

APPENDICES FOR
GEOLOGICALLY CONSTRAINED INVERSION MODELING
OF TITAN MAGNETOTELLURIC AND INDUCED
POLARIZATION SURVEY RESULTS AT KIDD CREEK MINE

MÉMOIRE DE MAÎTRISE ÈS SCIENCES APPLIQUÉES
(GÉNIE MINÉRAL)

DÉPARTEMENT DES GÉNIES CIVIL, GÉOLOGIQUES ET
DES MINES

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UNIVERSITÉ DE MONTRÉAL

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DÉPARTEMENT DES GÉNIES CIVIL,
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MÉMOIRE PRÉSENTÉ EN VUE DE L'OBTENTION
DU DIPLÔME DE MAÎTRISE ÈS SCIENCES APPLIQUÉES (M.SC.A)
(GÉNIE MINÉRAL)

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APPENDIX A: DCIP 2D UNCONSTRAINED INVERSIONS

General Comments on Unconstrained Inversion Modeling: The following inverse models were calculated using the UBC DCIP2D platform, using the native QARA array values (Quantec center-pole) with maximum 10% data errors for the voltage and ± 5 mrad error for the chargeability and with initial error floors set to 2% and 1mrad, respectively. In all cases “chi” was set to 1 and no error weights were used. The starting models for the unconstrained inversion were set to default to a uniform half-space using the average apparent resistivity or chargeability.

The inversion meshes were constructed using the UBC default, using a width/height ratio of 2, increasing in 10% increments from a minimum of 10m to approx. 300m depths, and in 50% increments to a maximum depth of 1500m. The meshes used a minimum column width of 17m, within the data range, increasing by 50% increments to a maximum distance of approx. 1.5km, laterally, from the ends of the profiles. Identical meshes were used for both the resistivity and associated chargeability models shown.

For each of the line-profiles, 2D inversion models for both the resistivity and the chargeability were calculated. In addition, two different models results were derived, for the purposes of comparison, using contrasting model objective functions –referred to here as either “sharp” vs. “smooth” models. The two relate to the “alpha-s” component of the model objective functions used in the inversion, and refer to the degree of adherence of the starting model – with sharp (large “s” =0.001) being similar and “smooth” (small “s”= 10^{-7}) not necessarily close to the half-space starting model.

In all cases, a target model misfit equal to the number of points was sought for and obtained – either through progressive increases in the minimum error floor and/or selective data removal (culling), using the Quantec DCIPoutinv.exe

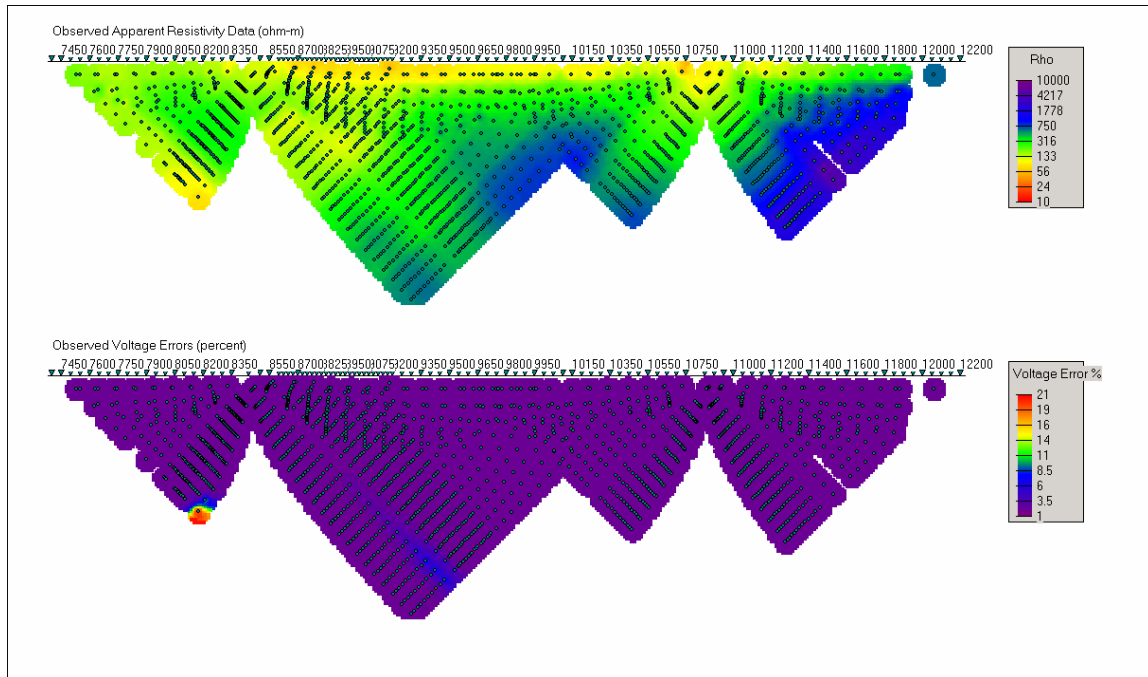
program, based on the degree of misfit between the observed data and those predicted in the initial inversion model. The requirements for successful convergence of the resistivity and chargeability inversions are summarized below:

Table A.1: Data Retention and Error Floors Required for Convergence to N-points for DCIP Inversions.

<u>DC Resistivity Inversions</u>		
<u>Line</u>	<u>Unconstrained Smooth</u>	<u>Unconstrained Sharp</u>
line 10800E	2% error floor with 5x cull, 18 iterations	2% error floor with 10x cull, 37 iterations
	(1601 / 1740pts = 92% data retained)	(1632 / 1740pts = 94% data retained)
line 11000E	2% error floor with 5x cull, 24 iterations	2% error floor with 7x cull, 36 iterations
	(1413 / 1569pts = 90% data retained)	(1337 / 1569pts = 87% data retained)
line 11200E	2% error floor with 7x cull, 61 iterations	2% error floor with 8x cull, 101 iterations
	(1491 / 1551pts = 87% data retained)	(1216 / 1216pts = 78% data retained)
line 11400E	2% error floor with 5x cull, 31 iterations	2% error floor with 8x cull, 65 iterations
	(1239 / 1512pts = 82% data retained)	(1191 / 1512pts = 79% data retained)
line 11600E	2% error floor with 5x cull, 24 iterations	2% error floor with 13x cull, 79 iterations
	(1198 / 1257pts = 95% data retained)	(1198 / 1257pts = 95% data retained)
<u>IP Chargeability Inversions</u>		
<u>Line</u>	<u>Unconstrained Smooth</u>	<u>Unconstrained Sharp</u>
line 10800E	2mrad error floor, 8 iterations	1mrad error floor, 55 iterations
	(1722 / 1722pts = 100% data retained)	(1720 / 1720pts = 100% data retained)
line 11000E	2mrad error floor, 8 iterations	1mrad error floor, 15 iterations
	(1443 / 1433pts = 100% data retained)	(1519 / 1566pts = 97% data retained)
line 11200E	2mrad error floor, 8 iterations	1mrad error floor, 28 iterations
	(1443 / 1443pts = 100% data retained)	(1550 / 1550pts = 100% data retained)
line 11400E	2mrad error floor with 5x cull, 14 iterations	1mrad error floor, 31 iterations
	(1421 / 1550pts = 92% data retained)	(1510 / 1510pts = 100% data retained)
line 11600E	2mrad error floor, 8 iterations	1mrad error floor, 13 iterations
	(1443 / 1443pts = 100% data retained)	(1257 / 1257pts = 100% data retained)

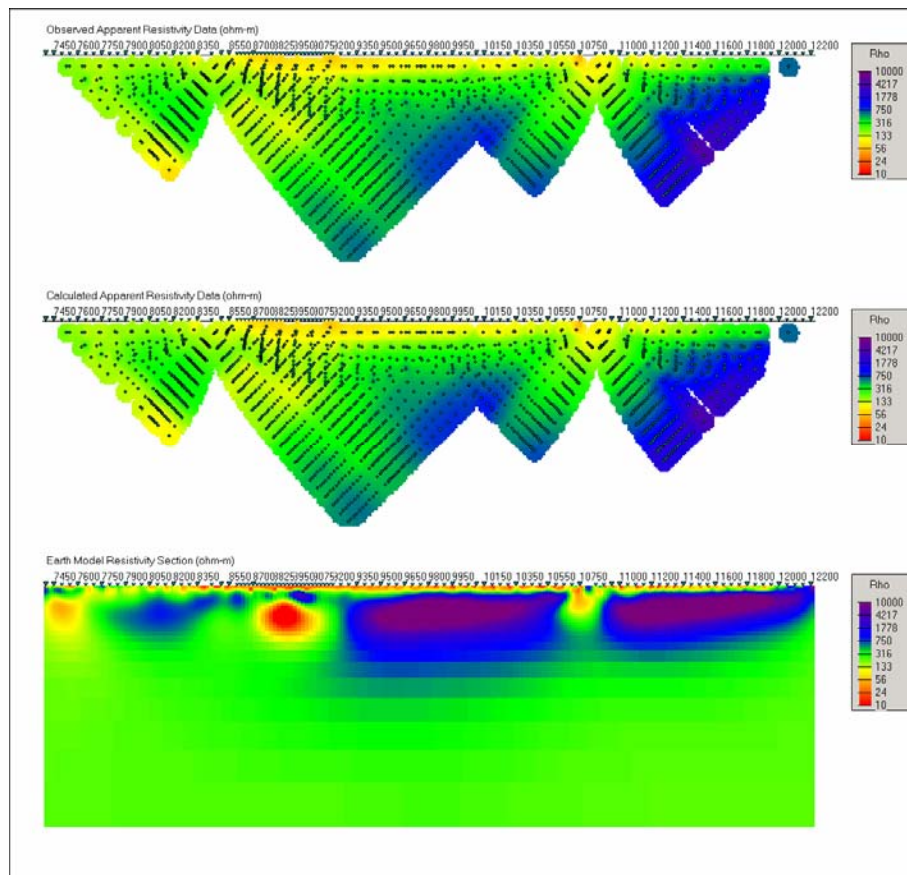
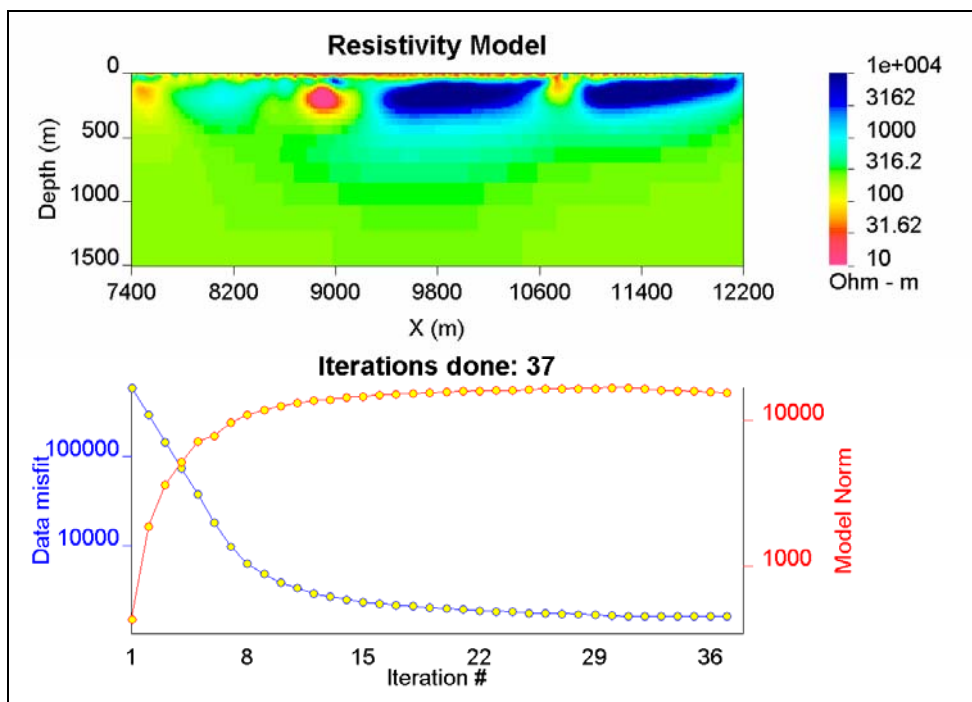
Line 10800N: Final Resistivity Model – Sharp Alphas

- Maximum data error allowed: 10%
- Minimum Error floor applied: 2%
- Error Misfits Removed: Misfits >10x (6% total)
- Alpha Parameters: 0.001, 1, 1
- Model Error Misfit: 1632 for 1632 points (1740 initial), in 37 iterations



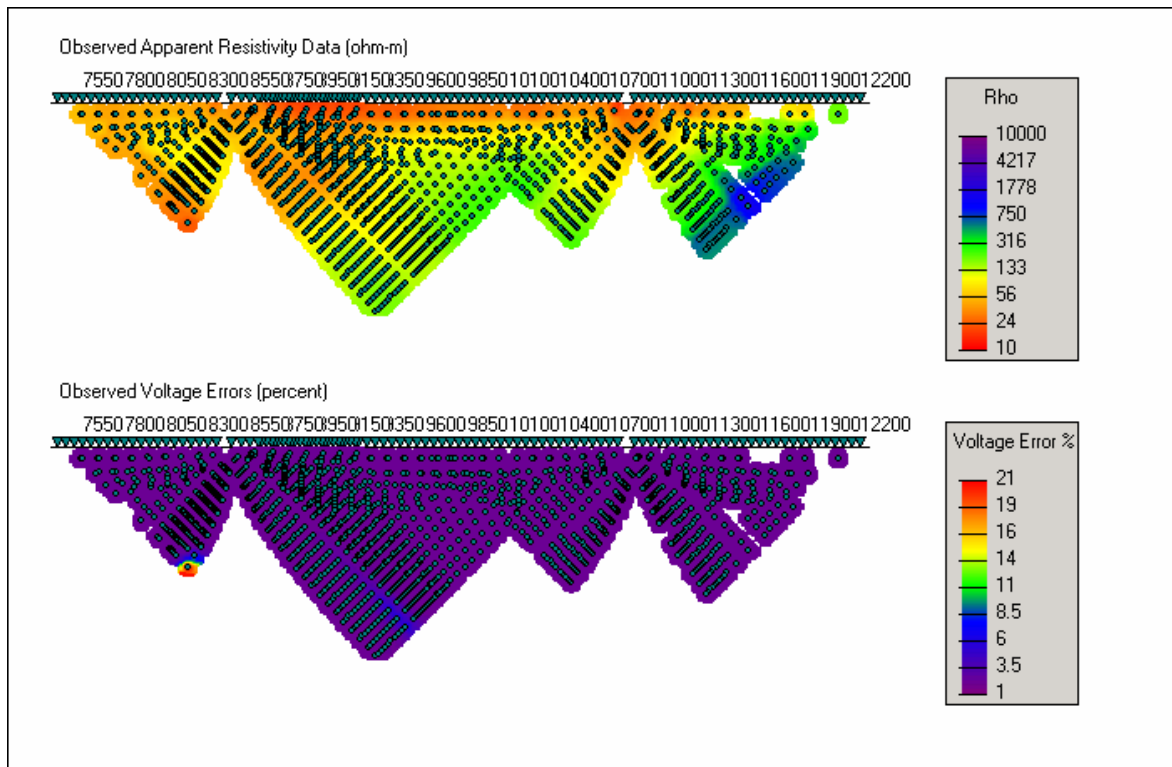
37 iter	data misfit	model norm	multiplier
0	1.17384E+06	0.00000E+00	0.00000E+00
5	3.74473E+04	7.16340E+03	5.70864E+00
10	3.89425E+03	1.25099E+04	1.34951E-02
15	2.34547E+03	1.45831E+04	7.40751E-04
19	2.03816E+03	1.54399E+04	2.18839E-04
20	1.98260E+03	1.55874E+04	1.75229E-04
25	1.77484E+03	1.62023E+04	8.40642E-05
29	1.67630E+03	1.65521E+04	6.55810E-05
30	1.65069E+03	1.66623E+04	6.38479E-05
31	1.63199E+03	1.66011E+04	8.07444E-02
32	1.62731E+03	1.63849E+04	2.05427E-01
33	1.63187E+03	1.60950E+04	2.44214E-01
34	1.63197E+03	1.58890E+04	2.41890E-01
35	1.63182E+03	1.57166E+04	2.20113E-01
36	1.63200E+03	1.55546E+04	2.39977E-01
37	1.63193E+03	1.54211E+04	2.25814E-01

1632 number of data



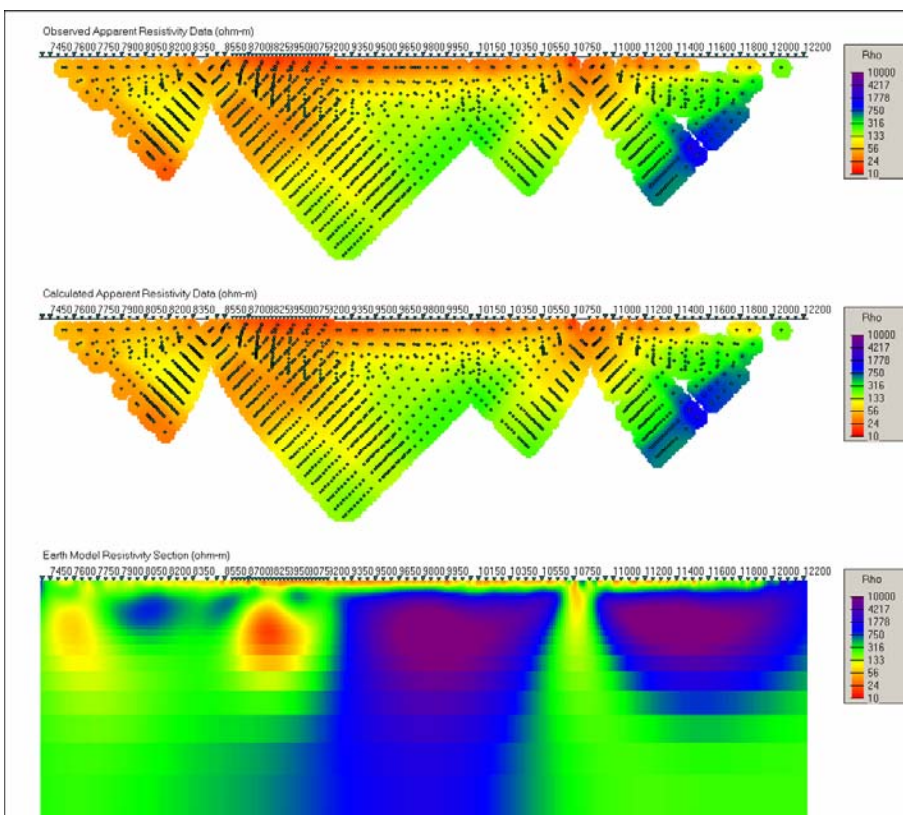
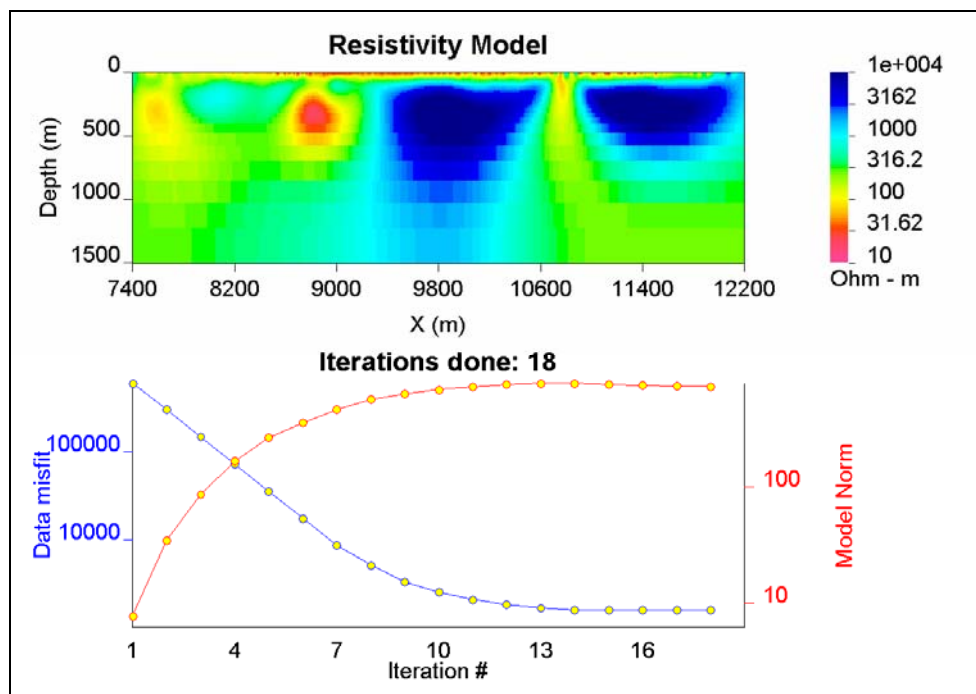
Line 10800N: Final Resistivity Model – Smooth Alphas

- Maximum data error allowed: 50%
- Minimum Error floor applied: 2%
- Error Misfits Removed: Misfits >5x (8% total)
- Alpha Parameters: 0.8e-06, 1, 1
- Model Error Misfit: 1601 for 1601 points (1740 initial), in 18 iterations



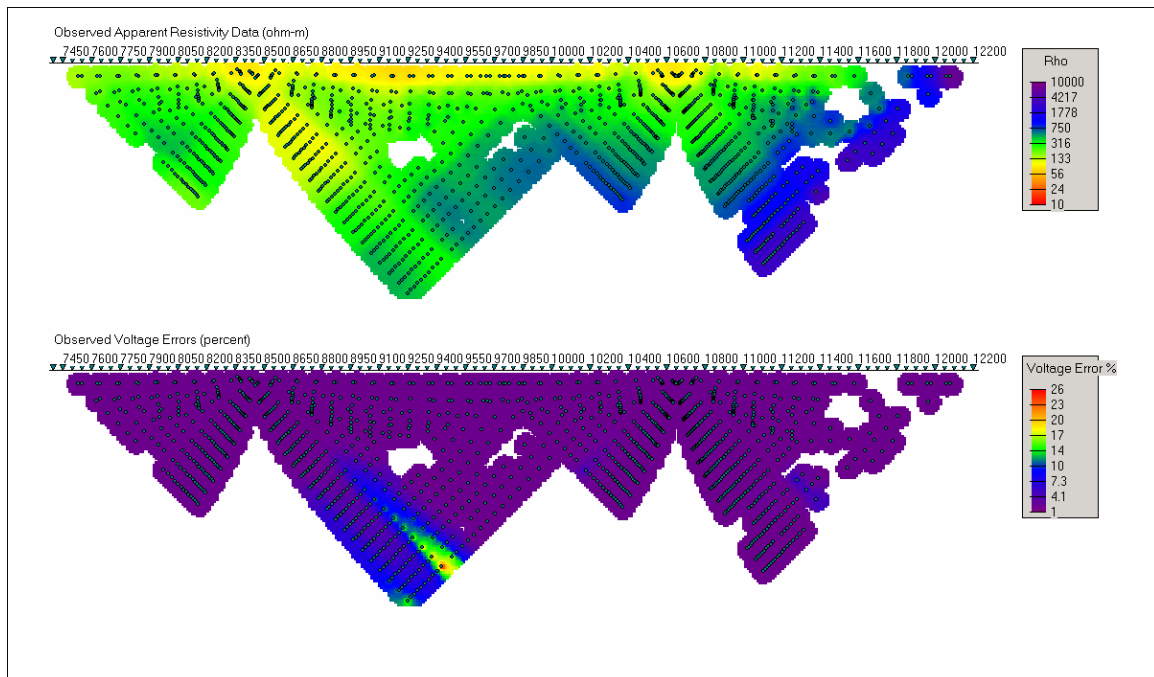
18 iter	data misfit	model norm	multiplier
0	1.19891E+06	0.00000E+00	0.00000E+00
5	3.56976E+04	2.61371E+02	2.31251E+02
9	3.35265E+03	6.23115E+02	1.74451E+00
10	2.54477E+03	6.73667E+02	8.72257E-01
11	2.09027E+03	7.11024E+02	5.48767E-01
12	1.83565E+03	7.40340E+02	4.20316E-01
13	1.67555E+03	7.62488E+02	3.66587E-01
14	1.59905E+03	7.62919E+02	2.64830E+00
15	1.58723E+03	7.46783E+02	5.06149E+00
16	1.60019E+03	7.34175E+02	6.26407E+00
17	1.60100E+03	7.26343E+02	6.43591E+00
18	1.60100E+03	7.21411E+02	6.63856E+00

1601 number of data



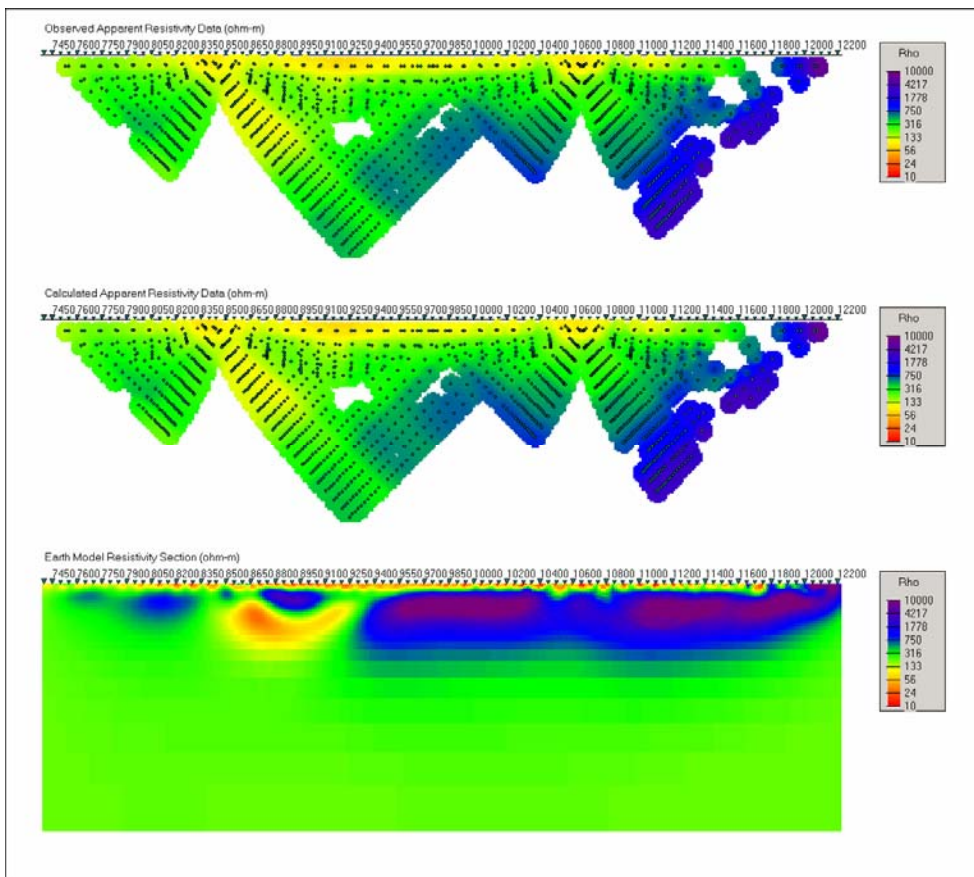
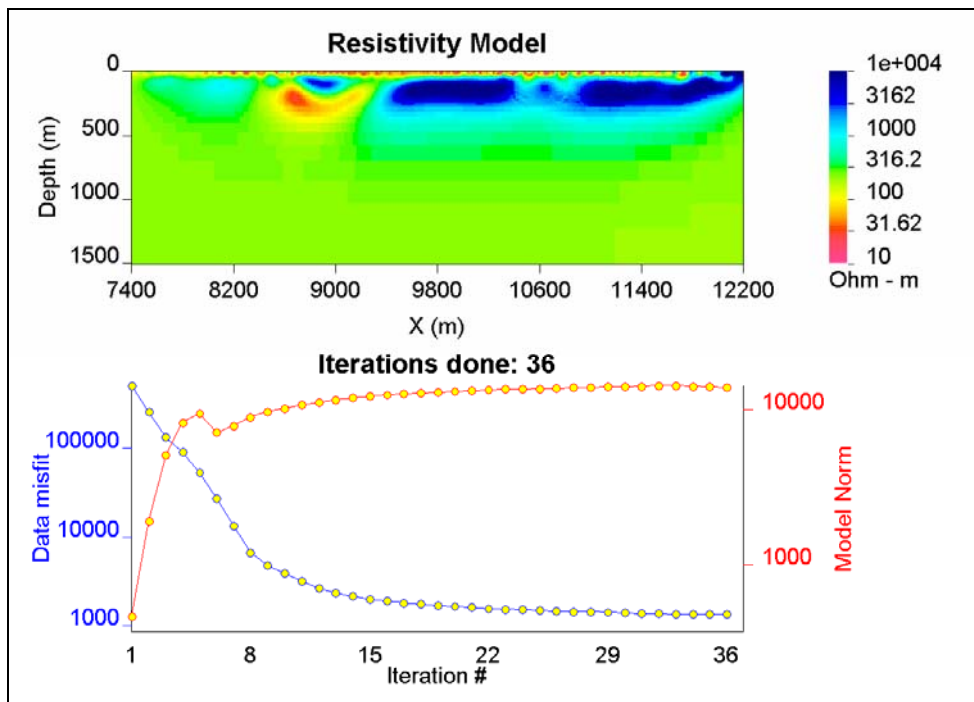
Line 11000N: Final Resistivity Model – Sharp Alphas

- Maximum data error allowed: 10%
- Minimum Error floor applied: 2%
- Error Misfits Removed: Misfits >7x (13% total)
- Alpha Parameters: 0.001,1,1
- Model Error Misfit: 1336 for 1336 points (1569 initial), in 36 iterations



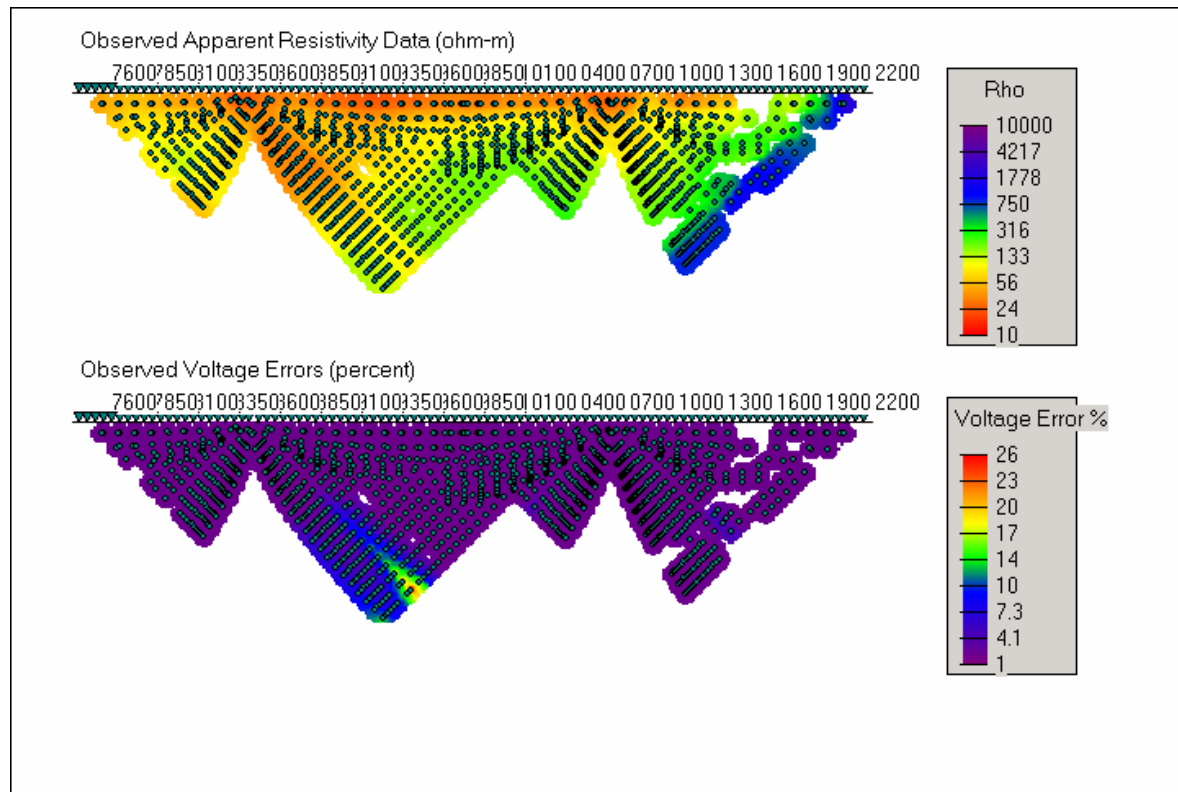
36 iter	data misfit	model norm	multiplier
0	1.03287E+06	0.00000E+00	0.00000E+00
5	5.38101E+04	9.47484E+03	1.95757E-01
10	3.86141E+03	1.02425E+04	1.14668E-01
15	1.98295E+03	1.22297E+04	5.25248E-03
20	1.63681E+03	1.31377E+04	1.13982E-03
26	1.45615E+03	1.37946E+04	4.73626E-04
27	1.43448E+03	1.38793E+04	4.34546E-04
28	1.41863E+03	1.39576E+04	4.04713E-04
29	1.40058E+03	1.40358E+04	3.81141E-04
30	1.38580E+03	1.41141E+04	3.63565E-04
31	1.36952E+03	1.41814E+04	3.50500E-04
32	1.35470E+03	1.42647E+04	3.41922E-04
33	1.34053E+03	1.43228E+04	3.37204E-04
34	1.33388E+03	1.42309E+04	9.62137E-02
35	1.33445E+03	1.40864E+04	1.36493E-01
36	1.33600E+03	1.39461E+04	1.43378E-01

1336 number of data



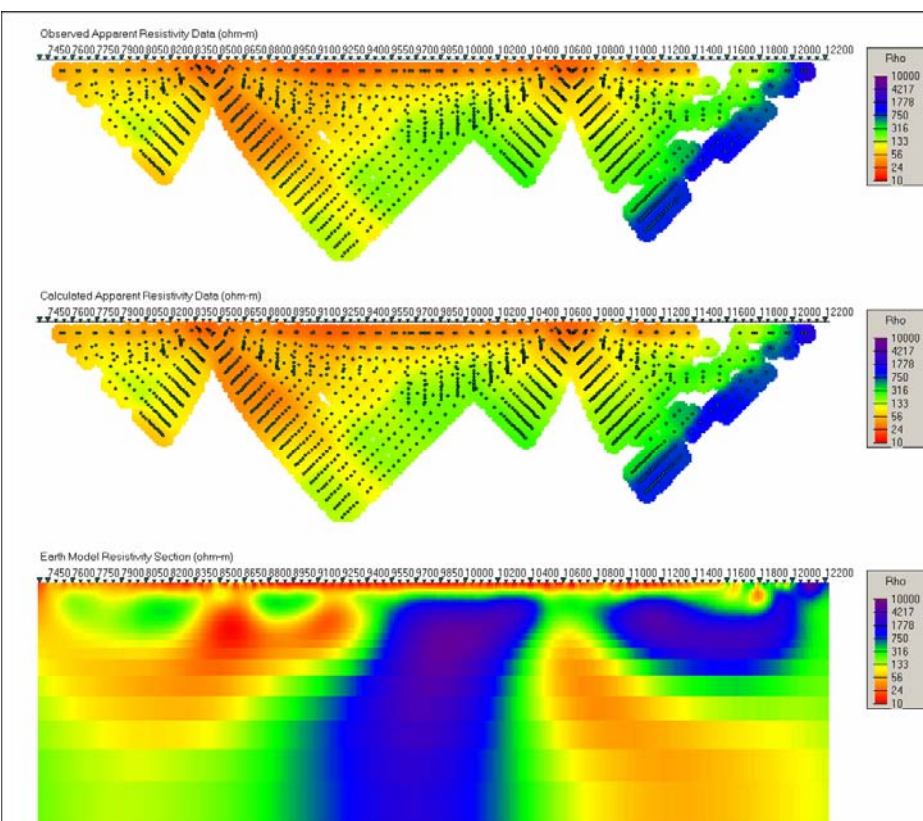
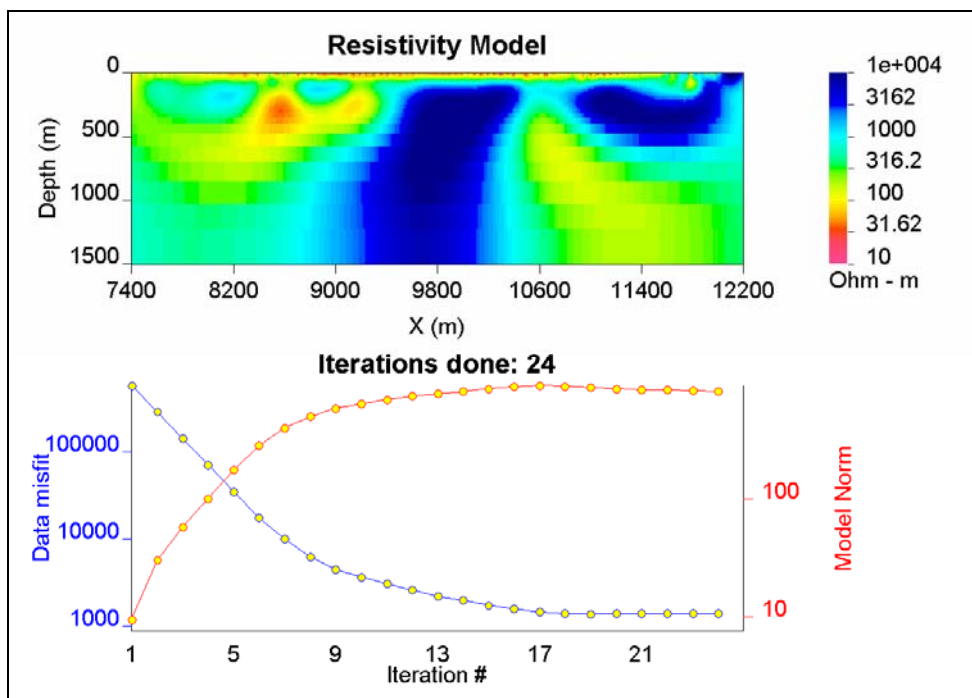
Line 11000N: Final Resistivity Model – Smooth Alphas

- Maximum data error allowed: 50%
- Minimum Error floor applied: 2%
- Error Misfits Removed: Misfits >5x (10% total)
- Alpha Parameters: 0.6e-06, 1, 1
- Model Error Misfit: 1413 for 1413 points (1569 initial), in 24 iterations



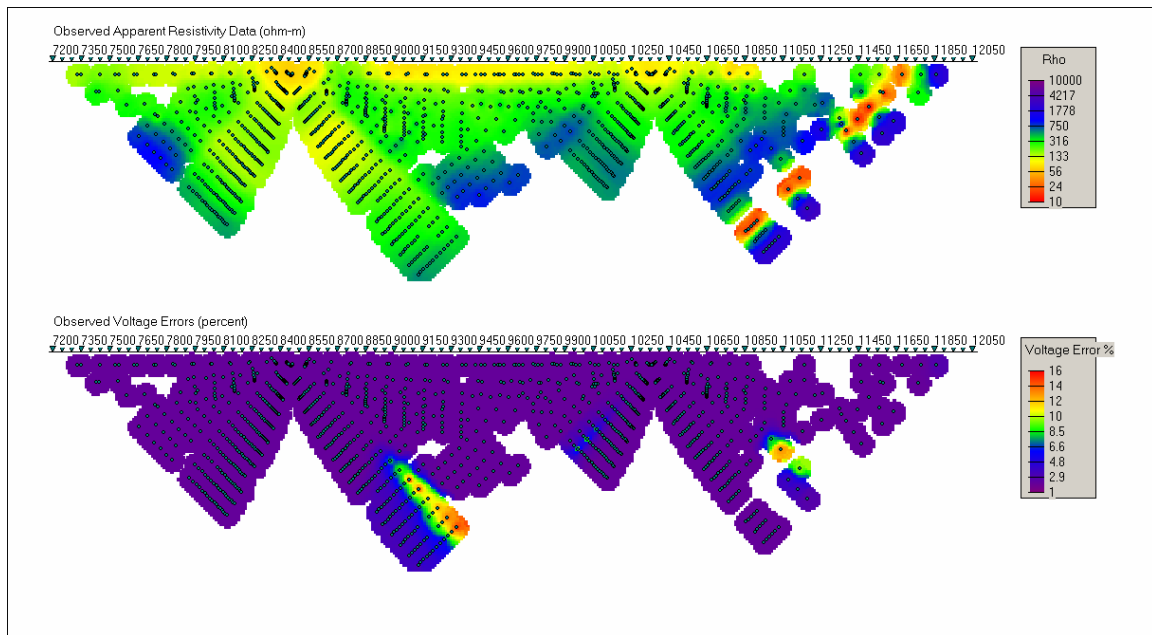
24 iter	data misfit	model norm	multiplier
0	3.51410E+04	1.79640E+02	2.48336E+02
5	3.51410E+04	1.79640E+02	2.48336E+02
10	3.69334E+03	6.50258E+02	3.92439E-01
15	1.74077E+03	8.73760E+02	2.37962E-02
17	1.45981E+03	9.29418E+02	1.71399E-02
18	1.41256E+03	9.18807E+02	1.81220E+00
19	1.39826E+03	8.95950E+02	3.10452E+00
20	1.41223E+03	8.75029E+02	3.89329E+00
21	1.41300E+03	8.58391E+02	3.98427E+00
22	1.41017E+03	8.49343E+02	4.10474E+00
23	1.41300E+03	8.39992E+02	4.17549E+00
24	1.41299E+03	8.32371E+02	4.42758E+00

1413 number of data

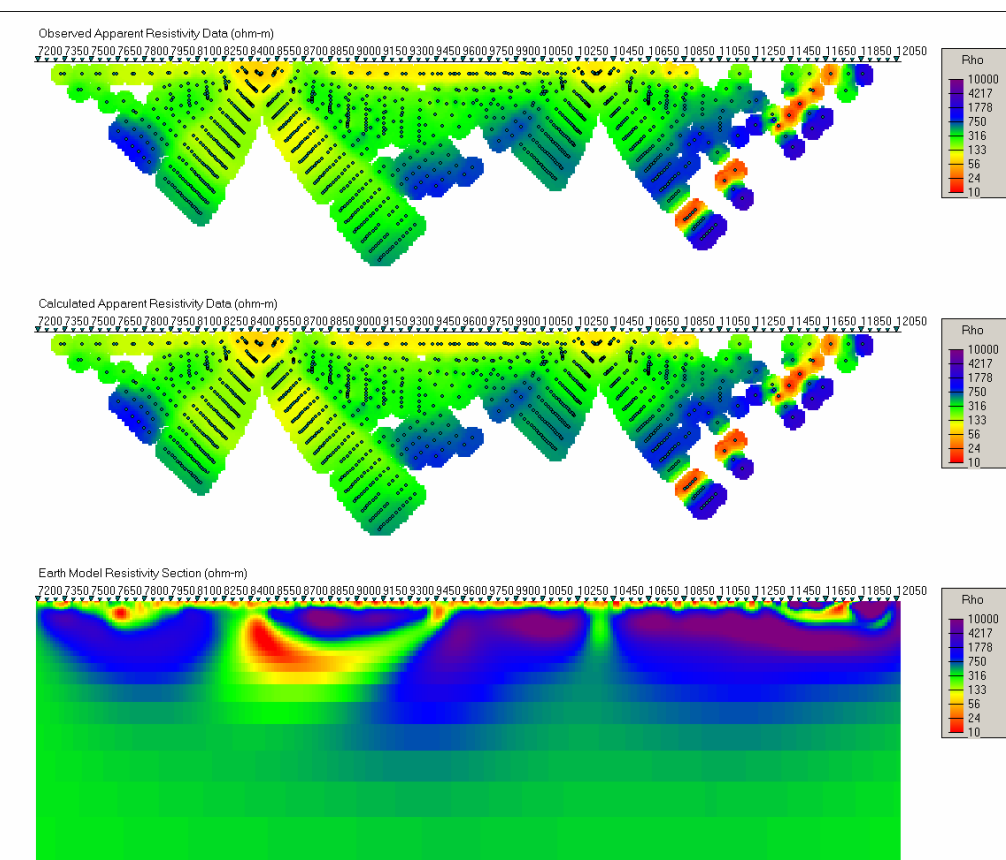
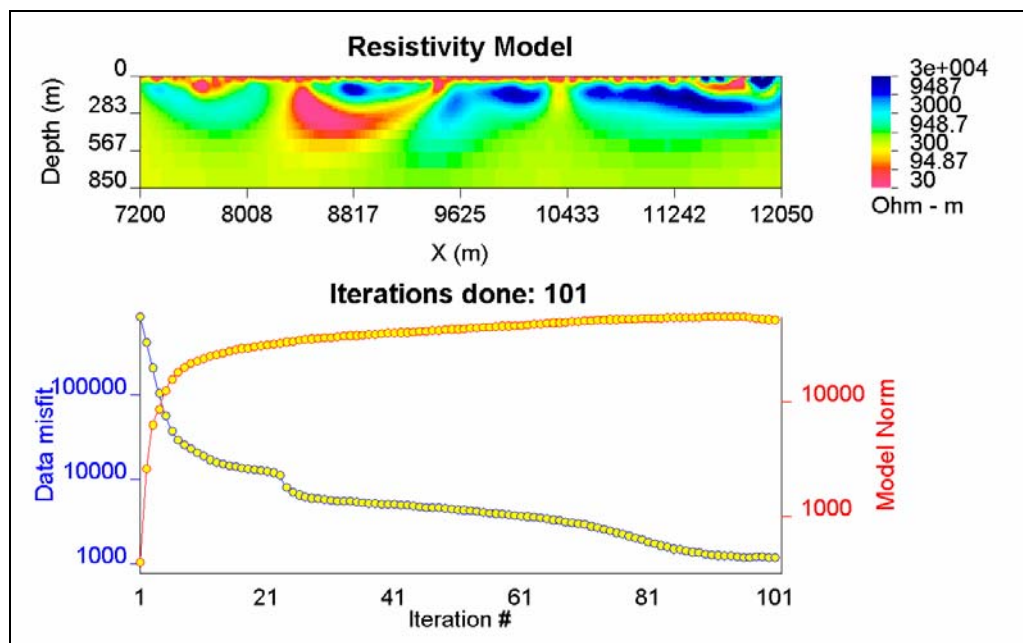


Line 11200N: Final Resistivity Model – Sharp Alphas

- Maximum data error allowed: 50%
- Minimum Error floor applied: 2%
- Error Misfits Removed: Misfits >8x (22% total)
- Alpha Parameters: 0.001, 1, 1
- Model Error Misfit: 1216 for 1216 points (1550 initial), in 101 iterations

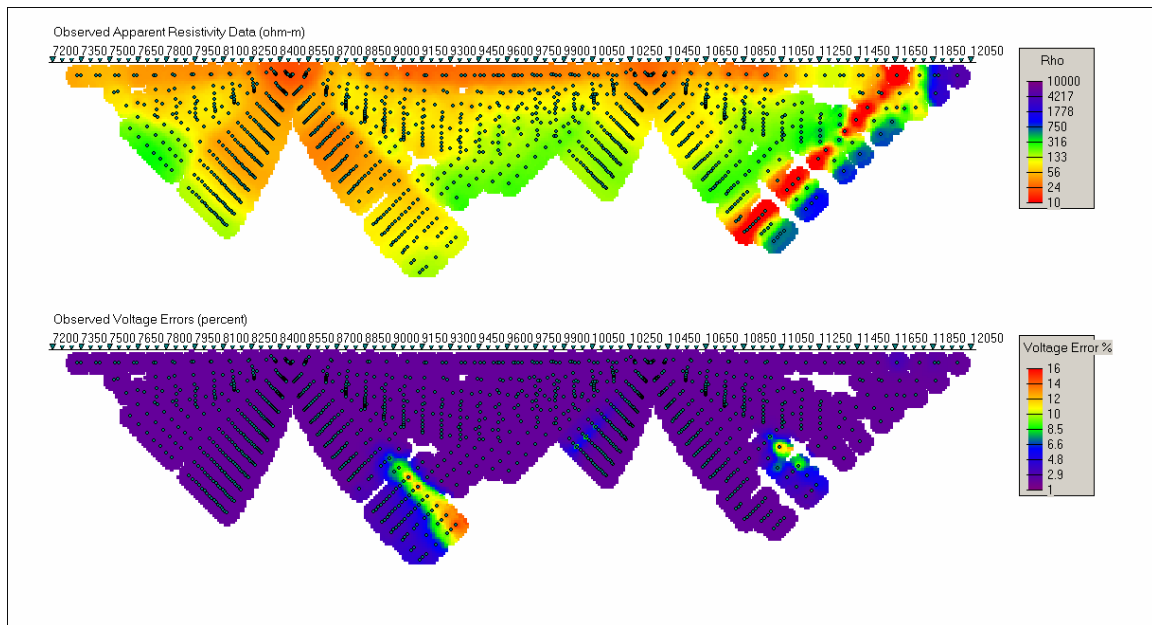


101 iter	data misfit	model norm	multiplier
0	1.68455E+06	0.00000E+00	0.00000E+00
10	2.07903E+04	2.30200E+04	4.12820E-03
20	1.28678E+04	3.11217E+04	4.03144E-06
30	5.82873E+03	3.64868E+04	2.51965E-07
40	5.11487E+03	3.99721E+04	2.51965E-07
45	4.81670E+03	4.15396E+04	6.29914E-08
50	4.48367E+03	4.32109E+04	5.03931E-07
55	4.12799E+03	4.50450E+04	1.00786E-06
60	3.79761E+03	4.68434E+04	2.51965E-07
65	3.43061E+03	4.88019E+04	6.29912E-08
70	3.01466E+03	5.08456E+04	5.03930E-07
75	2.47425E+03	5.26345E+04	6.29912E-08
80	1.91769E+03	5.39001E+04	4.79312E-08
85	1.52658E+03	5.47306E+04	2.55705E-07
90	1.32644E+03	5.52128E+04	7.14694E-06
95	1.22255E+03	5.55102E+04	5.55110E-06
100	1.21564E+03	5.27615E+04	1.49416E-01
101	1.21581E+03	5.22685E+04	1.30642E-01
1216 number of data			

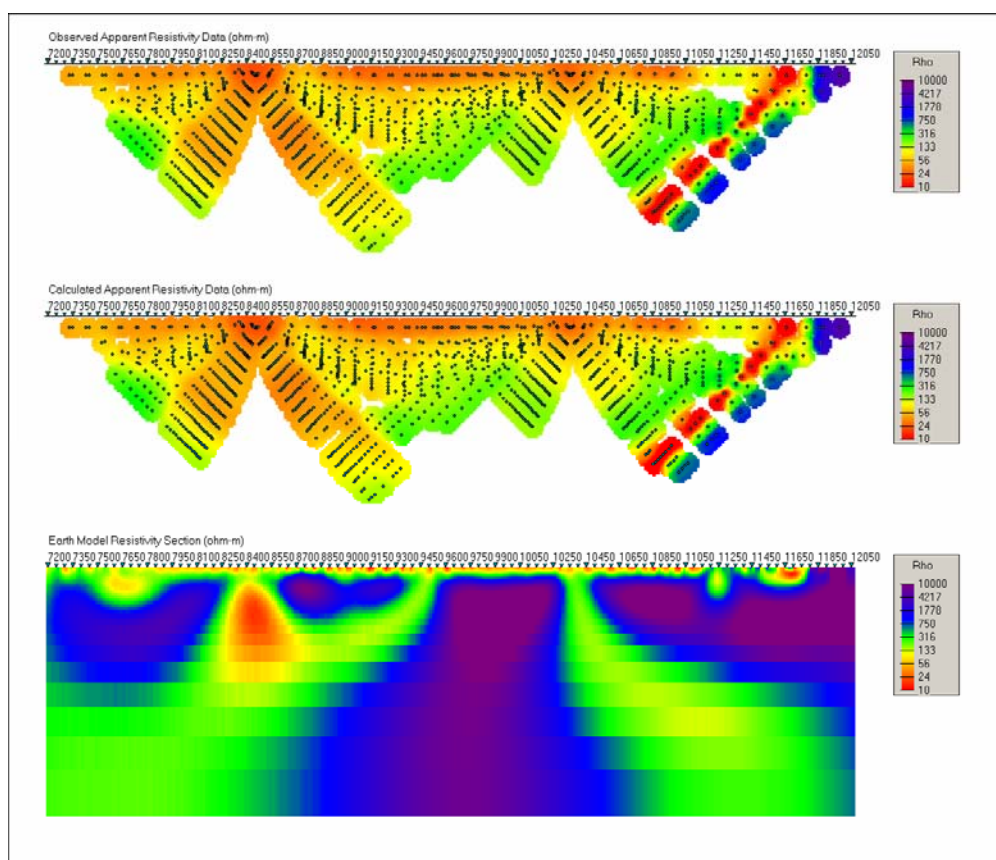
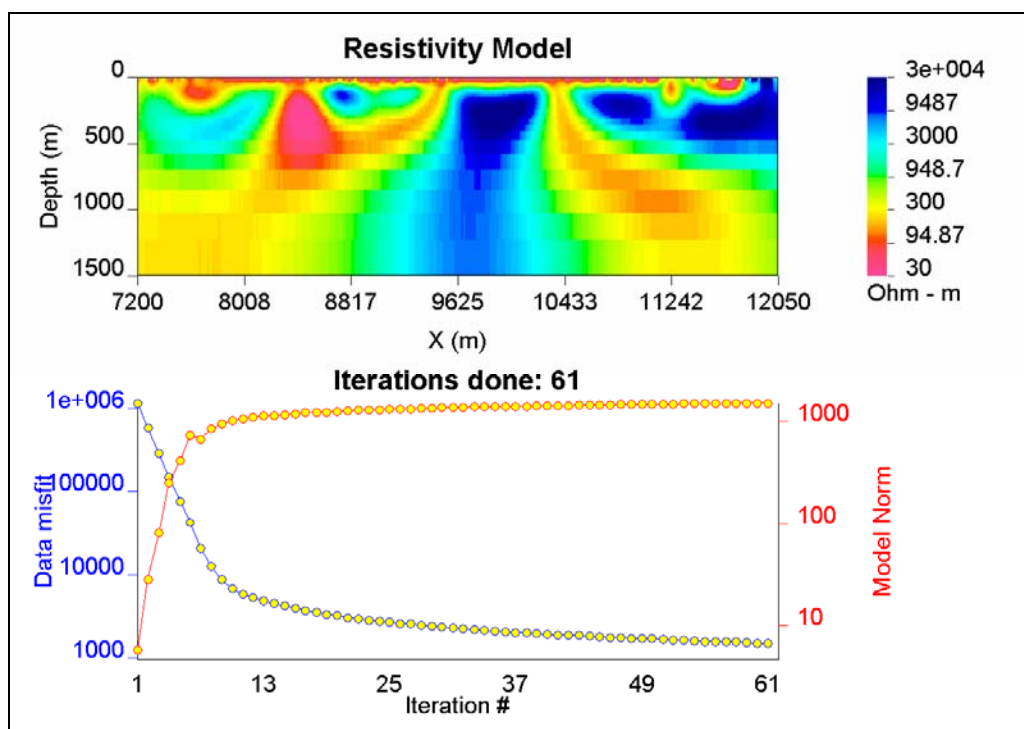


Line 11200N: Final Resistivity Model – Smooth Alphas

- Maximum data error allowed: 50%
- Minimum Error floor applied: 2%
- Error Misfits Removed: Misfits >7x removed (13%)
- Alpha Parameters: 0.6e-06, 1, 1
- Model Error Misfit: 1491 for 1354 points (1550 initial), in 61 iterations

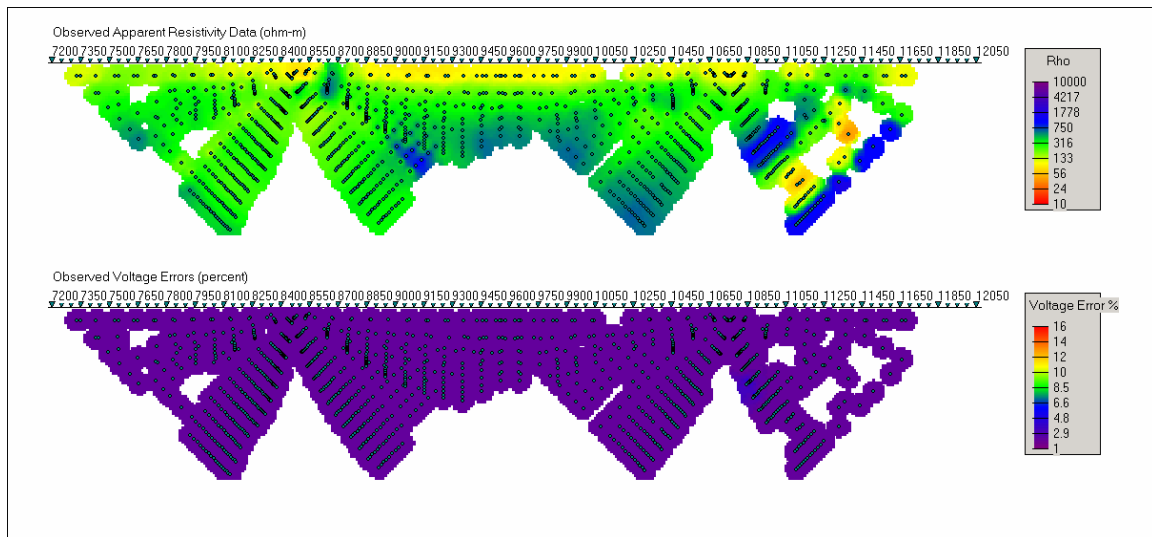


61 iter	data misfit	model norm	multiplier
0	2.29674E+06	0.00000E+00	0.00000E+00
5	7.53260E+04	4.11045E+02	6.38228E+01
10	6.81188E+03	1.03152E+03	4.89663E-01
15	4.19031E+03	1.17974E+03	1.53020E-02
20	3.19832E+03	1.26999E+03	4.78187E-04
25	2.66865E+03	1.33032E+03	1.49433E-05
30	2.34067E+03	1.37256E+03	1.31866E-06
35	2.09736E+03	1.40717E+03	3.44123E-06
40	1.92250E+03	1.43718E+03	7.40400E-06
45	1.78767E+03	1.46306E+03	5.96078E-06
47	1.74086E+03	1.47247E+03	3.46555E-06
48	1.71836E+03	1.47690E+03	2.69542E-06
49	1.69707E+03	1.48126E+03	4.24776E-06
50	1.67684E+03	1.48535E+03	3.38905E-06
55	1.58477E+03	1.50515E+03	2.61025E-06
59	1.52027E+03	1.51964E+03	1.48092E-06
60	1.50564E+03	1.52313E+03	2.63791E-06
1354 number of data			



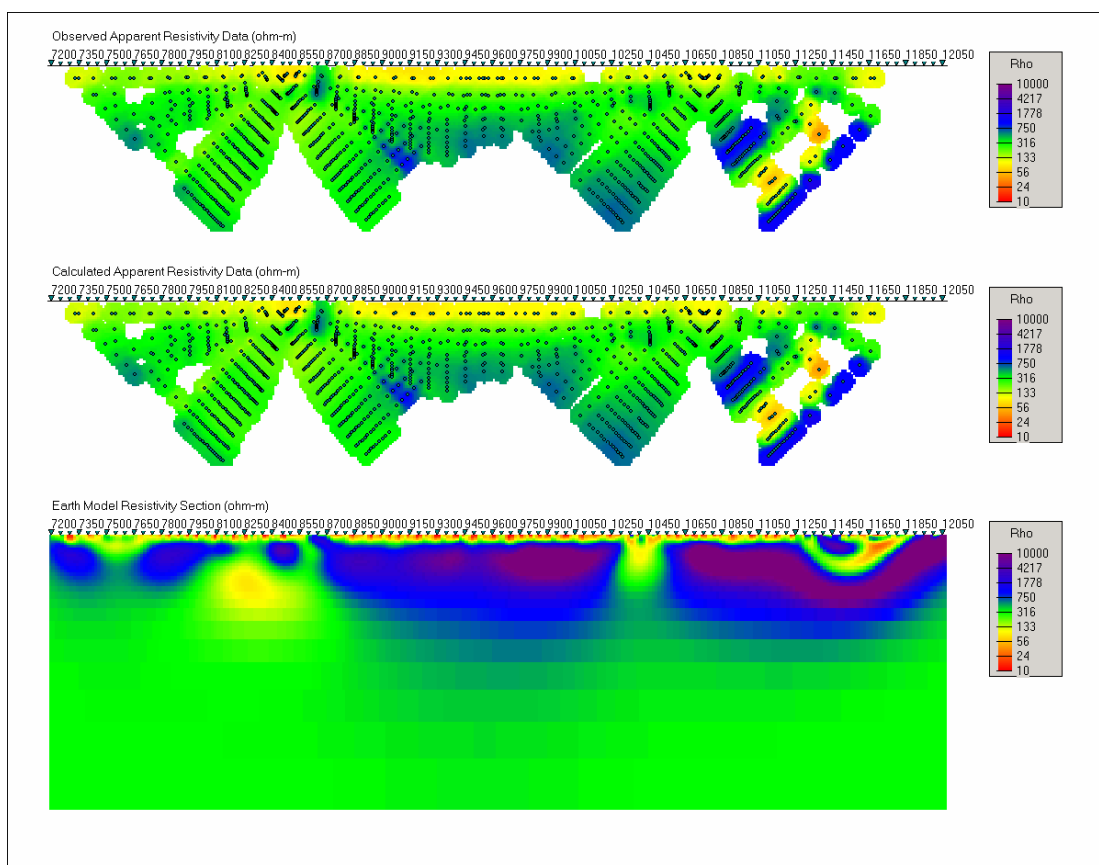
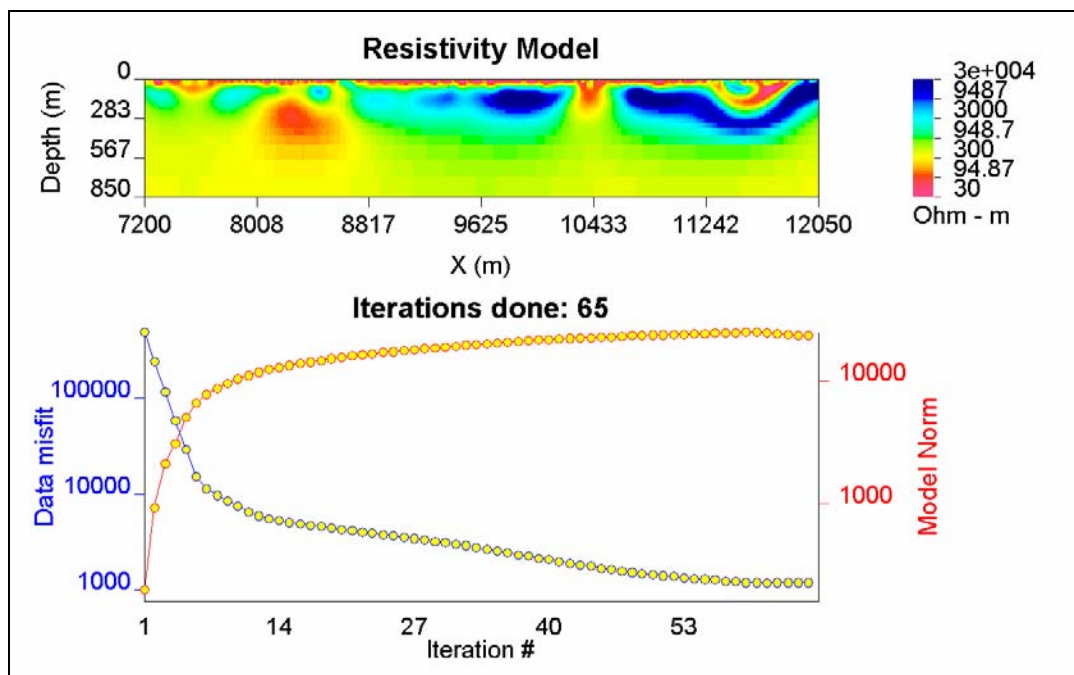
Line 11400N: Final Resistivity Model – Sharp Alphas

- Maximum data error allowed: 50%
- Minimum Error floor applied: 2%
- Error Misfits Removed: Misfits >8x (21% total)
- Alpha Parameters: 0.001, 1, 1
- Model Error Misfit: 1191 for 1191 points (1512 initial), in 65 iterations



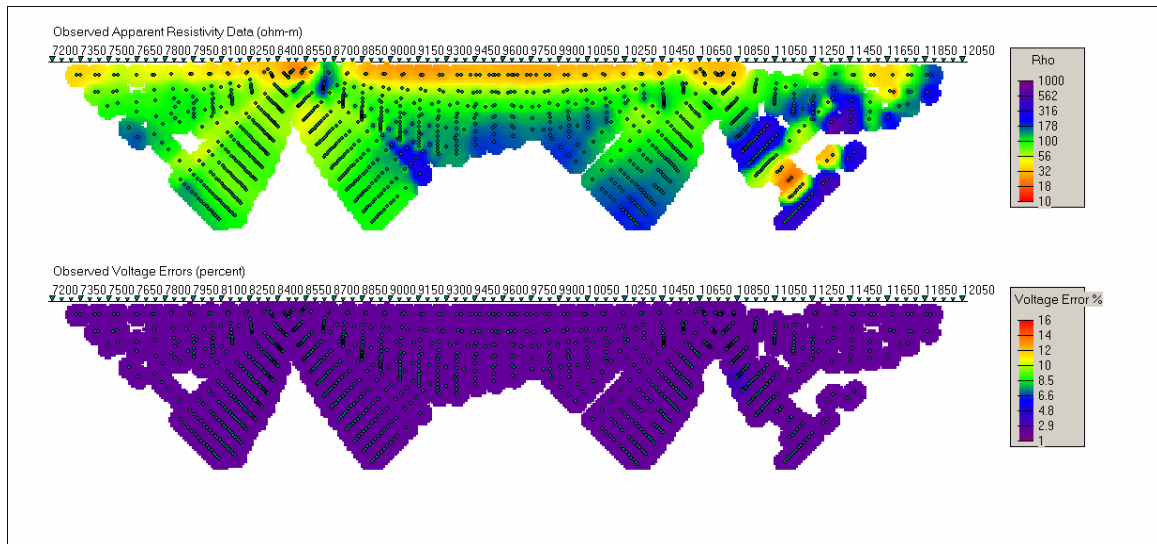
65 iter	data misfit	model norm	multiplier
0	9.68943E+05	0.00000E+00	0.00000E+00
5	2.92778E+04	5.08136E+03	1.97193E+00
10	7.43386E+03	1.04243E+04	1.40052E-02
15	5.09936E+03	1.33797E+04	4.37662E-04
20	4.26662E+03	1.55656E+04	1.36769E-05
25	3.65793E+03	1.73154E+04	1.70962E-06
30	3.10646E+03	1.88805E+04	2.13702E-07
35	2.56596E+03	2.03488E+04	1.06851E-07
40	2.07111E+03	2.17132E+04	1.27589E-07
45	1.68973E+03	2.27547E+04	9.86240E-08
50	1.44464E+03	2.35480E+04	1.53884E-06
55	1.29005E+03	2.43273E+04	7.42305E-07
60	1.19109E+03	2.48501E+04	1.01853E-02
61	1.18735E+03	2.45861E+04	9.14822E-02
62	1.19043E+03	2.41342E+04	1.21140E-01
63	1.19100E+03	2.38386E+04	1.27631E-01
64	1.19738E+03	2.34718E+04	1.27632E-01
65	1.19077E+03	2.32792E+04	1.09325E-01

1191 number of data



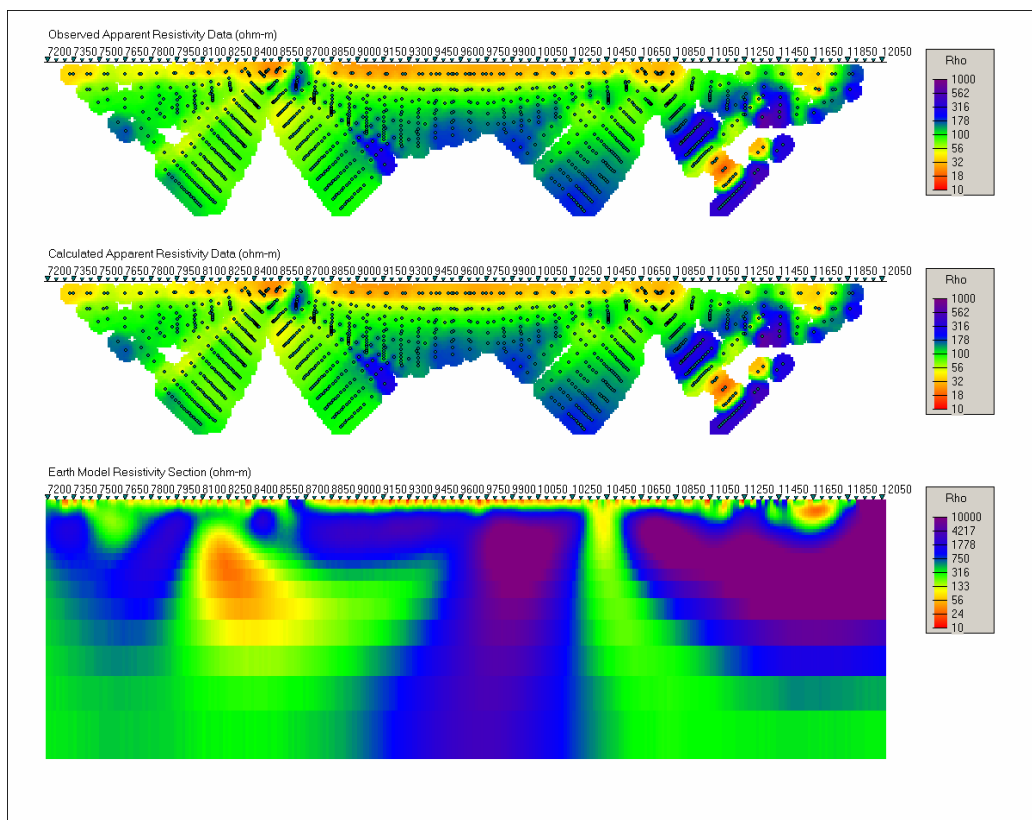
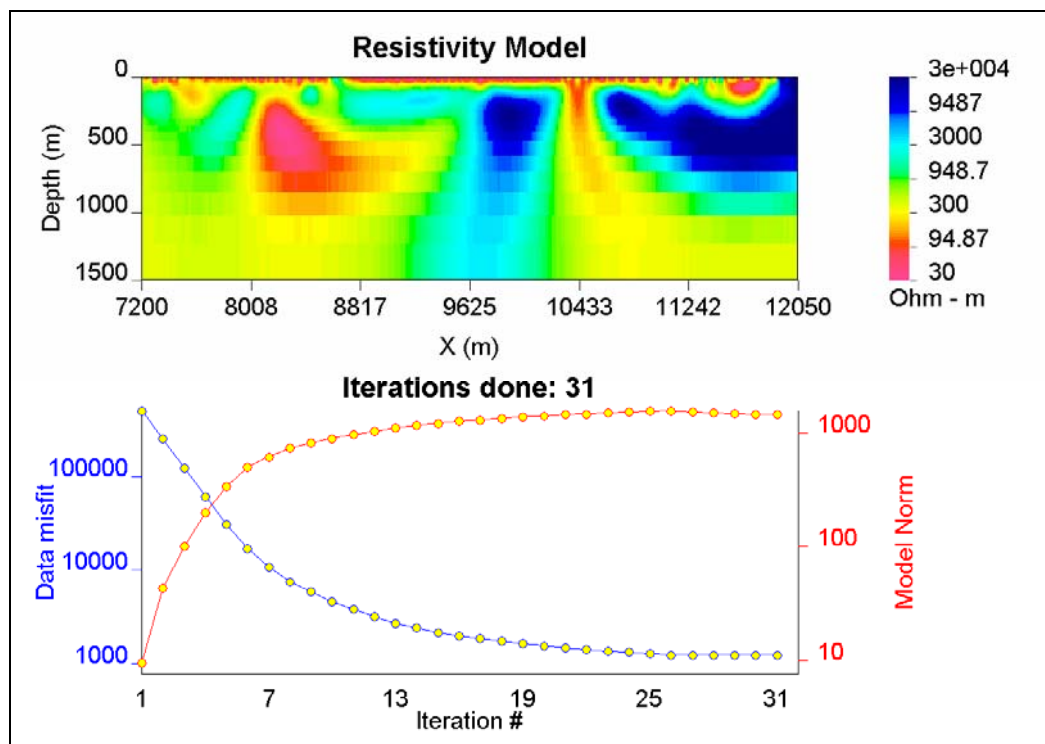
Line 11400N: Final Resistivity Model – Smooth Alphas

- Maximum data error allowed: 50%
- Minimum Error floor applied: 2%
- Error Misfits Removed: Misfits >5x removed (18%)
- Alpha Parameters: 0.6e-06, 1, 1
- Model Error Misfit: 1239 for 1241 points (1512 initial), in 31 iterations



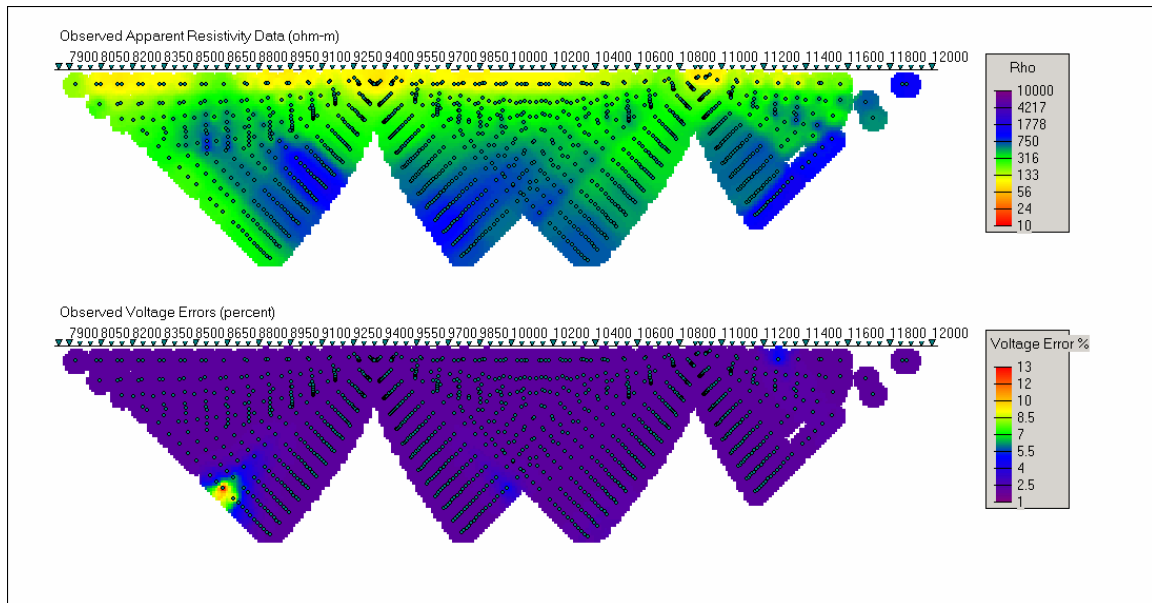
31 iter	data misfit	model norm	multiplier
0	1.00088E+06	0.00000E+00	0.00000E+00
5	3.05019E+04	3.40172E+02	5.04603E+01
10	4.58175E+03	9.04477E+02	1.79191E-01
15	2.17257E+03	1.23383E+03	5.78606E-03
17	1.85705E+03	1.32107E+03	2.04919E-03
18	1.74241E+03	1.35579E+03	1.36940E-03
19	1.63964E+03	1.39686E+03	9.75329E-04
20	1.55249E+03	1.42613E+03	7.38202E-04
21	1.48192E+03	1.46092E+03	5.90089E-04
22	1.42320E+03	1.48447E+03	4.94158E-04
23	1.37178E+03	1.51368E+03	4.30894E-04
24	1.32360E+03	1.53757E+03	3.89813E-04
25	1.28516E+03	1.56057E+03	3.65486E-04
26	1.24457E+03	1.58276E+03	3.52927E-04
27	1.25316E+03	1.53667E+03	1.64468E+00
28	1.24061E+03	1.51383E+03	1.33092E+00
29	1.23918E+03	1.49148E+03	1.73939E+00
30	1.24100E+03	1.46688E+03	1.76008E+00
31	1.23755E+03	1.45352E+03	1.88311E+00

1241 number of data



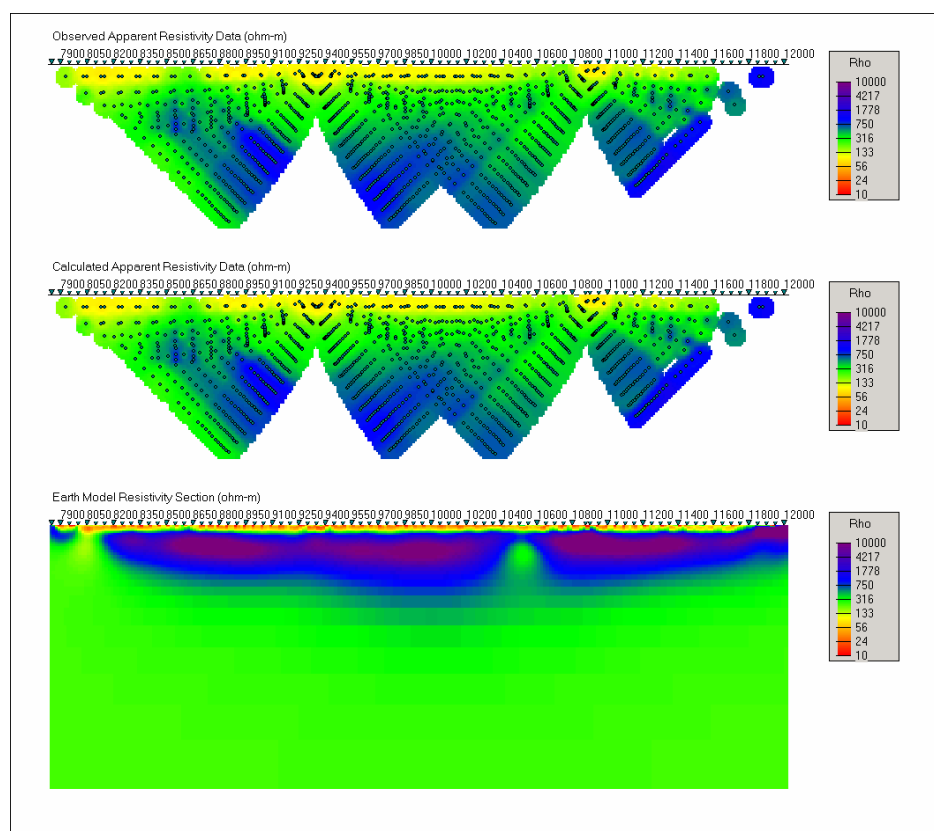
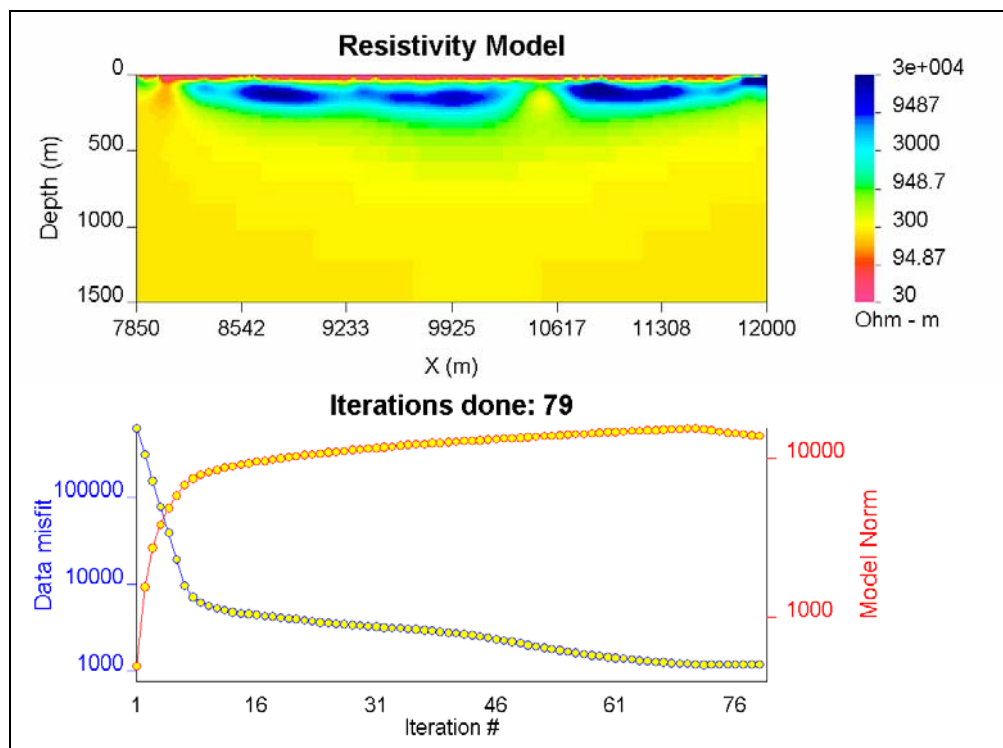
Line 11600N: Final Resistivity Model – Sharp Alphas

- Maximum data error allowed: 50%
- Minimum Error floor applied: 2%
- Error Misfits Removed: Misfits >13x (5% total)
- Alpha Parameters: 0.001, 1, 1
- Model Error Misfit: 1198 for 1198 points (1257 initial), in 79 iterations



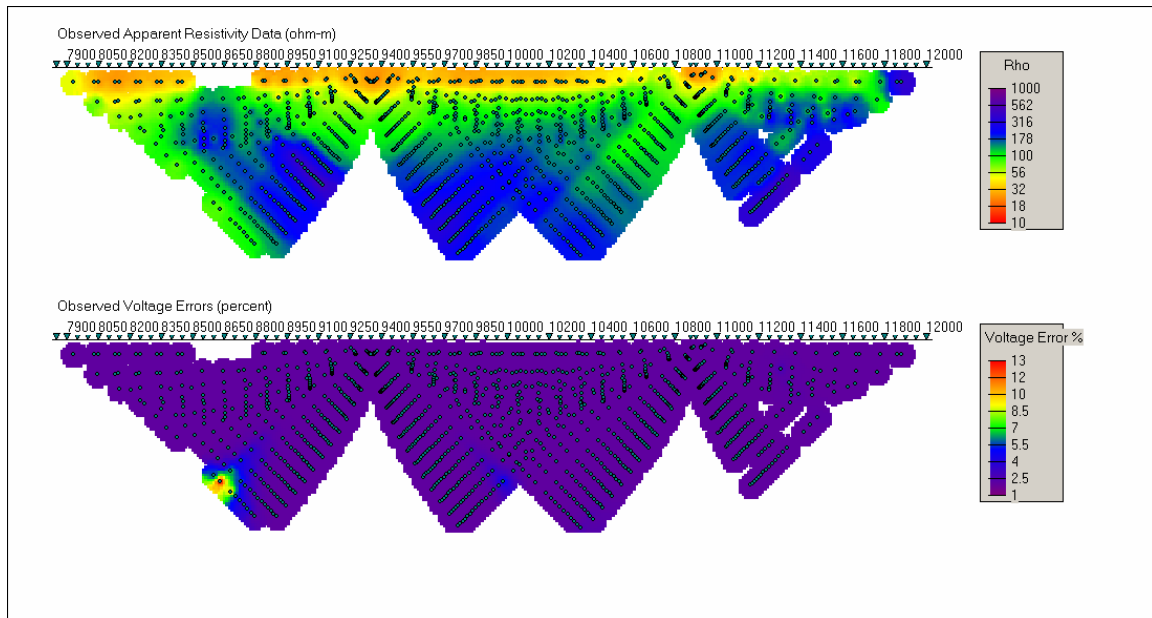
79 iter	data misfit	model norm	multiplier
0	1.25091E+06	0.00000E+00	0.00000E+00
5	3.89569E+04	4.87492E+03	2.49213E+01
10	5.62737E+03	8.21891E+03	6.45245E-02
15	4.54839E+03	9.36719E+03	2.01639E-03
20	4.03805E+03	1.02010E+04	6.30123E-05
25	3.61523E+03	1.08960E+04	1.96913E-06
30	3.31409E+03	1.15483E+04	2.46142E-07
35	3.06971E+03	1.21413E+04	3.93827E-06
40	2.80070E+03	1.26662E+04	1.23071E-07
45	2.42812E+03	1.31167E+04	2.46142E-07
50	2.00158E+03	1.35980E+04	3.42225E-07
55	1.67759E+03	1.40989E+04	3.02164E-07
60	1.45817E+03	1.45904E+04	3.03986E-07
65	1.31993E+03	1.50176E+04	5.60746E-07
70	1.21677E+03	1.54147E+04	3.28652E-06
75	1.19784E+03	1.45155E+04	2.22680E-01
79	1.19789E+03	1.39171E+04	2.00612E-01

