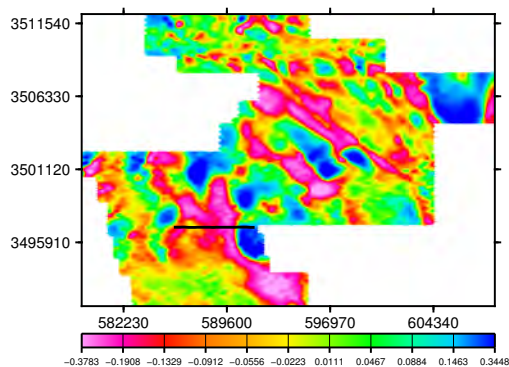
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1460

Analytic Signal [nT/m]



IP 090Hz DT



Liberty Star
Tombstone
Arizona

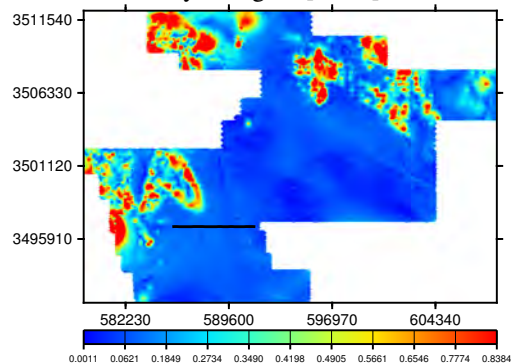
ZTEM System: Heliborne ZTEM
Job Number: GL130168

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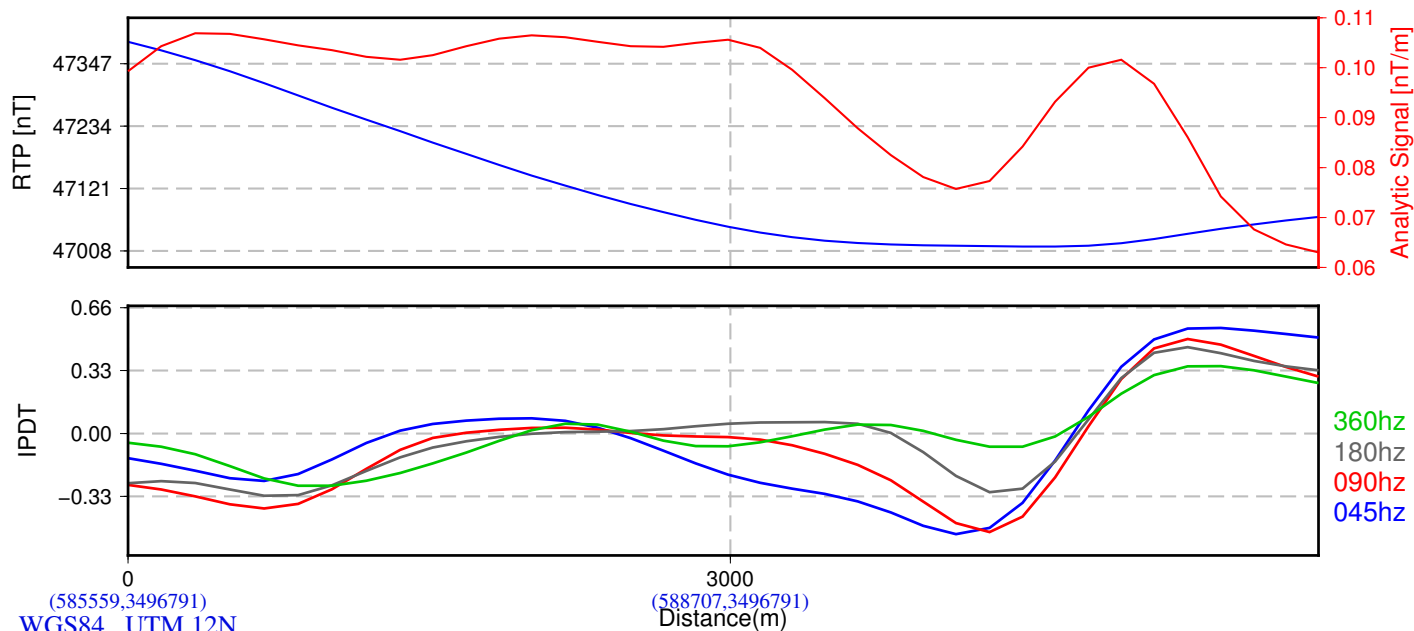
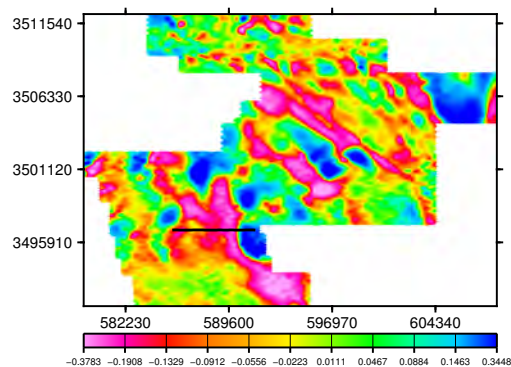
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1465

Analytic Signal [nT/m]

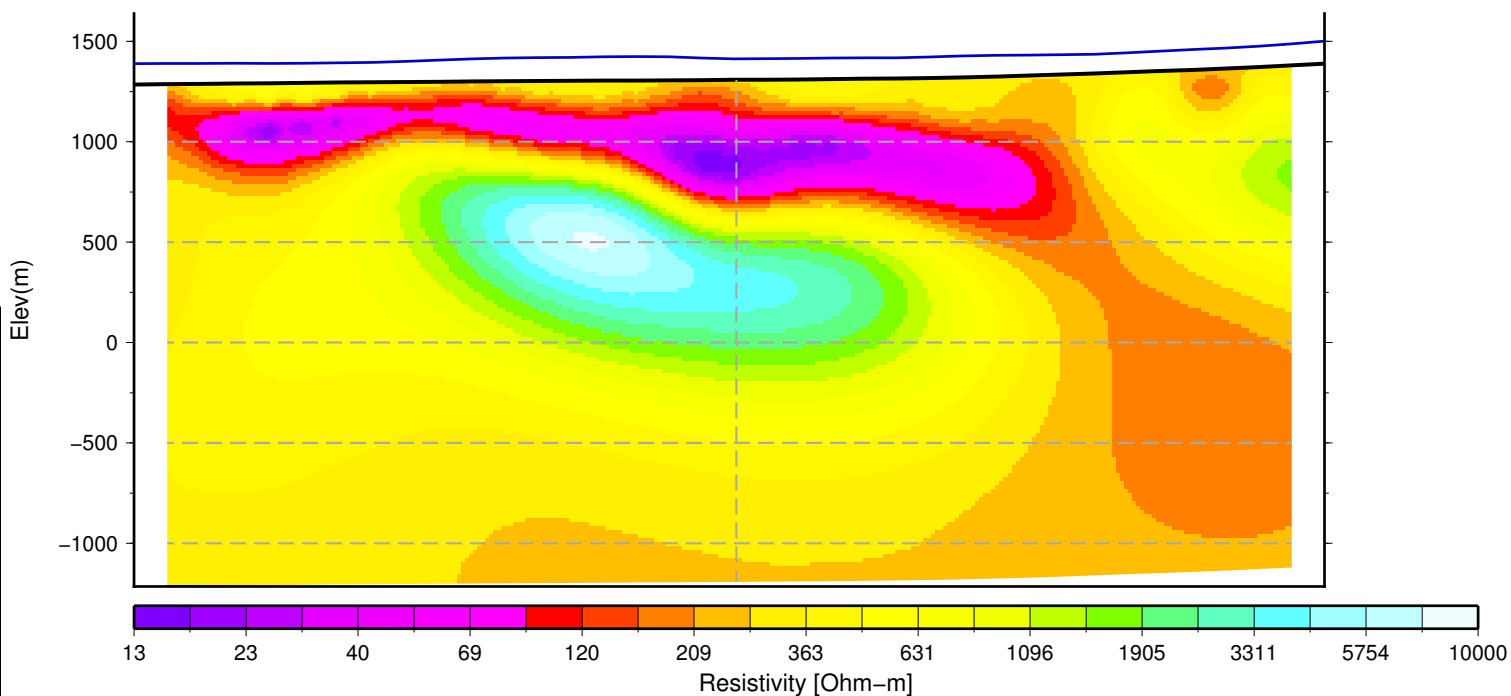


IP 090Hz DT



(585559,3496791)
WGS84 , UTM 12N

(588707,3496791)
Distance(m)



Liberty Star
Tombstone
Arizona

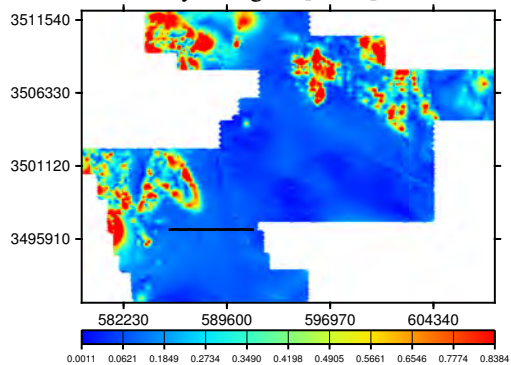
ZTEM System: Heliborne ZTEM
Job Number: GL130168

3D-ZTEM Inversion: Resistivity Sections
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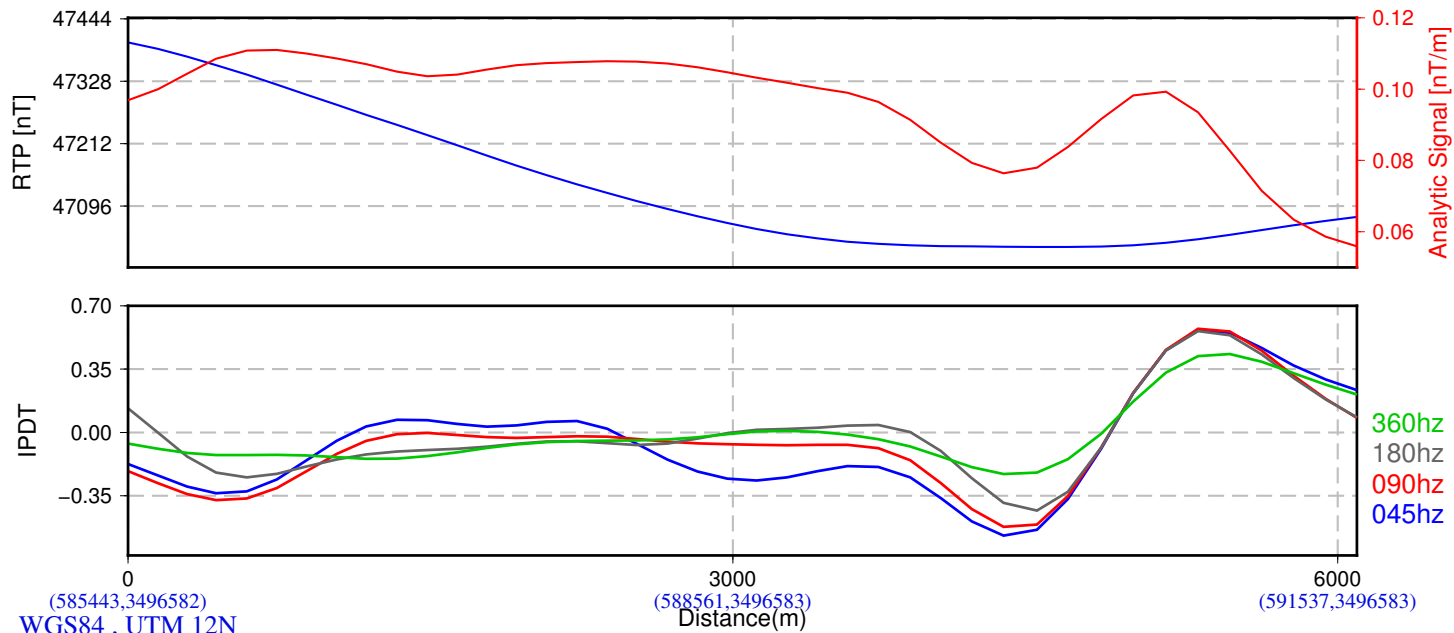
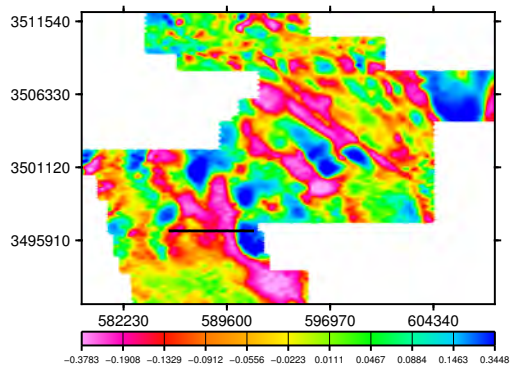
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1470

Analytic Signal [nT/m]



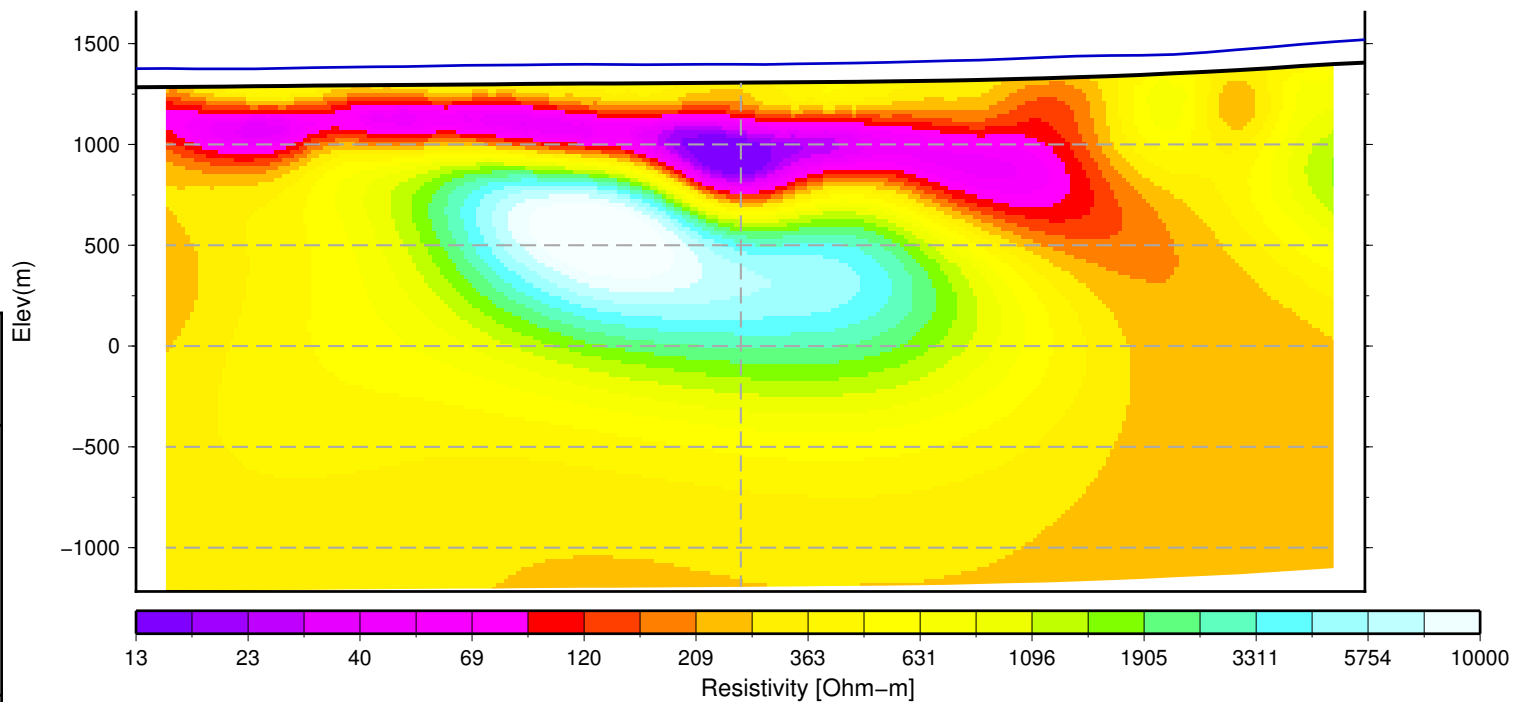
IP 090Hz DT



(585443,3496582)
WGS84 , UTM 12N

(588561,3496583)
Distance(m)

(591537,3496583)



View looking North

Liberty Star
Tombstone
Arizona

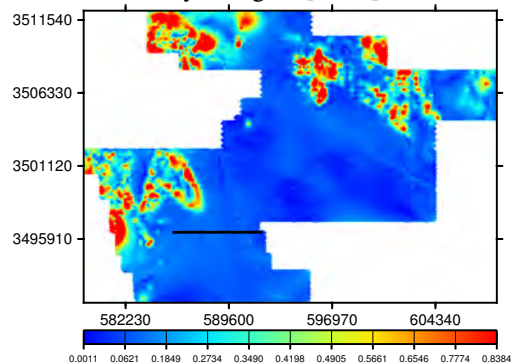
ZTEM System: Heliborne ZTEM
Job Number:GL130168

3D-ZTEM Inversion: Resistivity Sections
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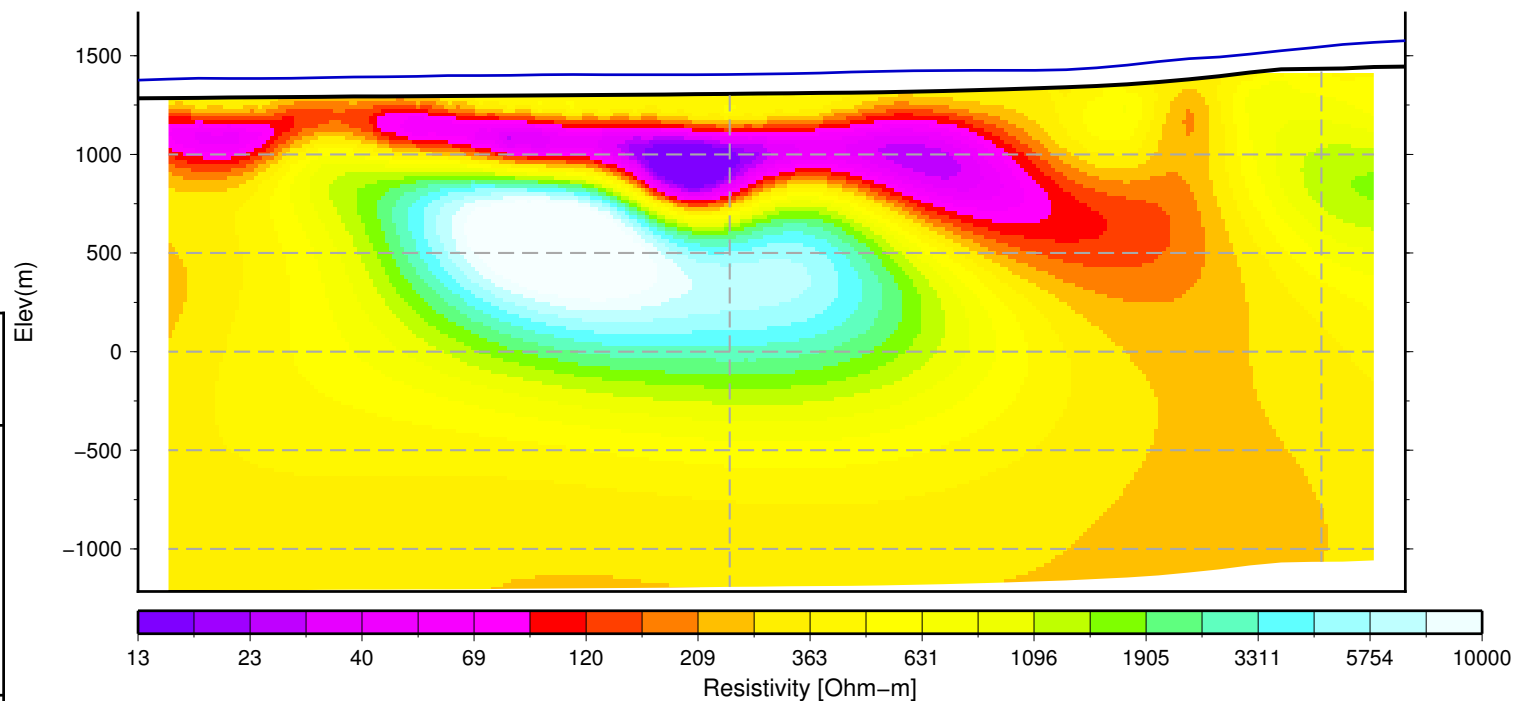
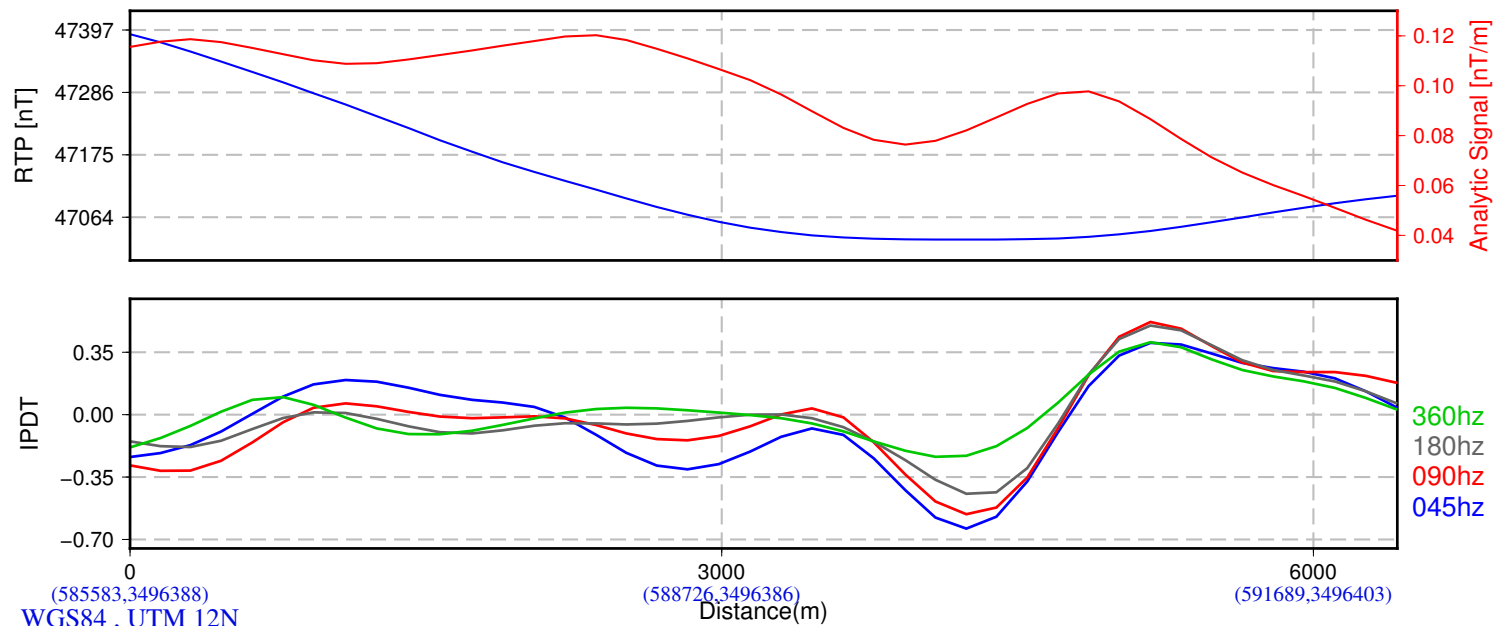
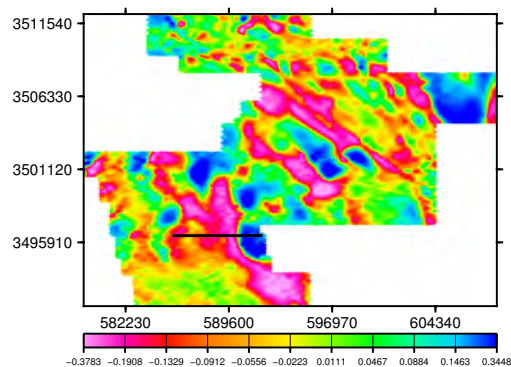
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1475

Analytic Signal [nT/m]



IP 090Hz DT



Liberty Star
Tombstone
Arizona

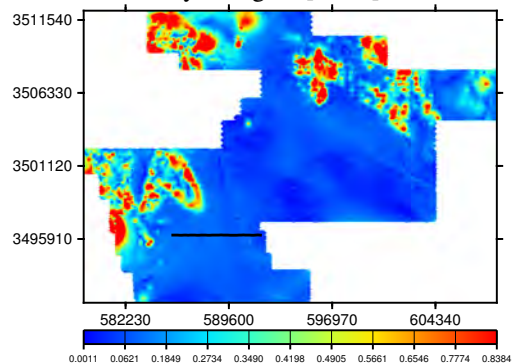
ZTEM System: Heliborne ZTEM
Job Number: GL130168

3D-ZTEM Inversion: Resistivity Sections
Flown by Geotech Ltd
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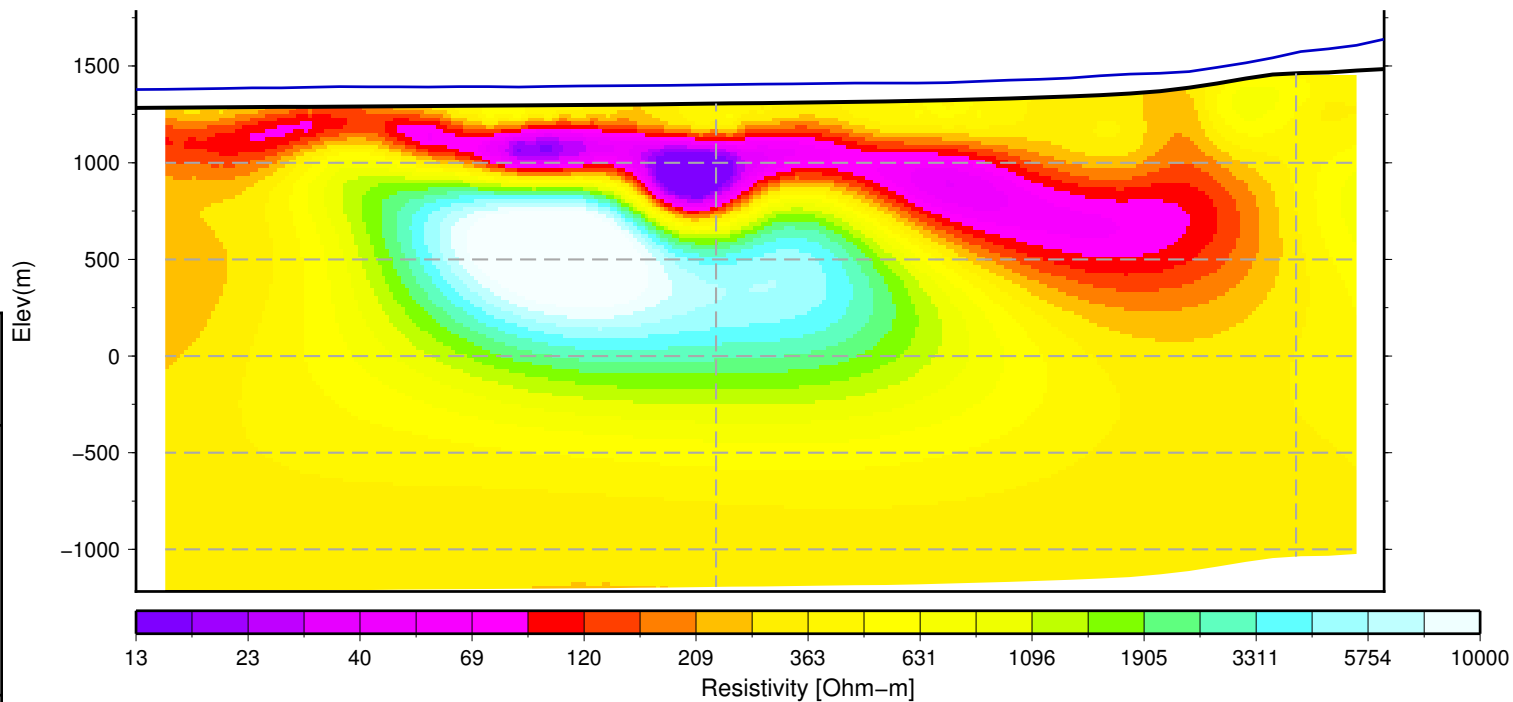
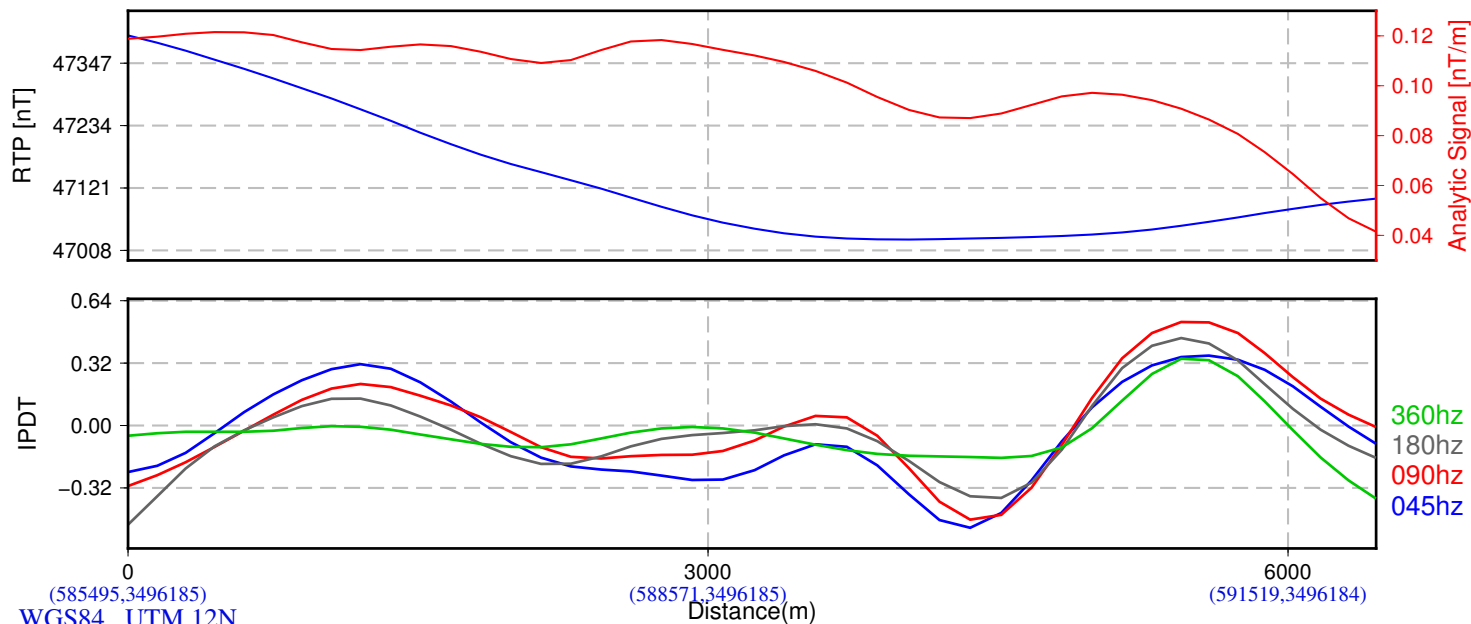
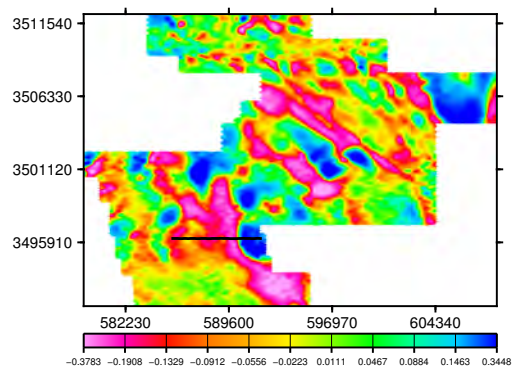
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1480

Analytic Signal [nT/m]