1198 number of data



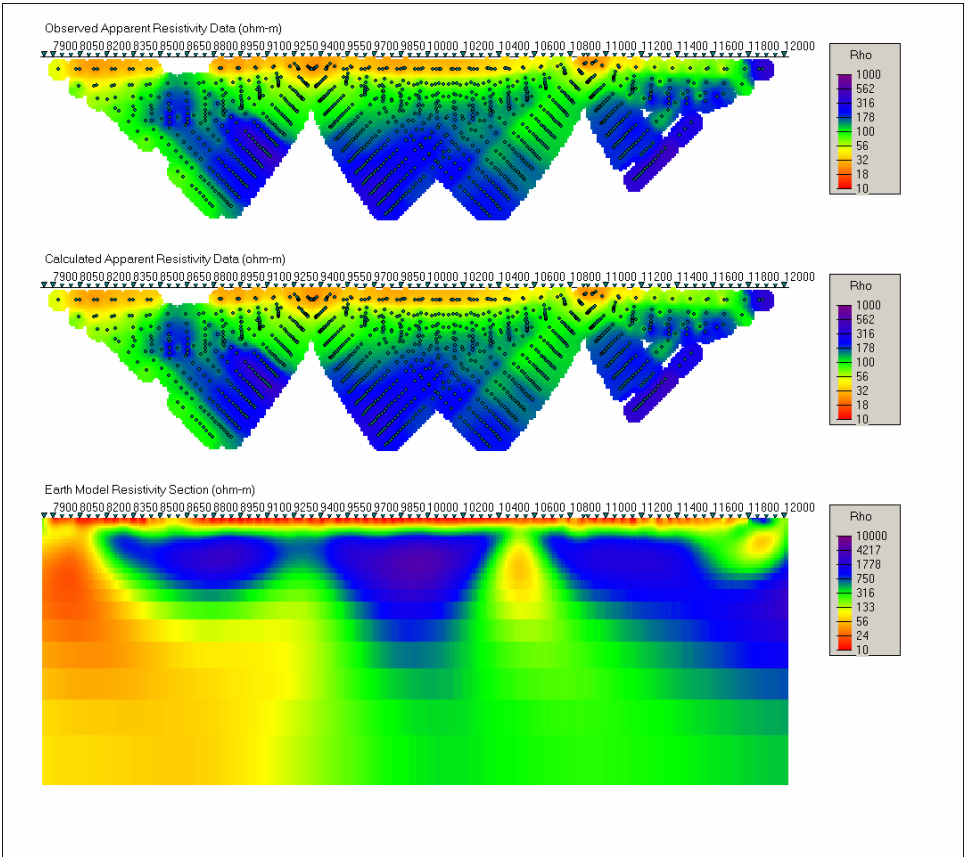
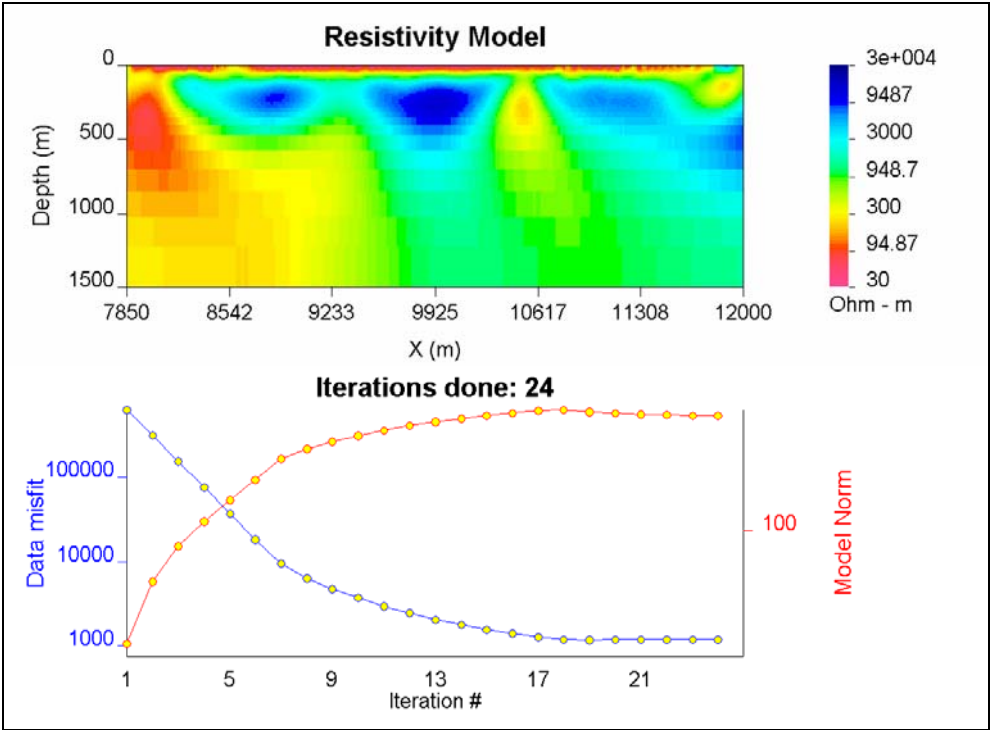
Line 11600N: Final Resistivity Model – Smooth Alpha

- Maximum data error allowed: 50%
- Minimum Error floor applied: 2%
- Error Misfits Removed: Misfits >5x removed (5%)
- Alpha Parameters: 0.6e-06, 1, 1
- Model Error Misfit: 1198 for 1198 points (1257 initial), in 24 iterations



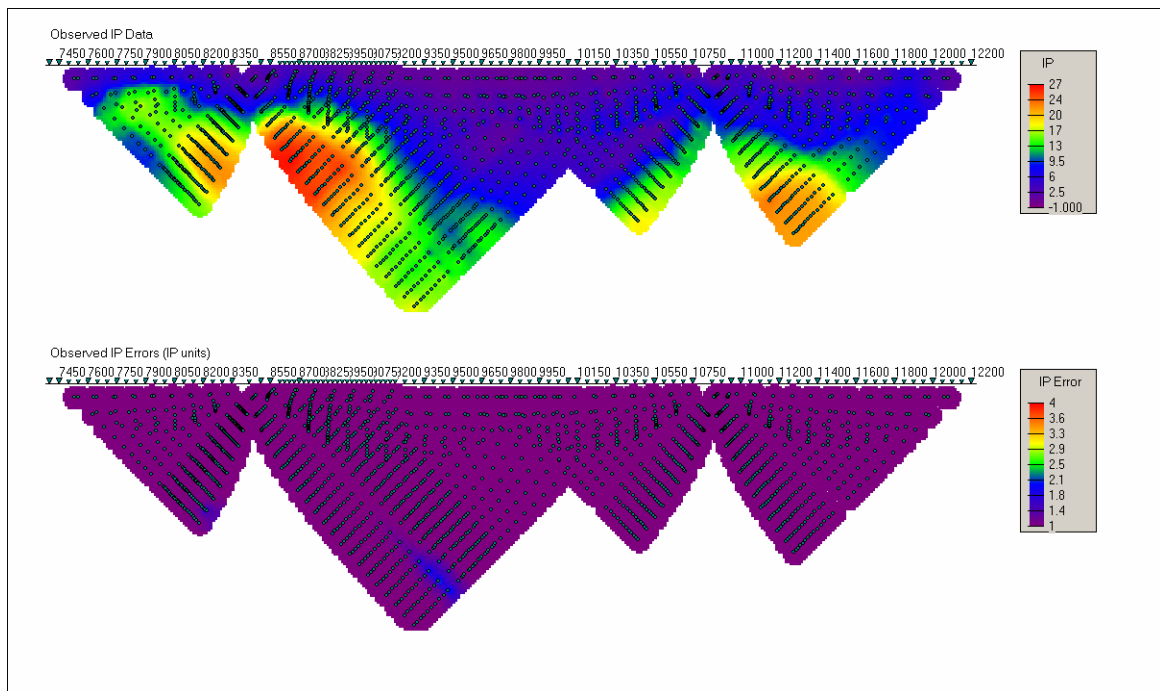
24 iter	data misfit	model norm	multiplier
0	1.23758E+06	0.00000E+00	0.00000E+00
5	3.71016E+04	1.75224E+02	4.49985E+02
9	4.71873E+03	5.06085E+02	2.00803E+00
10	3.74557E+03	5.60320E+02	1.00402E+00
12	2.46429E+03	6.70974E+02	2.51004E-01
13	2.03070E+03	7.23233E+02	1.25502E-01
14	1.77895E+03	7.64650E+02	7.40394E-02
15	1.55414E+03	8.08258E+02	4.98605E-02
16	1.40828E+03	8.42189E+02	3.84348E-02
17	1.27299E+03	8.77149E+02	3.26959E-02
18	1.19609E+03	8.89874E+02	8.70328E-01
19	1.18313E+03	8.63498E+02	3.31614E+00
20	1.19772E+03	8.40374E+02	3.99746E+00
21	1.19783E+03	8.25386E+02	3.90940E+00
22	1.19800E+03	8.16520E+02	3.94897E+00
23	1.19799E+03	8.07025E+02	4.13786E+00
24	1.19795E+03	8.01414E+02	4.11414E+00

1198 number of data



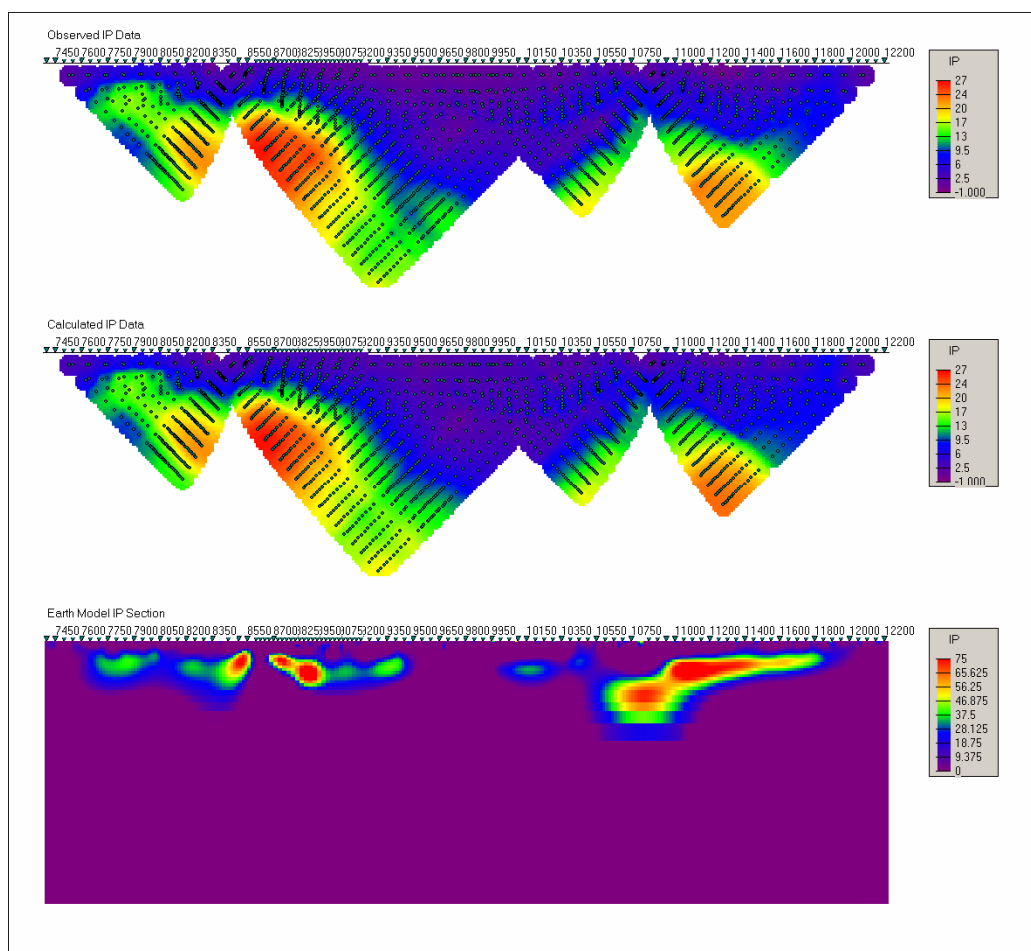
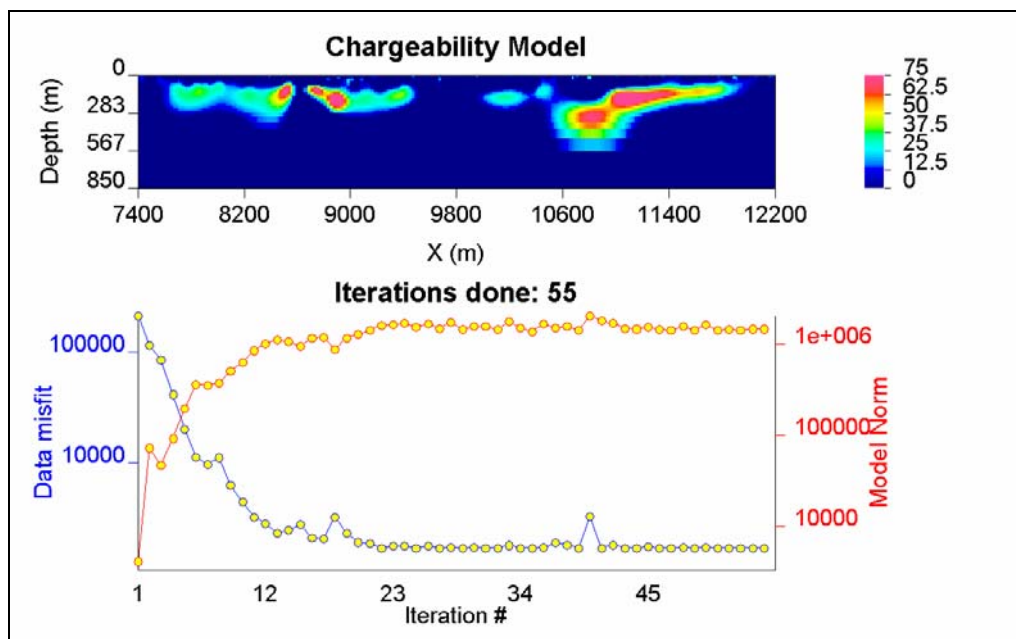
Line 10800N: Final Chargeability Model – Sharp Alphas

- Maximum data error allowed: 5 mradians
- Minimum Error floor applied: 1 mradians
- Error Misfits Removed: No misfits removed
- Alpha Parameters: 0.001, 1, 1
- Model Error Misfit: 1720 for 1720 points (100%), in 55 iterations



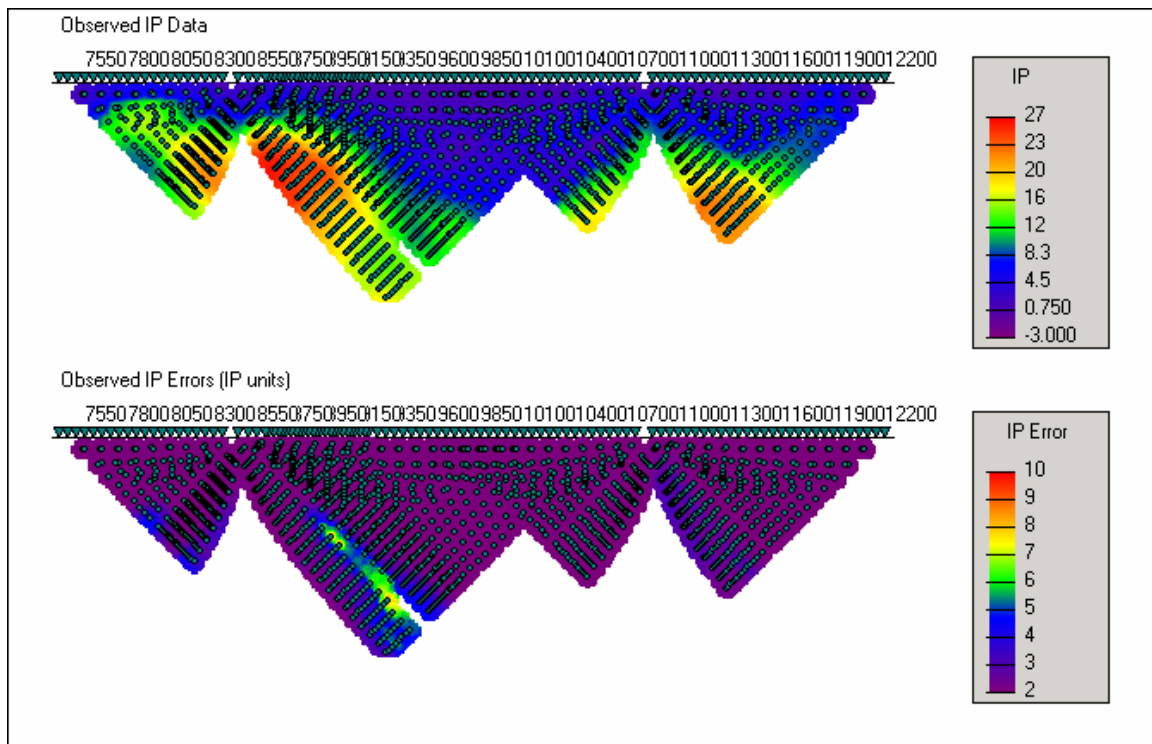
55 iter	data misfit	model norm	multiplier
0	2.58681E+05	0.00000E+00	0.00000E+00
5	2.01730E+04	1.96576E+05	1.26195E-01
10	4.40683E+03	6.31718E+05	7.09616E-03
15	2.78811E+03	9.47233E+05	2.31501E-03
20	1.93068E+03	1.28817E+06	8.34194E-04
25	1.72069E+03	1.54436E+06	5.96313E-04
30	1.72521E+03	1.55139E+06	6.06492E-04
35	1.72028E+03	1.37238E+06	9.54529E-04
40	3.30901E+03	2.05416E+06	2.18730E-04
45	1.74837E+03	1.53060E+06	6.76599E-04
50	1.74403E+03	1.65261E+06	4.72007E-04
52	1.71890E+03	1.44469E+06	7.78519E-04
53	1.71981E+03	1.41622E+06	8.76751E-04
54	1.71880E+03	1.46928E+06	7.44574E-04
55	1.71985E+03	1.46409E+06	7.36255E-04

1720 number of data

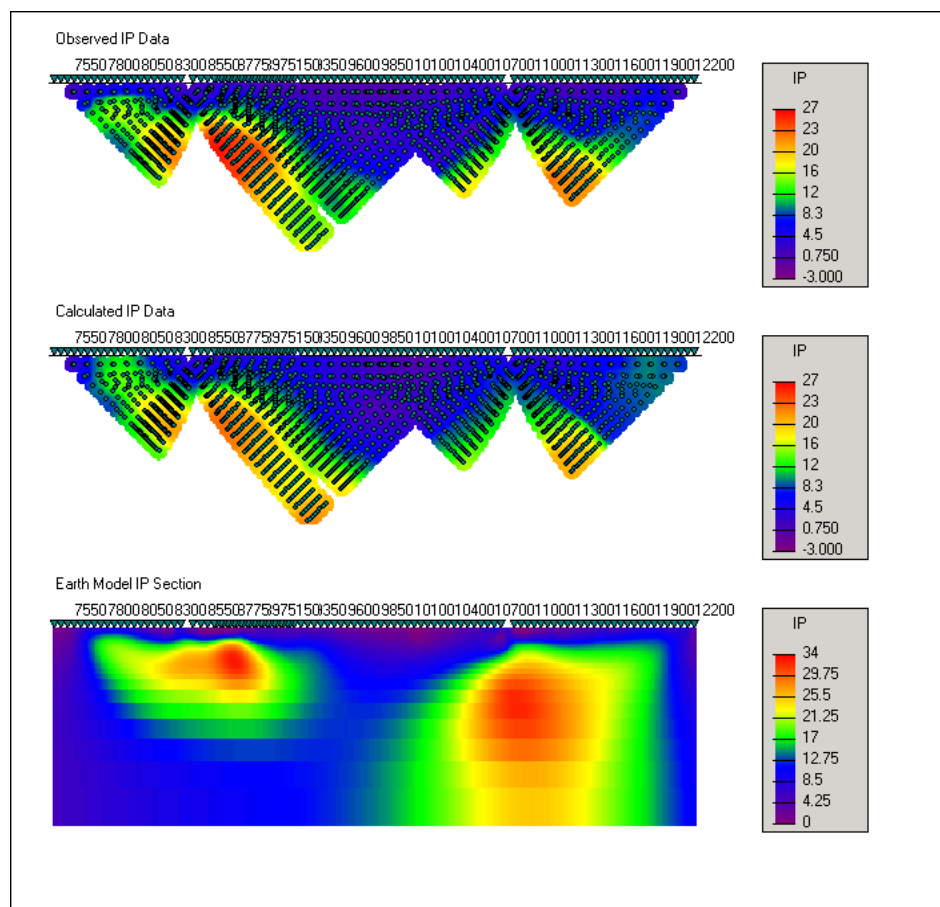
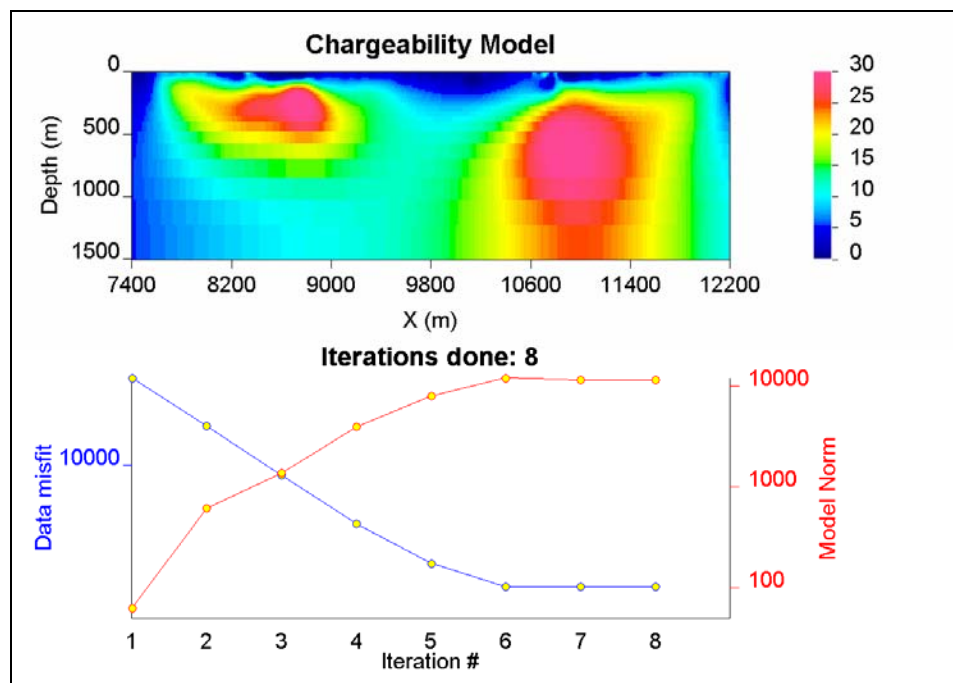


Line 10800N: Final Chargeability Model – Smooth Alphas

- Maximum data error allowed: 10 mrad
- Minimum Error floor applied: 2 mrad
- Error Misfits Removed: No error misfits removed
- Alpha Parameters: 1e-06, 1, 1
- Model Error Misfit: 1722 for 1722 points (100%), in 8 iterations

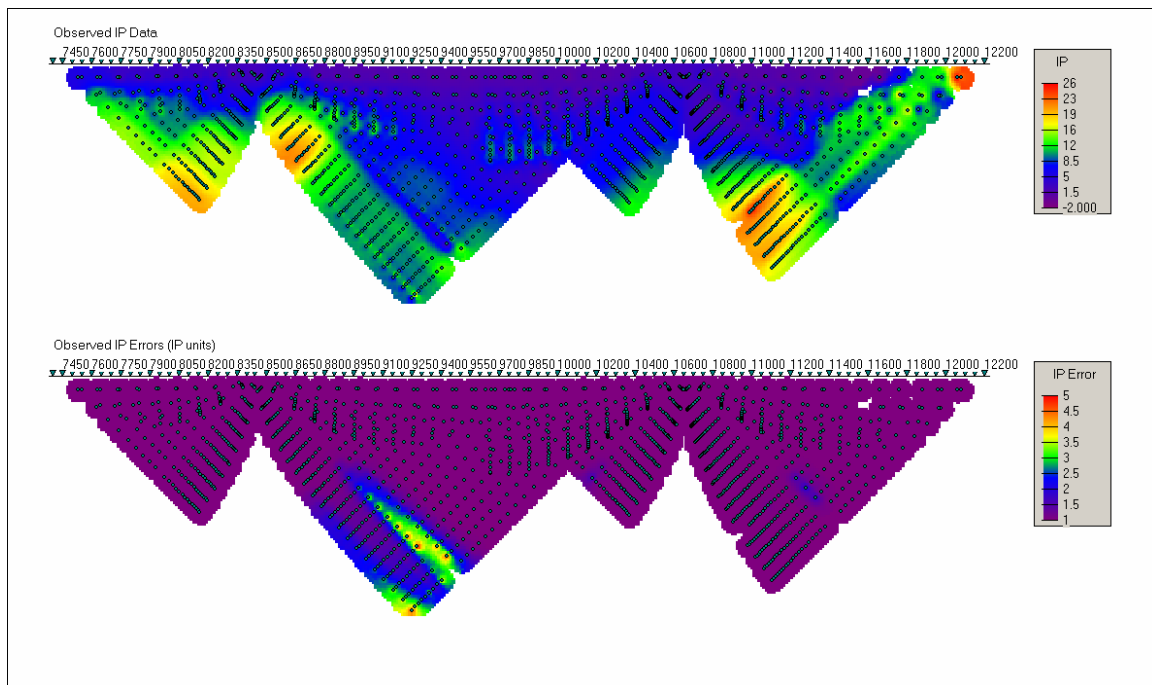


8 iter	data misfit	model norm	multiplier
0	5.58814E+04	0.00000E+00	0.00000E+00
1	3.55159E+04	6.21607E+01	1.57786E+03
2	1.76479E+04	6.06769E+02	9.68816E+01
3	8.67864E+03	1.37083E+03	5.04103E+00
4	4.30445E+03	3.94009E+03	8.89890E-01
5	2.42760E+03	7.87779E+03	2.34516E-01
6	1.72125E+03	1.19077E+04	1.07428E-01
7	1.72198E+03	1.14866E+04	1.11985E-01
8	1.72209E+03	1.13719E+04	1.14592E-01
1722 number of data			

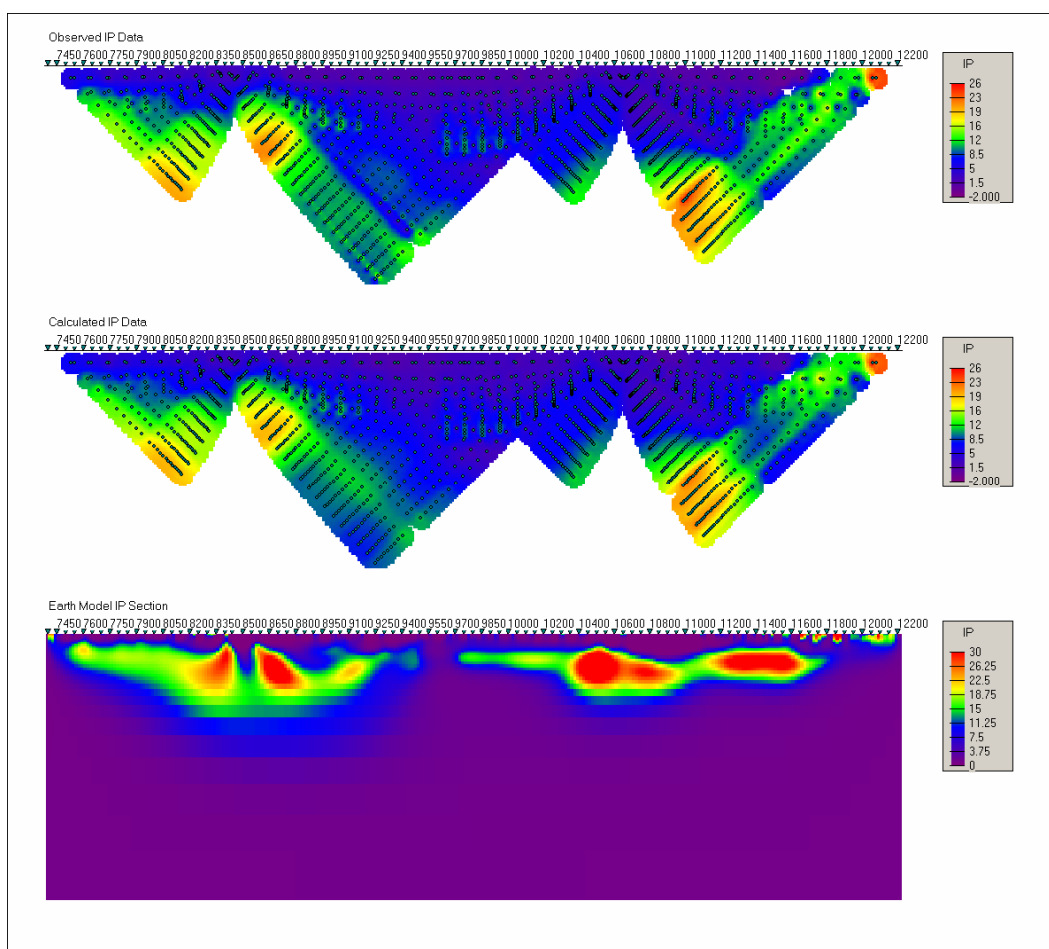
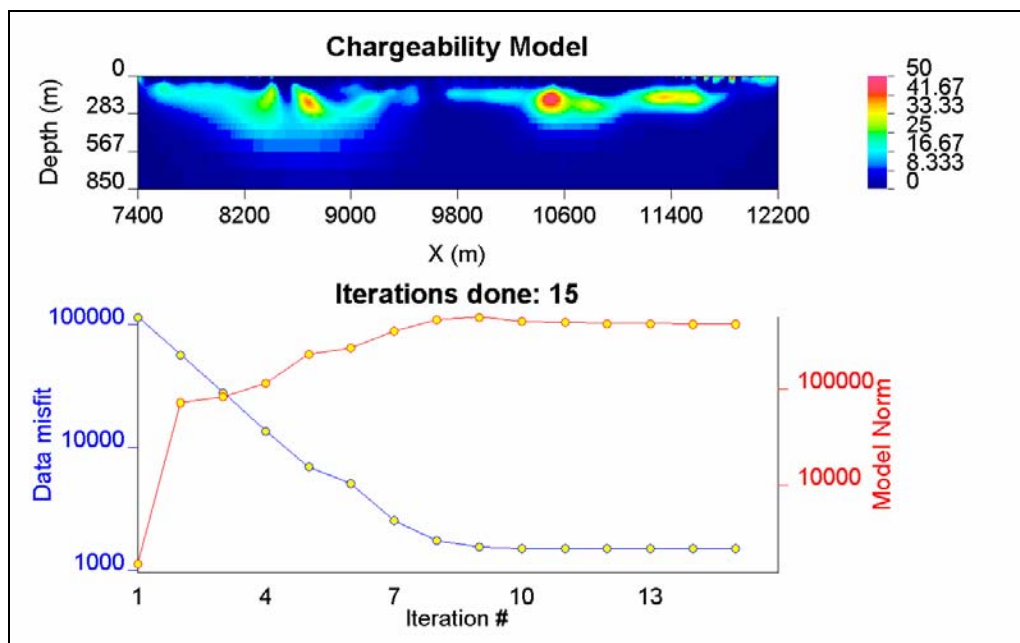


Line 11000N: Final Chargeability Model – Sharp Alphas

- Maximum data error allowed: 5 mradians
- Minimum Error floor applied: 1 mradians
- Error Misfits Removed: Misfits >15x removed (3% total)
- Alpha Parameters: 0.001, 1, 1
- Model Error Misfit: 1519 for 1519 points (1566 initial), in 15 iterations

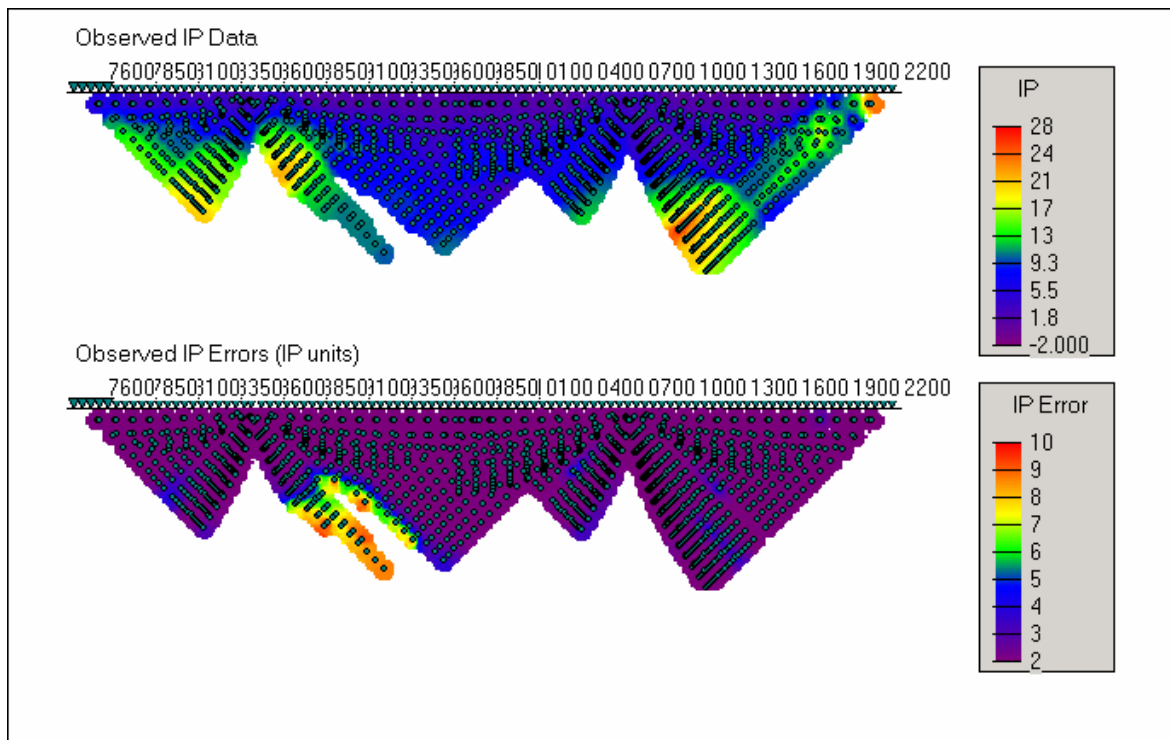


15 iter	data misfit	model norm	multiplier
0	1.38252E+05	0.00000E+00	0.00000E+00
1	1.15497E+05	1.53014E+03	1.12244E+02
2	5.67129E+04	7.23151E+04	7.17800E+00
3	2.79651E+04	8.23747E+04	4.69413E-01
4	1.37236E+04	1.16267E+05	1.34819E-01
5	7.04190E+03	2.31831E+05	3.68935E-02
8	1.76946E+03	5.29001E+05	3.51047E-03
9	1.57312E+03	5.61281E+05	2.70646E-03
10	1.51890E+03	5.01179E+05	4.18575E-03
11	1.51882E+03	4.98509E+05	4.06094E-03
12	1.51960E+03	4.82377E+05	4.66262E-03
13	1.51881E+03	4.82935E+05	4.47909E-03
14	1.51938E+03	4.73329E+05	4.85030E-03
15	1.51899E+03	4.71900E+05	4.84635E-03
1519 number of data			



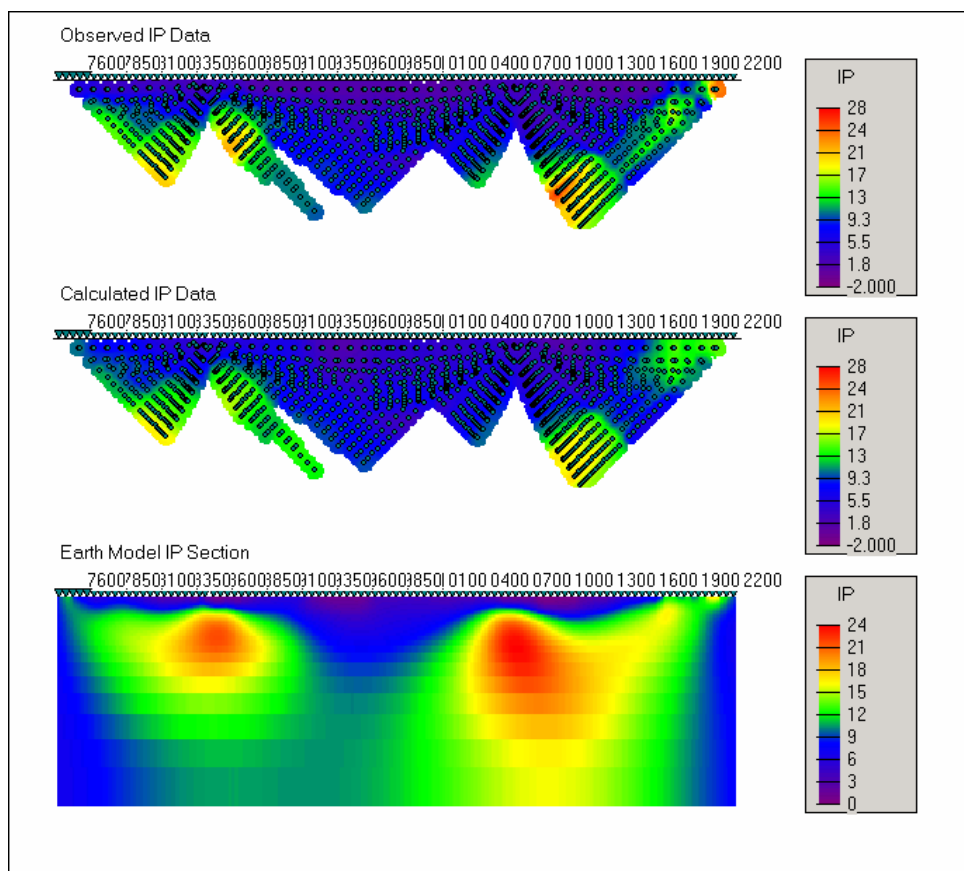
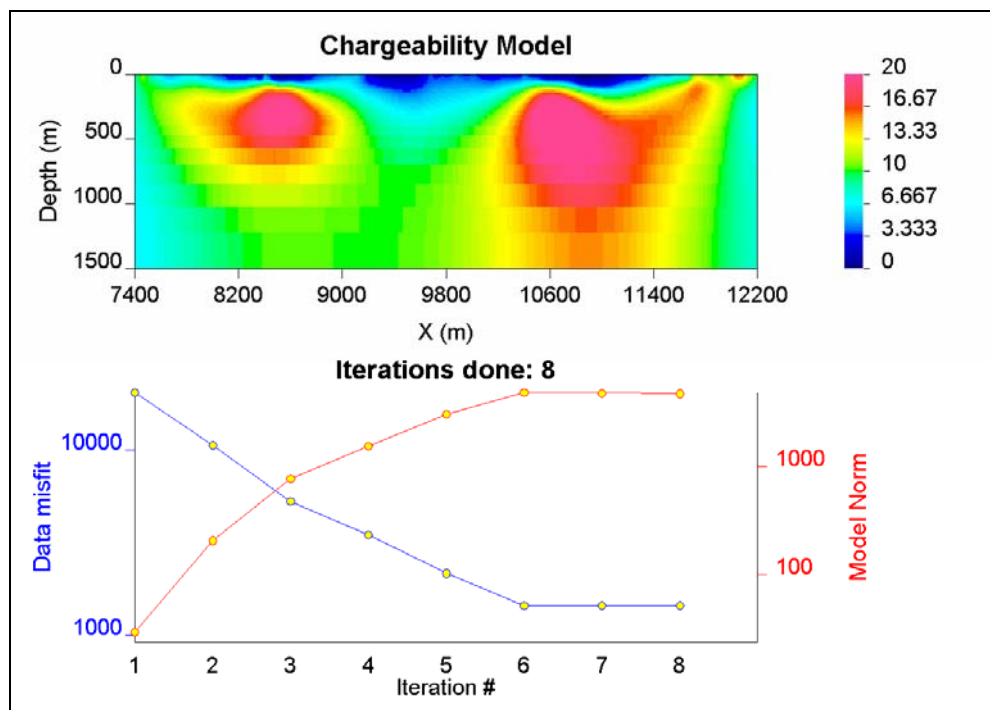
Line 11000N: Final Chargeability Model – Smooth Alphas

- Maximum data error allowed: 10 mradians
- Minimum Error floor applied: 2 mradians
- Error Misfits Removed: No misfits removed
- Alpha Parameters: 0.6e-06, 1, 1
- Model Error Misfit: 1443 for 1443 points (100%), in 8 iterations



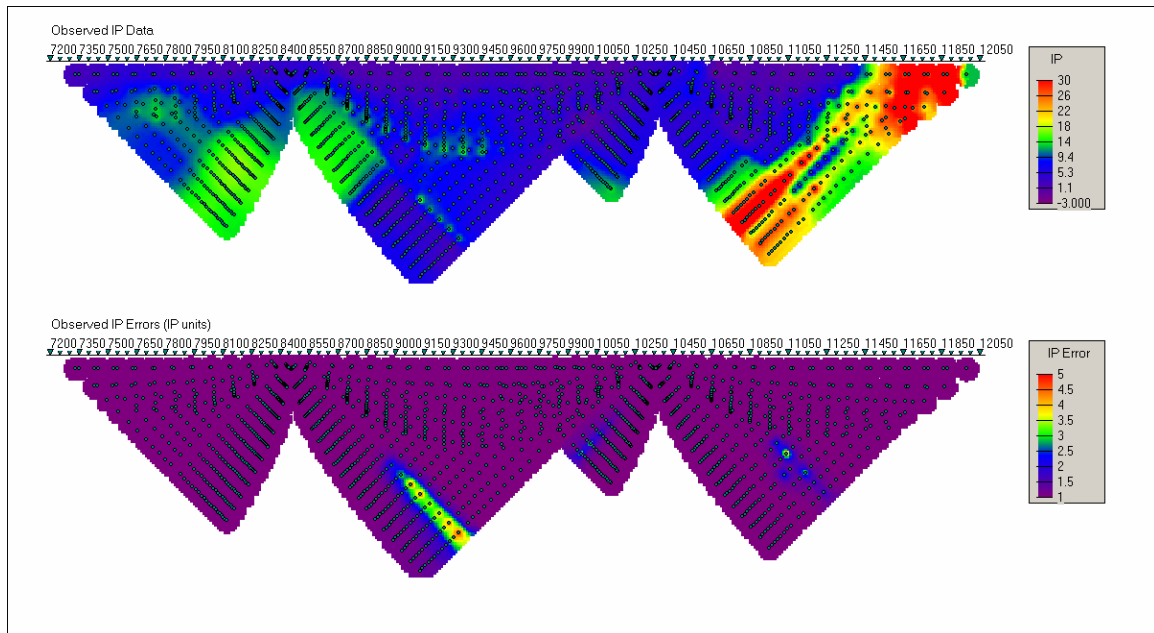
8 iter	data misfit	model norm	multiplier
0	3.13716E+04	0.00000E+00	0.00000E+00
1	2.07248E+04	2.90939E+01	1.20908E+03
2	1.06528E+04	2.04113E+02	8.97913E+01
3	5.30828E+03	7.68991E+02	5.21464E+00
4	3.49830E+03	1.53887E+03	1.41771E+00
5	2.16410E+03	3.07839E+03	5.69633E-01
6	1.44122E+03	4.89474E+03	2.61683E-01
7	1.44247E+03	4.79903E+03	2.69113E-01
8	1.44273E+03	4.76587E+03	2.72959E-01

1443 number of data

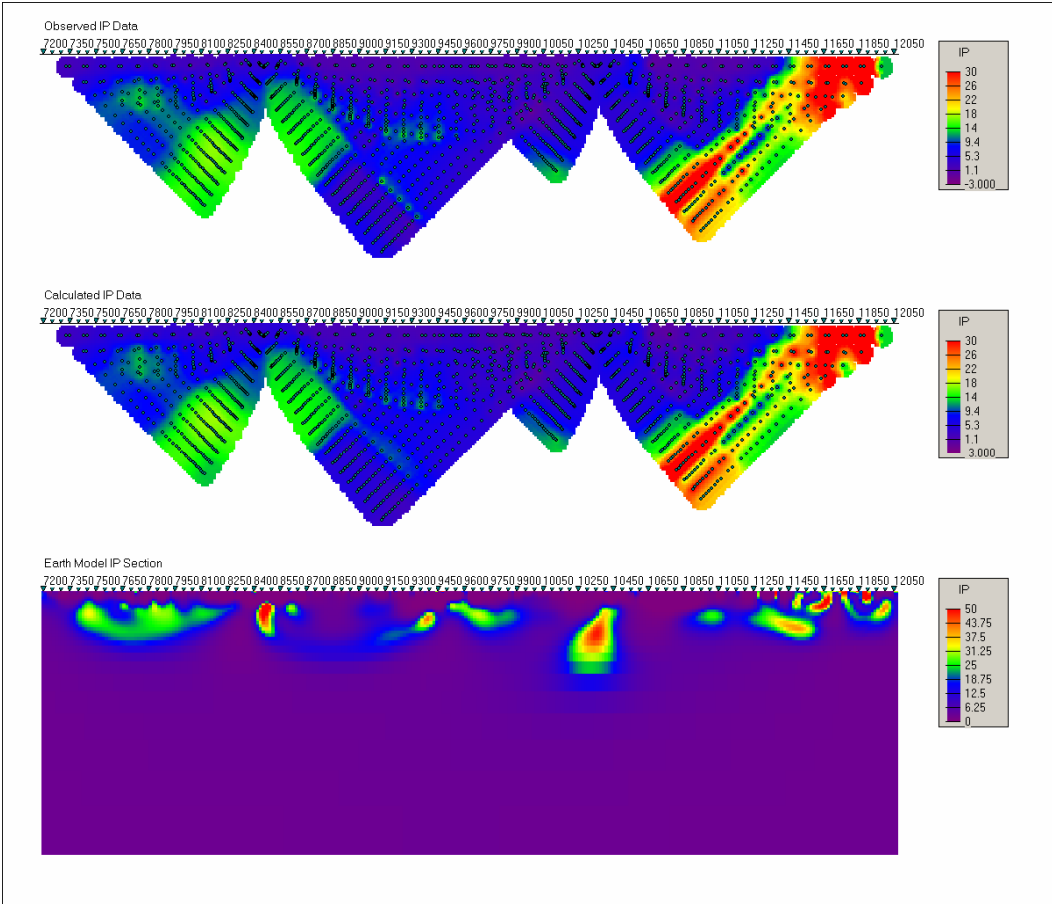
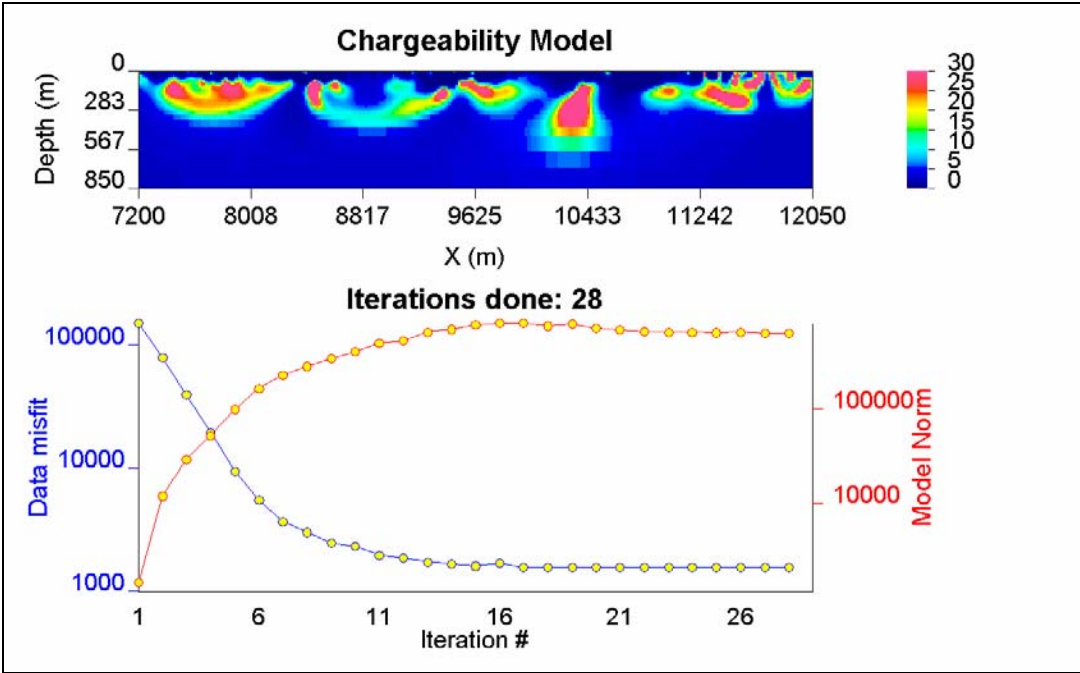


Line 11200N: Final Chargeability Model – Sharp Alphas

- Maximum data error allowed: 5 mradians
- Minimum Error floor applied: 1 mradians
- Error Misfits Removed: No Misfits removed
- Alpha Parameters: 0.001, 1, 1
- Model Error Misfit: 1550 for 1550 points (100%), in 28 iterations

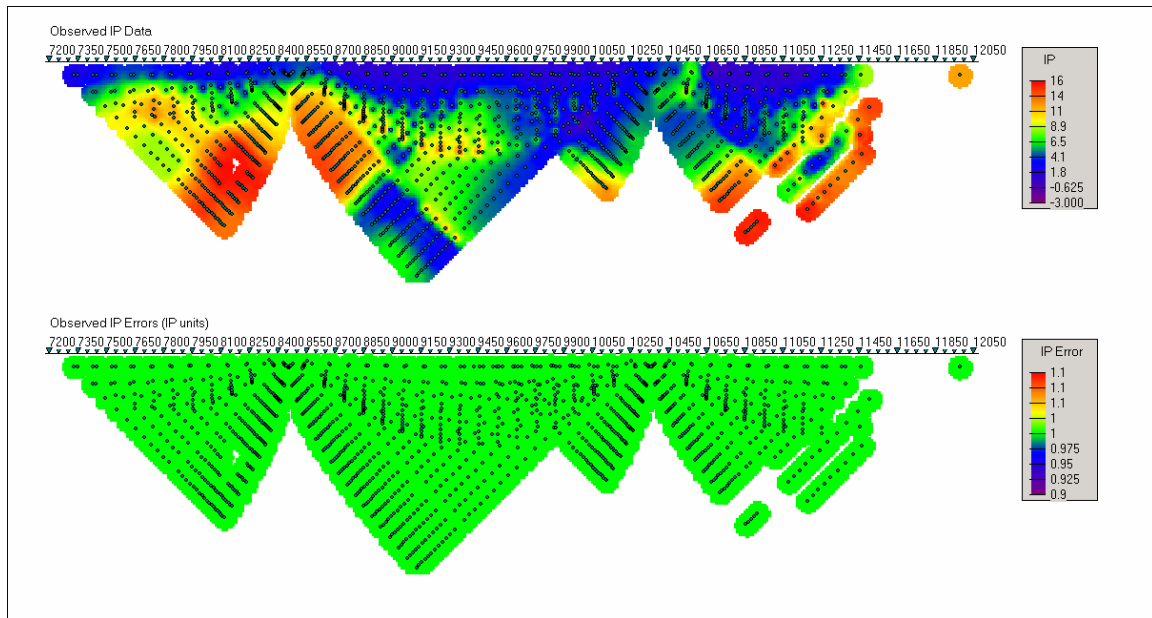


28 iter	data misfit	model norm	multiplier
0	1.87885E+05	0.00000E+00	0.00000E+00
5	9.52160E+03	1.00959E+05	1.46369E-01
10	2.30264E+03	4.15287E+05	1.92382E-03
15	1.60522E+03	8.11165E+05	4.18604E-04
17	1.55001E+03	8.27563E+05	4.92662E-04
18	1.55053E+03	7.74526E+05	6.93665E-04
19	1.56321E+03	8.16325E+05	4.83303E-04
20	1.55011E+03	7.42866E+05	7.37903E-04
21	1.55047E+03	7.03253E+05	9.13300E-04
22	1.55011E+03	6.84137E+05	8.56150E-04
23	1.55051E+03	6.68960E+05	9.35497E-04
24	1.55002E+03	6.76769E+05	8.48340E-04
25	1.54995E+03	6.58909E+05	1.00720E-03
26	1.55026E+03	6.69477E+05	7.98106E-04
27	1.54971E+03	6.49318E+05	1.00625E-03
28	1.55015E+03	6.45280E+05	1.02839E-03
1550 number of data			



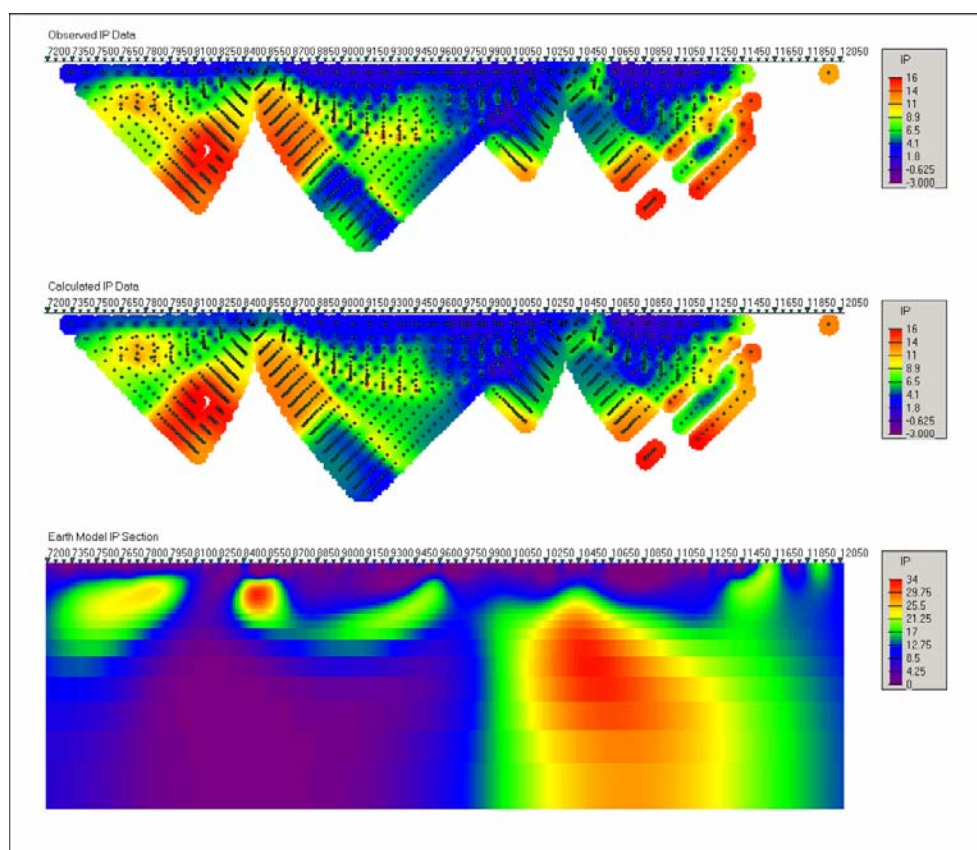
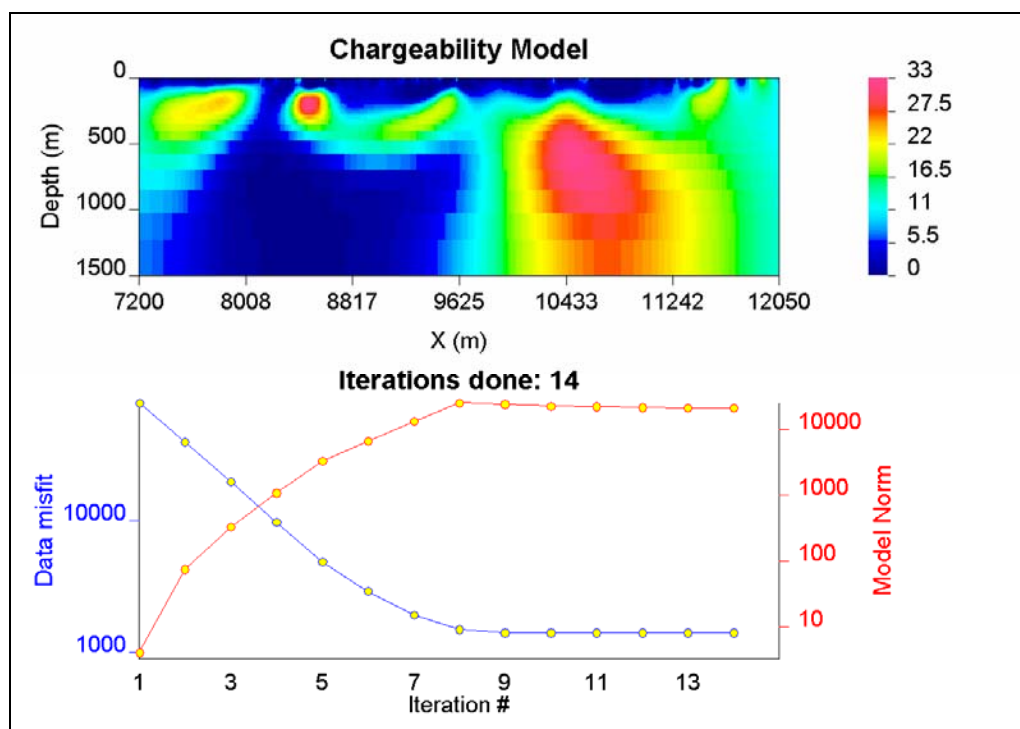
Line 11200N: Final Chargeability Model – Smooth Alphas

- Maximum data error allowed: 50 mradians
- Minimum Error floor applied: 2 mradians
- Error Misfits Removed: Misfits >5x removed (8%)
- Alpha Parameters: 0.6e-06, 1, 1
- Model Error Misfit: 1421 for 1421 points (1550 initial), in 14 iterations



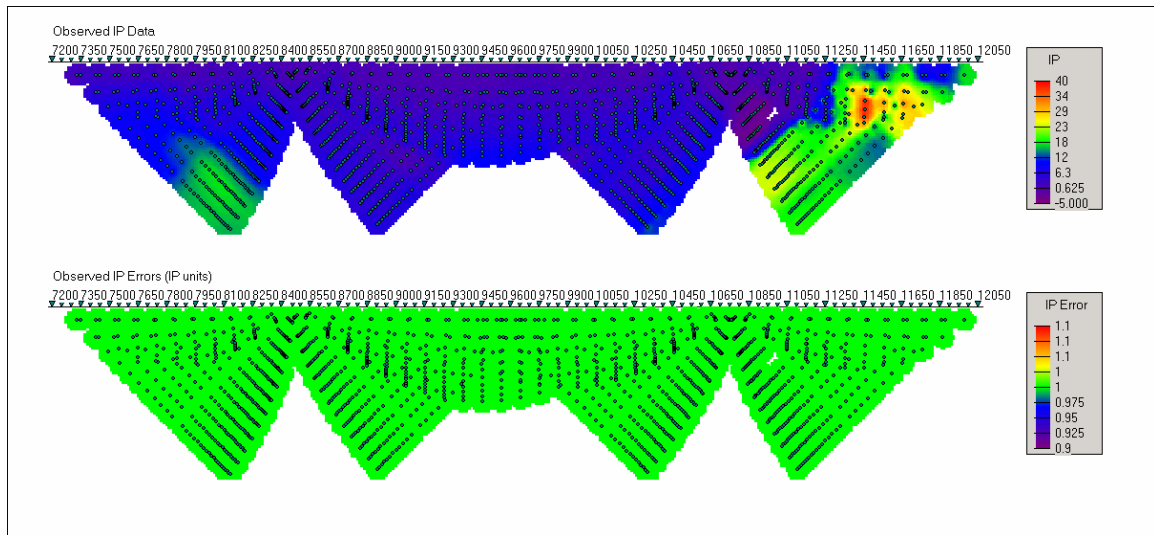
14 iter	data misfit	model norm	multiplier
0	9.54219E+04	0.00000E+00	0.00000E+00
1	7.80351E+04	4.17180E+00	9.36962E+03
2	3.95962E+04	7.55352E+01	9.07010E+02
3	1.98653E+04	3.27628E+02	5.17480E+01
4	9.82113E+03	1.07155E+03	5.55177E+00
5	4.90173E+03	3.25108E+03	9.25289E-01
6	2.93976E+03	6.50119E+03	2.95688E-01
7	1.94536E+03	1.30024E+04	7.42972E-02
8	1.50284E+03	2.47694E+04	1.85857E-02
9	1.42082E+03	2.38043E+04	1.97680E-02
10	1.42083E+03	2.21781E+04	2.42975E-02
11	1.42104E+03	2.15208E+04	2.53691E-02
12	1.42103E+03	2.10878E+04	2.70799E-02
13	1.42102E+03	2.08582E+04	2.73176E-02
14	1.42103E+03	2.06985E+04	2.78957E-02

1421 number of data



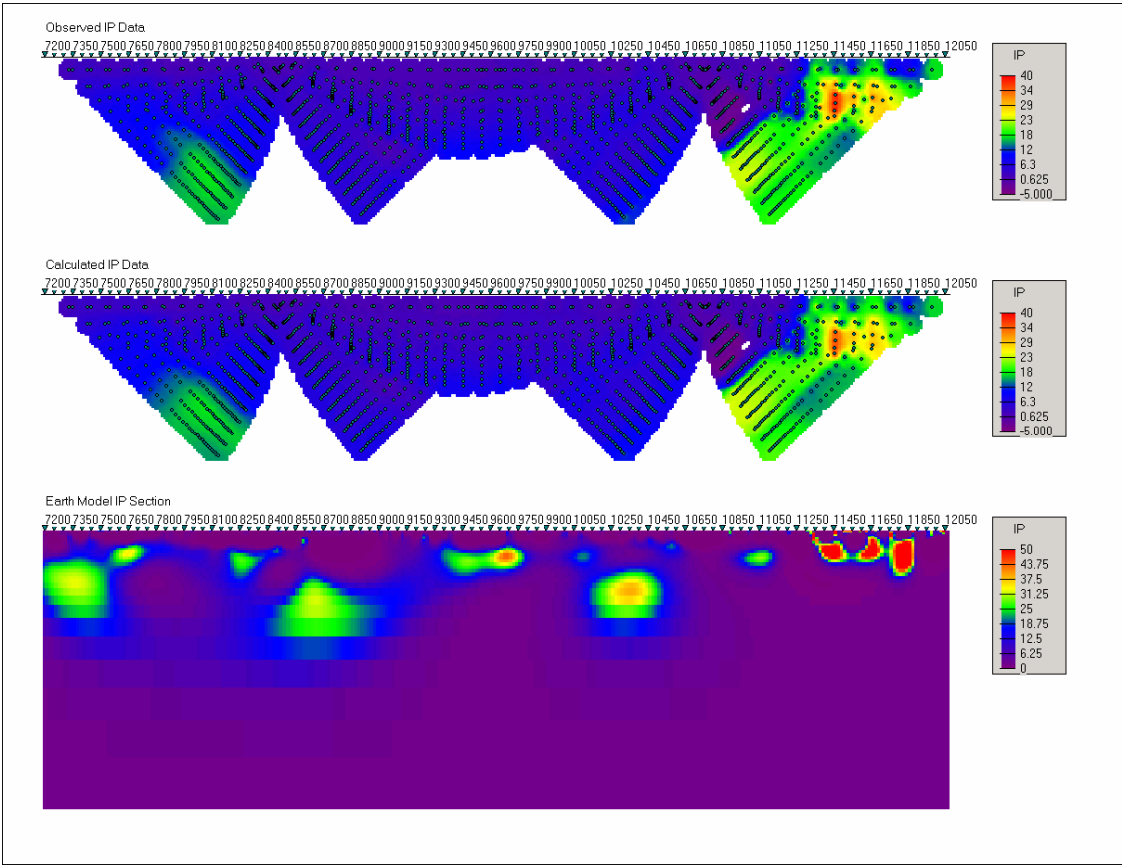
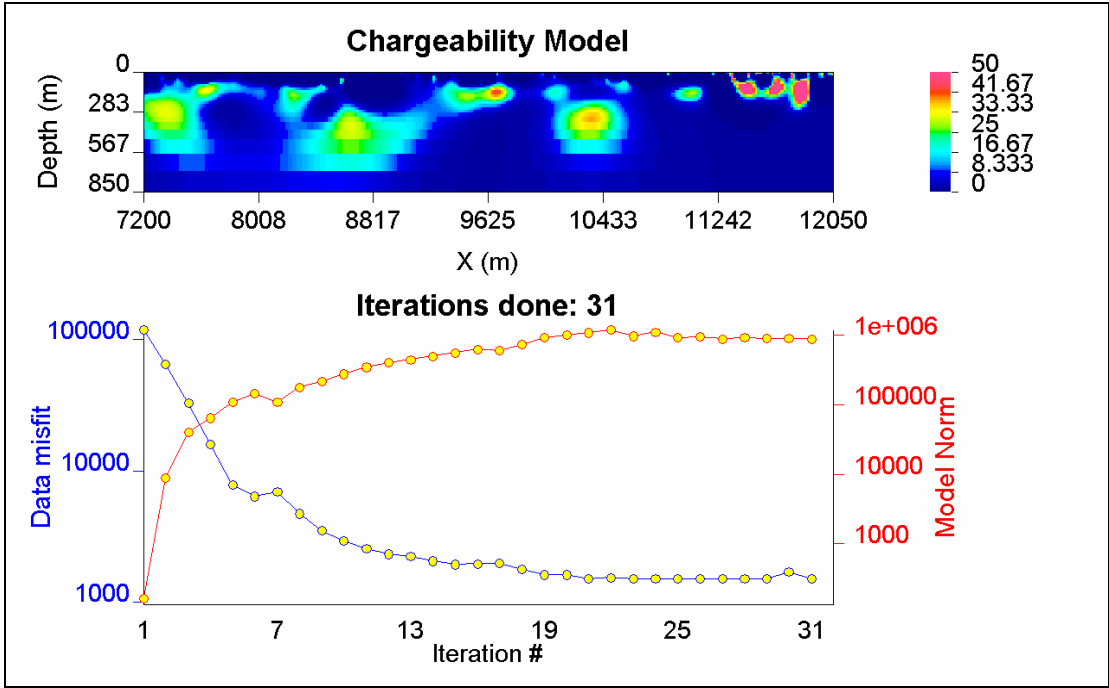
Line 11400N: Final Chargeability Model – Sharp Alphas

- Maximum data error allowed: 1 mradians
- Minimum Error floor applied: 1 mradians
- Error Misfits Removed: No Misfits removed
- Alpha Parameters: 0.001, 1, 1
- Model Error Misfit: 1510 for 1510 points (100%), in 31 iterations



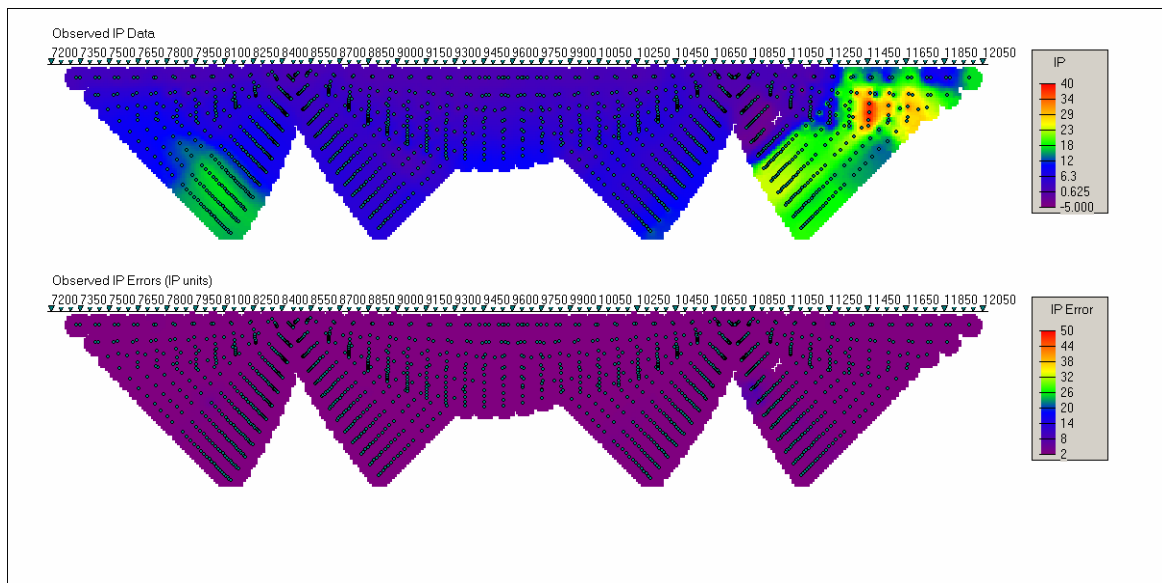
31 iter	data misfit	model norm	multiplier
0	1.32304E+05	0.00000E+00	0.00000E+00
5	7.85720E+03	1.08119E+05	8.29930E-02
10	2.93280E+03	2.78661E+05	5.60535E-03
15	1.94067E+03	5.63214E+05	8.45624E-04
16	1.97217E+03	6.33151E+05	6.07625E-04
17	1.99246E+03	6.08428E+05	8.22456E-04
18	1.78482E+03	7.37111E+05	4.24584E-04
19	1.61918E+03	9.23490E+05	3.06846E-04
20	1.61025E+03	1.01902E+06	2.61672E-04
21	1.50903E+03	1.07744E+06	2.35442E-04
22	1.53599E+03	1.19311E+06	2.07285E-04
23	1.50979E+03	9.78634E+05	3.50336E-04
24	1.51002E+03	1.11402E+06	2.13415E-04
25	1.51032E+03	9.36001E+05	4.11251E-04
26	1.50986E+03	9.40865E+05	3.30791E-04
27	1.50983E+03	8.80145E+05	4.26863E-04
28	1.50898E+03	9.20464E+05	3.54502E-04
29	1.51012E+03	9.08156E+05	3.68389E-04
30	1.69239E+03	8.97444E+05	4.13585E-04
31	1.50998E+03	8.96389E+05	4.07069E-04

1510 number of data



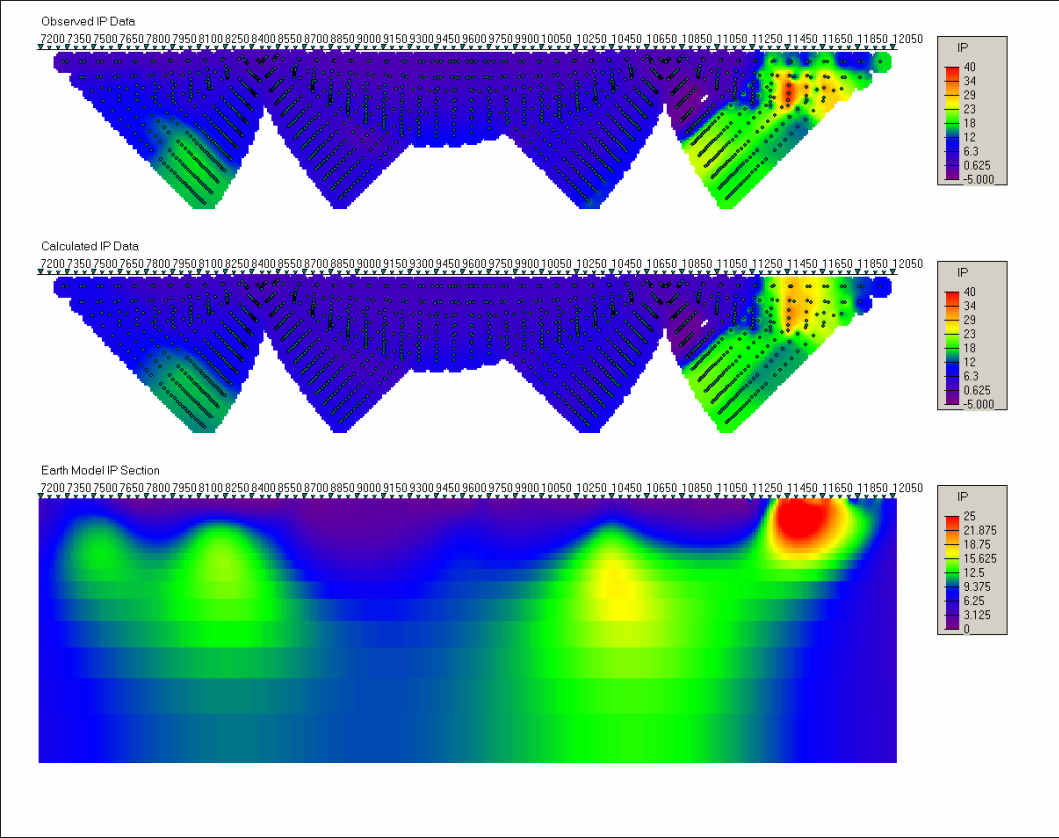
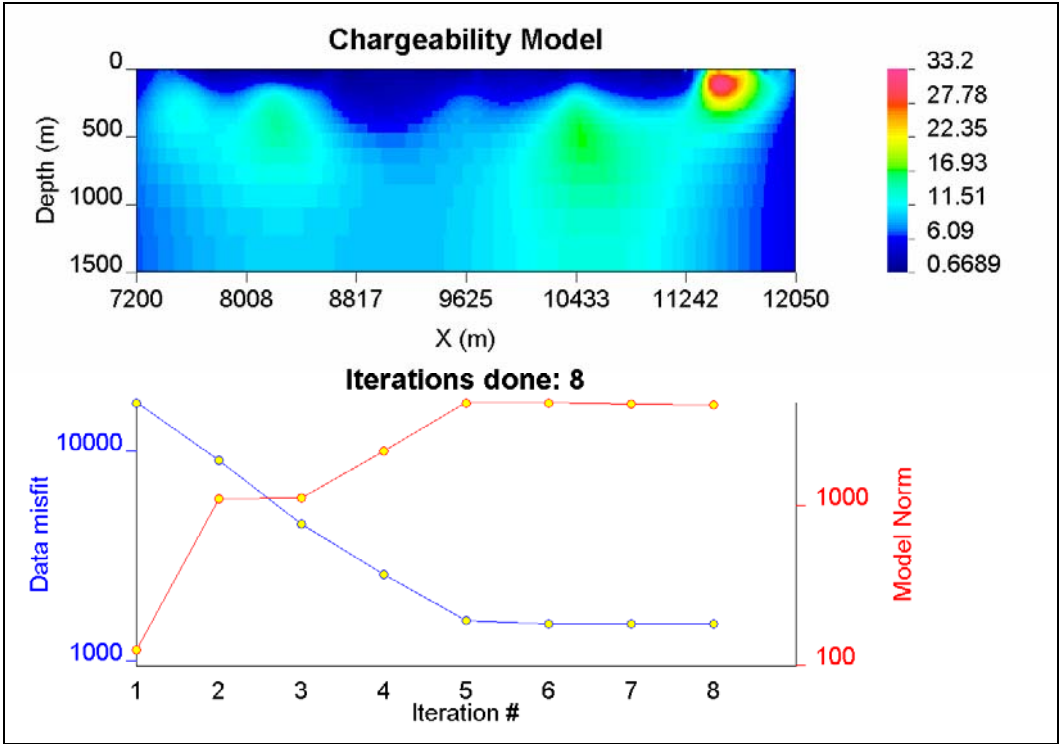
Line 11400N: Final Chargeability Model – Smooth Alphas

- Maximum data error allowed: 50 mrad
- Minimum Error floor applied: 2 mrad
- Error Misfits Removed: No error misfits removed
- Alpha Parameters: $8.8\text{e-}06$, 1, 1
- Model Error Misfit: 1443 for 1443 points (100%), in 8 iterations



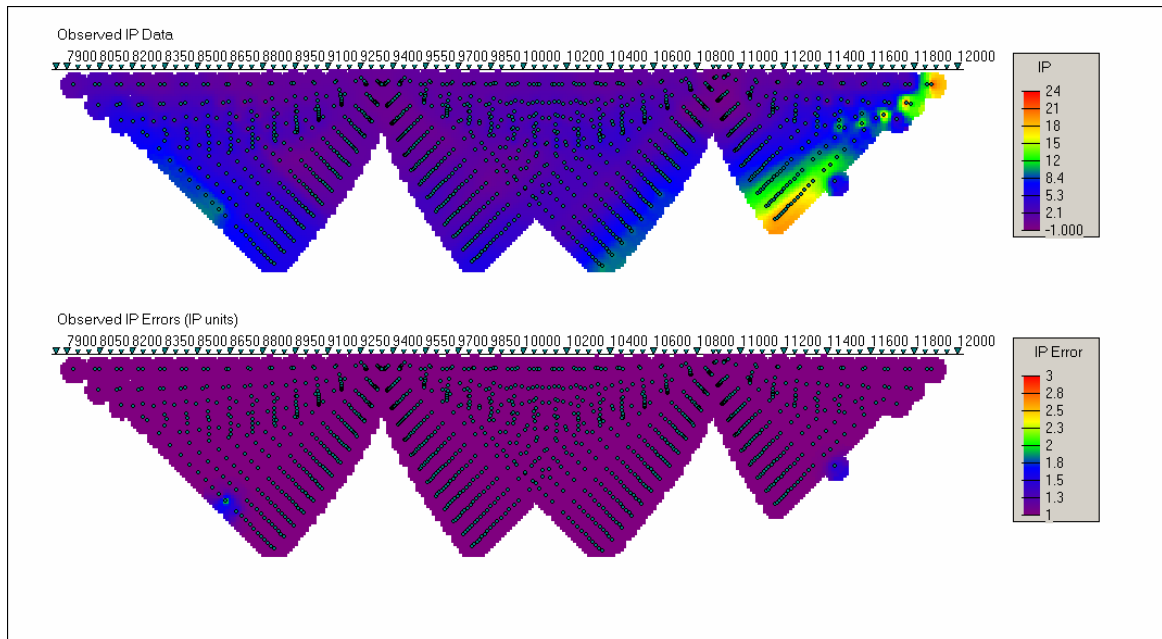
8 iter	data misfit	model norm	multiplier
0	3.13716E+04	0.00000E+00	0.00000E+00
1	2.07248E+04	2.90939E+01	1.20908E+03
2	1.06528E+04	2.04113E+02	8.97913E+01
3	5.30828E+03	7.68991E+02	5.21464E+00
4	3.49830E+03	1.53887E+03	1.41771E+00
5	2.16410E+03	3.07839E+03	5.69633E-01
6	1.44122E+03	4.89474E+03	2.61683E-01
7	1.44247E+03	4.79903E+03	2.69113E-01
8	1.44273E+03	4.76587E+03	2.72959E-01

1443 number of data



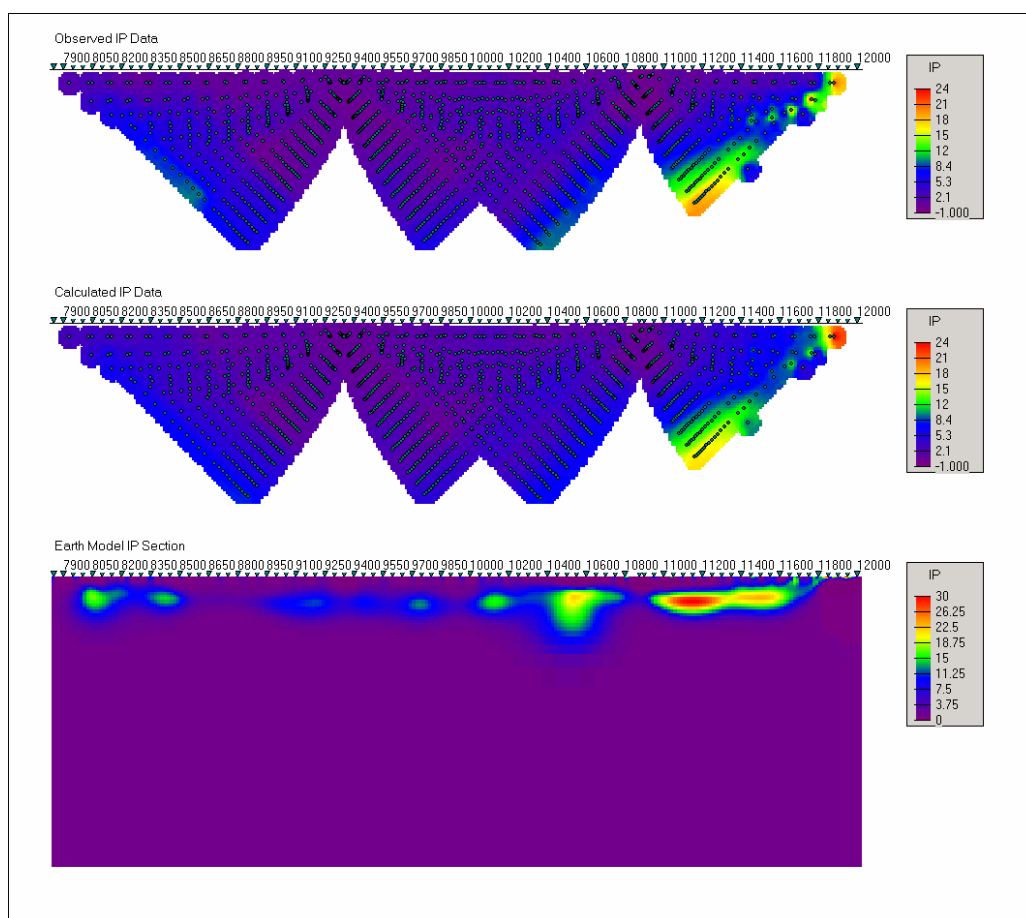
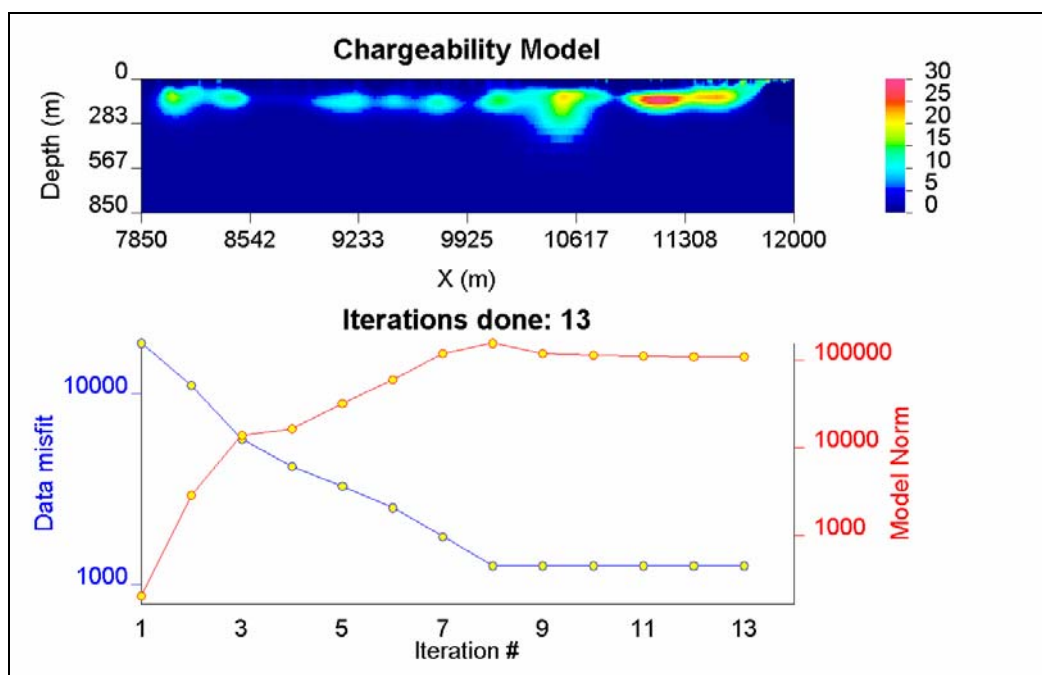
Line 11600N: Final Chargeability Model – Sharp Alphas

- Maximum data error allowed: 5 mradians
- Minimum Error floor applied: 1 mradians
- Error Misfits Removed: No misfits removed
- Alpha Parameters: 0.001, 1, 1
- Model Error Misfit: 1257 for 1257 points (100%), in 13 iterations



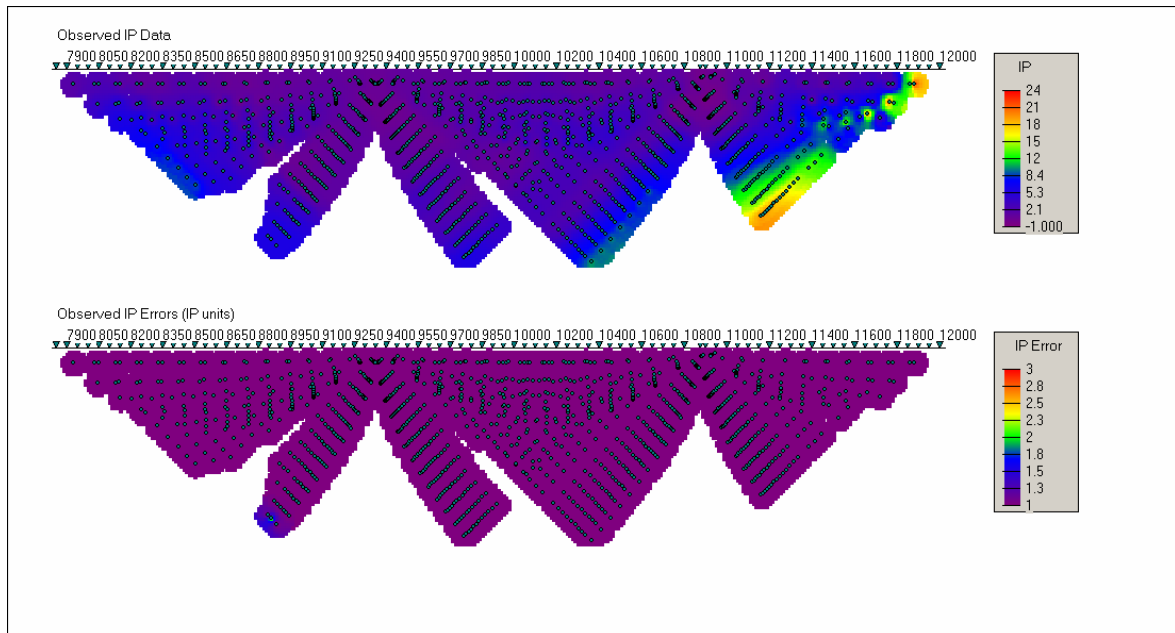
13	iter	data misfit	model norm	multiplier
	0	2.36349E+04	0.00000E+00	0.00000E+00
	1	1.83808E+04	2.06125E+02	7.59008E+01
	2	1.10000E+04	2.88234E+03	7.06321E+00
	3	5.76529E+03	1.38385E+04	4.25786E-01
	4	4.15402E+03	1.65215E+04	8.96156E-02
	5	3.29087E+03	3.22034E+04	3.15330E-02
	6	2.54219E+03	5.95050E+04	1.92686E-02
	7	1.78890E+03	1.18997E+05	7.43413E-03
	8	1.25423E+03	1.56069E+05	4.99797E-03
	9	1.25607E+03	1.18925E+05	6.92391E-03
	10	1.25675E+03	1.14794E+05	7.29800E-03
	11	1.25681E+03	1.11319E+05	7.56257E-03
	12	1.25699E+03	1.09328E+05	7.77421E-03
	13	1.25699E+03	1.09021E+05	7.80187E-03

1257 number of data

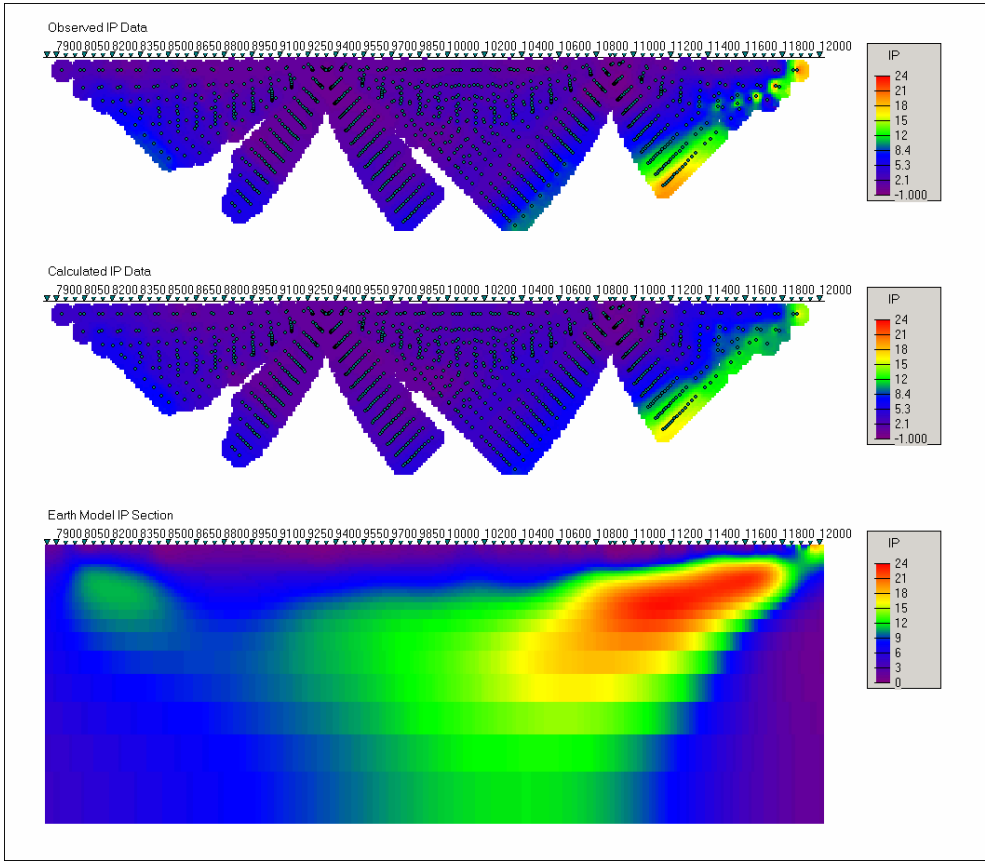
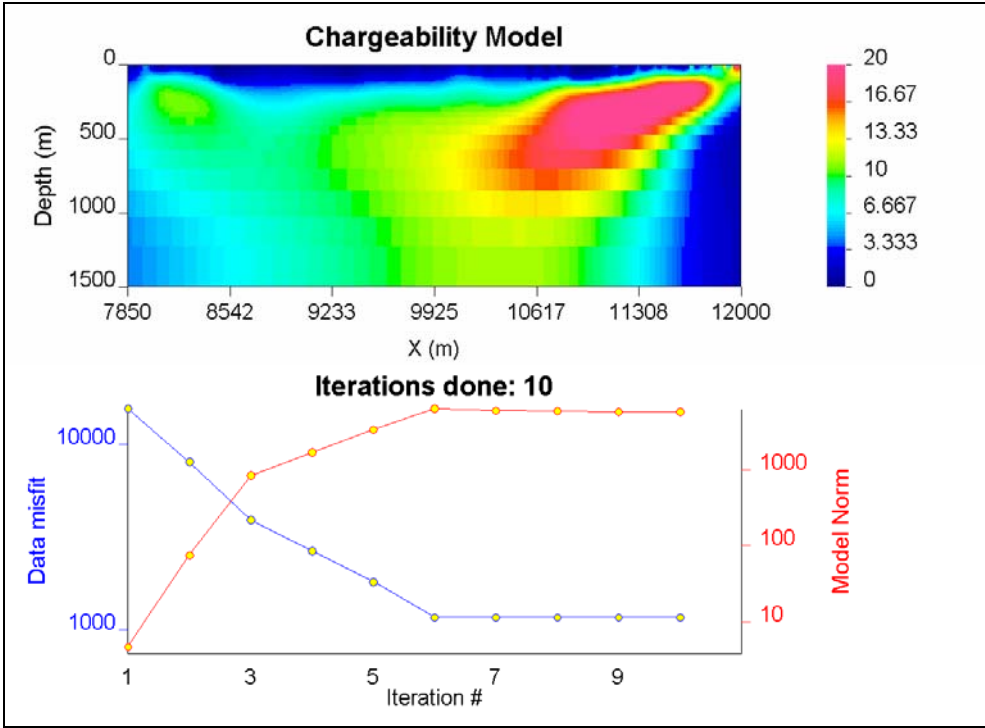


Line 11600N: Final Chargeability Model – Smooth Alphas

- Maximum data error allowed: 5 mrad
- Minimum Error floor applied: 2 mrad
- Error Misfits Removed: No error misfits removed
- Alpha Parameters: 8.8e-06, 1, 1
- Model Error Misfit: 1172 for 1172 points (100%), in 8 iterations



10 iter	data misfit	model norm	multiplier
0	2.15726E+04	0.00000E+00	0.00000E+00
1	1.56839E+04	4.73574E+00	2.20902E+03
2	8.06237E+03	7.44790E+01	1.61825E+02
3	3.92372E+03	8.47080E+02	3.81701E+00
4	2.67518E+03	1.69787E+03	7.65205E-01
5	1.81943E+03	3.40014E+03	3.28149E-01
6	1.17106E+03	6.36355E+03	1.37365E-01
7	1.17140E+03	6.02663E+03	1.48053E-01
8	1.17191E+03	5.89952E+03	1.49998E-01
9	1.17182E+03	5.83191E+03	1.54798E-01
10	1.17199E+03	5.78702E+03	1.54970E-01
1172 number of data			



APPENDIX B: DCIP 2D GOCAD-CONSTRAINED INVERSIONS

General Comments on Gocad-Constrained Inversion Modeling: The reference/constraining resistivity and chargeability models were constructed in Gocad. The resistivity and chargeability constraints were chosen using a statistical averages combining data from a) Kidd Creek borehole single-point resistance values, b) physical property laboratory measurements on Timmins area Archean rocks by Perparim Alikaj QGI, and c) borehole resistivity log of DDH 4509 by QLS. The values for the overburden were estimated from the DCIP results. Initial constrained inversion models, using 50 ohm-m and 50 milliradians for the rhyolite, where later changed to 1k ohm-m and 20 mradians, based on final model comparisons and behaviours. Similarly, chargeability estimates for the graphites and sulphides were also lowered from 150 and 100, respectively, to 75 milliradians in final models. The values chosen for the reference models are as follows:

Table B.2: Resistivity and Chargeability Constraints.

<u>Lithologic Unit</u>	<u>Resistivity (Conductivity)</u>	<u>Chargeability</u>
Overburden	10 ohm-m (0.01s/m)	0.1mrad
Mafic Volcanic	10,000 Ω -m (0.0001 s/m)	5 mrad
Ultramafic Volcanic	7,000 Ω -m	3 mrad
Sedimentary rock	5,000 Ω -m	10 mrad
Rhyolite	1,000 Ω -m (0.001 s/m)	20 mrad
Graphite	10 ohm-m (0.1 s/m)	75 mrad
Massive Sulphide	10 ohm-m (0.1 s/m)	75 mrad

The forward and inverse models were calculated using the UBC DCIP2D platform, using the native QARA array values (Quantec center-pole) with maximum 10% data errors for the voltage and ± 5 mrad error for the chargeability and with initial error floors set to 2% and 1mrad, respectively. In all cases “chi”

was set to 1 and no error weights were used. The starting models for constrained inversions used the reference model extracted from Gocad.

The inversion meshes were constructed using the UBC default, using a width/height ratio of 2, increasing in 10% increments from a minimum of 10m to approx. 300m depths, and in 50% increments to a maximum depth of 1500m. The meshes used a minimum column width of 17m, within the data range, increasing by 50% increments to a maximum distance of approx. 1.5km, laterally, from the ends of the profiles. Identical meshes were used for both the resistivity and associated chargeability models shown.

For each of the line-profiles, constrained inversion models were calculated for both the resistivity and chargeability. In addition, two different models results were derived, for the purposes of comparison, for both the resistivity and chargeability, using contrasting model objective functions –referred to here as either “Sharp” vs. “Smooth” models. The two relate to the “alpha-s” component of the model objective functions used in the inversion, and refer to the degree of adherence of the final model to the reference – with Sharp (large “s” =0.001) being similar and “Smooth” (small “s”= 10^{-7}) not necessarily close to the gocad reference model.

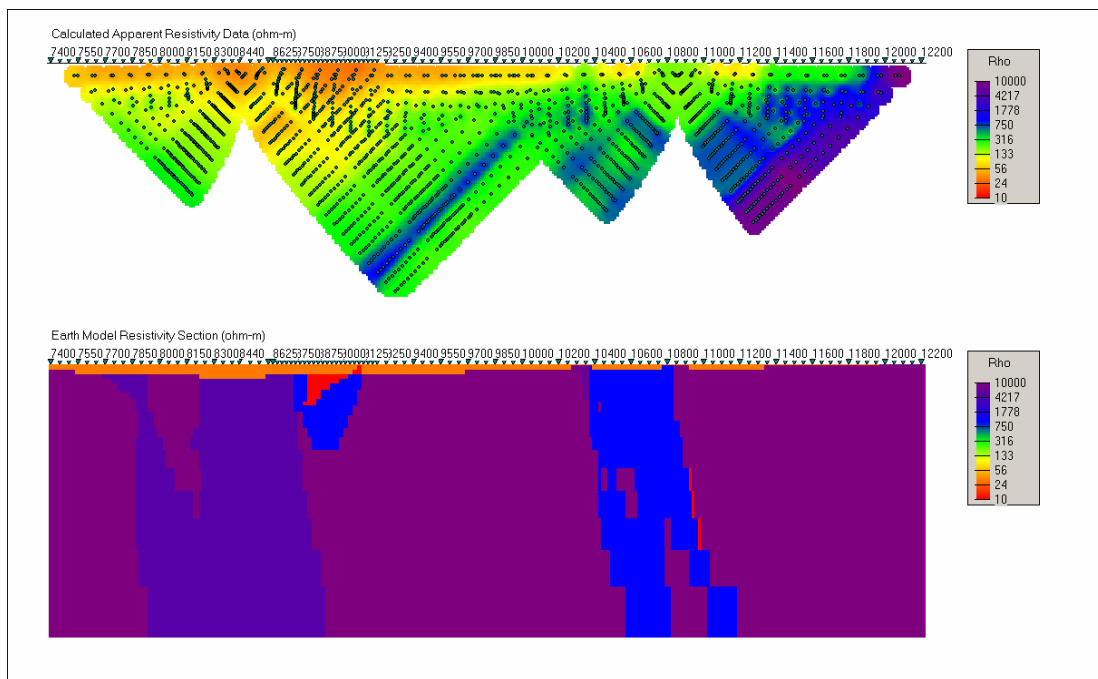
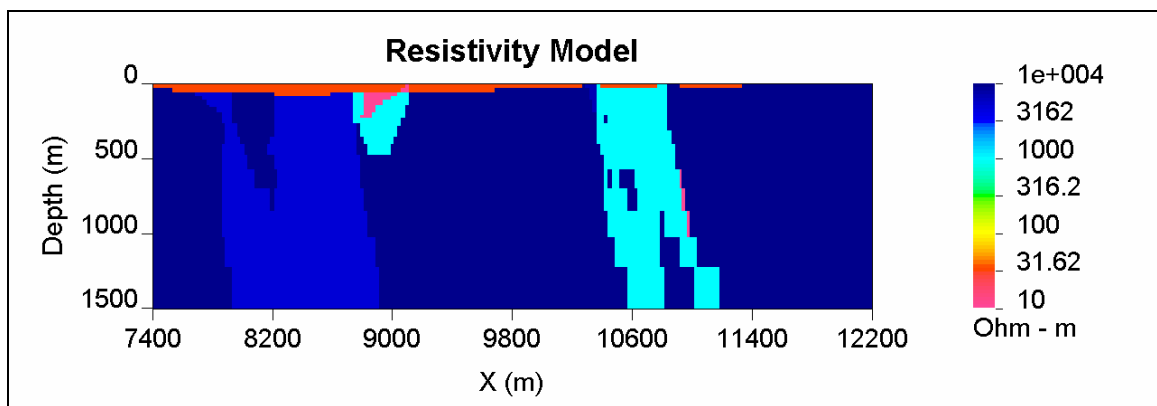
In all cases, a target model misfit equal to the number of points was sought for and obtained – either through progressive increases in the minimum error floor and/or selective data removal (culling), using the Quantec DCIPoutinv.exe program, based on the degree of misfit between the observed data and those predicted in the initial inversion model. The requirements for successful convergence of the resistivity and chargeability inversions are summarized below:

Table B.3: Data Retention & Error Floors Required for Convergence to N-points

<u>DC Resistivity Inversions</u>		
<u>Line</u>	<u>Constrained Sharp</u>	<u>Constrained Smooth</u>
line 10800N	3% floor w. 7x cull	3% floor
	(95% data retained)	(100% data retained)
line 11000N	3% floor w. 15x cull	3% floor w. 12x cull
	(92% data retained)	(95% data retained)
line 11200N	4% floor w. 12xcull	5% floor w. 15x cull
	(92% data retained)	(94% data retained)
line 11400N	5% floor w. 15x cull	5% floor w. 15x cull
	(96% data retained)	(93% data retained)
line 11600N	3% floor w. 57x cull	2% floor w. 12x cull
	(97% data retained)	(98% data retained)
<u>IP Chargeability Inversions</u>		
<u>Line</u>	<u>Constrained Sharp</u>	<u>Constrained Smooth</u>
line 10800N	1.5mr floor / 10x cull	1mr floor / 10x cull
	(all data retained)	(98% data retained)
line 11000N	1mr floor / 16x cull	1mr floor
	(97%data retained)	(all data retained)
line 11200N	1.5mrad floor	1mrad floor
	(all data retained)	(all data retained)
line 11400N	1mr floor / 50x cull	1mrad floor / 50x cull
	(97% data retained)	(98% data retained)
line 11600N	1mrad floor	1mrad floor
	(all data allowed)	(all data allowed)

Line 10800N: Gocad-Constrained Resistivity Model

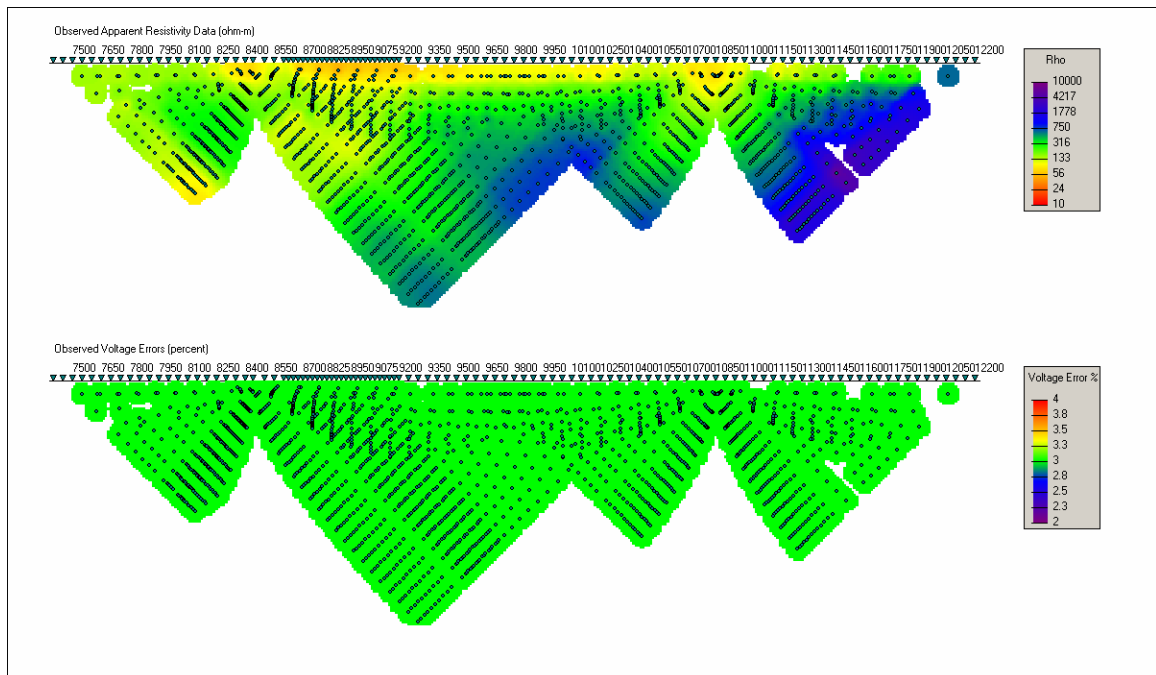
- Mafic volcanic = 10k ohm-m (purple)
- Ultramafic volcanic = 7k ohm-m (navy-blue)
- Sediments = 5k ohm-m (blue)
- Rhyolite = 1000 ohm-m (light blue)
- Overburden = 30 ohm-m (red)
- Graphite/Massive Sulphide = 10 ohm-m (pink)



Line 10800N: UBC 2D Gocad-Constrained Resistivity Forward Model

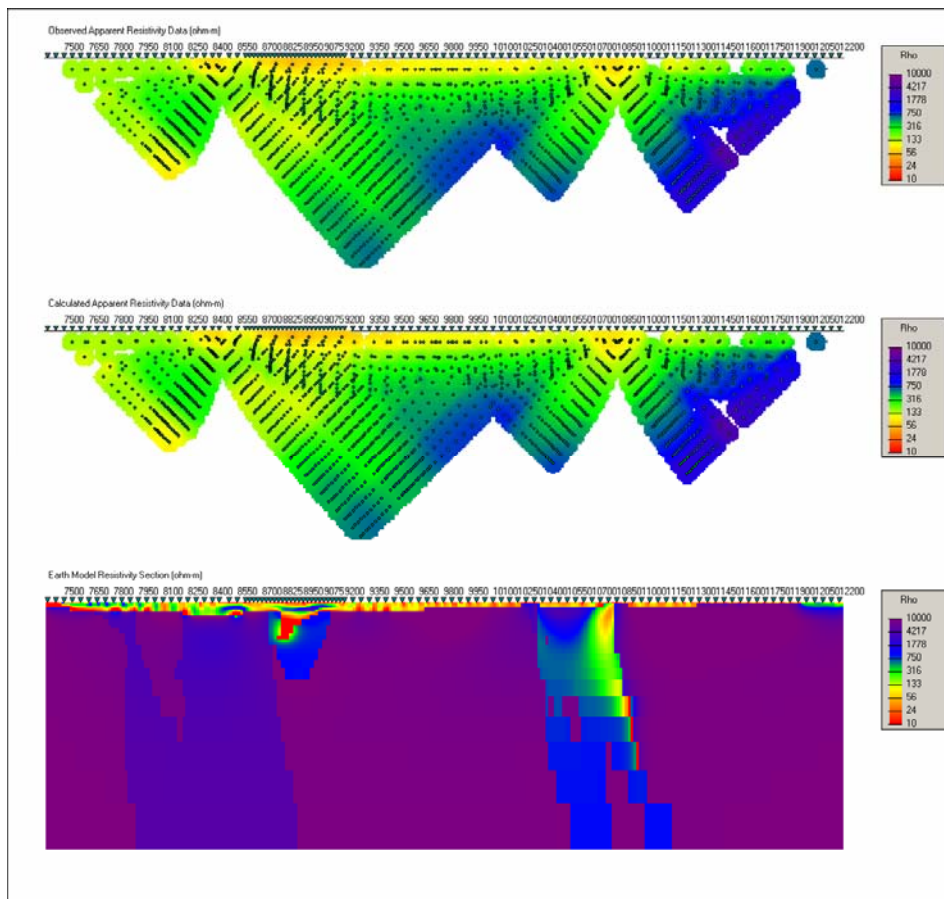
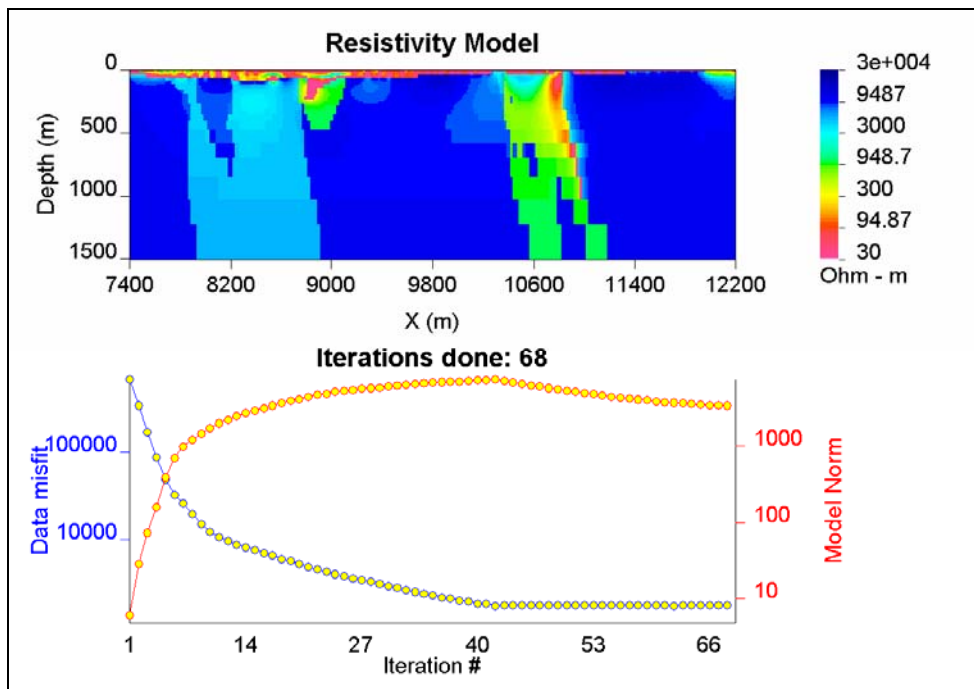
Line 10800N: Final Resistivity Model – Sharp Alphas

- Maximum data error allowed: 10%
- Minimum Error floor applied: 3%
- Error Misfits Removed: 7x (5% total)
- Alpha Parameters: 0.001,1,1
- Model Error Misfit: 1713 for 1713 points (1804 initial), in 68 iterations



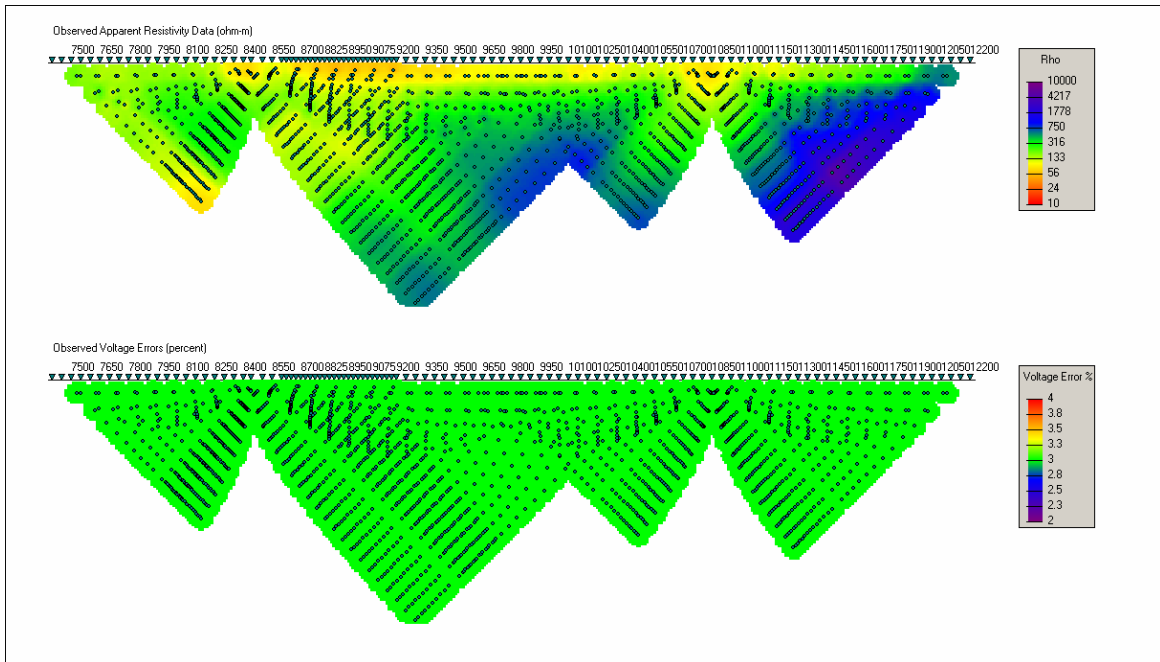
68 iter	data misfit	model norm	multiplier
0	1.40370E+06	0.00000E+00	0.00000E+00
5	4.92074E+04	3.85657E+02	4.57369E+01
10	1.21981E+04	1.71751E+03	8.12090E-02
15	7.53533E+03	2.88878E+03	2.53778E-03
20	5.15505E+03	4.11754E+03	7.93056E-05
25	3.76093E+03	5.31858E+03	9.91321E-06
30	2.87674E+03	6.05467E+03	7.40171E-07
35	2.24624E+03	6.72916E+03	1.45812E-06
40	1.81909E+03	7.25477E+03	2.32948E-06
45	1.71272E+03	6.53028E+03	4.20848E-01
50	1.71298E+03	5.34303E+03	5.83752E-01
55	1.71269E+03	4.45053E+03	8.59958E-01
60	1.71299E+03	3.83488E+03	1.11999E+00
65	1.71292E+03	3.50023E+03	1.26874E+00
67	1.71296E+03	3.41040E+03	1.30228E+00
68	1.71257E+03	3.37690E+03	1.27944E+00

1713 number of data



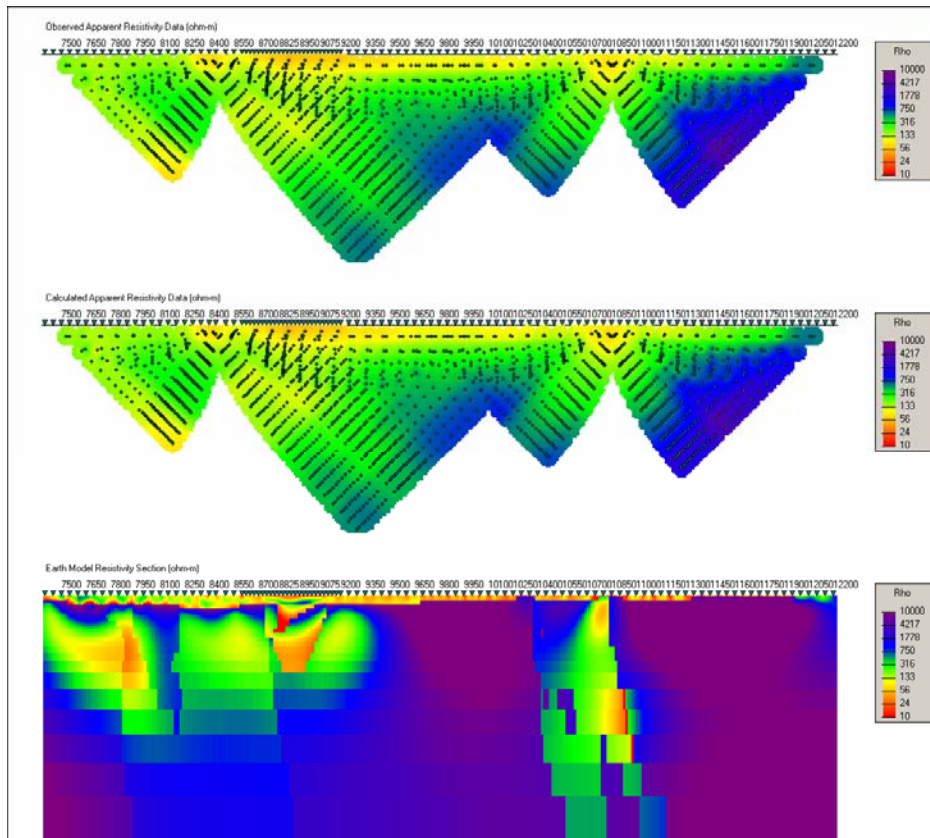
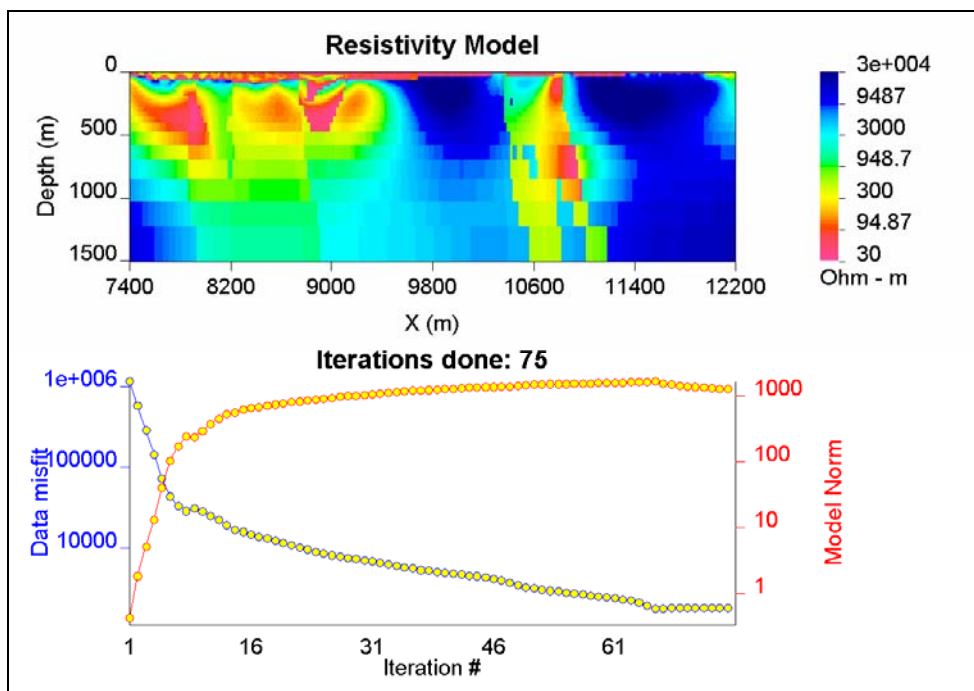
Line 10800N: Final Resistivity Model – Smooth Alphas

- Maximum data error allowed: 10%
- Minimum Error floor applied: 3%
- Error Misfits Removed: No error misfits removed (100% data usage)
- Alpha Parameters: $1e-07$, 1, 1
- Model Error Misfit: 1804 for 1804 points, in 75 iterations



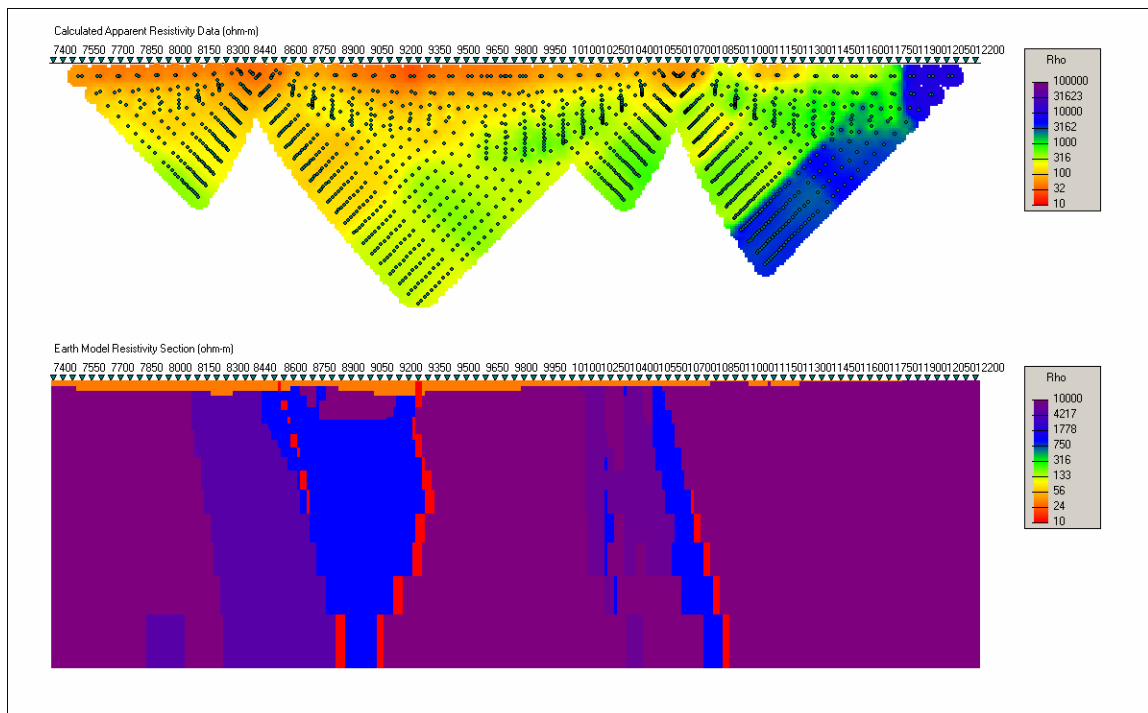
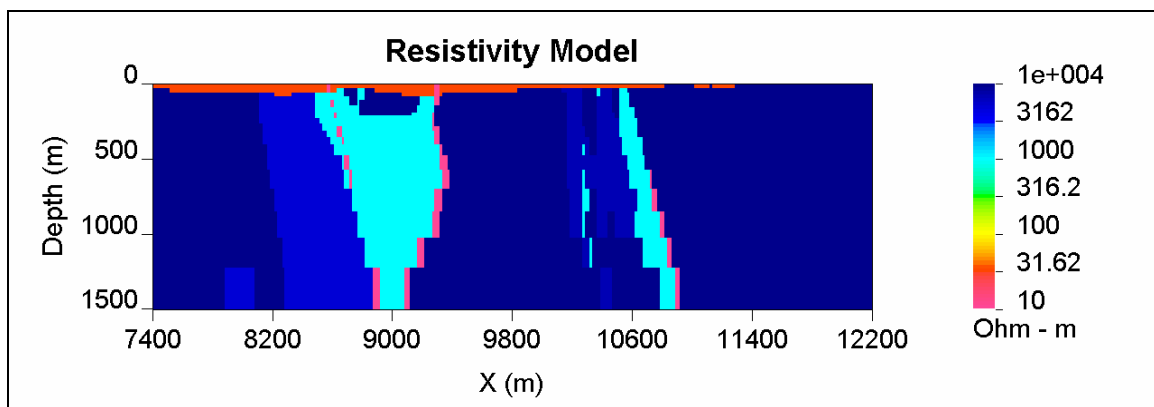
75 iter	data misfit	model norm	multiplier
0	2.33086E+06	0.00000E+00	0.00000E+00
5	7.28483E+04	4.02328E+01	7.53134E+02
10	2.81972E+04	2.95598E+02	5.34896E+00
15	1.58661E+04	6.18289E+02	1.33724E+00
20	1.15990E+04	7.68789E+02	4.17888E-02
25	8.44636E+03	9.10749E+02	1.30590E-03
30	6.97726E+03	1.04533E+03	4.08093E-05
35	5.78890E+03	1.16834E+03	2.55058E-06
40	4.91613E+03	1.27947E+03	6.37646E-07
45	4.29347E+03	1.35926E+03	5.10117E-06
50	3.27930E+03	1.45911E+03	1.32045E-06
55	2.80336E+03	1.53344E+03	7.57461E-07
60	2.44525E+03	1.57955E+03	4.42078E-07
65	1.94253E+03	1.63572E+03	2.16728E-06
70	1.80359E+03	1.39293E+03	4.18921E+00
75	1.80272E+03	1.27683E+03	3.32439E+00

1804 number of data



Line 11000N: Gocad-Constrained Resistivity Model

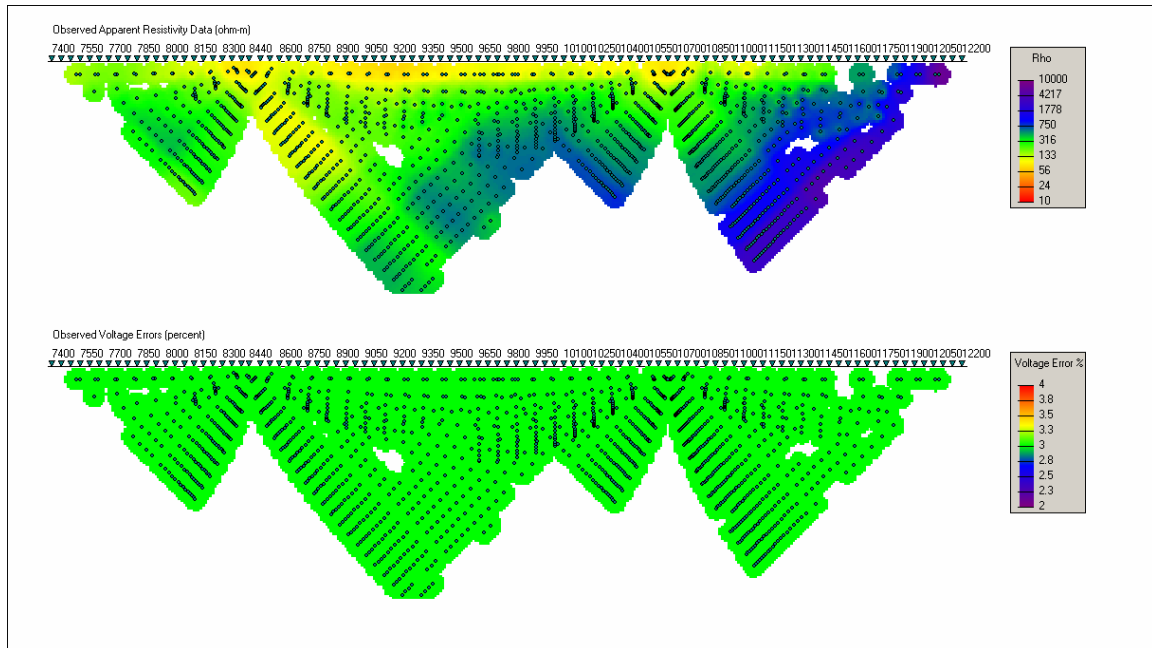
- Mafic volcanic = 10k ohm-m (purple)
- Ultramafic volcanic = 7k ohm-m (navy-blue)
- Sediments = 5k ohm-m (blue)
- Rhyolite = 1000 ohm-m (light blue)
- Overburden = 30 ohm-m (red)
- Graphite/Massive Sulphide = 10 ohm-m (pink)



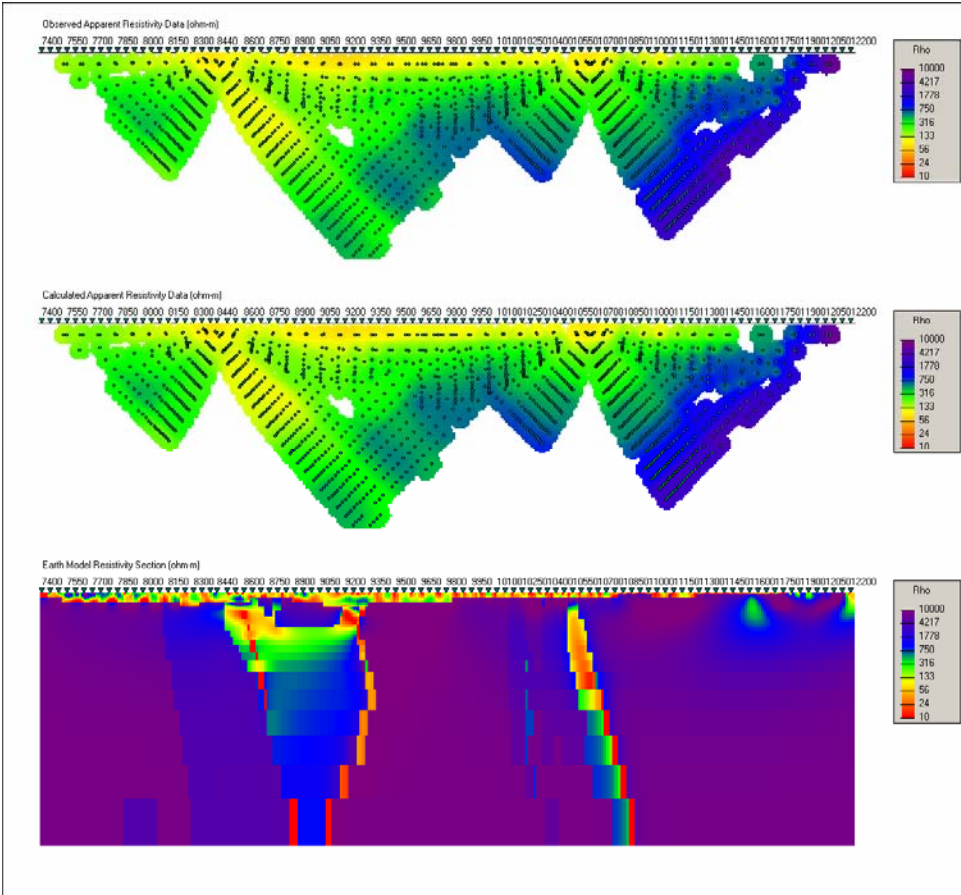
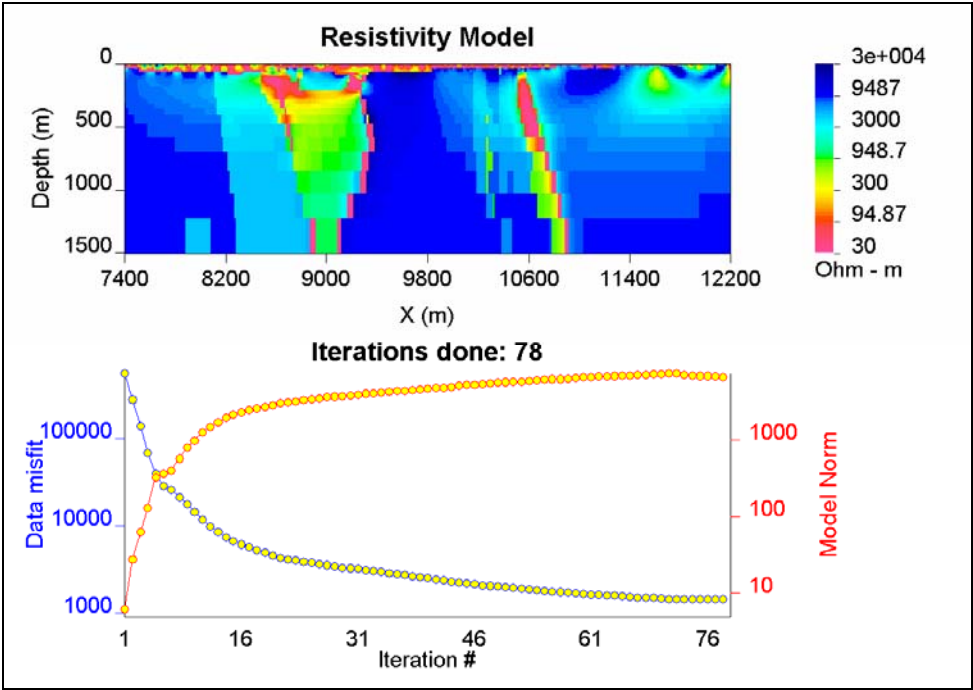
Line 11000N: UBC 2D Gocad-Constrained Resistivity Forward Model

Line 11000N: Final Resistivity Model – Sharp Alphas

- Maximum data error allowed: 10%
- Minimum Error floor applied: 3%
- Error Misfits Removed: 10x (8% total)
- Alpha Parameters: 0.001,1,1
- Model Error Misfit: 1459 for 1459 points (1594 initial), in 78 iterations

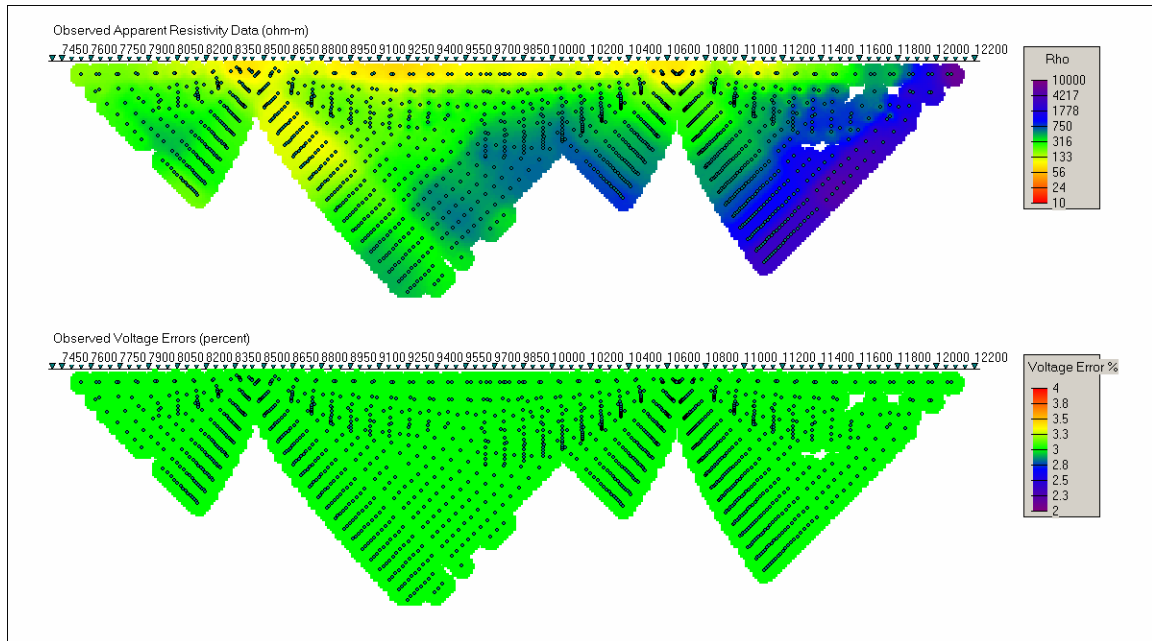


78 iter	data misfit	model norm	multiplier
0	1.10041E+06	0.00000E+00	0.00000E+00
5	3.99538E+04	3.26534E+02	4.02793E+01
10	1.44593E+04	9.94134E+02	2.51746E+00
15	6.71898E+03	2.13004E+03	7.86706E-02
20	4.59309E+03	2.86150E+03	2.45845E-03
25	3.79445E+03	3.39375E+03	7.68267E-05
30	3.29532E+03	3.84165E+03	2.40083E-06
35	2.90807E+03	4.23123E+03	6.00209E-07
40	2.54292E+03	4.66673E+03	3.96366E-07
45	2.21713E+03	5.17394E+03	5.27231E-07
50	1.99931E+03	5.67226E+03	1.62085E-07
54	1.85661E+03	6.03920E+03	8.22387E-07
55	1.82369E+03	6.12922E+03	6.46267E-07
60	1.68112E+03	6.55344E+03	2.50776E-07
65	1.56713E+03	6.92117E+03	2.84338E-07
70	1.47853E+03	7.26138E+03	1.80178E-06
75	1.45879E+03	6.90215E+03	2.01799E-01
1459 number of data			

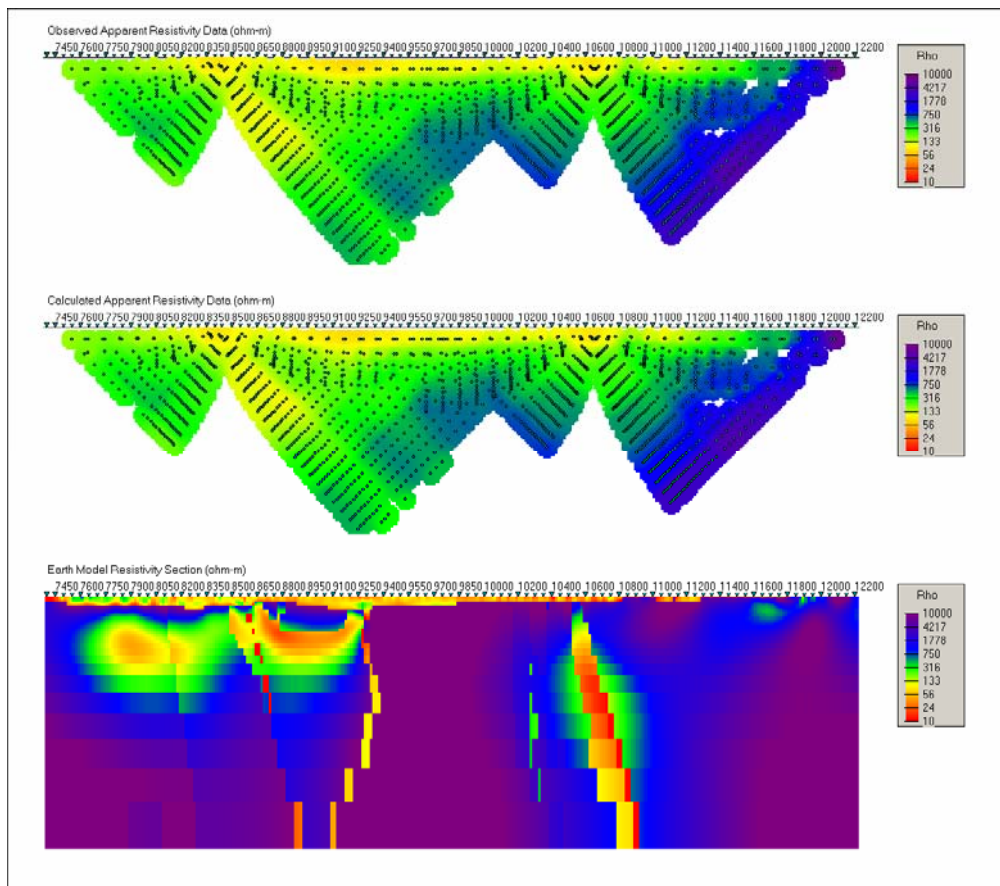
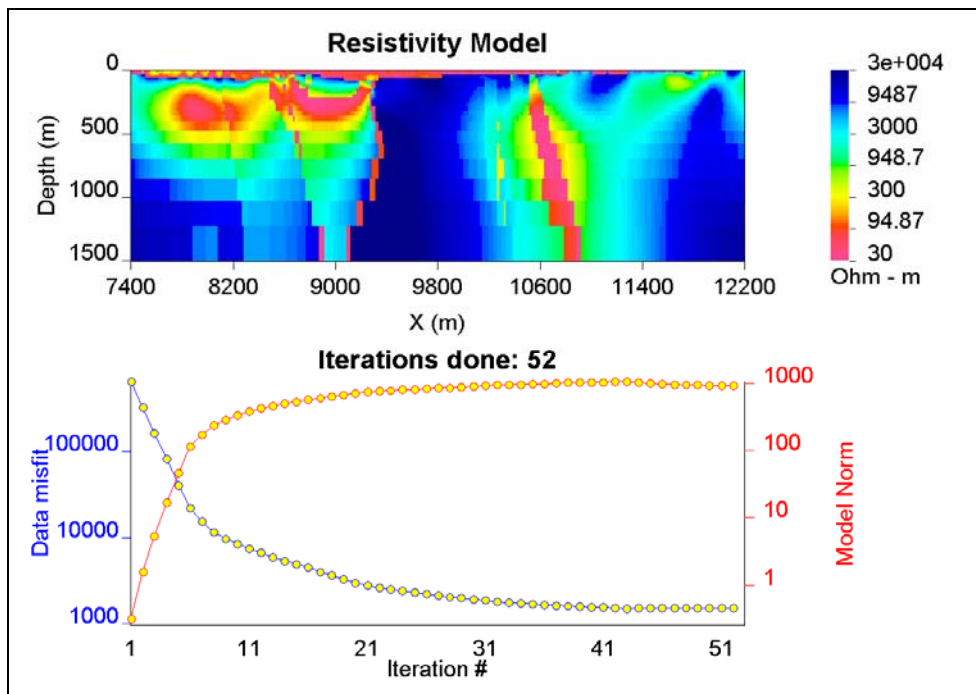


Line 11000N: Final Resistivity Model – Smooth Alphas

- Maximum Data error allowed: 10%
- Minimum Error floor applied: 3%
- Error Misfits Removed: Error misfits >12x removed (5% total)
- Alpha Parameters: 1e-07,1,1
- Model Error Misfit: 1518 for 1518 points (1594 initial), in 52 iterations

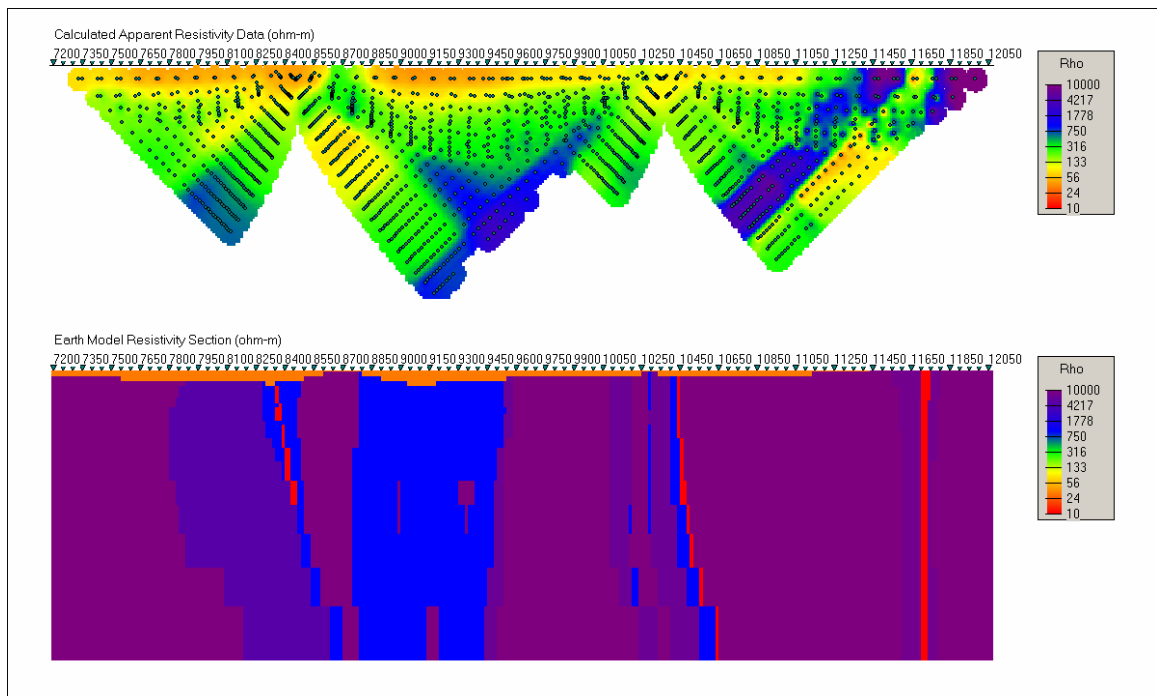
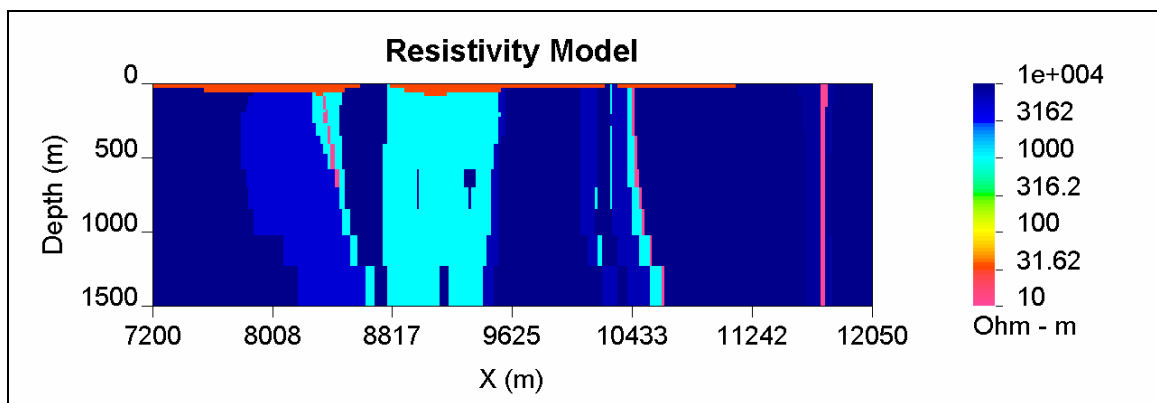


52 iter	data misfit	model norm	multiplier
0	1.29397E+06	0.00000E+00	0.00000E+00
5	4.04320E+04	4.63054E+01	4.83068E+02
10	8.42970E+03	3.35891E+02	7.79745E-01
15	4.91730E+03	5.33009E+02	2.43670E-02
20	2.99482E+03	7.05389E+02	7.61470E-04
25	2.29185E+03	8.12828E+02	4.77420E-05
30	1.91659E+03	8.92611E+02	8.88888E-06
35	1.68793E+03	9.67262E+02	7.33188E-06
40	1.55969E+03	1.02850E+03	2.03183E-05
45	1.51795E+03	9.85089E+02	1.59826E+00
46	1.51780E+03	9.66994E+02	1.48407E+00
47	1.51793E+03	9.52793E+02	1.44141E+00
48	1.51800E+03	9.41194E+02	1.51366E+00
49	1.51781E+03	9.30487E+02	1.52355E+00
50	1.51800E+03	9.21022E+02	1.60880E+00
51	1.51791E+03	9.11756E+02	1.61354E+00
52	1.51798E+03	9.03920E+02	1.70367E+00
1518 number of data			



Line 11200N: Gocad-Constrained Resistivity Model

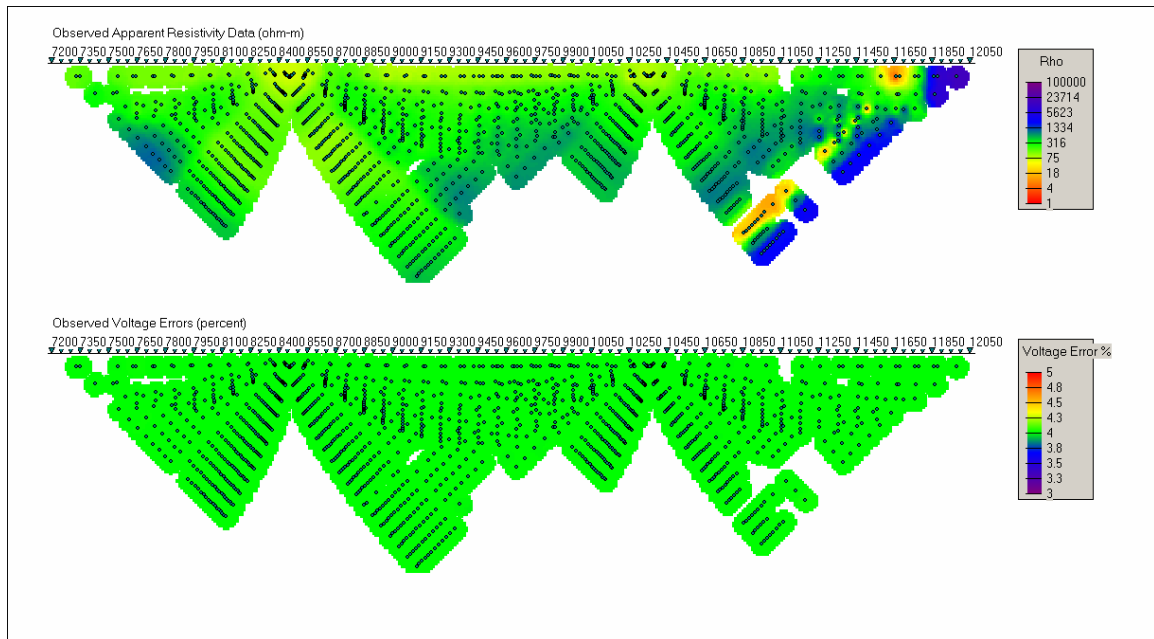
- Mafic volcanic = 10k ohm-m (purple)
- Ultramafic volcanic = 7k ohm-m (navy-blue)
- Sediments = 5k ohm-m (blue)
- Rhyolite = 1000 ohm-m (light blue)
- Overburden = 30 ohm-m (red)
- Graphite/Massive Sulphide = 10 ohm-m (pink)



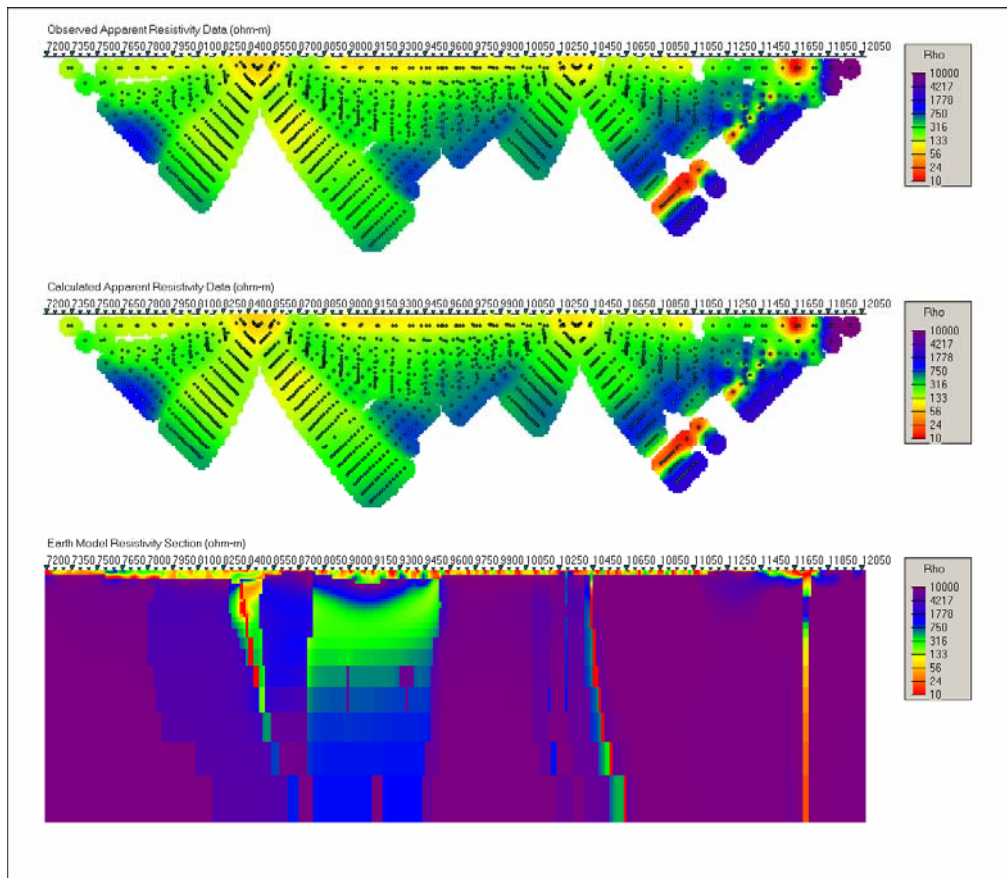
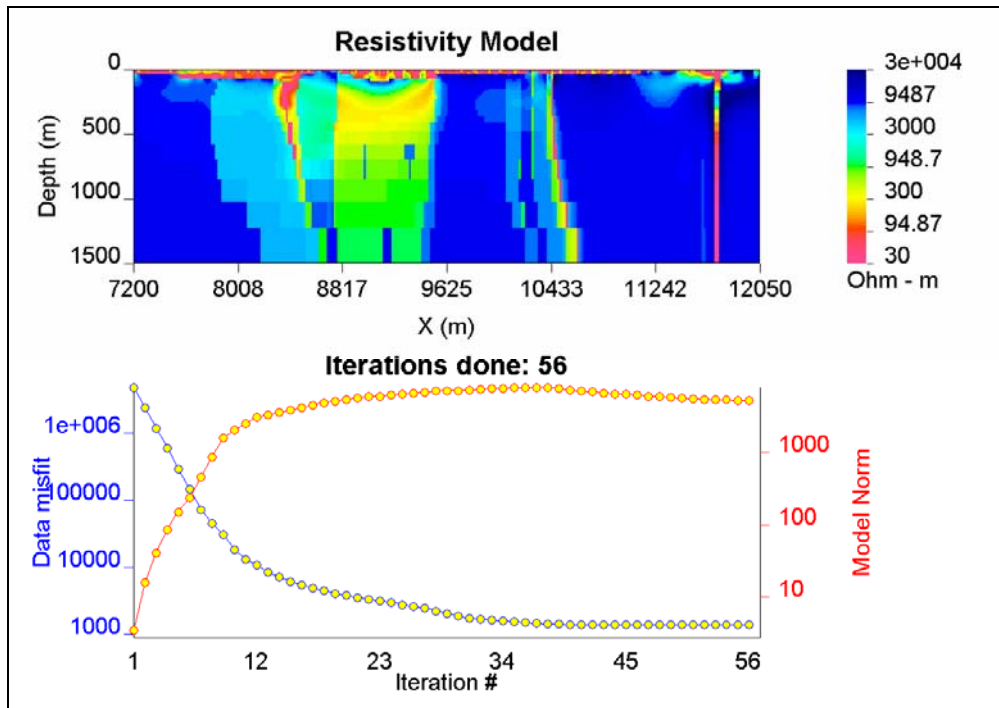
Line 11200N: UBC 2D Gocad-Constrained Resistivity Fwd Model

Line 11200N: Final Resistivity Model – Sharp Alphas

- Maximum data error allowed: 10%
- Minimum Error floor applied: 4%
- Error Misfits Removed: 12x (10% total)
- Alpha Parameters: 0.001,1,1
- Model Error Misfit: 1415 for 1415 points (1571 initial), in 56 iterations

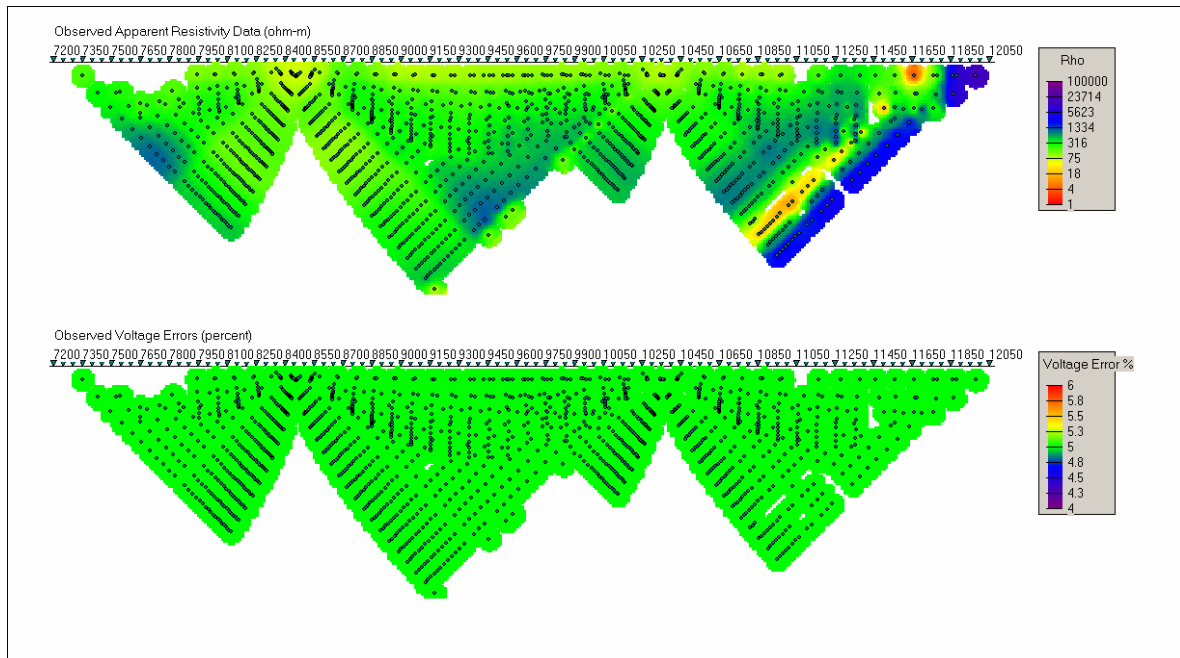


56 iter	data misfit	model norm	multiplier
0	9.80504E+06	0.00000E+00	0.00000E+00
5	3.00475E+05	1.51525E+02	2.81906E+03
10	1.85413E+04	2.04912E+03	6.28461E-01
15	6.25667E+03	3.91583E+03	1.96394E-02
20	3.81884E+03	5.40674E+03	6.13731E-04
25	2.80585E+03	6.44336E+03	1.91791E-05
30	1.89616E+03	7.25758E+03	1.26637E-06
35	1.55197E+03	7.75063E+03	7.90185E-06
40	1.41477E+03	7.36392E+03	2.15129E-01
45	1.41221E+03	6.36813E+03	3.05273E-01
50	1.41500E+03	5.68278E+03	4.59381E-01
52	1.41495E+03	5.48548E+03	5.02125E-01
53	1.41497E+03	5.39306E+03	5.00255E-01
54	1.41500E+03	5.33291E+03	5.36970E-01
55	1.41488E+03	5.27173E+03	5.28617E-01
56	1.41495E+03	5.22070E+03	5.65240E-01
1415 number of data			



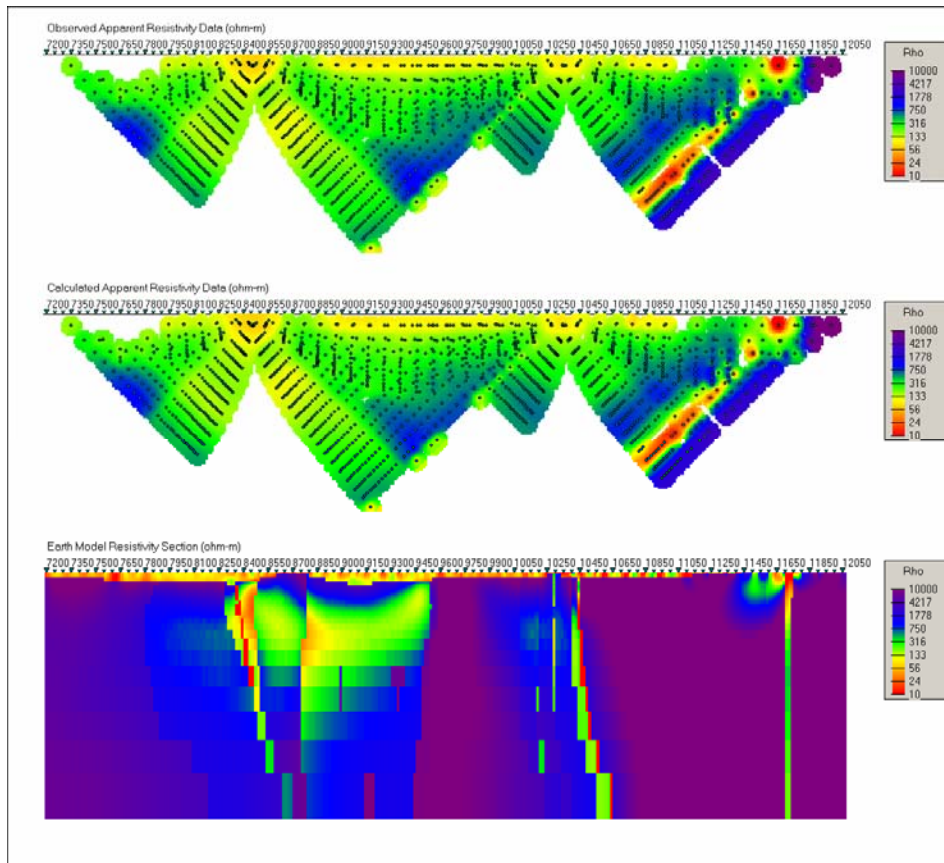
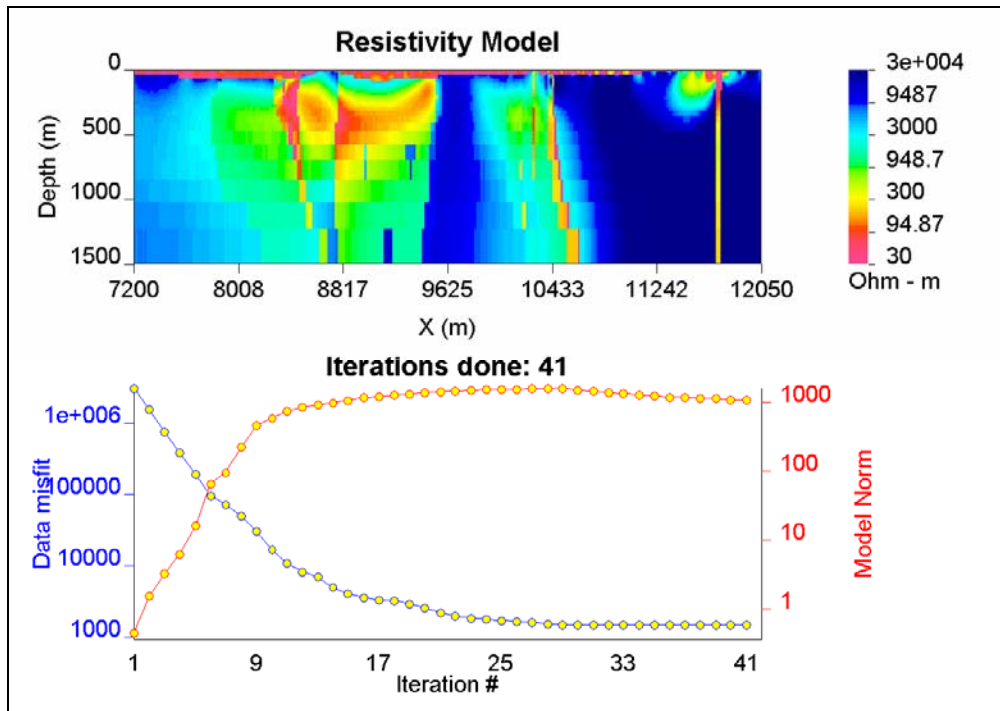
Line 11200N: Final Resistivity Model – Smooth Alphas

- Maximum data error allowed: 10%
- Minimum Error floor applied: 5%
- Error Misfits Removed: Error misfits >15x removed (6% total)
- Alpha Parameters: 1e-07,1,1
- Model Error Misfit: 1464 for 1464 points (1571 initial), in 51 iterations



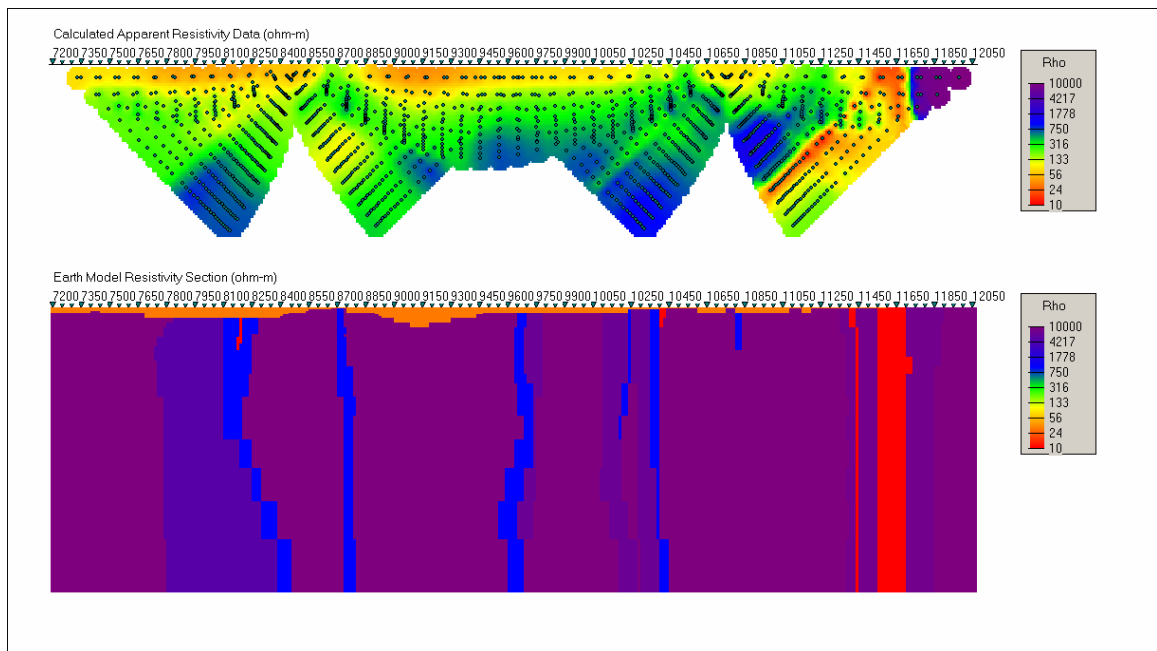
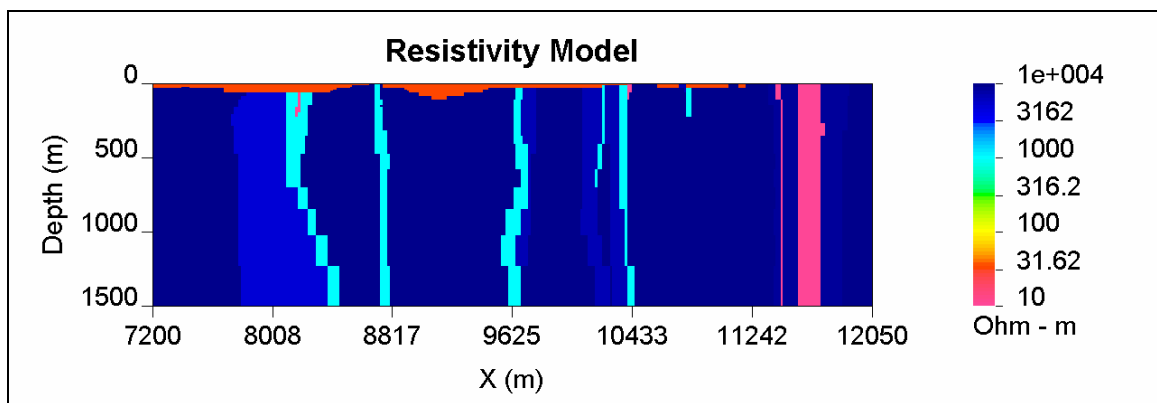
41 iter	data misfit	model norm	multiplier
0	6.22354E+06	0.00000E+00	0.00000E+00
5	1.91382E+05	1.61014E+01	3.97551E+03
10	1.68060E+04	5.89864E+02	7.20734E-01
15	4.02855E+03	1.06022E+03	2.25229E-02
20	2.53353E+03	1.36709E+03	7.06185E-04
25	1.70572E+03	1.50302E+03	1.37686E-01
30	1.45948E+03	1.46805E+03	1.01111E+00
33	1.46255E+03	1.32437E+03	1.00231E+00
34	1.45712E+03	1.26205E+03	1.43274E+00
35	1.46295E+03	1.22700E+03	1.26455E+00
36	1.46319E+03	1.18089E+03	1.54319E+00
37	1.46276E+03	1.16381E+03	1.26455E+00
38	1.46331E+03	1.12906E+03	1.52926E+00
39	1.46290E+03	1.11421E+03	1.34135E+00
40	1.46357E+03	1.08625E+03	1.59261E+00
41	1.46292E+03	1.08354E+03	1.18147E+00