IP 090Hz DT



Liberty Star
Tombstone
Arizona

ZTEM System: Heliborne ZTEM
Job Number: GL130168

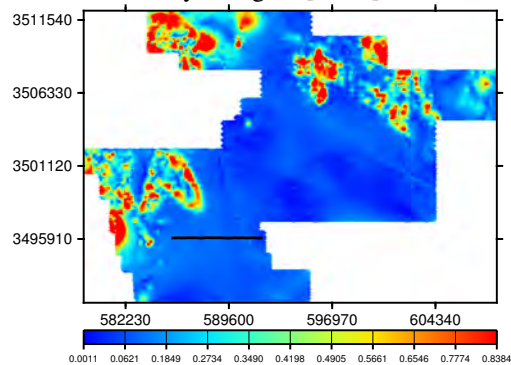
3D-ZTEM Inversion: Resistivity Sections
Flown by Geotech Ltd
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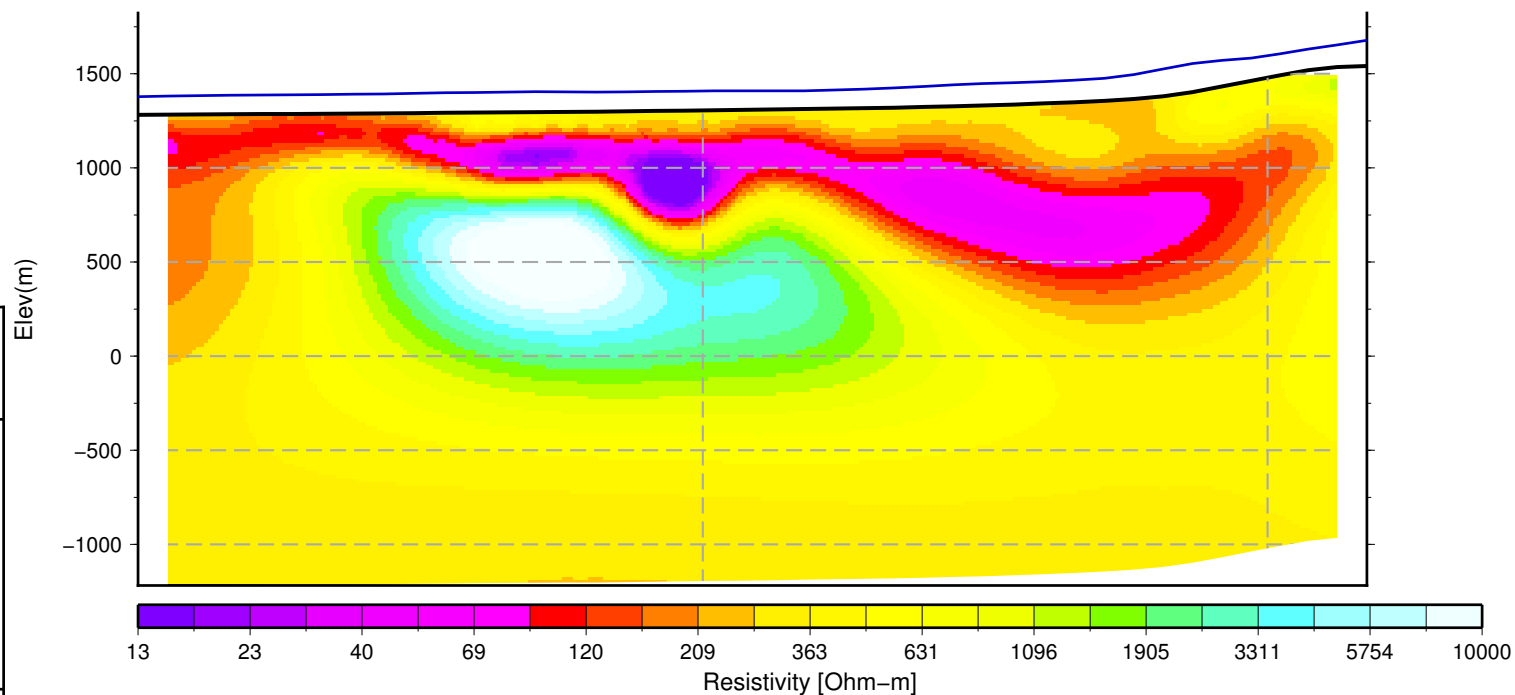
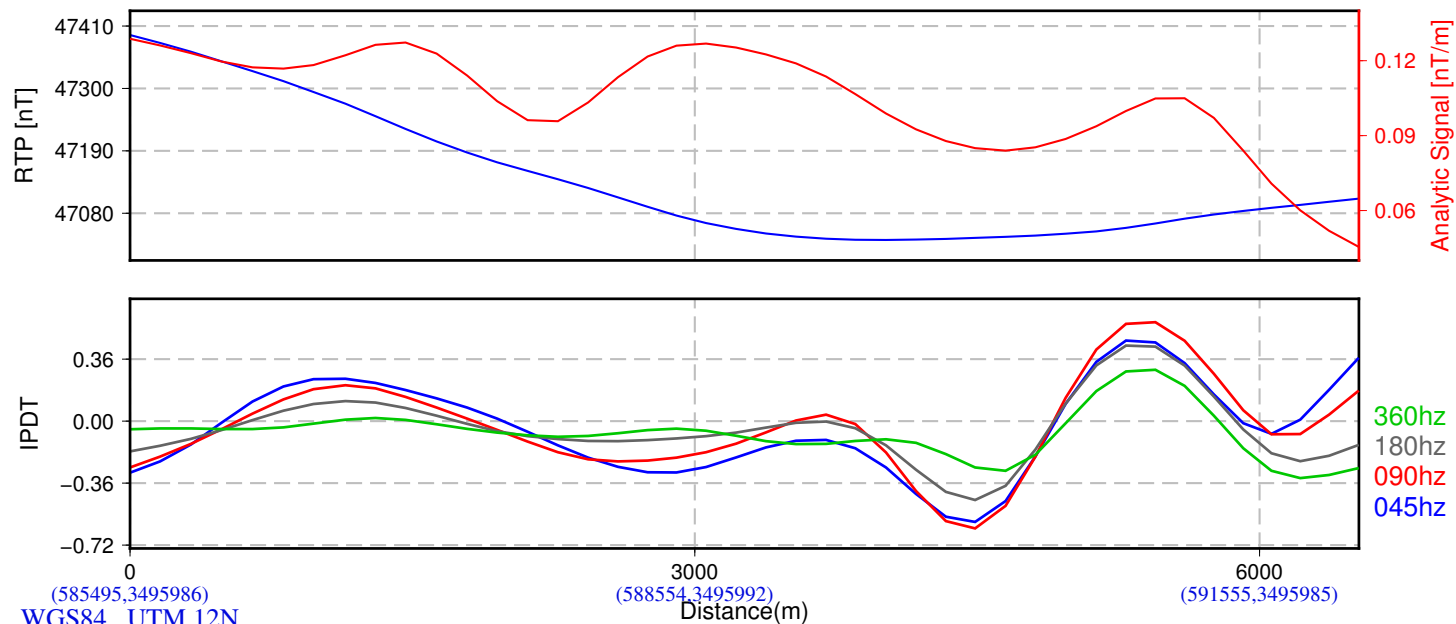
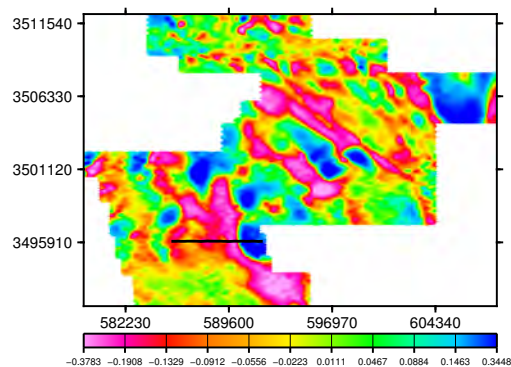
View looking North

3D ZTEM Inversion: Resistivity Section for Line 1485

Analytic Signal [nT/m]



IP 090Hz DT



Liberty Star
Tombstone
Arizona

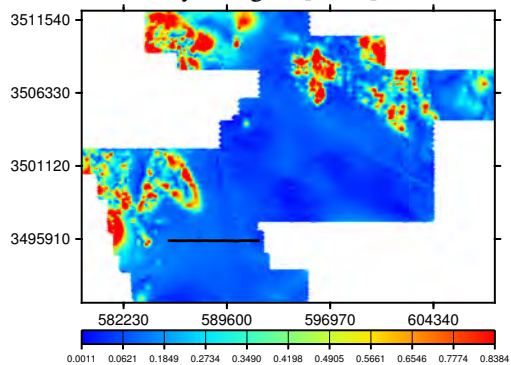
ZTEM System: Heliborne ZTEM
Job Number: GL130168

3D-ZTEM Inversion: Resistivity Sections
Flown by Geotech Ltd
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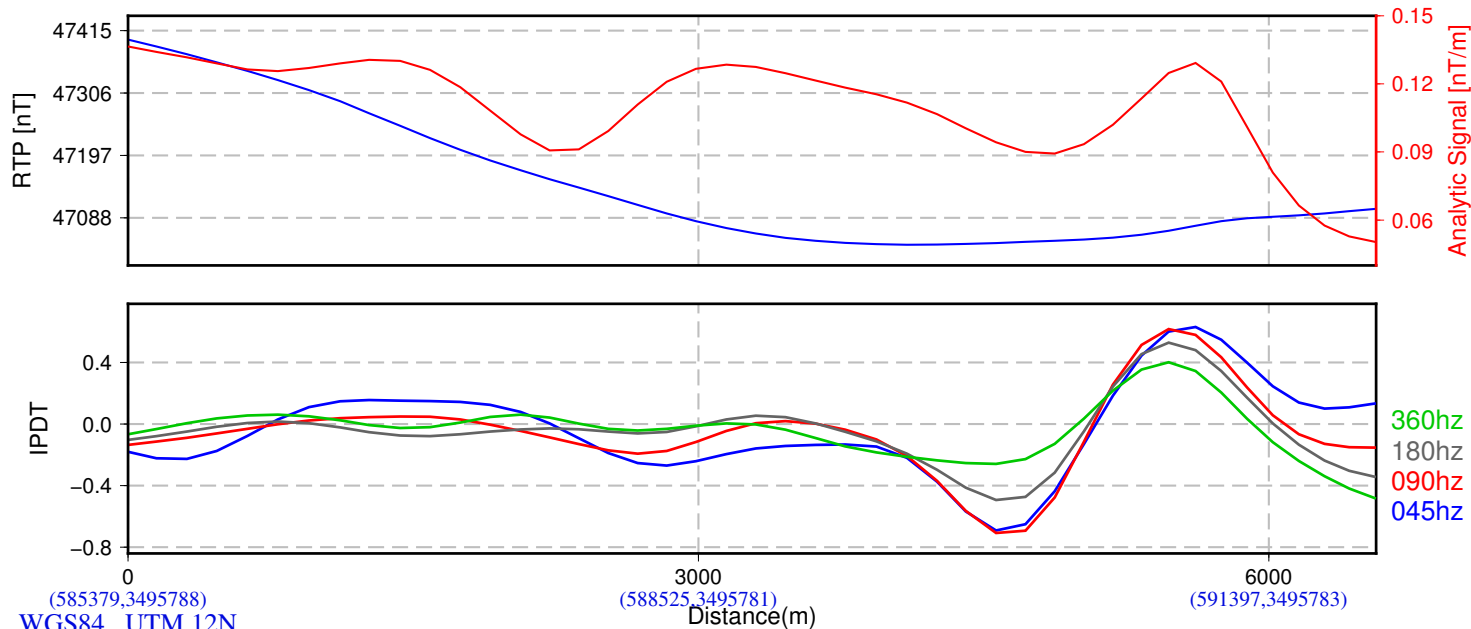
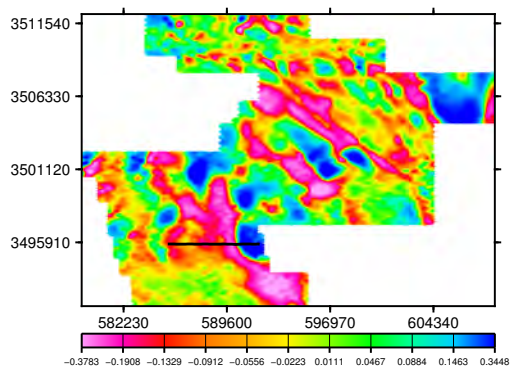
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1490

Analytic Signal [nT/m]



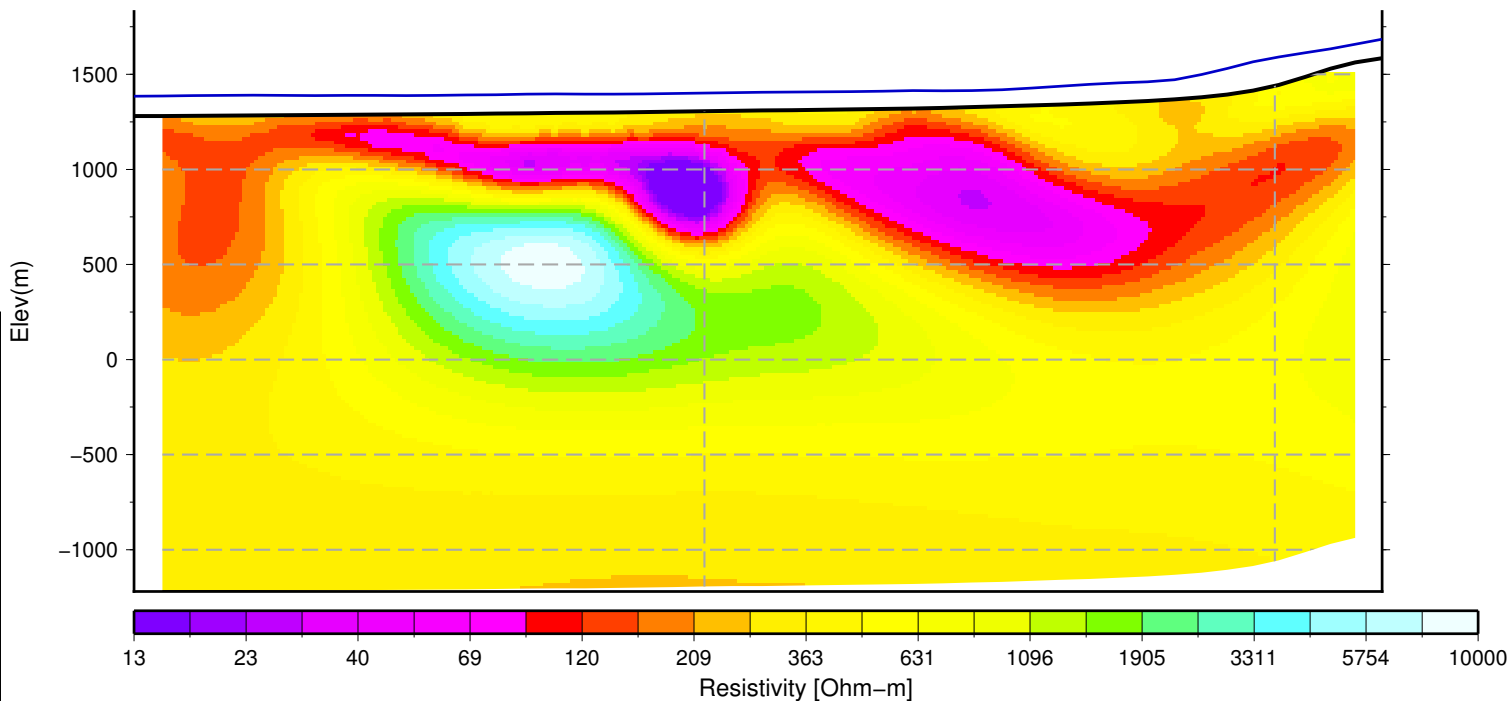
IP 090Hz DT



(585379,3495788)
WGS84 , UTM 12N

(588525,3495781)
Distance(m)

(591397,3495783)



View looking North

Liberty Star
Tombstone
Arizona

ZTEM System: Heliborne ZTEM
Job Number:GL130168

3D-ZTEM Inversion: Resistivity Sections

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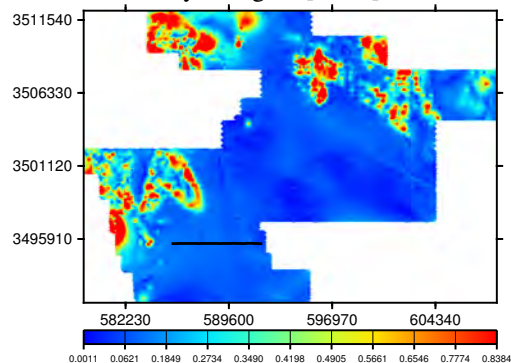
270 Industrial Parkway South
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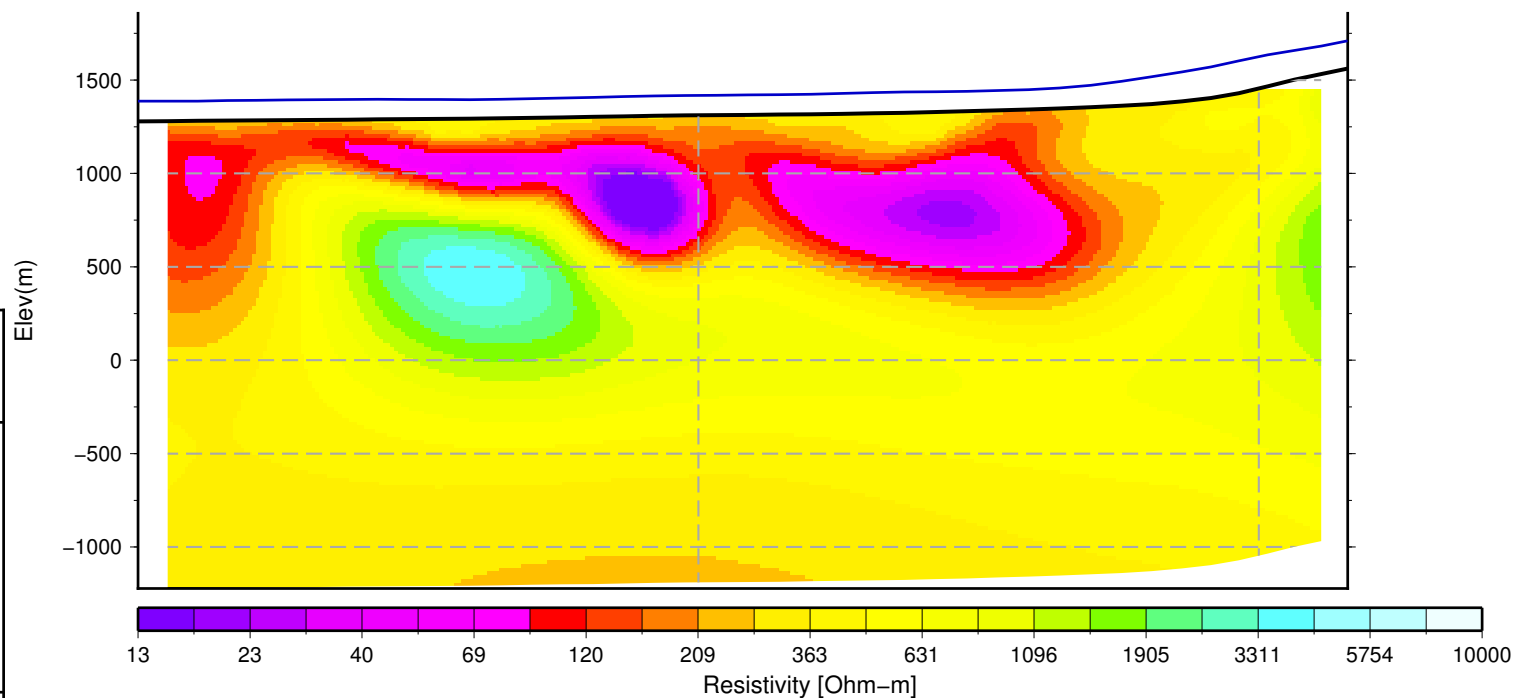
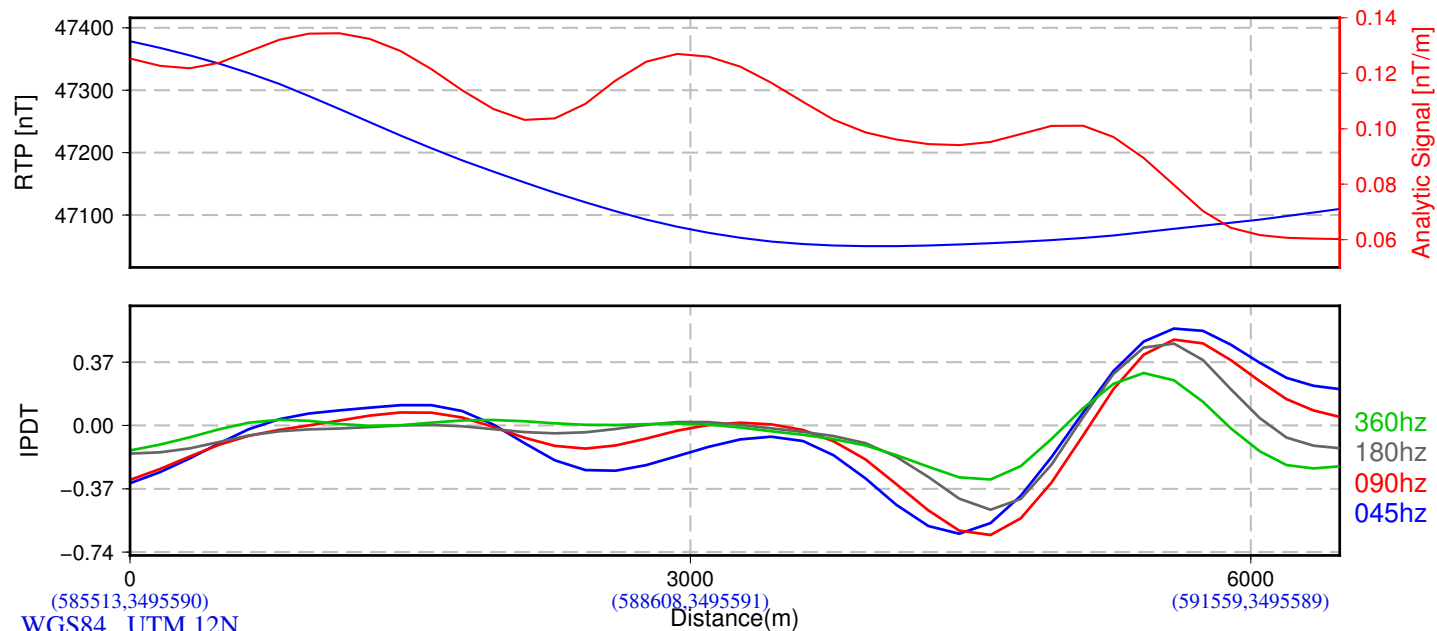
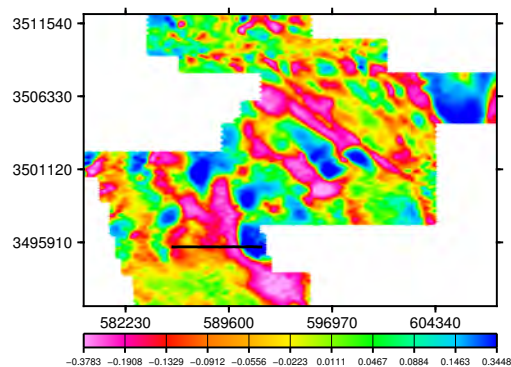
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1495

Analytic Signal [nT/m]



IP 090Hz DT



Liberty Star
Tombstone
Arizona

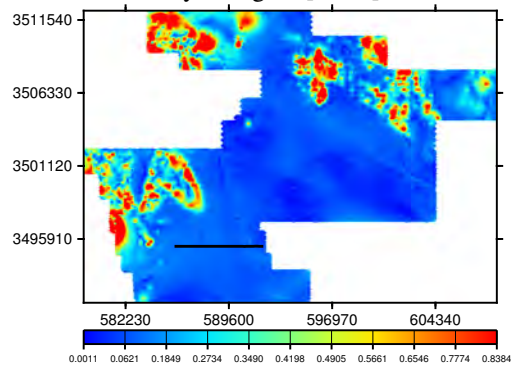
ZTEM System: Heliborne ZTEM
Job Number: GL130168

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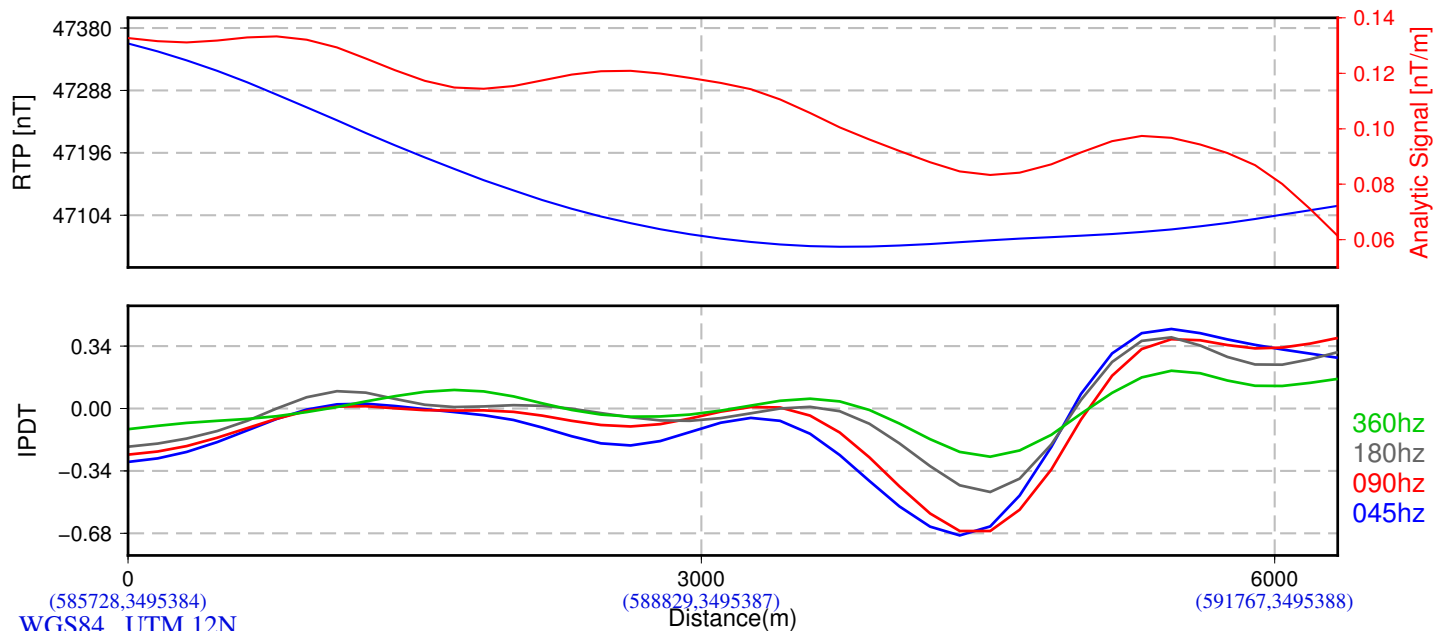
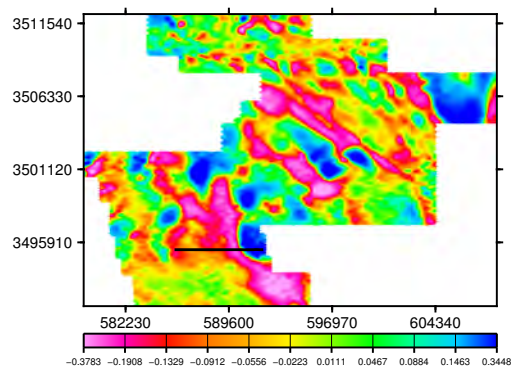
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1500

Analytic Signal [nT/m]



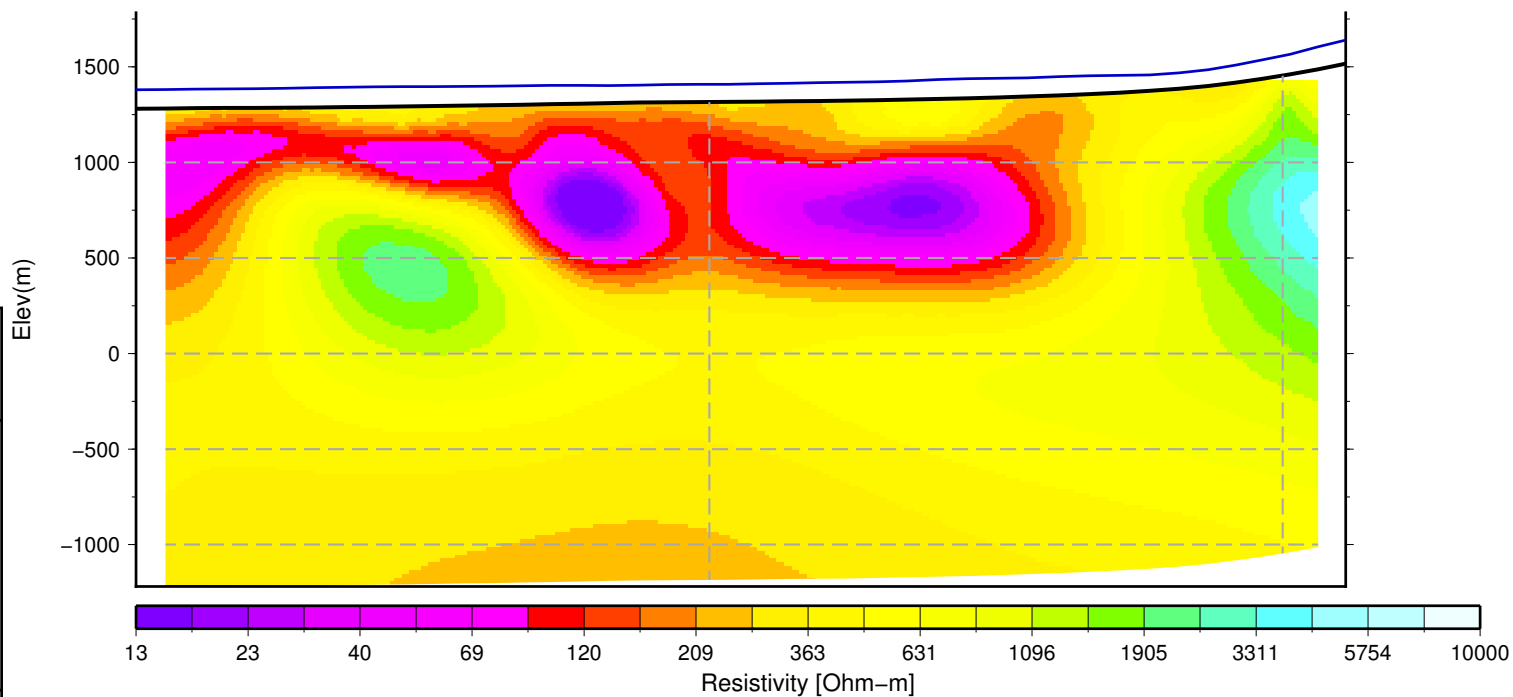
IP 090Hz DT



(585728,3495384)
WGS84 , UTM 12N

(588829,3495387)
Distance(m)

(591767,3495388)



Liberty Star
Tombstone
Arizona

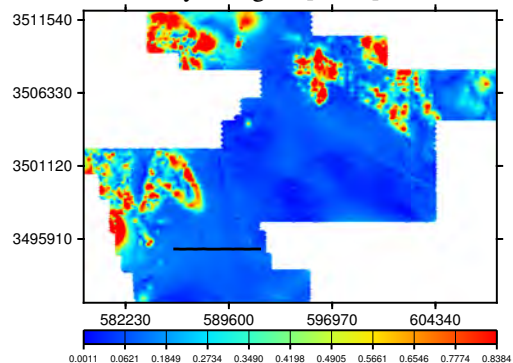
ZTEM System: Heliborne ZTEM
Job Number:GL130168

3D-ZTEM Inversion: Resistivity Sections
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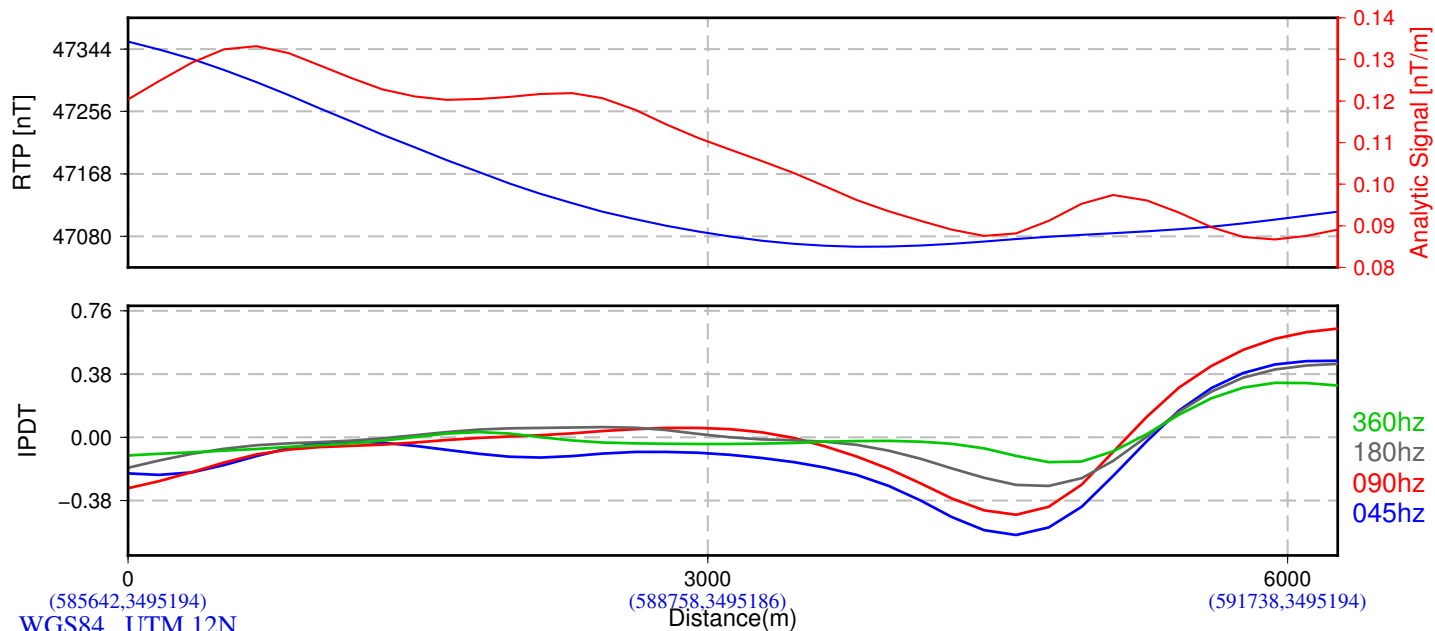
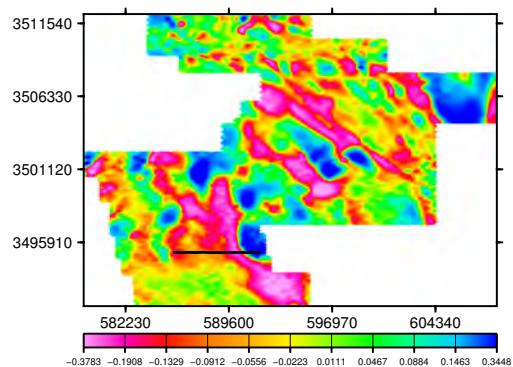
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1505

Analytic Signal [nT/m]



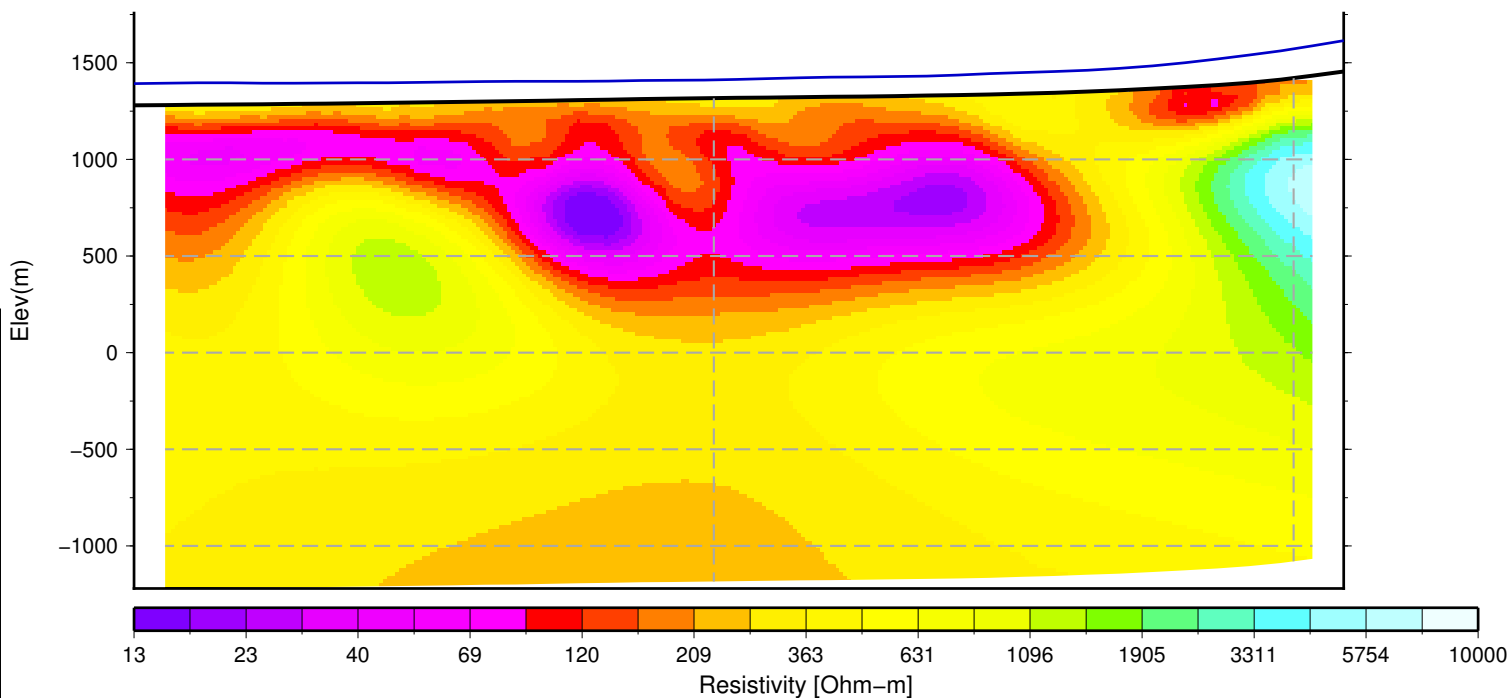
IP 090Hz DT



(585642,3495194)
WGS84 , UTM 12N

(588758,3495186)
Distance(m)