1464 number of data



Line 11400N: Gocad-Constrained Resistivity Model

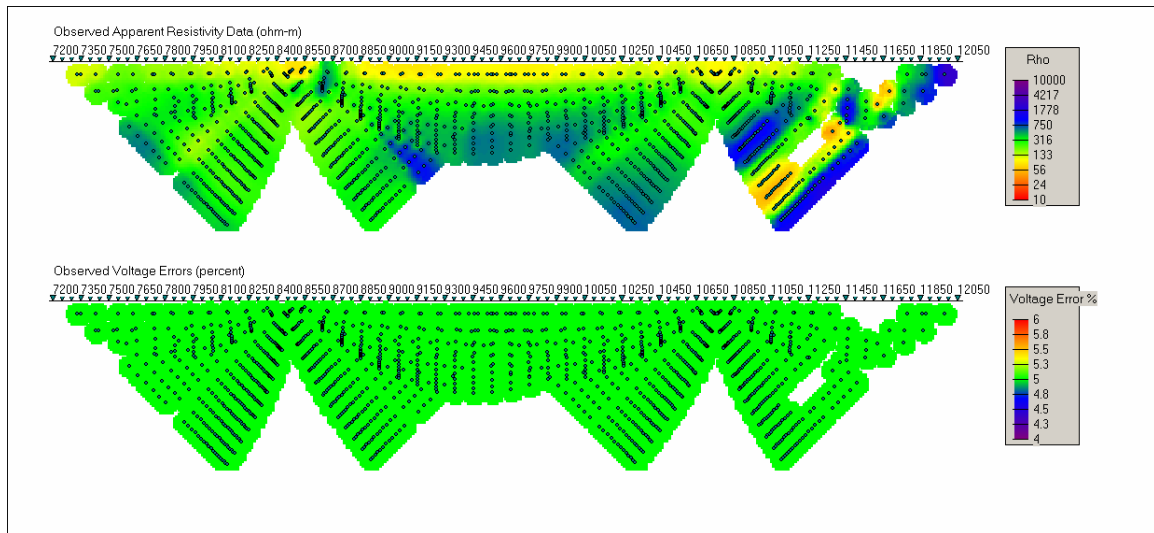
- Mafic volcanic = 10k ohm-m (purple)
- Ultramafic volcanic = 7k ohm-m (navy-blue)
- Sediments = 5k ohm-m (blue)
- Rhyolite = 1000 ohm-m (light blue)
- Overburden = 30 ohm-m (red)
- Graphite/Massive Sulphide = 10 ohm-m (pink)



Line 11400N: UBC 2D Gocad-Constrained Resistivity Fwd Model

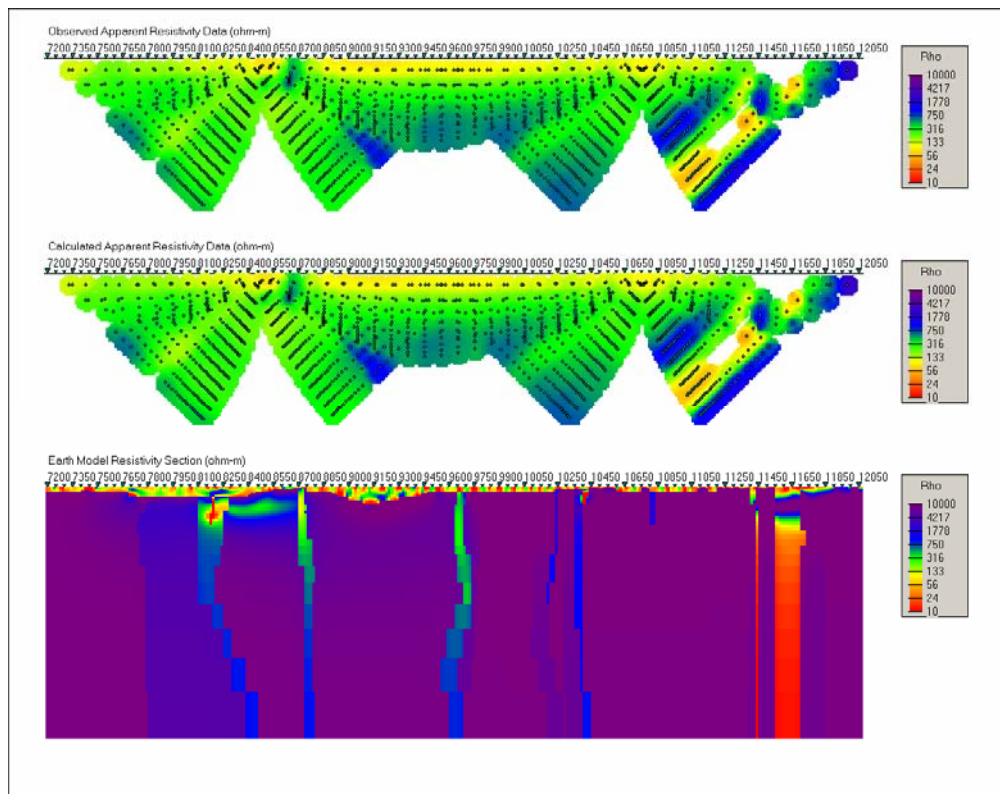
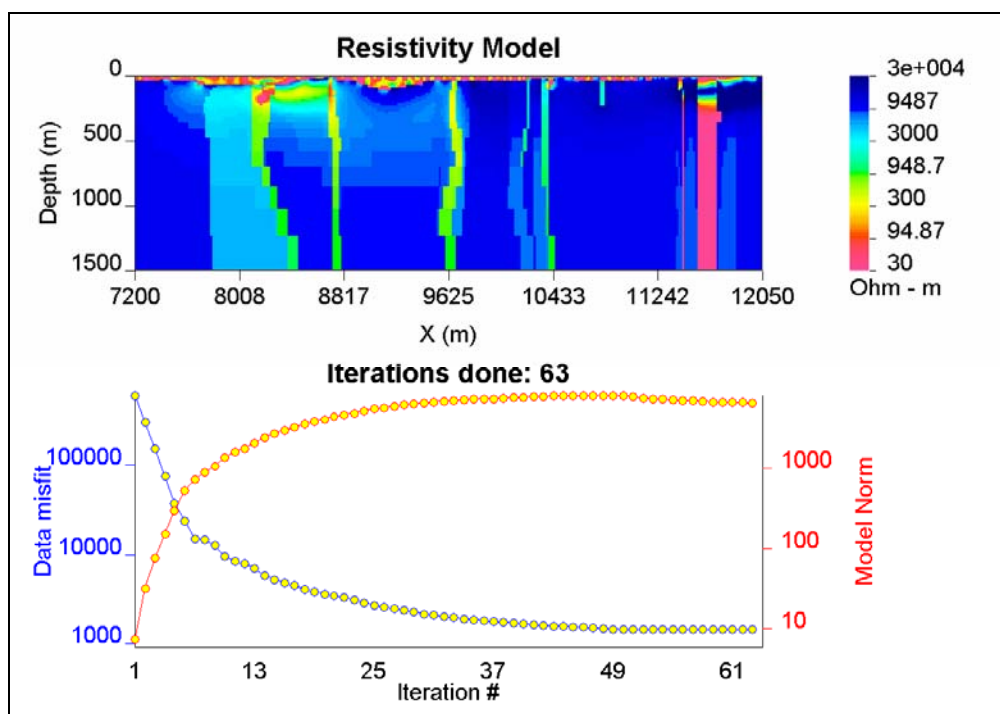
Line 11400N: Final Resistivity Model – Sharp Alphas

- Maximum data error allowed: 10%
- Minimum Error floor applied: 5%
- Error Misfits Removed: 15x (6% total)
- Alpha Parameters: 0.001,1,1
- Model Error Misfit: 1434 for 1434 points (1522 initial), in 63 iterations



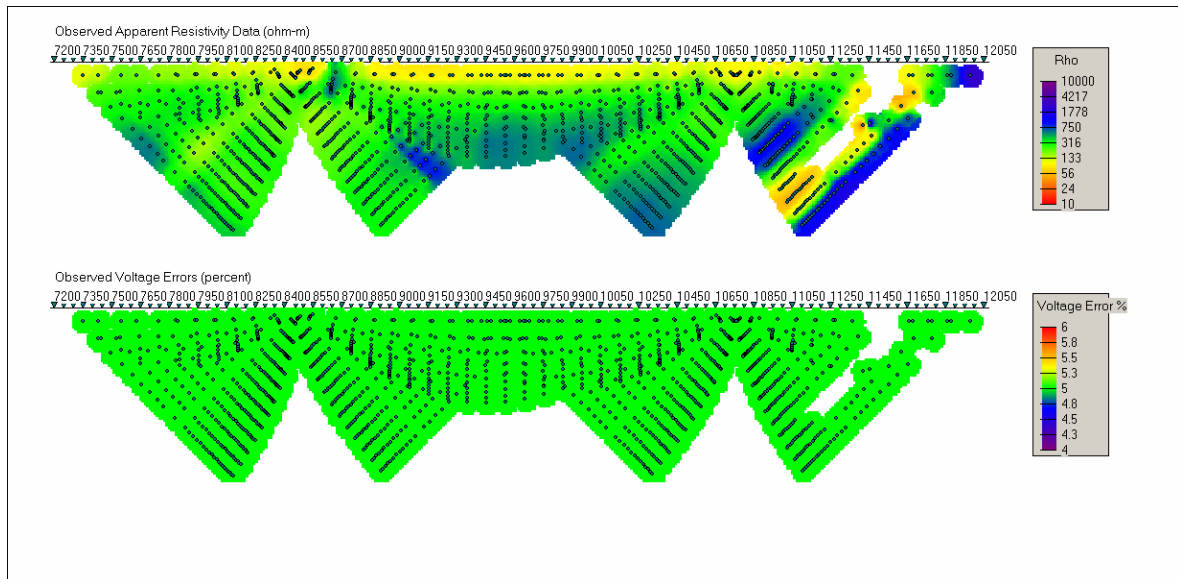
63 iter	data misfit	model norm	multiplier
0	1.23180E+06	0.00000E+00	0.00000E+00
5	3.81103E+04	2.91886E+02	9.99488E+01
10	9.41664E+03	1.33149E+03	7.80850E-01
15	5.22262E+03	2.65309E+03	9.76062E-02
20	3.60615E+03	4.00135E+03	3.05019E-03
25	2.70231E+03	5.34601E+03	2.44016E-02
30	2.15502E+03	6.35510E+03	1.64753E-03
35	1.83980E+03	7.08250E+03	2.46122E-03
40	1.65886E+03	7.45780E+03	1.40220E-02
45	1.53027E+03	7.72754E+03	3.19798E-02
50	1.43394E+03	7.76913E+03	1.40422E-01
55	1.43361E+03	6.92317E+03	3.35604E-01
56	1.43398E+03	6.83332E+03	3.56974E-01
57	1.43391E+03	6.74880E+03	3.51648E-01
58	1.43399E+03	6.67373E+03	3.67983E-01
59	1.43400E+03	6.60501E+03	3.69968E-01
60	1.43296E+03	6.53319E+03	3.76278E-01
61	1.43400E+03	6.46603E+03	3.89568E-01
62	1.43400E+03	6.39551E+03	3.99443E-01
63	1.43400E+03	6.33273E+03	4.12855E-01

1434 number of data



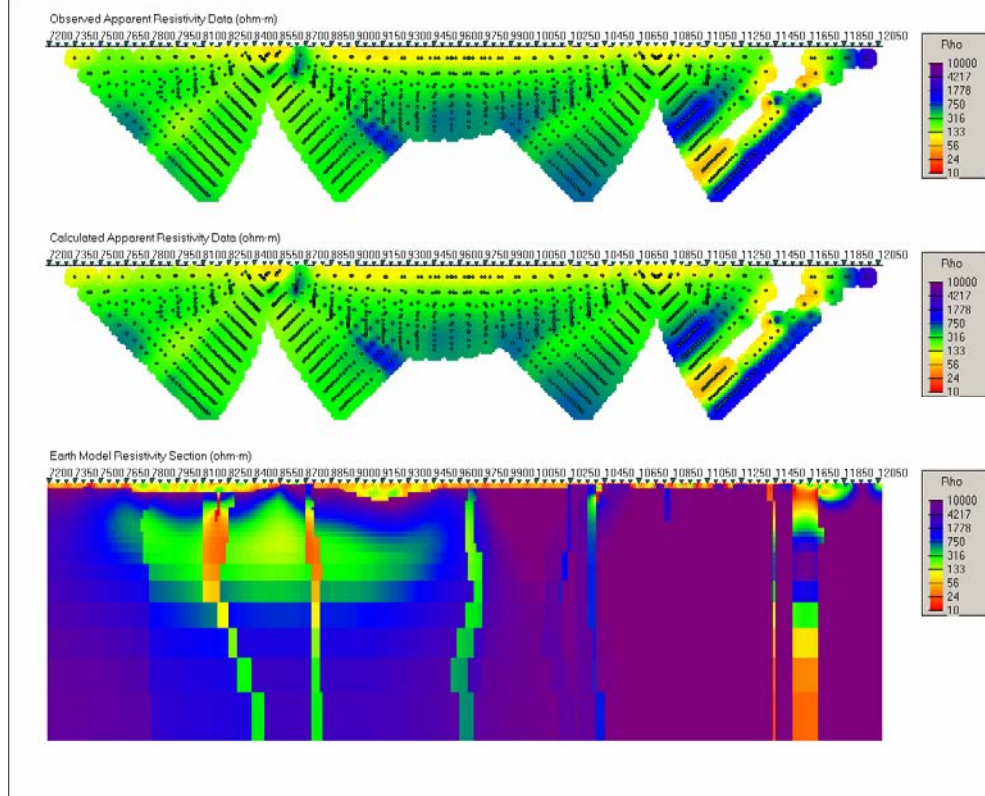
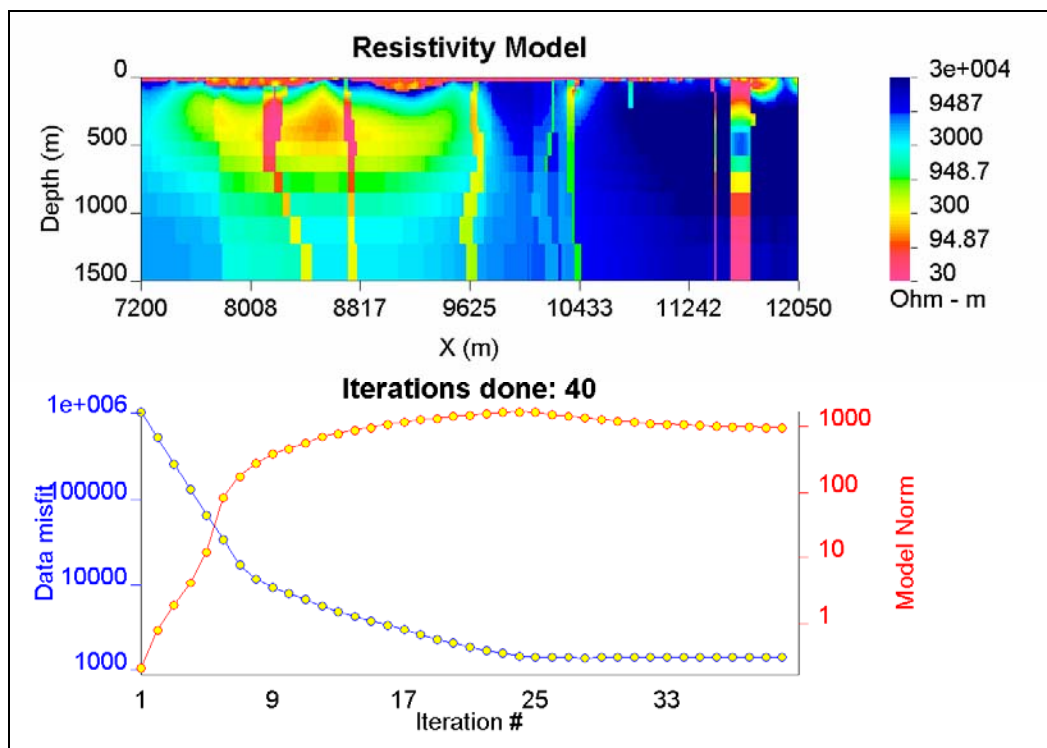
Line 11400N: Final Resistivity Model – Smooth Alphas

- Maximum Data error allowed: 10%
- Minimum Error floor applied: 5%
- Error Misfits Removed: Error misfits >15x removed (7% total)
- Alpha Parameters: 1e-07,1,1
- Model Error Misfit: 1418 for 1421 points (1522 initial), in 40 iterations



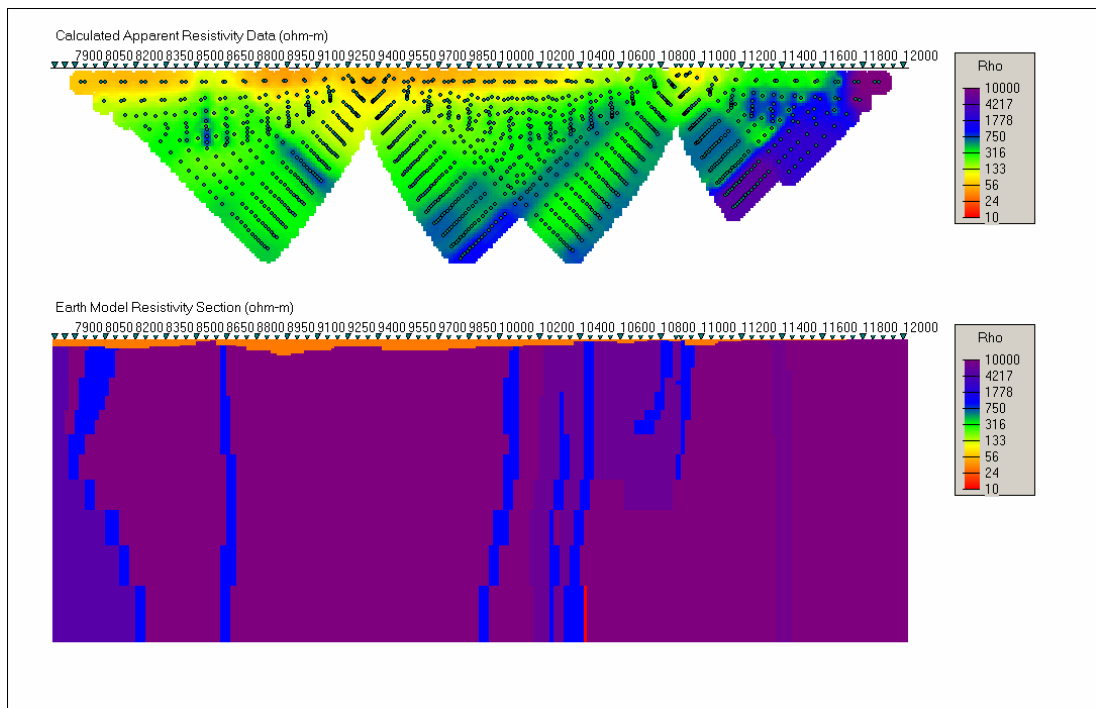
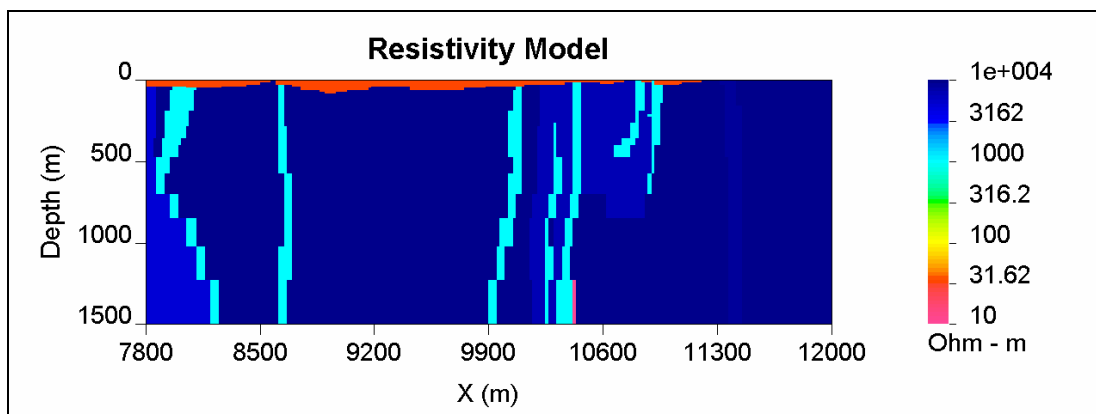
40 iter	data misfit	model norm	multiplier
0	2.08788E+06	0.00000E+00	0.00000E+00
5	6.50153E+04	1.23046E+01	2.30847E+03
10	7.86621E+03	4.62590E+02	1.76736E+00
15	3.80255E+03	9.80331E+02	5.52299E-02
20	2.09522E+03	1.42847E+03	1.47276E-01
25	1.42082E+03	1.67088E+03	3.79831E-01
29	1.41829E+03	1.29530E+03	1.73946E+00
30	1.42099E+03	1.22301E+03	1.84175E+00
31	1.42100E+03	1.17749E+03	1.96410E+00
32	1.41609E+03	1.12453E+03	2.07708E+00
33	1.42099E+03	1.09376E+03	2.18992E+00
34	1.42066E+03	1.05950E+03	2.32647E+00
35	1.42100E+03	1.03623E+03	2.43339E+00
36	1.42100E+03	1.01748E+03	2.47565E+00
37	1.41870E+03	1.00287E+03	2.53651E+00
38	1.42099E+03	9.90669E+02	2.69472E+00
39	1.42100E+03	9.79651E+02	2.72744E+00
40	1.41754E+03	9.72670E+02	2.82083E+00

1421 number of data



Line 11600N: Gocad-Constrained Resistivity Model

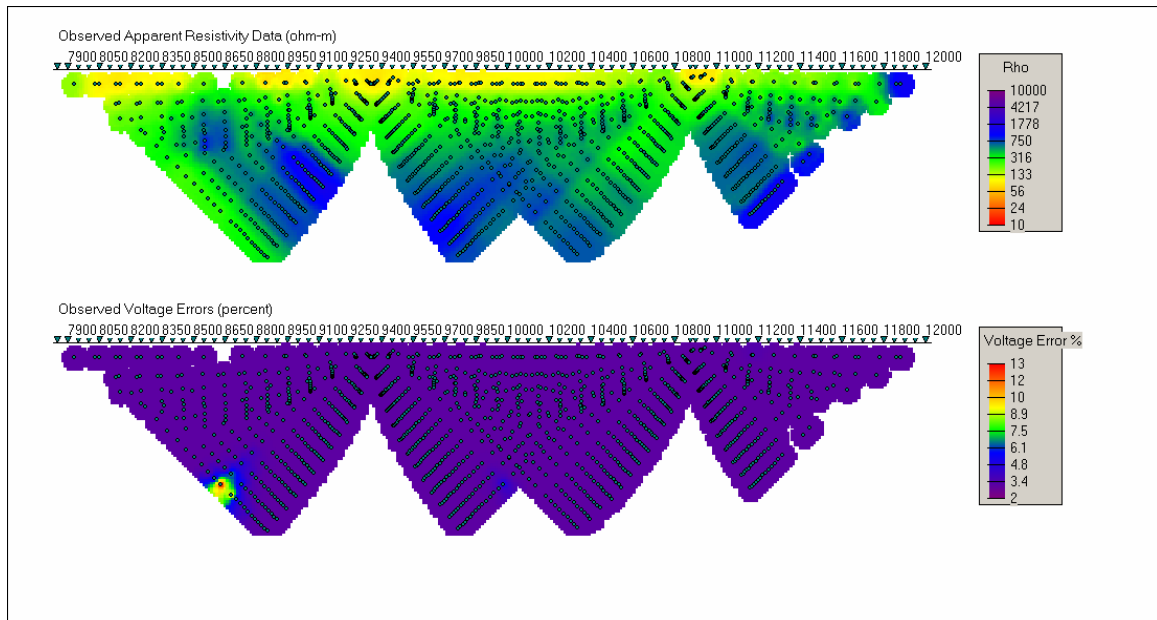
- Mafic volcanic = 10k ohm-m (purple)
- Ultramafic volcanic = 7k ohm-m (navy-blue)
- Sediments = 5k ohm-m (blue)
- Rhyolite = 1000 ohm-m (light blue)
- Overburden = 30 ohm-m (red)
- Graphite/Massive Sulphide = 10 ohm-m (pink)



Line 11600N: UBC 2D Gocad-Constrained Resistivity Fwd Model

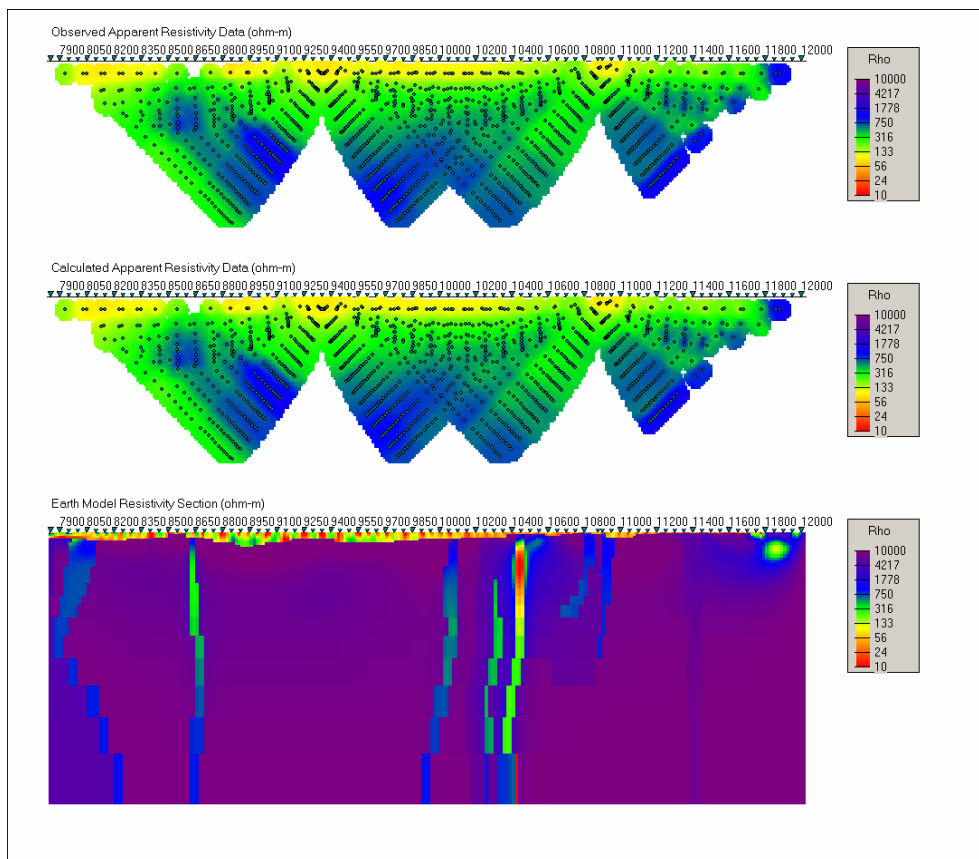
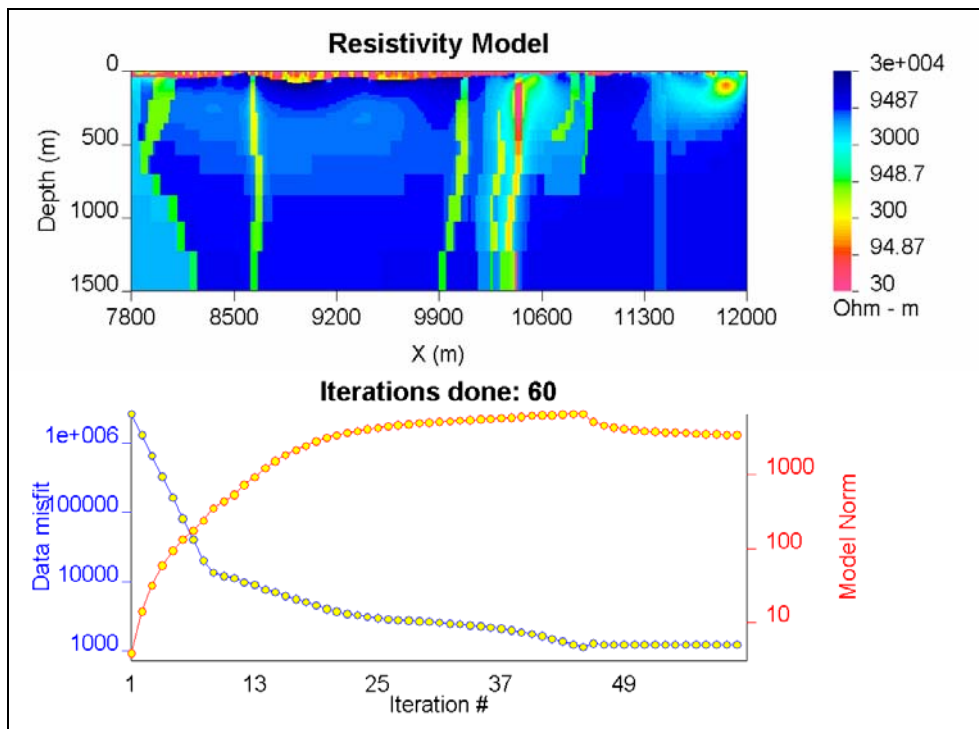
Line 11600N: Final Resistivity Model – Sharp Alphas

- Maximum data error allowed: 10%
- Minimum Error floor applied: 3%
- Error Misfits Removed: 5x (3% total)
- Alpha Parameters: 0.001,1,1
- Model Error Misfit: 1215 for 1215 points (1257 initial), in 50 iterations



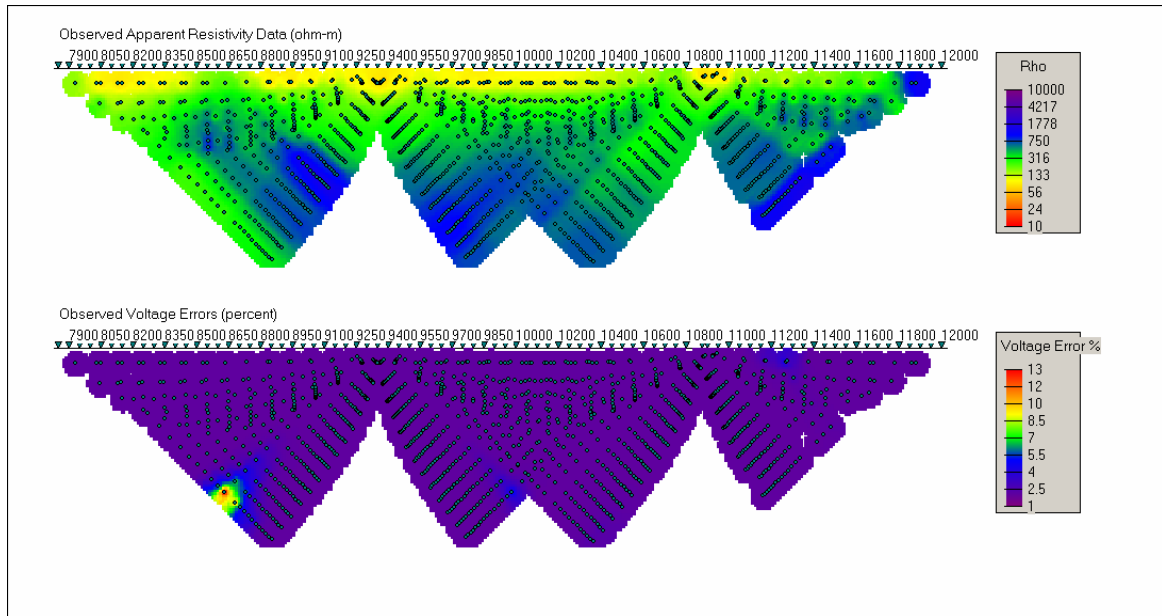
60 iter	data misfit	model norm	multiplier
0	5.33380E+06	0.00000E+00	0.00000E+00
5	1.64335E+05	9.28544E+01	3.19216E+03
10	1.19517E+04	4.37001E+02	3.33746E+00
15	7.08188E+03	1.54256E+03	2.08592E-01
20	3.98656E+03	3.19063E+03	6.51849E-03
25	2.94692E+03	4.42121E+03	2.03703E-04
30	2.60678E+03	5.20041E+03	1.27314E-05
35	2.26319E+03	5.80356E+03	1.66906E-06
40	1.74280E+03	6.42354E+03	4.68602E-07
45	1.13495E+03	6.84711E+03	9.14208E-04
50	1.21493E+03	4.12271E+03	6.41257E-01
55	1.21500E+03	3.73983E+03	7.13877E-01
56	1.21385E+03	3.69491E+03	7.18618E-01
57	1.21498E+03	3.63750E+03	7.56990E-01
58	1.21496E+03	3.59907E+03	7.55218E-01
59	1.21483E+03	3.55121E+03	7.47096E-01
60	1.21500E+03	3.51764E+03	7.75559E-01

1215 number of data



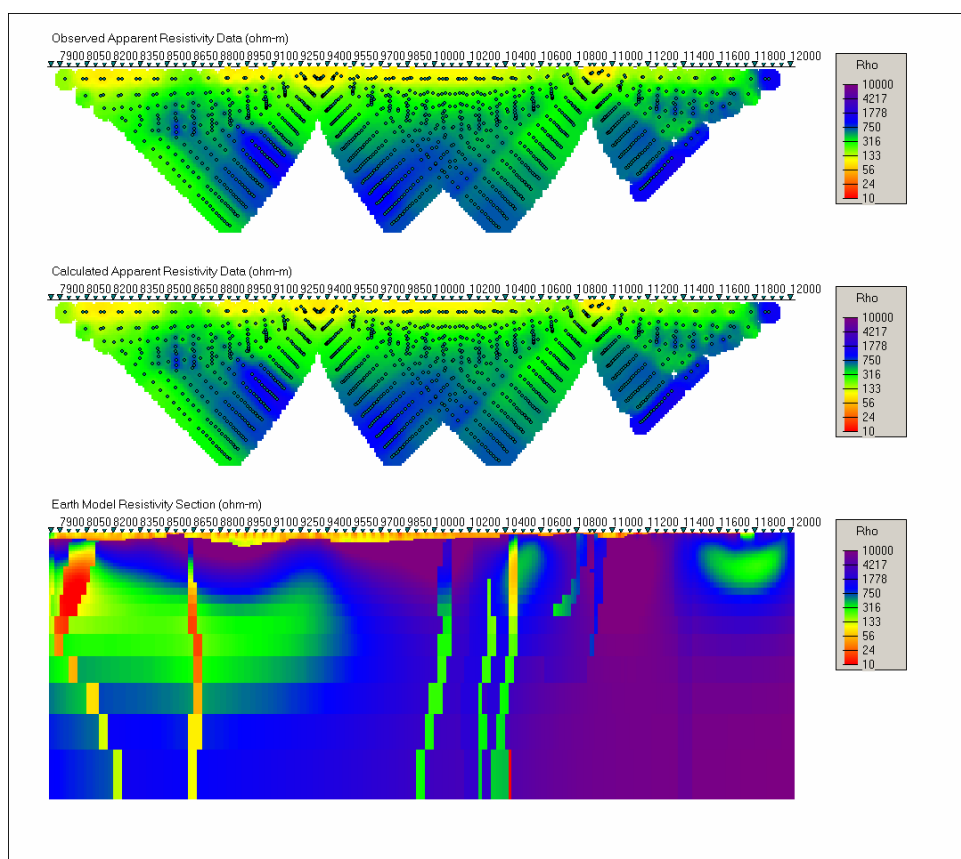
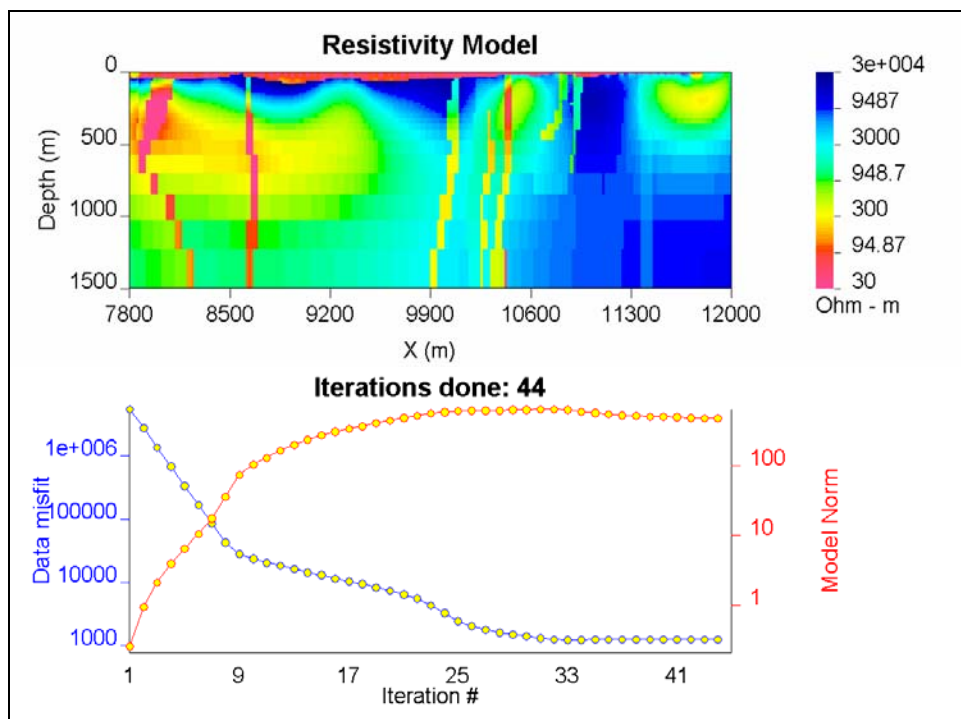
Line 11600N: Final Resistivity Model – Smooth Alphas

- Maximum data error allowed: 20%
- Error floor: 2%
- Error Misfits Removed: 12x removed (2% total)
- Alpha Parameters: 0,1,1
- Model Error Misfit: 1240 for 1240 points (1257 initial), in 44 iterations



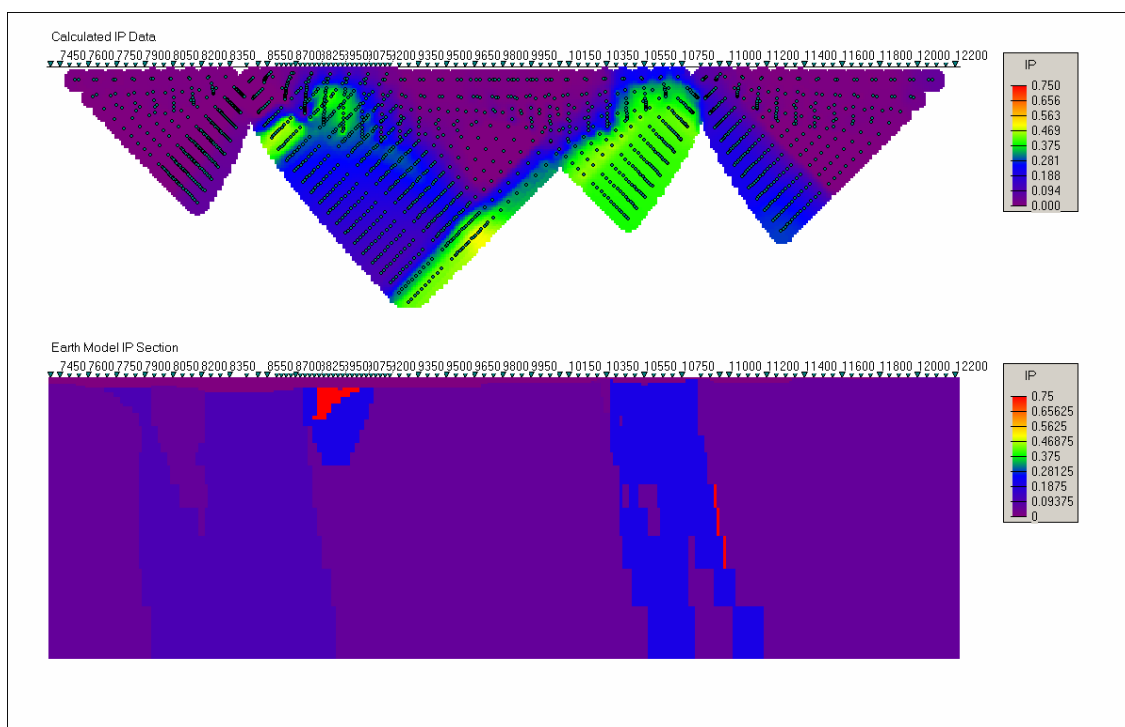
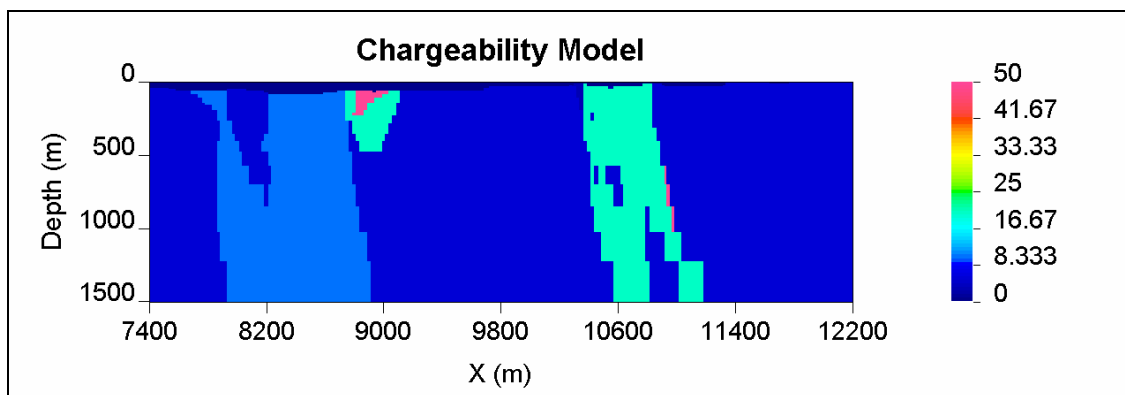
44 iter	data misfit	model norm	multiplier
0	1.11879E+07	0.00000E+00	0.00000E+00
5	3.40988E+05	6.54855E+00	8.56228E+04
10	2.34355E+04	1.05271E+02	1.98626E+01
15	1.29878E+04	2.74351E+02	6.20705E-01
20	7.36077E+03	4.48885E+02	1.93970E-02
25	2.40507E+03	6.08089E+02	1.21232E-03
30	1.37610E+03	6.41195E+02	1.76876E-04
34	1.22355E+03	5.99276E+02	4.76871E+00
35	1.23998E+03	5.74153E+02	5.19406E+00
36	1.23313E+03	5.52759E+02	5.54067E+00
37	1.24000E+03	5.37063E+02	5.60247E+00
38	1.23676E+03	5.26858E+02	5.84387E+00
39	1.24000E+03	5.15175E+02	6.00620E+00
40	1.24000E+03	5.07580E+02	6.30462E+00
41	1.23963E+03	4.98904E+02	6.59973E+00
42	1.24000E+03	4.93443E+02	6.83795E+00
43	1.24000E+03	4.86060E+02	7.08011E+00
44	1.24085E+03	4.81226E+02	7.08011E+00

1240 number of data



Line 10800N: Gocad-Constrained Chargeability Model

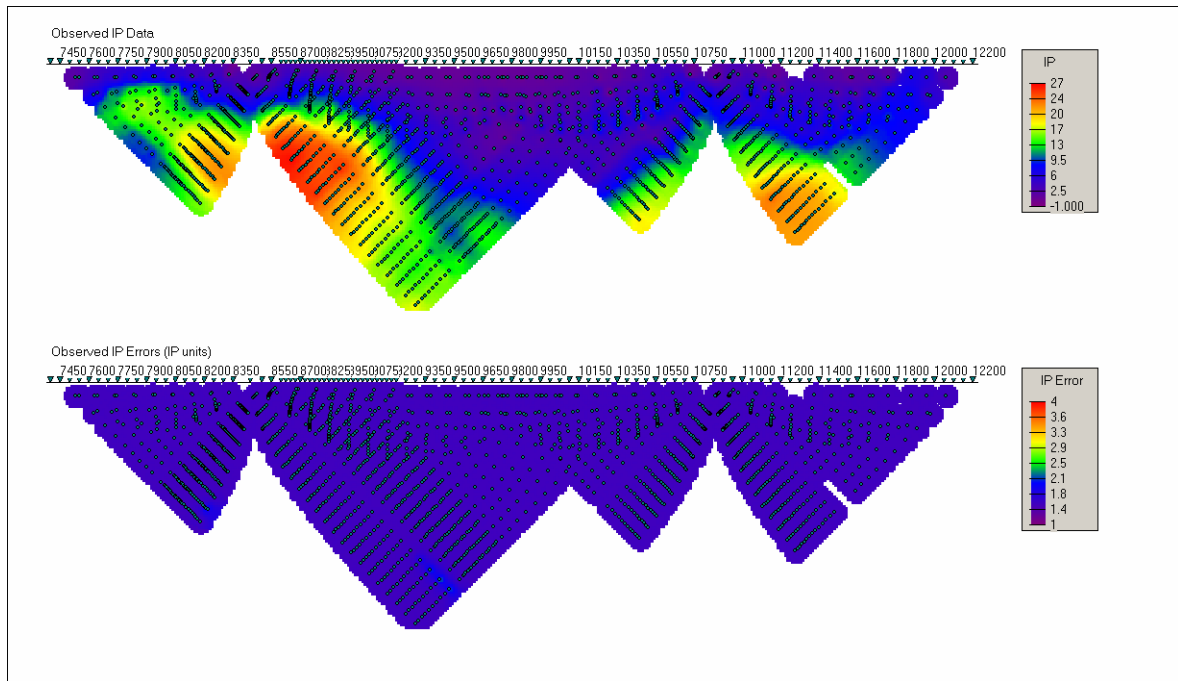
- Overburden = 0.5 mrad (purple)
- Ultramafic volcanic = 3 mrad (dark-blue)
- Mafic volcanic = 5 mrad (navy blue)
- Sediments = 10 mrad (blue)
- Rhyolite = 20 mrad (light blue)
- Graphite/Massive Sulphide = 75 mrad (pink)



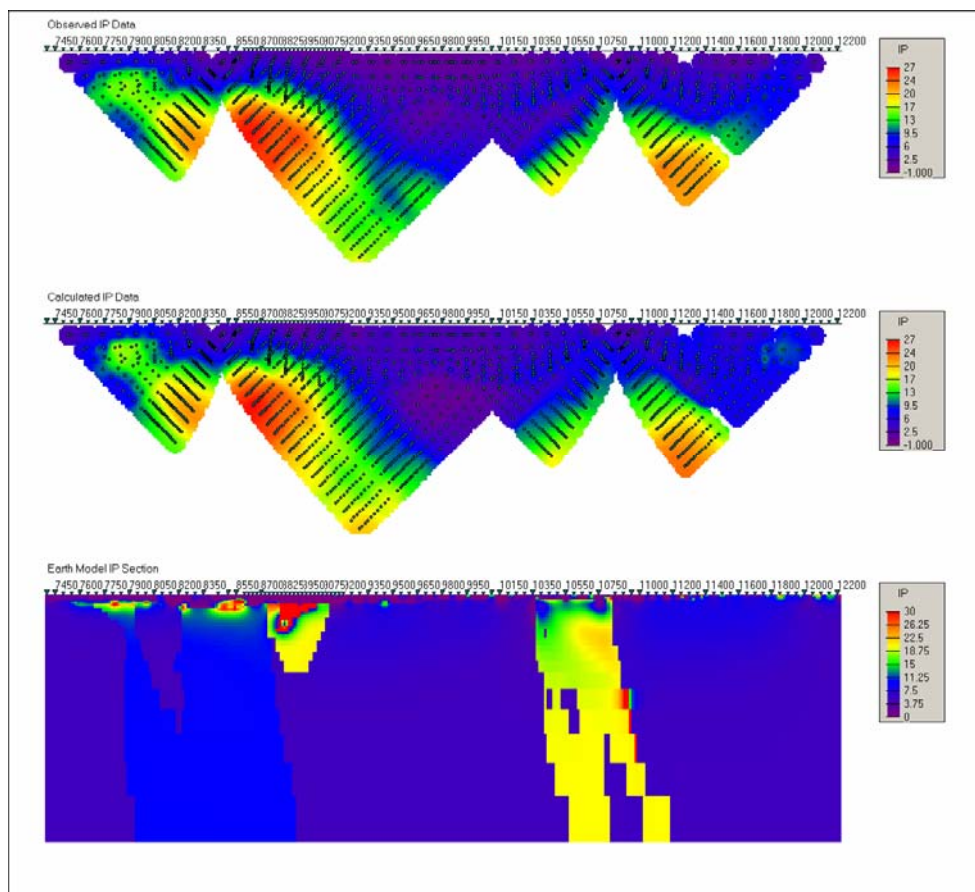
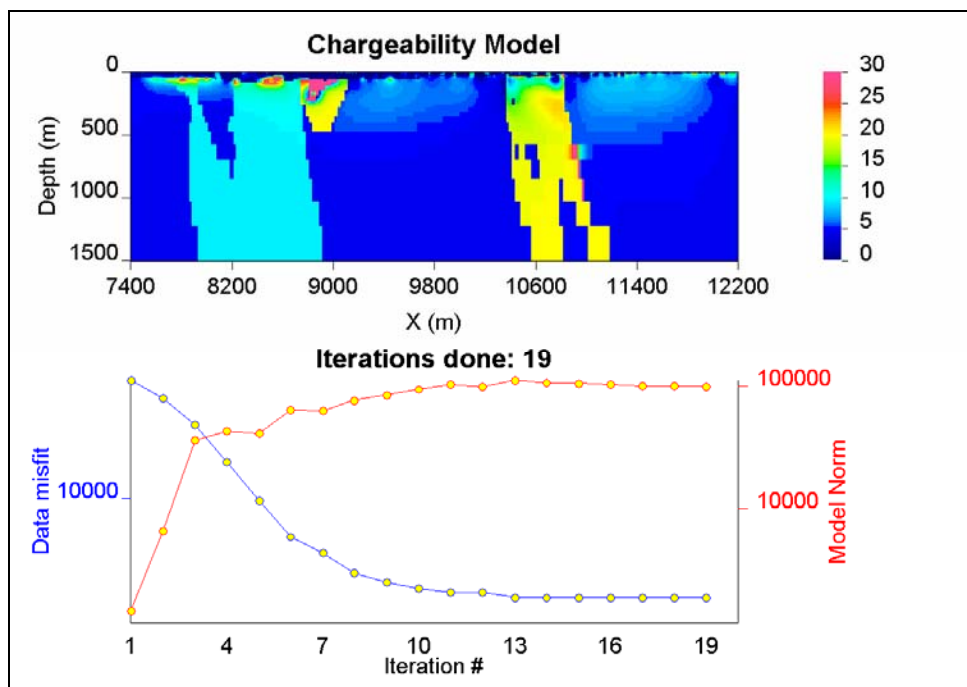
Line 10800N: UBC 2D Gocad-Constrained IP Fwd Model (values / 100)

Line 10800N: Final Chargeability Model – Sharp Alphas

- Maximum data error allowed: 5 mrad
- Minimum Error floor applied: 1.5 mrad
- Error Misfits Removed: Misfits >10x removed (2% total)
- Alpha Parameters: 0.001,1,1
- Model Error Misfit: 1713 for 1713 points (1739 initial), in 19 iterations

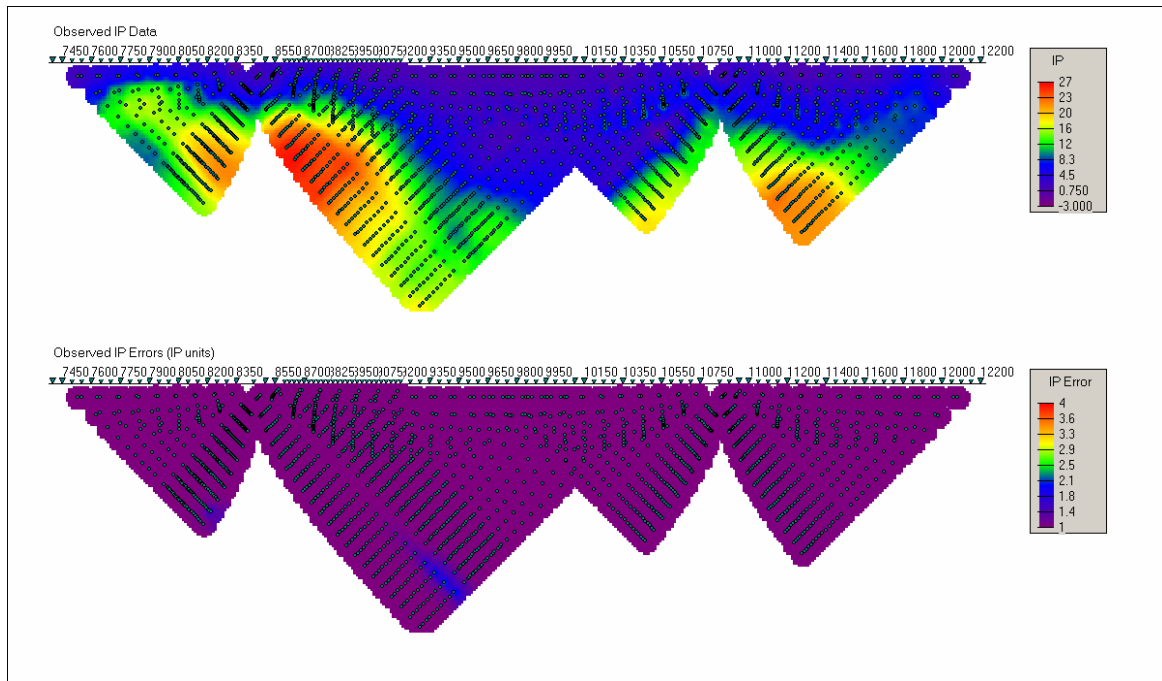


19 iter	data misfit	model norm	multiplier
0	9.84231E+04	0.00000E+00	0.00000E+00
5	9.64096E+03	4.09343E+04	2.61758E-01
7	3.80567E+03	6.24755E+04	5.16650E-02
8	2.63977E+03	7.58759E+04	1.90646E-02
9	2.23928E+03	8.37912E+04	1.24042E-02
10	2.00684E+03	9.29696E+04	7.87866E-03
11	1.85982E+03	1.02161E+05	5.40469E-03
12	1.86065E+03	9.72710E+04	6.80354E-03
13	1.71283E+03	1.10261E+05	4.18517E-03
14	1.71296E+03	1.05080E+05	4.71809E-03
15	1.71240E+03	1.03898E+05	5.52219E-03
16	1.71302E+03	1.01840E+05	5.57190E-03
17	1.71311E+03	9.95610E+04	5.91194E-03
18	1.71300E+03	9.96898E+04	5.86954E-03
19	1.71311E+03	9.87528E+04	6.26644E-03
1713 number of data			



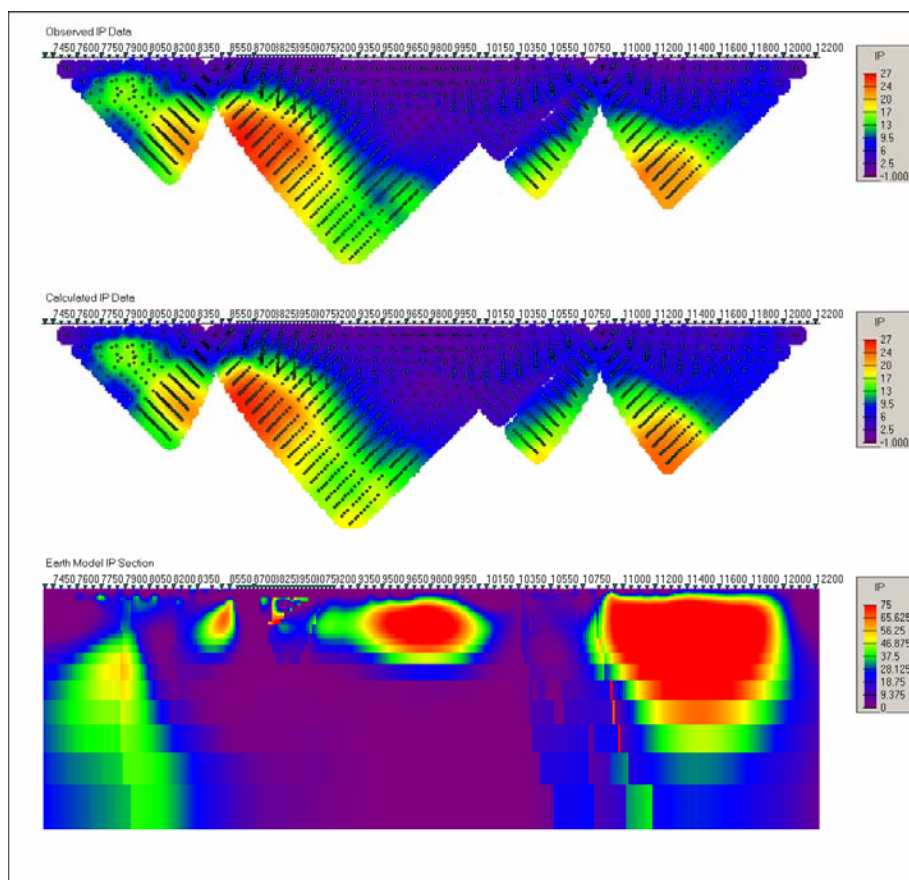
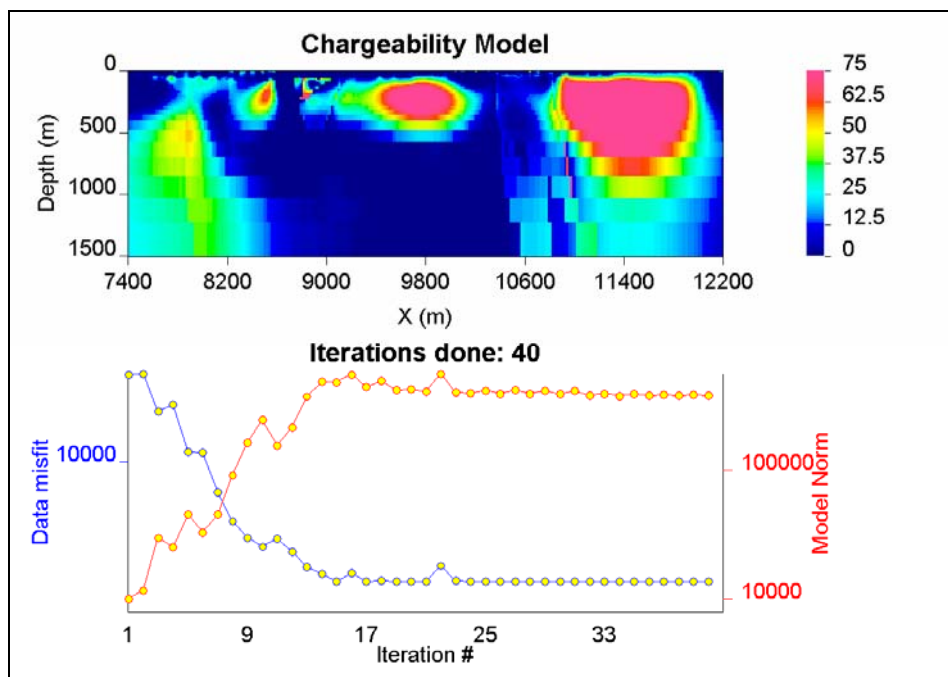
Line 10800N: Final Chargeability Model – Smooth Alphas

- Maximum data error allowed: 5 mrad
- Minimum Error floor applied: 1 mrad
- Error Misfits Removed: Misfits >10x (2% total)
- Alpha Parameters: 1e-6, 1, 1
- Model Error Misfit: 1715 for 1715 points (1739 initial), in 40 iterations



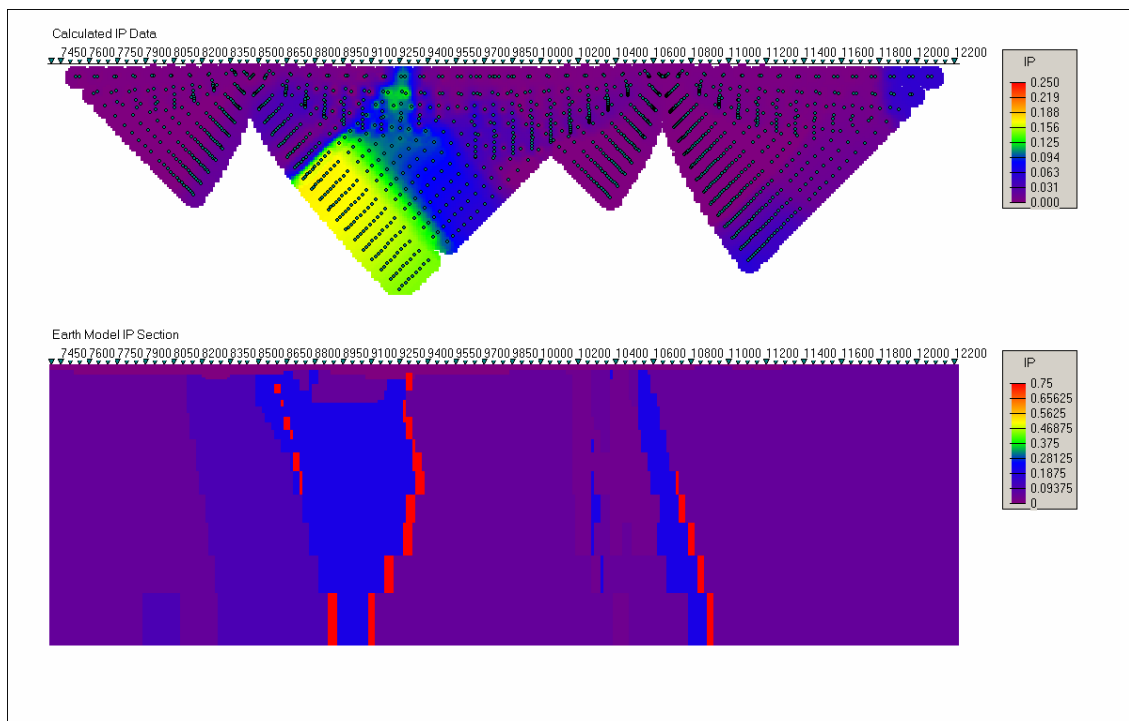
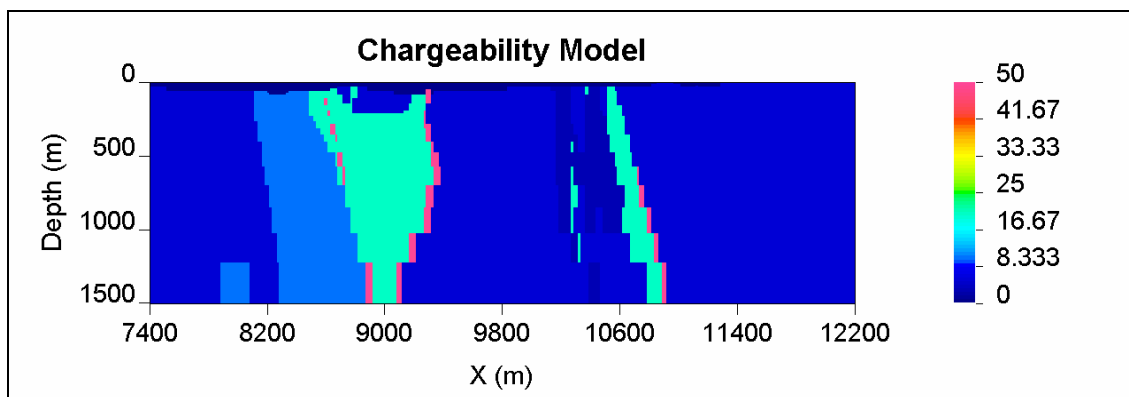
40 iter	data misfit	model norm	multiplier
0	7.49270E+04	0.00000E+00	0.00000E+00
5	1.15712E+04	4.54631E+04	1.35763E-01
10	2.86289E+03	2.45969E+05	3.91138E-03
15	1.71495E+03	4.79821E+05	1.52283E-03
20	1.71417E+03	4.22421E+05	1.93098E-03
25	1.71450E+03	4.14886E+05	2.02375E-03
30	1.71656E+03	3.88486E+05	2.27832E-03
33	1.71480E+03	3.92308E+05	2.28168E-03
34	1.71565E+03	3.77844E+05	2.35606E-03
35	1.71487E+03	3.88599E+05	2.32513E-03
36	1.71517E+03	3.78122E+05	2.36307E-03
37	1.71503E+03	3.83888E+05	2.37536E-03
38	1.71497E+03	3.78289E+05	2.36577E-03
39	1.71506E+03	3.83551E+05	2.38116E-03
40	1.71488E+03	3.79854E+05	2.32427E-03

1715 number of data



Line 11000N: Gocad-Constrained Chargeability Model

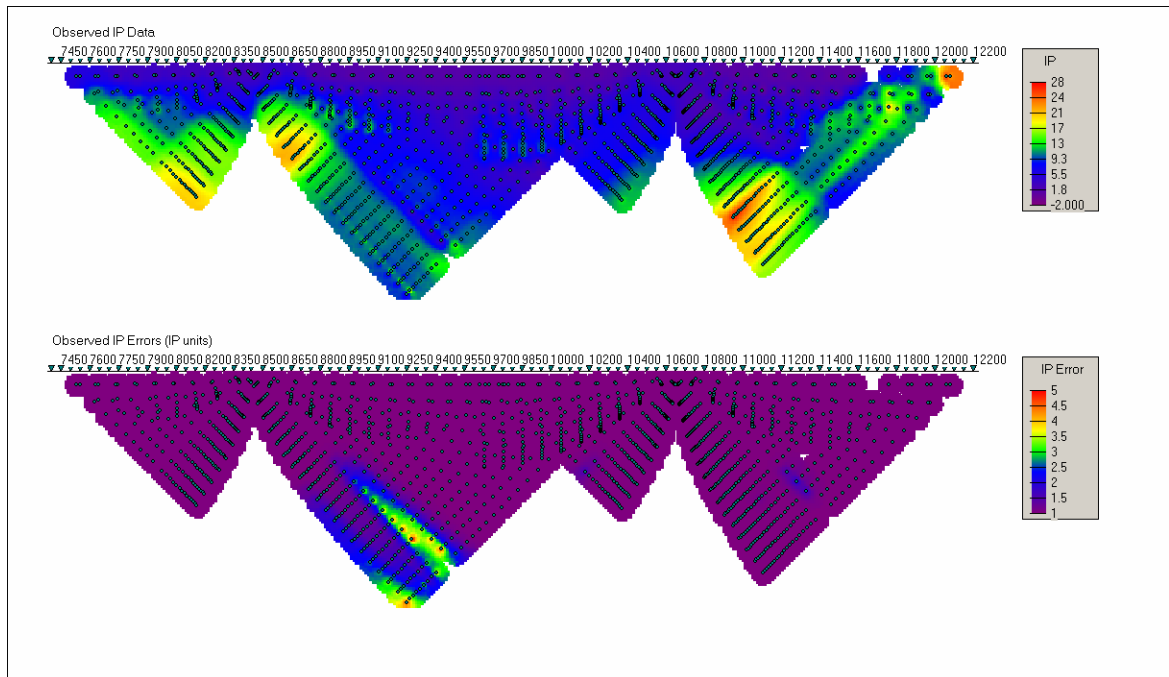
- Overburden = 0.5 mrad (purple)
- Ultramafic volcanic = 3 mrad (dark-blue)
- Mafic volcanic = 5 mrad (navy blue)
- Sediments = 10 mrad (blue)
- Rhyolite = 20 mrad (light blue)
- Graphite/Massive Sulphide = 75 mrad (red)



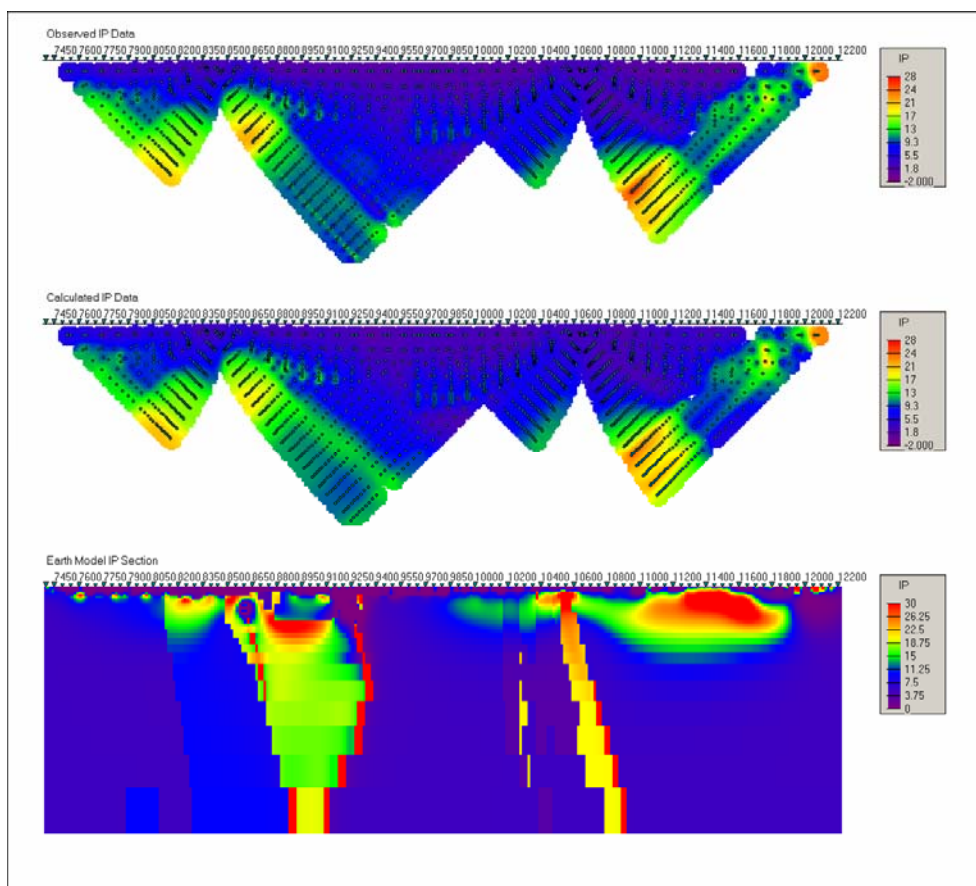
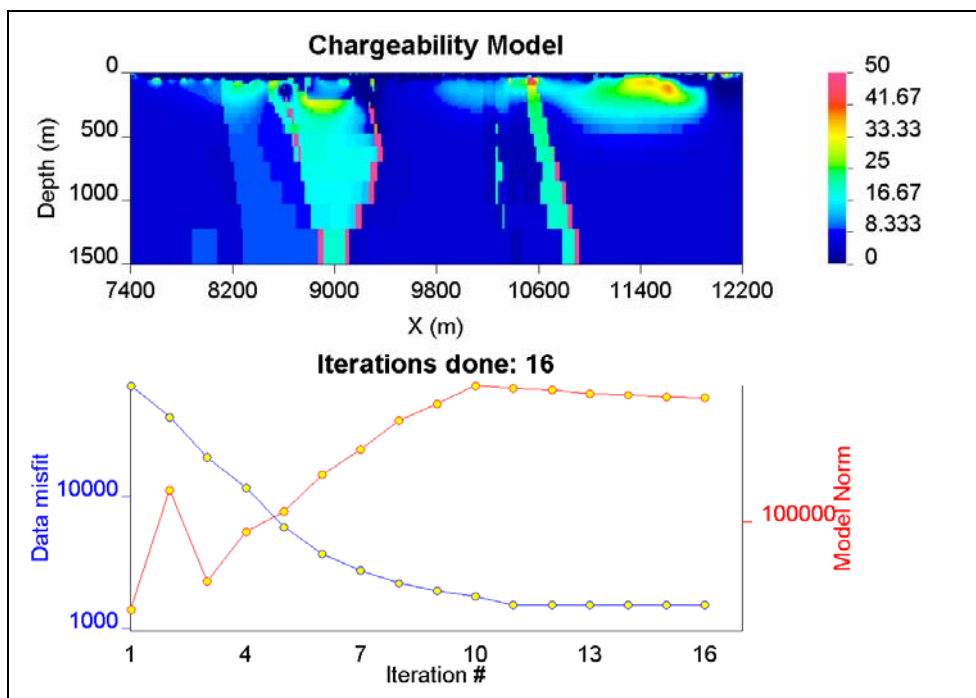
Line 11000N: UBC 2D Gocad-Constrained IP Fwd Model (values / 100)

Line 11000N: Final Chargeability Model – Sharp Alphas

- Maximum data error allowed: 5 mrad
- Minimum Error floor applied: 1 mrad
- Error Misfits Removed: Misfits >15x removed (3% total)
- Alpha Parameters: 0.001,1,1
- Model Error Misfit: 1523 for 1523 points (1566 initial), in 16 iterations

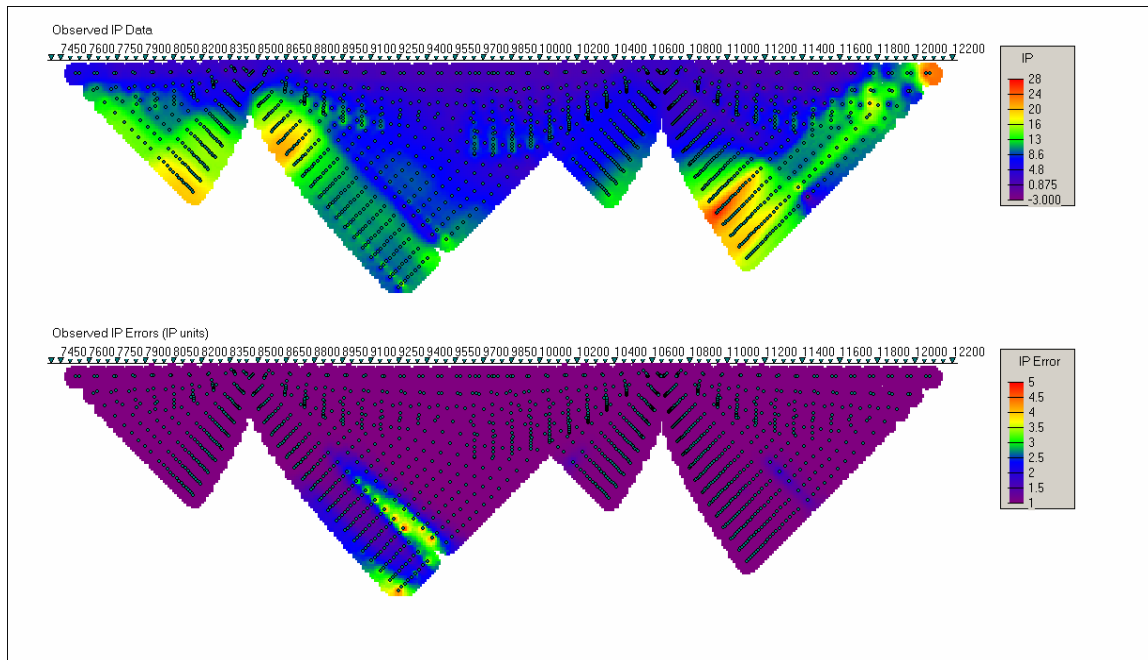


16 iter	data misfit	model norm	multiplier
0	1.28924E+05	0.00000E+00	0.00000E+00
3	1.99758E+04	5.30333E+04	3.83710E-01
4	1.17978E+04	8.98896E+04	1.45909E-01
5	5.89692E+03	1.11379E+05	5.85292E-02
6	3.71006E+03	1.64925E+05	1.71559E-02
7	2.77763E+03	2.15296E+05	7.93915E-03
8	2.21330E+03	2.92410E+05	4.09062E-03
9	1.94978E+03	3.48383E+05	2.92801E-03
10	1.76653E+03	4.24742E+05	1.90768E-03
11	1.52230E+03	4.14141E+05	2.05597E-03
12	1.52297E+03	4.05173E+05	2.07976E-03
13	1.52284E+03	3.90239E+05	2.29359E-03
14	1.52285E+03	3.85859E+05	2.34556E-03
15	1.52283E+03	3.77310E+05	2.46837E-03
16	1.52301E+03	3.73603E+05	2.51480E-03
1523 number of data			



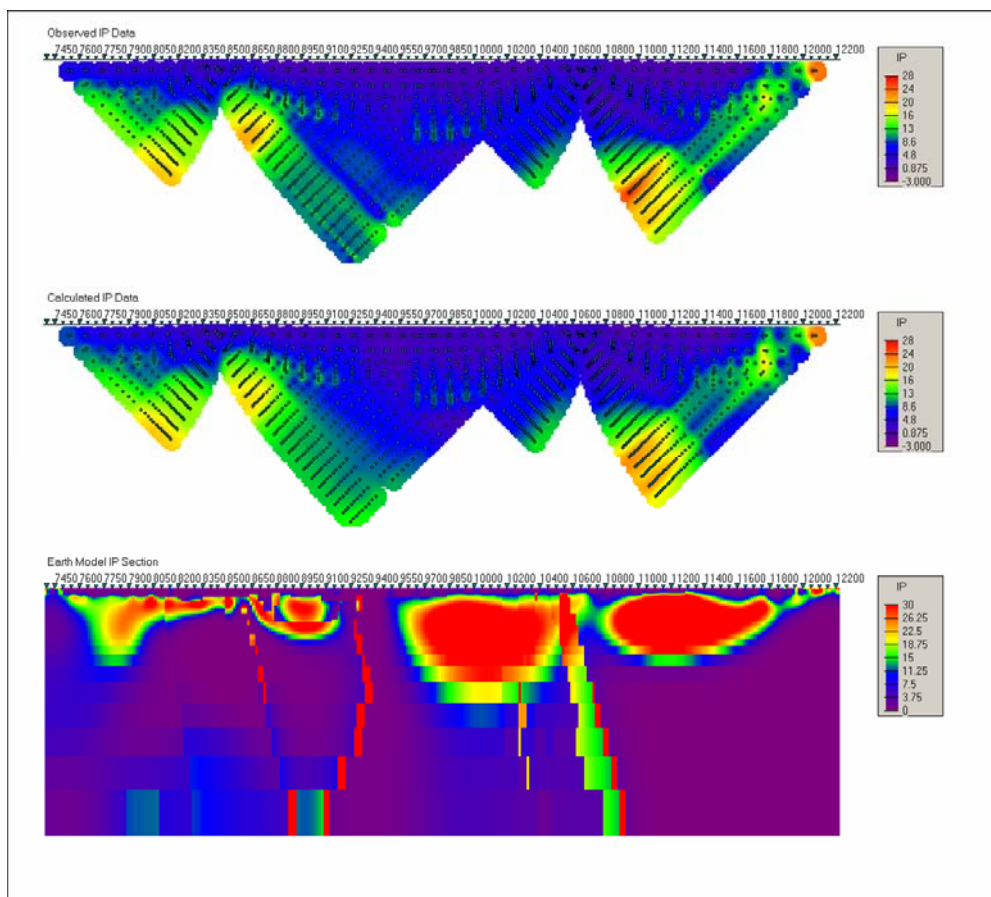
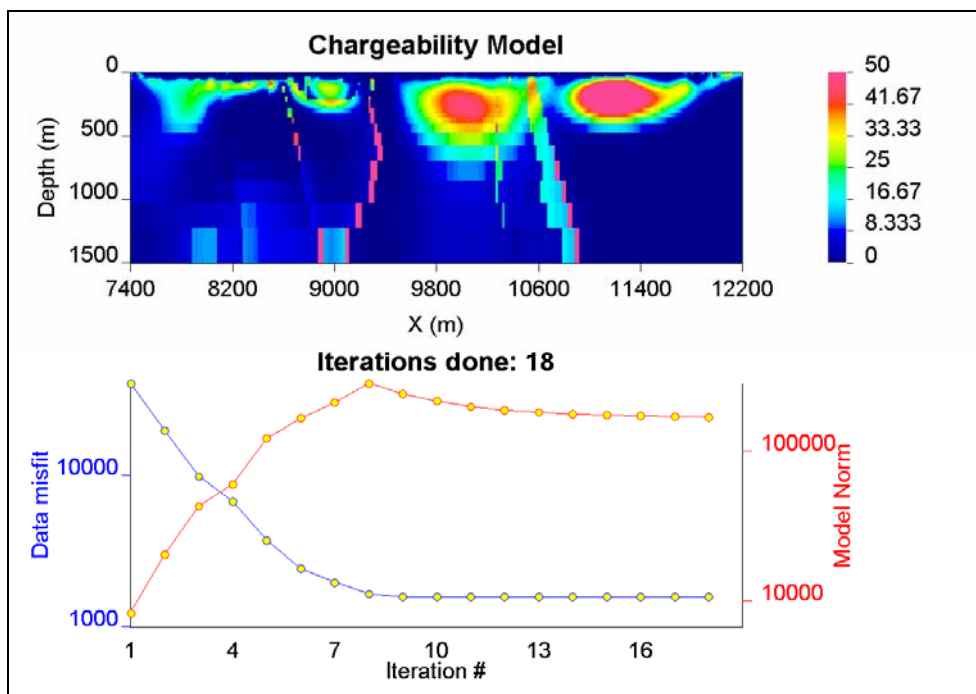
Line 11000N: Final Chargeability Model – Smooth Alphas

- Maximum data error allowed: 5 mrad
- Minimum Error floor applied: 1 mrad
- Error Misfits Removed: No data points removed
- Alpha Parameters: $1e-07$, 1, 1
- Model Error Misfit: 1566 for 1523points (100%), in 18 iterations



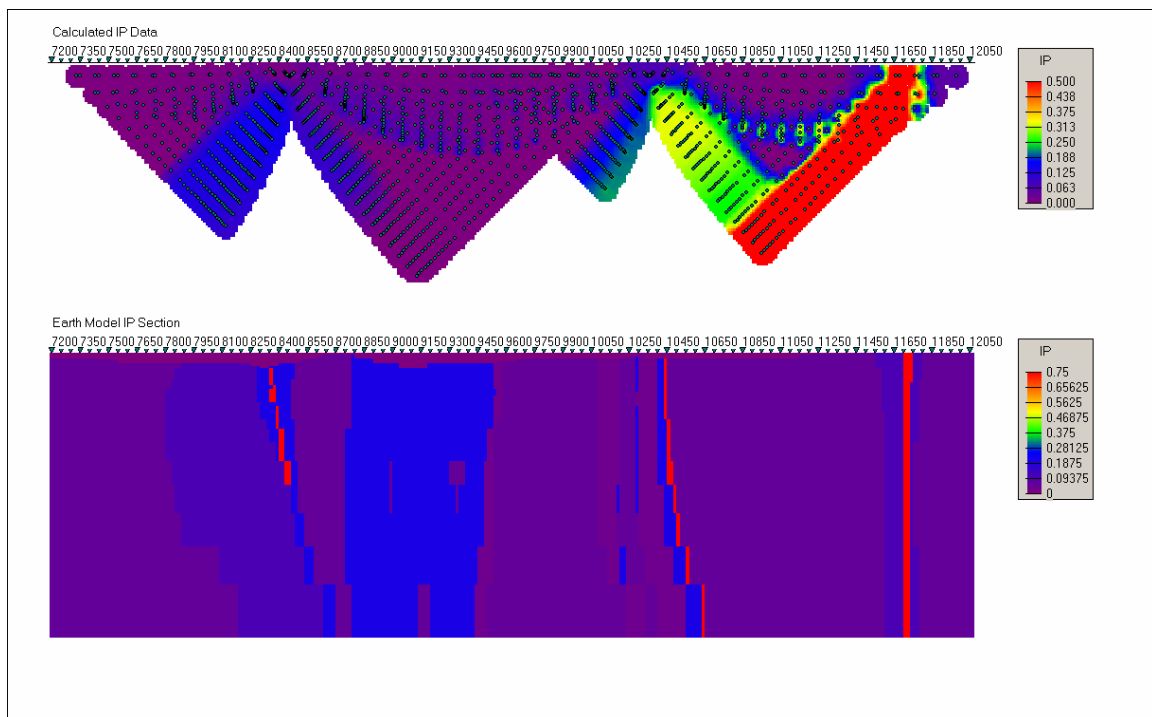
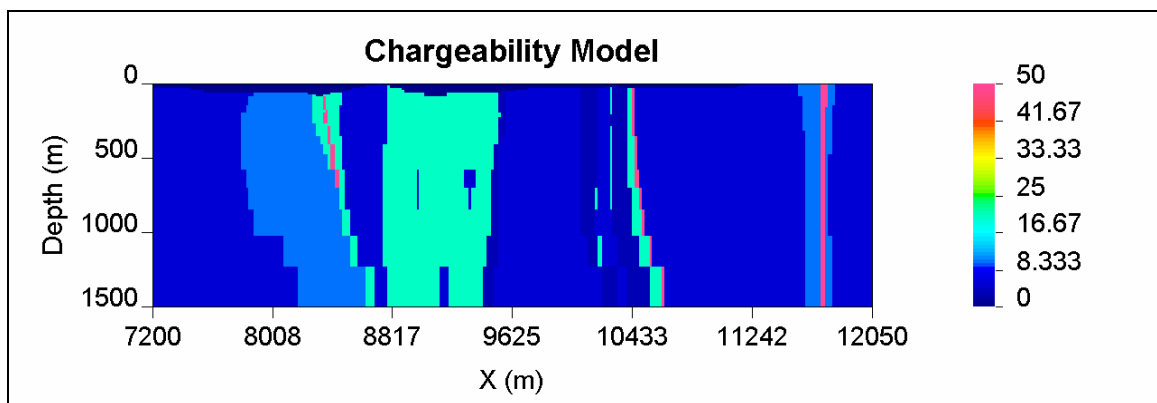
18 iter	data misfit	model norm	multiplier
0	8.07157E+04	0.00000E+00	0.00000E+00
4	6.67304E+03	6.01828E+04	6.54730E-02
5	3.70391E+03	1.22194E+05	1.43539E-02
6	2.40962E+03	1.66862E+05	5.85610E-03
7	1.96810E+03	2.13146E+05	3.49925E-03
8	1.64363E+03	2.84100E+05	1.67058E-03
9	1.56605E+03	2.42543E+05	2.69136E-03
10	1.56587E+03	2.15786E+05	3.39053E-03
11	1.56602E+03	1.97997E+05	3.49509E-03
12	1.56568E+03	1.88566E+05	4.08707E-03
13	1.56600E+03	1.82314E+05	4.09340E-03
14	1.56594E+03	1.78095E+05	4.28260E-03
15	1.56600E+03	1.74730E+05	4.30057E-03
16	1.56600E+03	1.72888E+05	4.39039E-03
17	1.56600E+03	1.70895E+05	4.38105E-03
18	1.56598E+03	1.69594E+05	4.47847E-03

1566 number of data



Line 11200N: Gocad-Constrained Chargeability Model

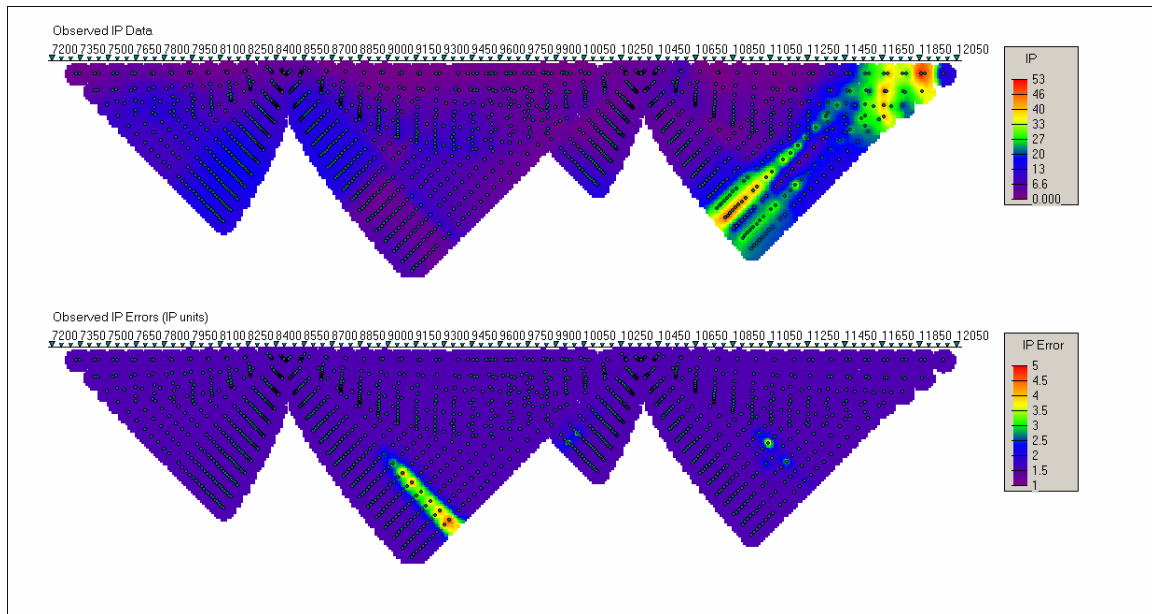
- Overburden = 0.5 mrad (purple)
- Ultramafic volcanic = 3 mrad (dark-blue)
- Mafic volcanic = 5 mrad (navy blue)
- Sediments = 10 mrad (blue)
- Rhyolite = 20 mrad (light blue)
- Graphite/Massive Sulphide = 75 mrad (red)



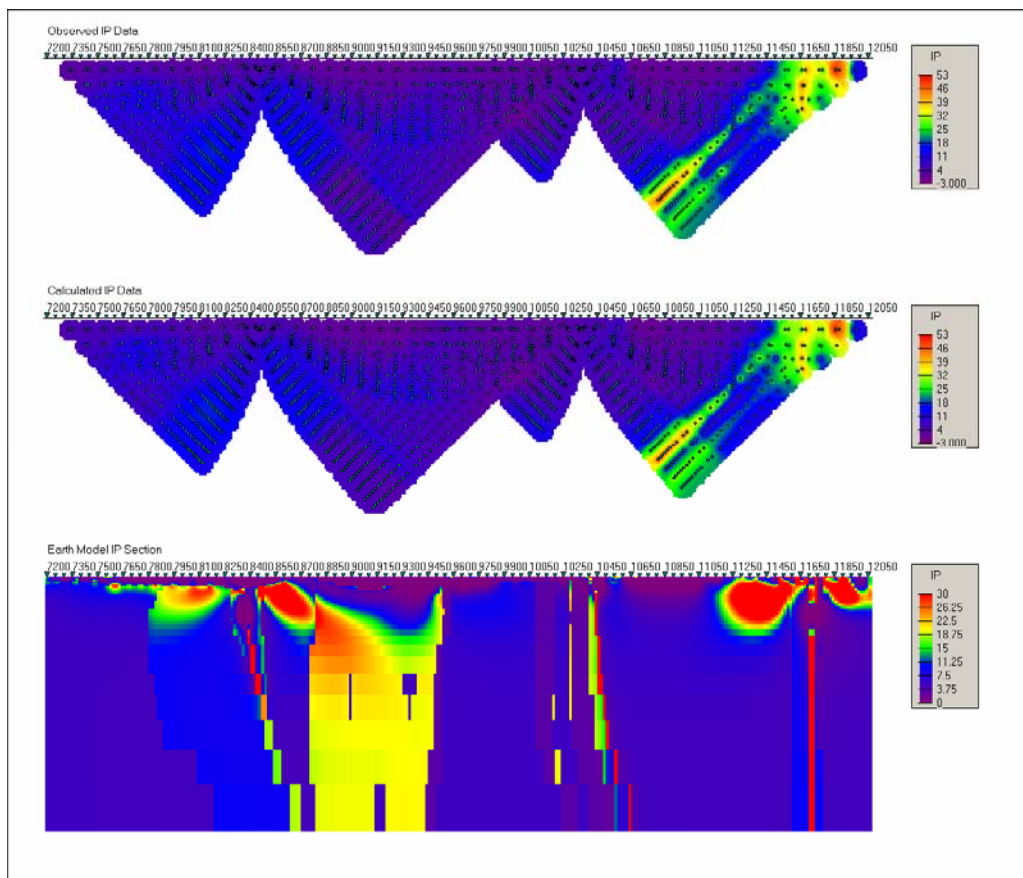
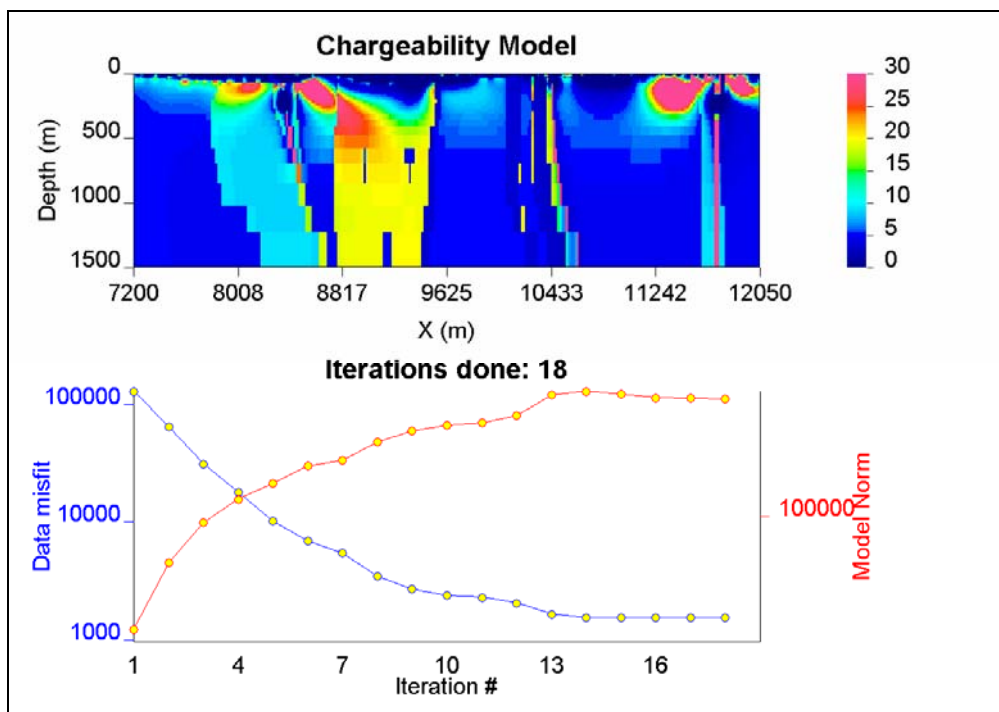
Line 11200N: UBC 2D Gocad-Constrained IP Fwd Model (values / 100)

Line 11200N: Final Chargeability Model – Sharp Alphas

- Maximum data error allowed: 5 mrad
- Minimum Error floor applied: 1.5 mrad
- Error Misfits Removed: all data retained
- Alpha Parameters: 0.001,1,1
- Model Error Misfit: 1550 for 1550 points (100%), in 18 iterations

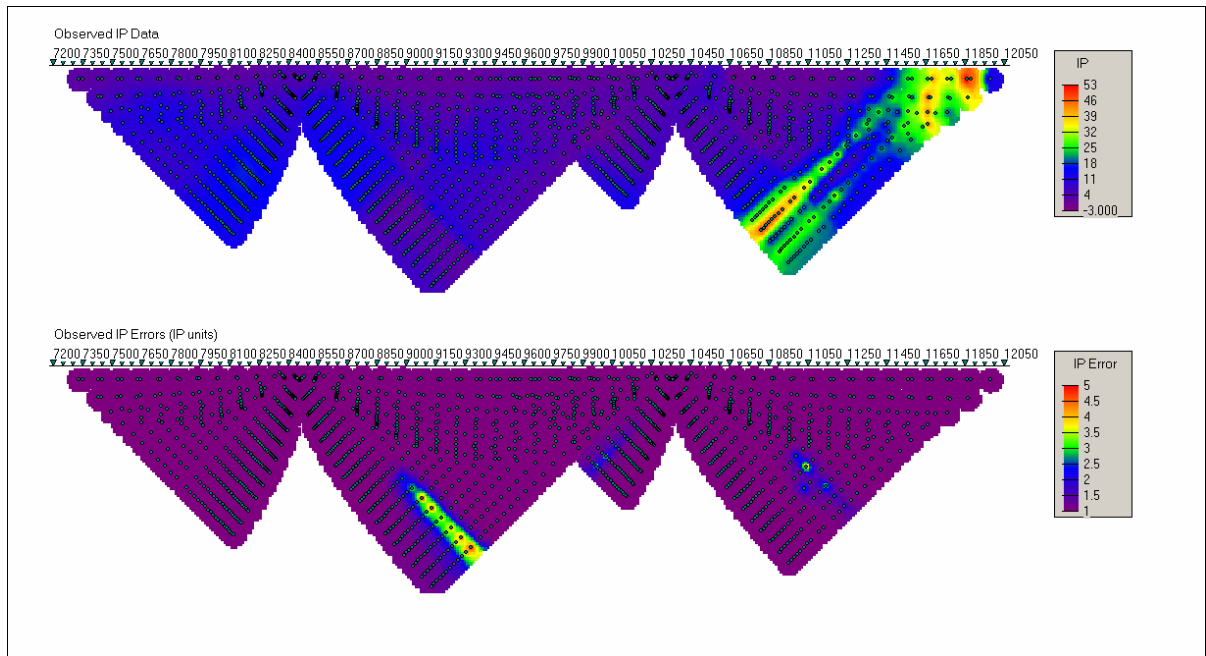


18 iter	data misfit	model norm	multiplier
0	2.61670E+05	0.00000E+00	0.00000E+00
3	3.12690E+04	8.92983E+04	3.69264E-01
4	1.80082E+04	1.38042E+05	1.57369E-01
5	1.02801E+04	1.84628E+05	5.98635E-02
6	6.93630E+03	2.53470E+05	2.36367E-02
7	5.52464E+03	2.79465E+05	1.91826E-02
8	3.50751E+03	3.91509E+05	6.72058E-03
9	2.72515E+03	4.78579E+05	3.82681E-03
10	2.42172E+03	5.32963E+05	2.81339E-03
11	2.31129E+03	5.52840E+05	2.44222E-03
12	2.09008E+03	6.28054E+05	1.75310E-03
13	1.67566E+03	9.22725E+05	7.33523E-04
14	1.54871E+03	9.83327E+05	5.66489E-04
15	1.54829E+03	9.43305E+05	7.47986E-04
16	1.54934E+03	8.77978E+05	8.93385E-04
17	1.54973E+03	8.63832E+05	9.71175E-04
18	1.54982E+03	8.58417E+05	9.18346E-04
1550 number of data			

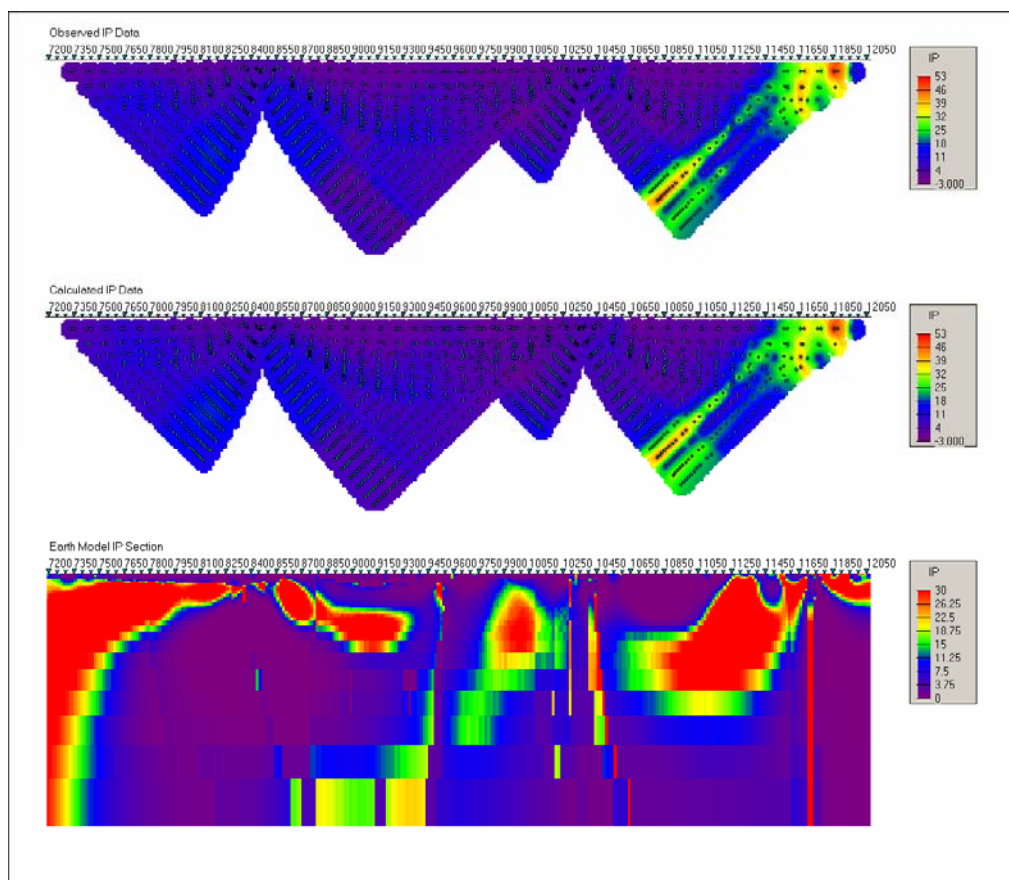
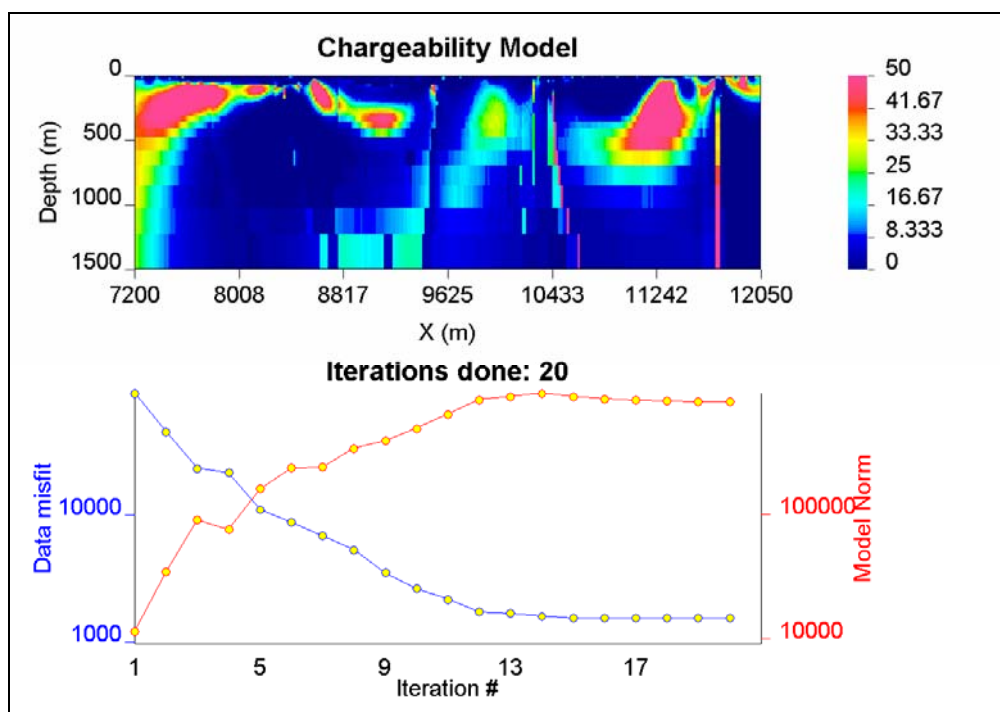


Line 11200N: Final Chargeability Model – Smooth Alphas

- Maximum data error allowed: 5 mrad
- Minimum Error floor applied: 1mrad
- Error Misfits Removed: all data retained
- Alpha Parameters: $1e-07$, 1, 1
- Model Error Misfit: 1550 for 1500 points (100%), in 20 iterations

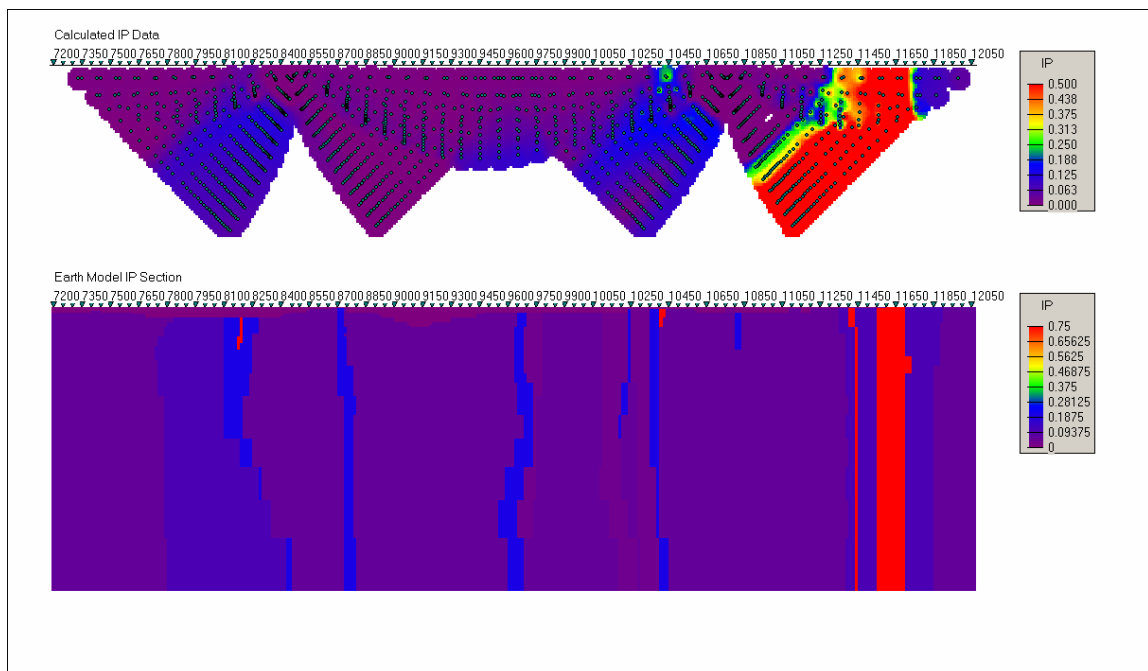
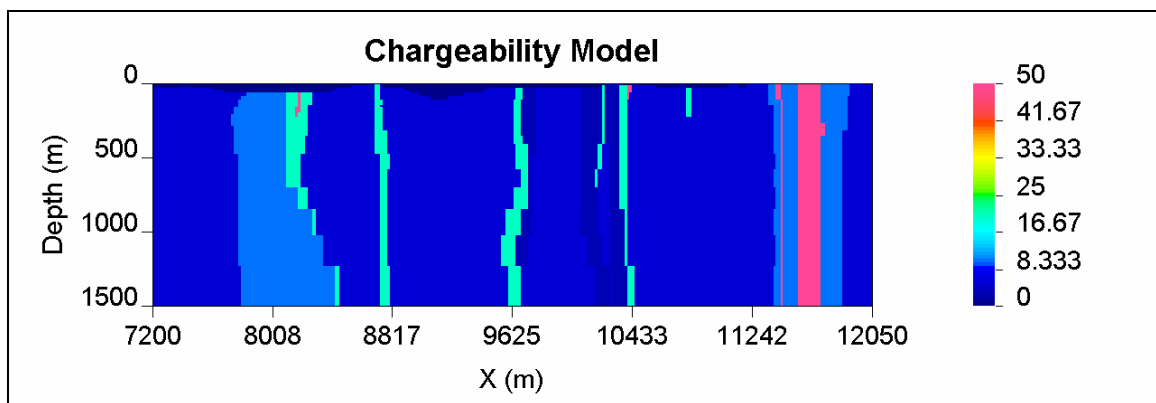


0	1.84127E+05	0.00000E+00	0.00000E+00
3	2.32932E+04	9.16020E+04	2.28236E-01
4	2.16219E+04	7.64076E+04	2.15585E-01
5	1.10683E+04	1.62630E+05	5.86153E-02
6	8.81753E+03	2.39094E+05	2.31928E-02
7	6.84886E+03	2.42483E+05	2.27400E-02
8	5.35832E+03	3.44039E+05	9.21905E-03
9	3.55591E+03	3.92553E+05	6.16614E-03
10	2.66073E+03	4.97727E+05	2.96736E-03
11	2.17968E+03	6.47900E+05	1.22003E-03
12	1.74770E+03	8.52160E+05	6.91425E-04
13	1.69689E+03	9.02247E+05	6.27289E-04
14	1.60814E+03	9.53065E+05	5.32829E-04
15	1.54972E+03	8.99171E+05	6.56029E-04
16	1.55070E+03	8.60860E+05	7.99529E-04
17	1.55095E+03	8.42085E+05	8.36678E-04
18	1.55087E+03	8.33512E+05	8.75943E-04
19	1.55086E+03	8.19383E+05	9.04403E-04
20	1.55006E+03	8.15351E+05	9.08239E-04
1550 number of data			



Line 11400N: Gocad-Constrained Chargeability Model

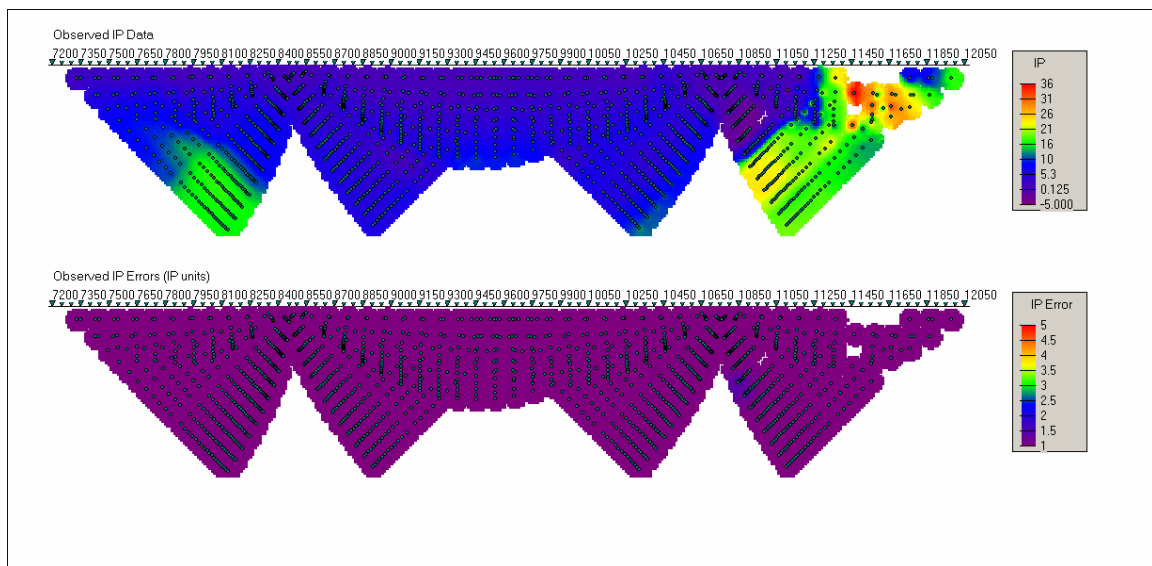
- Overburden = 0.5 mrad (purple)
- Ultramafic volcanic = 3 mrad (dark-blue)
- Mafic volcanic = 5 mrad (navy blue)
- Sediments = 10 mrad (blue)
- Rhyolite = 20 mrad (light blue)
- Graphite/Massive Sulphide = 75 mrad (red)



Line 11400N: UBC 2D Gocad-Constrained IP Fwd Model (values / 100)

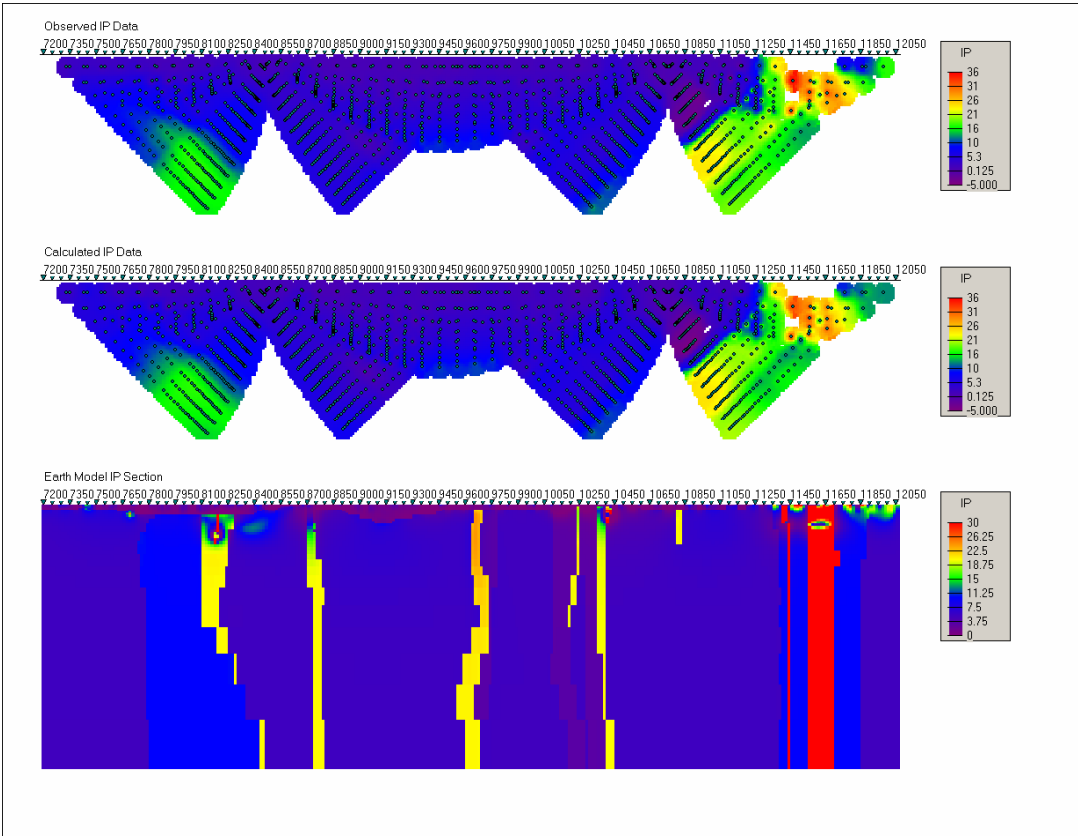
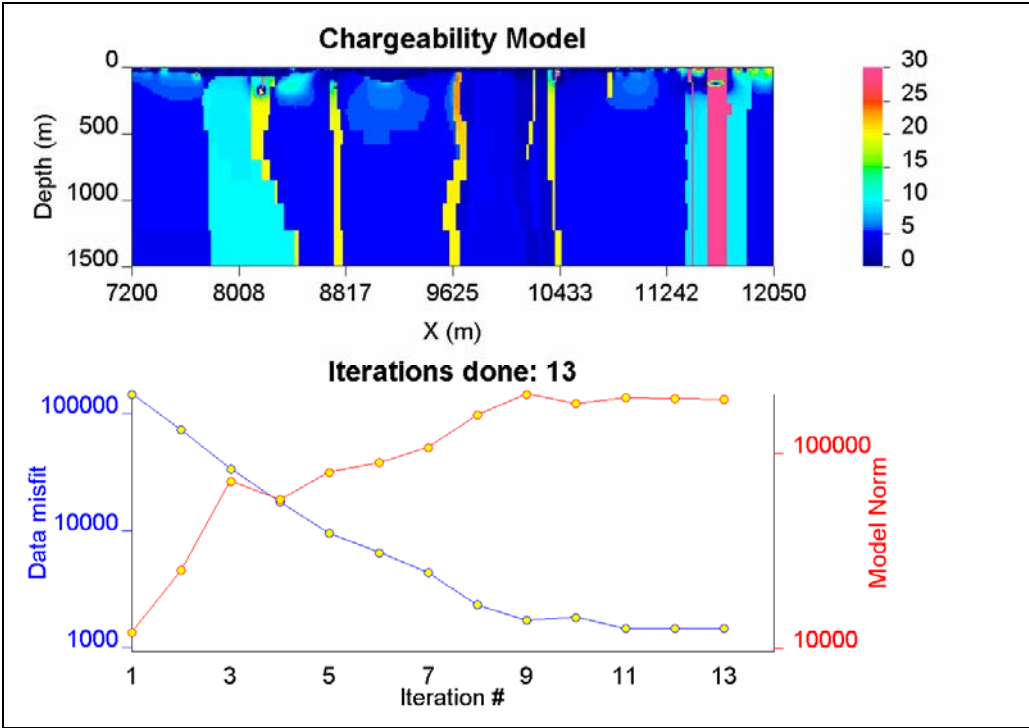
Line 11400N: Final Chargeability Model – Sharp Alphas

- Maximum data error allowed: 5 mrad
- Minimum Error floor applied: 1 mrad
- Error Misfits Removed: 50x (3% total)
- Alpha Parameters: 0.001,1,1
- Model Error Misfit: 1471 for 1471 points (1512 initial), in 13 iterations



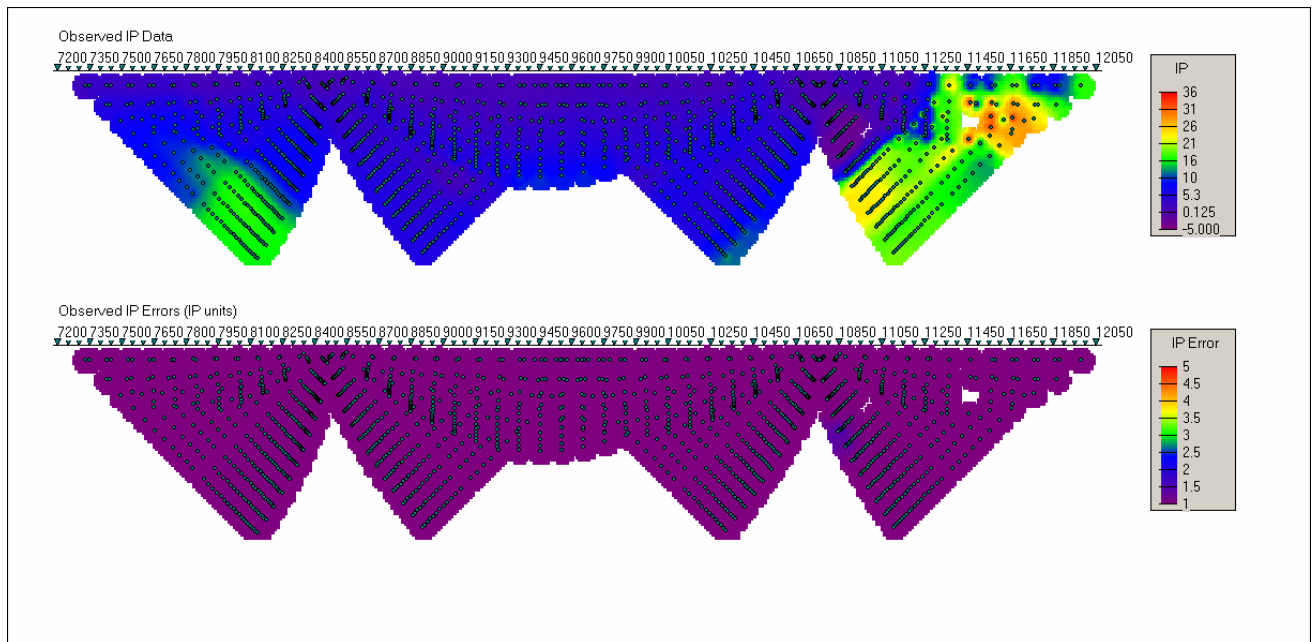
13 iter	data misfit	model norm	multiplier
0	2.96307E+05	0.00000E+00	0.00000E+00
1	1.45700E+05	1.21488E+04	7.86103E+00
2	7.22405E+04	2.51590E+04	2.36927E+00
3	3.37025E+04	7.23056E+04	7.66269E-01
4	1.73788E+04	5.80307E+04	6.09816E-01
5	9.48158E+03	8.05517E+04	1.86913E-01
6	6.46764E+03	9.00324E+04	1.08528E-01
7	4.39000E+03	1.07541E+05	5.59099E-02
8	2.34662E+03	1.58820E+05	1.42843E-02
9	1.73375E+03	2.01802E+05	7.10465E-03
10	1.82169E+03	1.79994E+05	1.00079E-02
11	1.47027E+03	1.93382E+05	7.46523E-03
12	1.47142E+03	1.90934E+05	8.11216E-03
13	1.47105E+03	1.89295E+05	8.23143E-03

1471 number of data



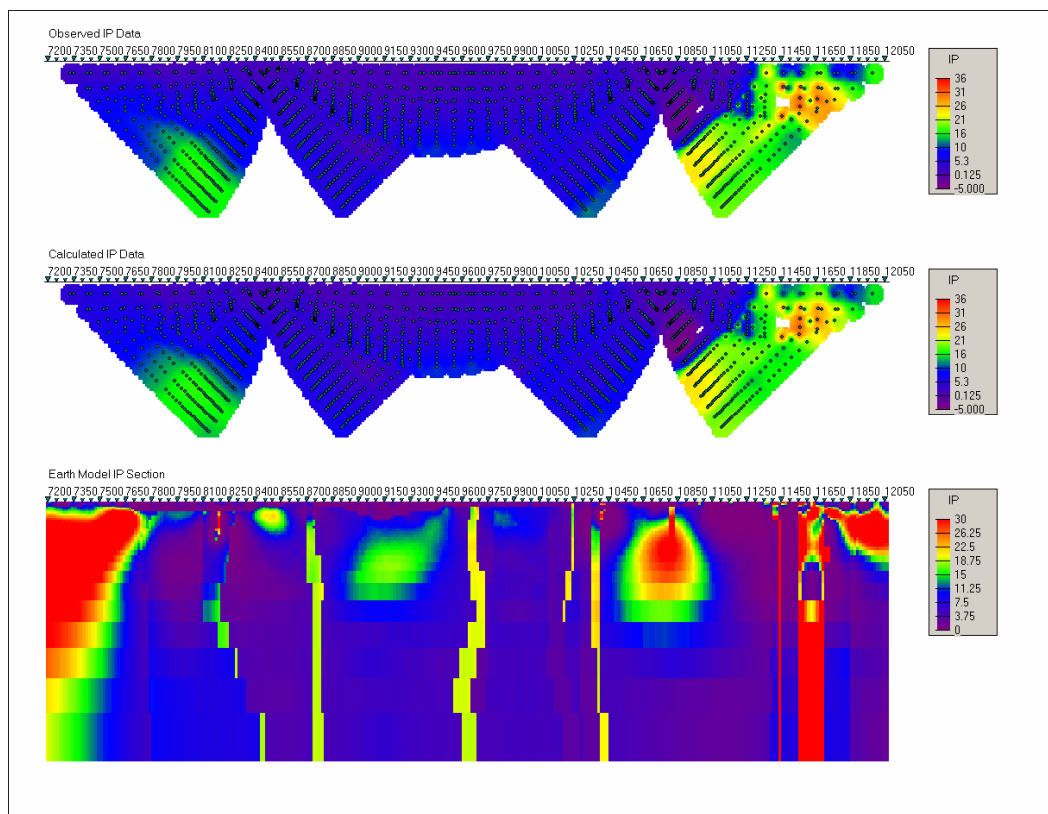
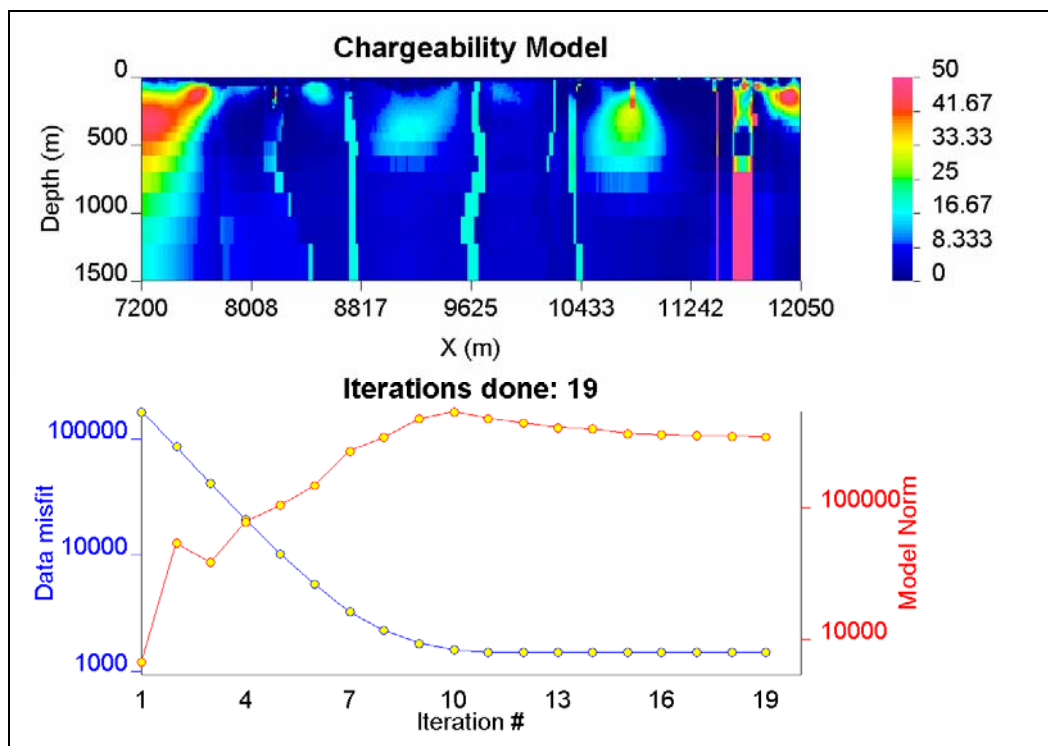
Line 11400N: Final Chargeability Model – Smooth Alphas

- Maximum data error allowed: 5 mrad
- Minimum Error floor applied: 1 mrad
- Error Misfits Removed: Misfits >50x (2% total)
- Alpha Parameters: 1e-07, 1, 1
- Model Error Misfit: 1481 for 1481 points (1512 initial), in 19 iterations



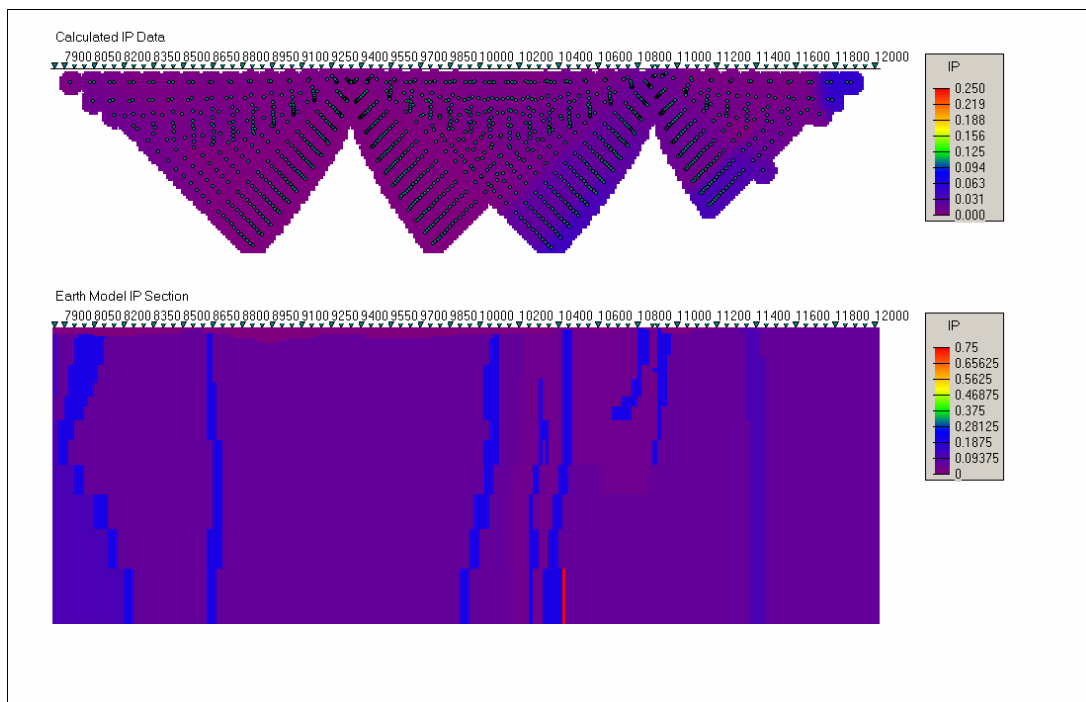
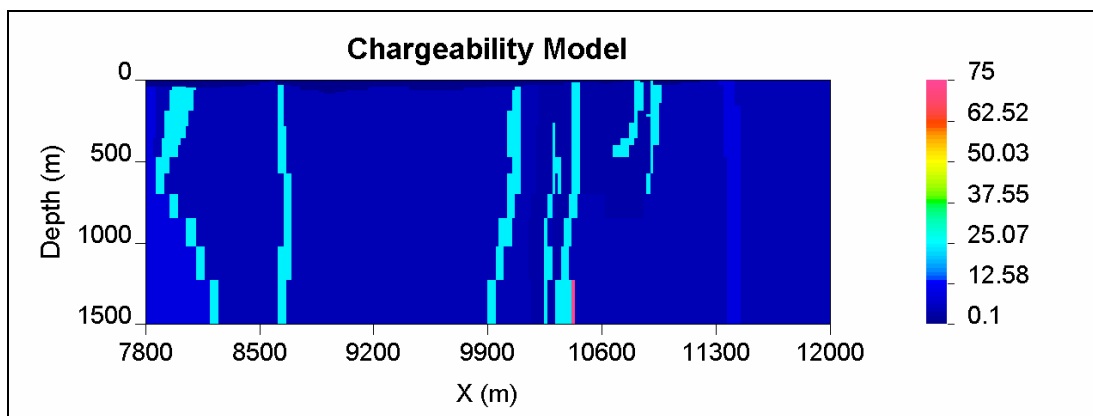
19 iter	data misfit	model norm	multiplier
0	3.38601E+05	0.00000E+00	0.00000E+00
5	1.02291E+04	1.04759E+05	1.12418E-01
6	5.60132E+03	1.49055E+05	3.15431E-02
7	3.24664E+03	2.70386E+05	5.80129E-03
8	2.26724E+03	3.42403E+05	3.53800E-03
9	1.75602E+03	4.73815E+05	1.40850E-03
10	1.53130E+03	5.38248E+05	1.24363E-03
11	1.48101E+03	4.77615E+05	1.79969E-03
12	1.48174E+03	4.40326E+05	1.97200E-03
13	1.48110E+03	4.10760E+05	2.62043E-03
14	1.48086E+03	3.98157E+05	2.22988E-03
15	1.48149E+03	3.67683E+05	2.96245E-03
16	1.48093E+03	3.61435E+05	2.83535E-03
17	1.48125E+03	3.56434E+05	2.98016E-03
18	1.48098E+03	3.52291E+05	2.92598E-03
19	1.48126E+03	3.49054E+05	3.04453E-03

1481 number of data



Line 11600N: Gocad Constraining Chargeability Model

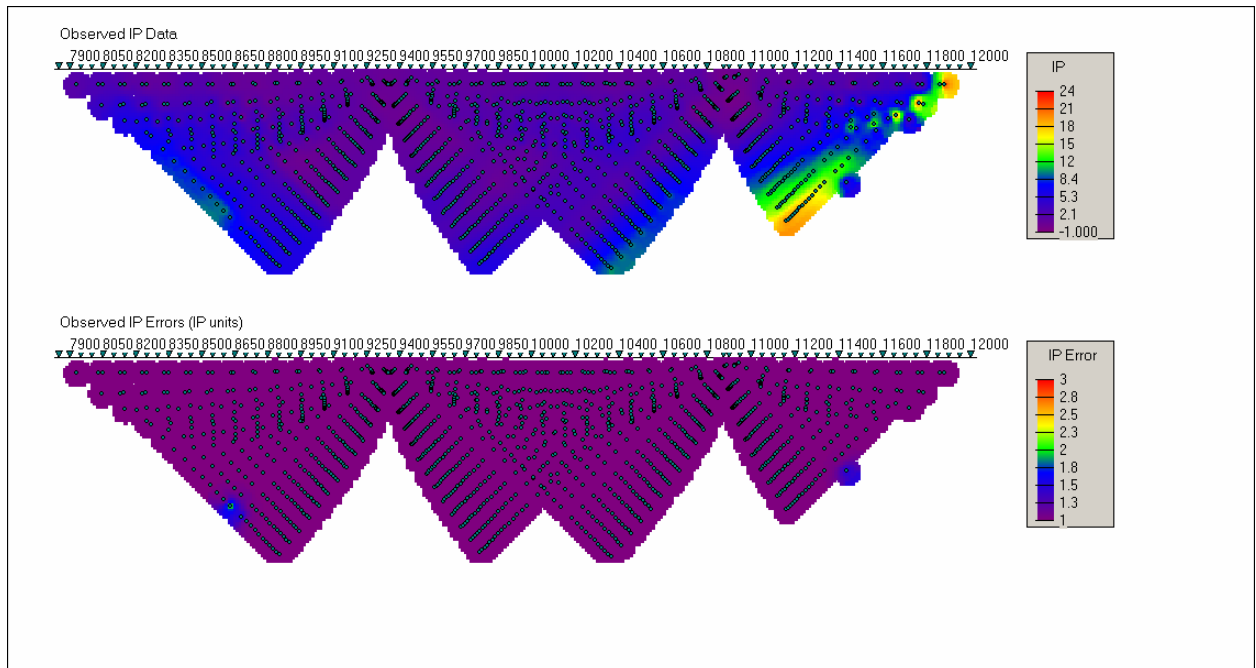
- Overburden = 0.5 mrad (purple)
- Ultramafic volcanic = 3 mrad (dark-blue)
- Mafic volcanic = 5 mrad (navy blue)
- Sediments = 10 mrad (blue)
- Rhyolite = 20 mrad (light blue)
- Graphite/Massive Sulphide = 75 mrad (red)



Line 11600N: UBC 2D Gocad-Constrained IP Fwd Model (values / 100)

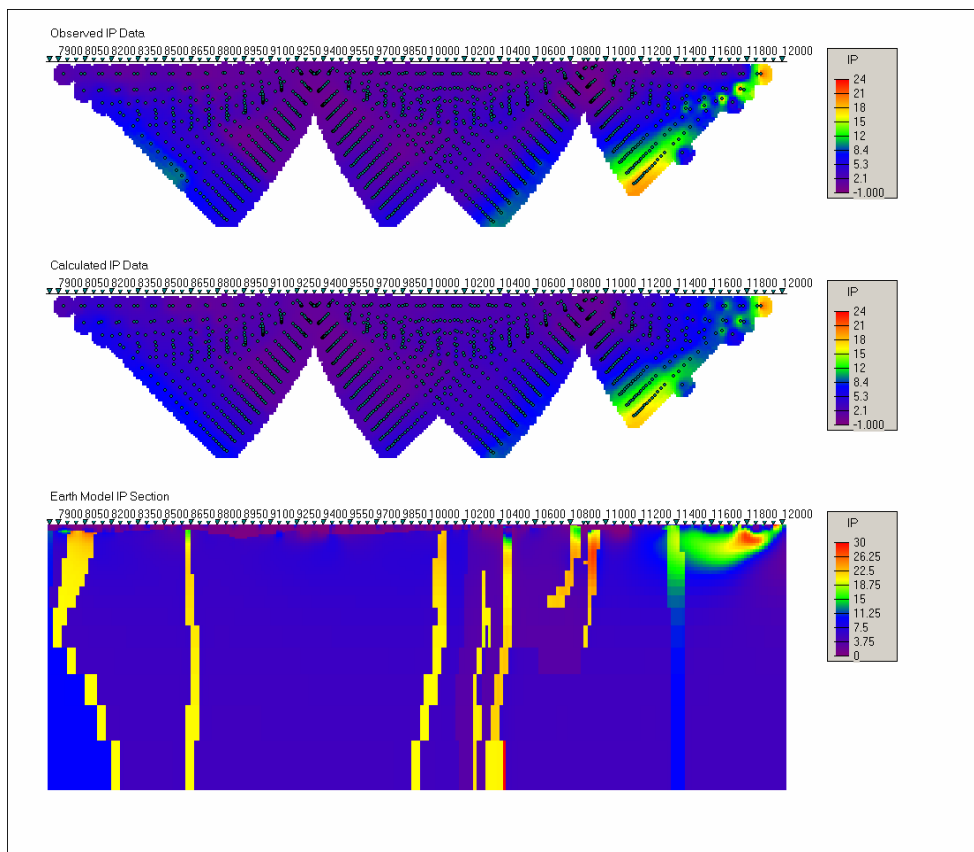
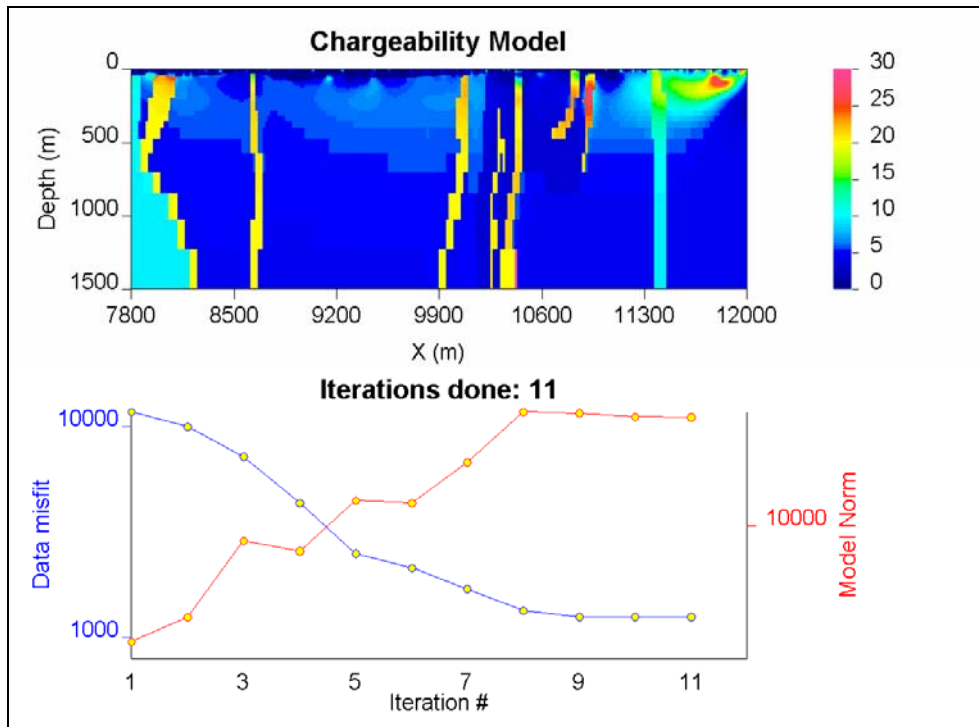
Line 11600N: Final Chargeability Model – Sharp Alphas

- Maximum data error allowed: 5 mrad
- Minimum Error floor applied: 1 mrad
- Error Misfits Removed: No error misfits removed
- Alpha Parameters: 0.001,1,1
- Model Error Misfit: 1257 for 1257 points (100%), in 11 iterations



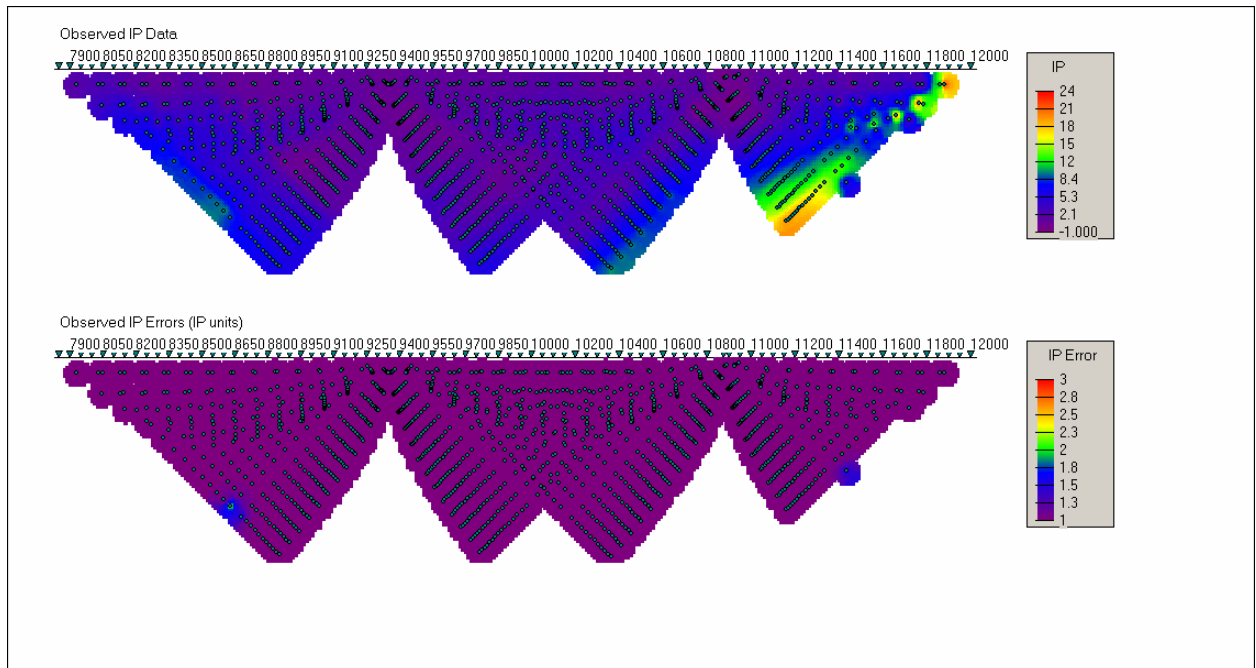
11 iter	data misfit	model norm	multiplier
0	1.40905E+04	0.00000E+00	0.00000E+00
1	1.17512E+04	2.04242E+03	2.56284E+00
2	1.00174E+04	2.86295E+03	8.40527E-01
3	7.17382E+03	8.15765E+03	3.10691E-01
4	4.33140E+03	7.08582E+03	2.91085E-01
5	2.49194E+03	1.41794E+04	8.07150E-02
6	2.13655E+03	1.36141E+04	5.45740E-02
7	1.69499E+03	2.38444E+04	1.80324E-02
8	1.34421E+03	4.77263E+04	8.51802E-03
9	1.25661E+03	4.71152E+04	8.90840E-03
10	1.25698E+03	4.45101E+04	9.82564E-03
11	1.25694E+03	4.41717E+04	9.94217E-03

1257 number of data



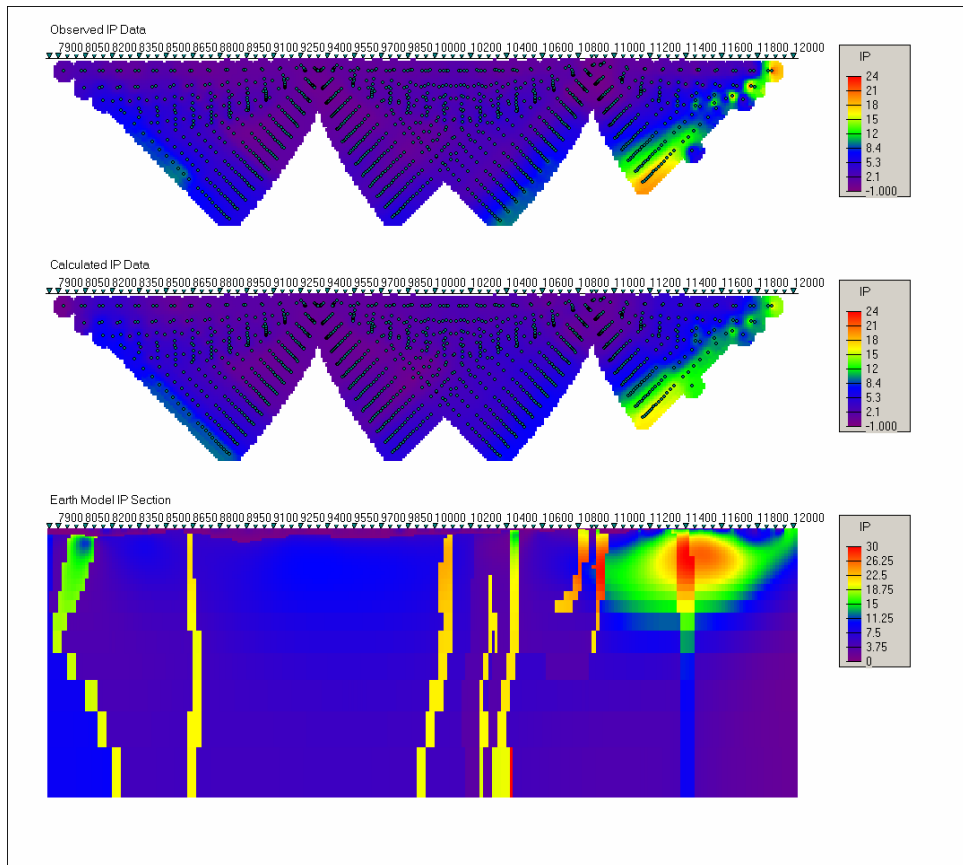
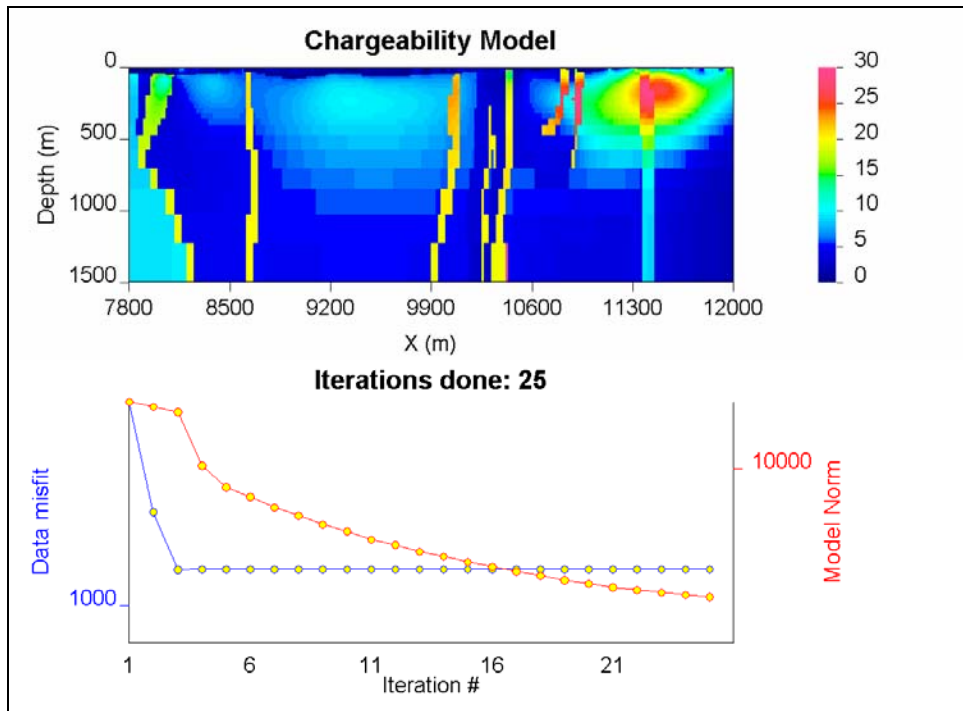
Line 11600N: Final Chargeability Model – Smooth Alphas

- Maximum data error allowed: 5 mrad
- Minimum Error floor applied: 1 mrad
- Error Misfits Removed: No error misfits removed
- Alpha Parameters: $1\text{e-}07$, 1, 1
- Model Error Misfit: 1257 for 1257 points (100%), in 25 iterations



25 iter	data misfit	model norm	multiplier
0	1.02658E+04	0.00000E+00	0.00000E+00
5	1.25702E+03	9.14365E+03	9.20310E-02
10	1.25712E+03	7.30858E+03	1.07182E-01
11	1.25714E+03	7.02546E+03	1.09559E-01
12	1.25708E+03	6.81667E+03	1.12071E-01
13	1.25714E+03	6.60949E+03	1.14734E-01
14	1.25706E+03	6.44686E+03	1.17326E-01
15	1.25716E+03	6.26877E+03	1.21189E-01
16	1.25704E+03	6.12285E+03	1.24055E-01
17	1.25713E+03	5.96816E+03	1.27786E-01
18	1.25702E+03	5.84300E+03	1.29996E-01
19	1.25708E+03	5.72230E+03	1.32599E-01
20	1.25701E+03	5.61751E+03	1.34130E-01
21	1.25707E+03	5.52273E+03	1.36673E-01
22	1.25701E+03	5.44025E+03	1.37634E-01
23	1.25704E+03	5.37305E+03	1.39066E-01
24	1.25701E+03	5.30979E+03	1.40040E-01
25	1.25703E+03	5.25996E+03	1.40999E-01

1257 number of data



APPENDIX C: MT 2D UNCONSTRAINED INVERSIONS

General Comments on Unconstrained MT Inversion Modeling: The following inverse models were calculated using on the Geotools™ MT processing and model-inversion platform. The initial data input into the Geotools database were line-station data, taken directly from the EDI (electronic data exchange) archive, contained within the logistics report, and which consist of non-derotated tensor spectra, calculated using the Quicklay™ platform. The spectra span the 15000 Hz to 0.1025 frequency bandwidth, with a data density of approximately 8 points per decade (0.15 decade band-average), with minimal data editing.

For each of the line-profiles, unconstrained 2D inversions were calculated using both the Smooth Conjugate Gradient and PW Gauss-Newton solutions. The smooth models were calculated using solely the raw non-derotated data, with the In-line XY, having a strike direction of 090O, as the TM component, and Cross-line YX, at 000O, assigned to TE. The PW Gauss-Newton models were calculated using EVA processed data, which consists of a) tensor rotation into the maximum and minimum components, using either conventional (maximizing rho XY and YX) or eigen-vector (LaTorrica decomposition) analyses, b) TM-TE mode identification, based on similar/dissimilar 2D component behaviour, c) static shifting, performed manually on individual resistivity curves, and d) curve-fitting to 1D Occam inversion model, to ensure Hilbert-transformable resistivity and phase curves –with data-editing and mode-swapping, as required, at each step of the processing stage. Other EVA processes such as 3D static-stripping and 2D topographic stripping were not performed.

In preparation for the 2D inversions, the meshes were constructed using: a) run-mesh frequencies set at 10k, 1k, 100, 10 and 0.1 Hz, b) model resistivity projection to 10 to 10k ohm-m range, c) a minimum column width of 33m to 50m (Smooth and PW, respectively), inside the data range, increasing by 50% increments to 30km off each end, laterally, d) maximum 80 rows, with a minimum

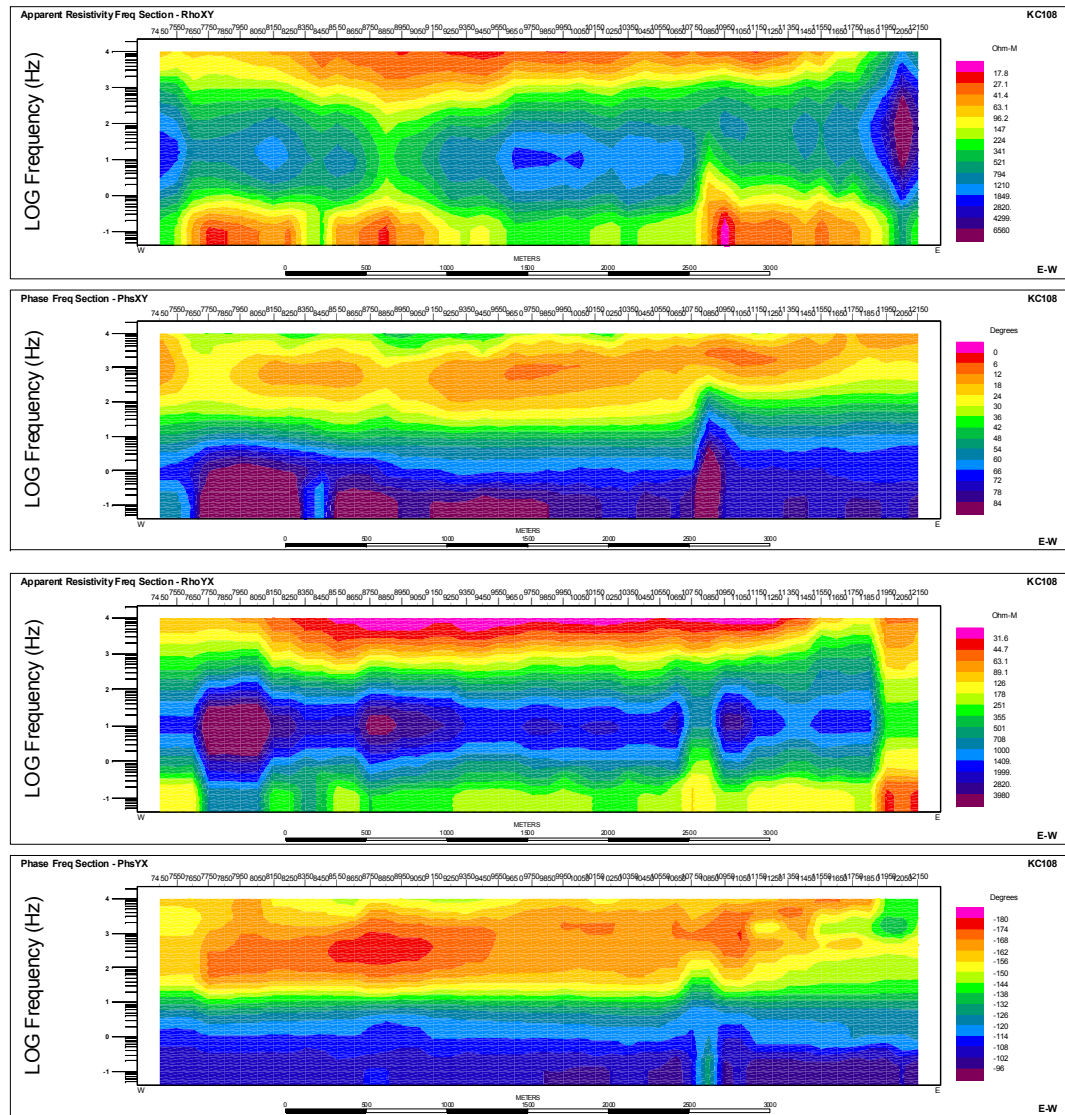
row-thickness of 10m to a depth of 1km, increasing by 10% increments to 30km depths. For the PW inversion, mesh nodes were situated at each station, and between stations for the Smooth Conjugate models.

The inversion models were calculated using the interpolated resistivity and phase curves, across the 10kHz to 0.1Hz bandwidth, assuming a 2% error for the resistivity and 3 degrees for the phase, at 6 equi-spaced frequencies per decade for the PW and 4 pts/decade for the Smooth models. The inversion parameters for the Smooth model used a maximum of 100 iterations, Tau set to 3, and a noise floor of 5%. The PW inversion parameters used a Tolerance of 1, 40 single rows, and a regularization width/depth ratio of 0.1. The Smooth models were performed in a single-stage, using a uniform half-space starting model, optimized for the 10-10k ohm-m resistivity range. The PW models were performed in 3 stages, by first calculating a Smooth model inversion for the EVA-processed data, then using this as a starting model for the TM mode calculation, and subsequently using the TM mode solution as a reference for the final TM-TE mode calculation.

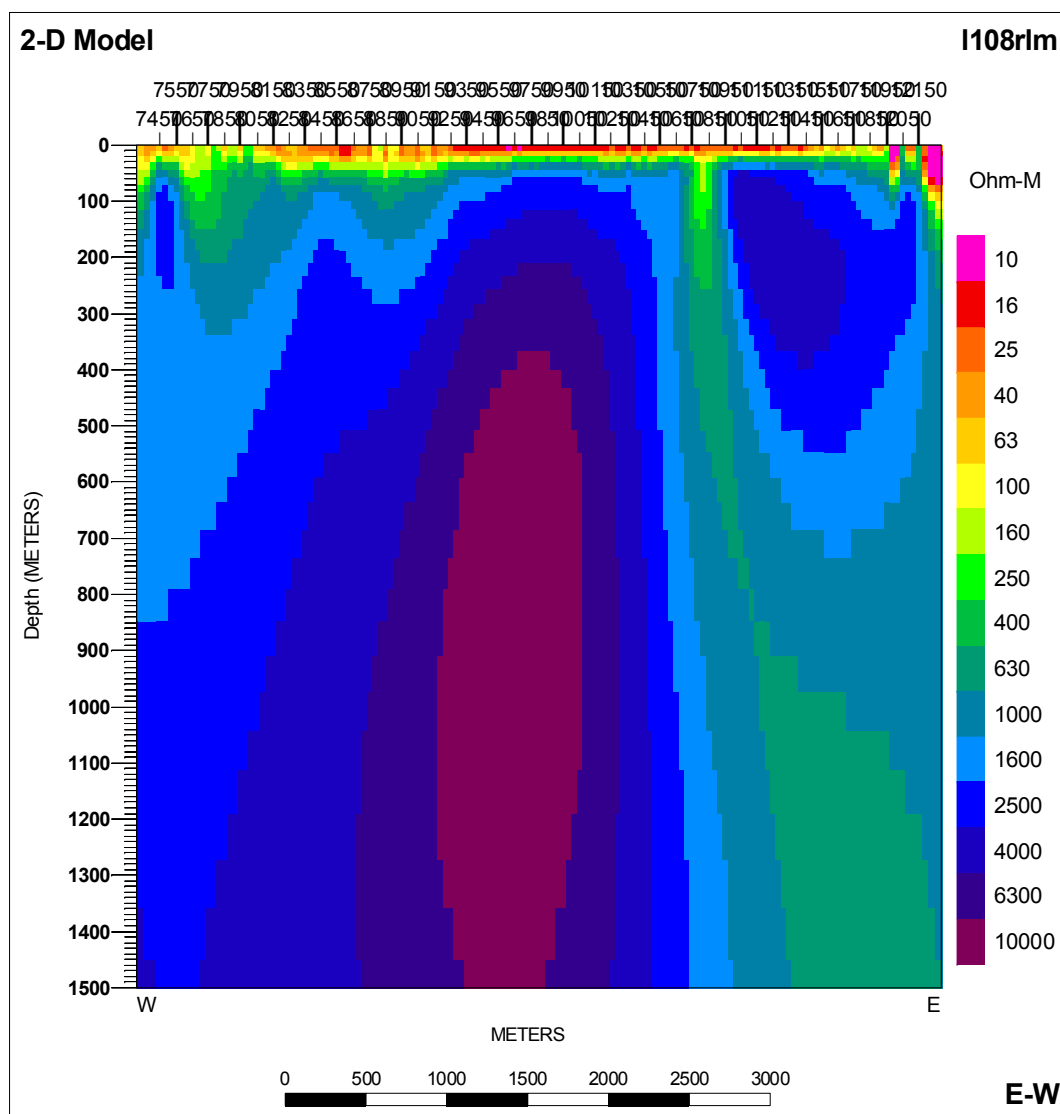
Table C.4: Model Convergences for 2D Unconstrained MT Inversions.

<u>MT Resistivity Inversions</u>		
<u>Line</u>	<u>Unconstrained Smooth Conjugate Gradient</u>	<u>Unconstrained PW Gauss-Newton</u>
10800E	TM-TE rms error = 5.64% in 40 iterations	TM rms error $\approx$ 5% in 20 iterations
		TM-TE rms error $\approx$ 6% in 16 iterations
11000E	TM-TE rms error = 6.20% in 35 iterations	TM rms error $\approx$ 6% in 36 iterations
		TM-TE rms error = 6.8% in 24 iterations
11200E	TM-TE rms error = 7.30% in 30 iterations	TM rms error $\approx$ 8% in 29 iterations
		TM-TE rms error 11.4% in 18 iterations
11400E	TM-TE rms error = 6.13% in 30 iterations	TM rms error =5.7% in 34 iterations
		TM-TE rms error =6.6% in 22 iterations
11600E	TM-TE rms error = 5.73% in 35 iterations	TM rms error =5.6% in 25 iterations
		TM-TE rms error =7.6% in 26 iterations

Line 10800N: Preliminary Resistivity Model (Smooth Conjugate Gradient)



Raw Unrotated (Cagniard) RhoXY/PhaseXY and RhoYX/PhaseYX Pseudosections (I108all).



Line 108+00N – Smooth Conjugate 2D MT Model, in 40 Iterations

Smooth Conjugate Gradient Run Log

```

inv. iter.=    40   line search iter.=    0
data (S1): 128230.7   model roughness (S2): 3562.911
  model closeness (s3): 0.0000000E+00   total S= 131793.6
iteration #    40
resistivity values are:
data for block    16
rms error for this location = 5.922922
data for block    19
rms error for this location = 5.367155
data for block    22

```

```

rms error for this location = 5.071963
data for block      25
rms error for this location = 9.399060
data for block      28
rms error for this location = 9.731789
data for block      31
rms error for this location = 10.45592
data for block      34
rms error for this location = 10.24959
data for block      37
rms error for this location = 4.589727
data for block      40
rms error for this location = 4.528864
data for block      43
rms error for this location = 3.775366
data for block      46
rms error for this location = 4.549451
data for block      49
rms error for this location = 2.627922
data for block      52
rms error for this location = 2.155358
data for block      55
rms error for this location = 6.021069
data for block      58
rms error for this location = 5.902586
data for block      61
rms error for this location = 4.298195
data for block      64
rms error for this location = 4.293740
data for block      67
rms error for this location = 3.329914
data for block      70
rms error for this location = 3.703288
data for block      73
rms error for this location = 3.498380
data for block      76
rms error for this location = 3.148170
data for block      79
rms error for this location = 3.306159
data for block      82
rms error for this location = 3.234162
data for block      85
rms error for this location = 3.353295
data for block      88
rms error for this location = 3.327591
data for block      91
rms error for this location = 3.113076
data for block      94
rms error for this location = 3.111560
data for block      97
rms error for this location = 3.454086
data for block     100

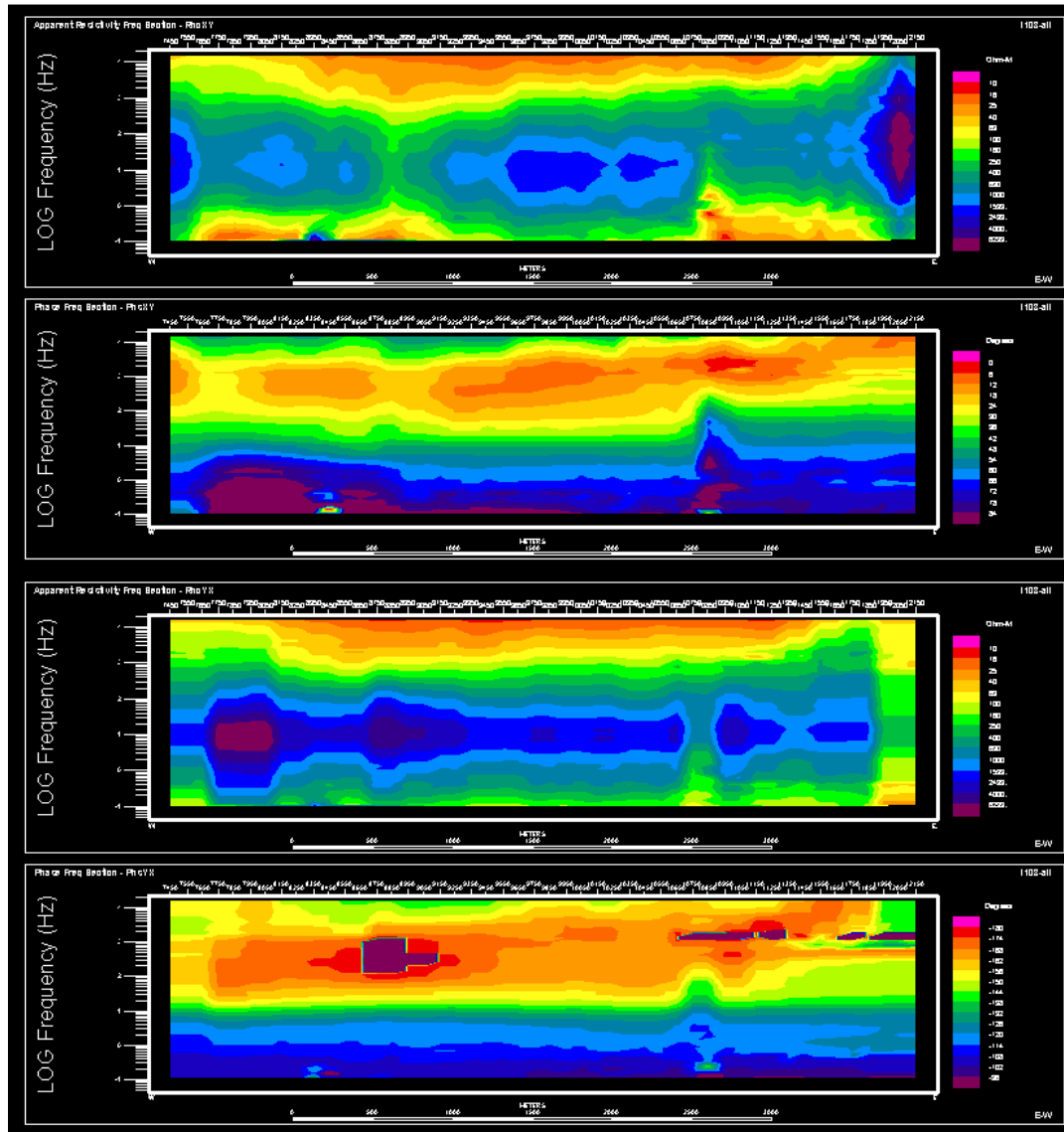
```

```

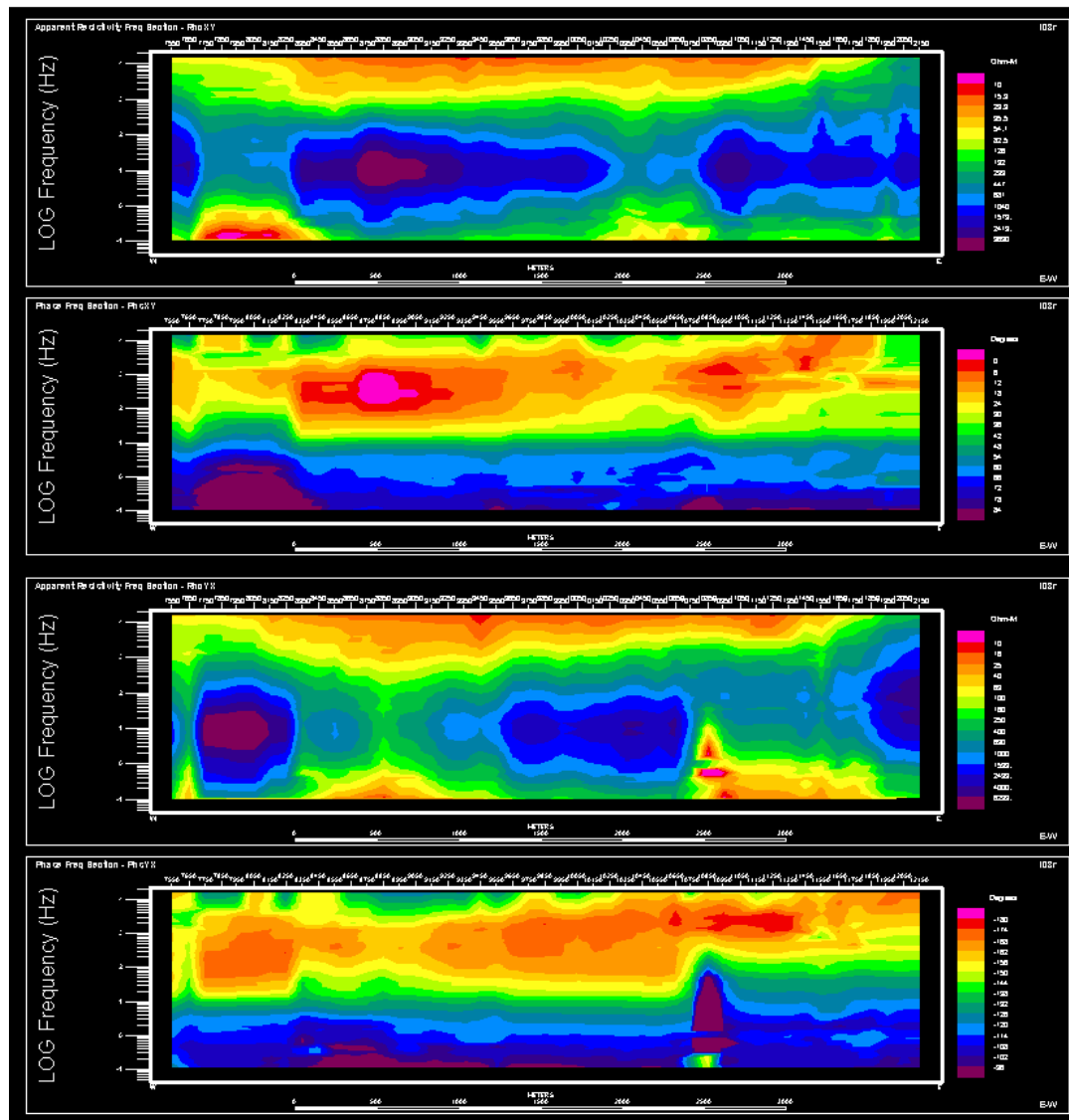
rms error for this location = 3.528216
data for block      103
rms error for this location = 3.804482
data for block      106
rms error for this location = 3.151114
data for block      109
rms error for this location = 3.168588
data for block      112
rms error for this location = 4.248799
data for block      115
rms error for this location = 6.561214
data for block      118
rms error for this location = 9.258018
data for block      121
rms error for this location = 8.511983
data for block      124
rms error for this location = 6.229877
data for block      127
rms error for this location = 3.730962
data for block      130
rms error for this location = 3.699515
data for block      133
rms error for this location = 3.100558
data for block      136
rms error for this location = 3.037973
data for block      139
rms error for this location = 3.987668
data for block      142
rms error for this location = 3.782837
data for block      145
rms error for this location = 3.970016
data for block      148
rms error for this location = 4.525919
data for block      151
rms error for this location = 10.36608
data for block      154
rms error for this location = 9.894411
data for block      157
rms error for this location = 9.911416
data (S1): 128230.7    model roughness (S2): 3562.911
    model closeness (s3): 0.0000000E+00    total S= 131793.6
rms error for previous iteration= 5.661256
rms error for current iteration= 5.639437
desired chi square for this model= 4032.000
chi square for previous iteration = 129224.9
chi square for current iteration = 128230.7

```

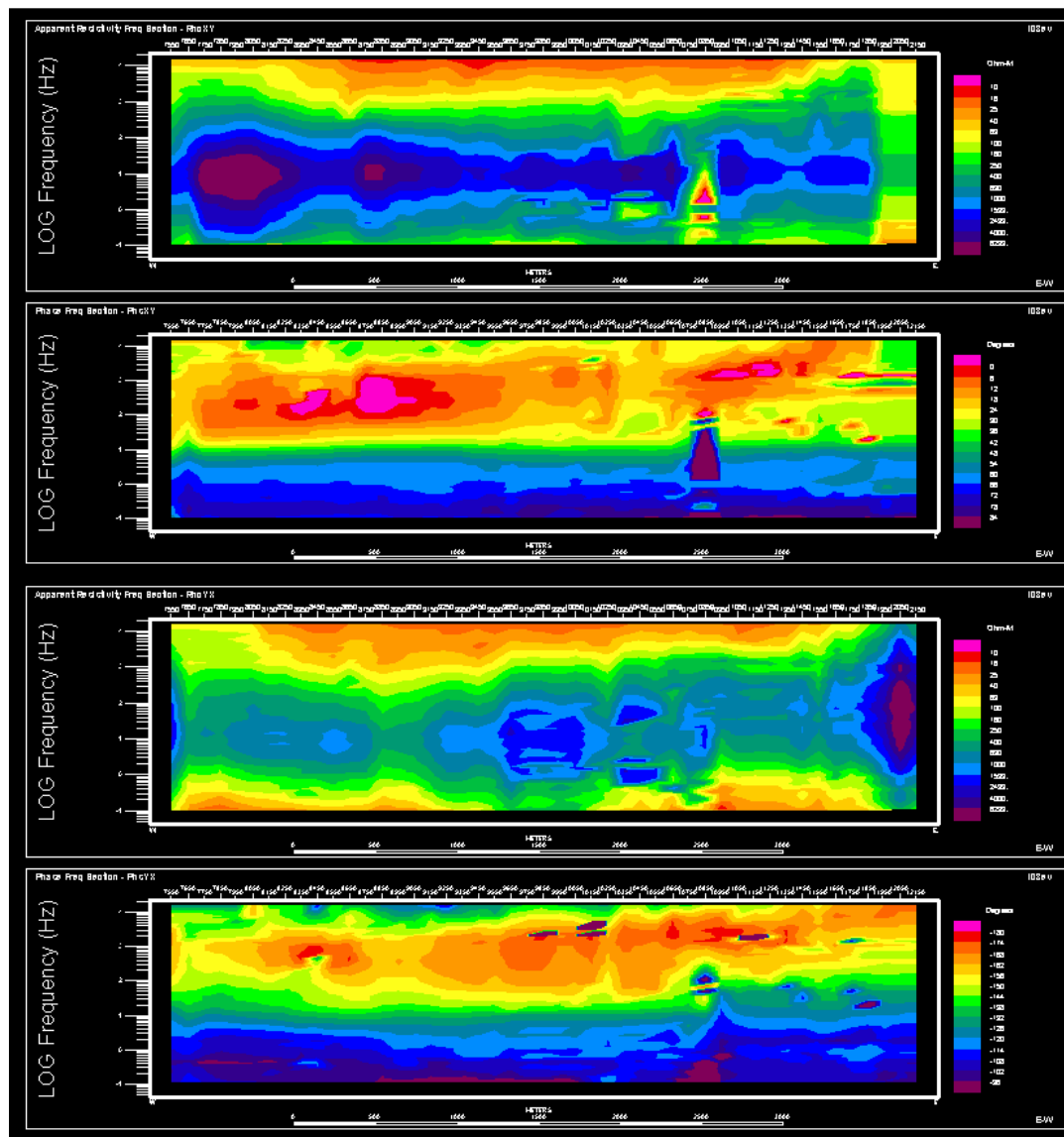
Line 10800N: Final PW Resistivity Model (minimal static-shifting applied).