(591738,3495194)



View looking North

Liberty Star
Tombstone
Arizona

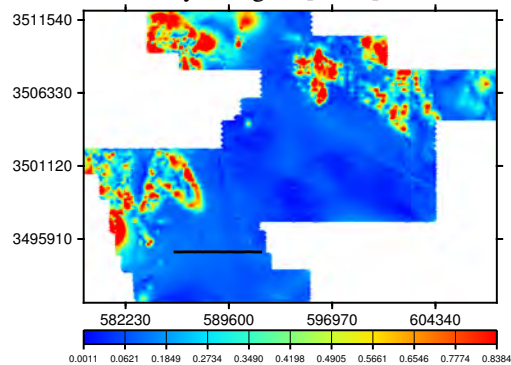
ZTEM System: Heliborne ZTEM
Job Number:GL130168

3D-ZTEM Inversion: Resistivity Sections
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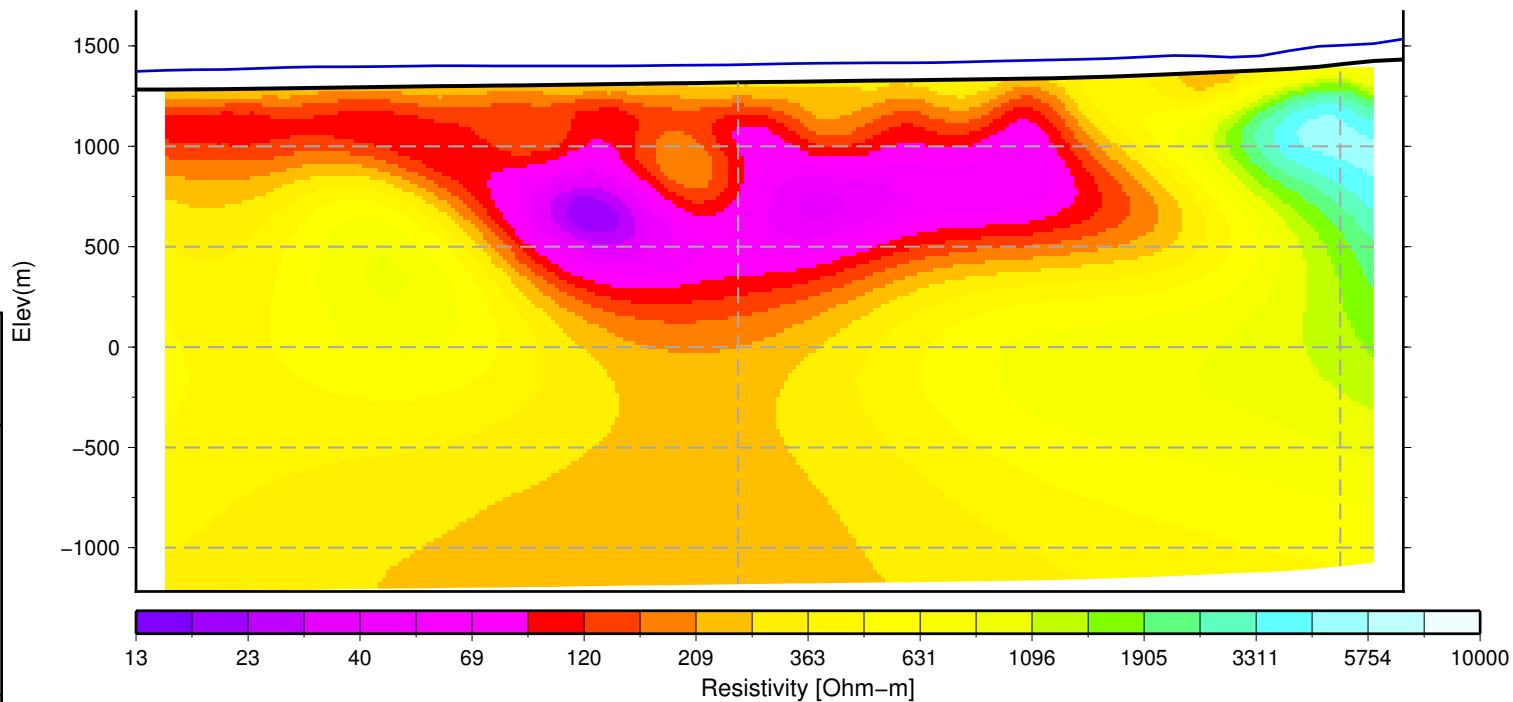
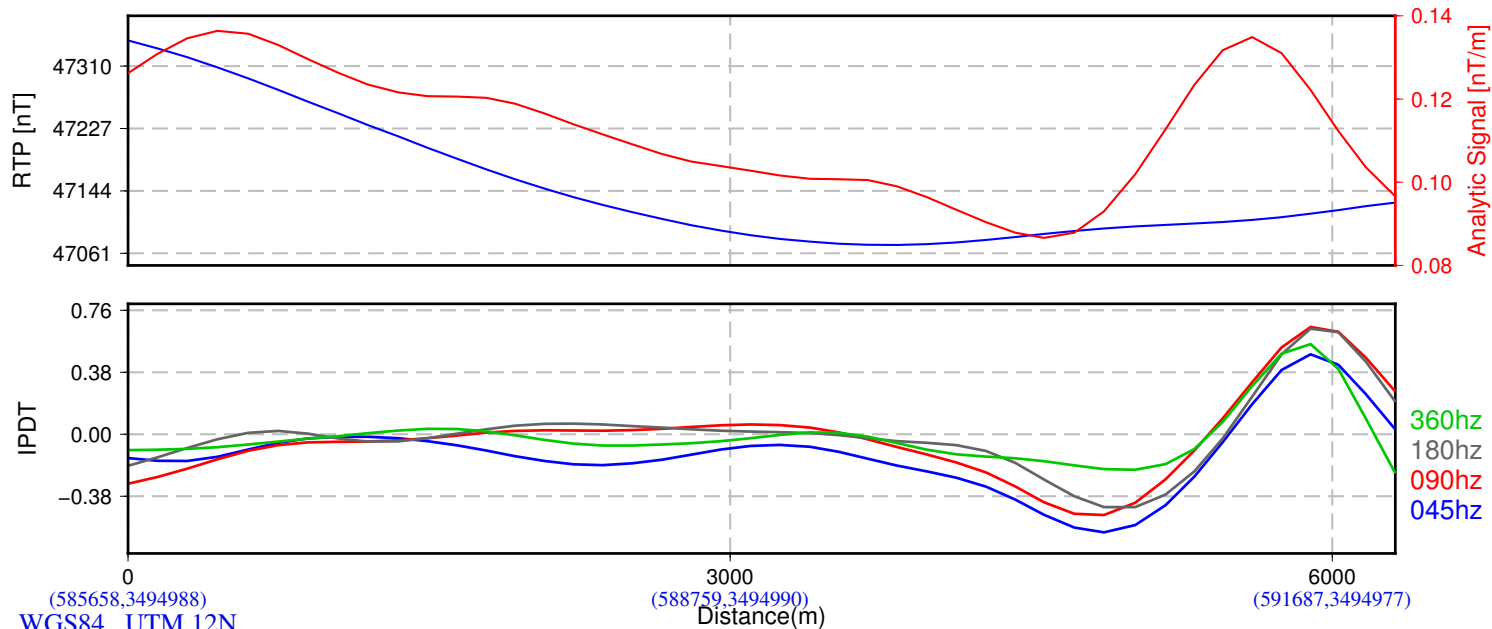
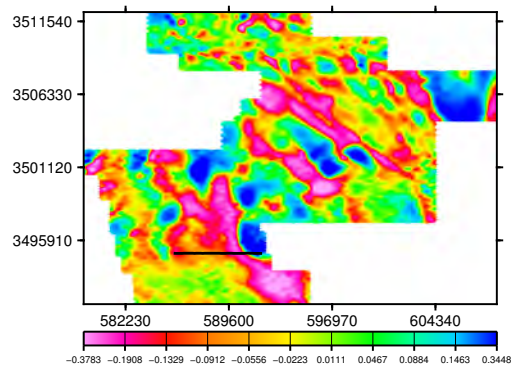
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1510

Analytic Signal [nT/m]



IP 090Hz DT



Liberty Star
Tombstone
Arizona

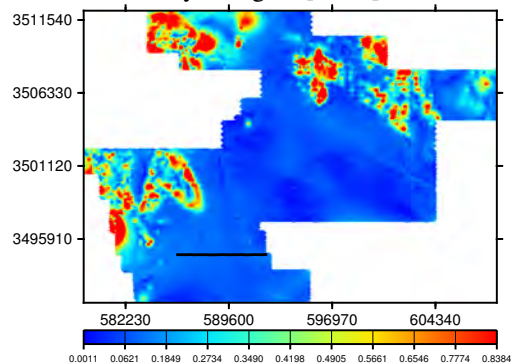
ZTEM System: Heliborne ZTEM
Job Number: GL130168

3D-ZTEM Inversion: Resistivity Sections
Flown by Geotech Ltd
Processed by Geotech Ltd
270 Industrial Parkway South
Aurora, Ontario, Canada L4G 3T9
www.geotech.ca

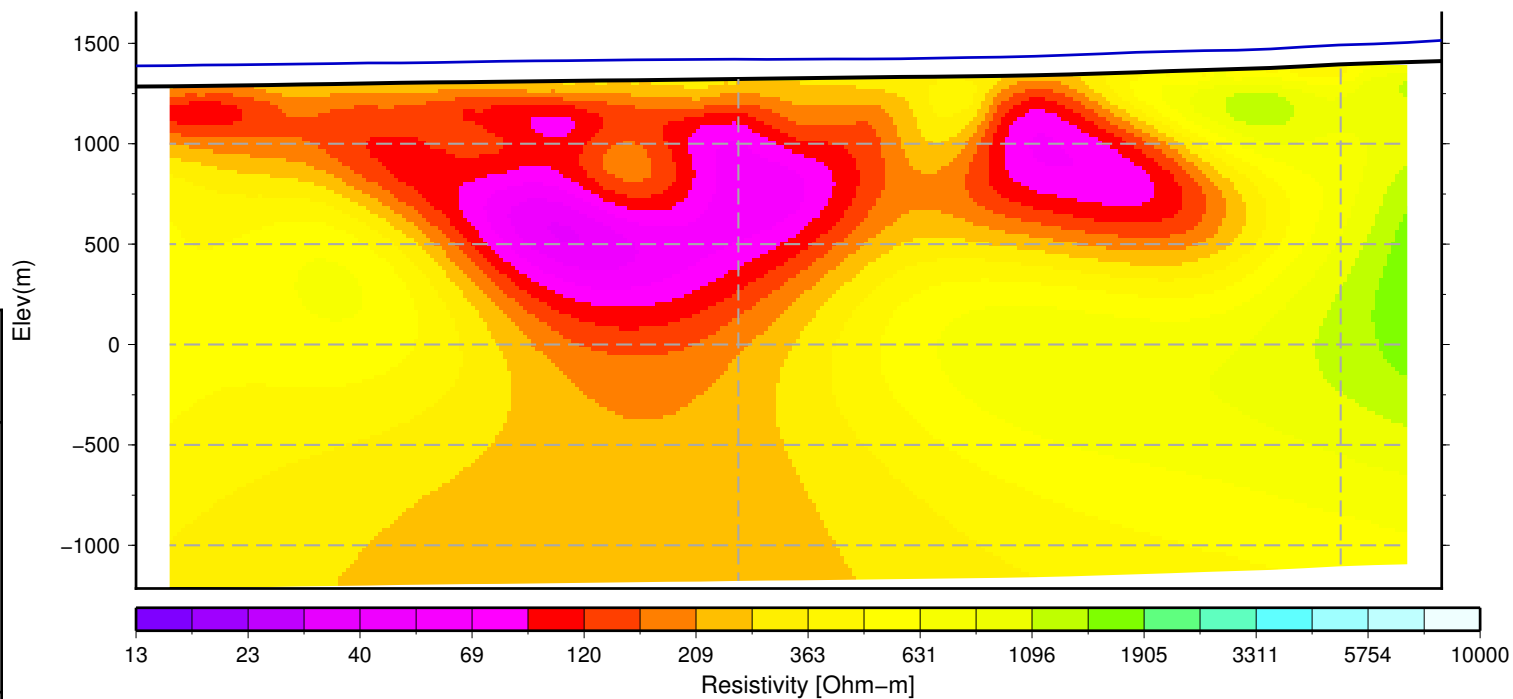
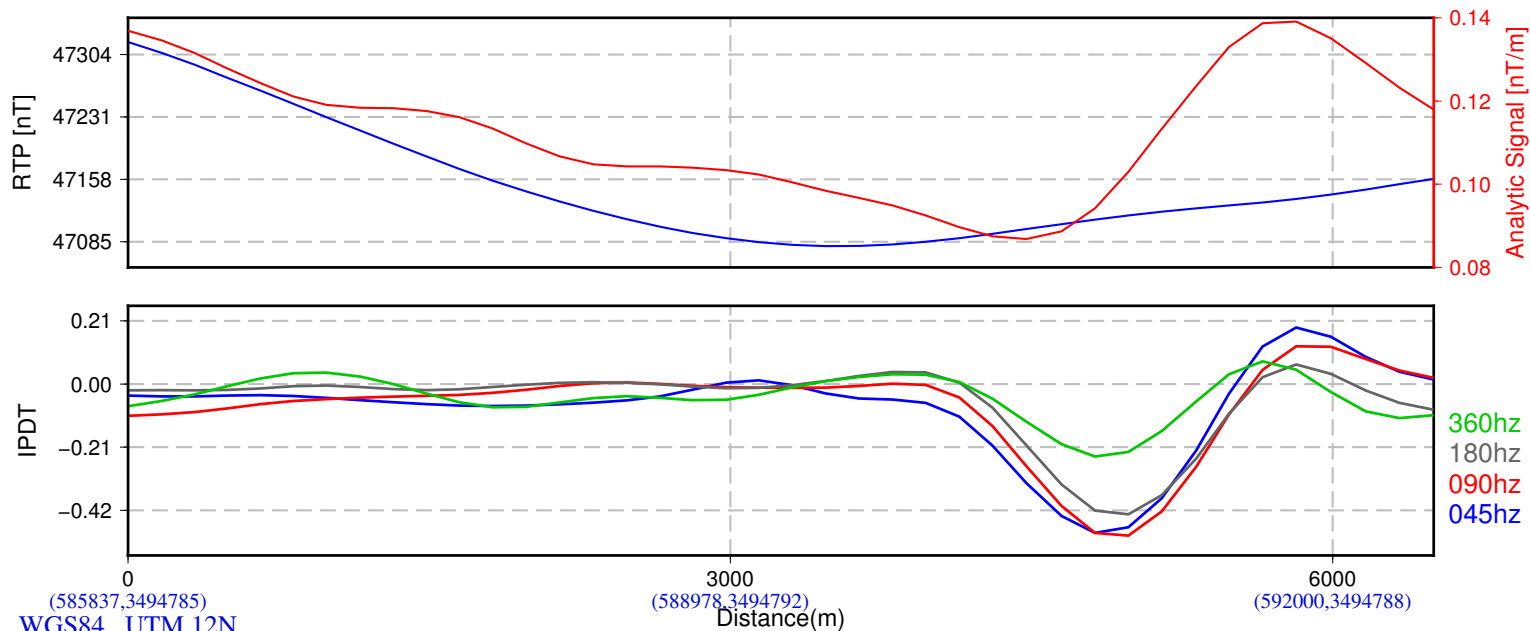
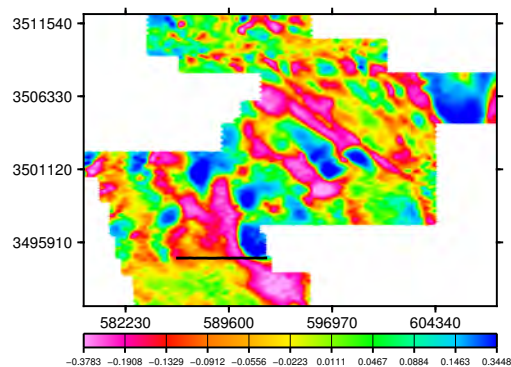
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1515

Analytic Signal [nT/m]



IP 090Hz DT



Liberty Star
Tombstone
Arizona

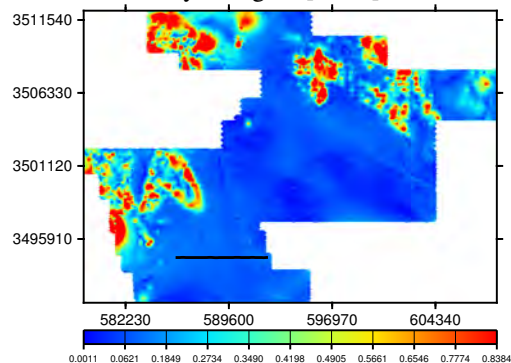
ZTEM System: Heliborne ZTEM
Job Number:GL130168

3D-ZTEM Inversion: Resistivity Sections
Flown by Geotech Ltd
Processed by Geotech Ltd
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Aurora, Ontario, Canada L4G 3T9
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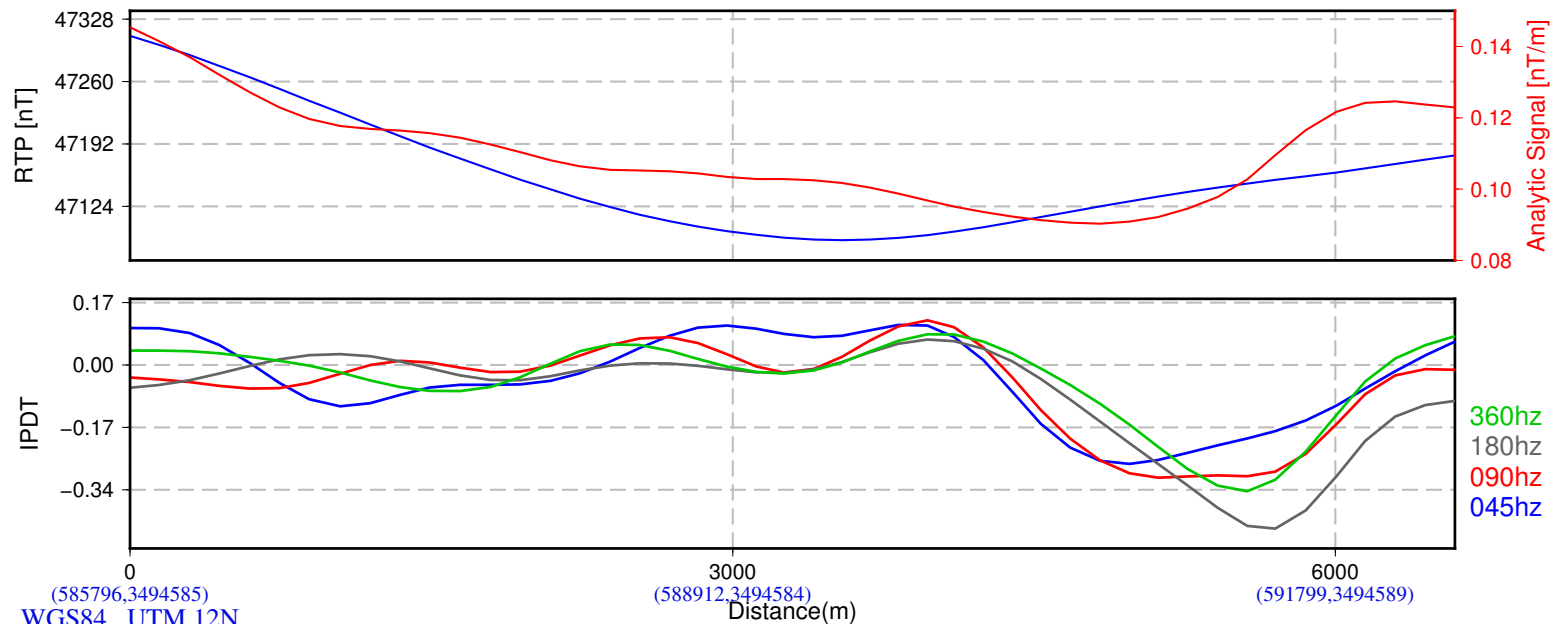
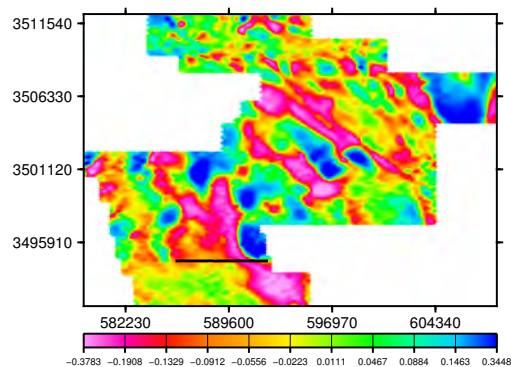
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1520

Analytic Signal [nT/m]



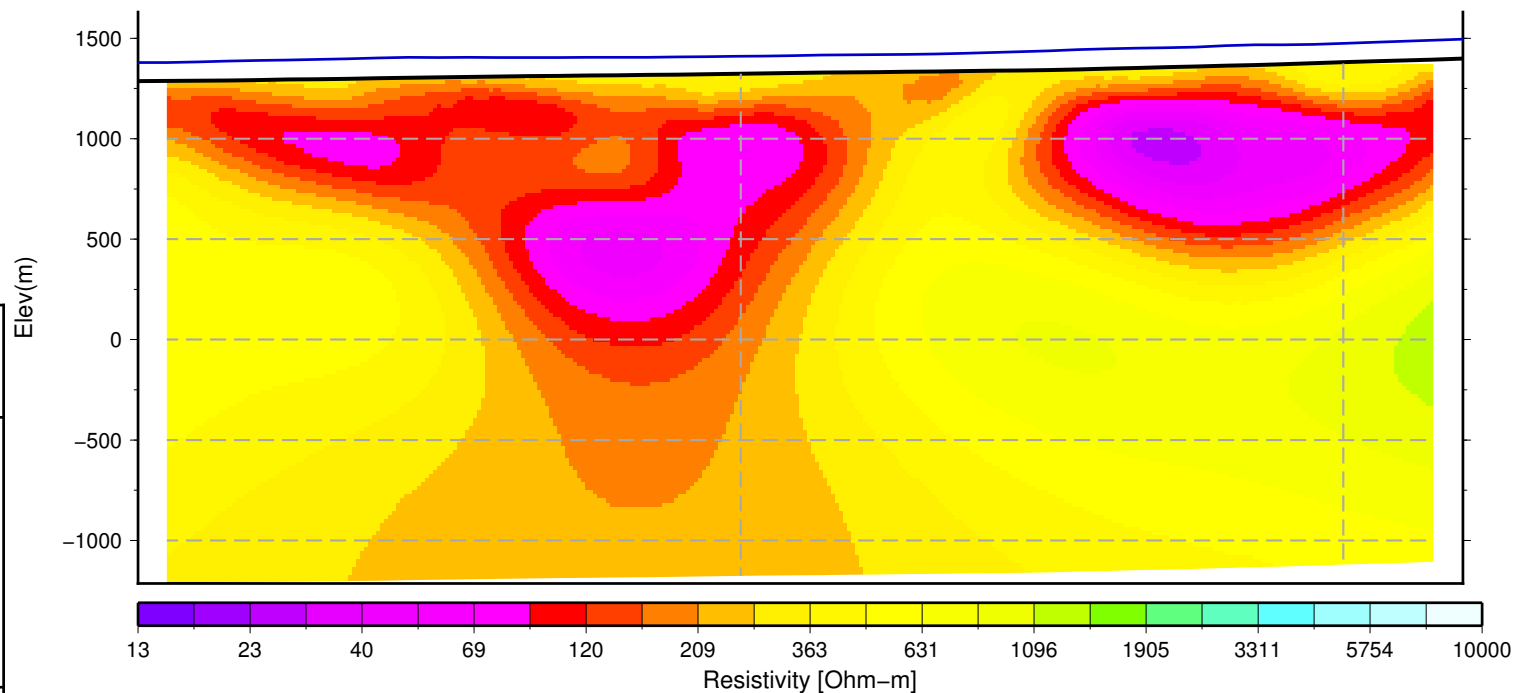
IP 090Hz DT



(585796,3494585)
WGS84 , UTM 12N

(588912,3494584)
Distance(m)

(591799,3494589)



View looking North

Liberty Star
Tombstone
Arizona

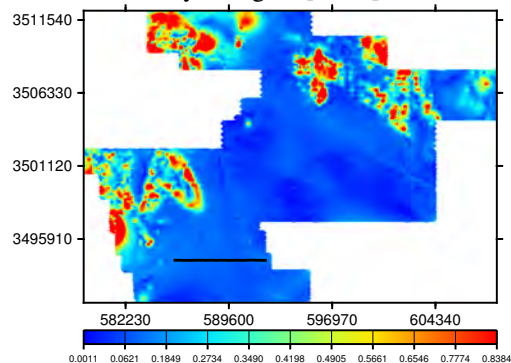
ZTEM System: Heliborne ZTEM
Job Number:GL130168

3D-ZTEM Inversion: Resistivity Sections
Flown by Geotech Ltd
Processed by Geotech Ltd
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Aurora, Ontario, Canada L4G 3T9
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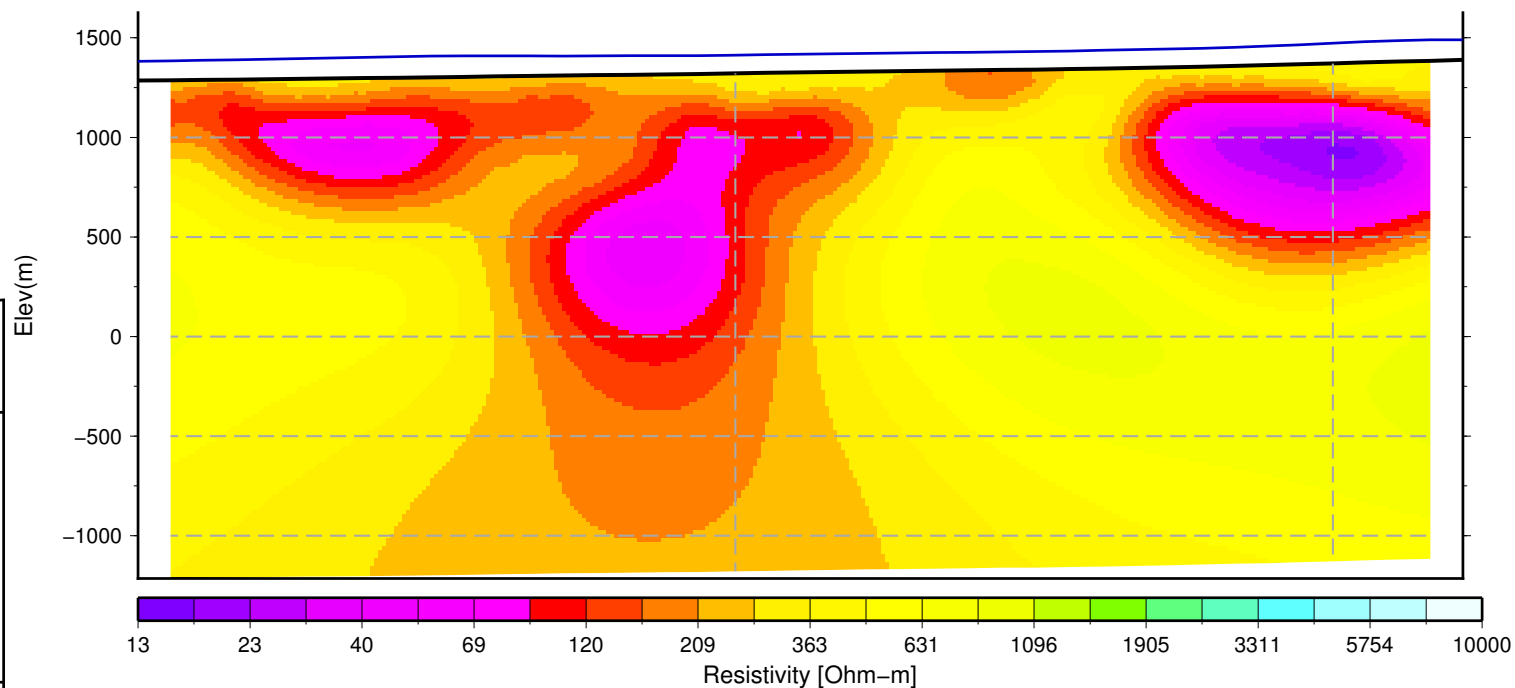
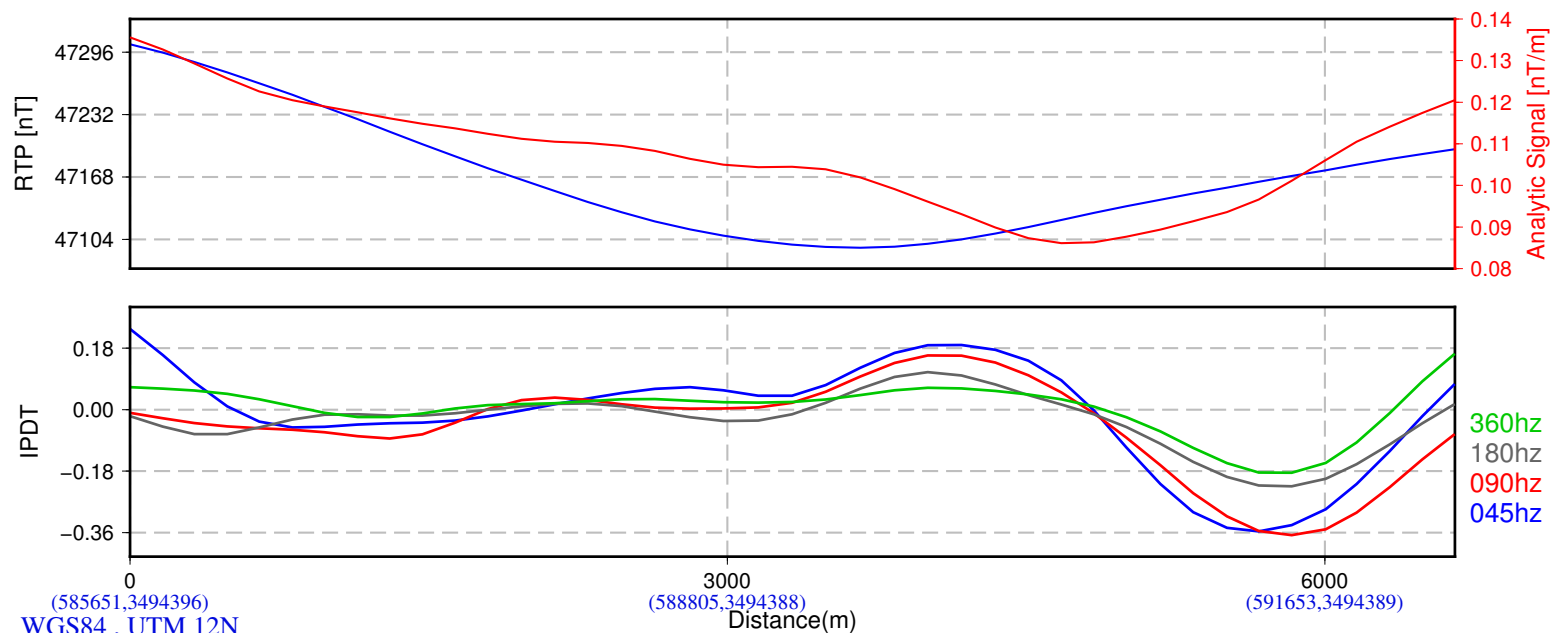
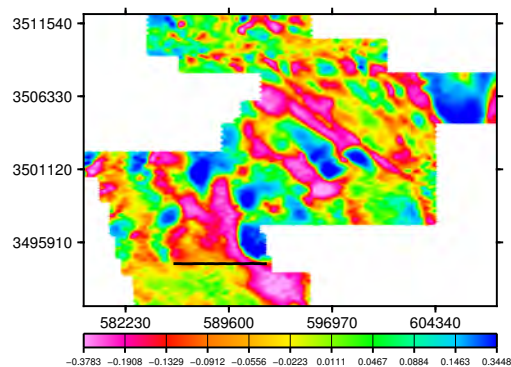
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1525

Analytic Signal [nT/m]



IP 090Hz DT



Liberty Star
Tombstone
Arizona

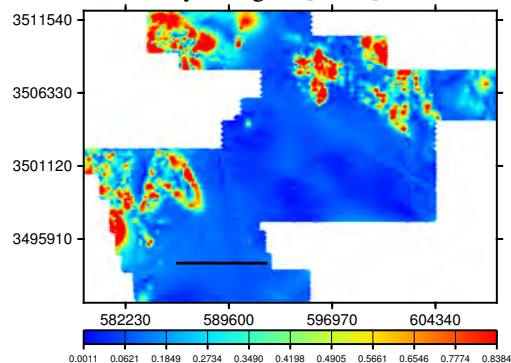
ZTEM System: Heliborne ZTEM
Job Number: GL130168