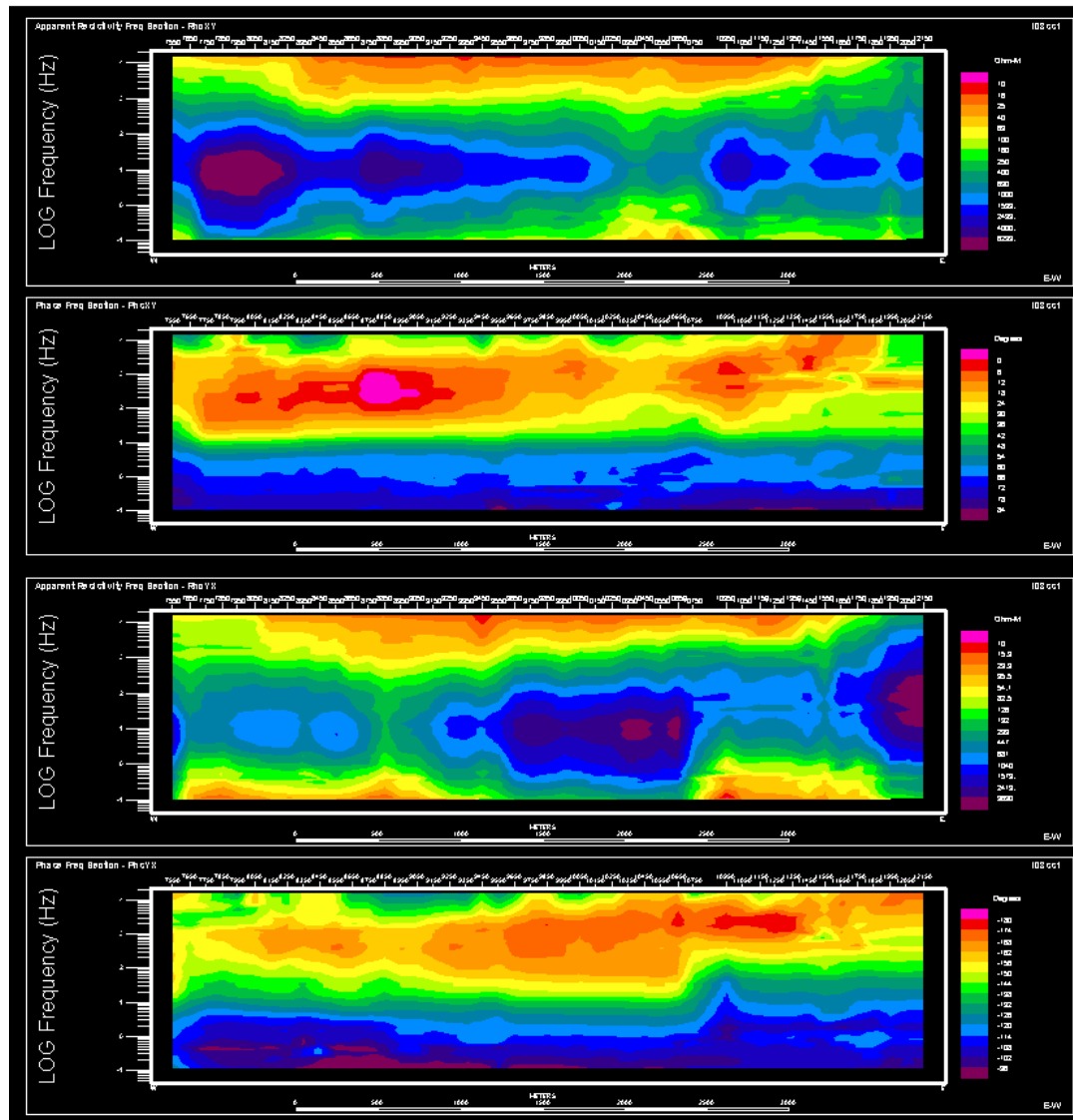
Unrotated RhoXY/PhaseXY and RhoYX/PhaseYX (I108all)



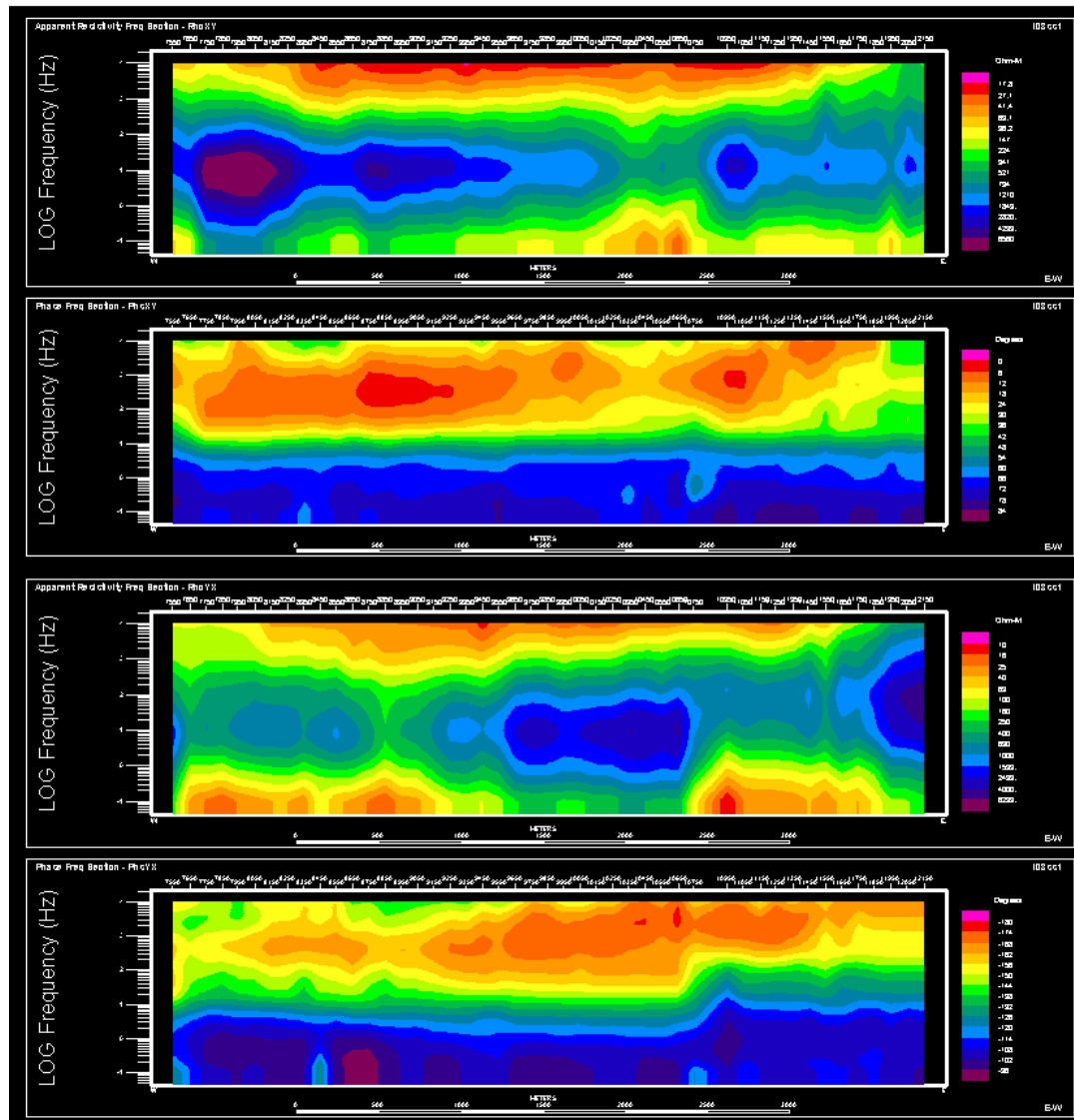
Rotated RhoXY/PhaseXY and RhoYX/PhaseYX (I108r)



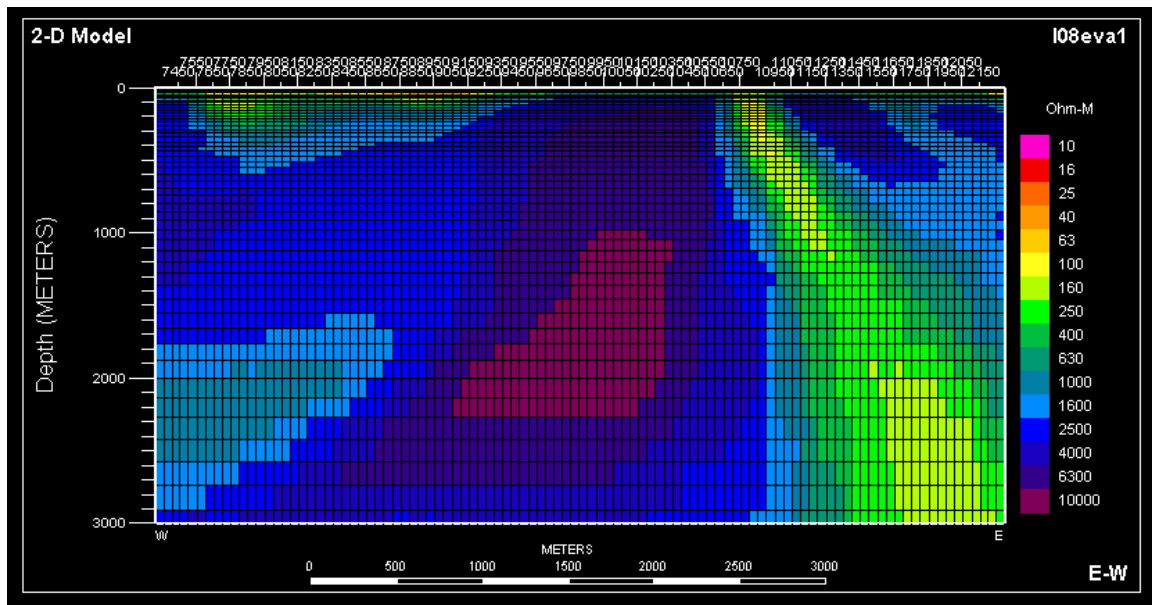
Eigen-vector Rotated RhoXY/PhaseXY and RhoYX/PhaseYX (I108ev)



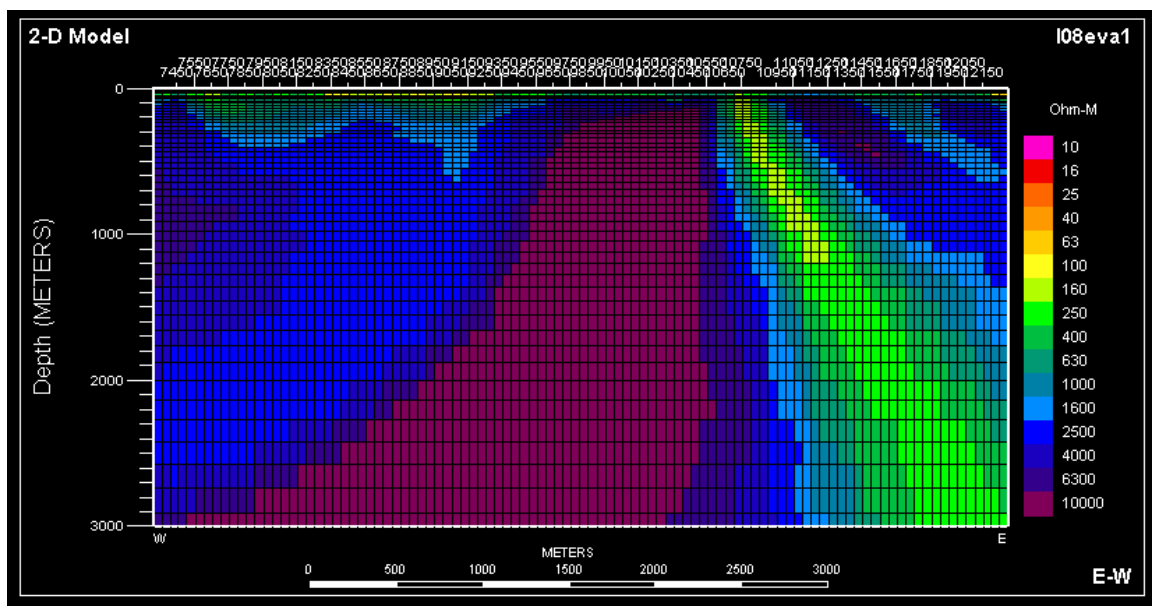
Static-Shifted (mixed rot + eva) RhoXY/PhaseXY and RhoYX/PhaseYX (I108ss1)



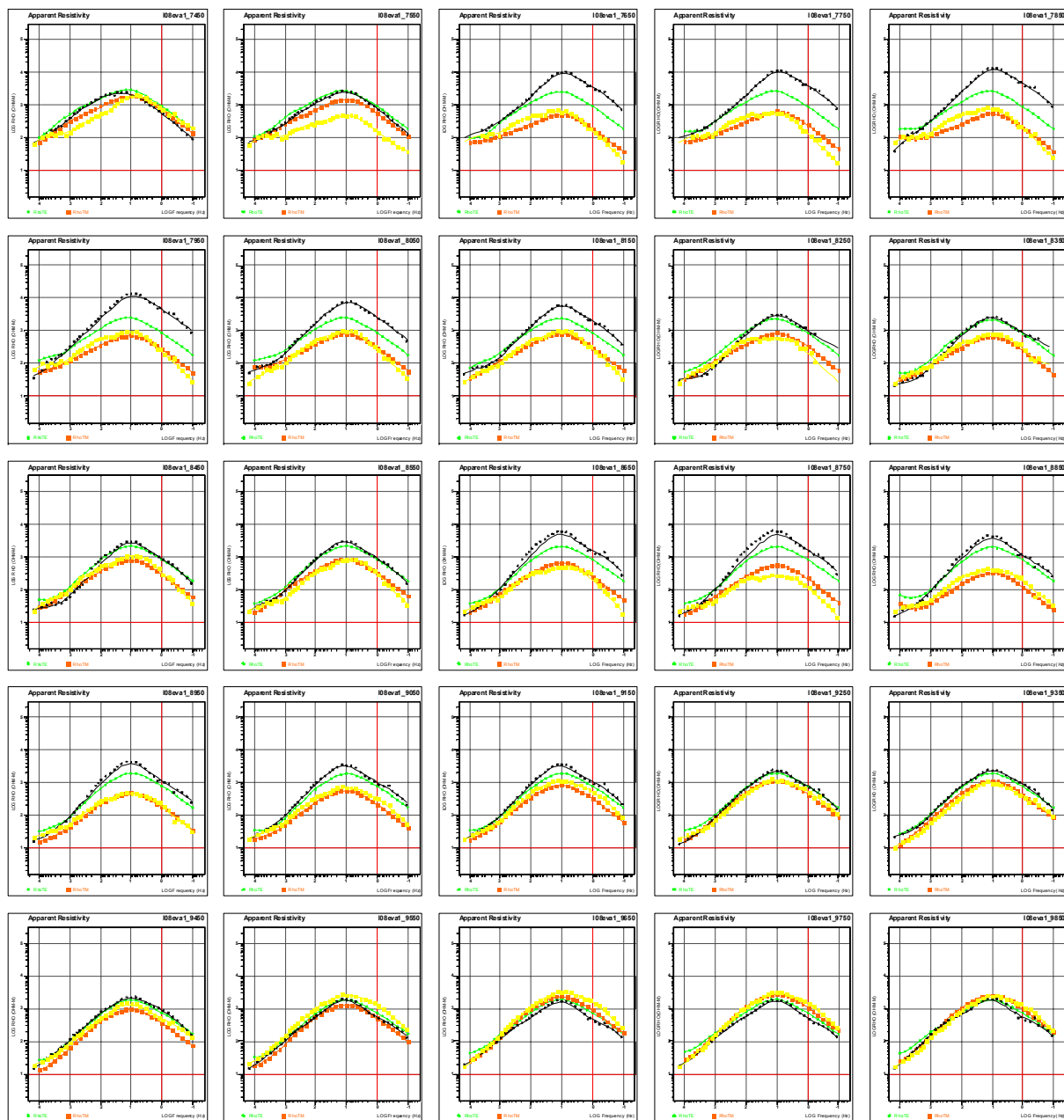
Occam 1D Curve-Fitted (using I108ss1) RhoXY/P haseXY and RhoYX/PhaseYX



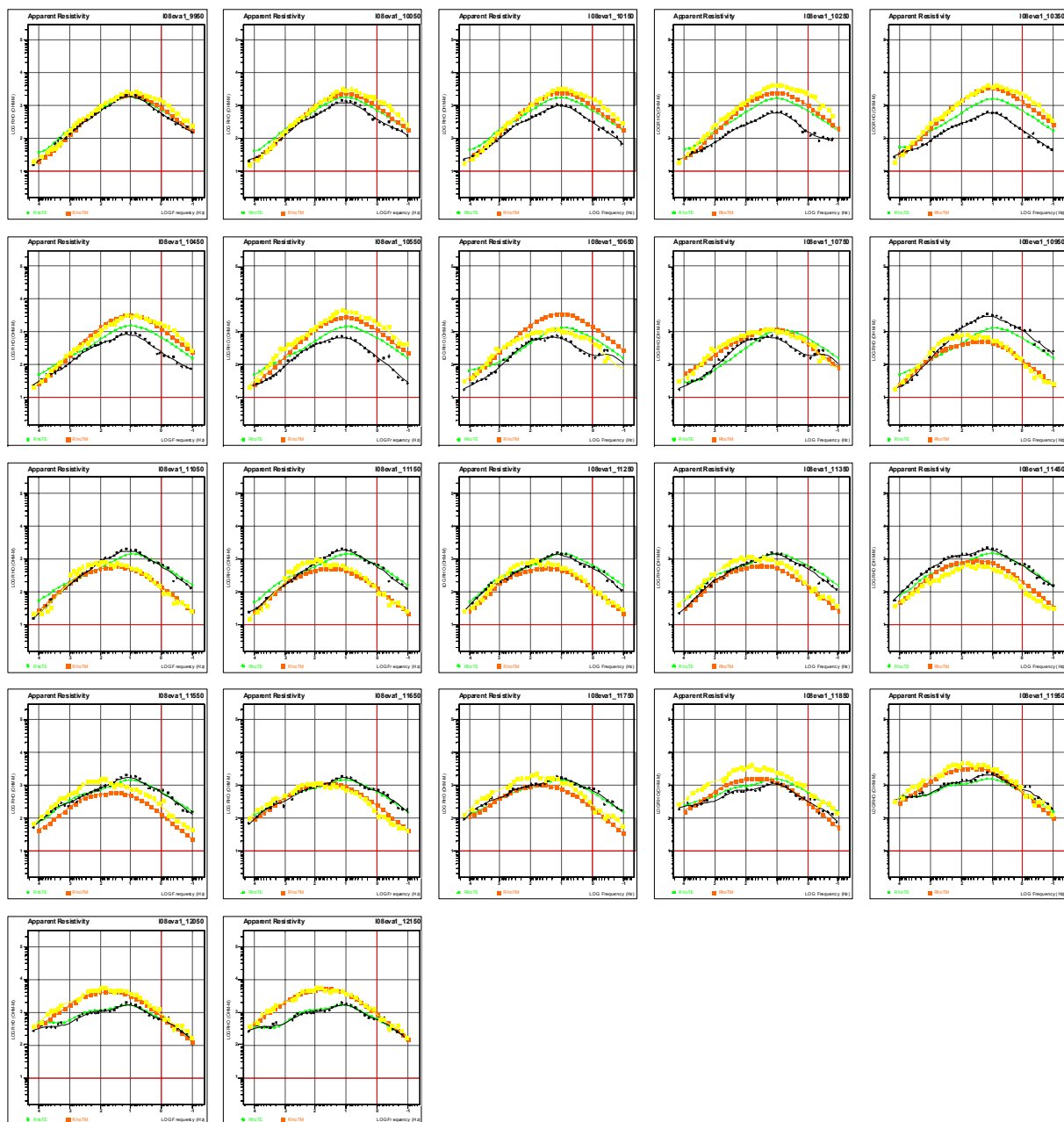
TM Mode PW Resistivity Model #1 (I108eva1) using Eva-processed data (I108ss1), and Smooth Conjugate



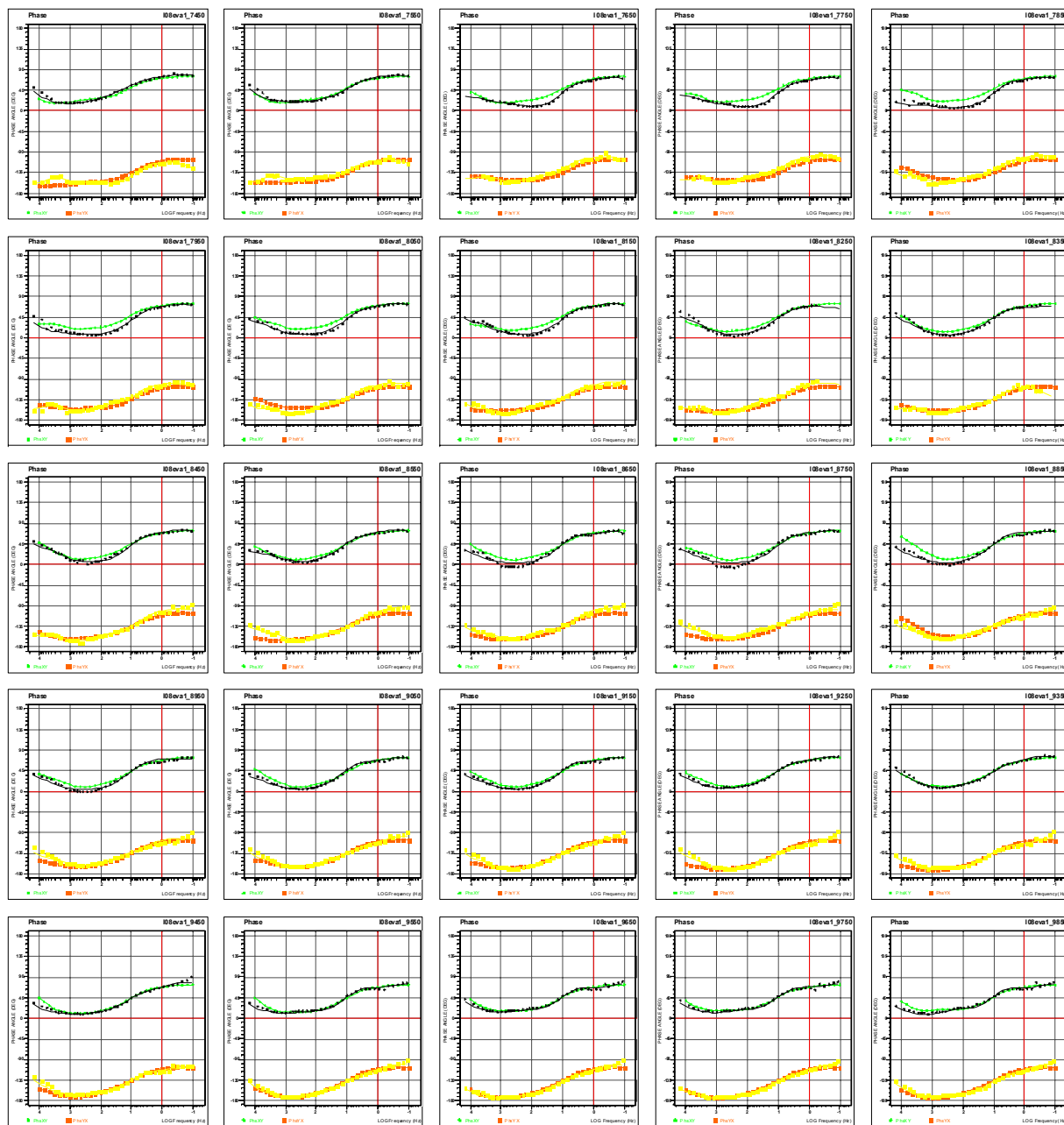
Final TM-TE Mode PW Resistivity Model (I108eva1), using TM Mode Starting Model, at Iter. 16 (rms error $\approx 6\%$)



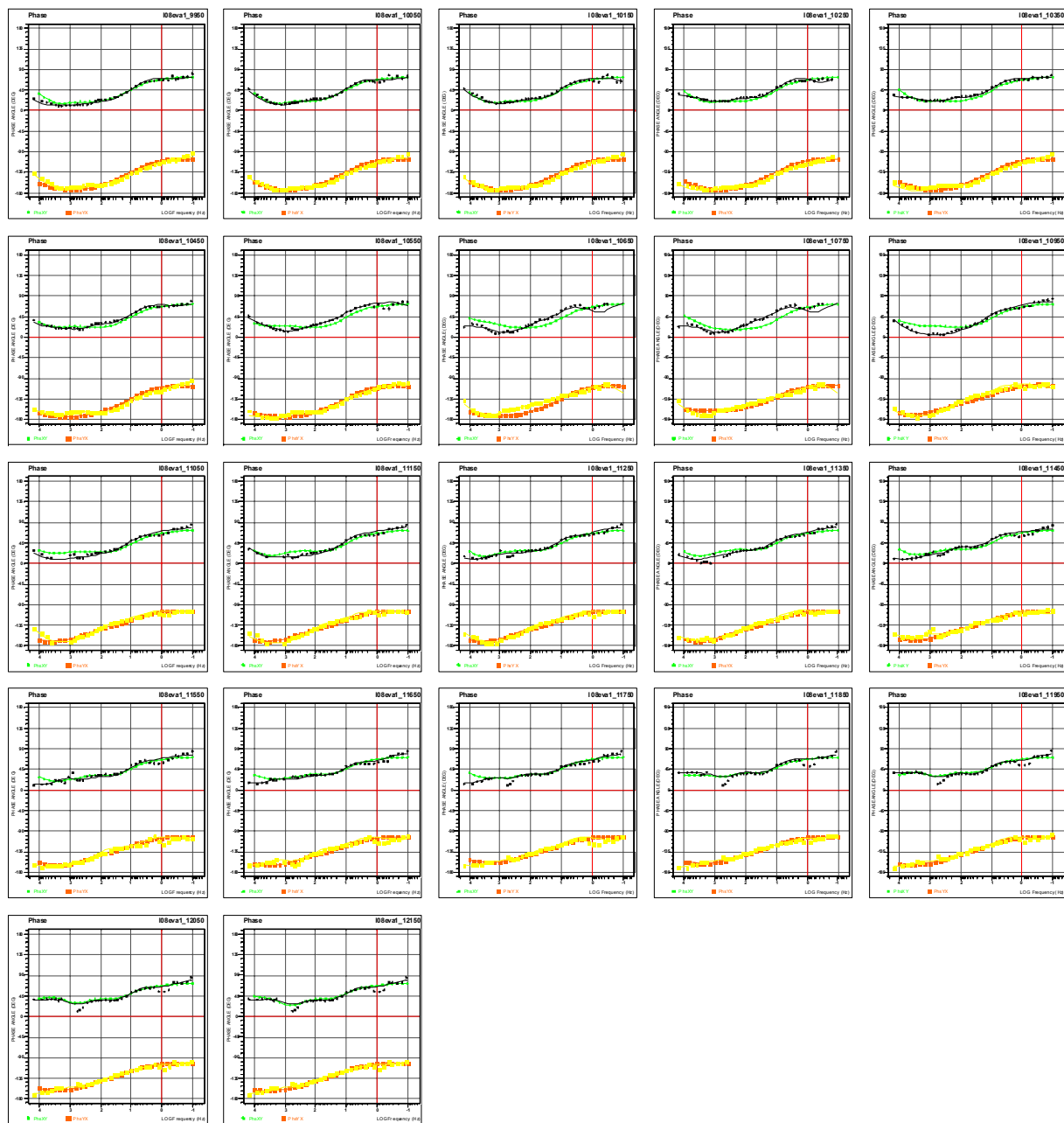
Resistivity Response Comparison (1/2): L108eva1 vs L108ss1 (7450E-9850E)



Resistivity Response Comparison (2/2): L108eva1 vs L108ss1 (9950E-12150E)

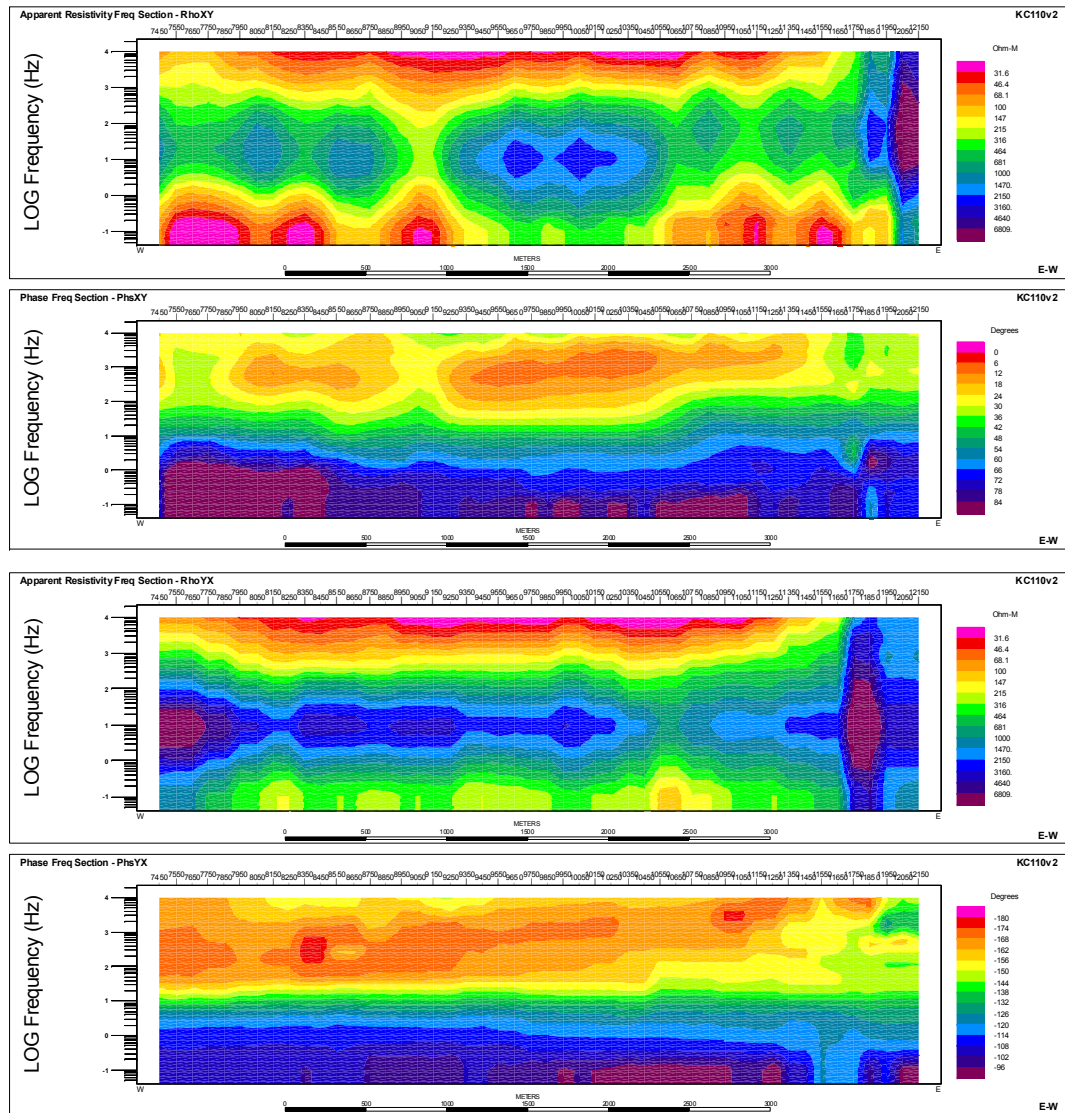


Phase Response Comparison (1/2): L108eva1 vs L108ss1 (7450E-9850E)

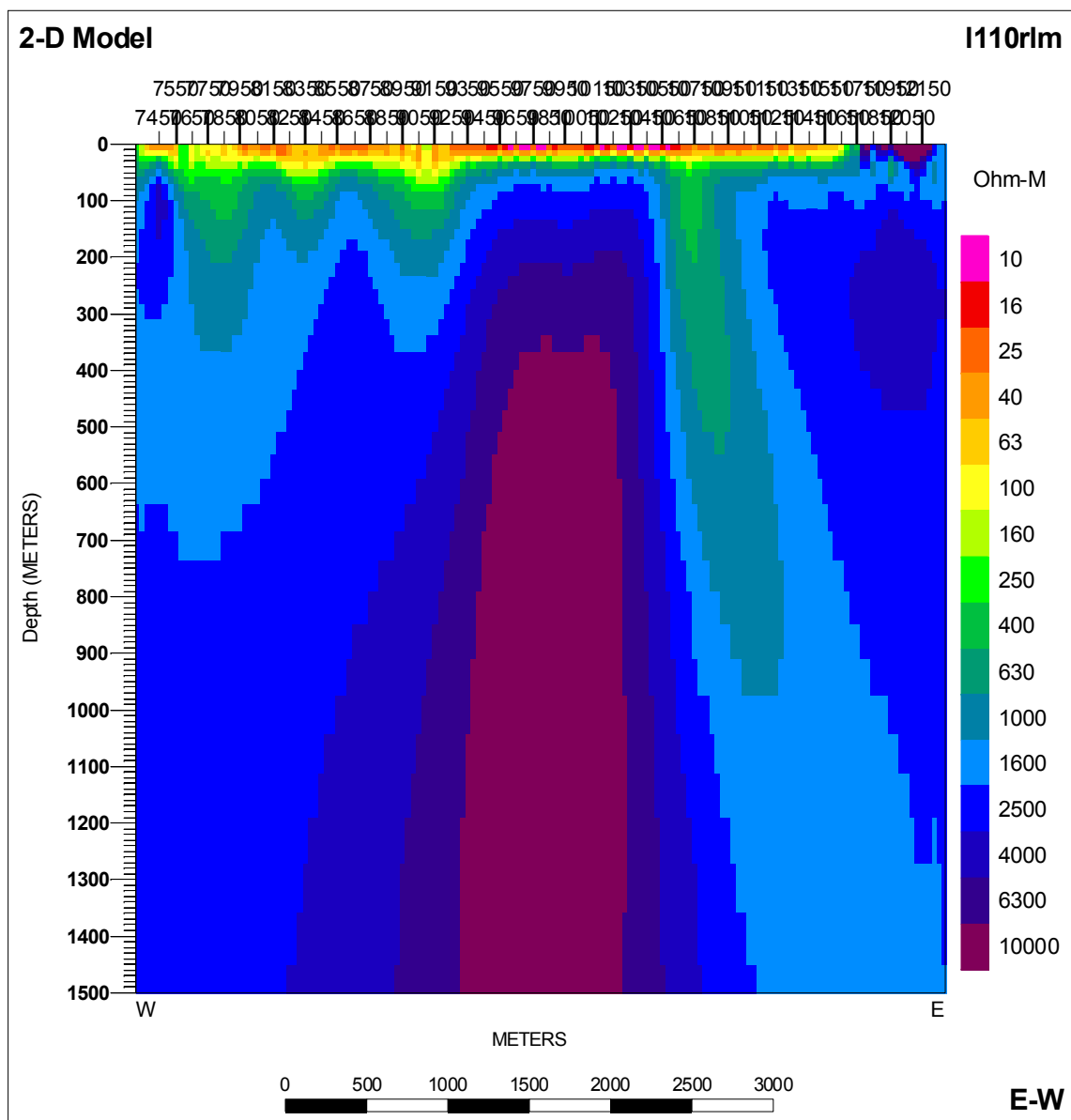


Phase Response Comparison (2/2): L108eva1 vs L108ss1 (9950E-12150E)

Line 110+00N: Preliminary Resistivity Model (Smooth Conjugate Gradient)



Raw Unrotated (Cagniard) RhoXY/PhaseXY and RhoYX/PhaseYX
Pseudosections (I110all).



Line 110+00N – Preliminary 2D MT Model – 40 Iterations

Smooth Conjugate Gradient Run Log

```

inv. iter.=      35   line search iter.=      0
data (S1):  154952.3   model roughness (S2):  1892.749
  model closeness (s3):  0.0000000E+00   total S=  156845.0
iteration #      35
resistivity values are:
data for block    23
rms error for this location =  8.647927
  
```

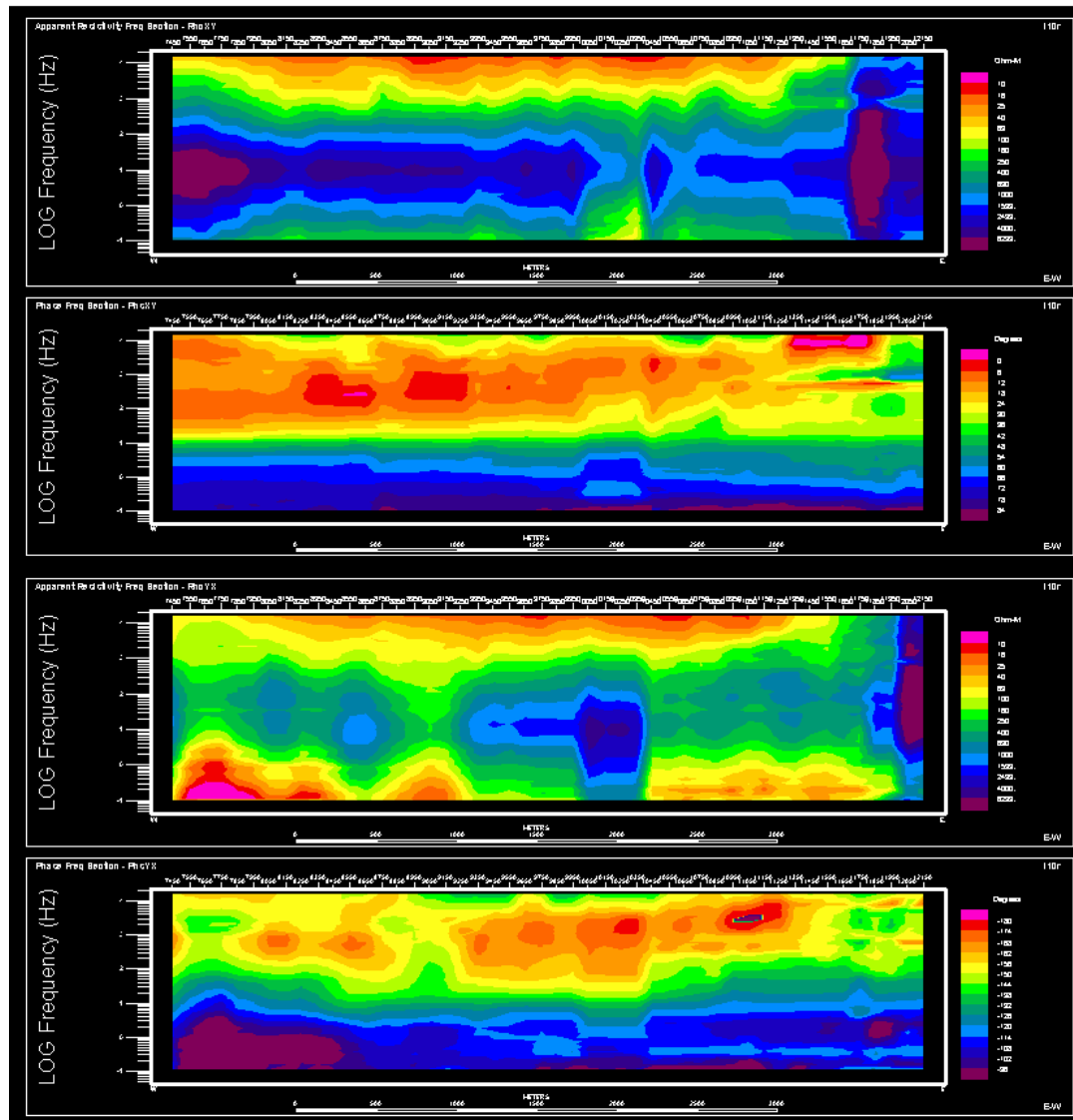
data for block	26
rms error for this location =	9.773805
data for block	29
rms error for this location =	10.34331
data for block	32
rms error for this location =	7.106716
data for block	35
rms error for this location =	6.216441
data for block	38
rms error for this location =	3.920135
data for block	41
rms error for this location =	3.670545
data for block	44
rms error for this location =	5.044762
data for block	47
rms error for this location =	4.939589
data for block	50
rms error for this location =	4.448887
data for block	53
rms error for this location =	3.361746
data for block	56
rms error for this location =	3.709659
data for block	59
rms error for this location =	4.024819
data for block	62
rms error for this location =	3.743322
data for block	65
rms error for this location =	3.566786
data for block	68
rms error for this location =	3.486152
data for block	71
rms error for this location =	3.805642
data for block	74
rms error for this location =	3.479791
data for block	77
rms error for this location =	3.273956
data for block	80
rms error for this location =	4.781905
data for block	83
rms error for this location =	4.970755
data for block	86
rms error for this location =	4.853489
data for block	89
rms error for this location =	4.763937
data for block	92
rms error for this location =	5.096604
data for block	95
rms error for this location =	4.505481
data for block	98
rms error for this location =	4.271440
data for block	101
rms error for this location =	4.146243

```

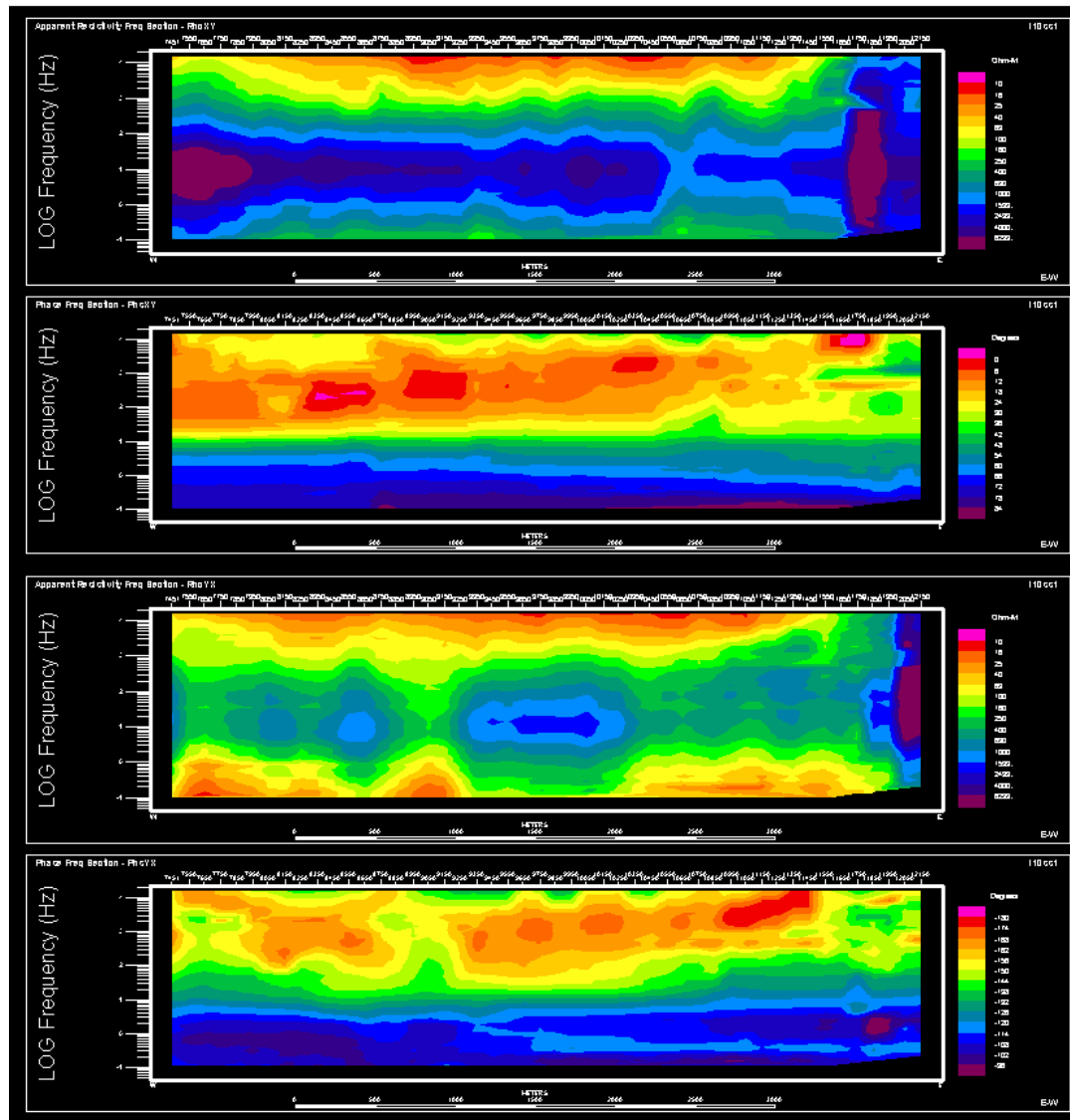
data for block      104
rms error for this location =  4.616745
data for block      107
rms error for this location =  4.582098
data for block      110
rms error for this location =  6.123816
data for block      113
rms error for this location =  5.750681
data for block      116
rms error for this location =  8.773131
data for block      119
rms error for this location =  8.527632
data for block      122
rms error for this location =  5.841248
data for block      125
rms error for this location =  6.033228
data for block      128
rms error for this location =  4.420711
data for block      131
rms error for this location =  4.098778
data for block      134
rms error for this location =  4.368571
data for block      137
rms error for this location =  4.313434
data for block      140
rms error for this location =  2.979171
data for block      143
rms error for this location =  2.804601
data for block      146
rms error for this location =  3.317829
data for block      149
rms error for this location =  4.347336
data for block      152
rms error for this location = 15.80488
data for block      155
rms error for this location = 16.17073
data for block      158
rms error for this location =  7.030043
data for block      161
rms error for this location =  5.882305
data for block      164
rms error for this location =  6.136784
data (S1): 154952.3    model roughness (S2): 1892.749
model closeness (s3): 0.000000E+00    total S= 156845.0
rms error for previous iteration=  6.215312
rms error for current iteration=  6.199244
desired chi square for this model=  4032.000
chi square for previous iteration = 155756.6
chi square for current iteration = 154952.3

```

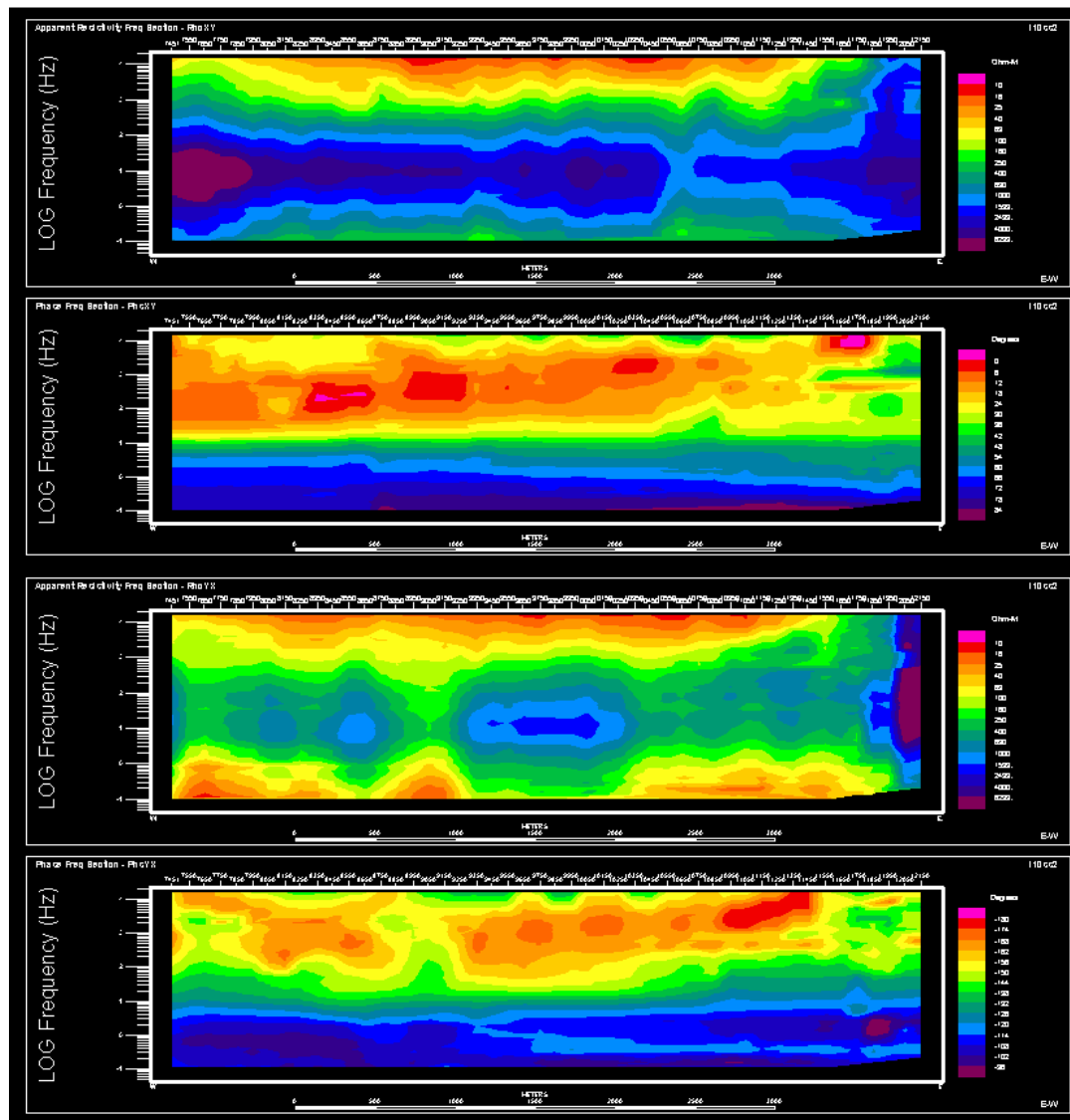
Line 11000N: Final PW Resistivity Model (additional static shifting applied to data).



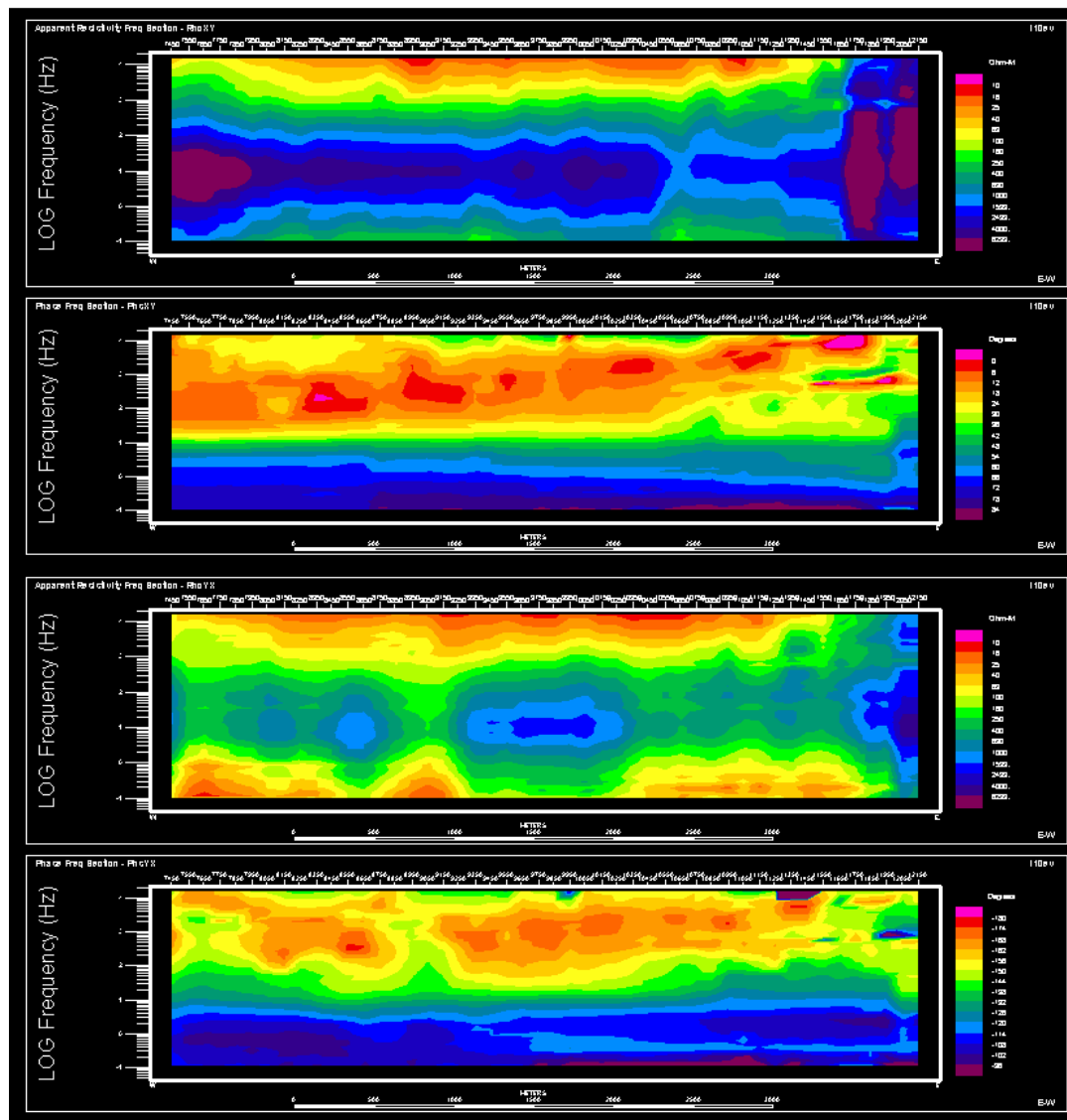
Unrotated RhoXY/PhaseXY and RhoYX/PhaseYX (I110all)



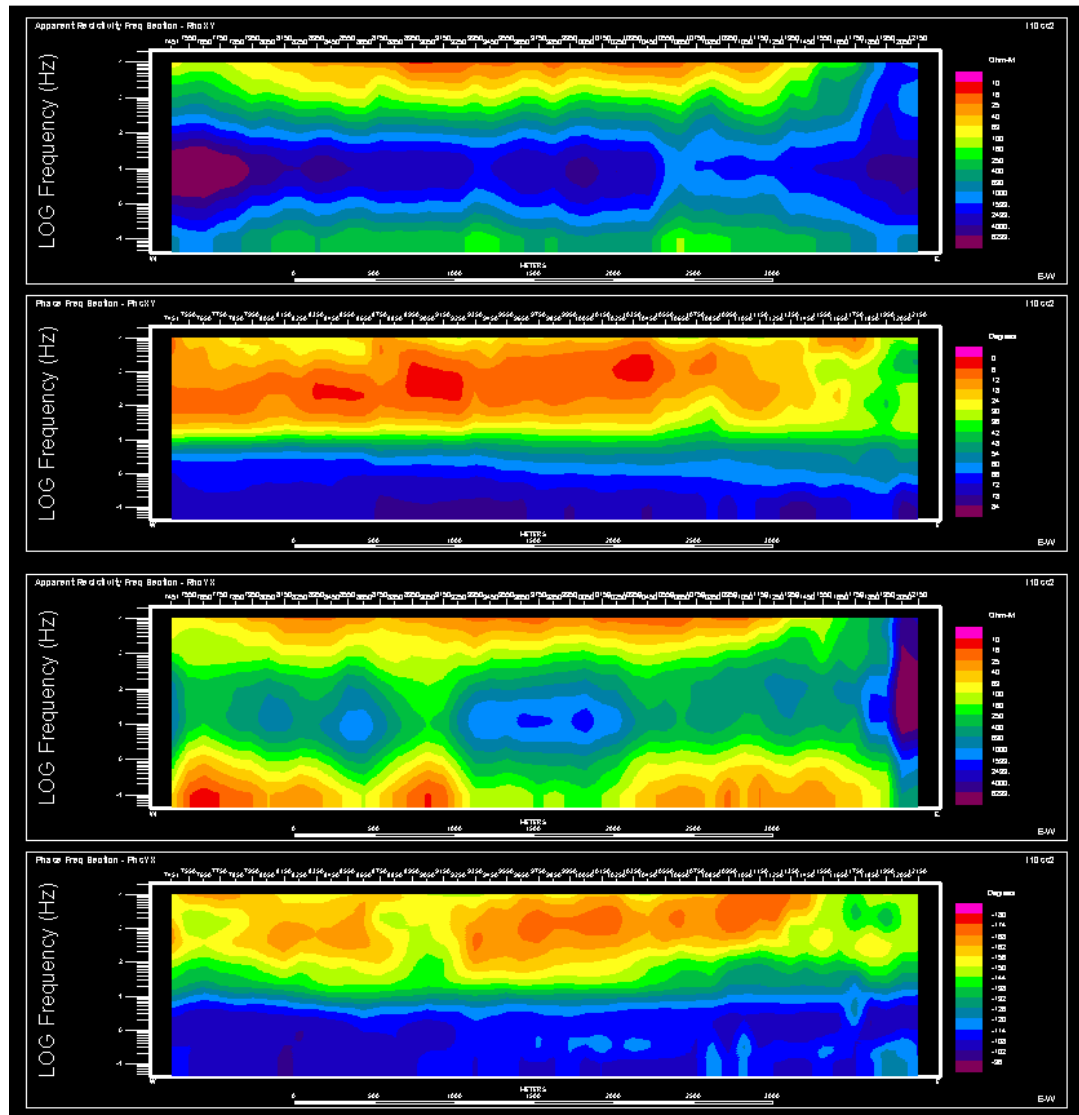
Rotated (Res Max-Min) RhoXY/PhaseXY and RhoYX/PhaseYX (I110r)



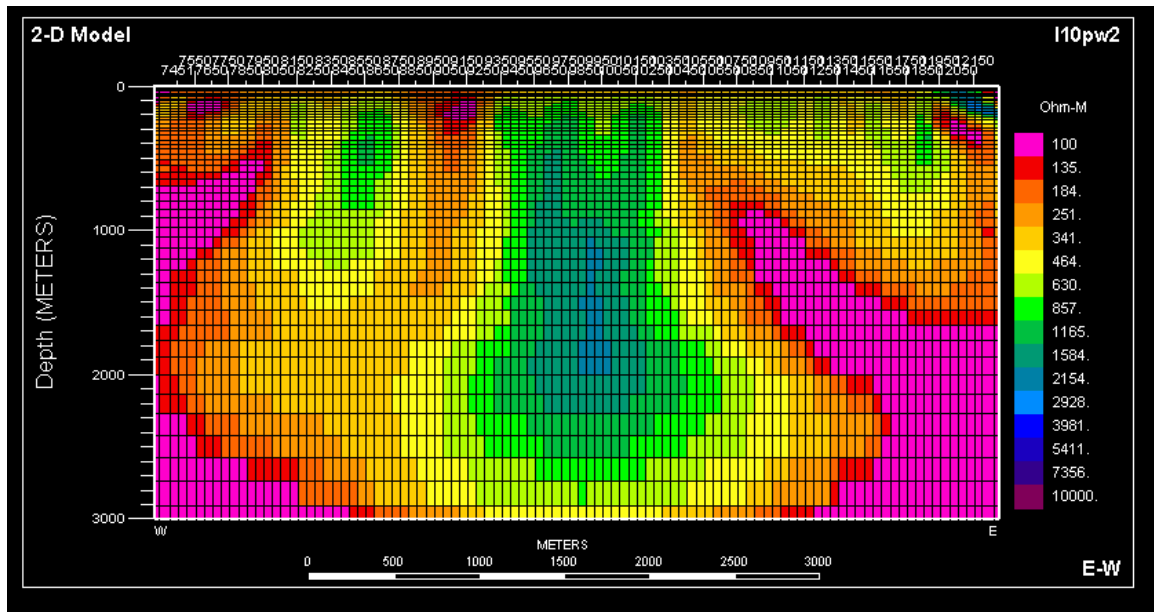
Eigen-vector Rotated RhoXY/PhaseXY and RhoYX/PhaseYX (I110ev)



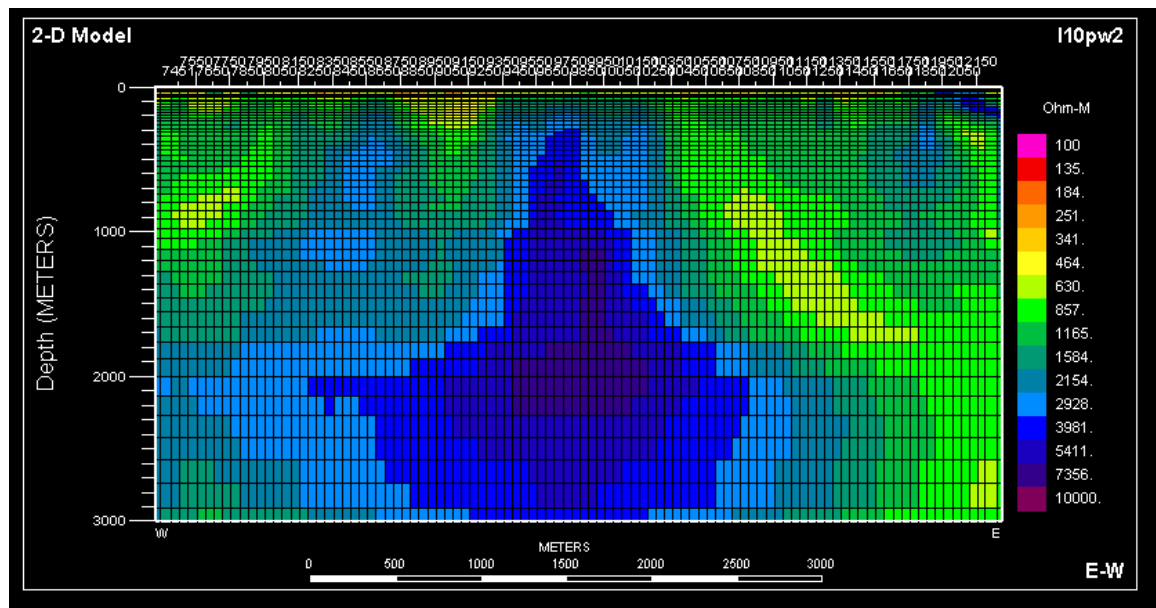
Static-Shifted Data (I110ss2) RhoXY/PhaseXY and RhoYX/PhaseYX



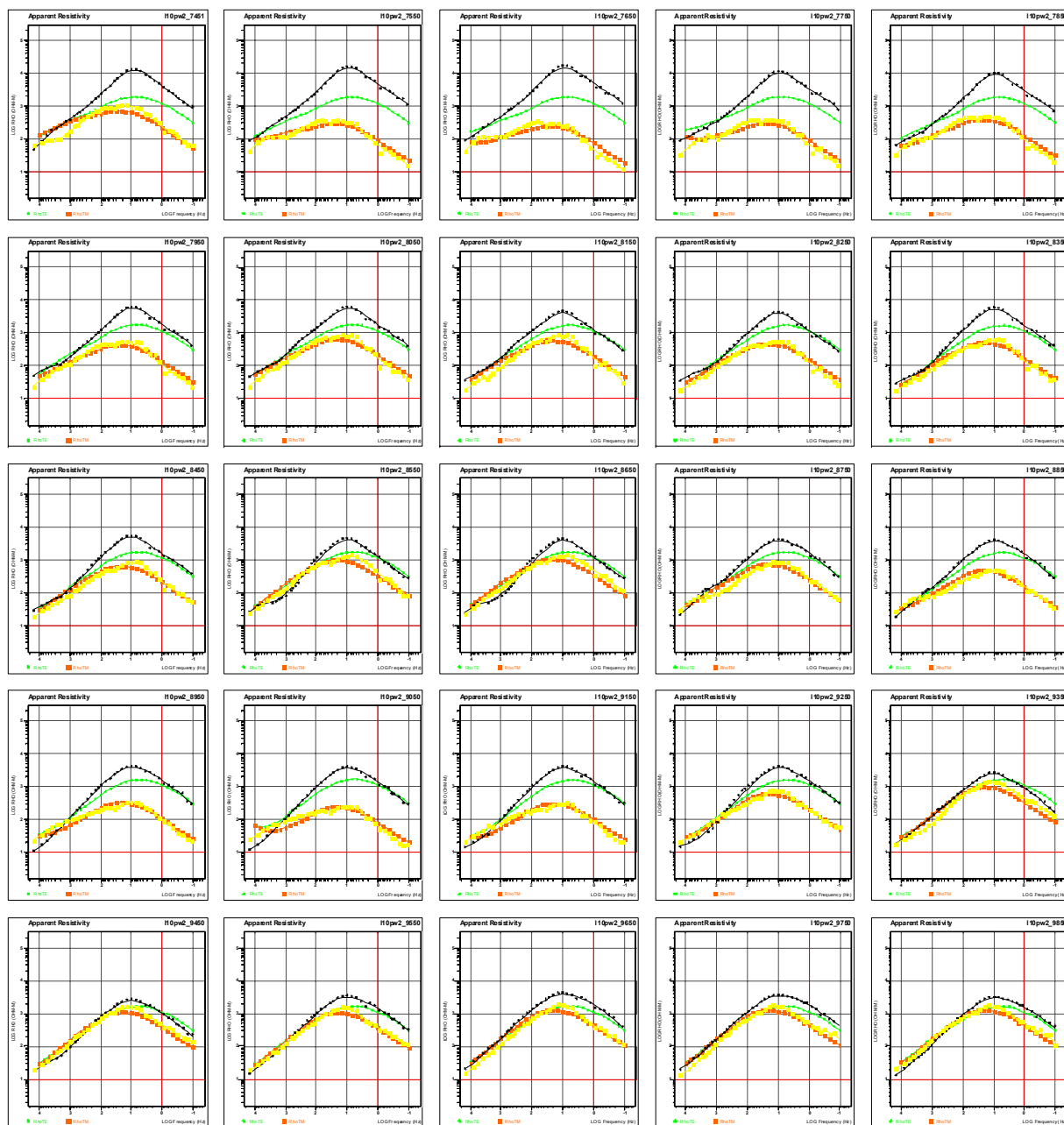
Occam 1D Curve-Fitted (using I110ss2) RhoXY/P haseXY and RhoYX/PhaseYX



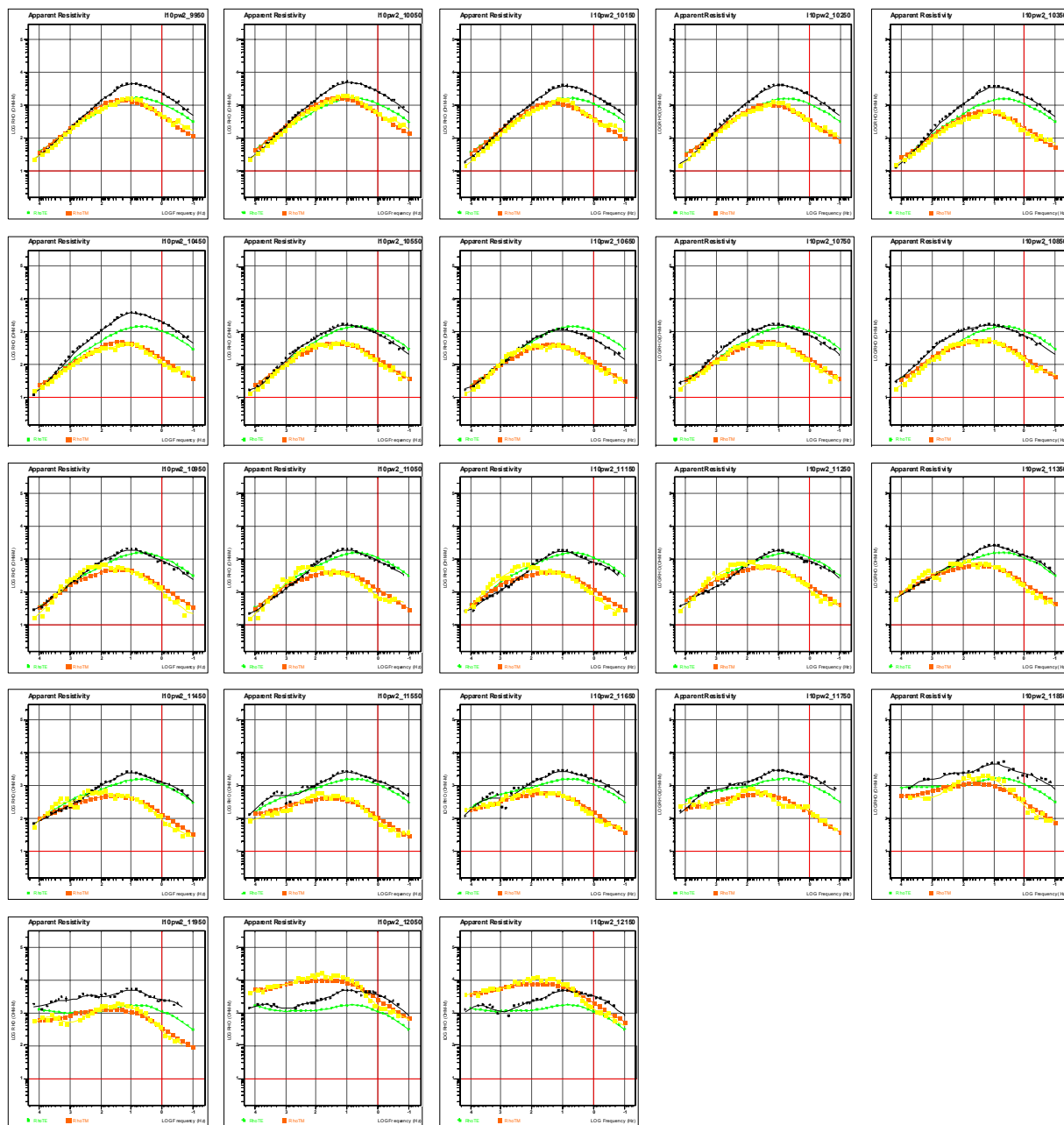
TM Mode PW Resistivity Model (I110pw2) using Eva-processed data (I110ss2, using Smooth Conjugate Starting Model (I110rlm2), at Iter 36 (rms error $\approx 6\%$))



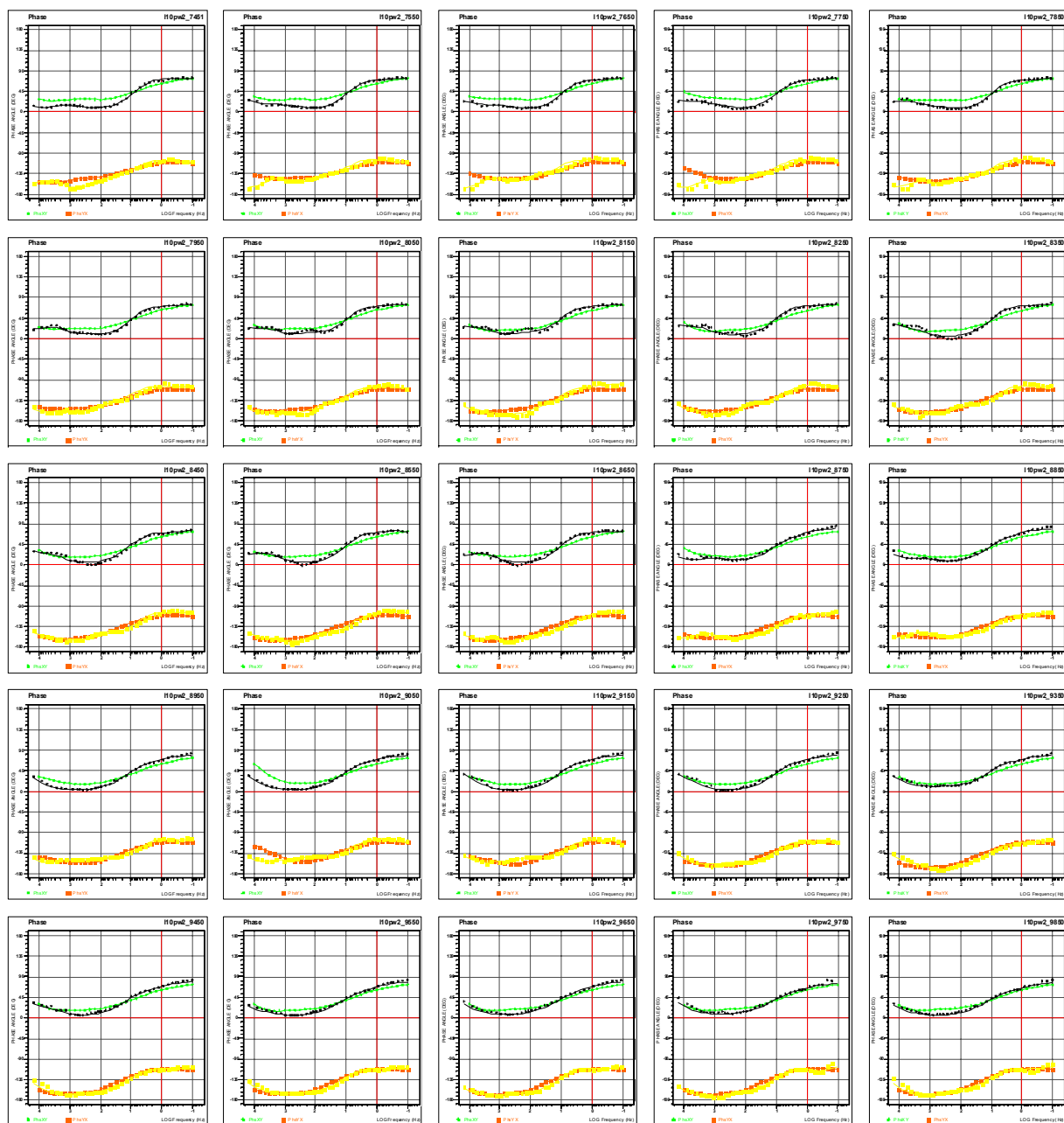
Final TM-TE Mode PW Resistivity Model #2 (I110pw22i1), using TM Mode Starting Model, at Iteration 23 (ITER = 24, RMSERR = 0.6816×10^1 , FMRQ = 0.800).