3D-ZTEM Inversion: Resistivity Sections
Flown by Geotech Ltd
Processed by Geotech Ltd
270 Industrial Parkway South
Aurora, Ontario, Canada L4G 3T9
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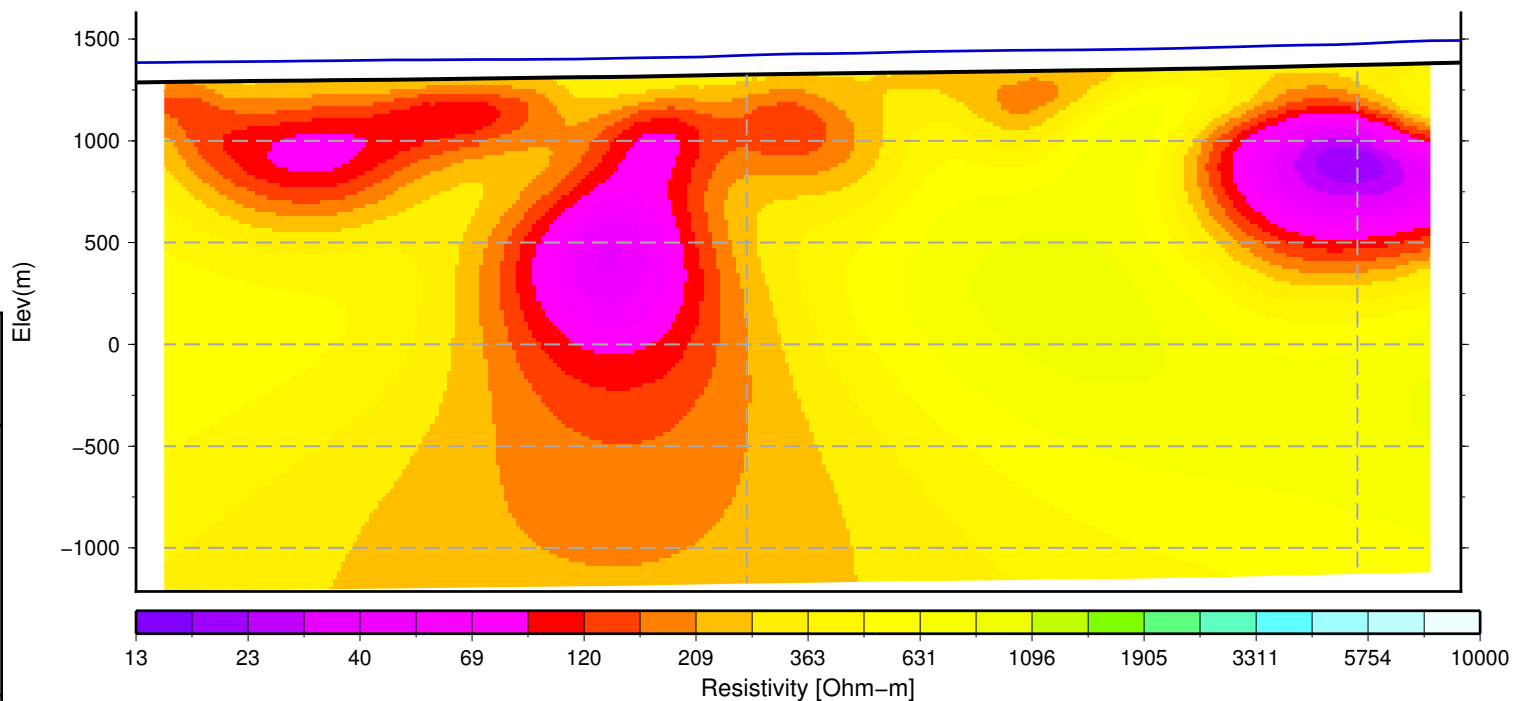
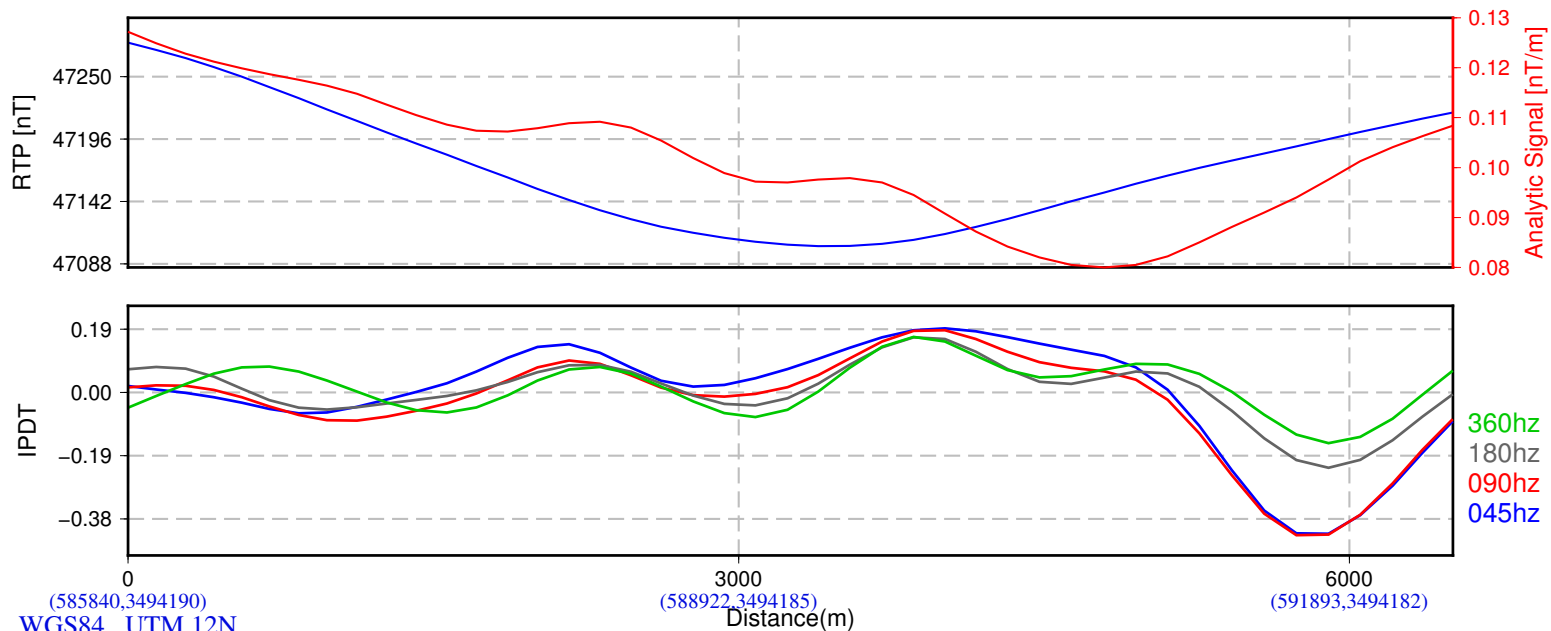
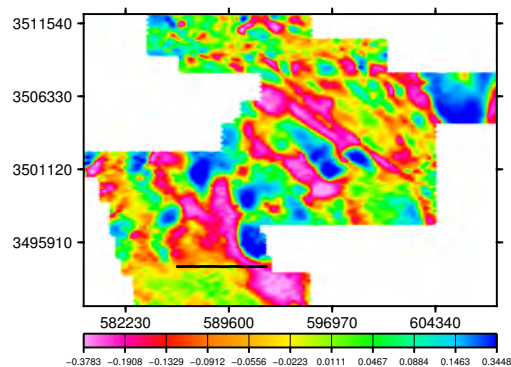
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1530

Analytic Signal [nT/m]



IP 090Hz DT



Liberty Star
Tombstone
Arizona

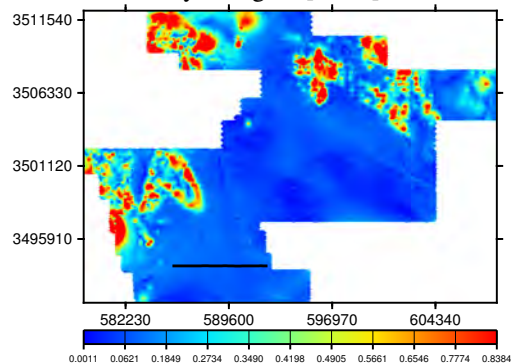
ZTEM System: Heliborne ZTEM
Job Number:GL130168

3D-ZTEM Inversion: Resistivity Sections
Flown by Geotech Ltd
Processed by Geotech Ltd
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Aurora, Ontario, Canada L4G 3T9
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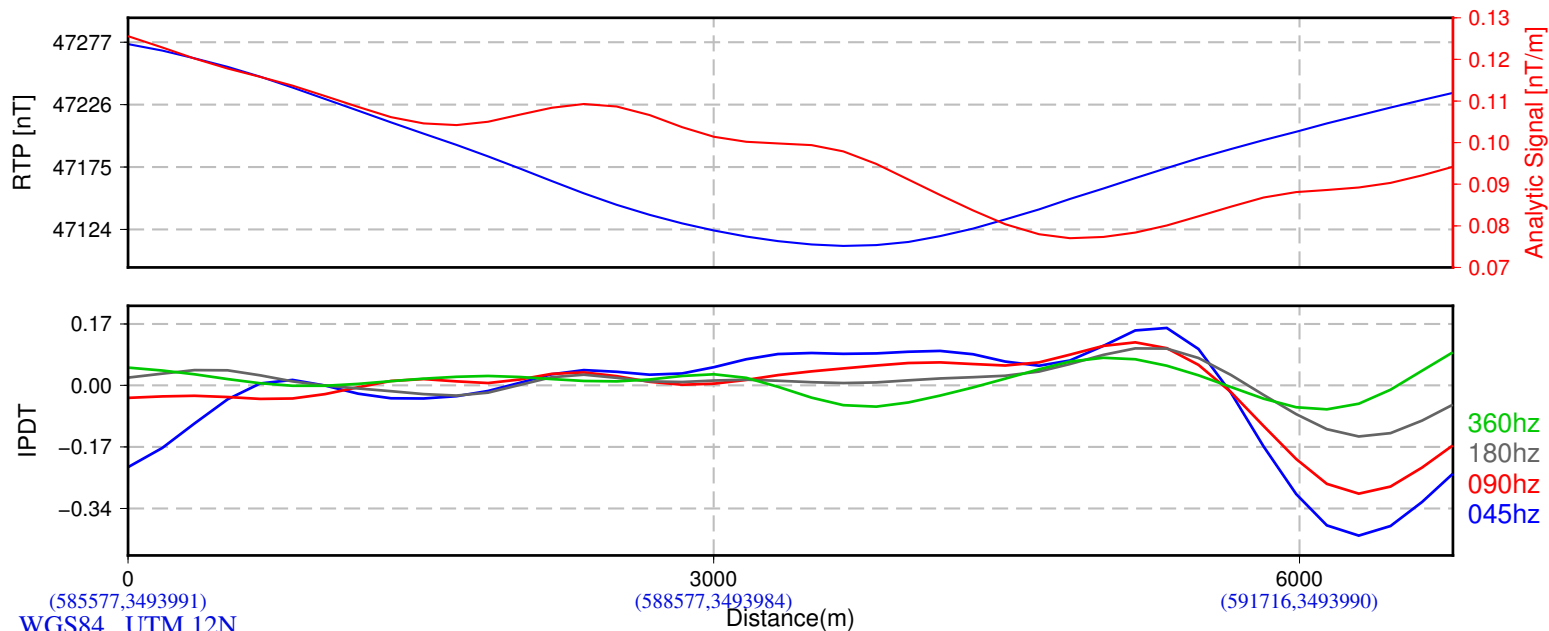
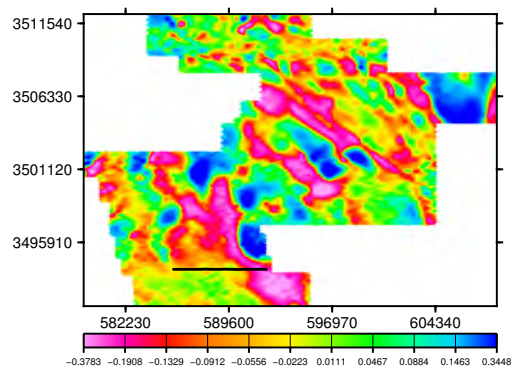
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1535

Analytic Signal [nT/m]



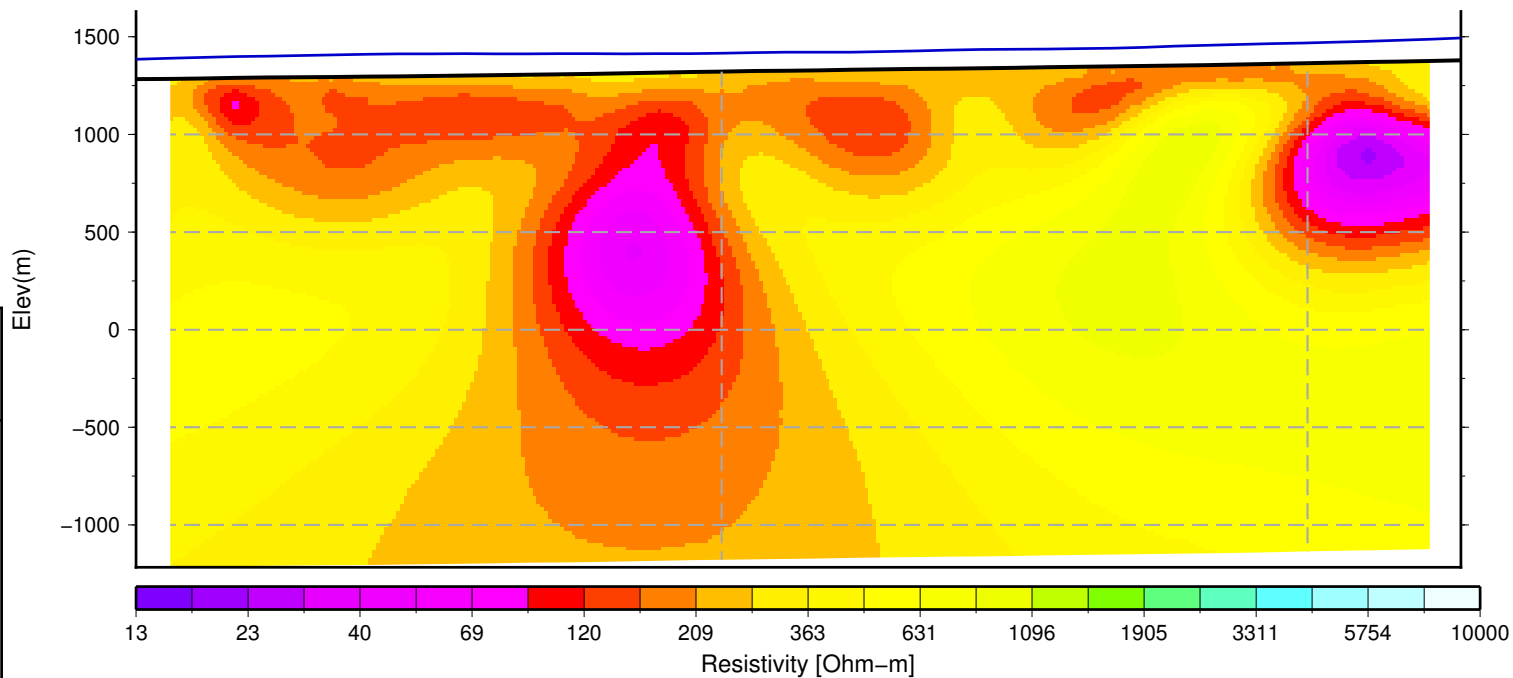
IP 090Hz DT



(585577,3493991)
WGS84 , UTM 12N

(588577,3493984)
Distance(m)

(591716,3493990)



View looking North

Liberty Star
Tombstone
Arizona

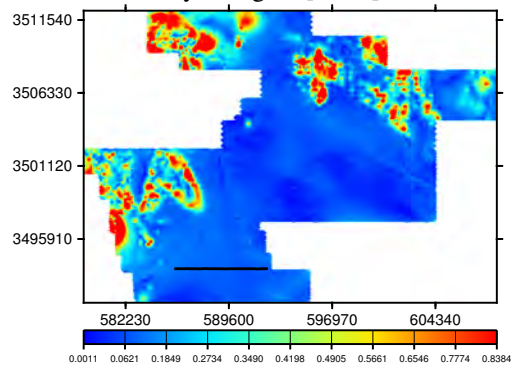
ZTEM System: Heliborne ZTEM
Job Number:GL130168

3D-ZTEM Inversion: Resistivity Sections
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Processed by Geotech Ltd
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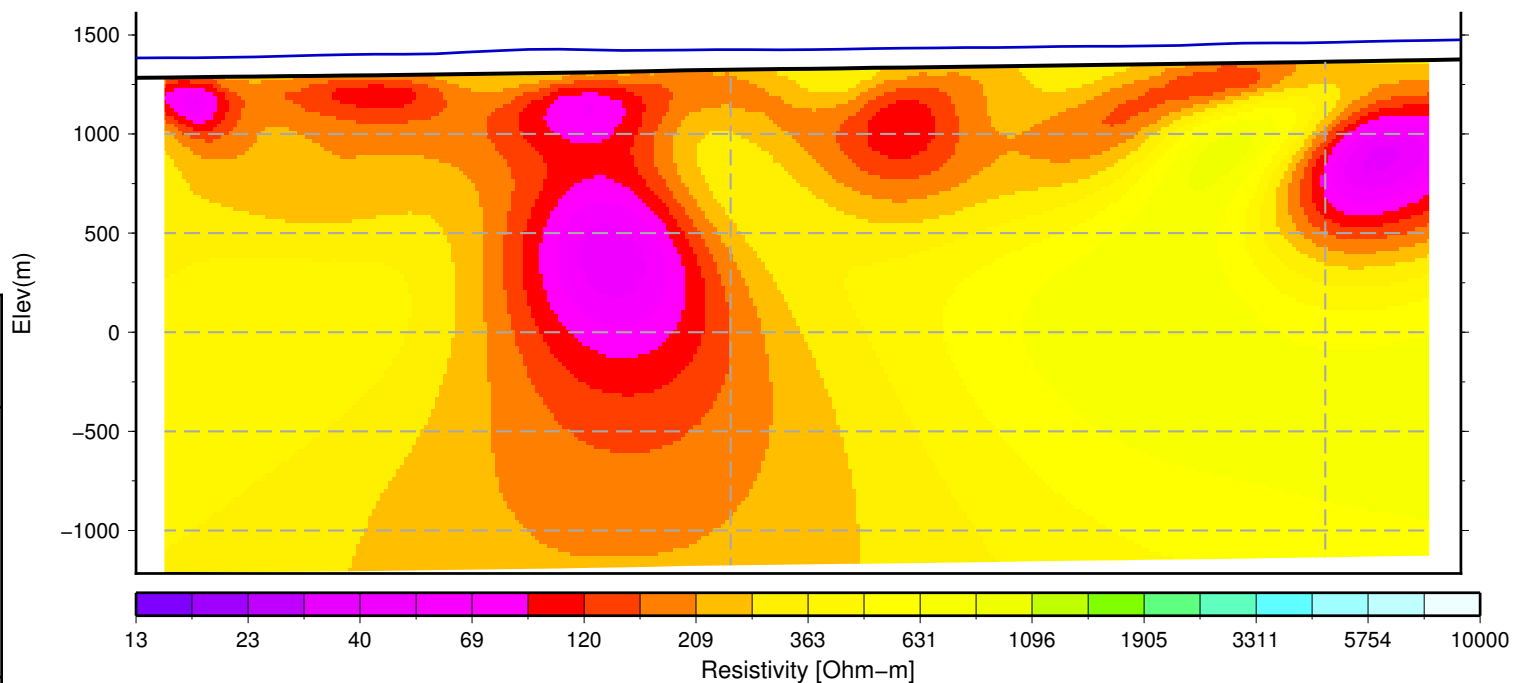
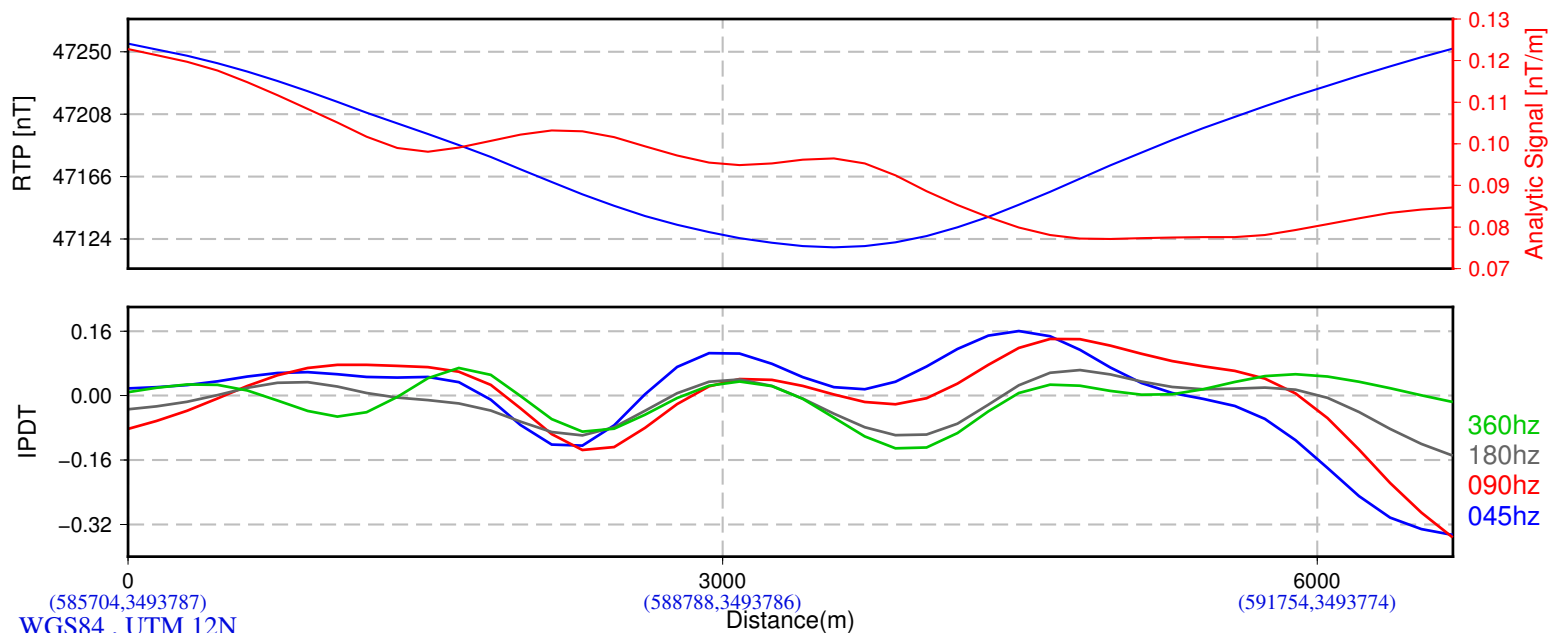
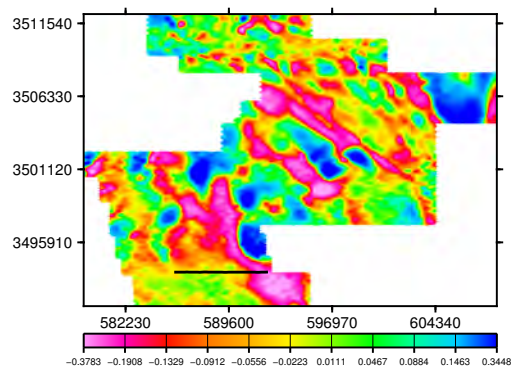
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1540

Analytic Signal [nT/m]



IP 090Hz DT



Liberty Star
Tombstone
Arizona

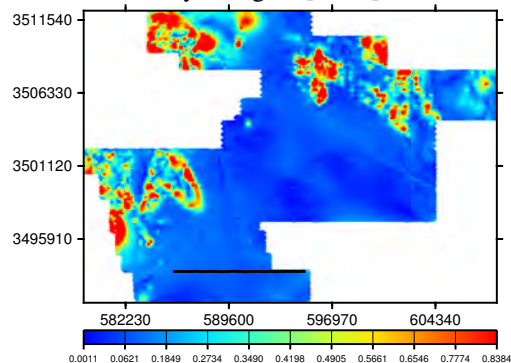
ZTEM System: Heliborne ZTEM
Job Number: GL130168

3D-ZTEM Inversion: Resistivity Sections
Flown by Geotech Ltd
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Aurora, Ontario, Canada L4G 3T9
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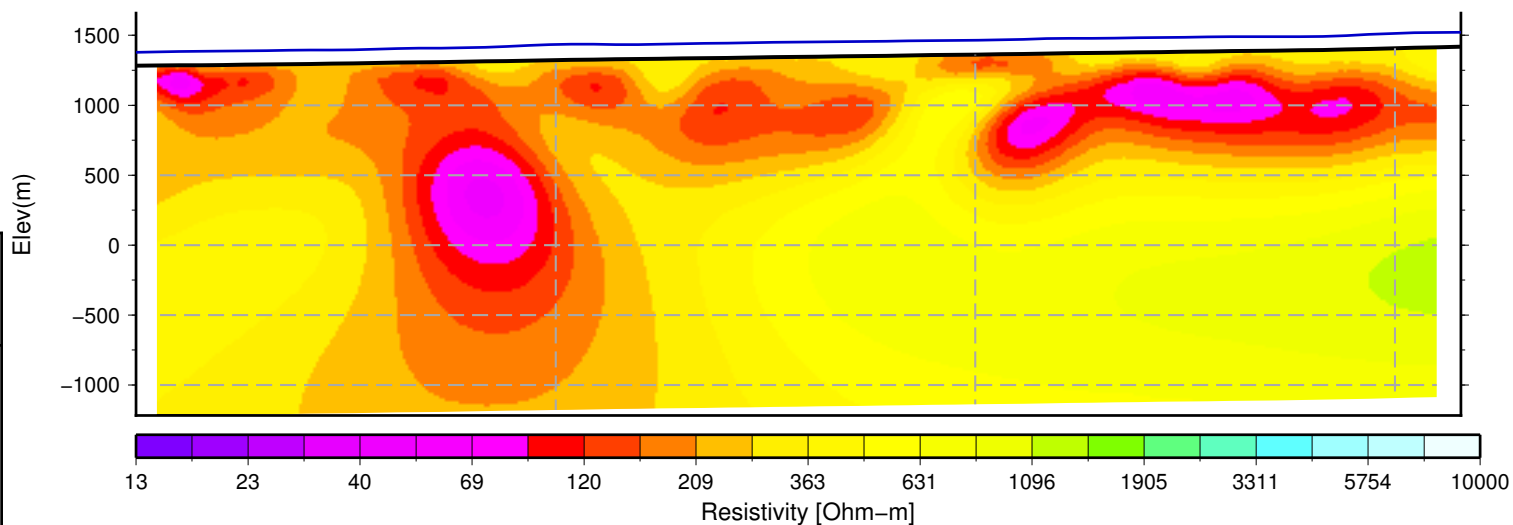
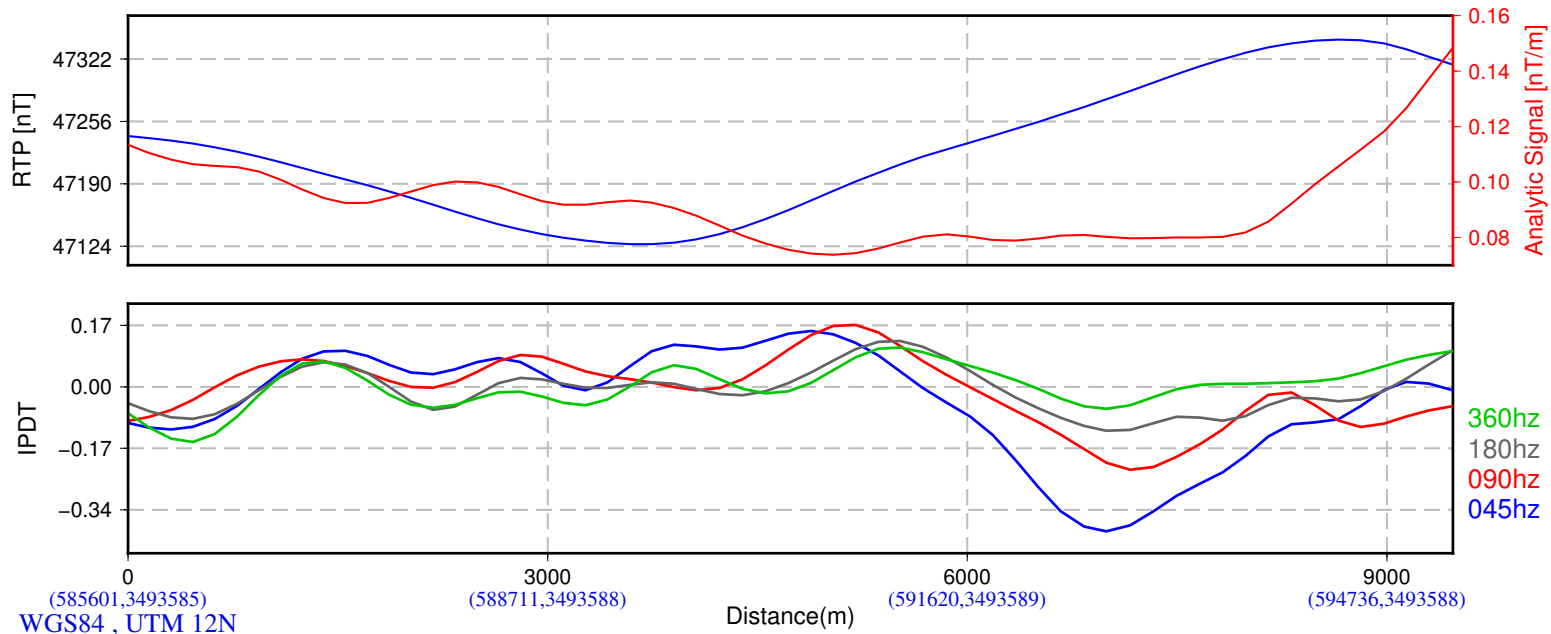
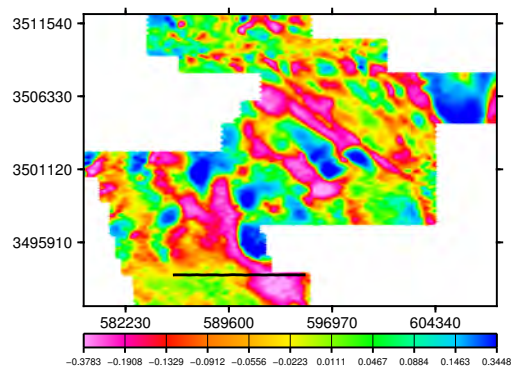
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1545

Analytic Signal [nT/m]



IP 090Hz DT



View looking North

Liberty Star
Tombstone
Arizona

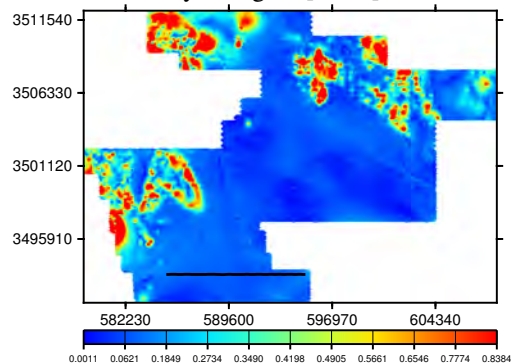
ZTEM System: Heliborne ZTEM
Job Number: GL130168

3D-ZTEM Inversion: Resistivity Sections
Flown by Geotech Ltd
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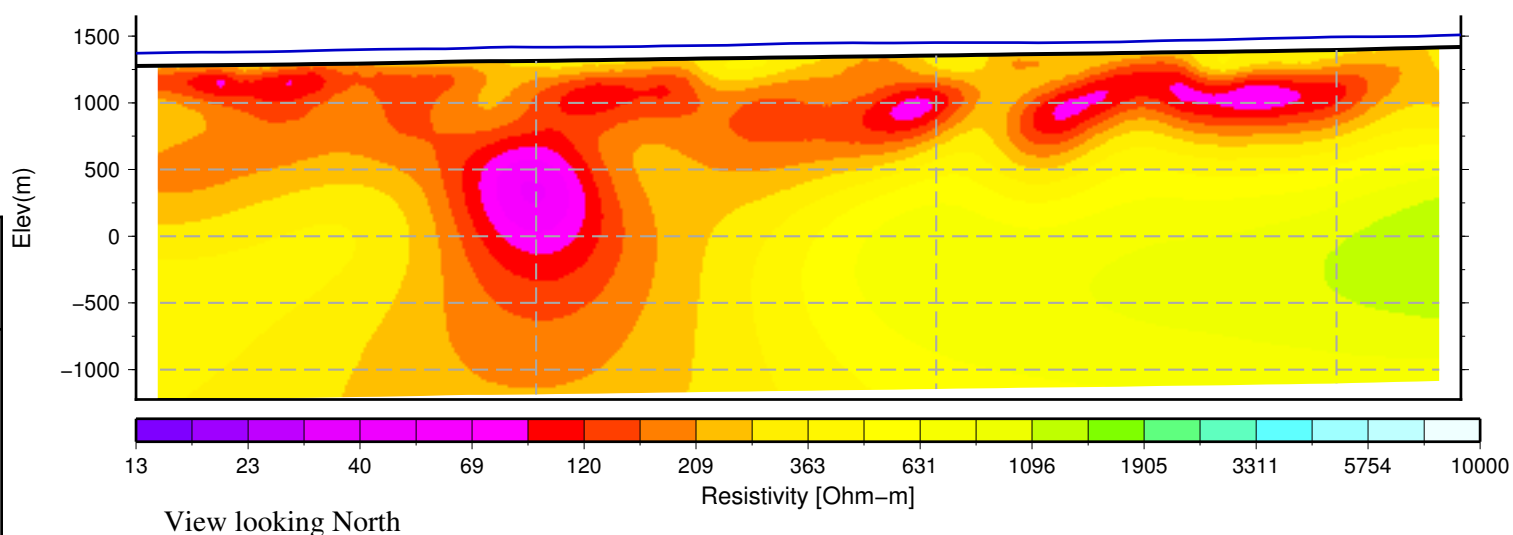
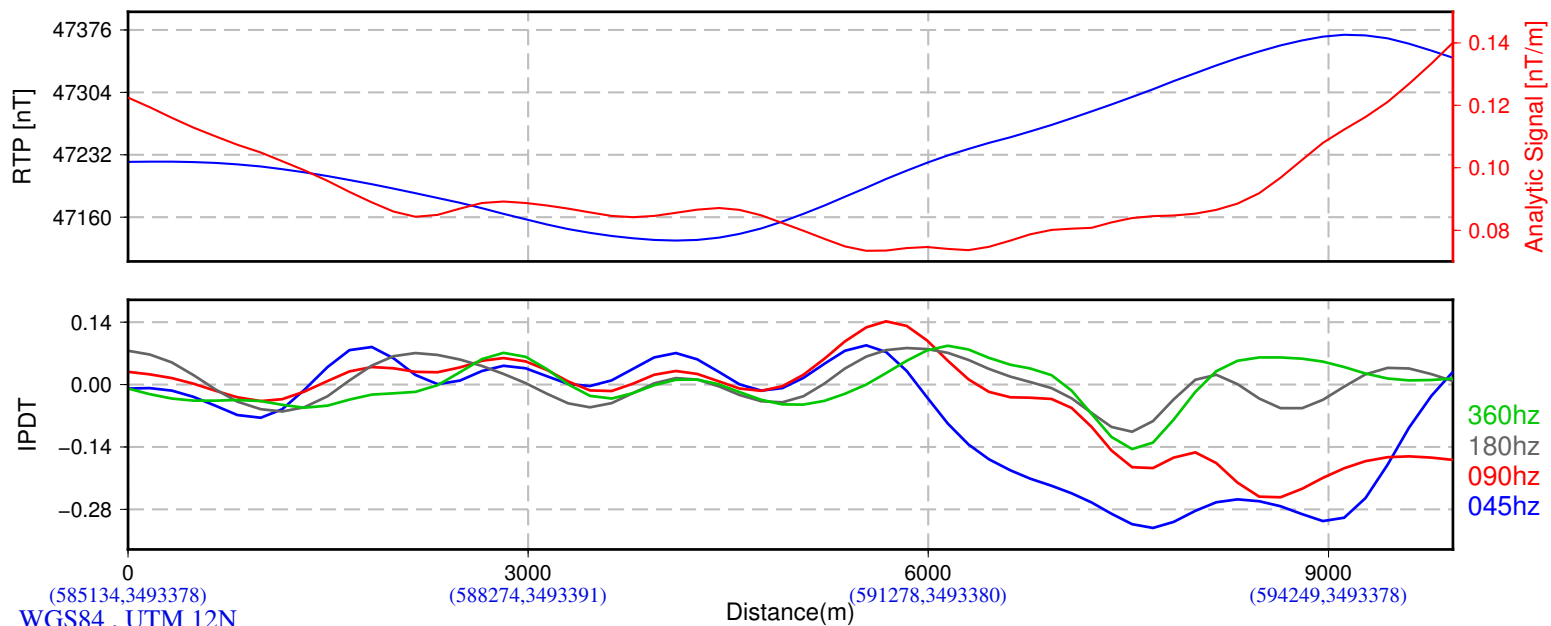
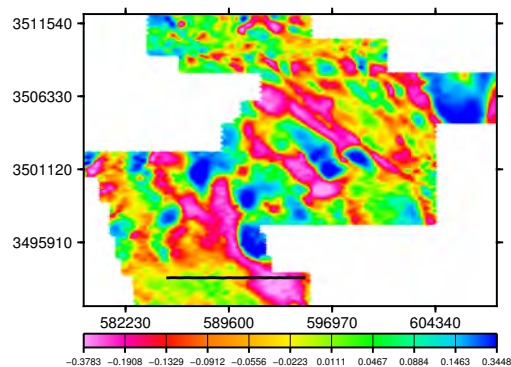
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1550

Analytic Signal [nT/m]



IP 090Hz DT



Liberty Star
Tombstone
Arizona

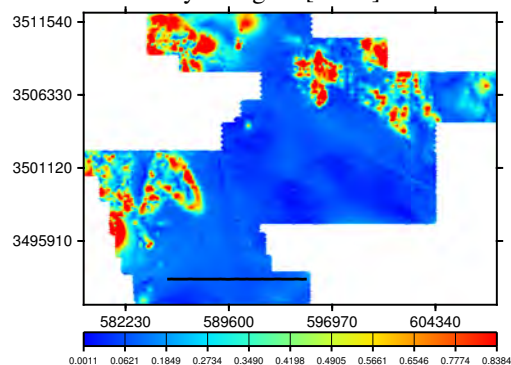
ZTEM System: Heliborne ZTEM
Job Number: GL130168

3D-ZTEM Inversion: Resistivity Sections
Flown by Geotech Ltd
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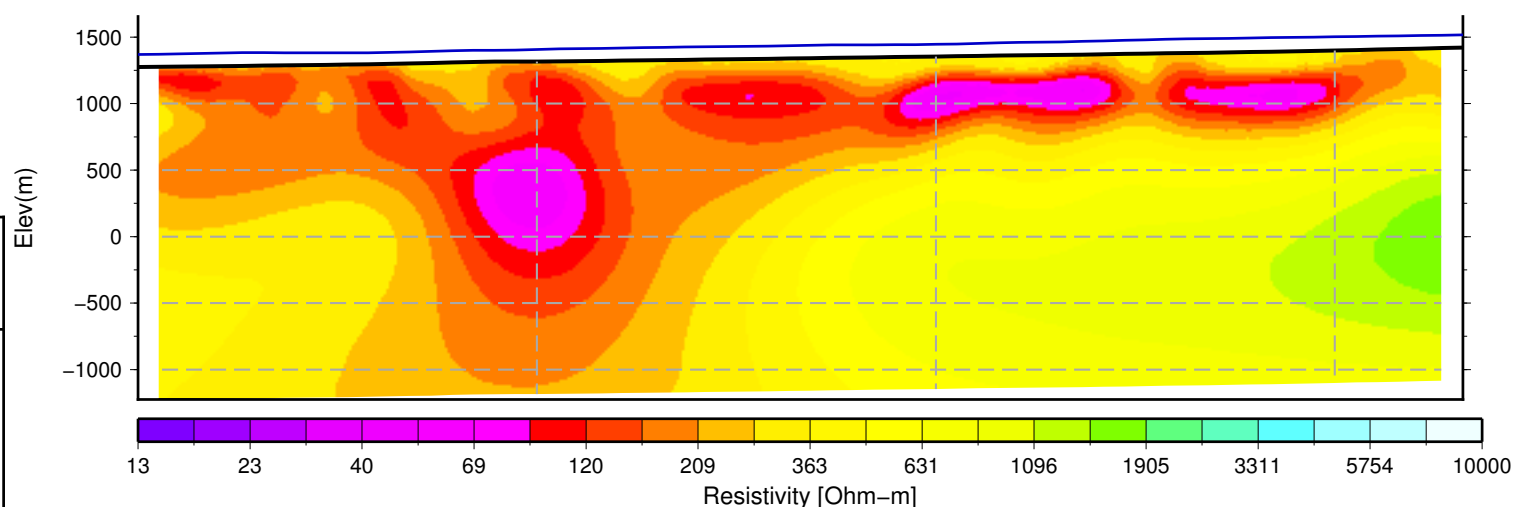
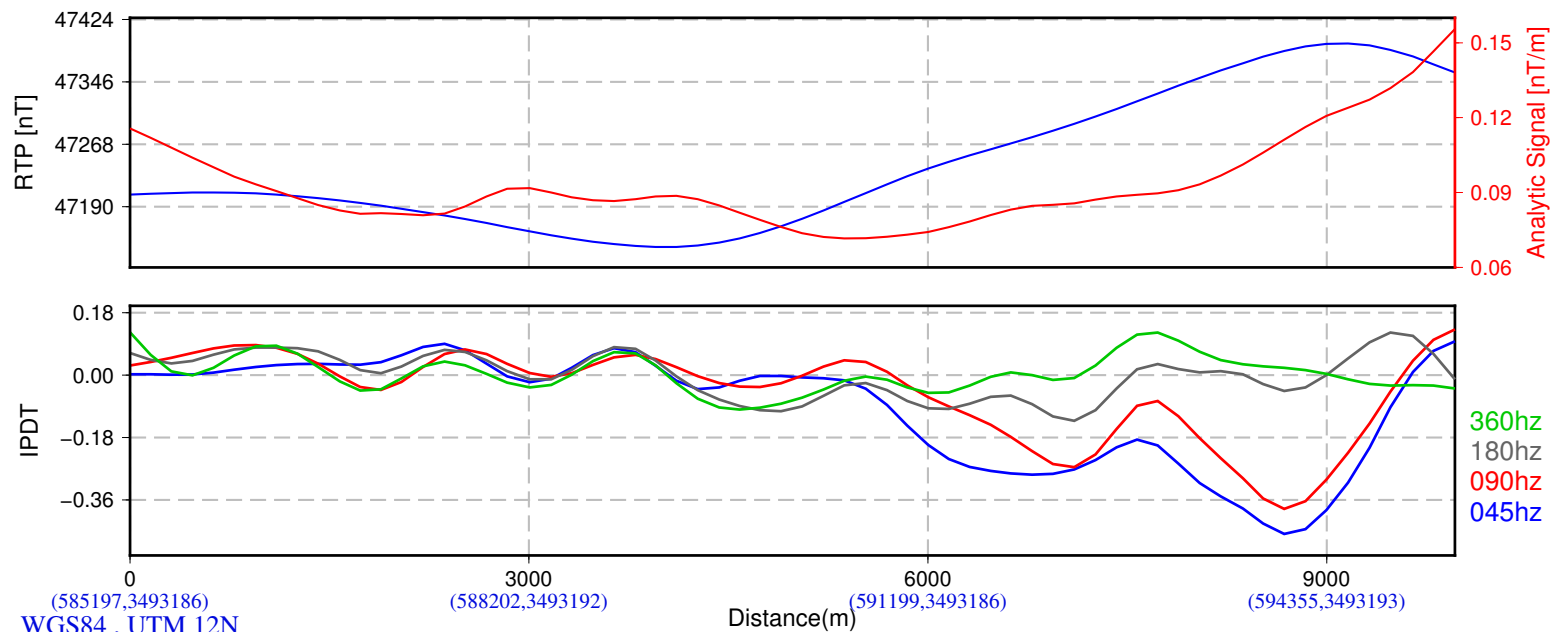
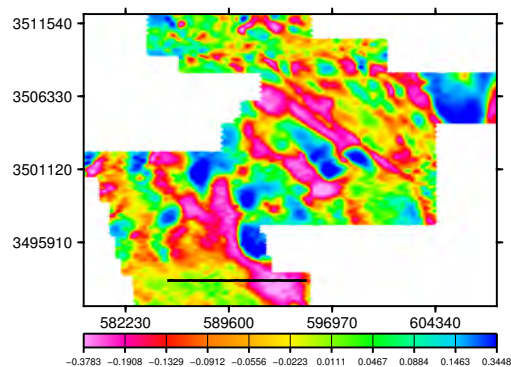
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1555

Analytic Signal [nT/m]



IP 090Hz DT



Liberty Star
Tombstone
Arizona

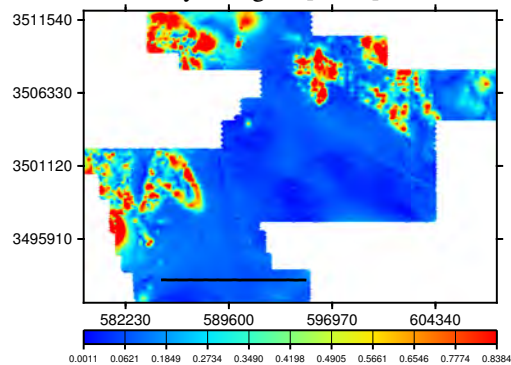
ZTEM System: Heliborne ZTEM
Job Number:GL130168

3D-ZTEM Inversion: Resistivity Sections
Flown by Geotech Ltd
Processed by Geotech Ltd
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Aurora, Ontario, Canada L4G 3T9
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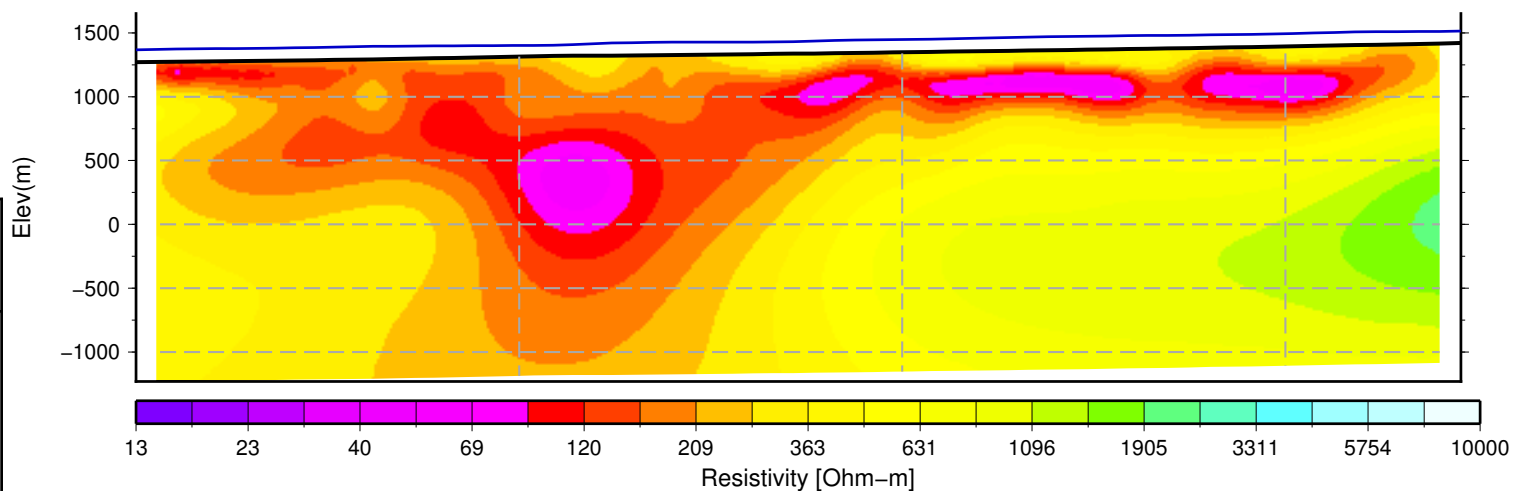
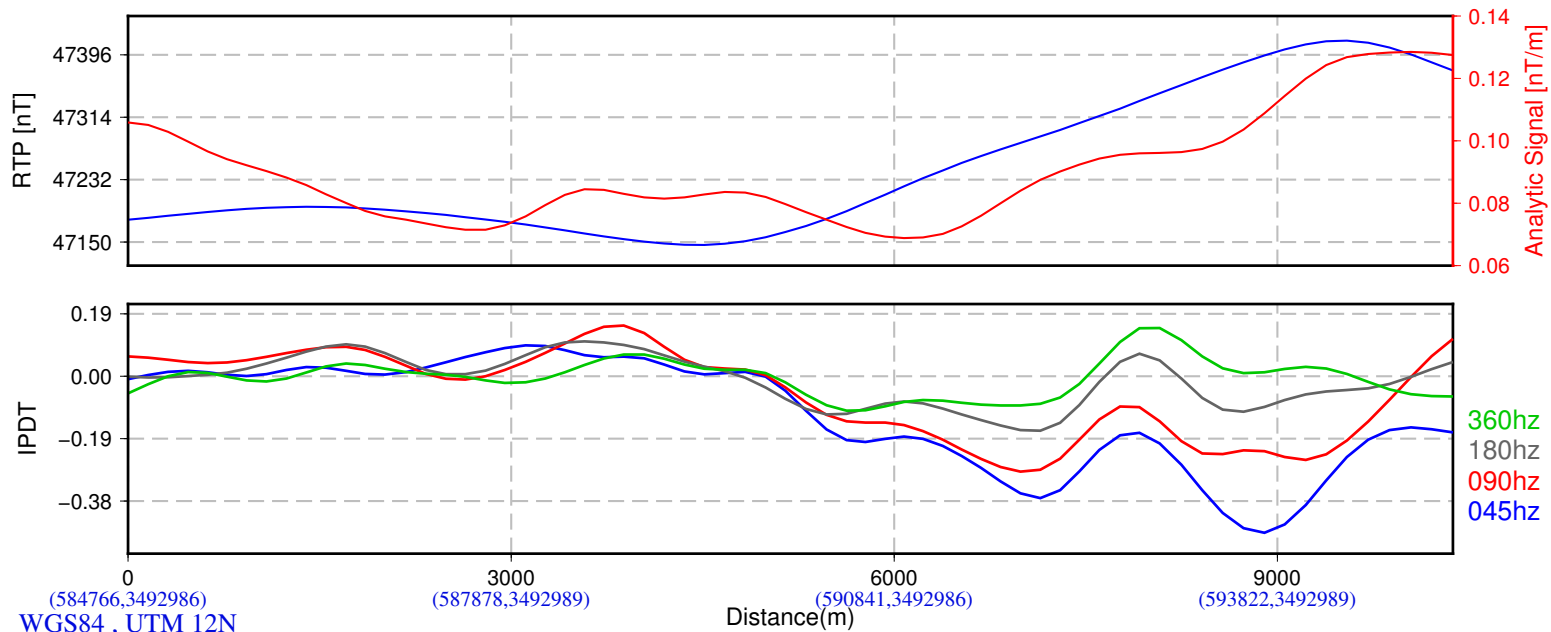
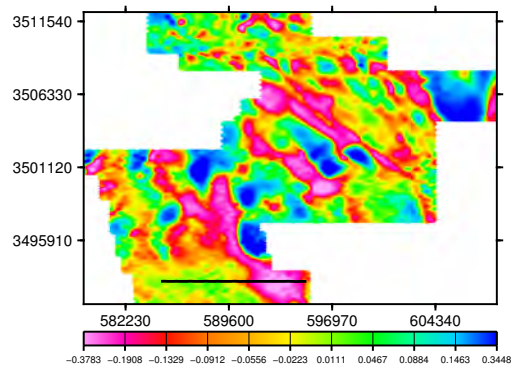
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1560

Analytic Signal [nT/m]



IP 090Hz DT



Liberty Star
Tombstone
Arizona

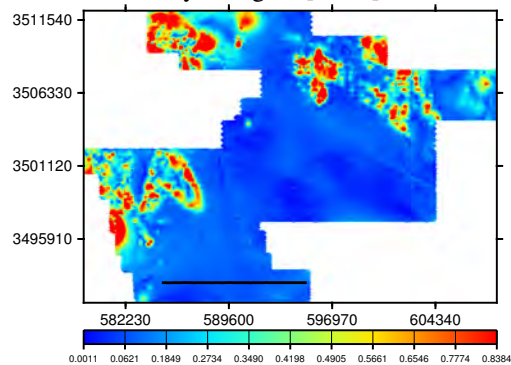
ZTEM System: Heliborne ZTEM
Job Number:GL130168

3D-ZTEM Inversion: Resistivity Sections
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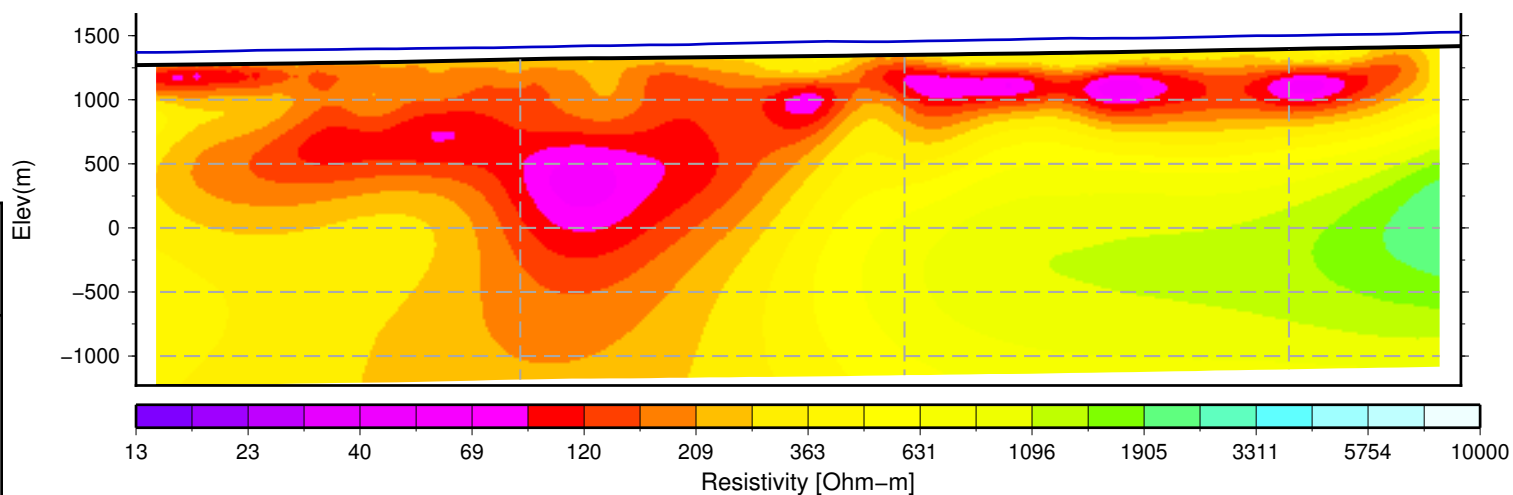
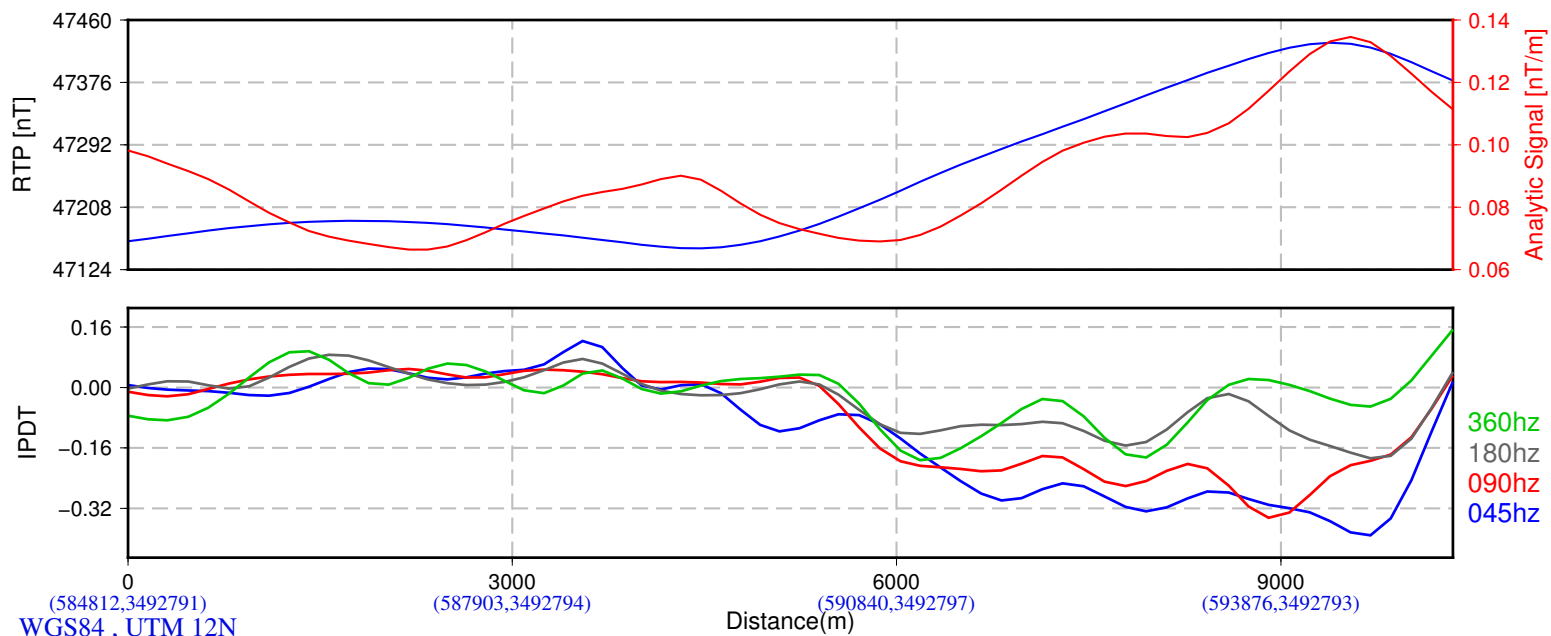
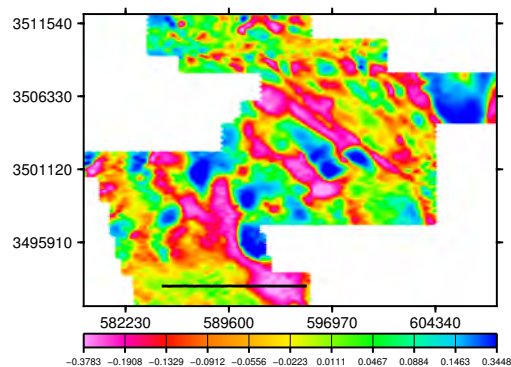
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1565

Analytic Signal [nT/m]



IP 090Hz DT



View looking North

Liberty Star
Tombstone
Arizona

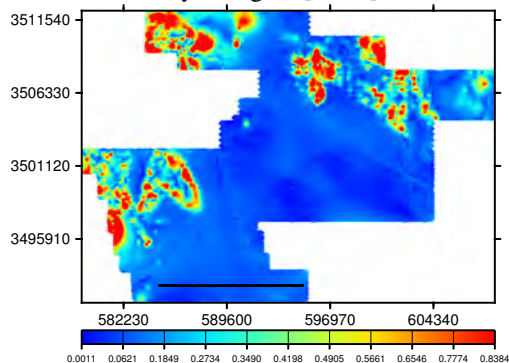
ZTEM System: Heliborne ZTEM
Job Number:GL130168

3D-ZTEM Inversion: Resistivity Sections
Flown by Geotech Ltd
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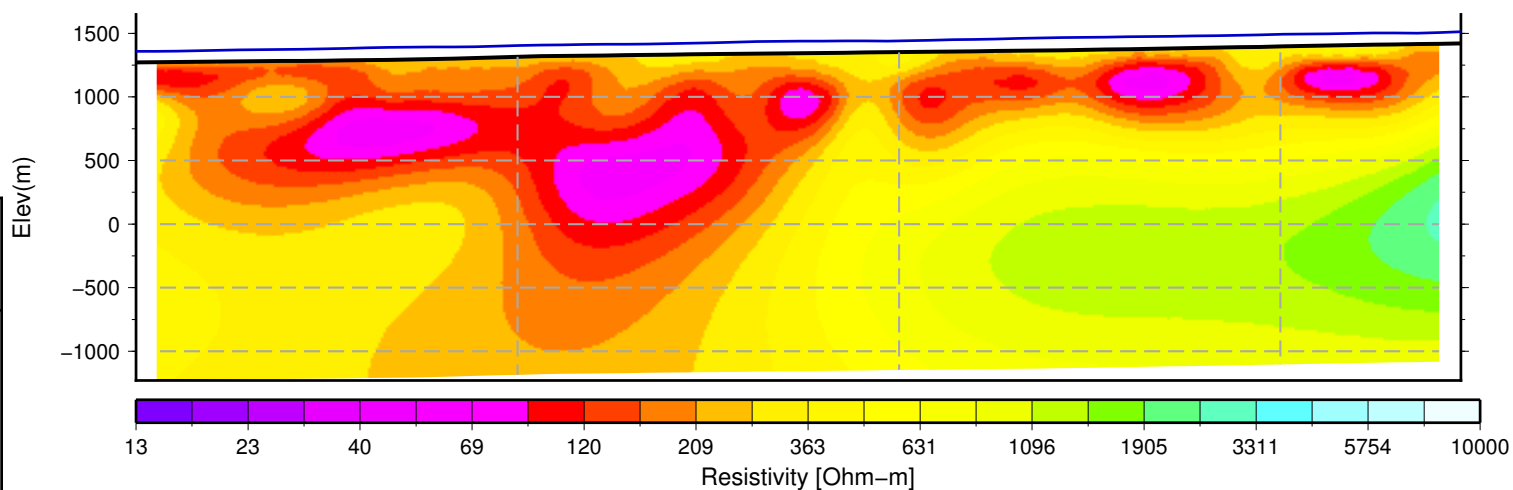
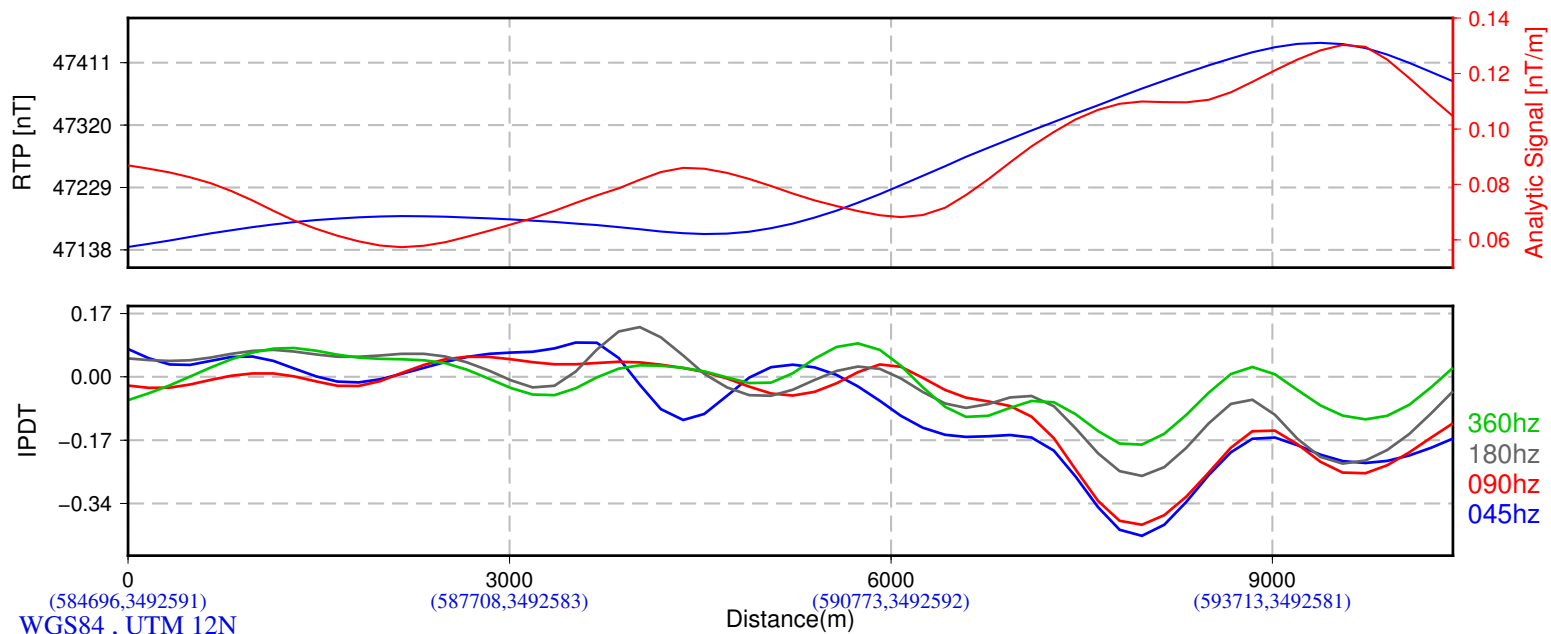
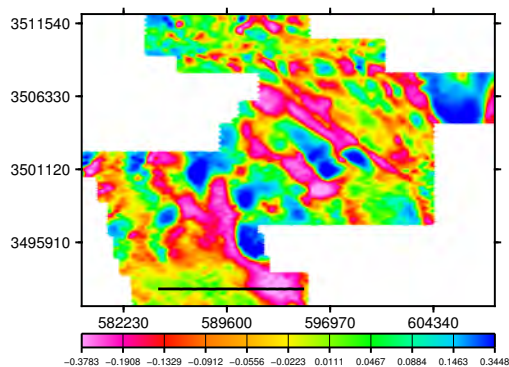
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1570

Analytic Signal [nT/m]



IP 090Hz DT



View looking North

Liberty Star
Tombstone
Arizona

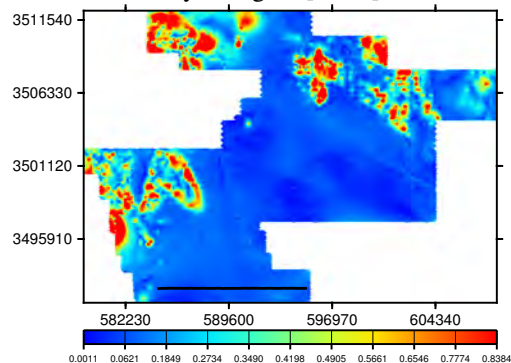
ZTEM System: Heliborne ZTEM
Job Number:GL130168

3D-ZTEM Inversion: Resistivity Sections
Flown by Geotech Ltd
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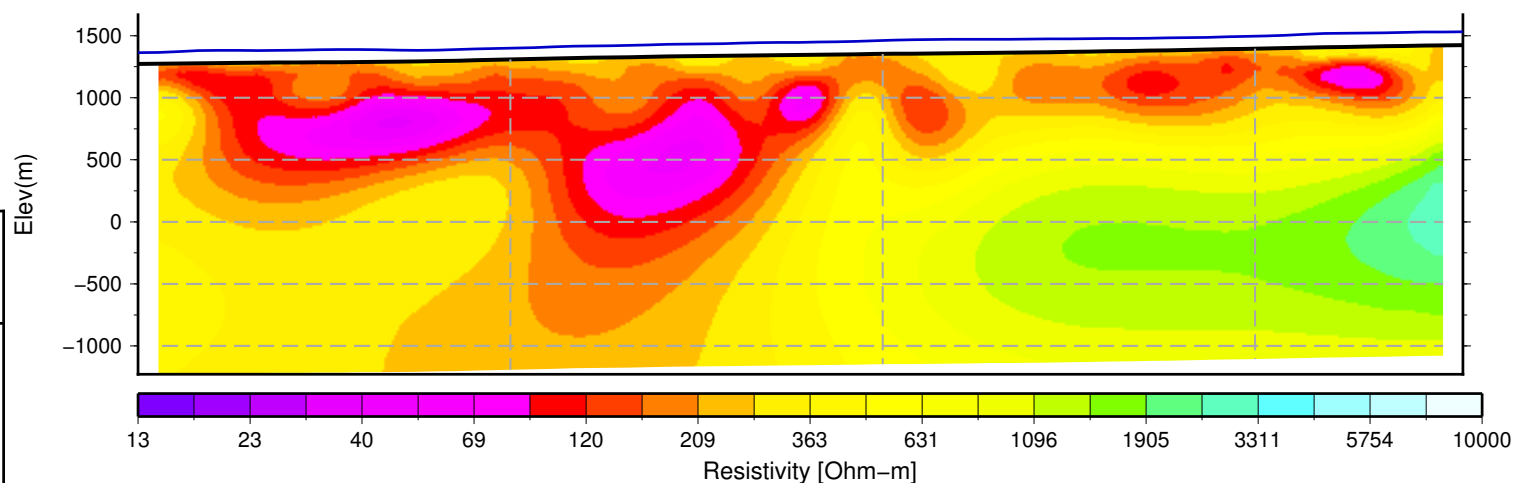
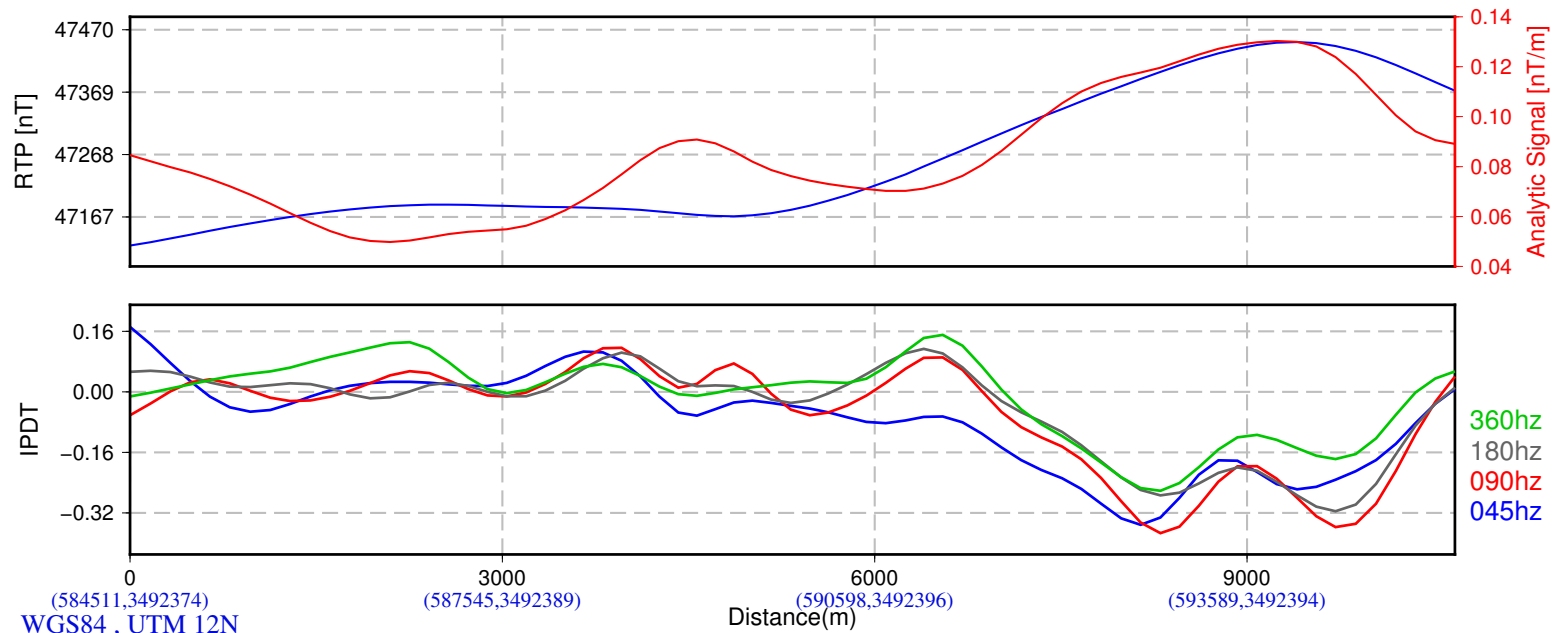
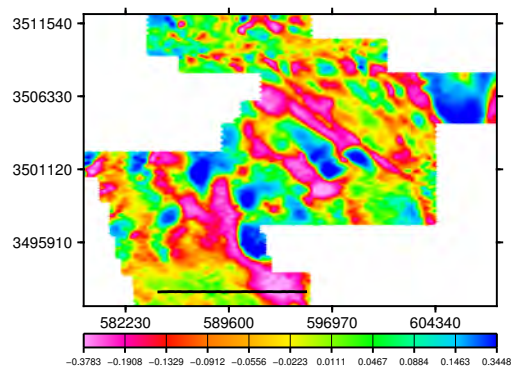
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1575