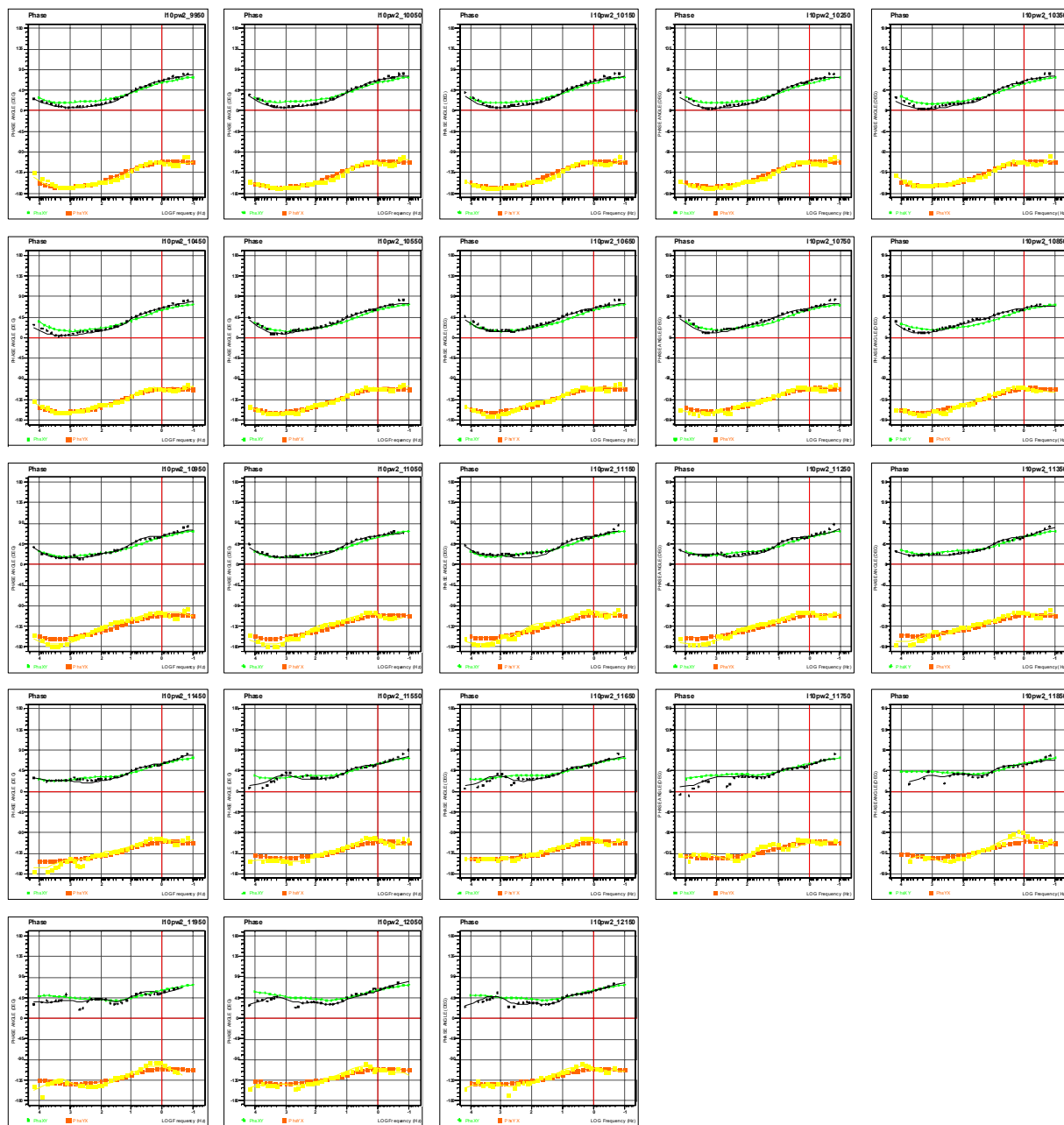
Resistivity Response Comparison (1/2): L110pw2 vs L110ss2 (7450E-9850E)



Resistivity Response Comparison (2/2): L110pw2 vs L110ss2 (9950E-12150E)

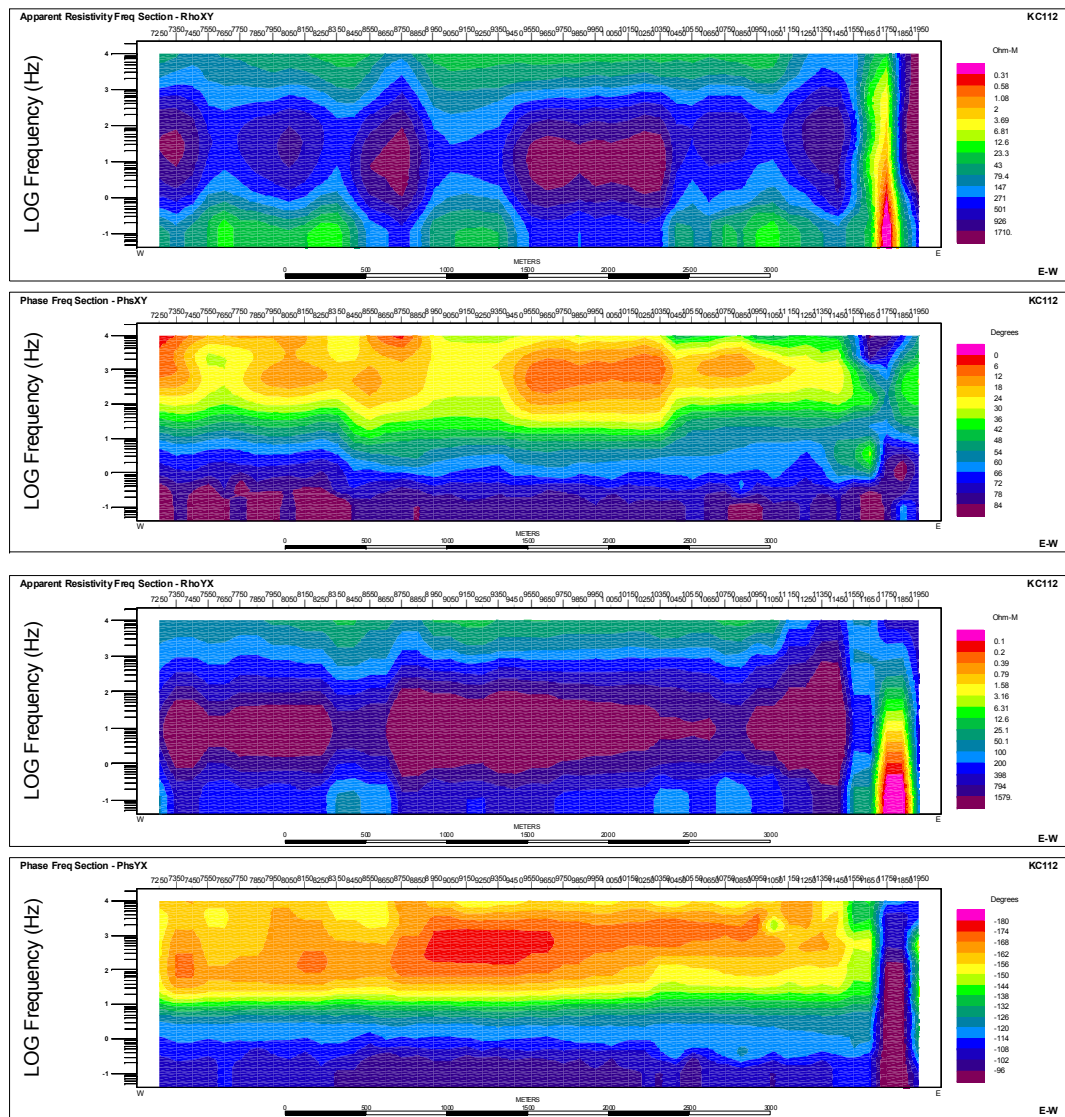


Phase Response Comparison (1/2): L110pw2 vs L1108ss2 (7450E-9850E)

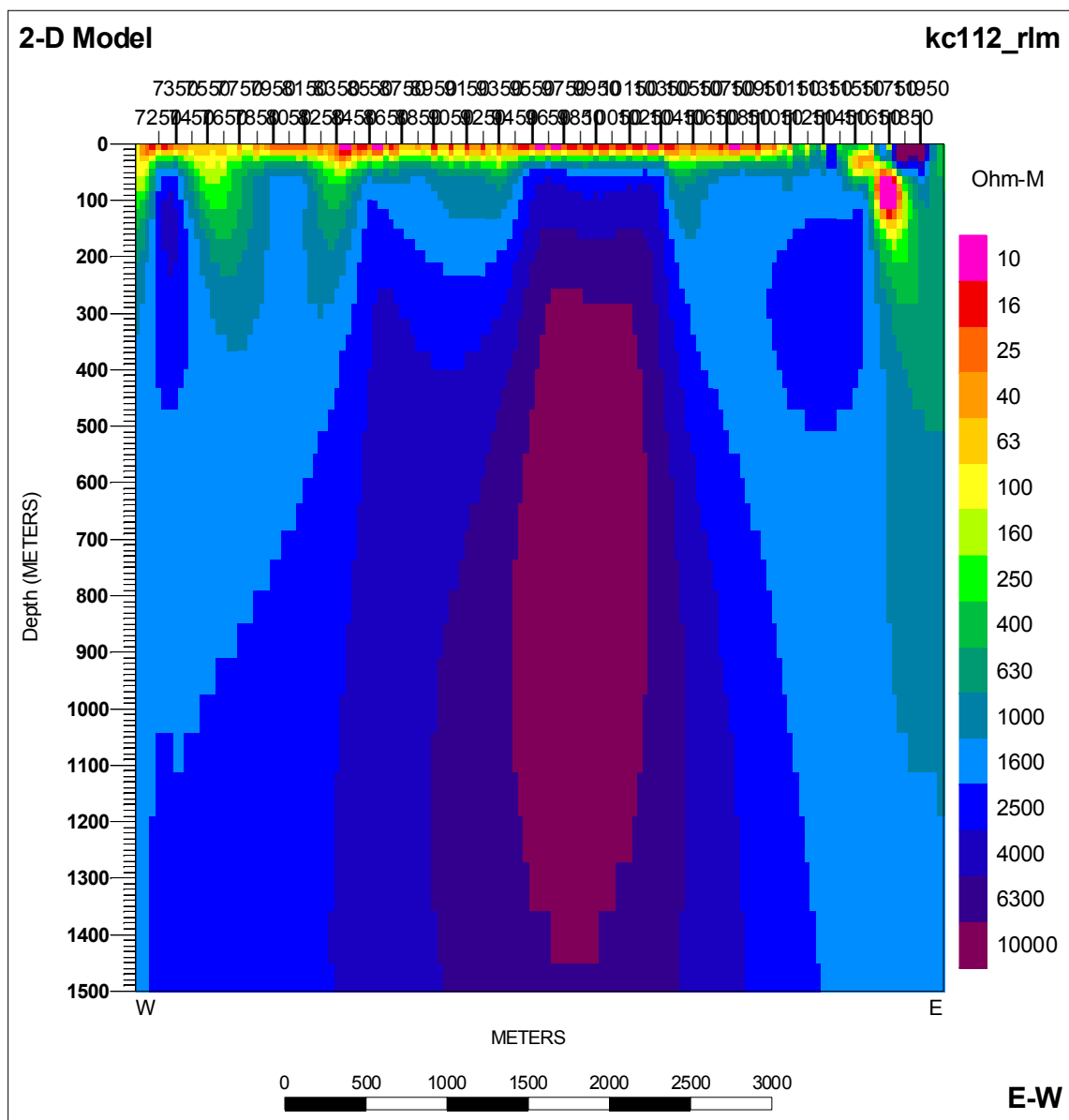


Phase Response Comparison (2/2): L110pw2 vs L1108ss2 (9950E-12150E)

Line 112+00N: Preliminary Resistivity Model (Smooth Conjugate Gradient)



Raw Unrotated (Cagniard) RhoXY/PhaseXY and RhoYX/PhaseYX
Pseudosections (I112all).



Line 112+00N – Preliminary 2D MT Model – 35 Iterations

Smooth Conjugate Gradient Run Log

```

inv. iter.=    30   line search iter.=    0
data (S1):  217326.1   model roughness (S2):  3046.688
  model closeness (s3):  0.0000000E+00   total S=  220372.8
iteration #    30
resistivity values are:
data for block    26
rms error for this location =  8.882927

```

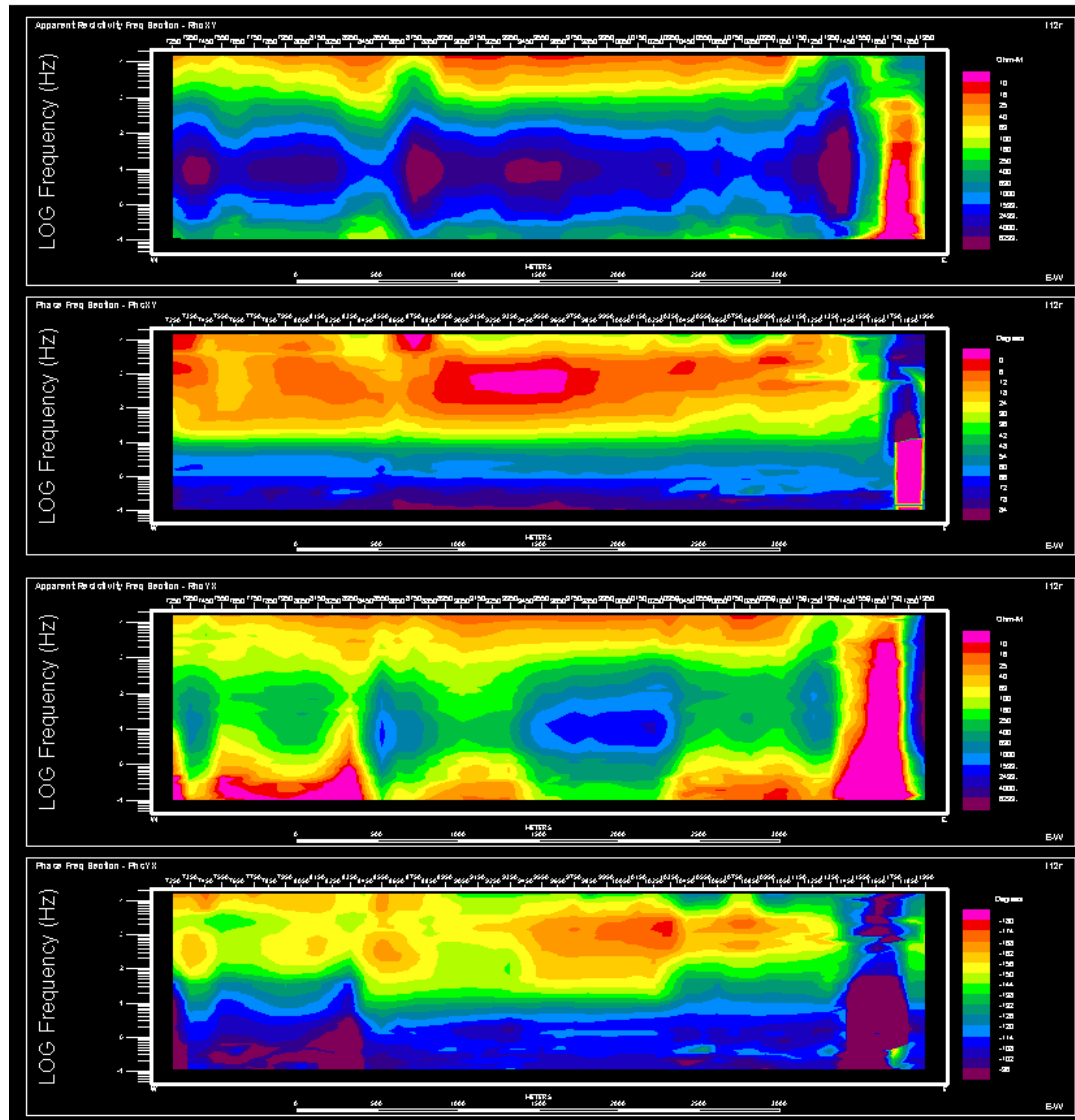
data for block	29
rms error for this location =	5.271632
data for block	32
rms error for this location =	5.074067
data for block	35
rms error for this location =	4.025543
data for block	38
rms error for this location =	4.181472
data for block	41
rms error for this location =	2.945925
data for block	44
rms error for this location =	3.007174
data for block	47
rms error for this location =	2.990516
data for block	50
rms error for this location =	3.013812
data for block	53
rms error for this location =	3.429056
data for block	56
rms error for this location =	4.377569
data for block	59
rms error for this location =	7.115585
data for block	62
rms error for this location =	7.645498
data for block	65
rms error for this location =	6.597529
data for block	68
rms error for this location =	6.464809
data for block	71
rms error for this location =	8.439052
data for block	74
rms error for this location =	8.438156
data for block	77
rms error for this location =	6.709188
data for block	80
rms error for this location =	6.661046
data for block	83
rms error for this location =	5.822992
data for block	86
rms error for this location =	5.645748
data for block	89
rms error for this location =	7.948830
data for block	92
rms error for this location =	7.759204
data for block	95
rms error for this location =	6.935359
data for block	98
rms error for this location =	7.291013
data for block	101
rms error for this location =	5.400103
data for block	104
rms error for this location =	4.689402

```

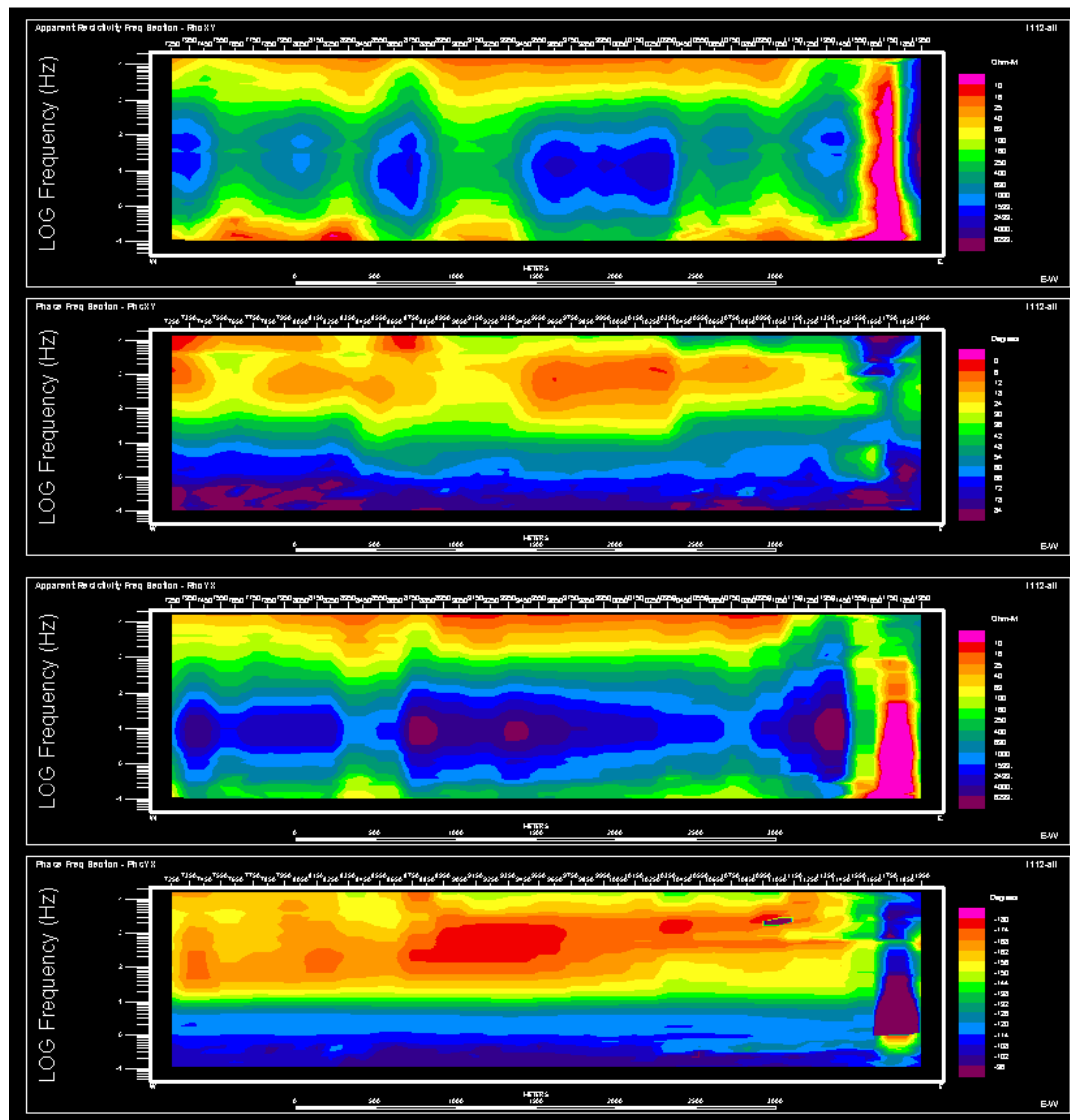
data for block      107
rms error for this location =  4.405552
data for block      110
rms error for this location =  4.376266
data for block      113
rms error for this location =  4.395515
data for block      116
rms error for this location =  4.475686
data for block      119
rms error for this location =  5.462036
data for block      122
rms error for this location =  4.111284
data for block      125
rms error for this location =  4.145051
data for block      128
rms error for this location =  3.674265
data for block      131
rms error for this location =  6.483785
data for block      134
rms error for this location =  5.947345
data for block      137
rms error for this location =  4.461635
data for block      140
rms error for this location =  5.501928
data for block      143
rms error for this location =  7.383307
data for block      146
rms error for this location =  8.582822
data for block      149
rms error for this location = 13.80536
data for block      152
rms error for this location = 14.43418
data for block      155
rms error for this location = 14.33241
data for block      158
rms error for this location = 15.39360
data for block      161
rms error for this location = 10.25278
data for block      164
rms error for this location = 11.69409
data for block      167
rms error for this location =  9.609489
data (S1): 217326.1    model roughness (S2): 3046.688
  model closeness (s3): 0.0000000E+00    total S= 220372.8
rms error for previous iteration=  7.365452
rms error for current iteration=  7.341684
desired chi square for this model= 4032.000
chi square for previous iteration = 218735.5
chi square for current iteration = 217326.1

```

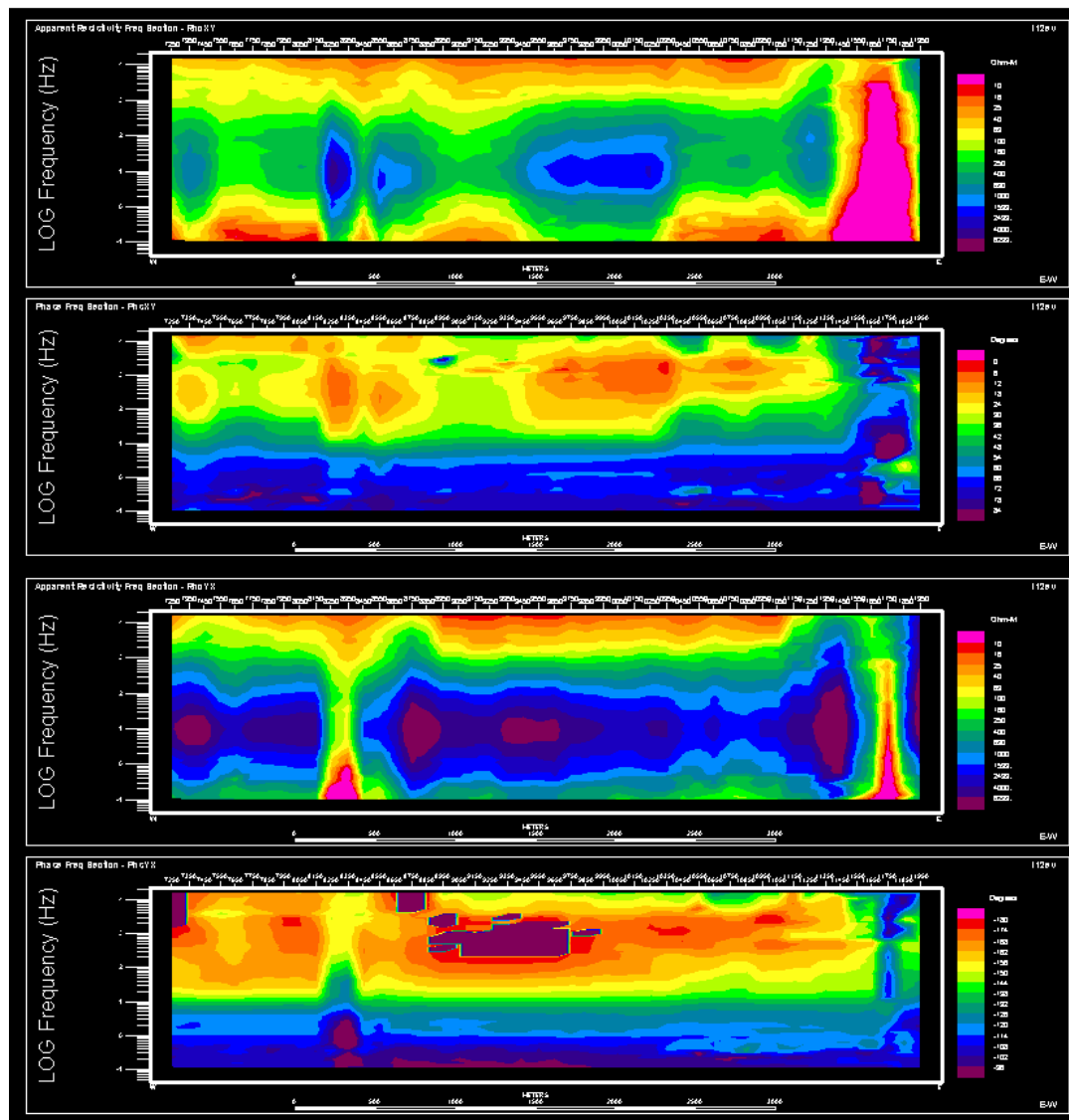
Line 11200N: Final PW Model (using minimal static shifting)



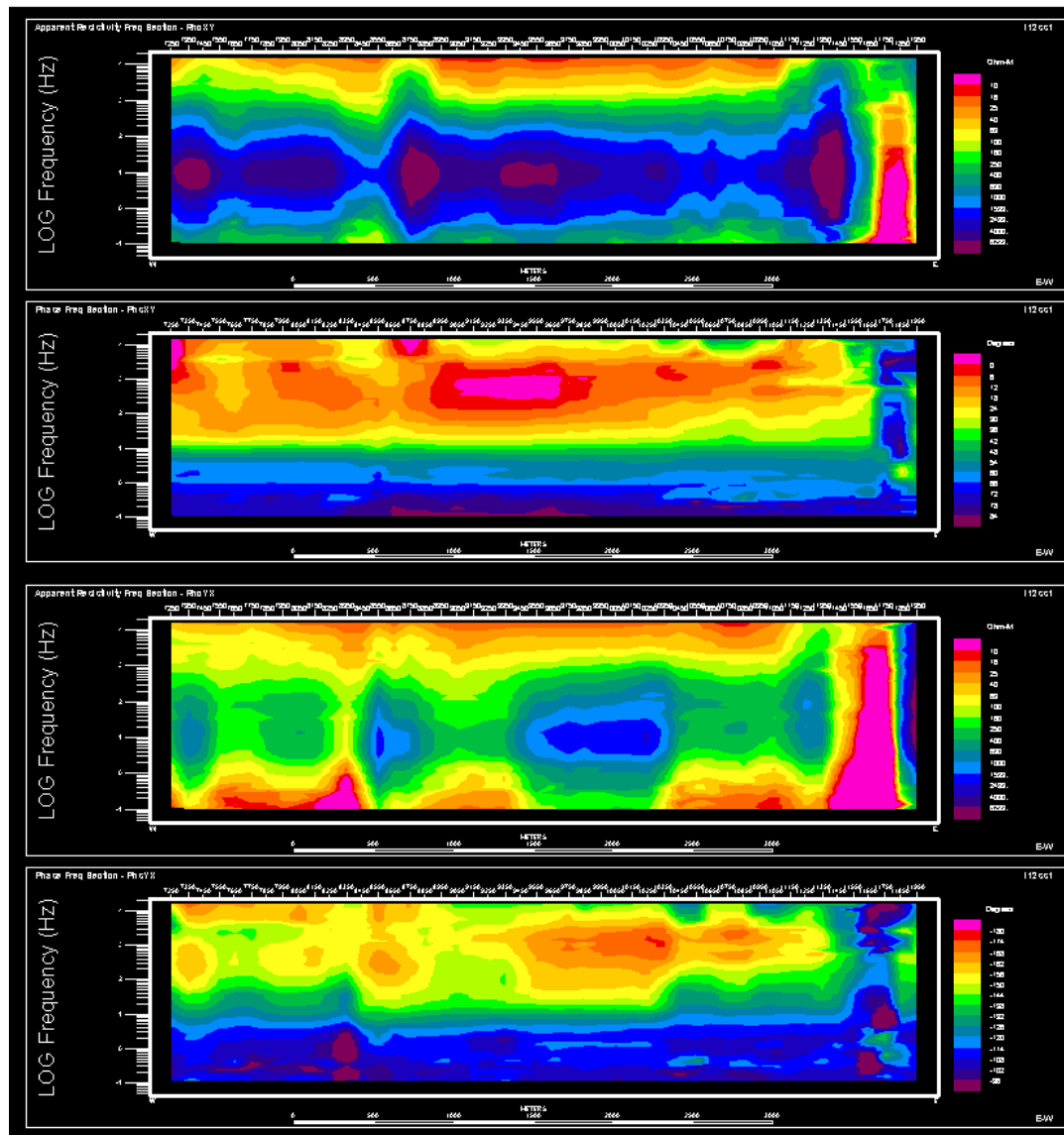
Unrotated RhoXY/PhaseXY and RhoYX/PhaseYX (I12all)



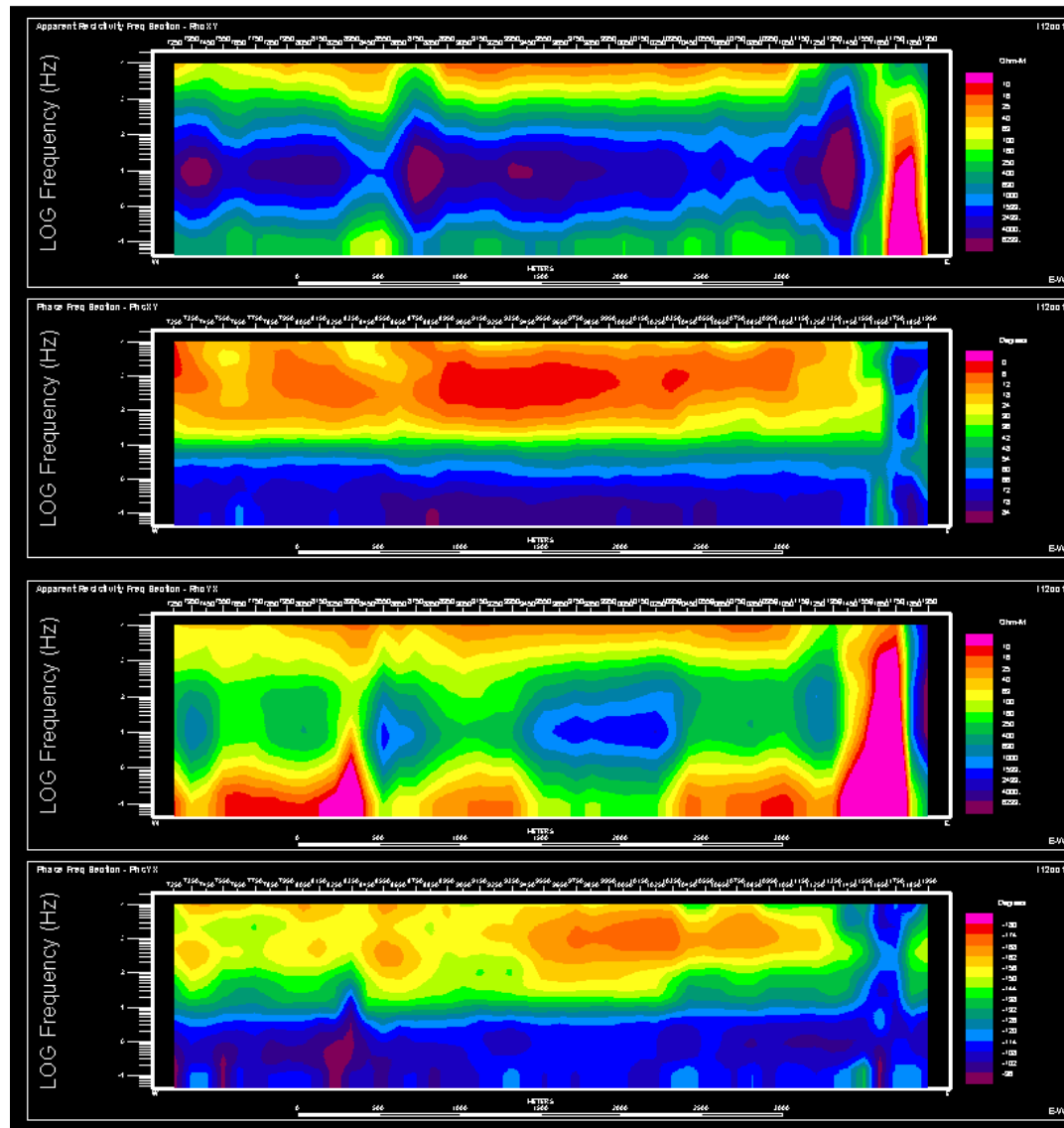
Rotated (to Maximize ResXY-YX) RhoXY/PhaseXY and RhoYX/PhaseYX (I112r)



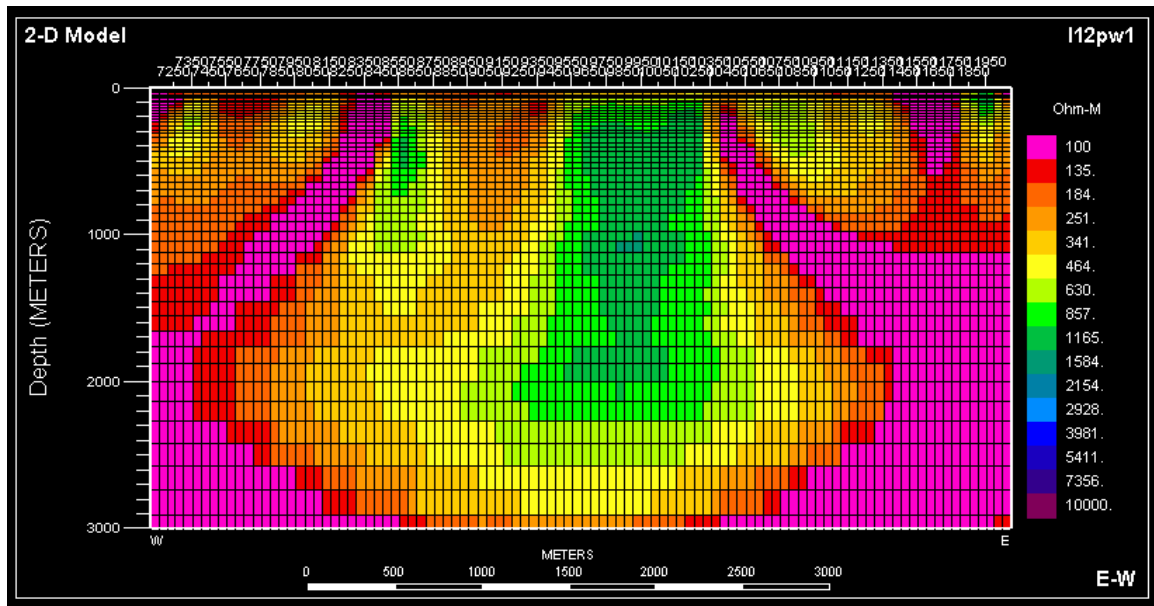
Eigen-vector Rotated RhoXY/PhaseXY and RhoYX/PhaseYX (I112ev)



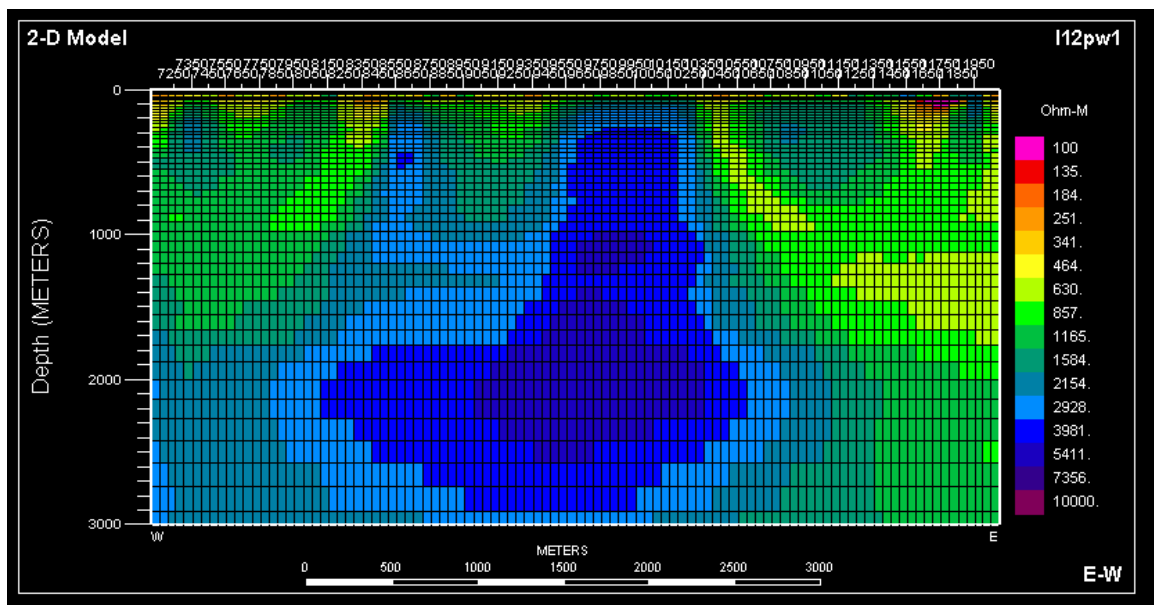
Static-Shifted (minimal) RhoXY/PhaseXY and RhoYX/PhaseYX (I112ss1)



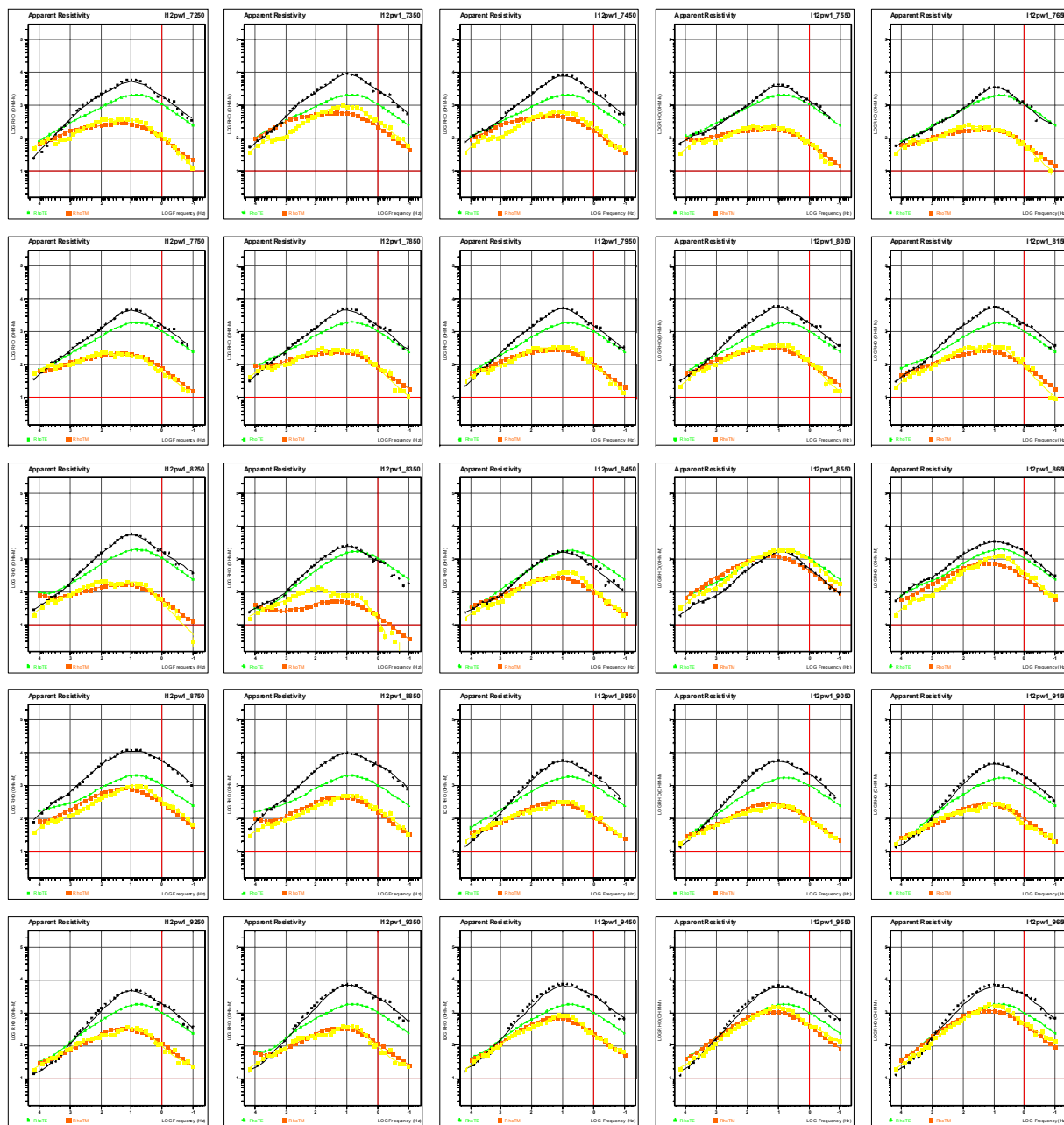
Occam 1D Curve-Fitted (using I112ss1) RhoXY/P haseXY and RhoYX/PhaseYX (I112oc1)



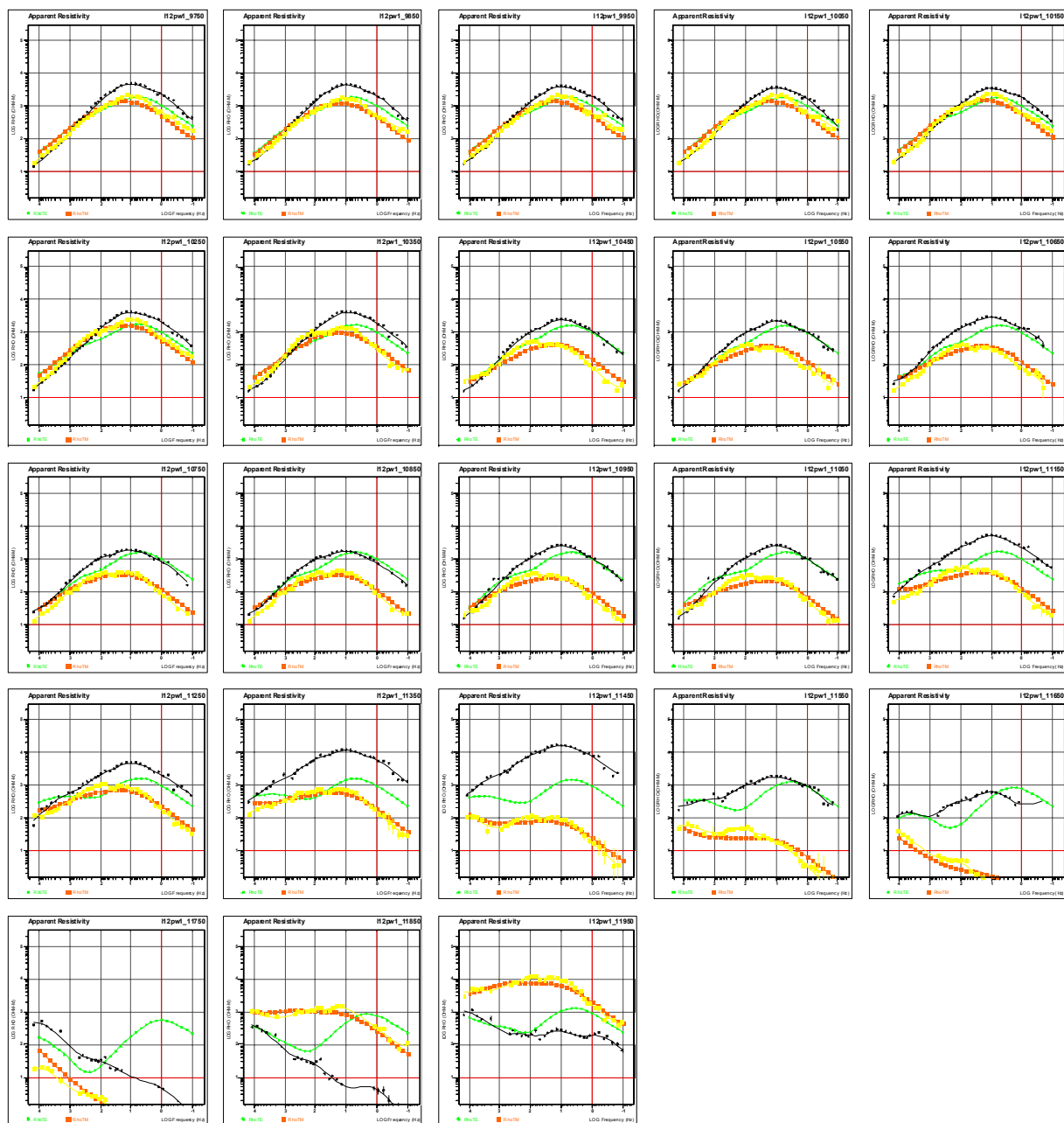
TM Mode PW Resistivity Model (I112pw1) using Eva-processed data (I112oc1), using Smooth Conjugate Starting Model (I112rlm1), at Iter 29 (rms error $\approx 8\%$)



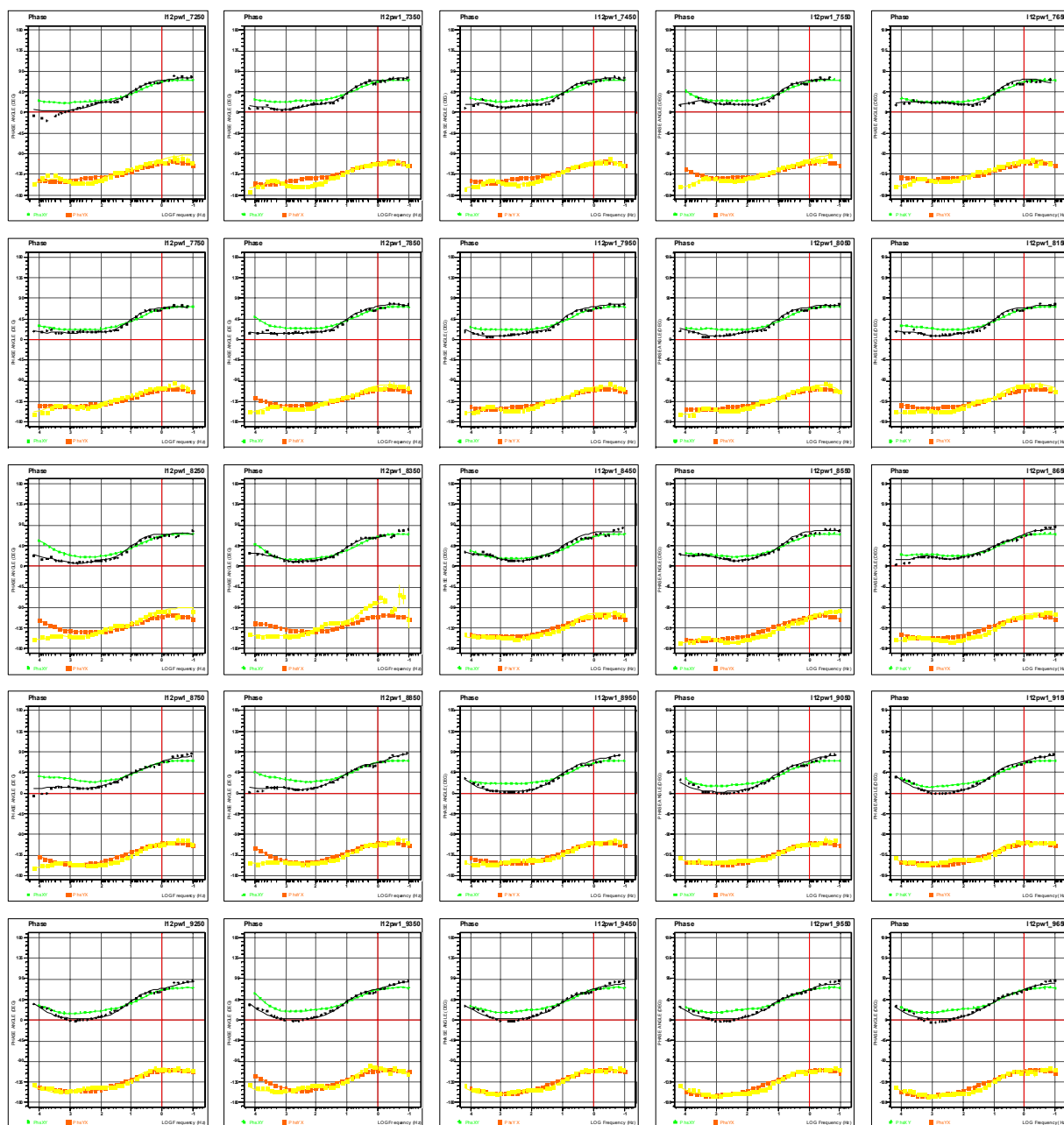
Final TM-TE Mode PW Resistivity Model #1 (I112pw1), using TM Mode Starting Model, at Iteration 18 (ITER = 18, RMSERR = $0.1140E+02$, FMRQ = 0.800)



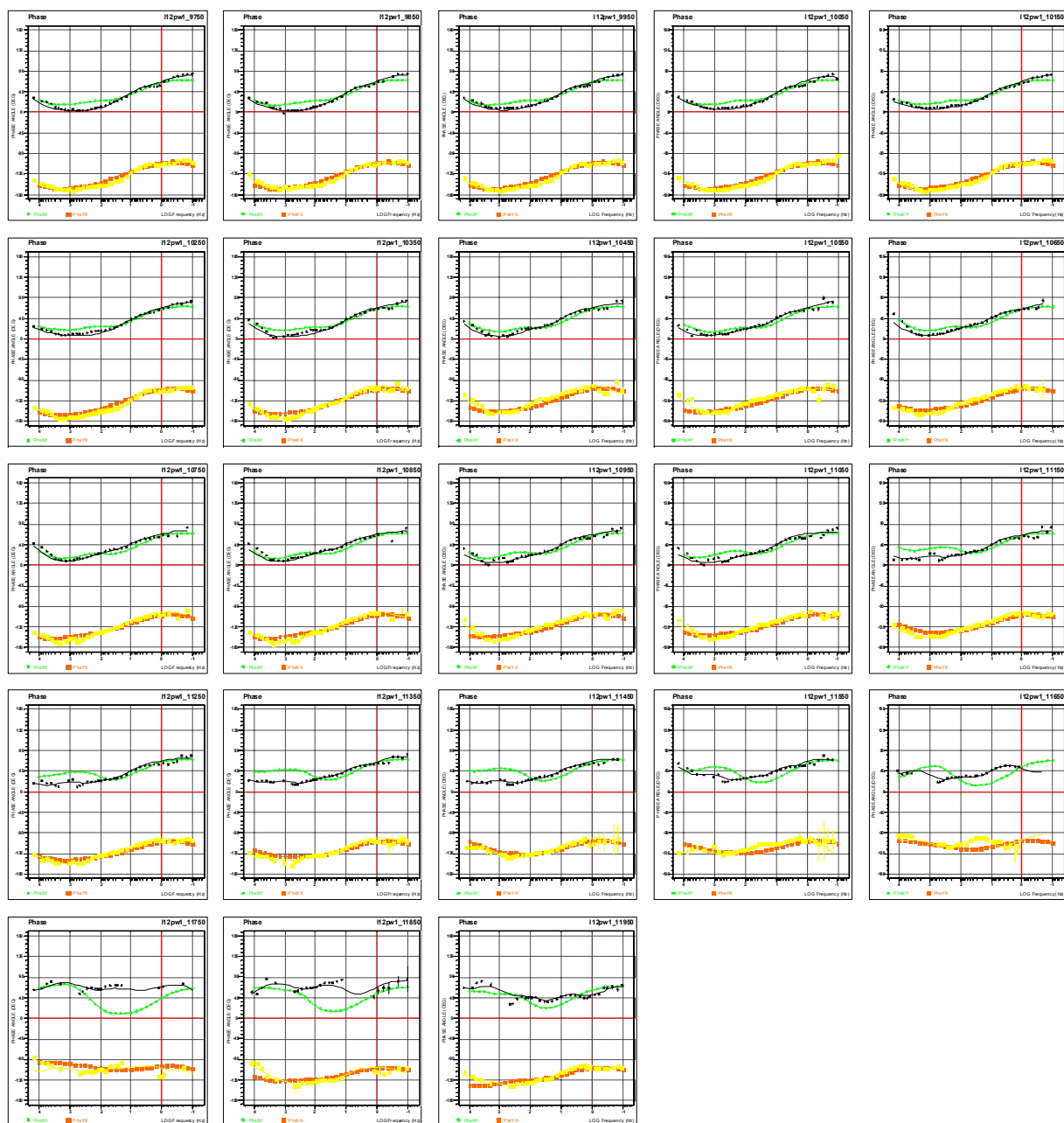
Resistivity Response Comparison (1/2): L112pw1 vs L112ss1 (7250E-9650E)



Resistivity Response Comparison (2/2): L112pw1 vs L112ss1 (9750E-11950E)

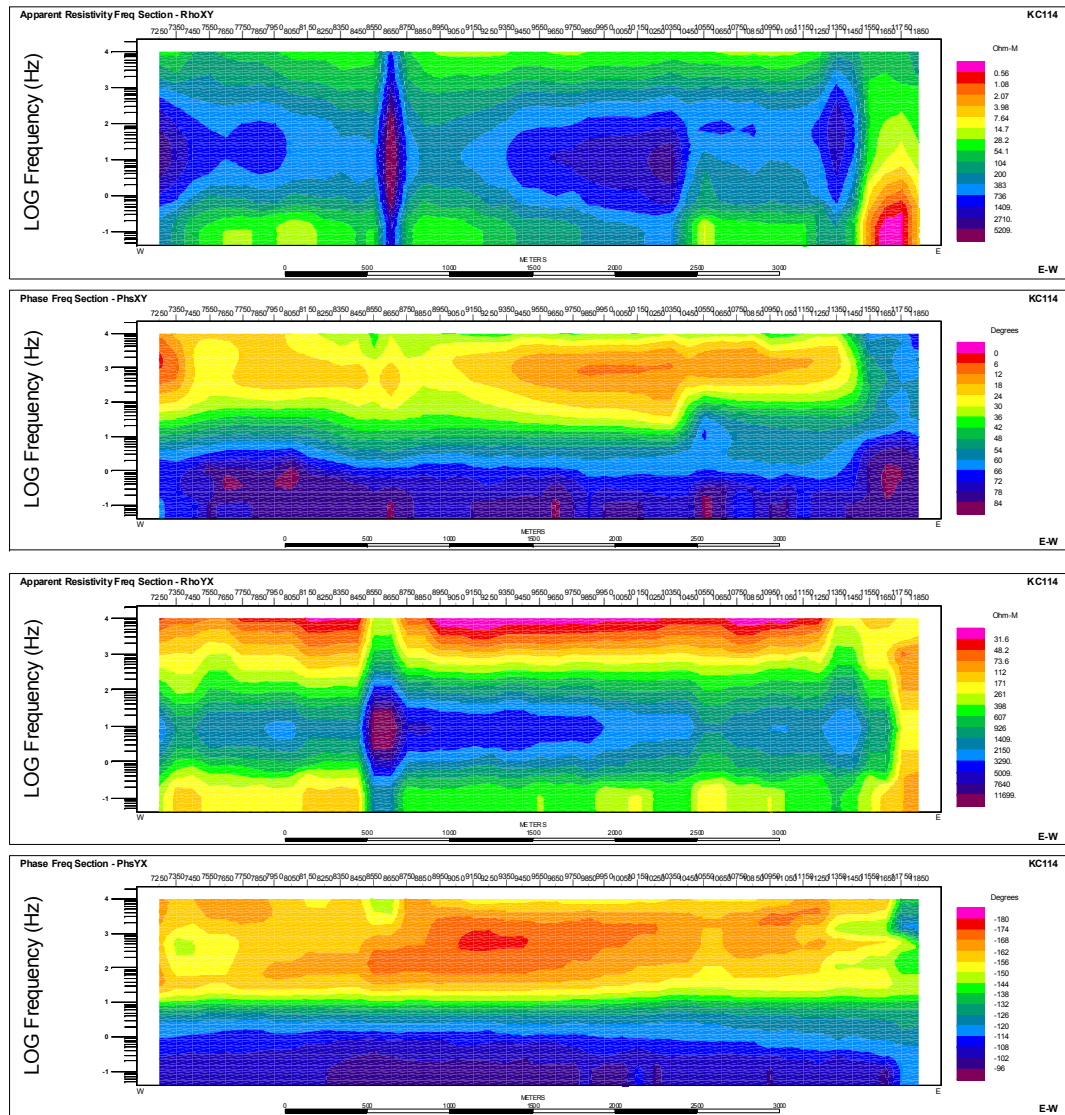


Phase Response Comparison (1/2): L112pw1 vs L112ss1 (7250E-9650E)

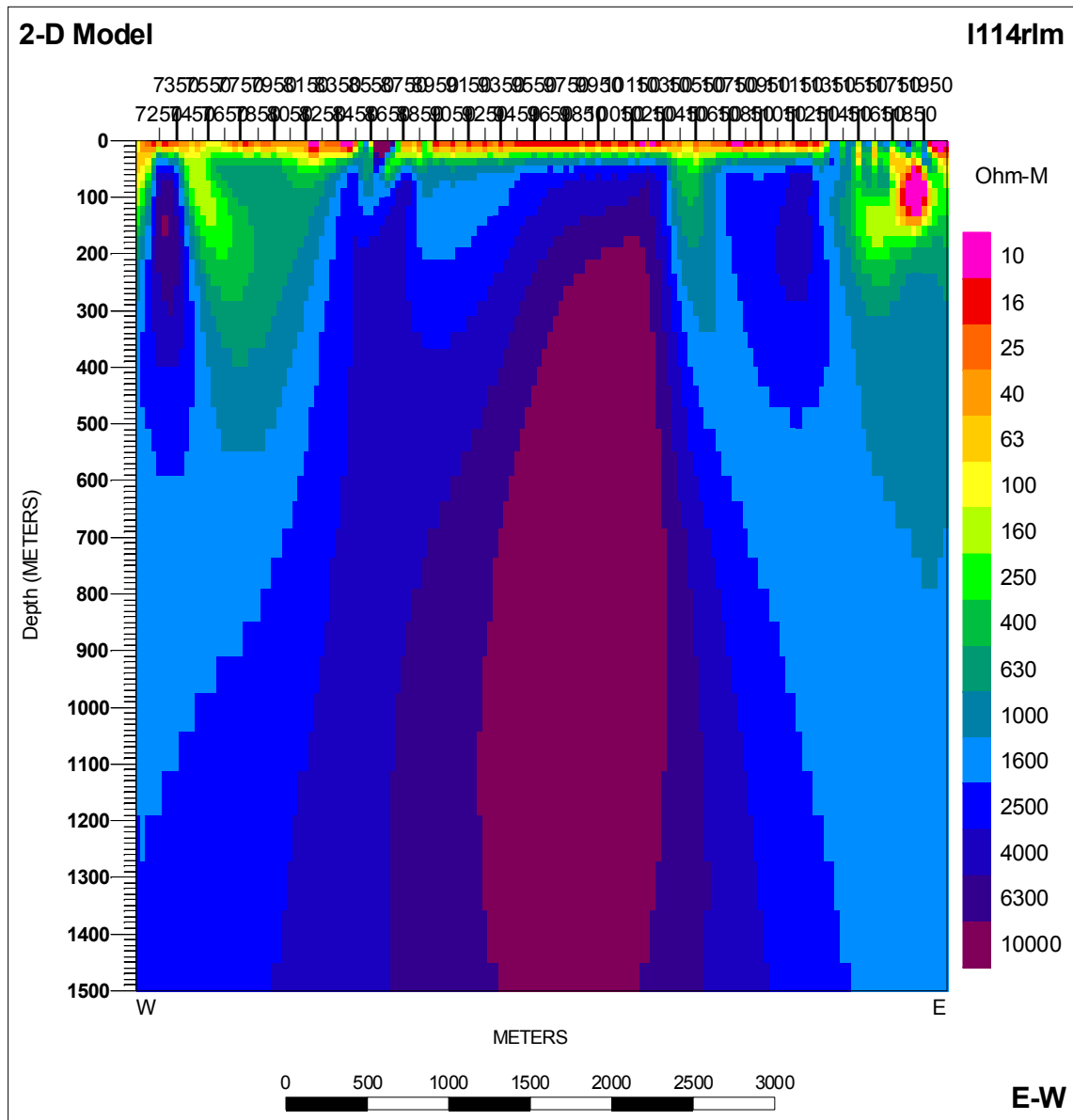


Phase Response Comparison (2/2): L112pw1 vs L112ss1 (9750E-11950E)

Line 114+00N: Preliminary Resistivity Model (Smooth Conjugate Gradient)



Raw Unrotated (Cagniard) RhoXY/PhaseXY and RhoYX/PhaseYX
Pseudosections (I114all).



Line 114+00N – Preliminary 2D MT Model – 40 Iterations

Smooth Conjugate Gradient Run Log

```

inv. iter.=      40   line search iter.=      0
data (S1):  151505.7   model roughness (S2):  4012.736
  model closeness (s3):  0.0000000E+00   total S=  155518.4
iteration #      40
resistivity values are:
data for block    23
rms error for this location =  4.008251
  
```

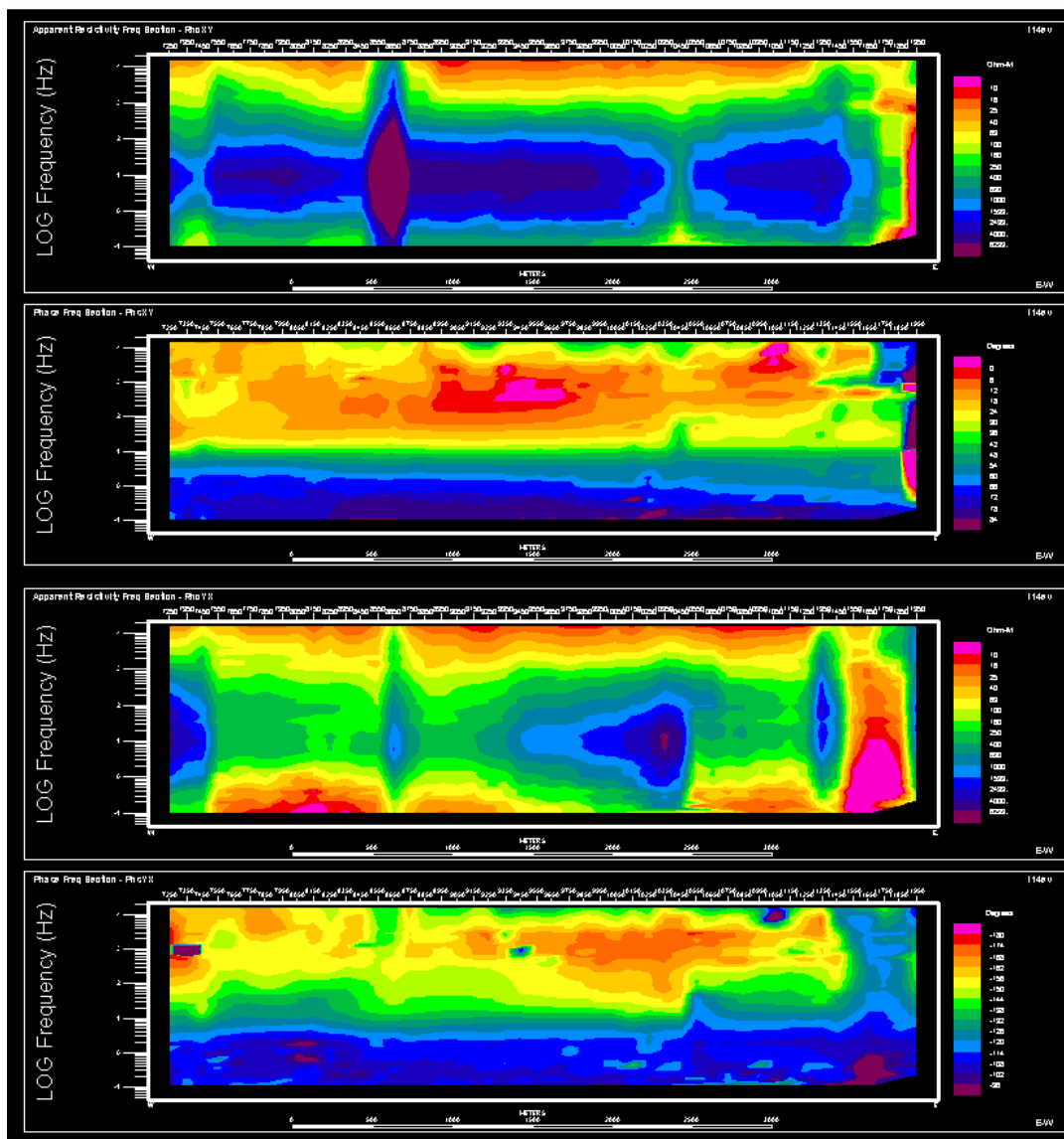
data for block	26	
rms error for this location =	6.901791	
data for block	29	
rms error for this location =	6.839851	
data for block	32	
rms error for this location =	5.132565	
data for block	35	
rms error for this location =	4.840806	
data for block	38	
rms error for this location =	4.467325	
data for block	41	
rms error for this location =	4.335339	
data for block	44	
rms error for this location =	4.247196	
data for block	47	
rms error for this location =	4.186119	
data for block	50	
rms error for this location =	5.716889	
data for block	53	
rms error for this location =	5.075903	
data for block	56	
rms error for this location =	5.097938	
data for block	59	
rms error for this location =	6.130549	
data for block	62	
rms error for this location =	13.90644	
data for block	65	
rms error for this location =	13.89695	
data for block	68	
rms error for this location =	5.952161	
data for block	71	
rms error for this location =	5.480122	
data for block	74	
rms error for this location =	5.714824	
data for block	77	
rms error for this location =	5.321519	
data for block	80	
rms error for this location =	4.611456	
data for block	83	
rms error for this location =	4.621283	
data for block	86	
rms error for this location =	5.146471	
data for block	89	
rms error for this location =	5.134878	
data for block	92	
rms error for this location =	3.876011	
data for block	95	
rms error for this location =	4.455646	
data for block	98	
rms error for this location =	4.204111	
data for block	101	

```

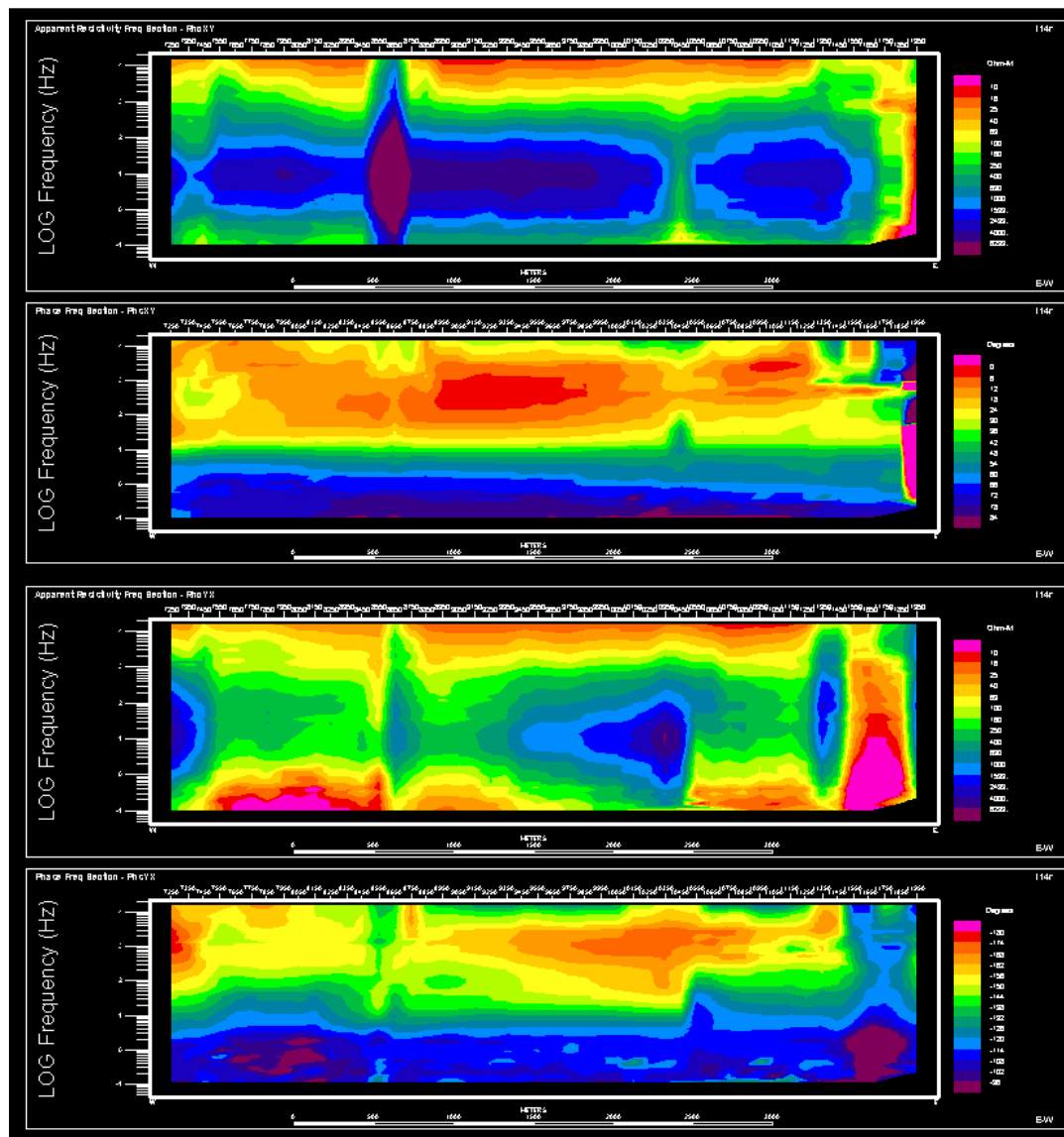
rms error for this location = 5.126270
data for block      104
rms error for this location = 4.423848
data for block      107
rms error for this location = 4.621134
data for block      110
rms error for this location = 4.825087
data for block      113
rms error for this location = 5.493835
data for block      116
rms error for this location = 5.269319
data for block      119
rms error for this location = 2.792017
data for block      122
rms error for this location = 7.111454
data for block      125
rms error for this location = 5.449977
data for block      128
rms error for this location = 3.468923
data for block      131
rms error for this location = 3.364852
data for block      134
rms error for this location = 2.997264
data for block      137
rms error for this location = 3.421167
data for block      140
rms error for this location = 3.140547
data for block      143
rms error for this location = 3.577815
data for block      146
rms error for this location = 5.167907
data for block      149
rms error for this location = 6.246576
data for block      152
rms error for this location = 5.210723
data for block      155
rms error for this location = 6.151803
data for block      158
rms error for this location = 11.36707
data for block      161
rms error for this location = 11.89020
data for block      164
rms error for this location = 9.030271
data (S1): 151505.7    model roughness (S2): 4012.736
  model closeness (s3): 0.0000000E+00    total S= 155518.4
rms error for previous iteration= 6.173256
rms error for current iteration= 6.129912
desired chi square for this model= 4032.000
chi square for previous iteration = 153655.9
chi square for current iteration = 151505.7

```

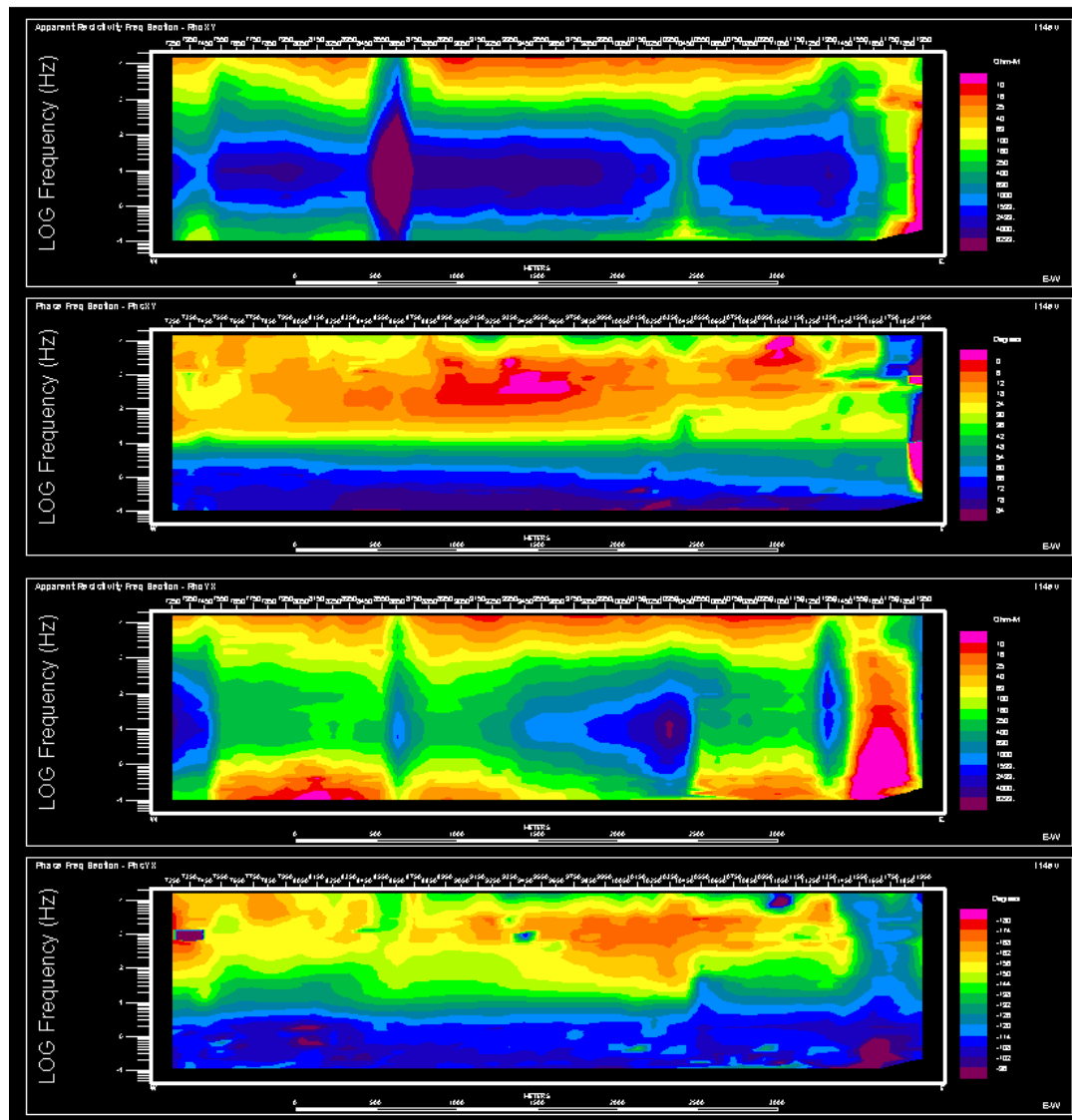
Line 11400N: Final PW Model (additional static shifting applied to data)



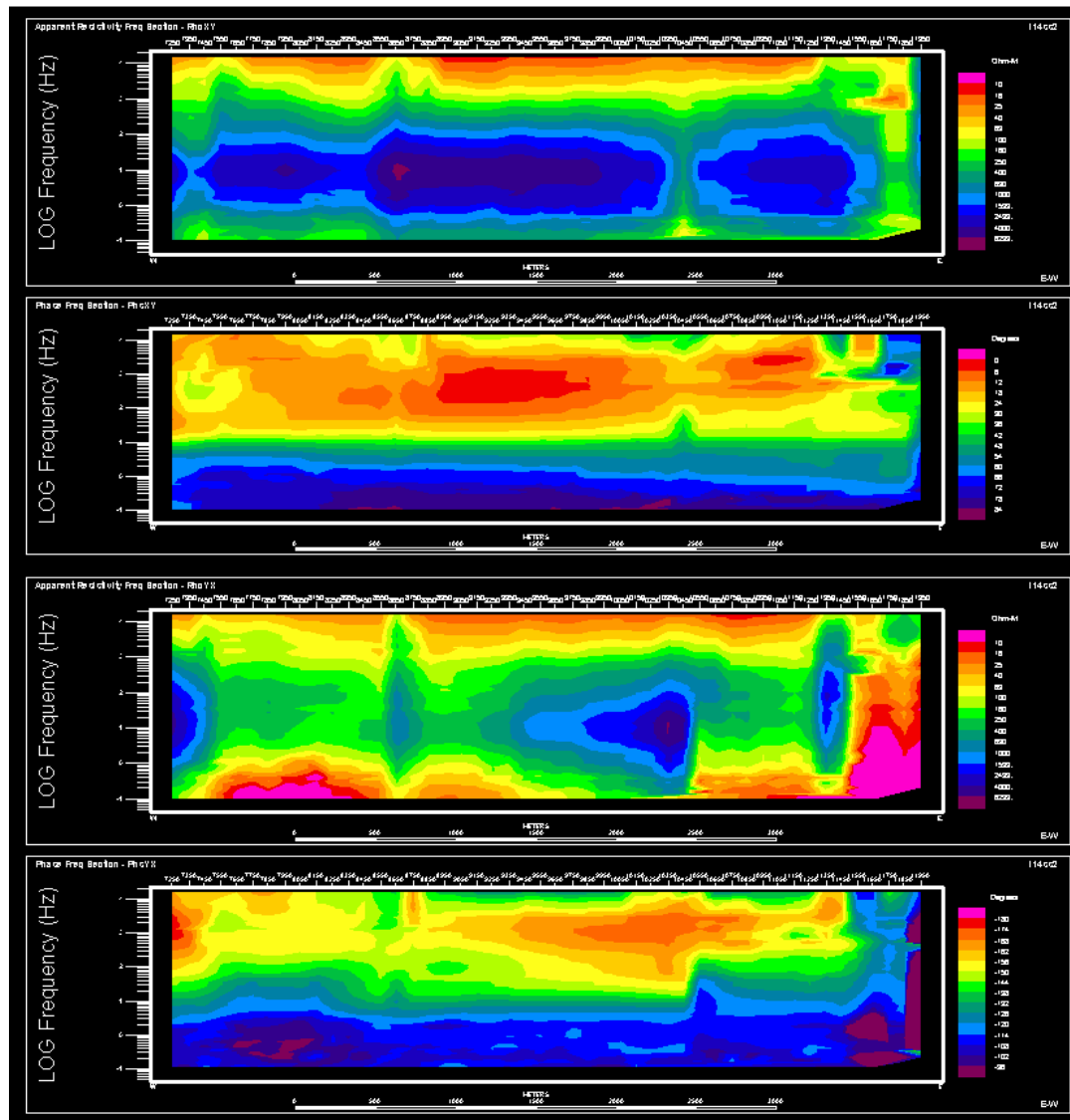
Unrotated RhoXY/PhaseXY and RhoYX/PhaseYX (I114all)



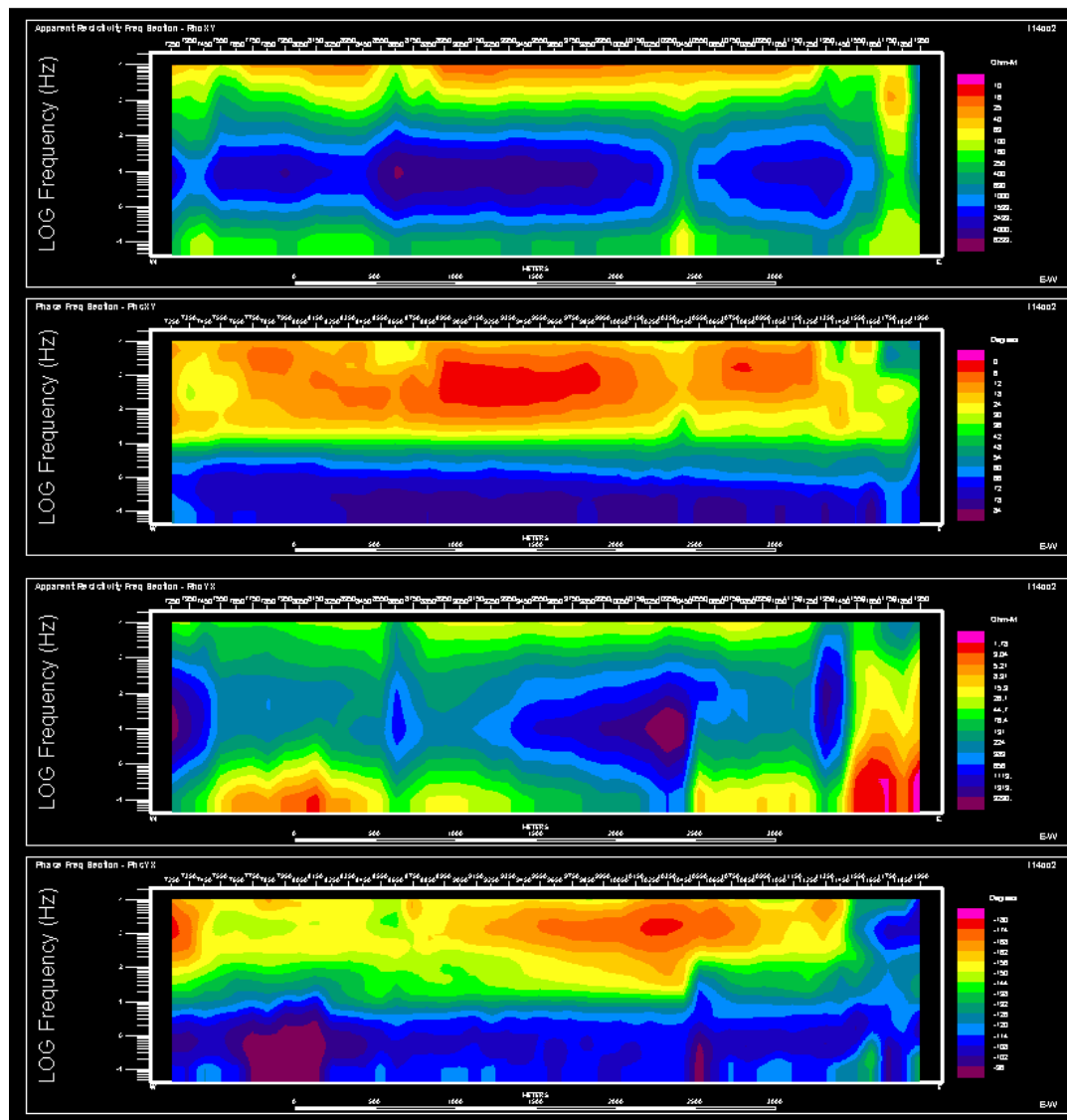
Rotated (to Maximize ResXY-YX) RhoXY/PhaseXY and RhoYX/PhaseYX (I114r)



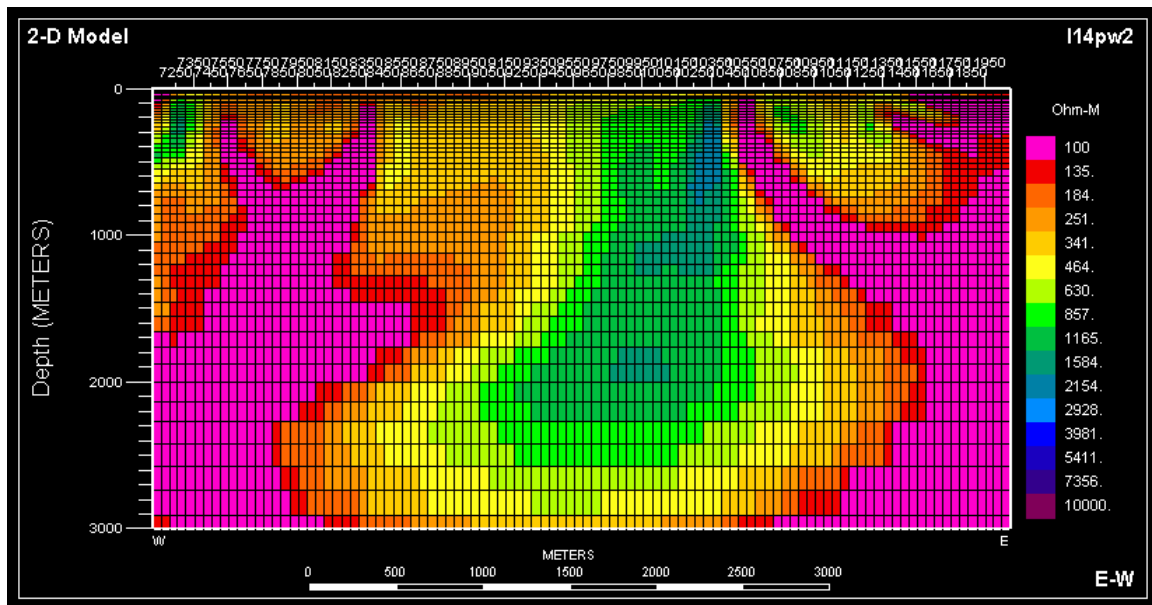
Eigen-vector Rotated RhoXY/PhaseXY and RhoYX/PhaseYX (I114ev)



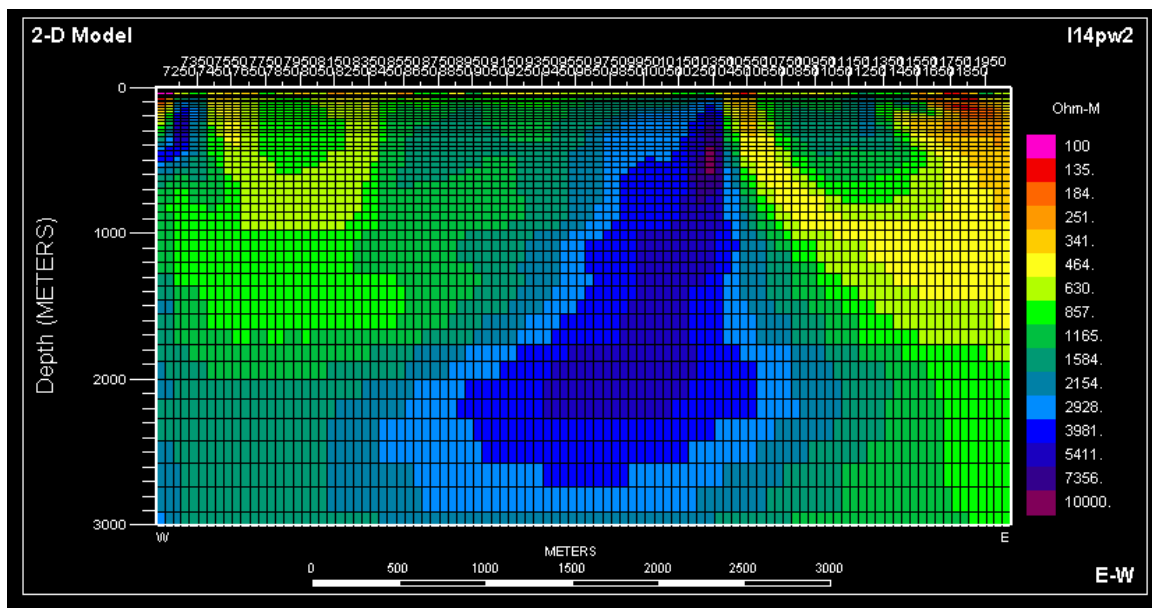
Static-Shifted Data RhoXY/PhaseXY and RhoYX/PhaseYX (I114ss2)



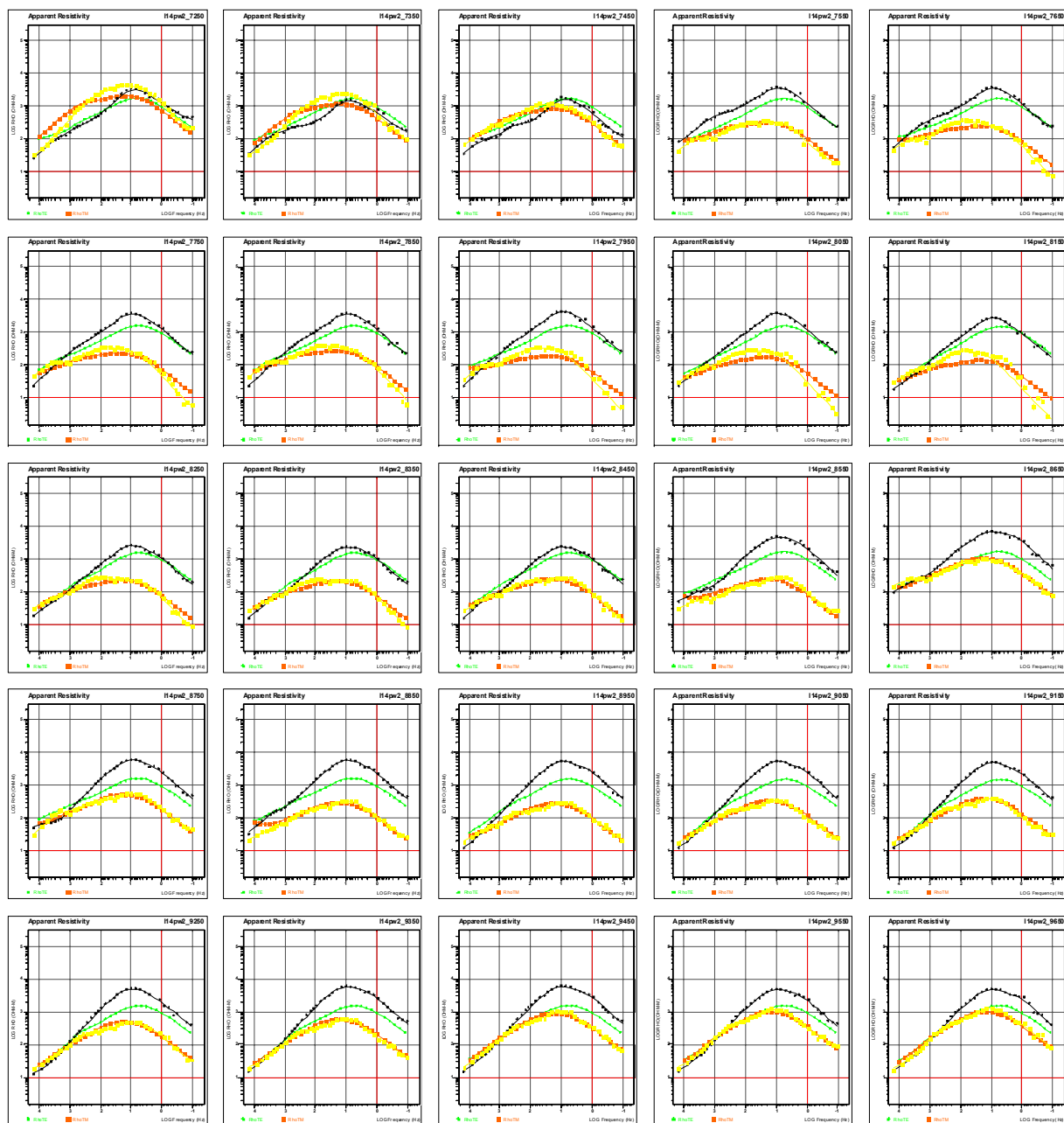
Occam 1D Curve-Fitted (using I114ss2) RhoXY/P haseXY and RhoYX/PhaseYX (I114oc2)



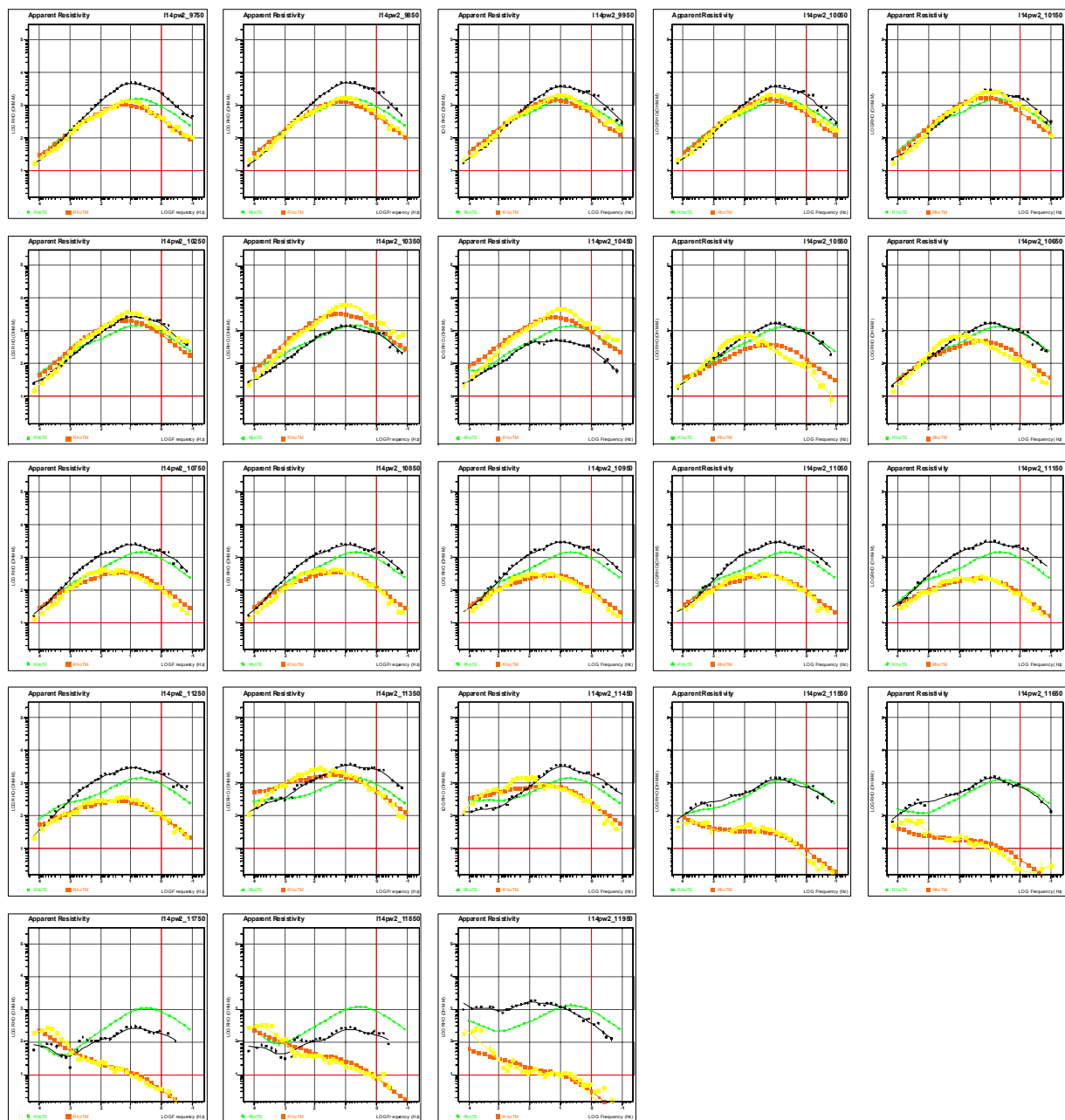
TM Mode PW Resistivity Model (I114pw2) using Eva-processed data (I114oc2), using Smooth Conjugate Starting Model (I114rlm2), at Iter 34 (rms error = 5.7%)



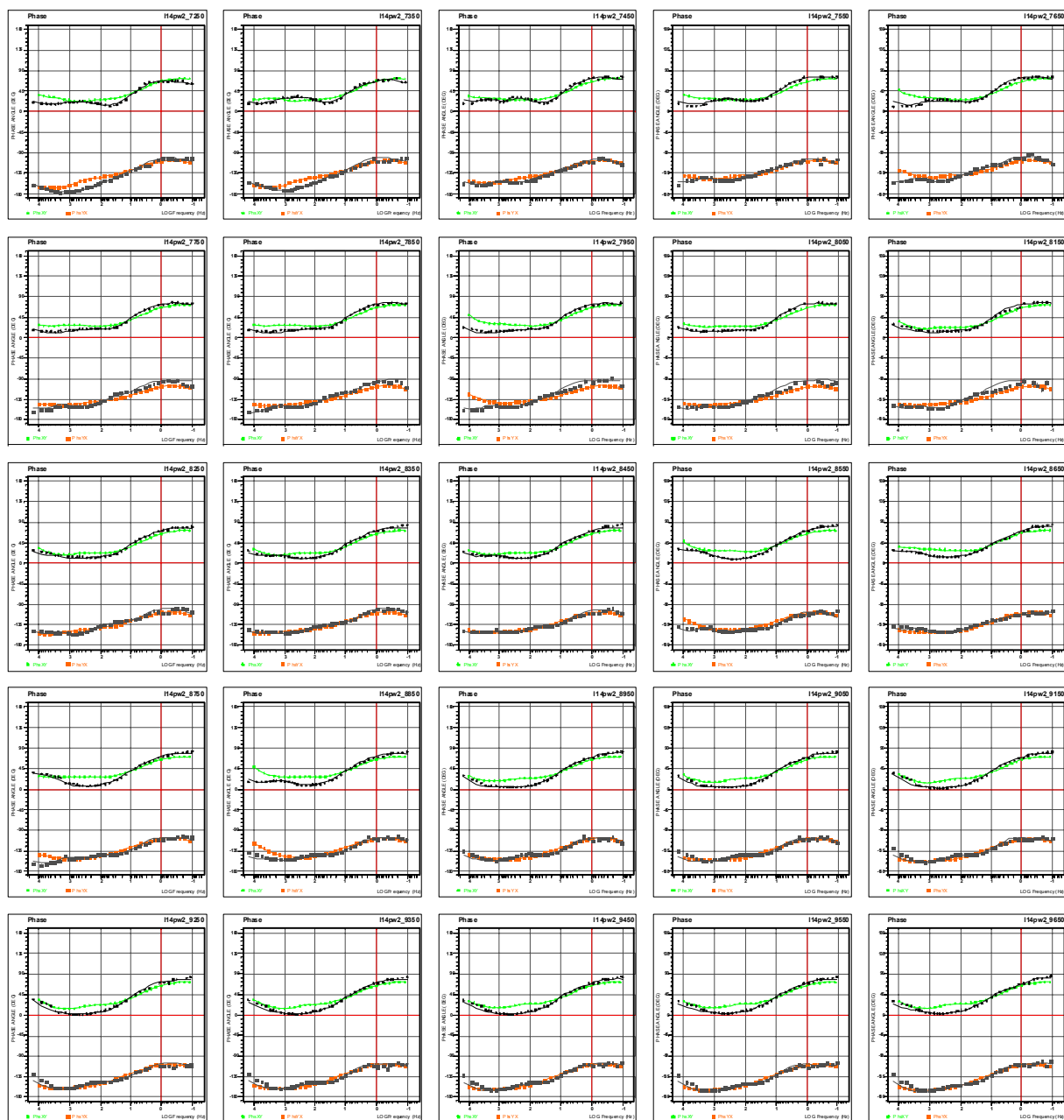
Final TM-TE Mode PW Resistivity Model (I114pw2), using TM Mode Starting Model, at Iteration 22 (ITER = 22, RMSERR = 0.7883E+01, OBJFUN = 0.6625E+06, FMRQ = 1.600).