Analytic Signal [nT/m]



IP 090Hz DT



View looking North

Liberty Star
Tombstone
Arizona

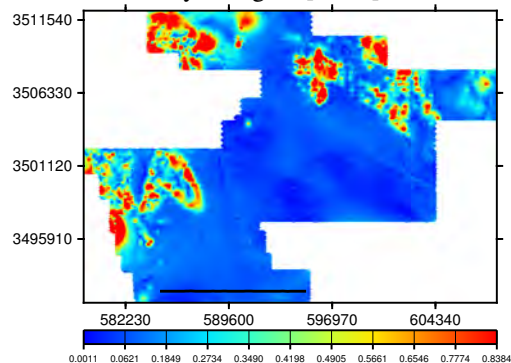
ZTEM System: Heliborne ZTEM
Job Number: GL130168

3D-ZTEM Inversion: Resistivity Sections
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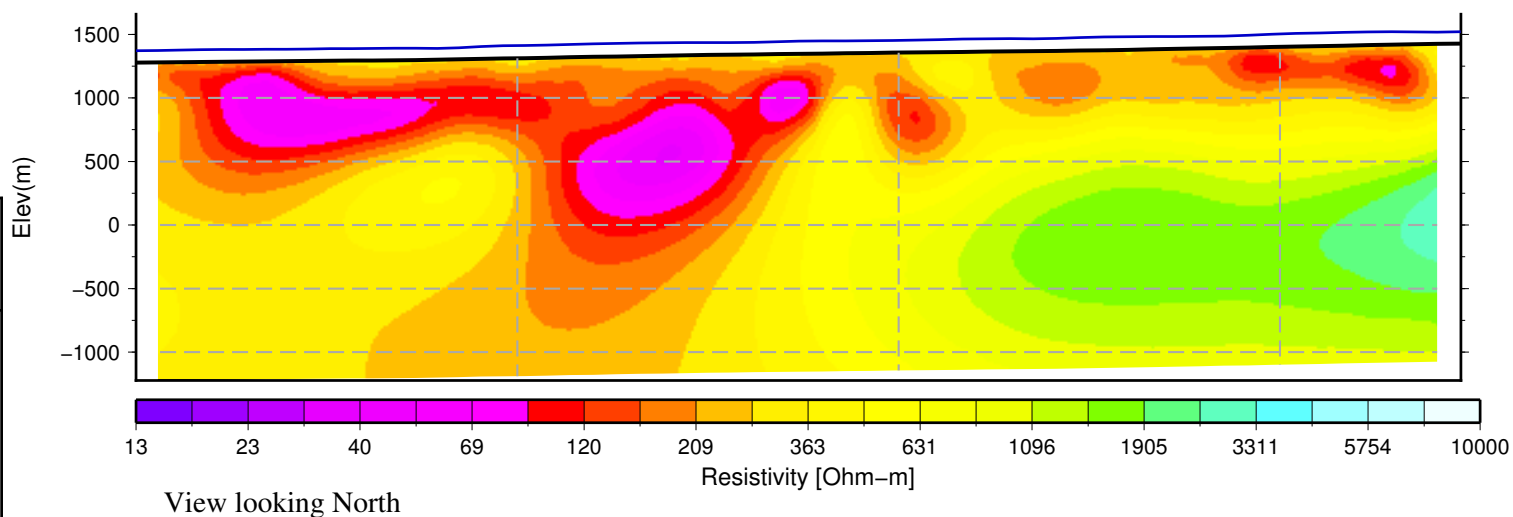
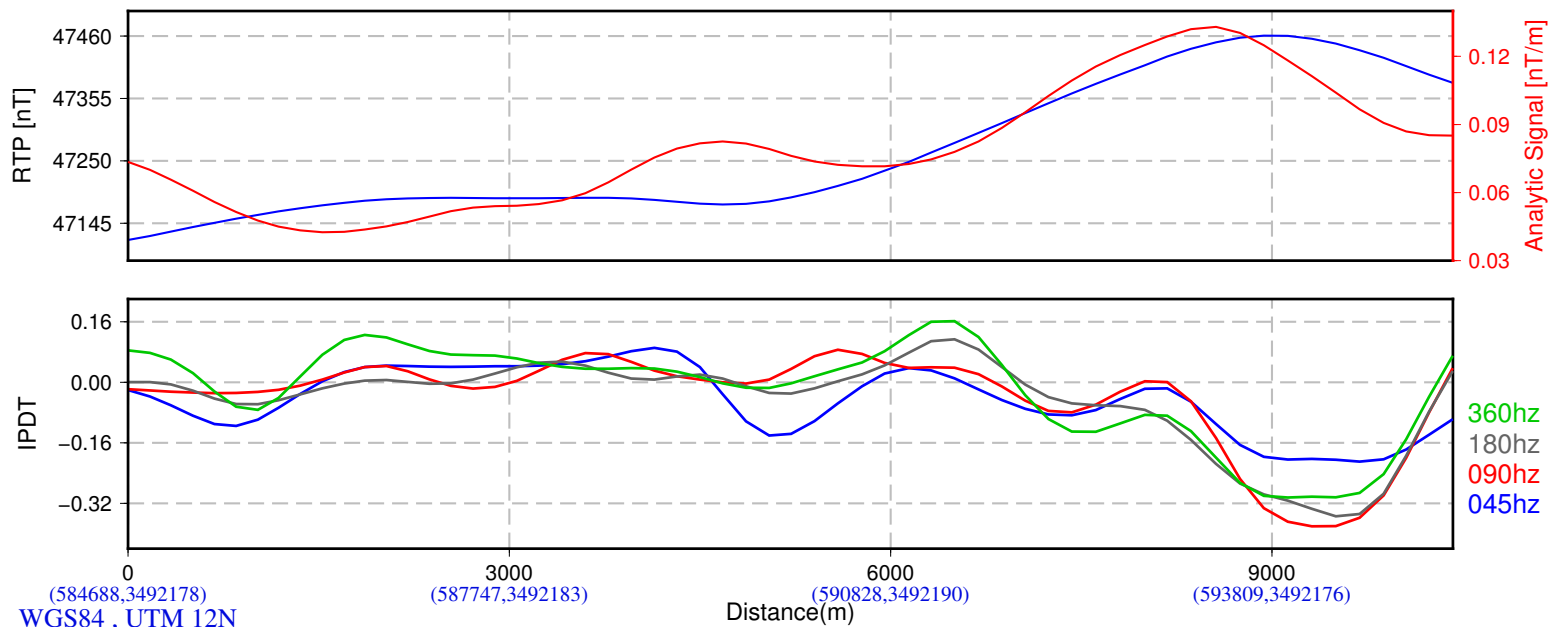
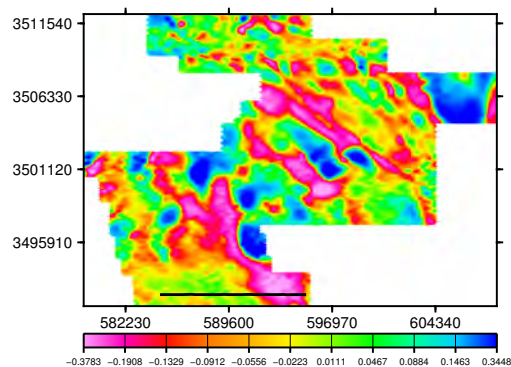
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1580

Analytic Signal [nT/m]



IP 090Hz DT



Liberty Star
Tombstone
Arizona

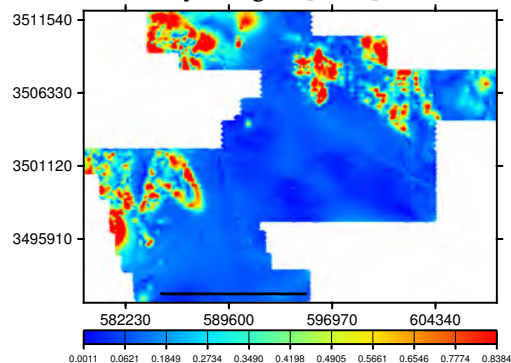
ZTEM System: Heliborne ZTEM
Job Number: GL130168

3D-ZTEM Inversion: Resistivity Sections
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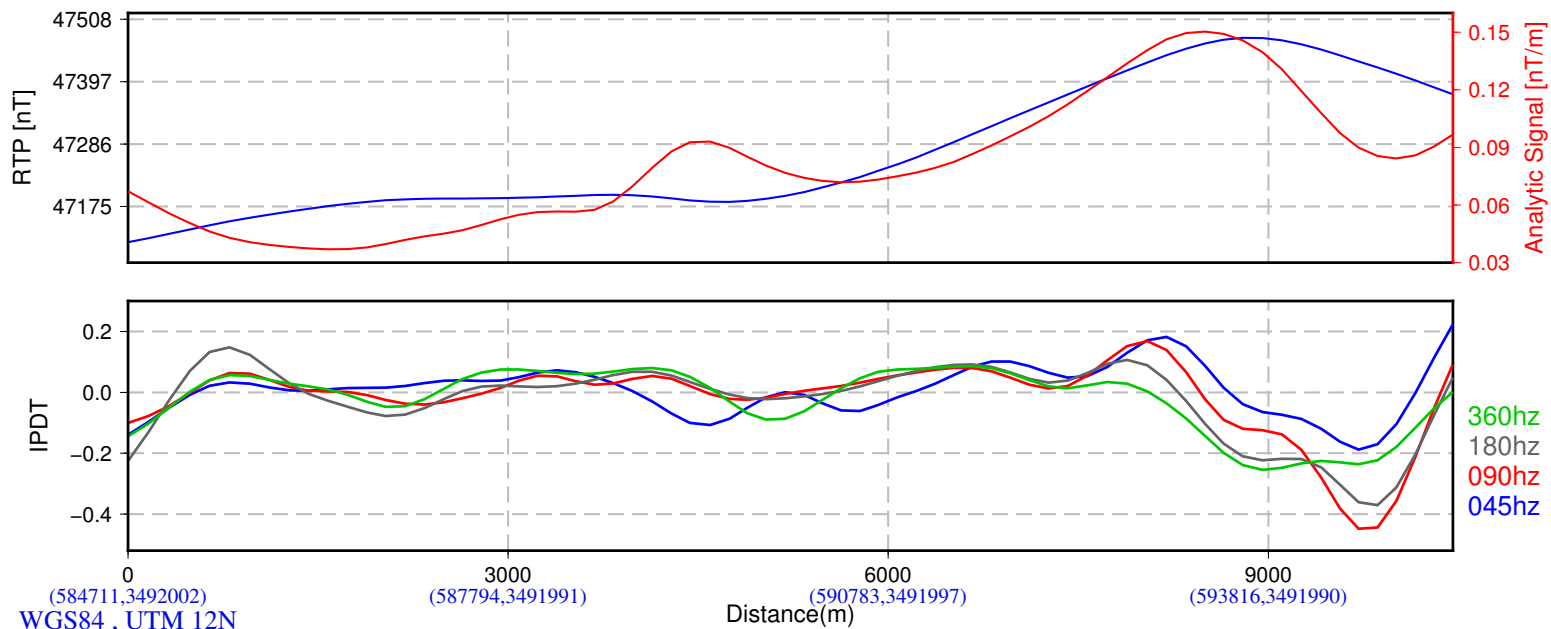
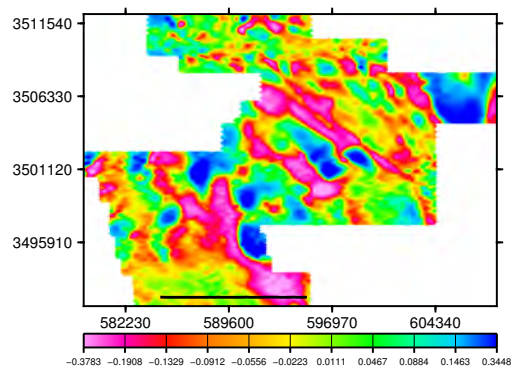
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1585

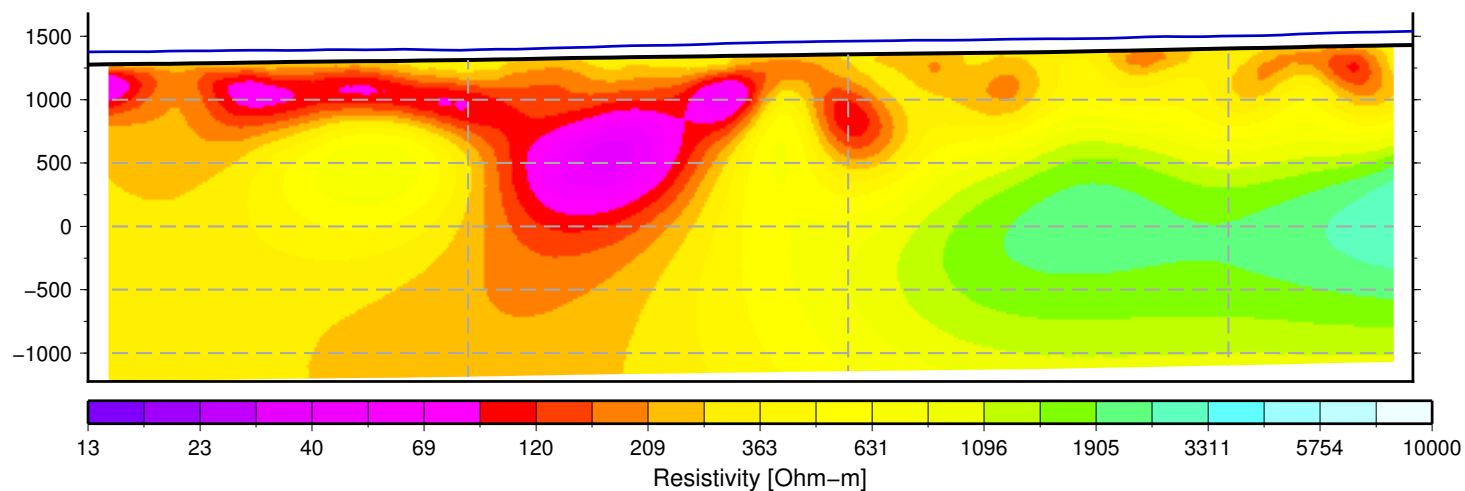
Analytic Signal [nT/m]



IP 090Hz DT



Elev(m)



View looking North

Liberty Star
Tombstone
Arizona

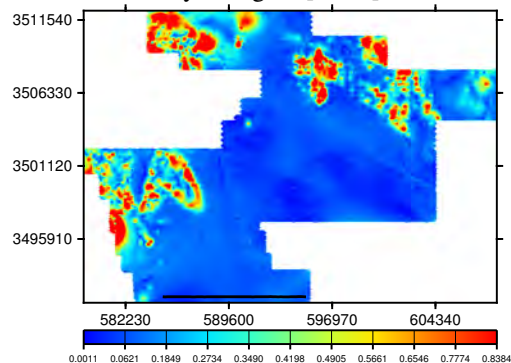
ZTEM System: Heliborne ZTEM
Job Number:GL130168

3D-ZTEM Inversion: Resistivity Sections
Flown by Geotech Ltd
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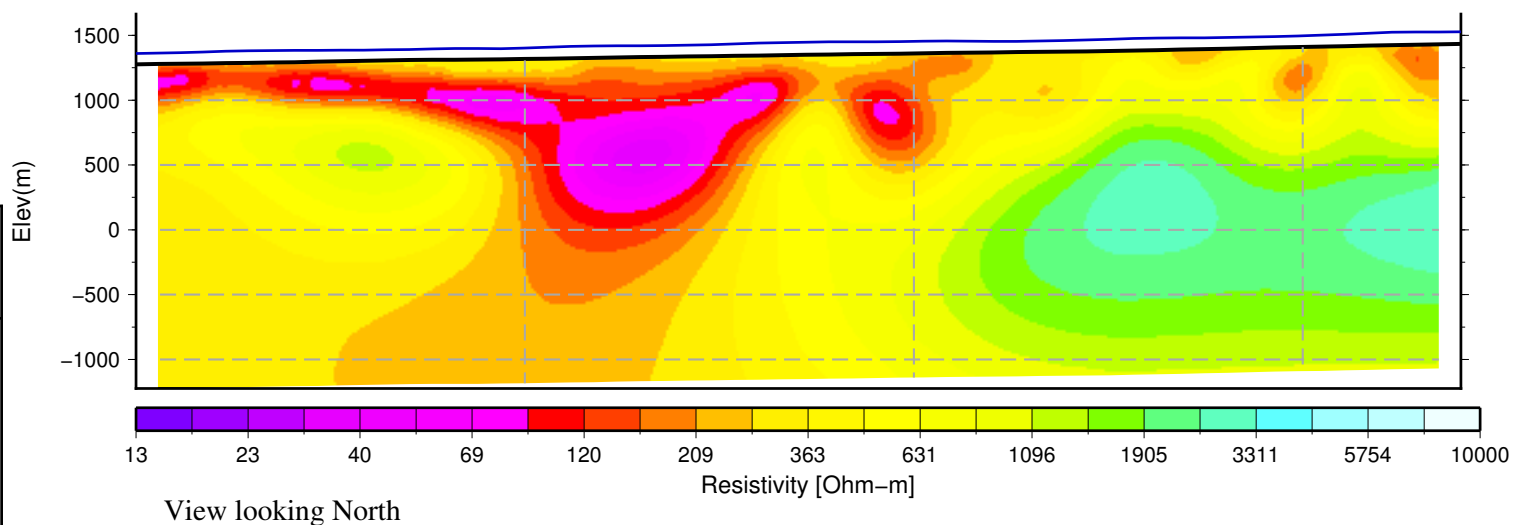
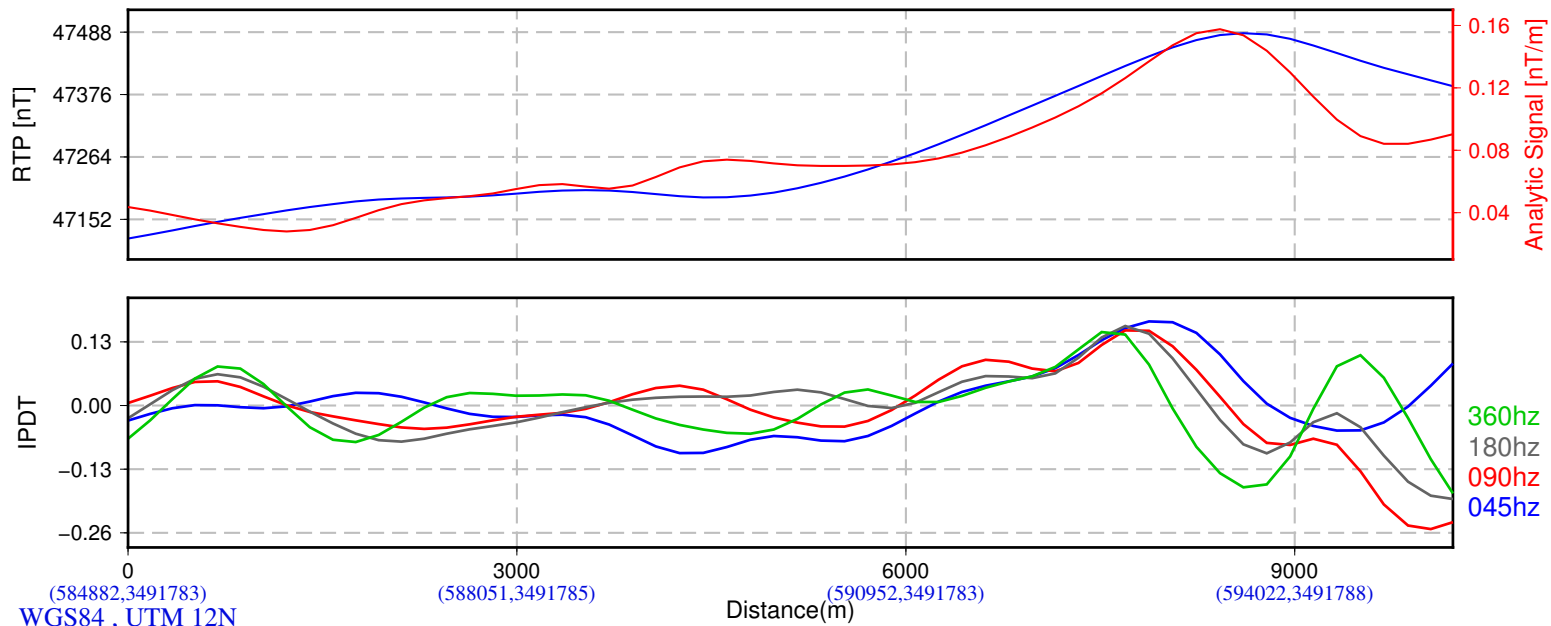
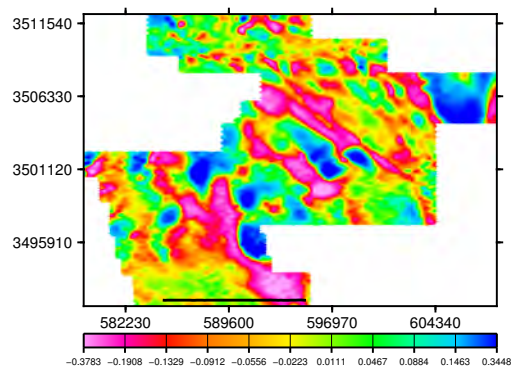
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1590

Analytic Signal [nT/m]



IP 090Hz DT



Liberty Star
Tombstone
Arizona

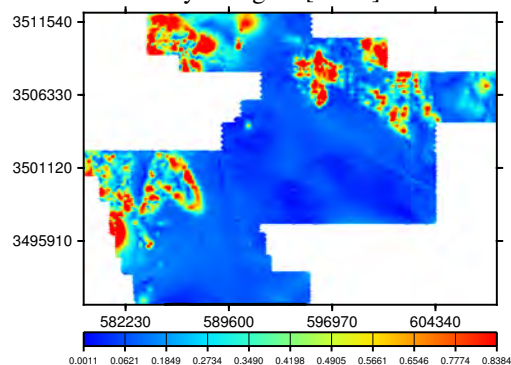
ZTEM System: Heliborne ZTEM
Job Number:GL130168

3D-ZTEM Inversion: Resistivity Sections
Flown by Geotech Ltd
Processed by Geotech Ltd
270 Industrial Parkway South
Aurora, Ontario, Canada L4G 3T9
www.geotech.ca

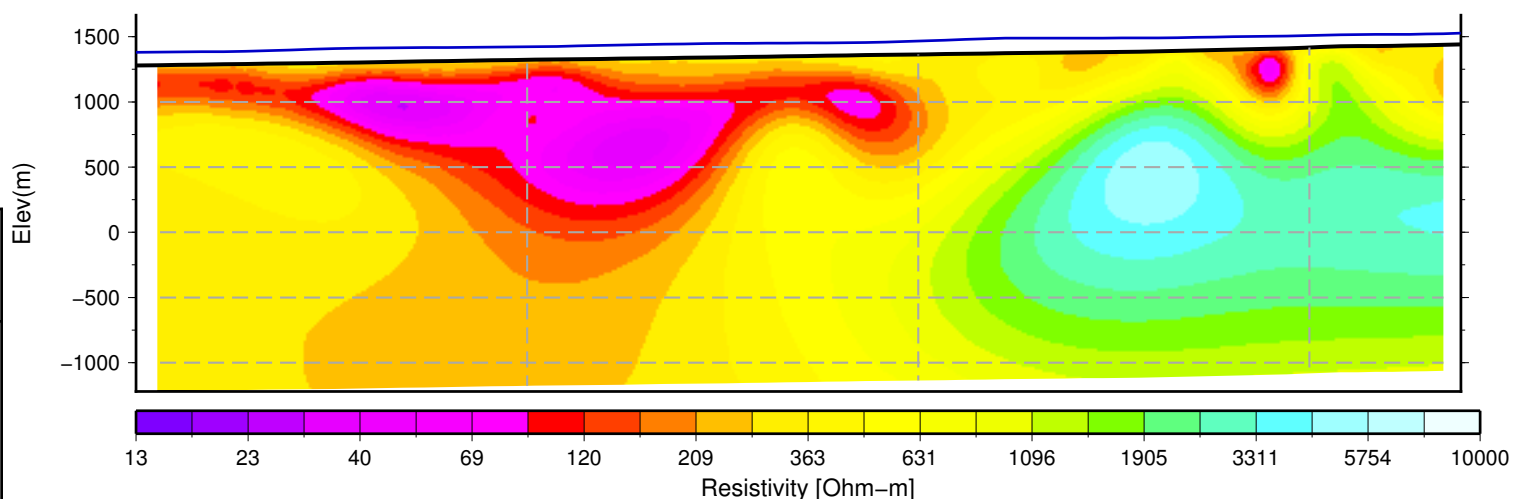
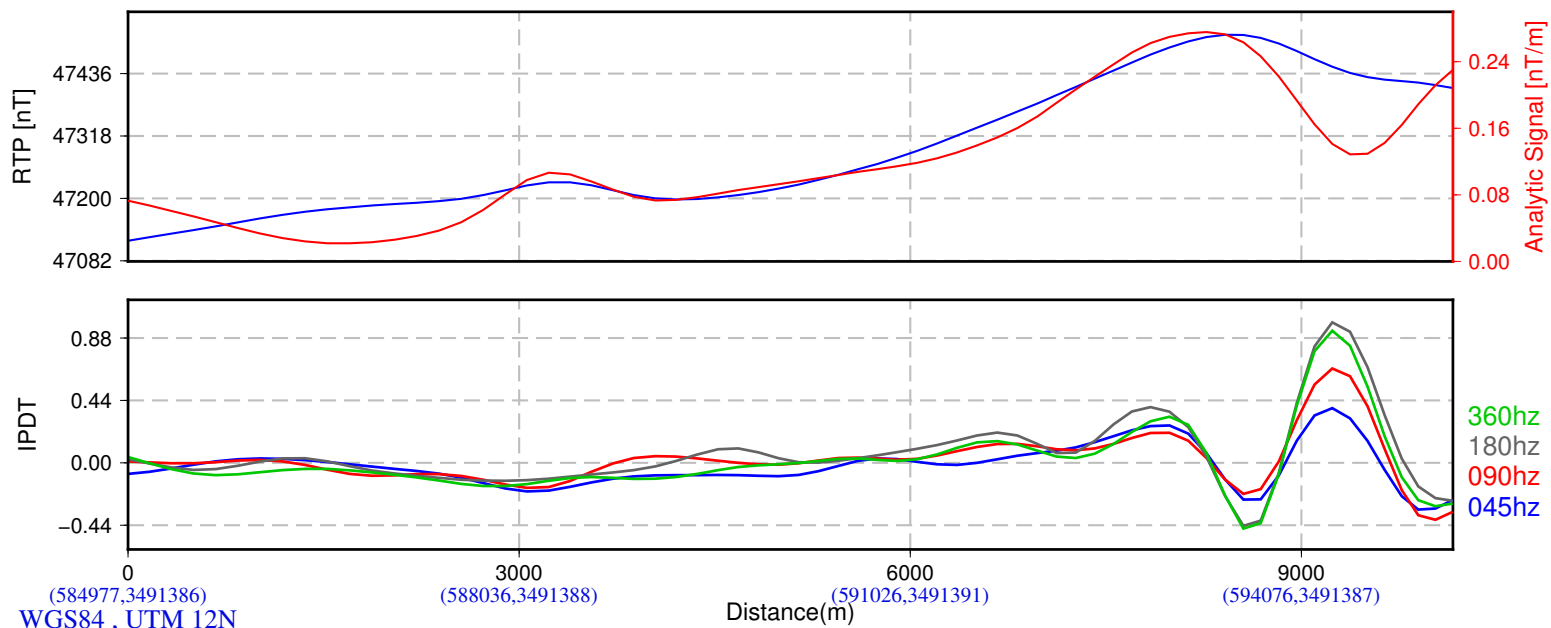
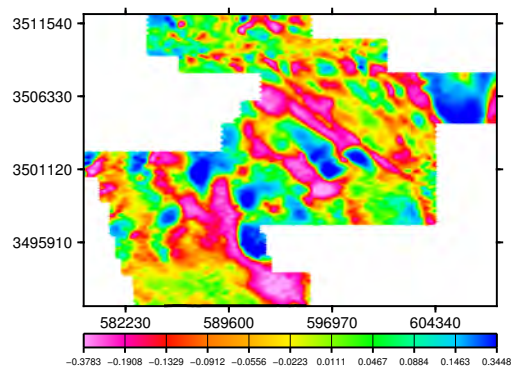
2019/11/20

3D ZTEM Inversion: Resistivity Section for Line 1600

Analytic Signal [nT/m]



IP 090Hz DT



Liberty Star
Tombstone
Arizona

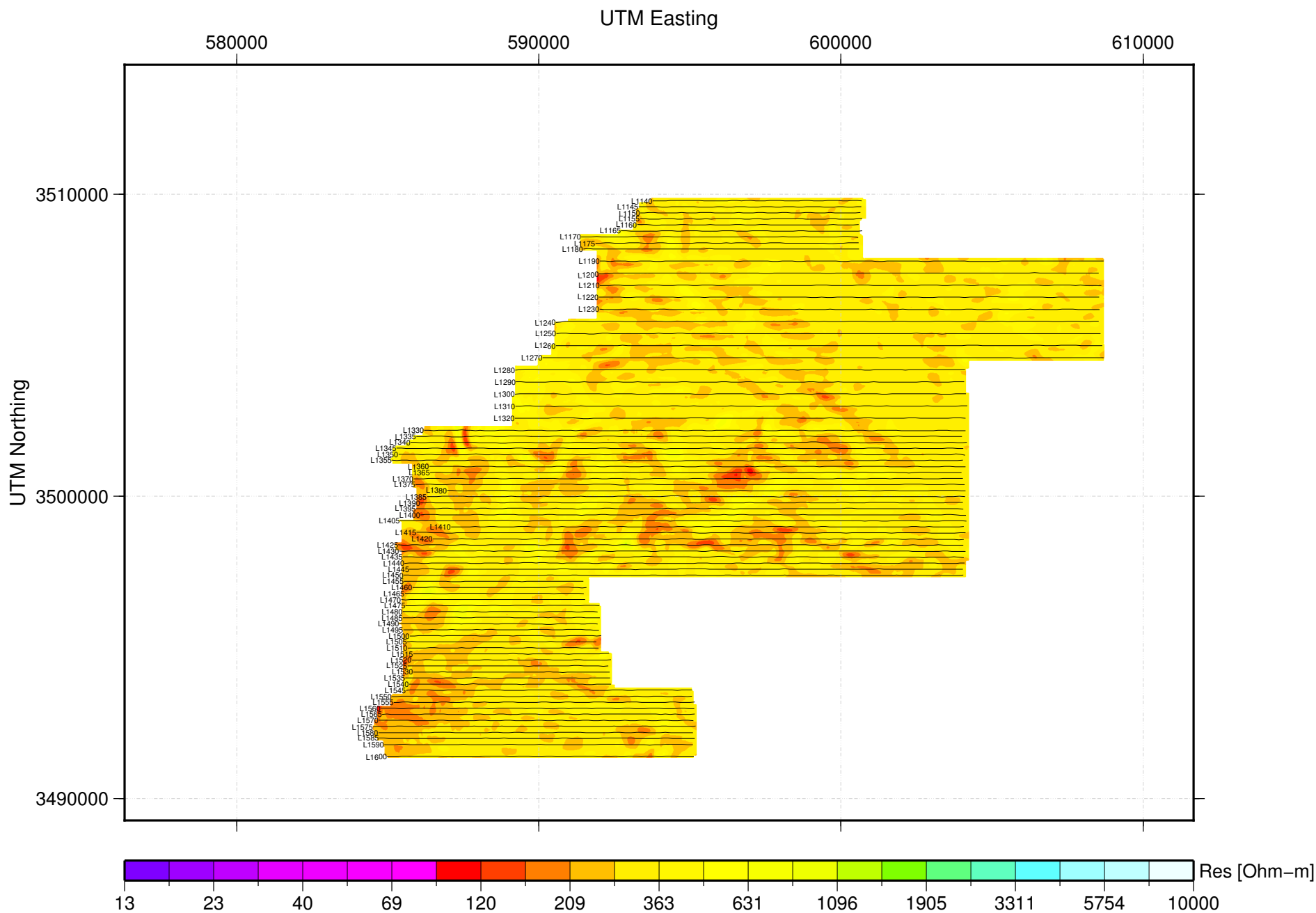
ZTEM System: Heliborne ZTEM
Job Number: GL130168

3D-ZTEM Inversion: Resistivity Sections
Flown by Geotech Ltd
Processed by Geotech Ltd
270 Industrial Parkway South
Aurora, Ontario, Canada L4G 3T9
www.geotech.ca

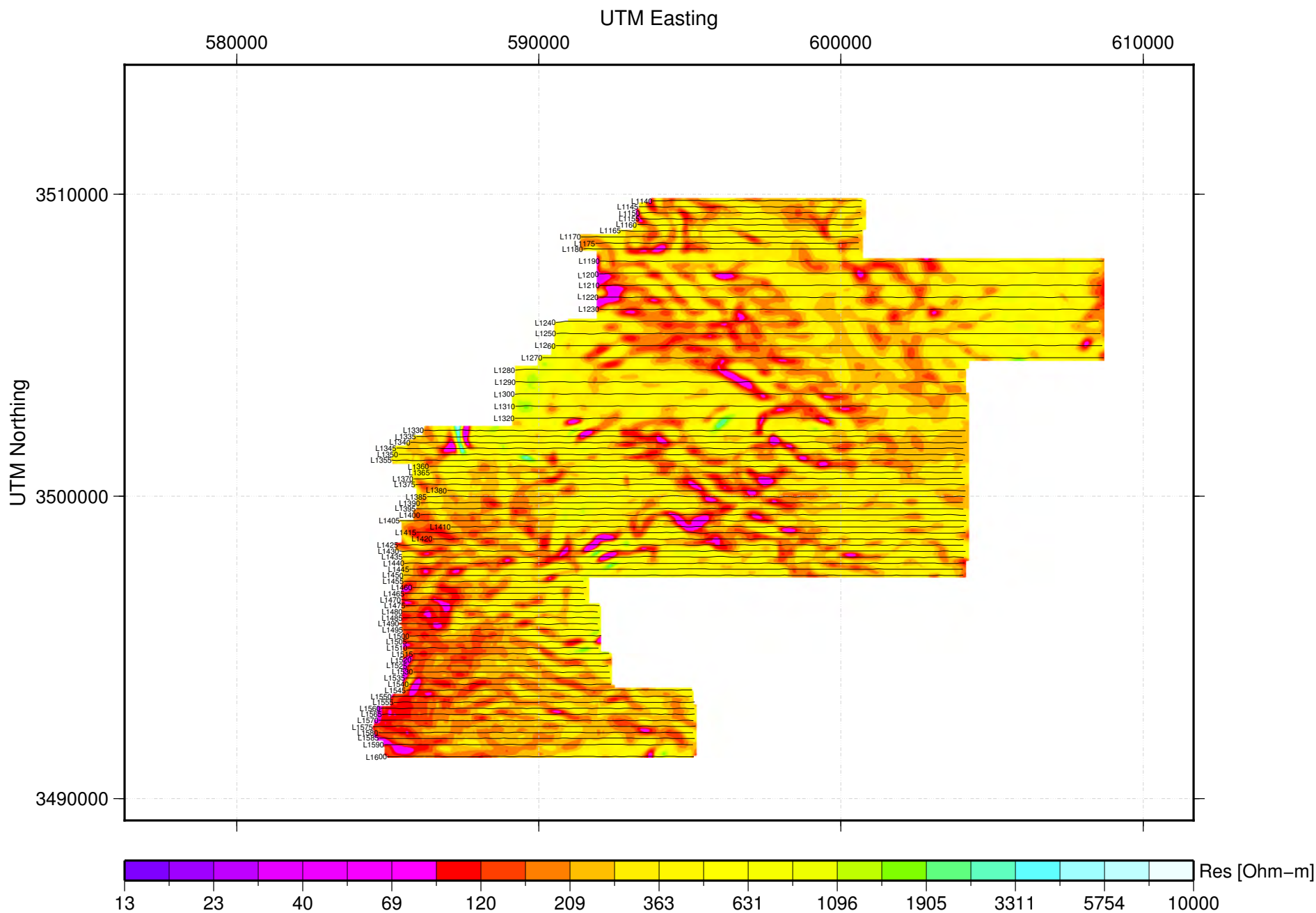
2019/11/20

**The following slides are
Depth Slices**

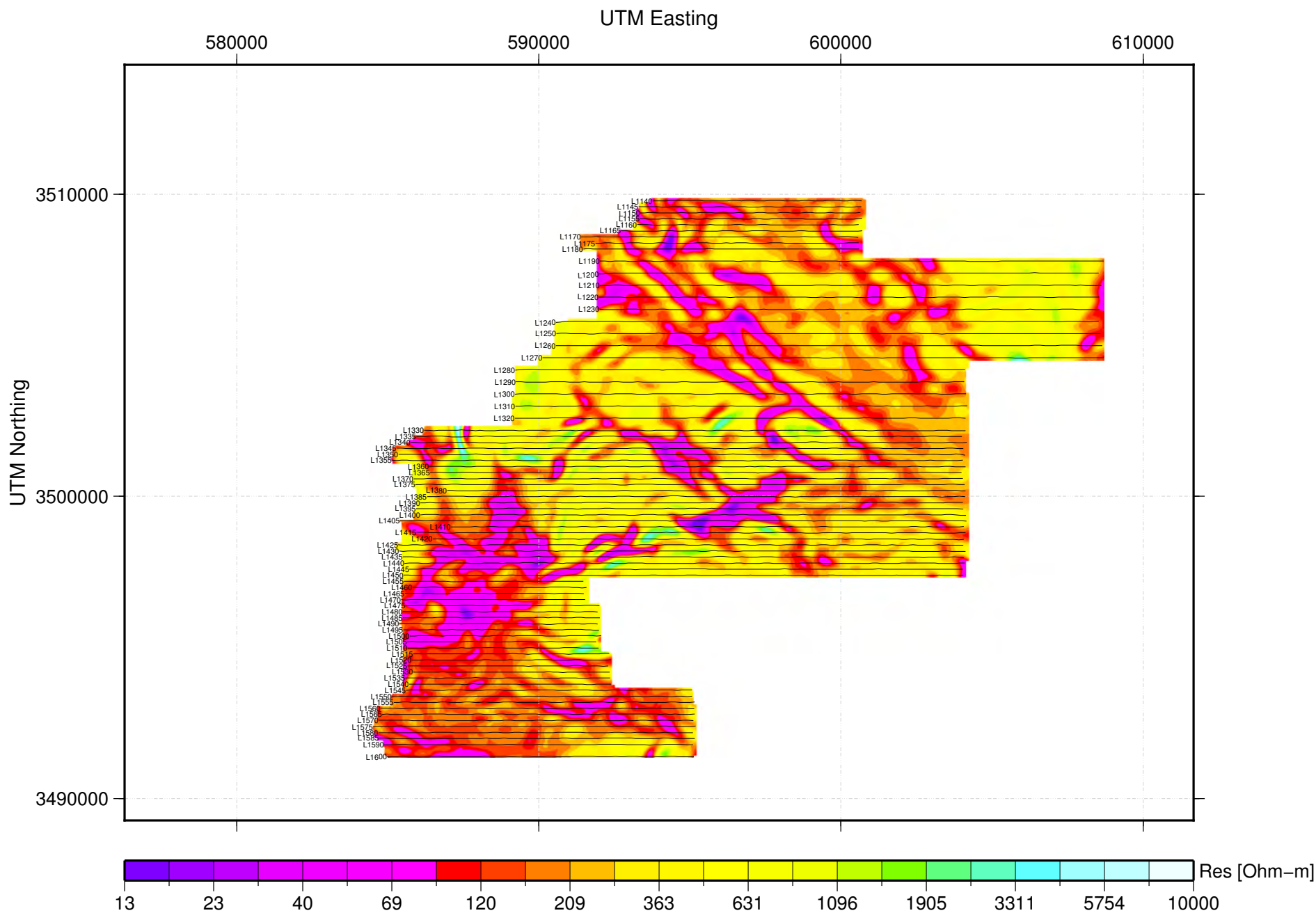
3D ZTEM Inversion: Resistivity Depth Slice at 0m



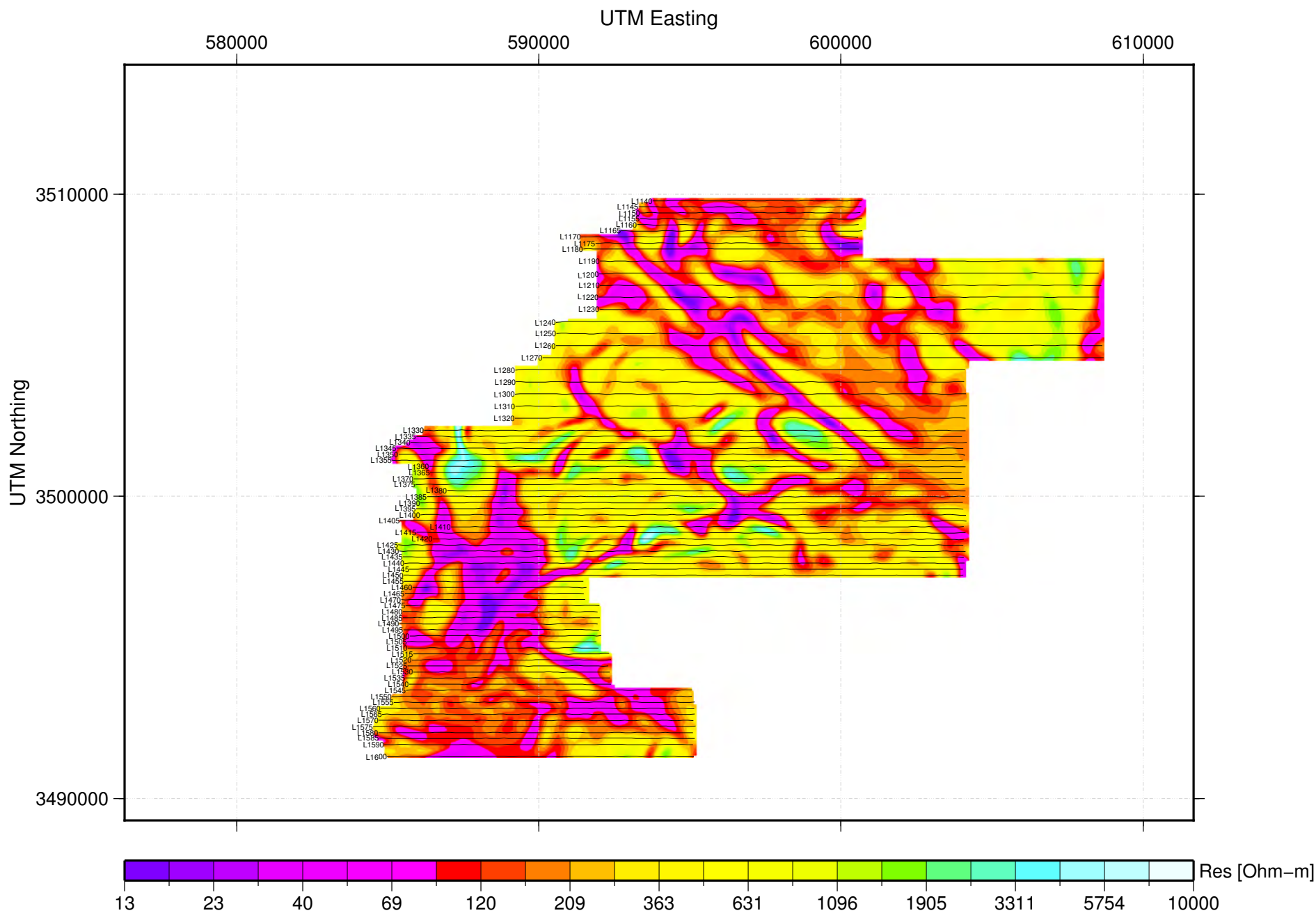
3D ZTEM Inversion: Resistivity Depth Slice at 100m



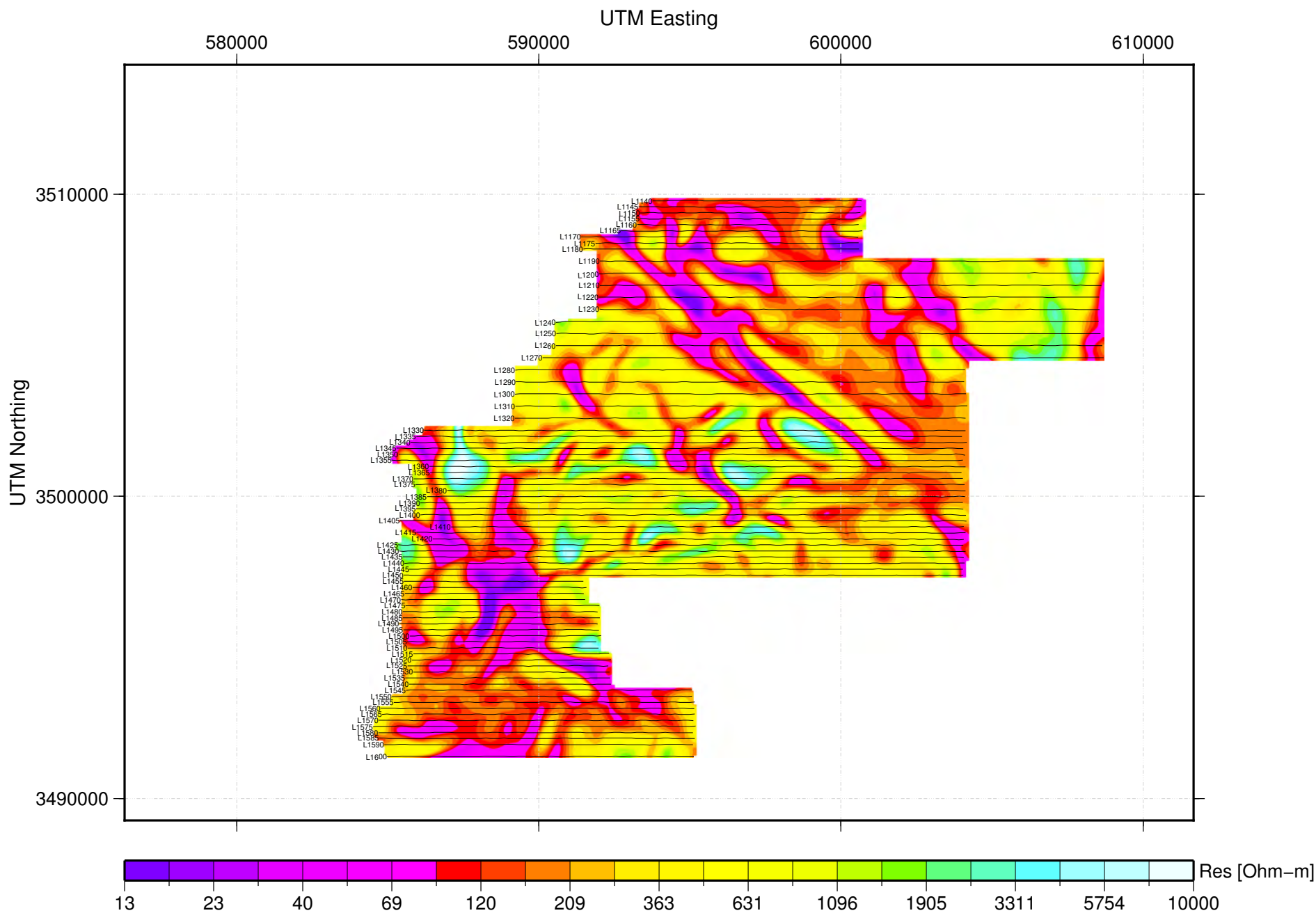
3D ZTEM Inversion: Resistivity Depth Slice at 200m



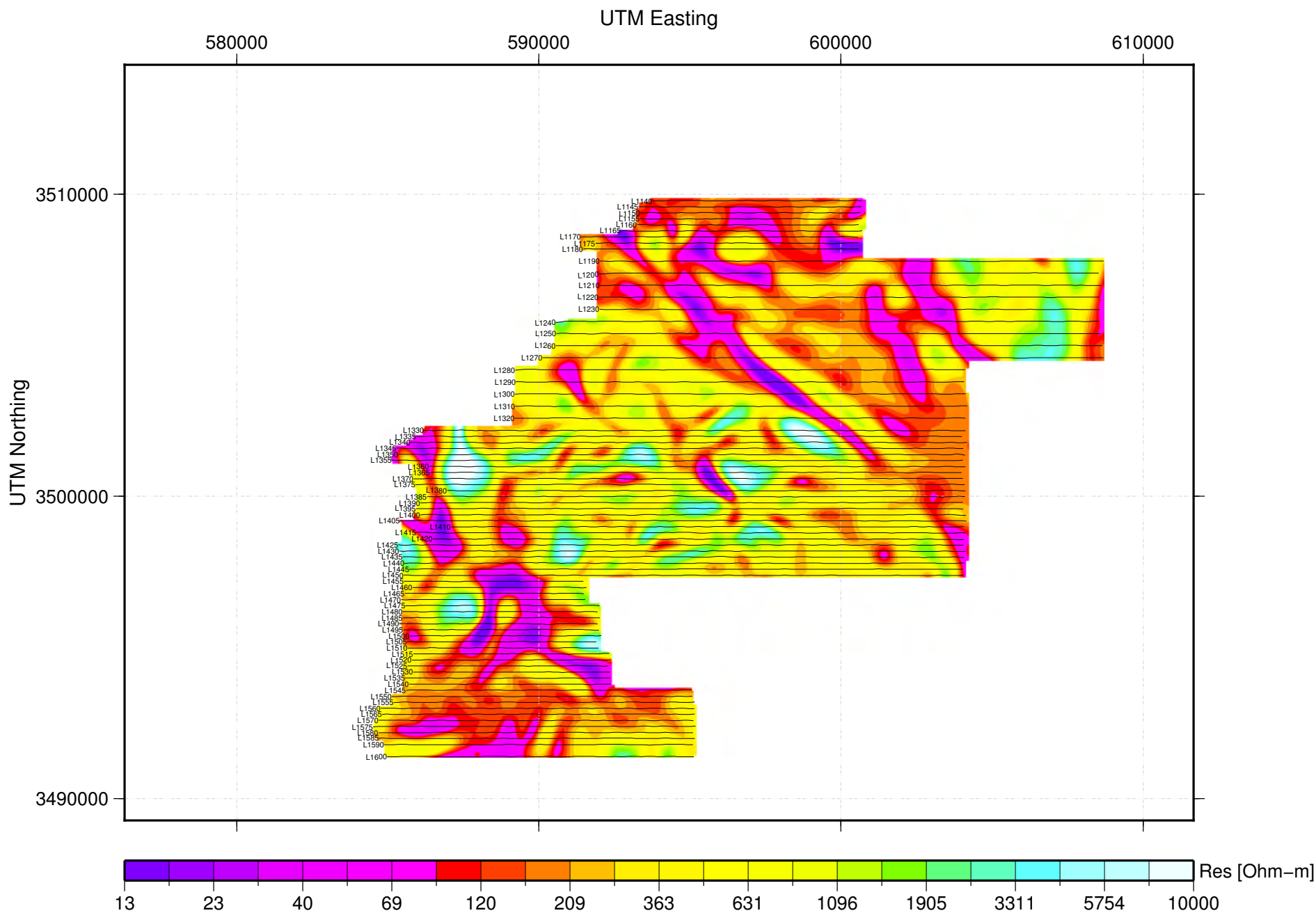
3D ZTEM Inversion: Resistivity Depth Slice at 300m



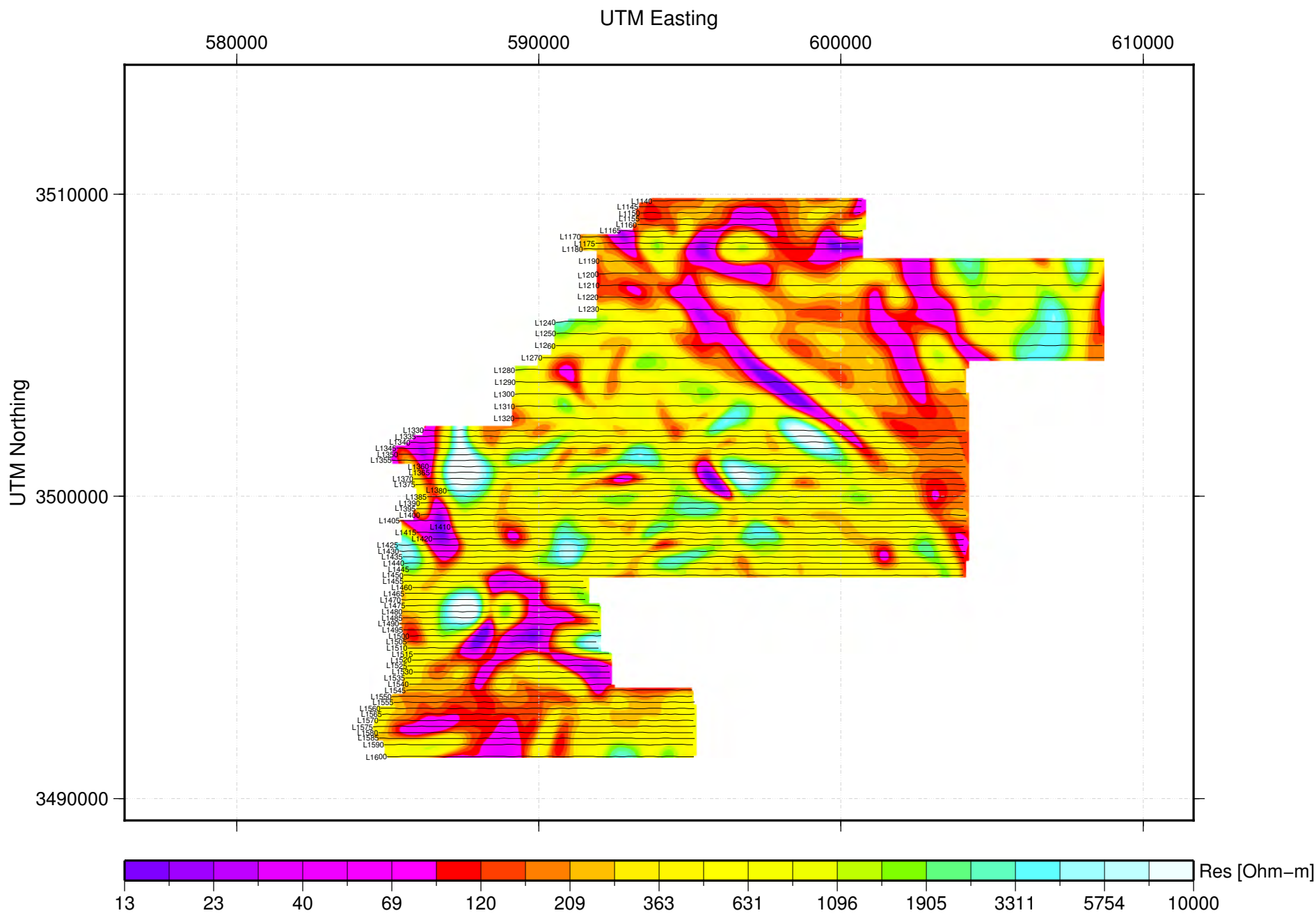
3D ZTEM Inversion: Resistivity Depth Slice at 400m



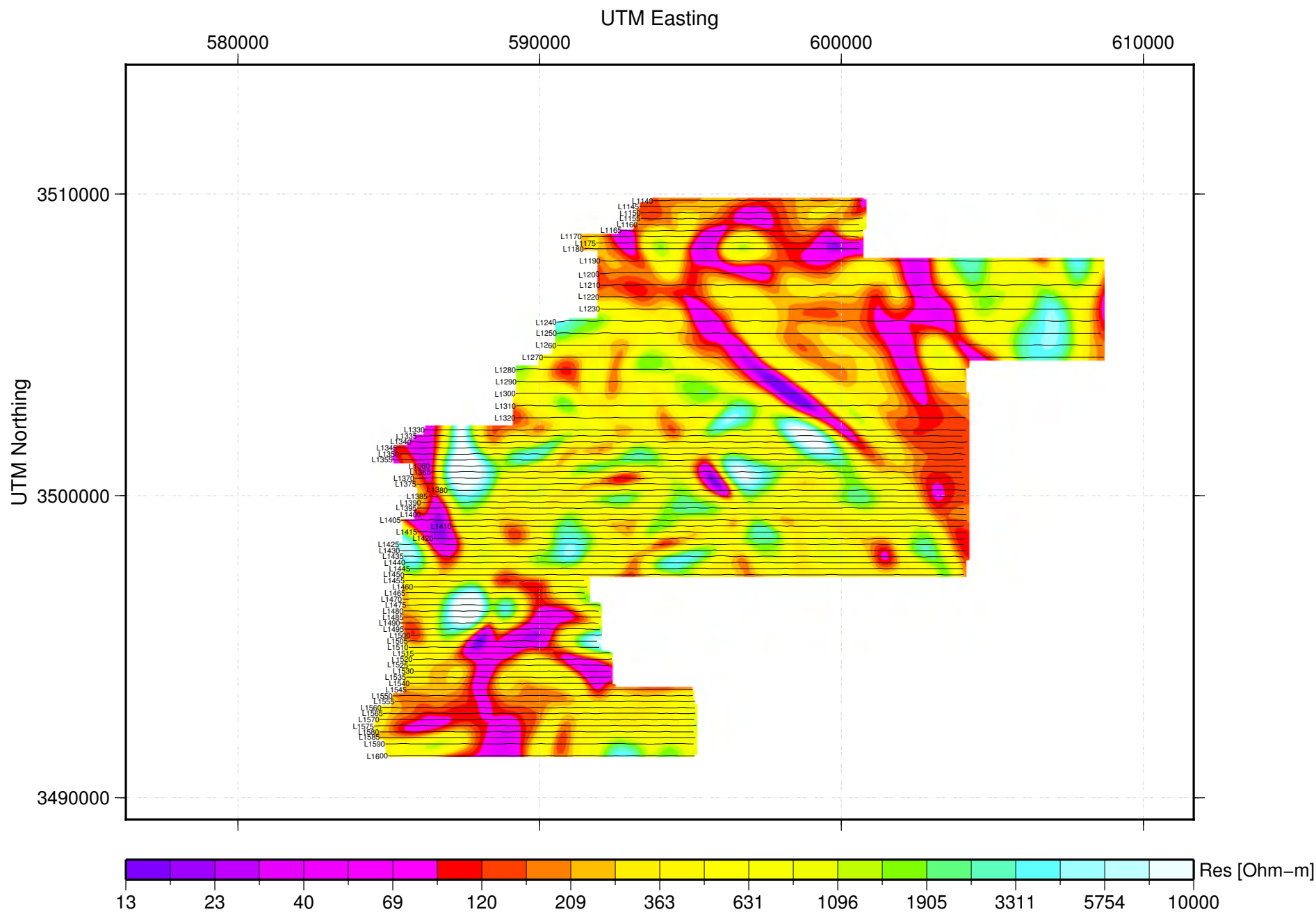
3D ZTEM Inversion: Resistivity Depth Slice at 500m



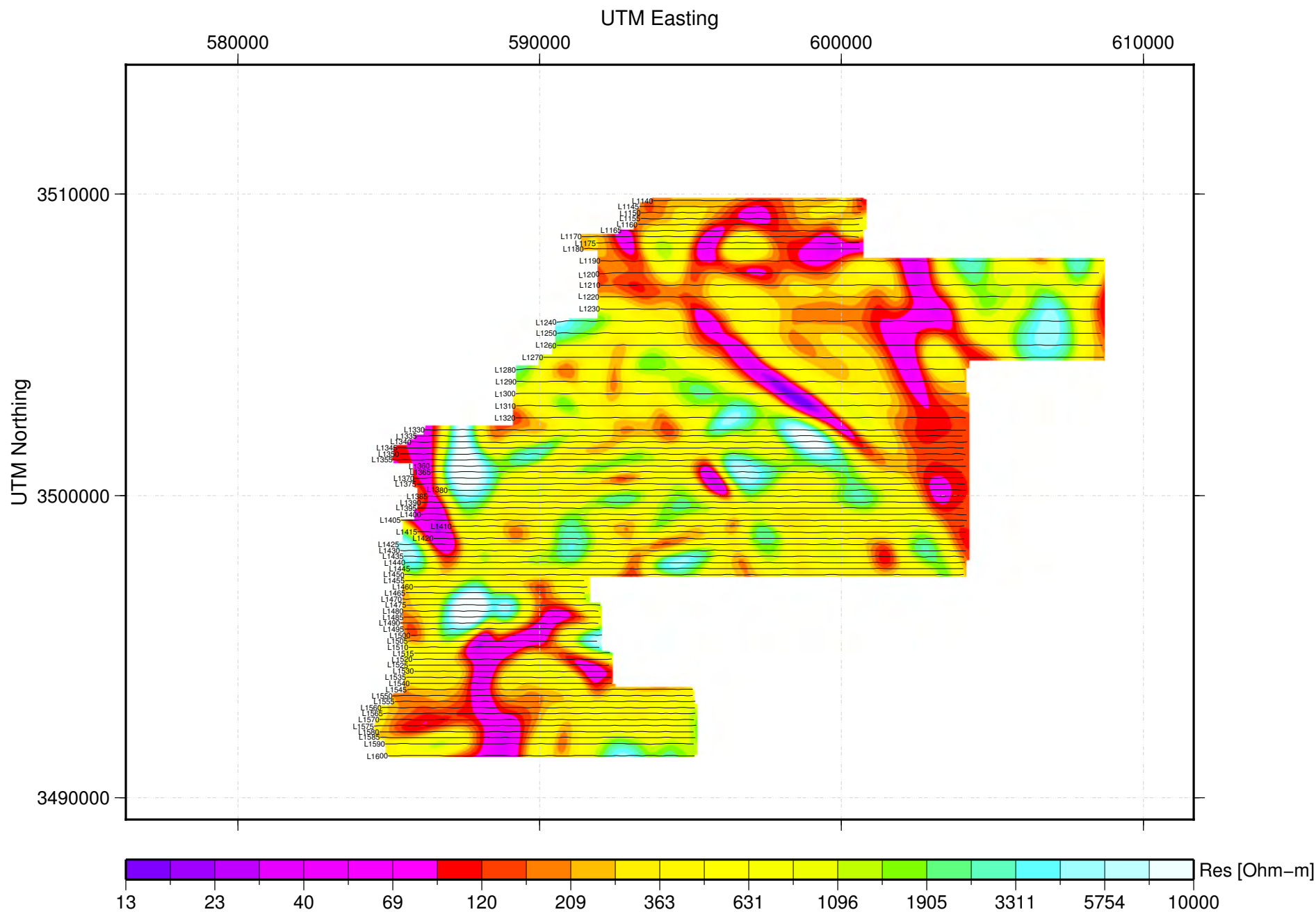
3D ZTEM Inversion: Resistivity Depth Slice at 600m



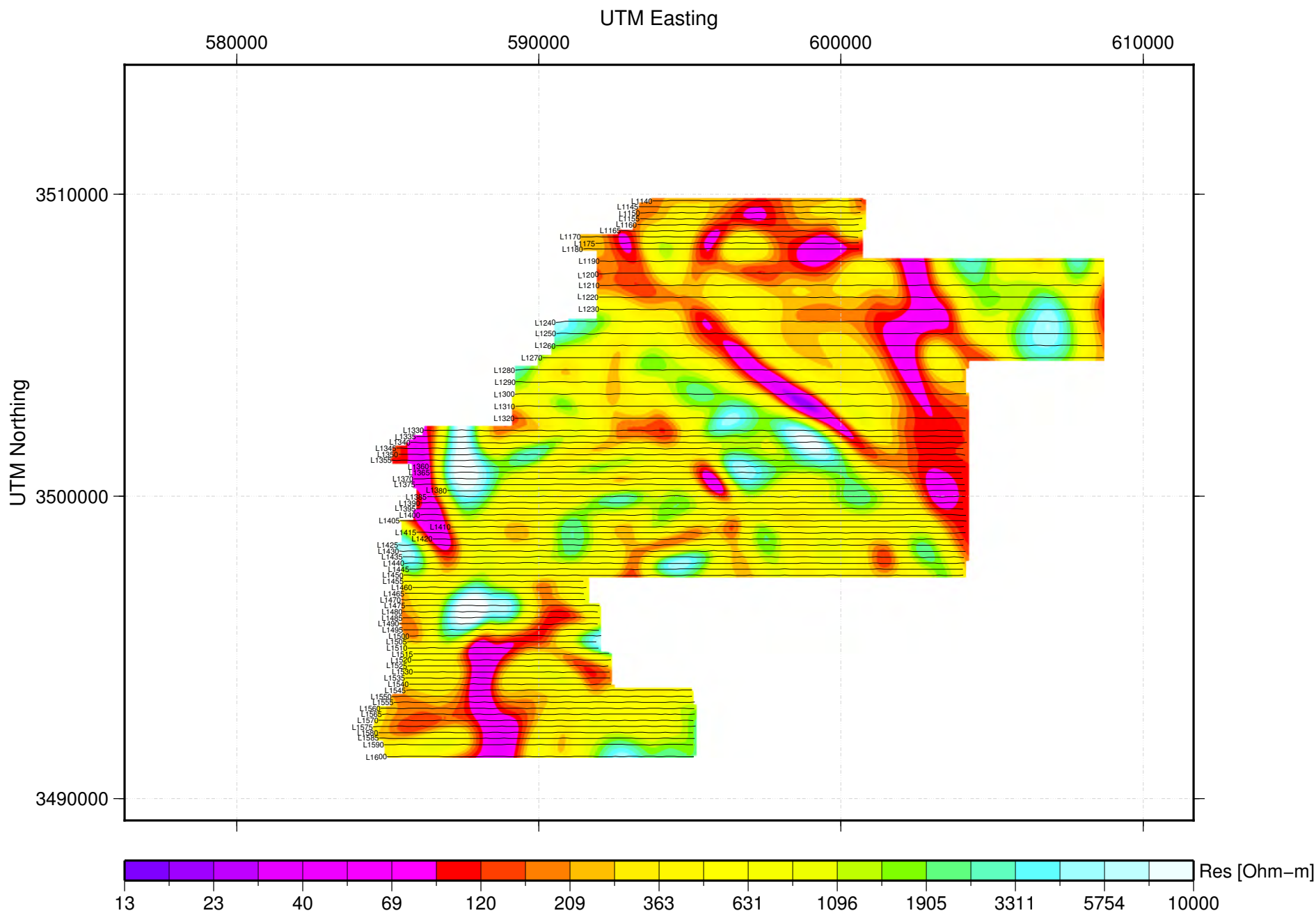
3D ZTEM Inversion: Resistivity Depth Slice at 700m



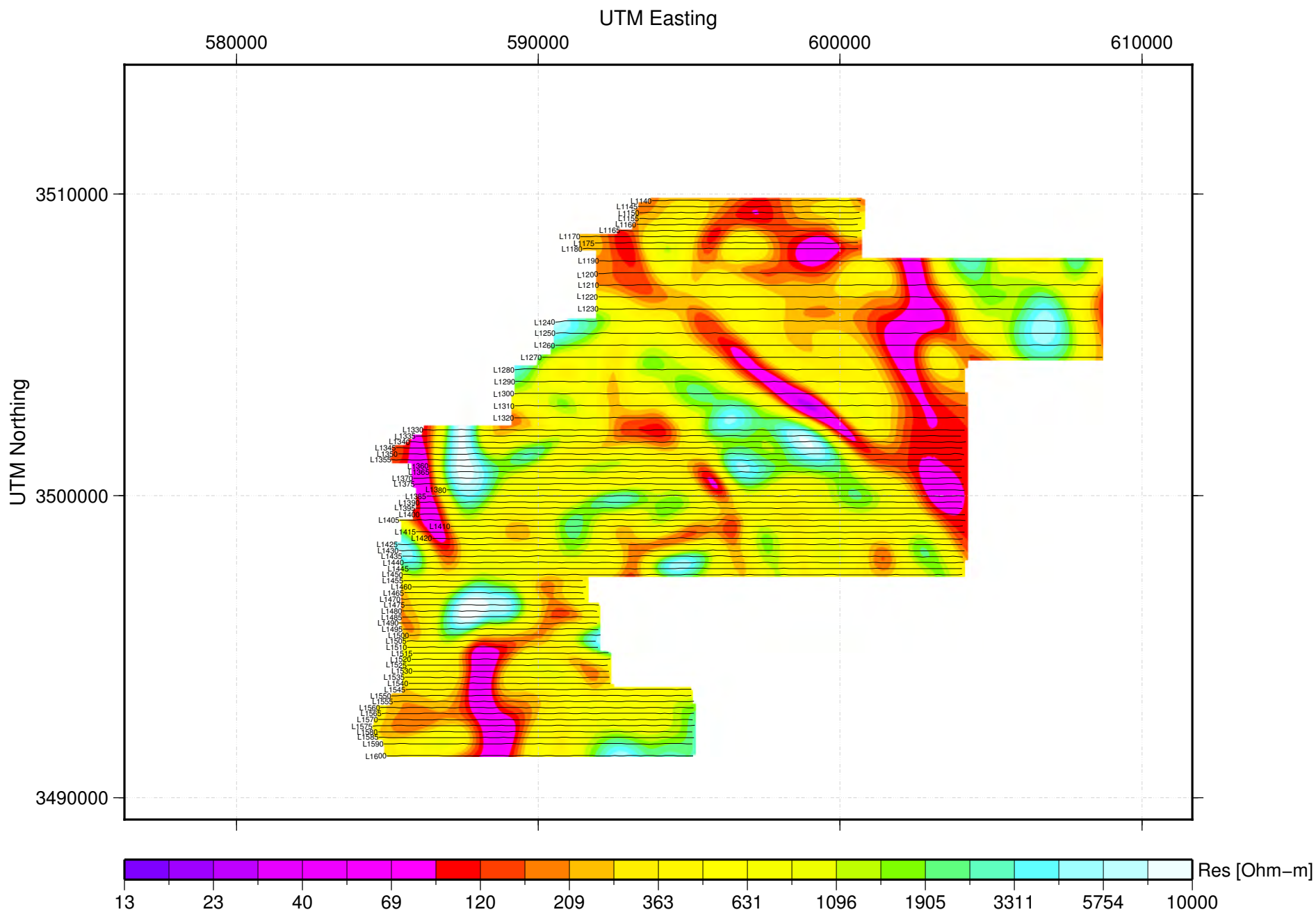
3D ZTEM Inversion: Resistivity Depth Slice at 800m



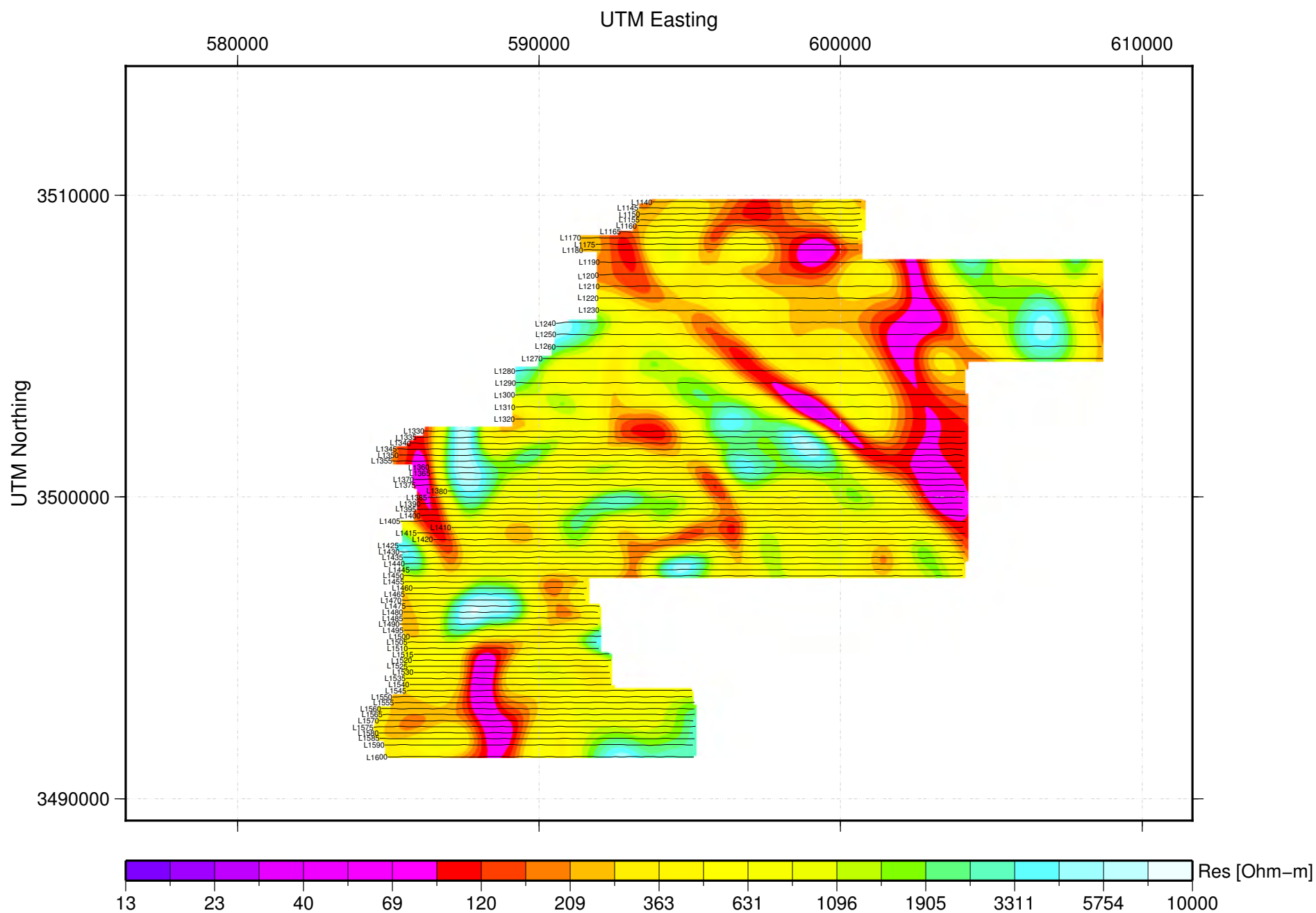
3D ZTEM Inversion: Resistivity Depth Slice at 900m



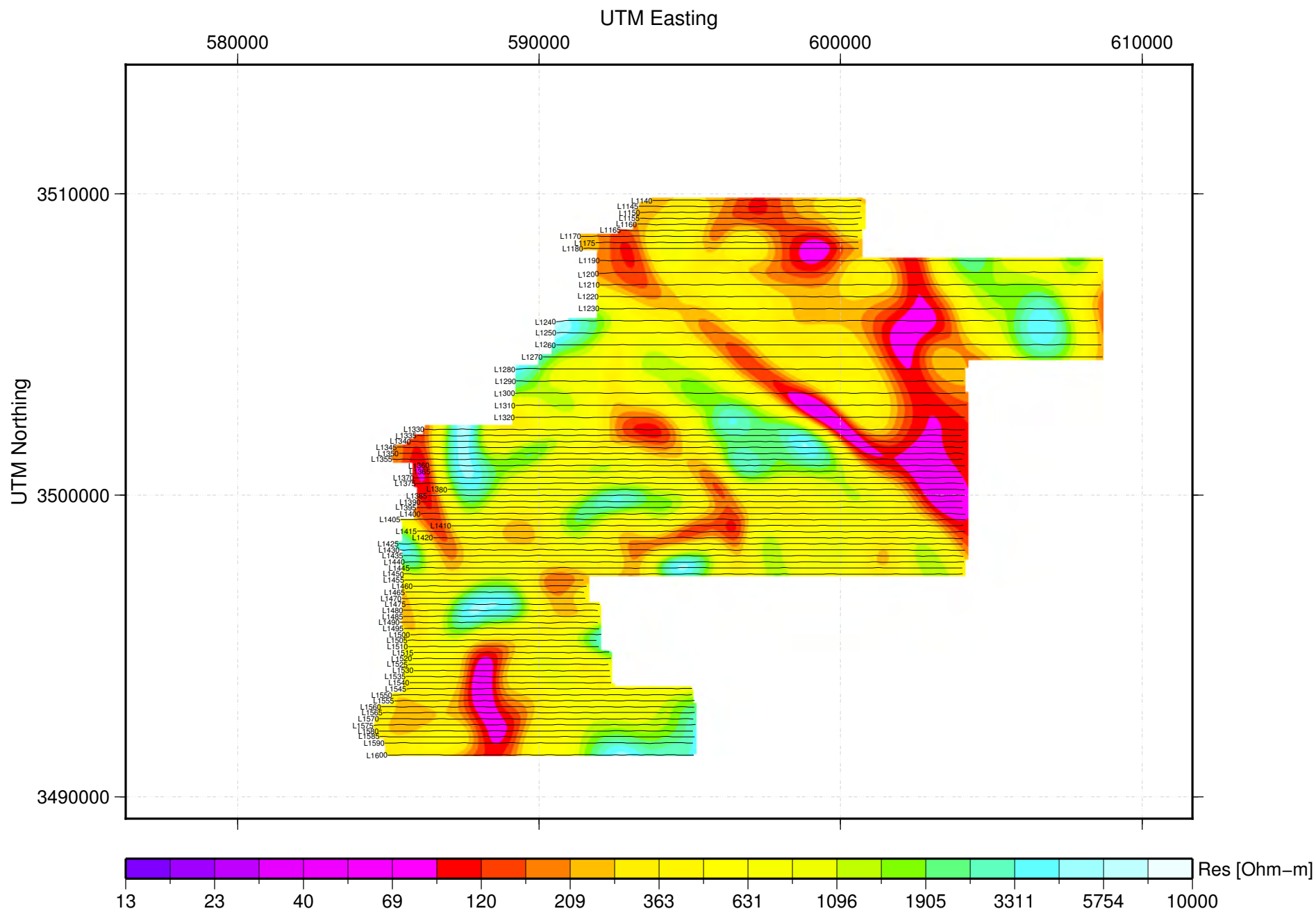
3D ZTEM Inversion: Resistivity Depth Slice at 1000m



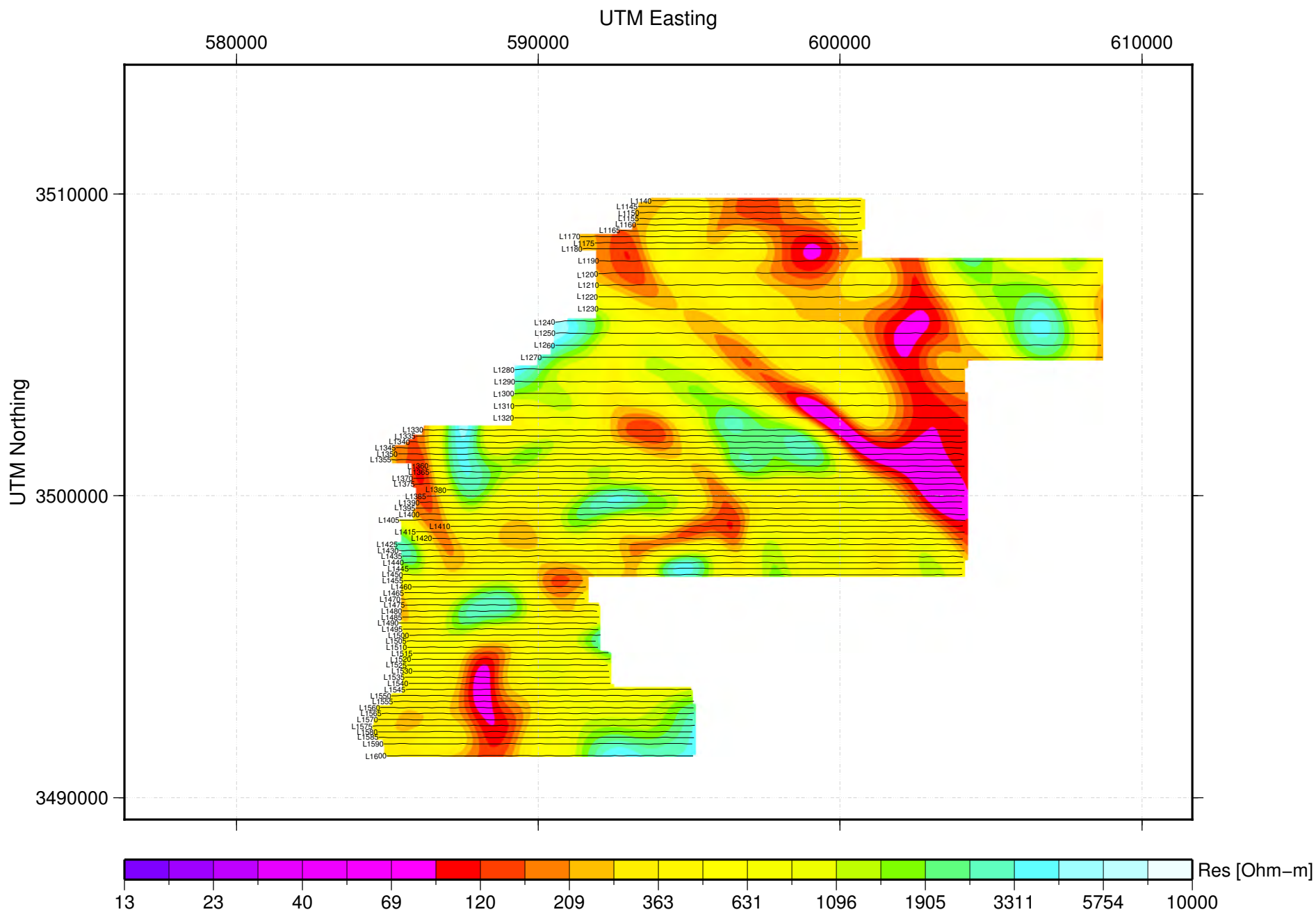
3D ZTEM Inversion: Resistivity Depth Slice at 1100m



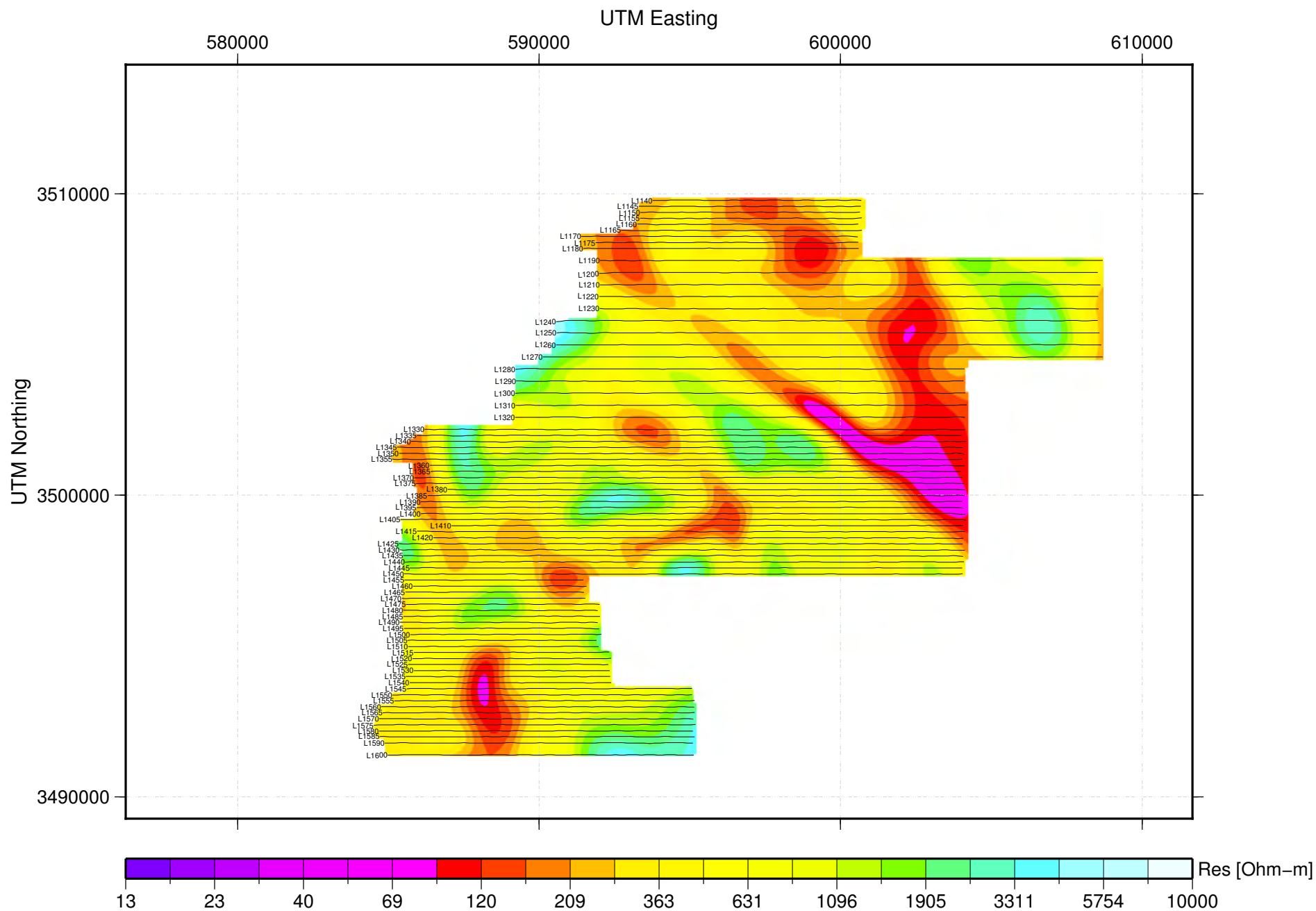
3D ZTEM Inversion: Resistivity Depth Slice at 1200m



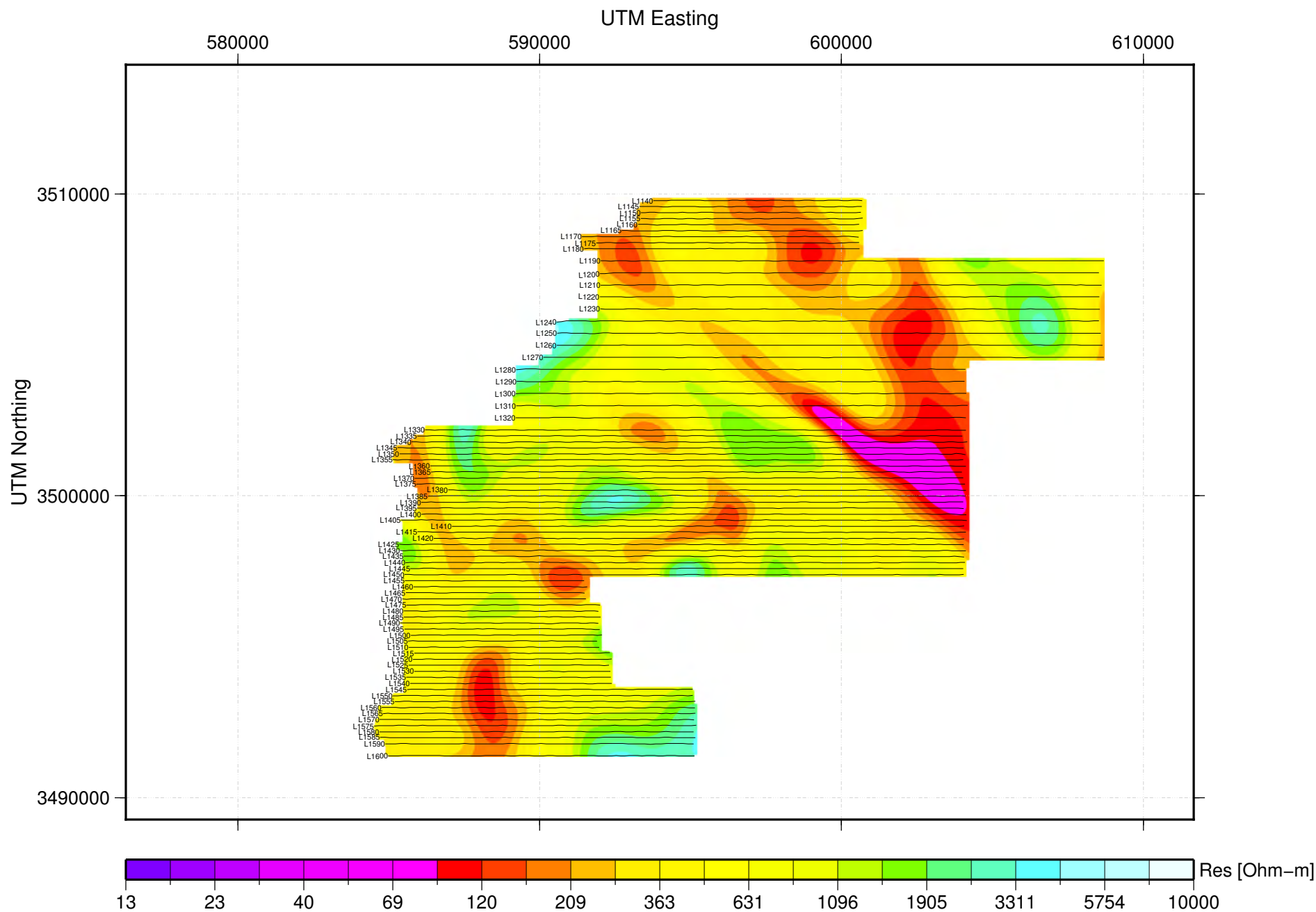
3D ZTEM Inversion: Resistivity Depth Slice at 1300m



3D ZTEM Inversion: Resistivity Depth Slice at 1400m



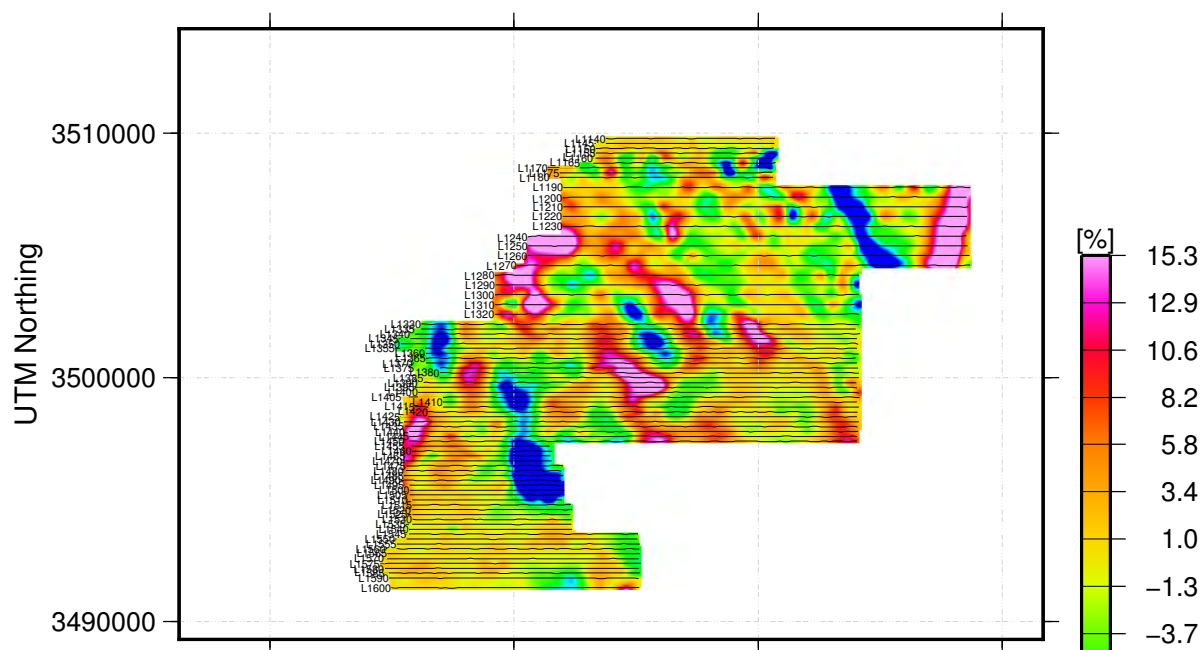
3D ZTEM Inversion: Resistivity Depth Slice at 1500m



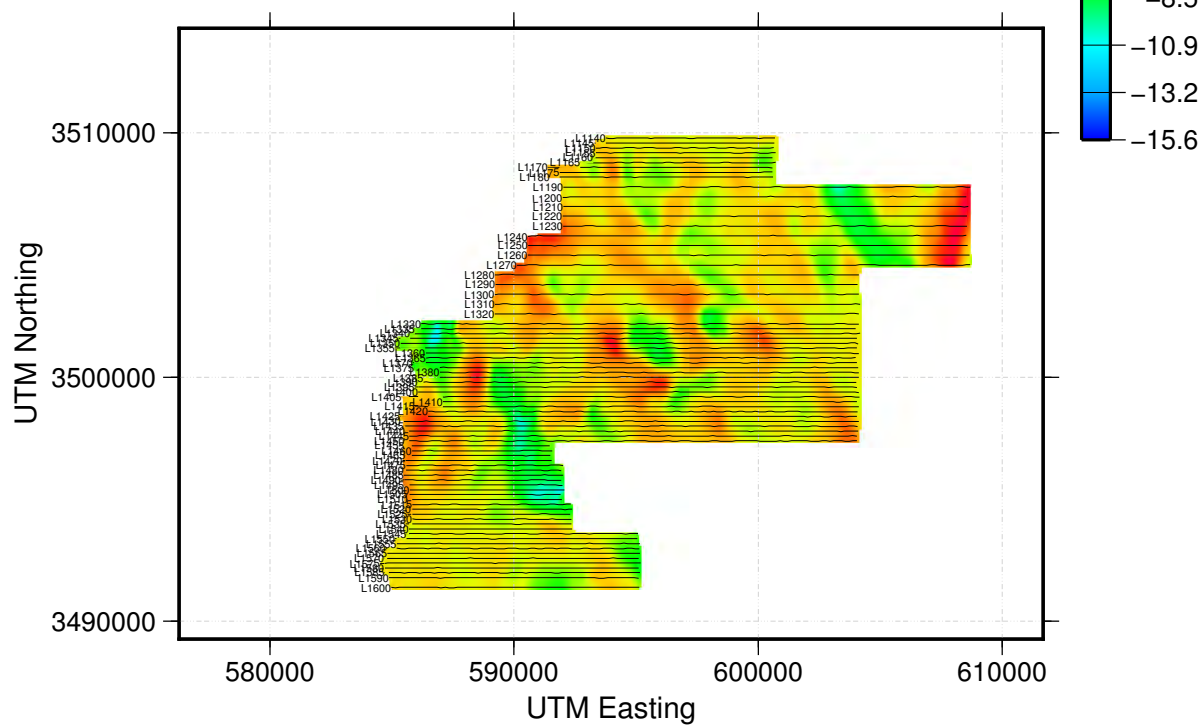
**The following slides are tipper maps of
field data and model responses**

3DZTEM Inversion Data for xqd_360hzf

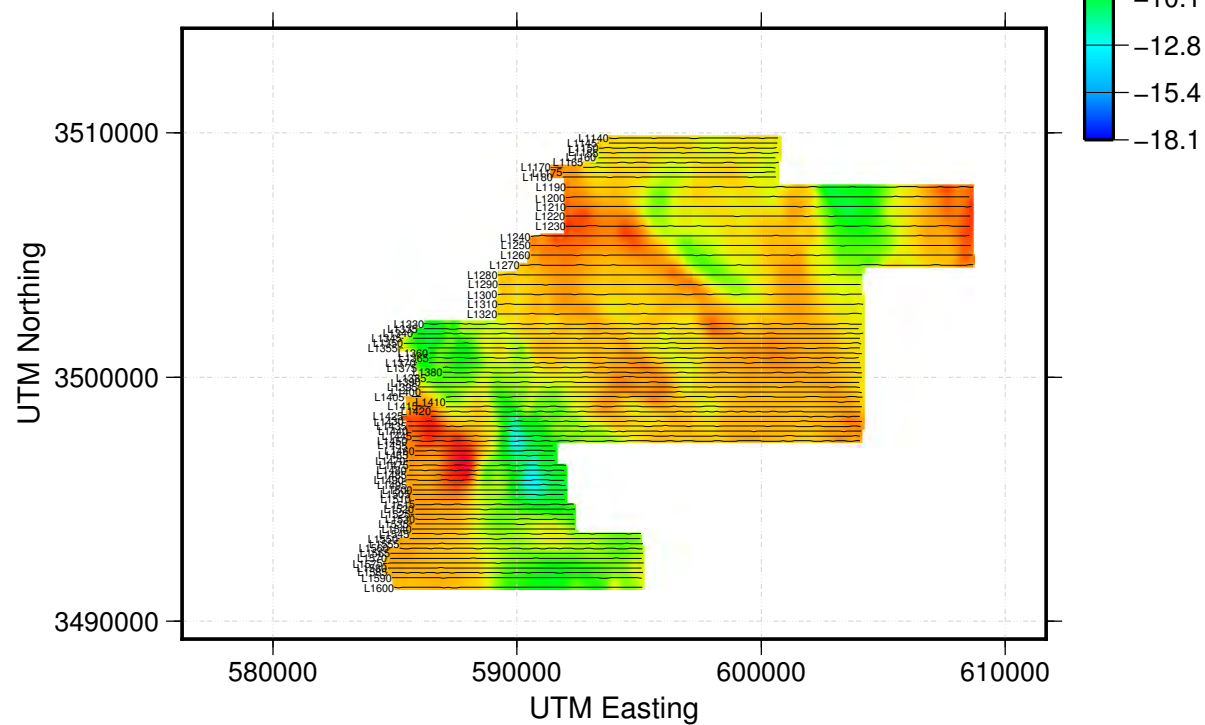
Field Data

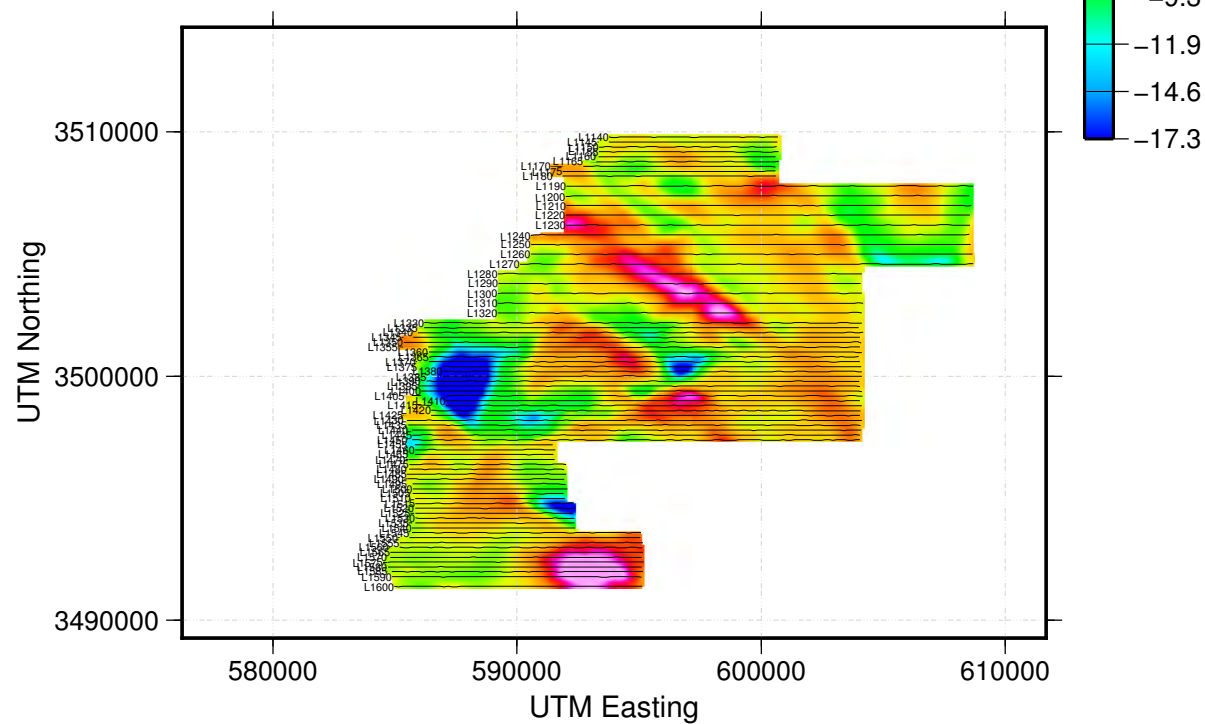


Model Response



Model Response





Conclusions

3D ZTEM inversion was successfully performed on the Tipper Transfer functions acquired over the Tombstone block, Arizona. The 3D Inversion results are presented as 3D voxel model, Resistivity depth slices from 0 to 1500 m at 100m depth interval and Resistivity cross section along all flight lines.

References

1. Holtham, E. and Douglas W. Oldenburg, 2010, **Three-dimensional inversion of ZTEM data**, *Geophys. J. Int.* (2010) **182**, 168–182 (<http://gif.eos.ubc.ca/publications>)
2. Oldenburg D. W. and Y. Li, **Inversion for Applied geophysics: A Tutorial** (<http://www.eos.ubc.ca/ubcgif/iag/tutorials/tutorial-v9.pdf>)
3. Holtham E. and Douglas W. Oldenburg, 2012, **Large-scale inversion of ZTEM data**, *GEOPHYSICS*, VOL. 77, P. WB37–WB45
4. MTZ3Dinv- A program Library for Inversion of Magnetotelluric and Magnetovariational Data over 3D Structures, User Manual, version 2011, UBC-GIF