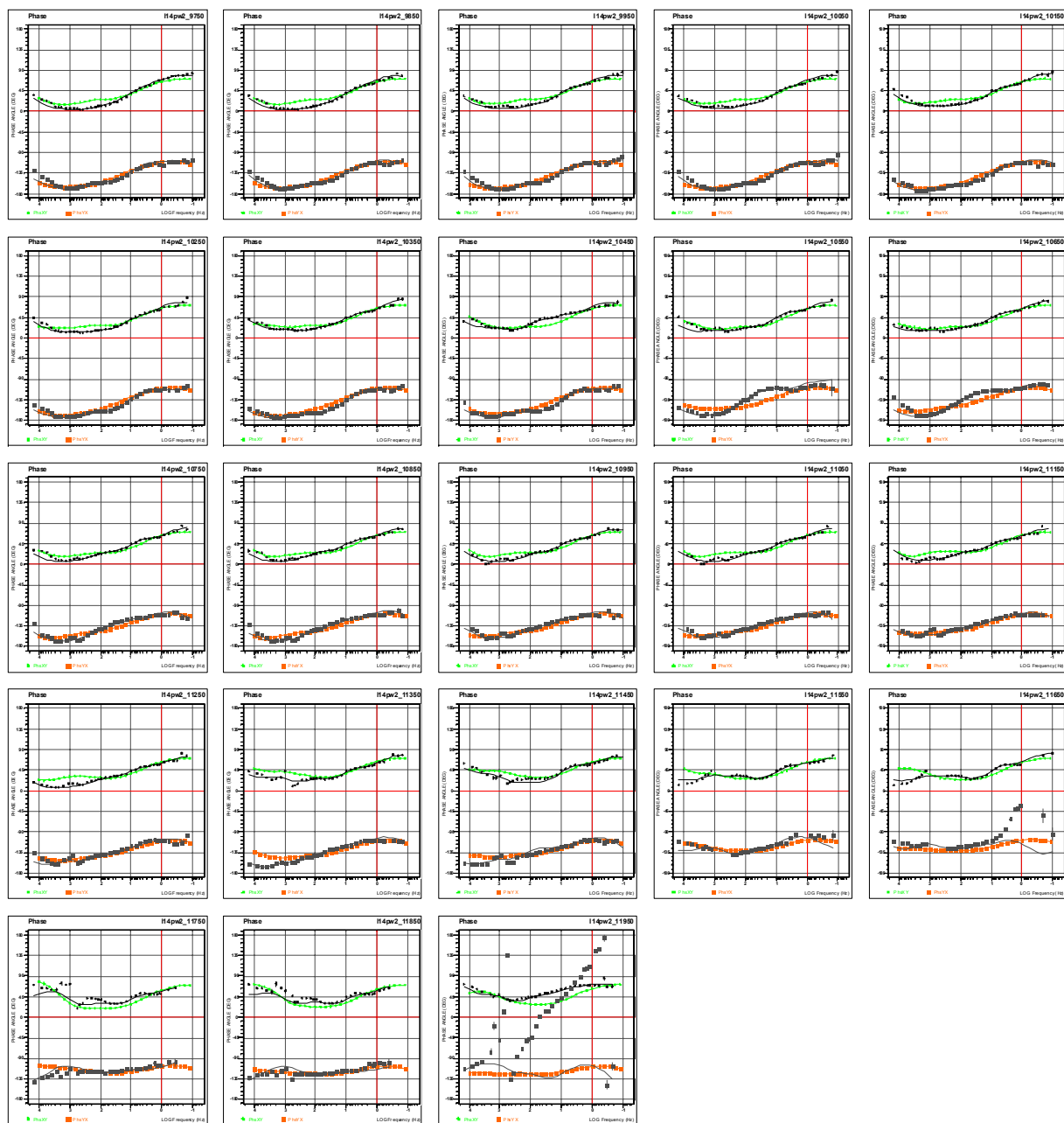
Resistivity Response Comparison (1/2): L114ss2i1 vs L114ss2 (7250E-9650E)



Resistivity Response Comparison (2/2): L114pw2 vs L114oc2 (9750E-11450E)

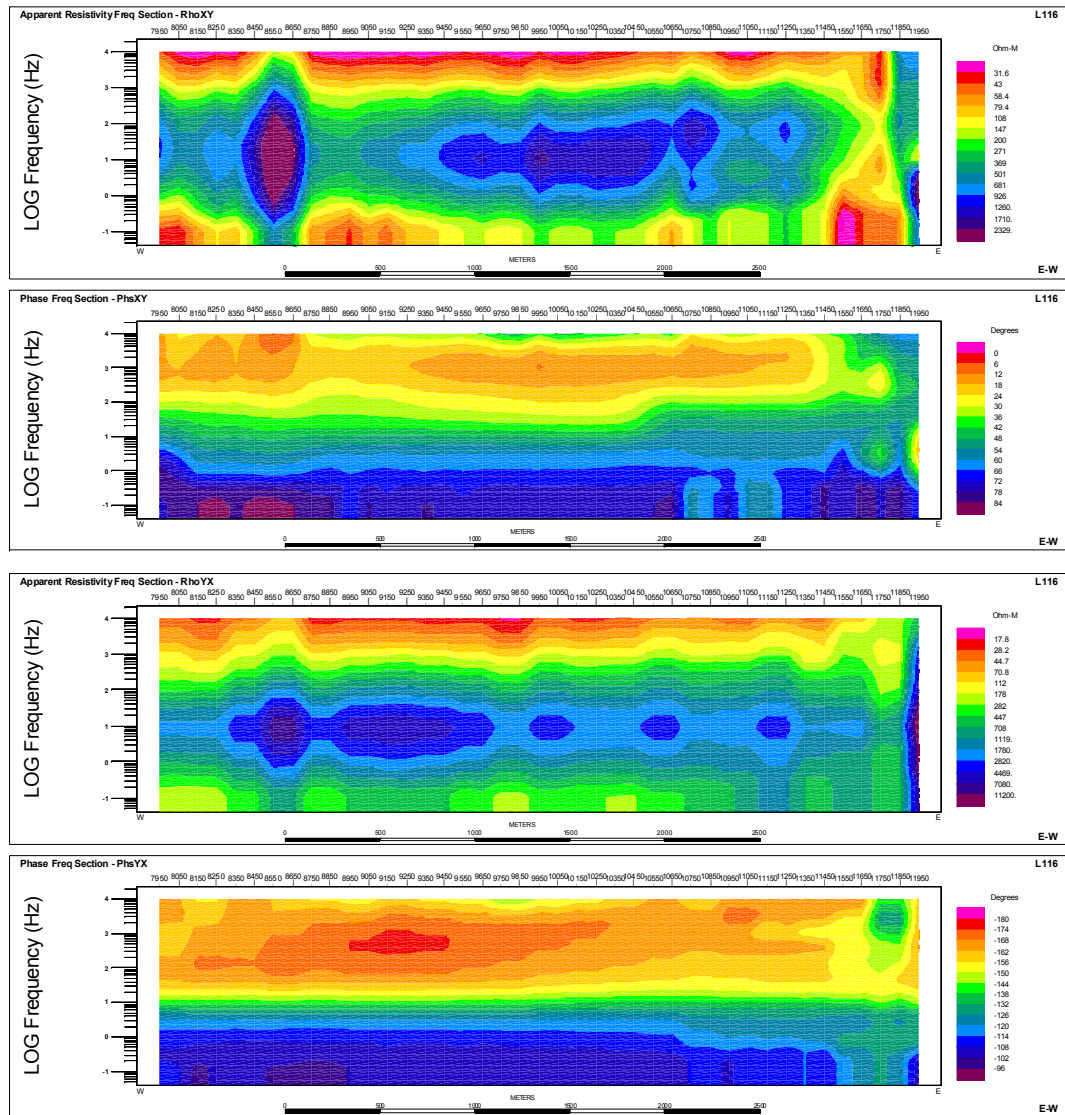


Phase Response Comparison (1/2): L114pw2 vs L114oc2 (7250E-9650E)

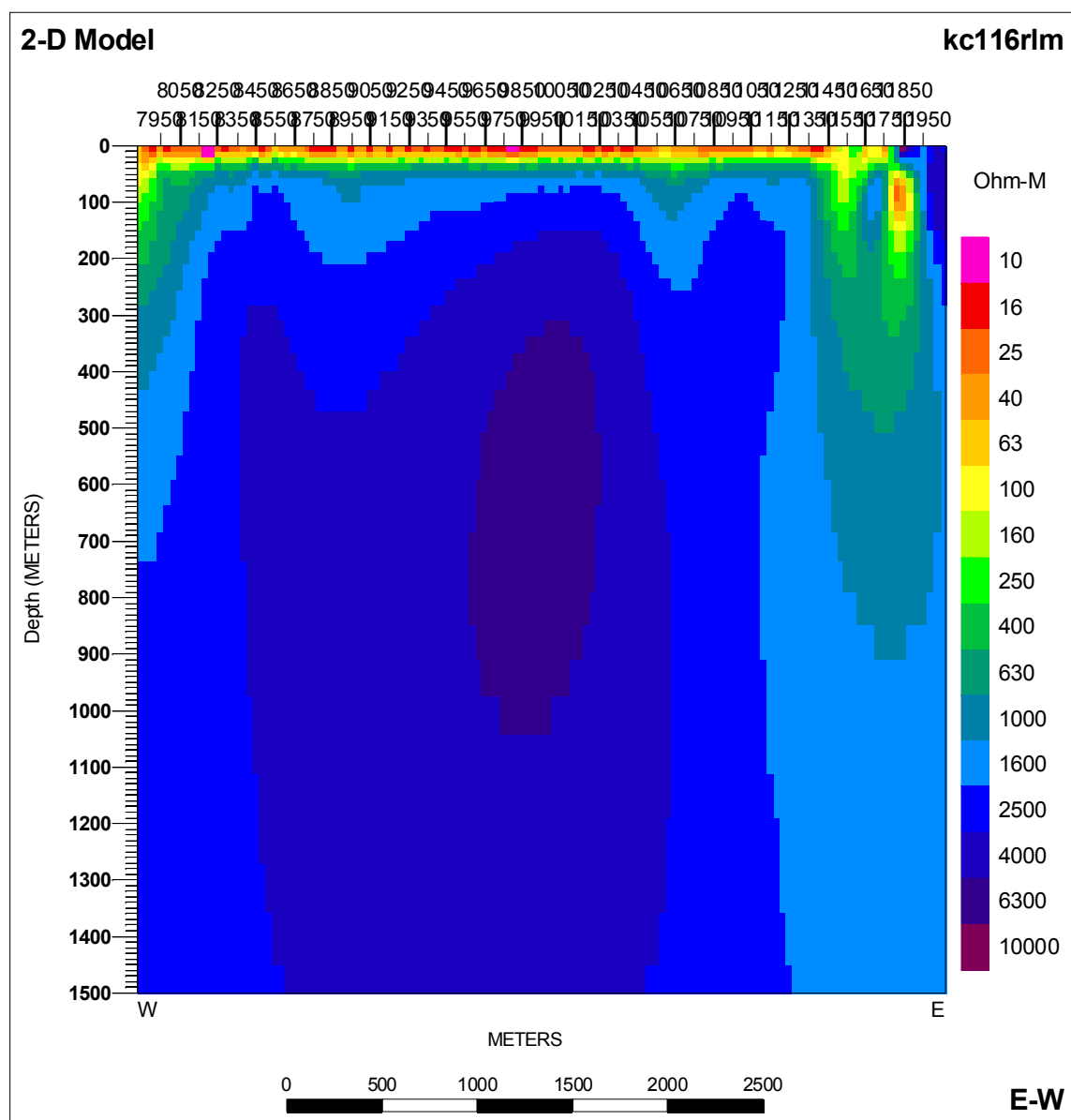


Phase Response Comparison (2/2): L114pw2 vs L114oc2 (9750E-11450E)

Line 116+00N: Preliminary Resistivity Model (Smooth Conjugate Gradient)



Raw Unrotated (Cagniard) RhoXY/PhaseXY and RhoYX/PhaseYX
Pseudosections (I116all)



Line 116+00N – Preliminary 2D MT Model – 35 Iterations

Smooth Conjugate Gradient Run Log

```

inv. iter.=      35   line search iter.=      0
data (S1): 113050.6   model roughness (S2): 1661.725
model closeness (s3): 0.0000000E+00   total S= 114712.3
iteration #      35
resistivity values are:
data for block   17
rms error for this location = 6.071338

```

```

data for block      20
rms error for this location =  5.472359
data for block      23
rms error for this location =  4.792117
data for block      26
rms error for this location =  4.643963
data for block      29
rms error for this location =  2.468300
data for block      32
rms error for this location =  2.774190
data for block      35
rms error for this location =  7.338741
data for block      38
rms error for this location =  7.305863
data for block      41
rms error for this location =  2.894901
data for block      44
rms error for this location =  2.904063
data for block      47
rms error for this location =  4.835560
data for block      50
rms error for this location =  4.618605
data for block      53
rms error for this location =  5.604773
data for block      56
rms error for this location =  5.379770
data for block      59
rms error for this location =  4.272103
data for block      62
rms error for this location =  4.169983
data for block      65
rms error for this location =  2.703119
data for block      68
rms error for this location =  2.763694
data for block      71
rms error for this location =  3.513194
data for block      74
rms error for this location =  3.668443
data for block      77
rms error for this location =  3.078818
data for block      80
rms error for this location =  3.161593
data for block      83
rms error for this location =  3.371206
data for block      86
rms error for this location =  3.334812
data for block      89
rms error for this location =  3.247930
data for block      92
rms error for this location =  3.293933
data for block      95
rms error for this location =  3.251601

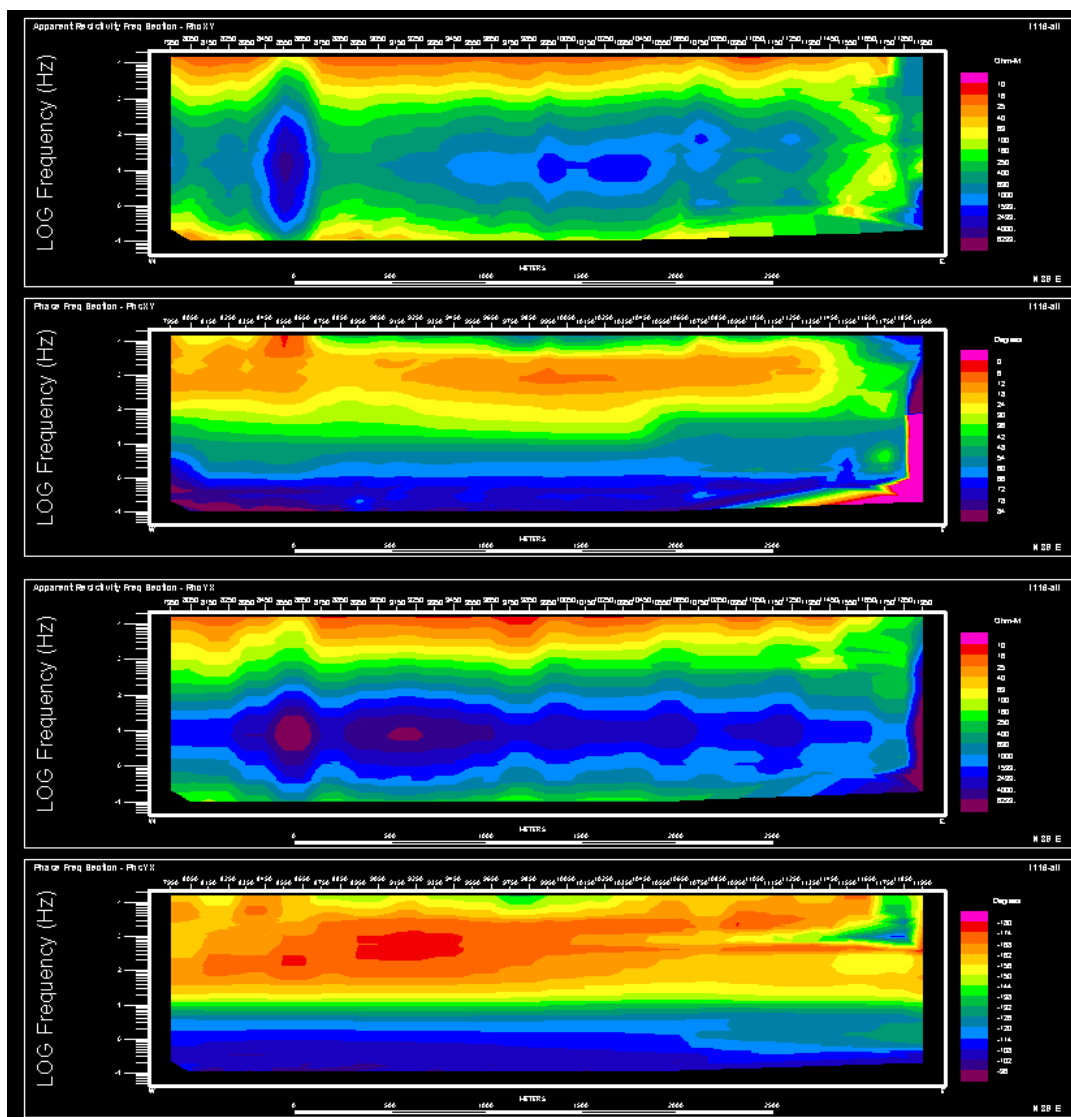
```

```

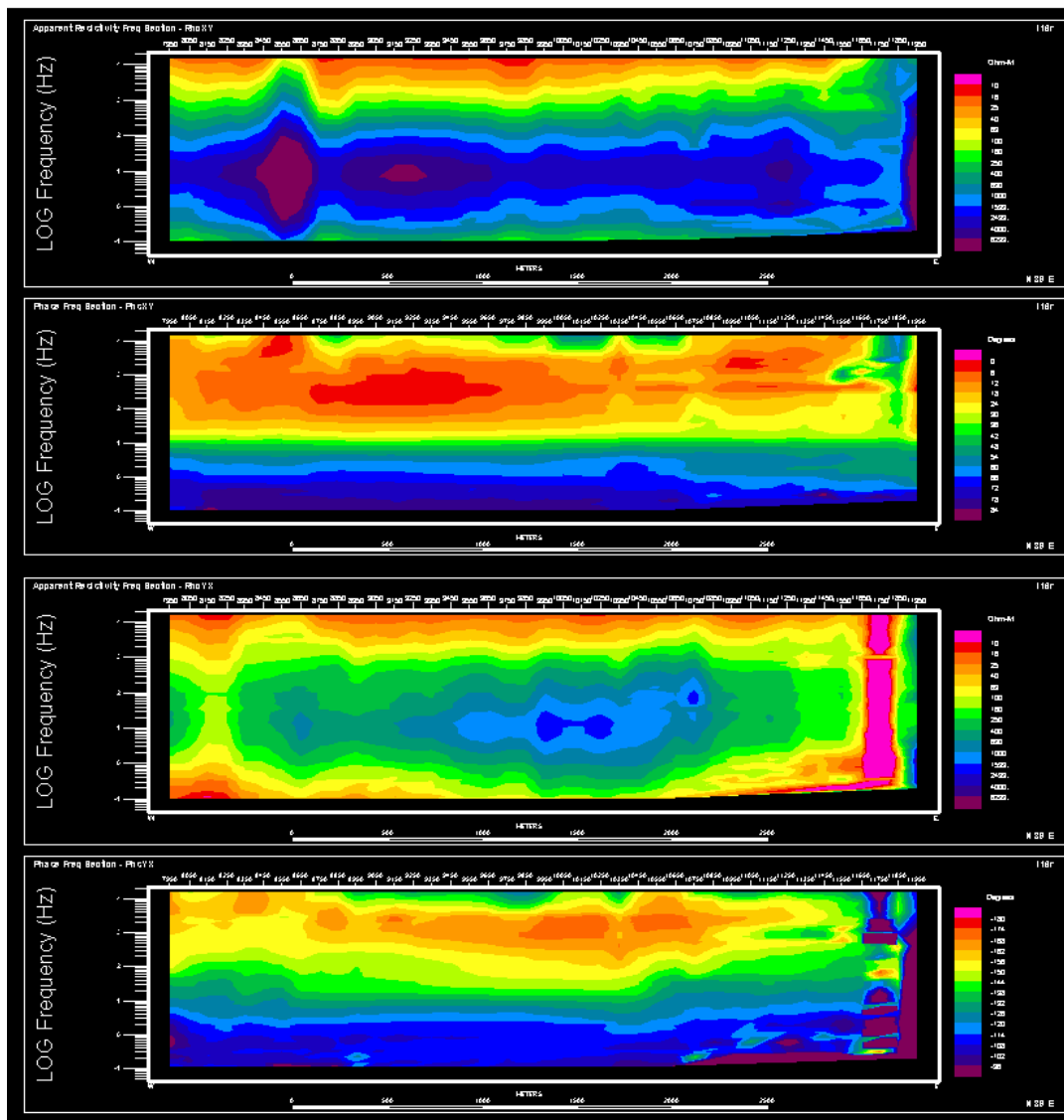
data for block      98
rms error for this location =  4.133764
data for block      101
rms error for this location =  3.927263
data for block      104
rms error for this location =  2.864444
data for block      107
rms error for this location =  2.851790
data for block      110
rms error for this location =  3.556210
data for block      113
rms error for this location =  4.476006
data for block      116
rms error for this location =  4.432775
data for block      119
rms error for this location =  3.896114
data for block      122
rms error for this location =  4.109278
data for block      125
rms error for this location =  6.555041
data for block      128
rms error for this location =  4.868950
data for block      131
rms error for this location =  9.641606
data for block      134
rms error for this location =  8.714656
data for block      137
rms error for this location =  21.73596
data (S1):  113050.6    model roughness (S2):  1661.725
  model closeness (s3):  0.0000000E+00    total S=  114712.3
rms error for previous iteration=  5.736341
rms error for current iteration=  5.729342
desired chi square for this model=  3444.000
chi square for previous iteration =  113326.9
chi square for current iteration =  113050.6

```

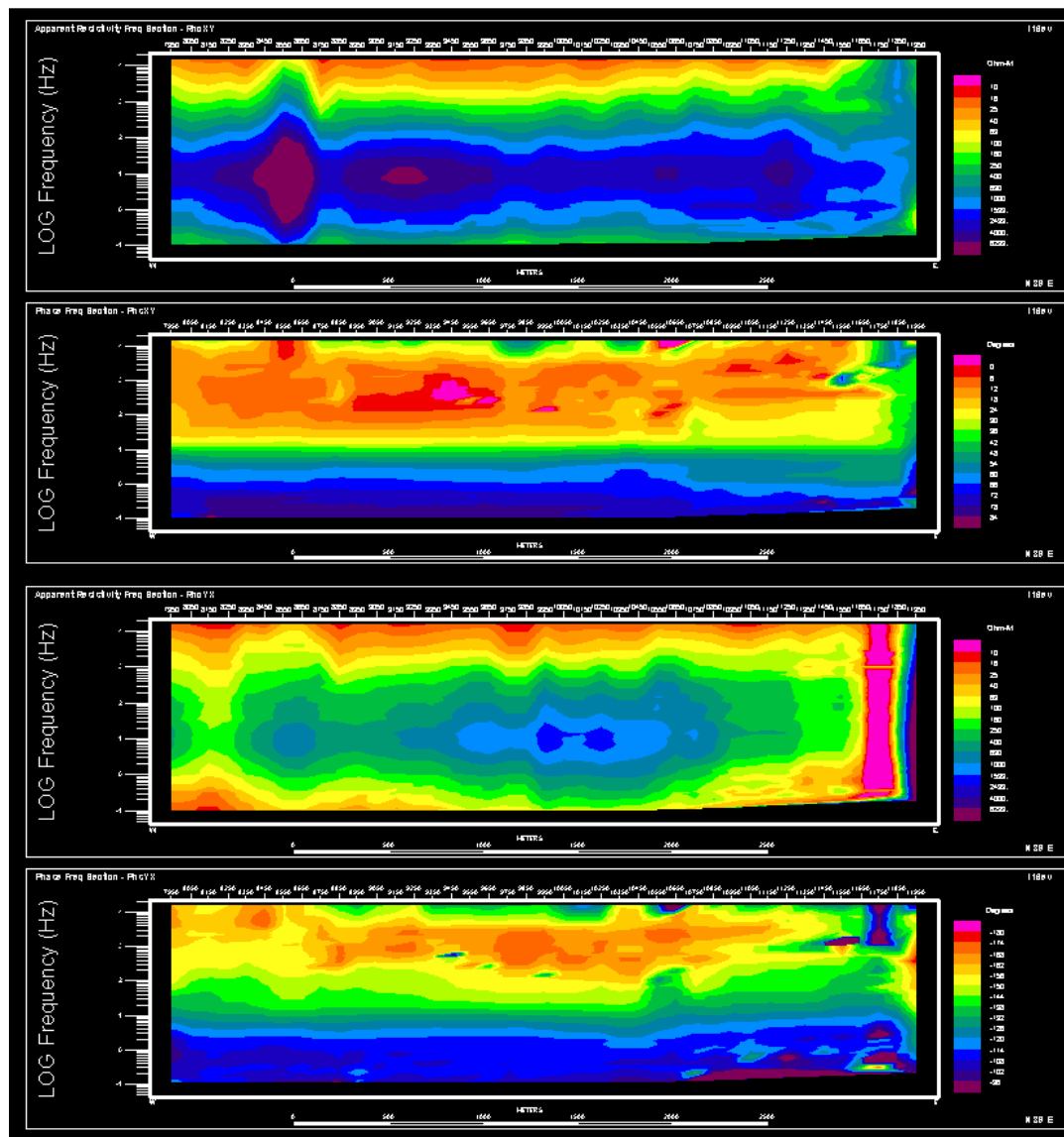
Line 11600N: Final PW Model #2 (additional static shifting applied to data).



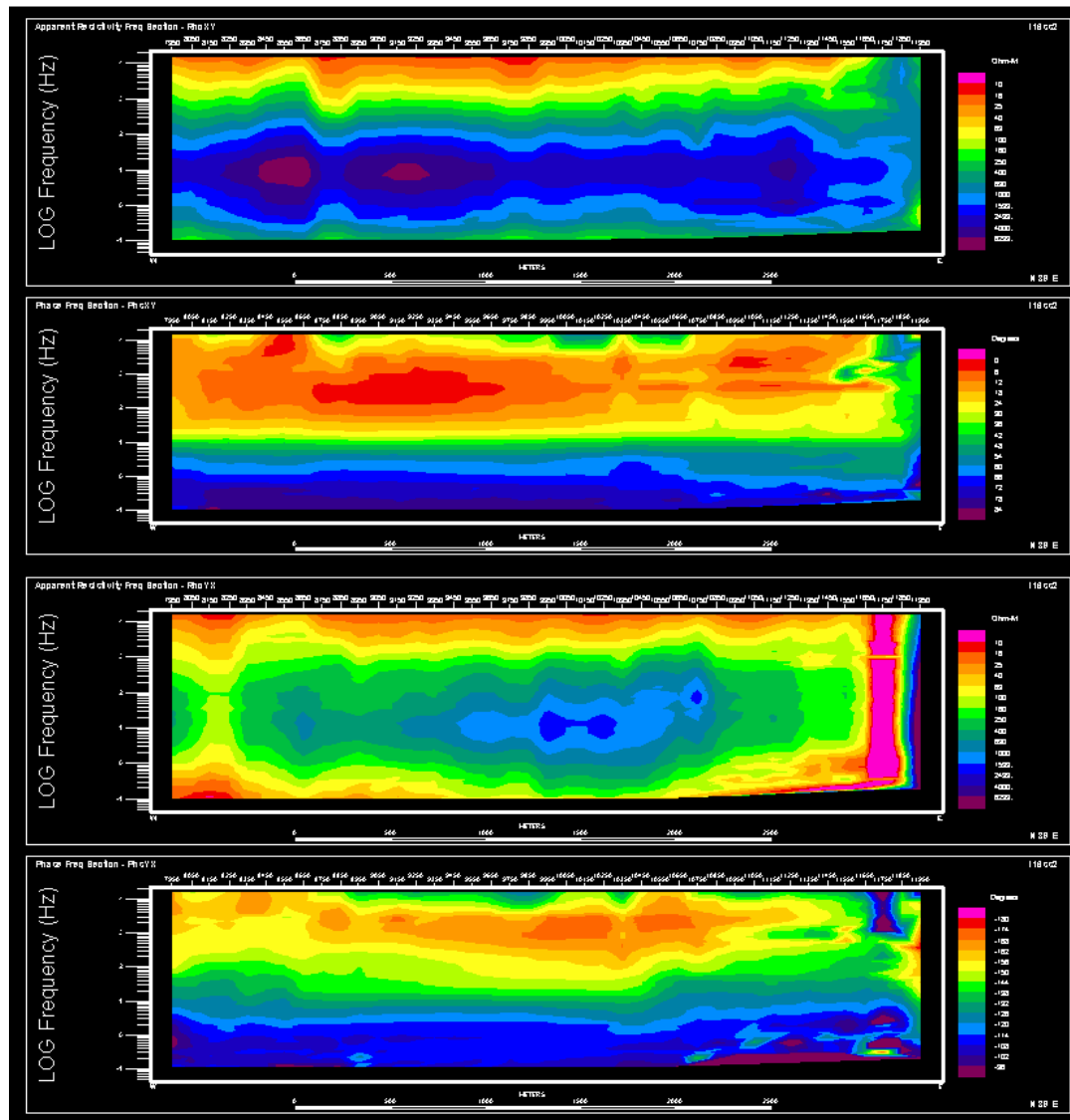
Unrotated RhoXY/PhaseXY and RhoYX/PhaseYX (I116a1)



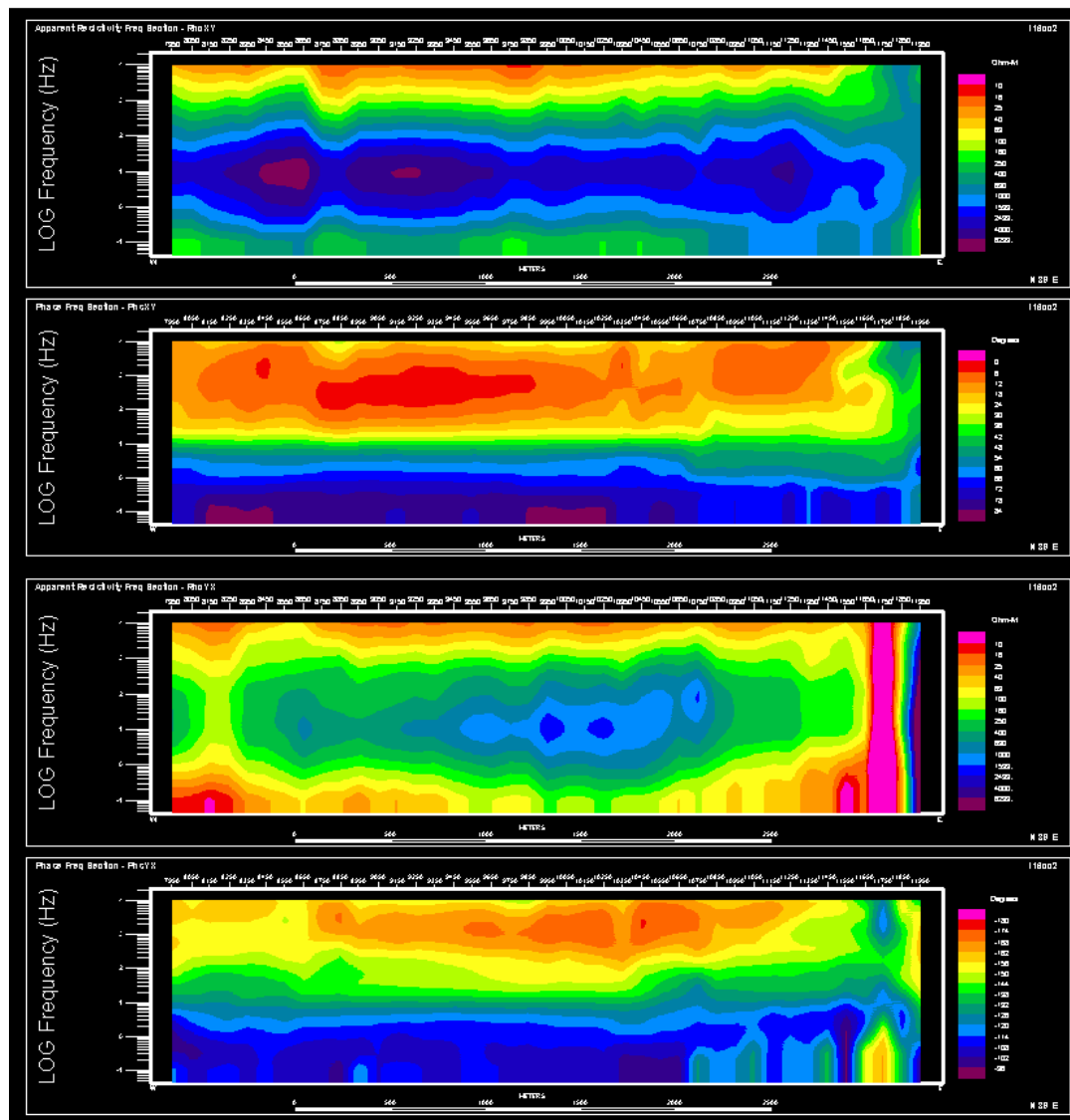
Rotated (to Maximize ResXY-YX RhoXY/PhaseXY and RhoYX/PhaseYX (I116r)



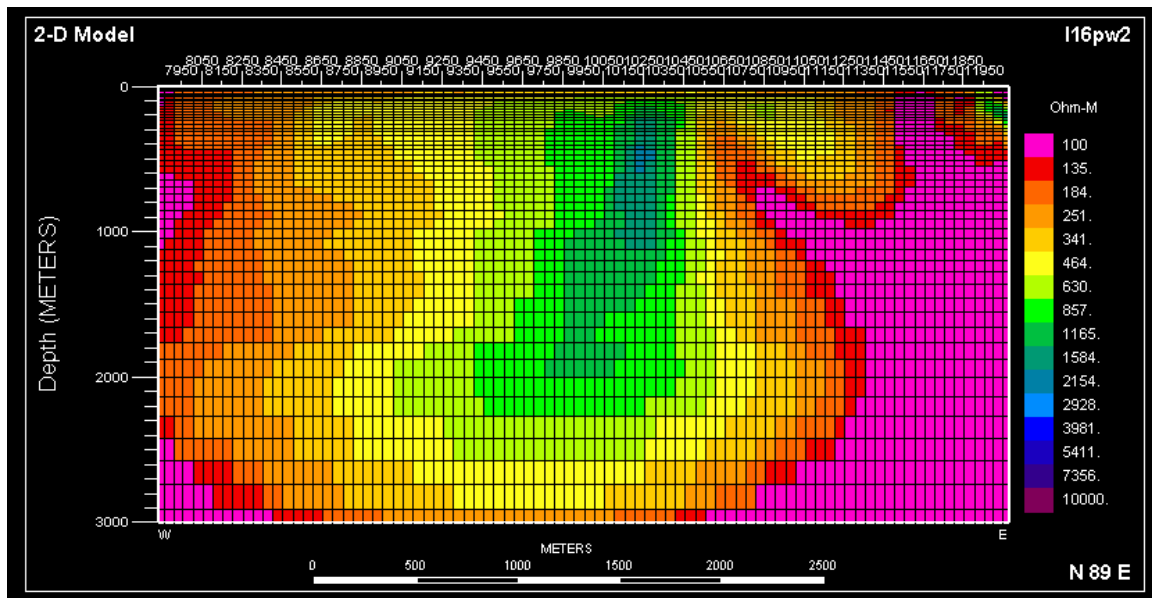
Eigen-vector Rotated RhoXY/PhaseXY and RhoYX/PhaseYX (I116ev)



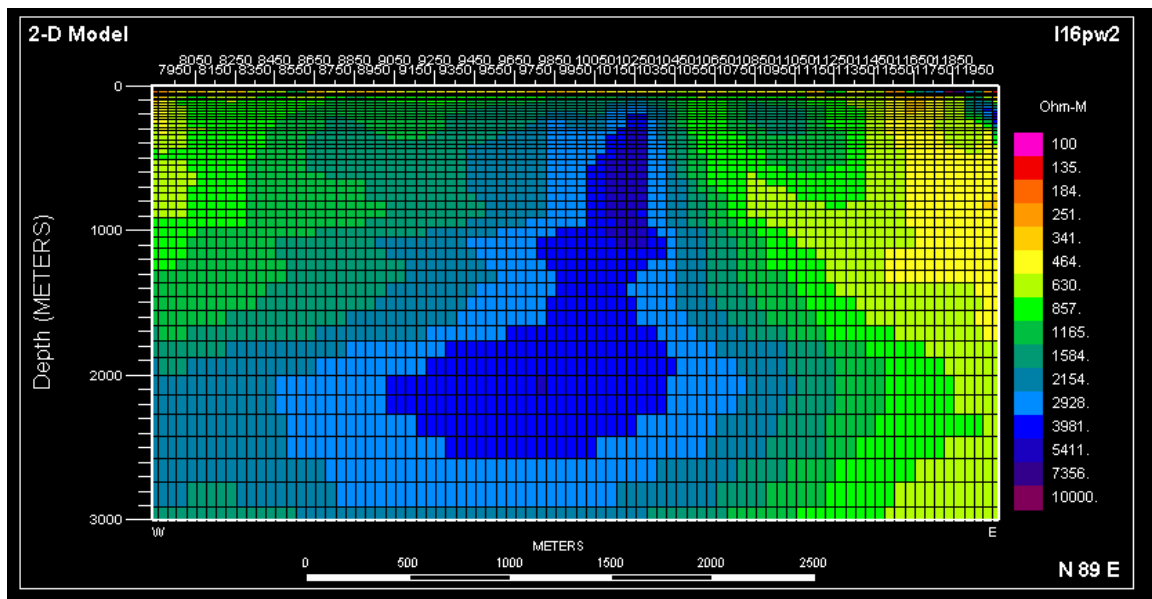
Static-Shifted Data #2 (I114ss2) RhoXY/PhaseXY and RhoYX/PhaseYX



Occam 1D Curve-Fitted (using I116ss2) RhoXY/P haseXY and RhoYX/PhaseYX
(I116oc2)

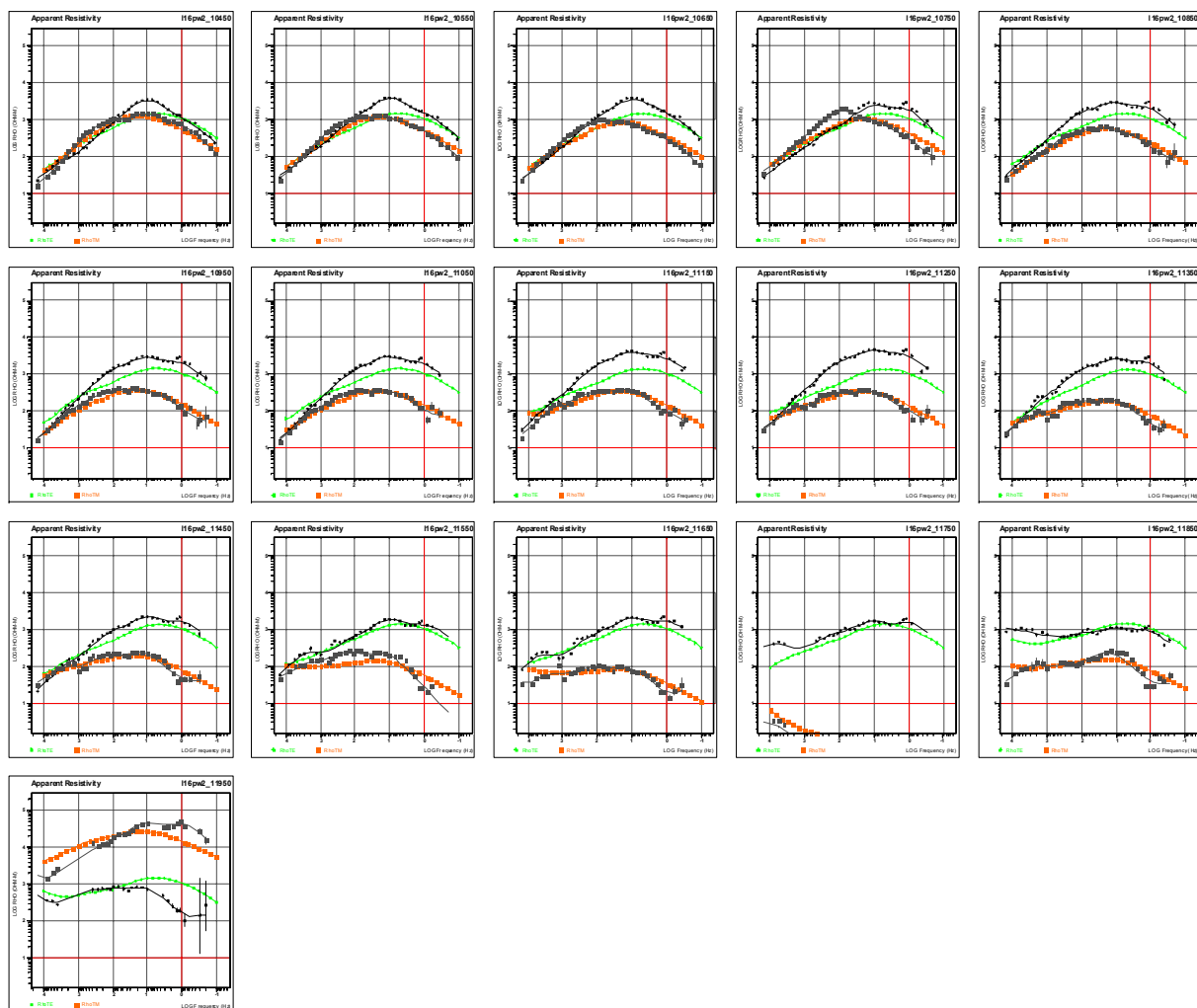


TM Mode PW Resistivity Model (I116pw2) using Eva-processed data (I116oc2), using Smooth Conjugate Starting Model (I116lm2), at Iter 25 (rms error = 5.6%)

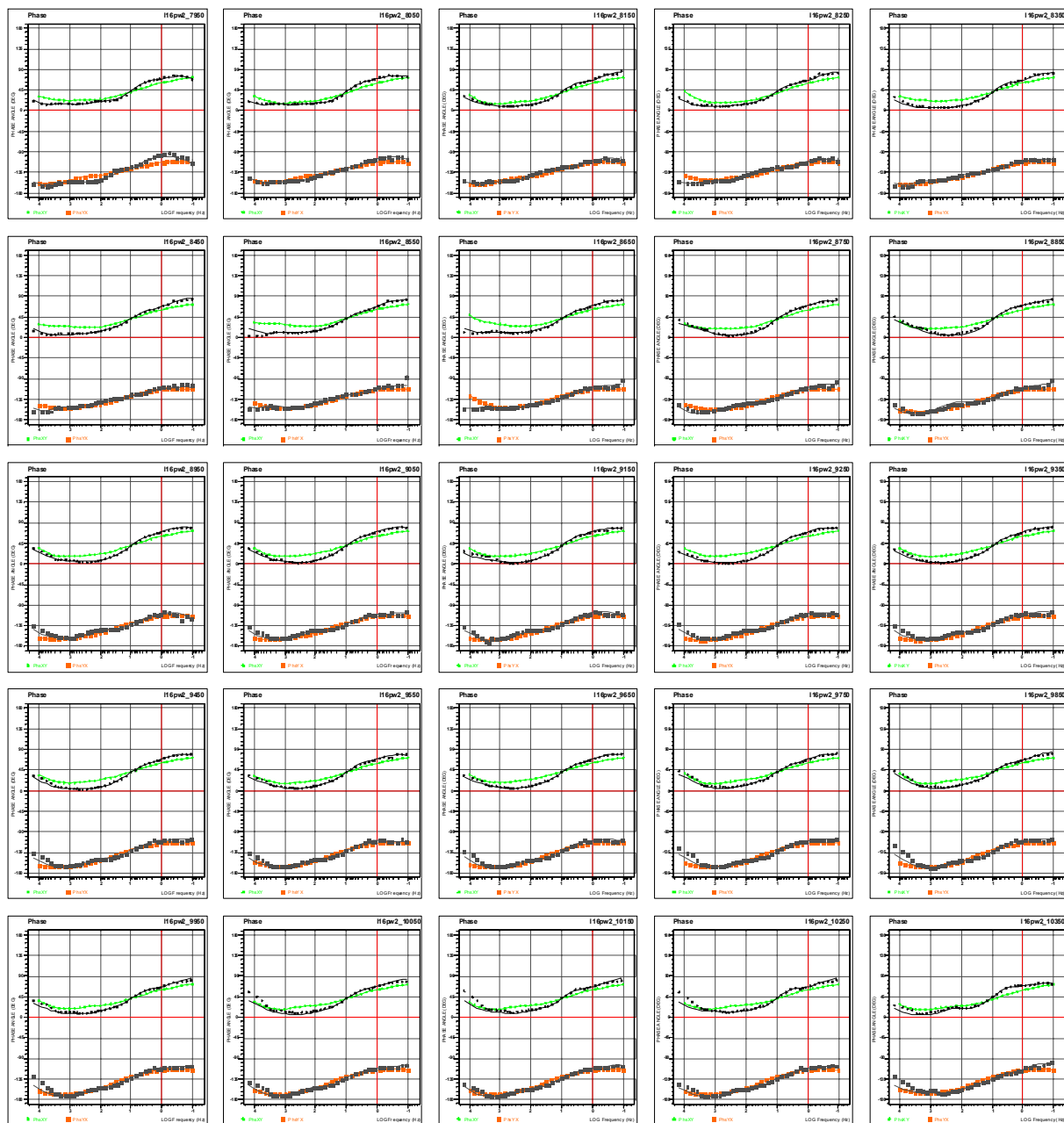


Final TM-TE Mode PW Resistivity Model #2 (I116pw2), using TM Mode Starting Model, at Iteration 26 (rms error = 7.6%)

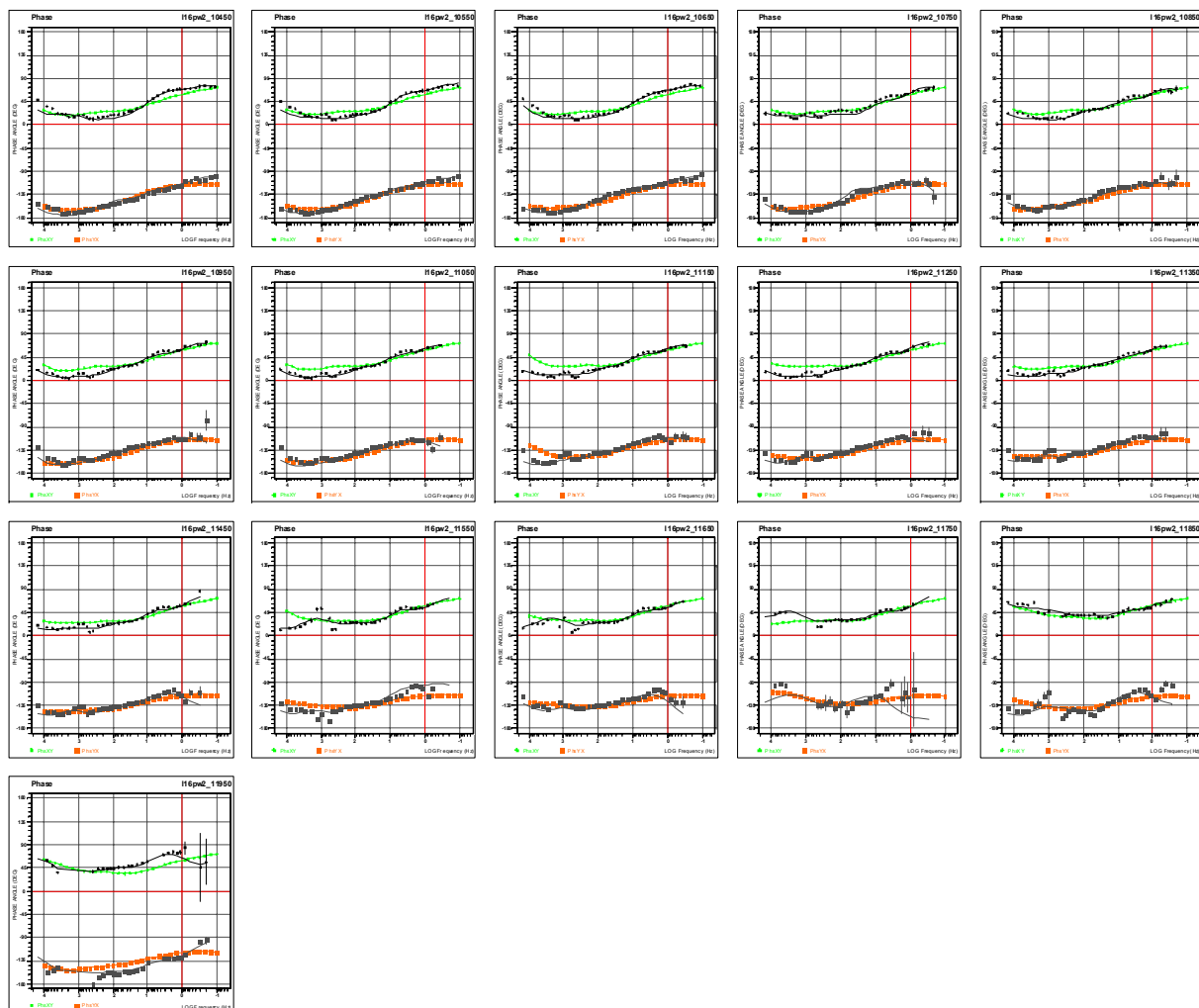
Resistivity Response Comparison (1/2): L116pw2 vs L116oc2 (7950E-10350E)



Resistivity Response Comparison (2/2): L116pw2 vs L116oc2 (10450E-11950E)



Phase Response Comparison (1/2): L116pw2 vs L116oc2 (7950E-10350E)



Phase Response Comparison (2/2): L116pw2 vs L116oc2 (10450E-11950E)

APPENDIX E: MT 2D GOCAD CONSTRAINED INVERSIONS

General Comments on Gocad Constrained MT Inversion Modeling: The reference/constraining resistivity models were constructed in Gocad, and are identical to those used in the DCIP 2D inversions. The resistivity constraints were chosen using a statistical average combining data from a) Kidd Creek borehole single-point resistance values, b) physical property laboratory measurements on Timmins area Archean rocks by Perparim Alikaj QCI, and c) borehole resistivity log of DDH 4509 by QLS. The values for the overburden were estimated from the DCIP results. Initial constrained inversion models, using 50 ohm-m for the rhyolite, where later changed to 1k ohm-m, based on final model comparisons and behaviour. The values chosen for the reference models are as follows:

Table D.5: Resistivity Constraints.

<u>Lithologic Unit</u>	<u>Resistivity (Conductivity)</u>
Overburden	10 ohm-m (0.01s/m)
Mafic Volcanic	10,000 Ω -m (0.0001 s/m)
Ultramafic Volcanic	7,000 Ω -m
Sedimentary rock	5,000 Ω -m
Rhyolite	1,000 Ω -m (0.001 s/m)
Graphite	10 ohm-m (0.1 s/m)
Massive Sulphide	10 ohm-m (0.1 s/m)

The following inverse models were calculated using on the GeotoolsTM MT processing and model-inversion platform. The initial data input into the Geotools database were line-station data, taken directly from the EDI (electronic data exchange) archive, contained within the logistics report, and which consist of non-derotated tensor spectra, calculated using the QuicklayTM platform. The spectra span the 15000 Hz to 0.1025 frequency bandwidth, with a data density of approximately 8 points per decade (0.15 decade band-average), with minimal data editing.

For each of the line-profiles, constrained 2D inversions were calculated using solely the PW Gauss-Newton solutions. The PW Gauss-Newton models were calculated using EVA processed data, identical to those used in the unconstrained inversions, which consists of a) tensor rotation into the maximum and minimum components, using either conventional (maximizing ρ_{XY} and ρ_{YX}) or eigen-vector (LaTorraca decomposition) analyses, b) TM-TE mode identification, based on similar/dissimilar 2D component behaviour, c) static shifting, performed manually on individual resistivity curves, and d) curve-fitting to 1D Occam inversion model, to ensure Hilbert-transformable resistivity and phase curves –with data-editing and mode-swapping, as required, at each step of the processing stage. Other EVA processes such as 3D static-stripping and 2D topographic stripping were not performed.

In preparation for the 2D inversions, the meshes were constructed using: a) run-mesh frequencies set at 10k, 1k, 100, 10 and 0.1 Hz, b) model resistivity projection to 10 to 10k ohm-m range, c) a minimum column width of 50m, inside the data range, increasing by 50% increments to 30km off each end, laterally, d) maximum 80 rows, with a minimum row-thickness of 10m to a depth of 1km, increasing by 10% increments to 30km depths. For the PW inversion, mesh nodes were situated at each station, as for unconstrained inversions.

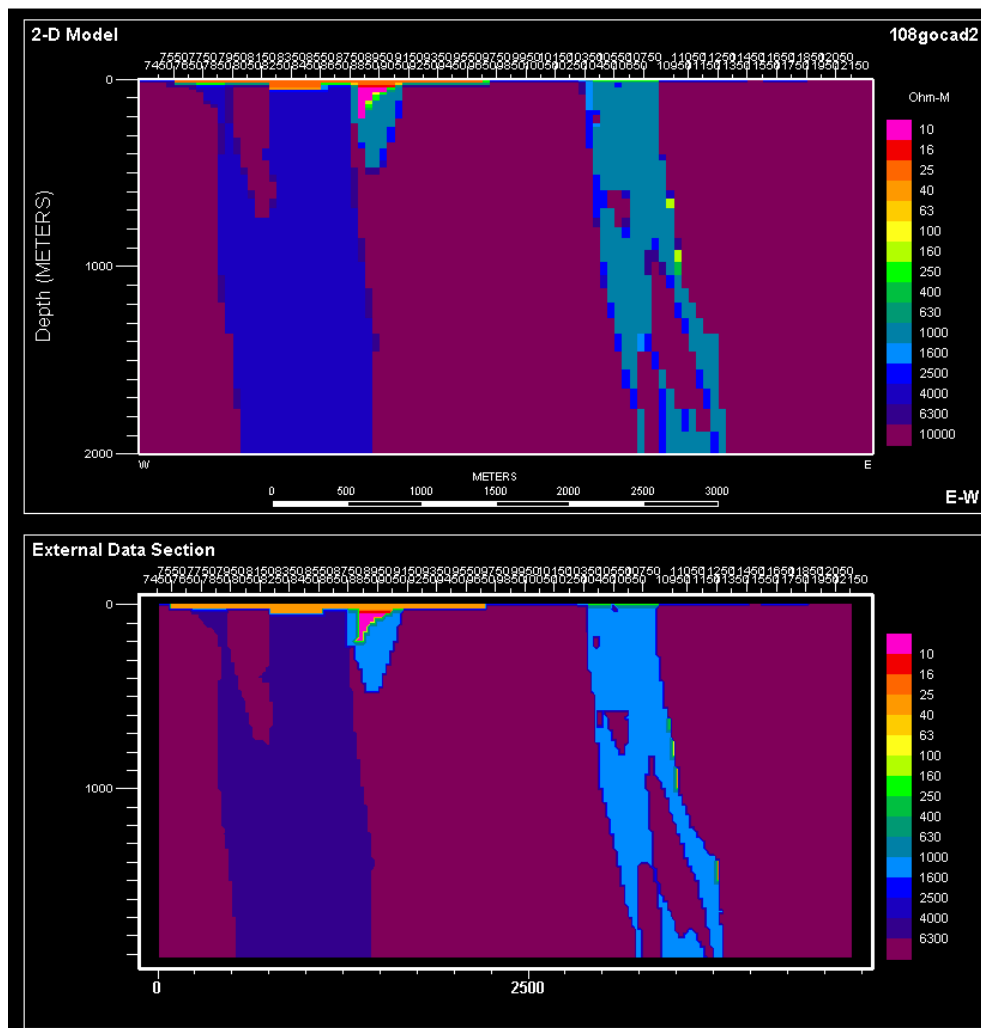
The inversion models were calculated using the interpolated resistivity and phase curves, across the 10kHz to 0.1Hz bandwidth, assuming a 2% error for the resistivity and 3 degrees for the phase, at 6 equi-spaced frequencies per decade. The PW inversion parameters used a Tolerance of 1, 40 single rows, and a regularization width/depth ratio of 0.1. The PW models were performed in 2 stages, by first importing the gocad reference and performing the calculation in the TM mode, then subsequently using the TM mode solution as a reference for the final TM-TE mode calculation.

Table D.6: Model Convergences for 2D Unconstrained MT Inversions.

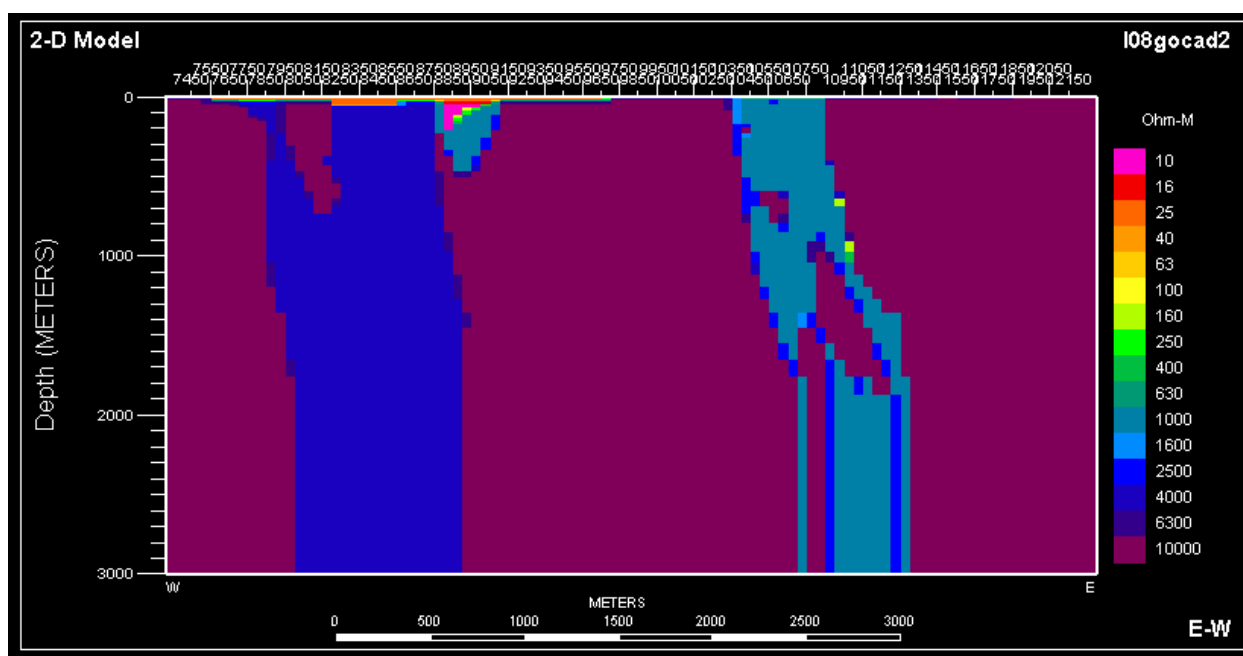
<u>Line</u>	<u>Gocad Constrained PW Gauss-Newton 2D MT Inversions</u>
line 10800E	TM rms error = 4.95% in 26 iterations
	TM-TE rms error = 6.92% in 18 iterations
line 11000E	TM rms error = 6.97% in 15 iterations
	TM-TE rms error = 5.24% in 17 iterations
line 11200E	TM rms error $\approx$ 6.7% in 18 iterations
	TM-TE rms error $\approx$ 5.5% in 16 iterations
line 11400E	TM rms error = 8.3% in 20 iterations
	TM-TE rms error = 8.2% in 16 iterations
line 11600E	TM rms error = 8.4% in 25 iterations
	TM-TE rms error = 6.4% in 38 iterations

Line 10800E: Gocad-Constrained Resistivity Model #3 (I108i3) with Rhyolite @ 1k ohm-m.

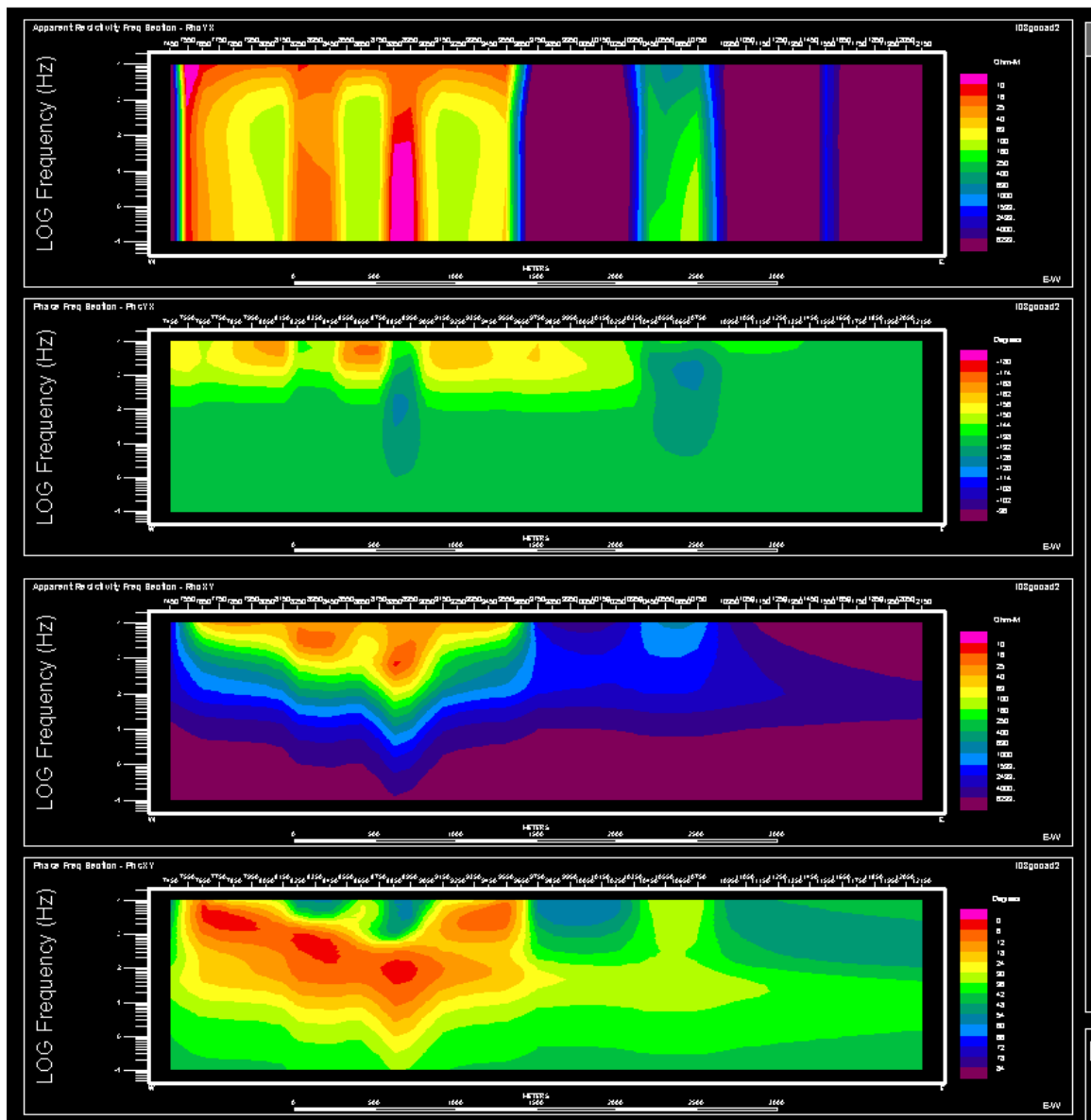
- Mafic volcanic = 10k ohm-m (purple)
- Ultramafic volcanic = 7k ohm-m (navy-blue)
- Sediments = 5k ohm-m (blue)
- Rhyolite = 1000 ohm-m (royal blue)
- Overburden = 30 ohm-m (red)
- Graphite/Massive Sulphide = 10 ohm-m (pink to yellow)



Geotools Starting Model (I108gocad2) and Gocad Reference.

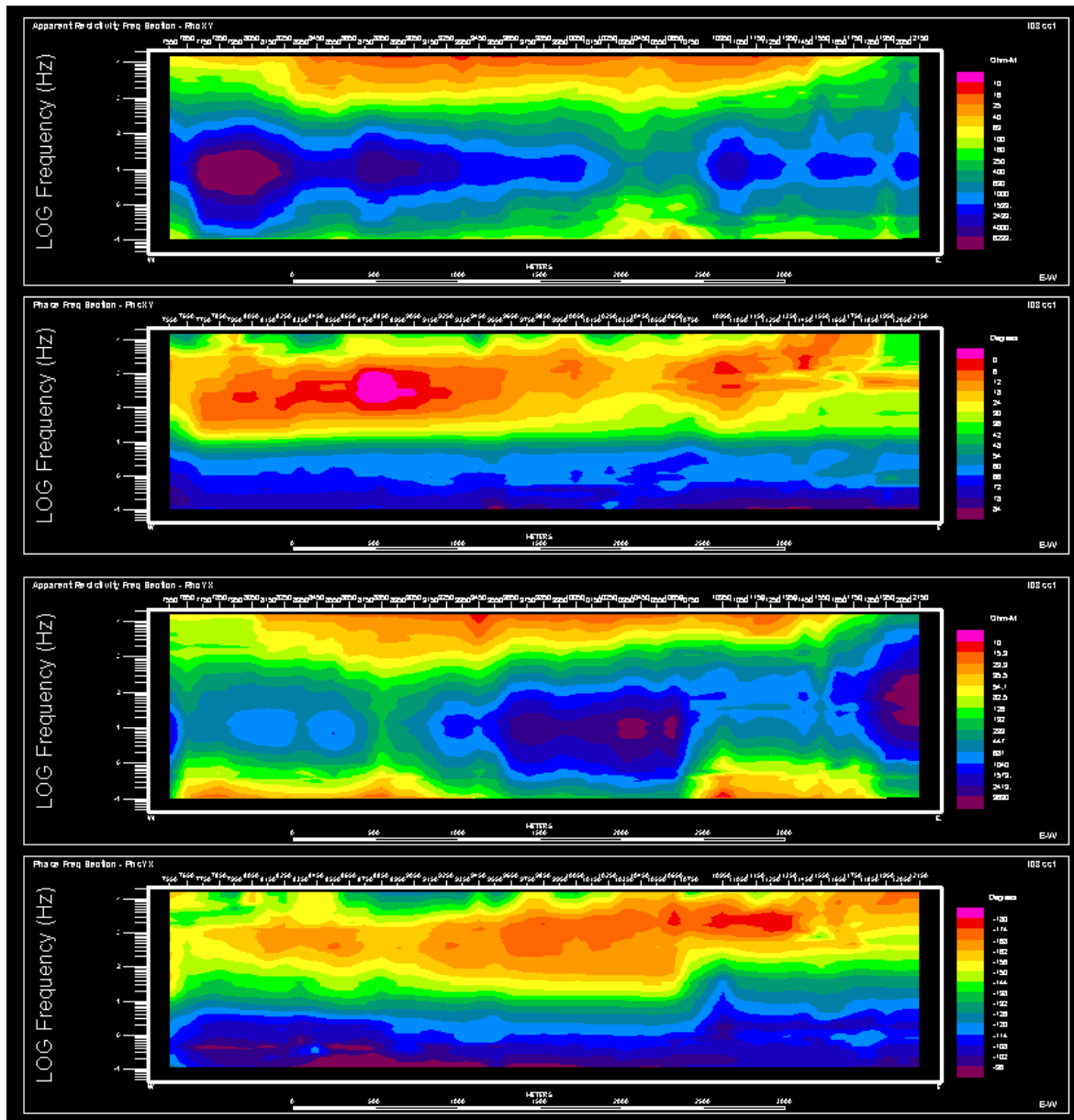


Gocad Reference Model (I08gocad2) for Constrained 2D Inversion

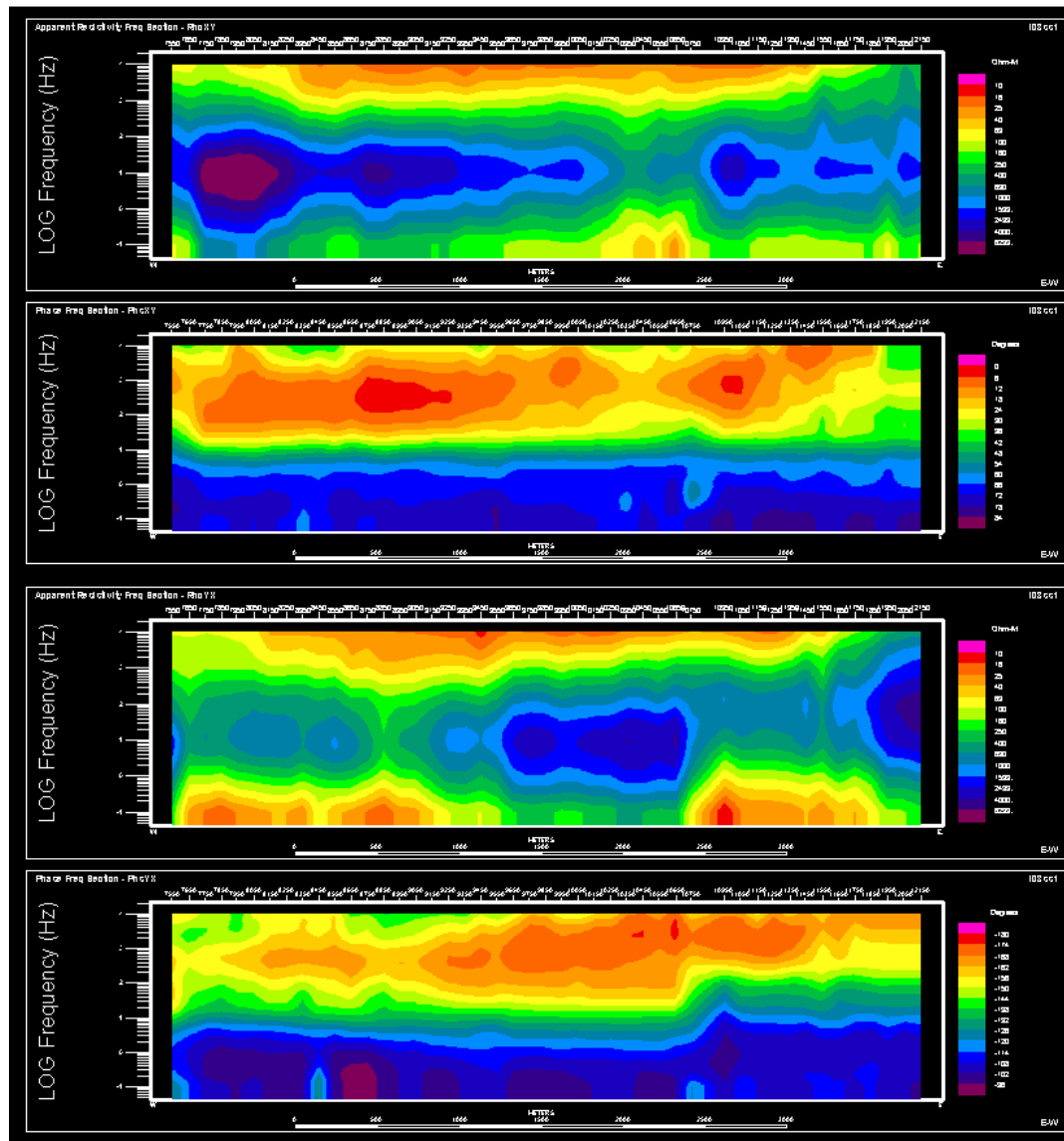


PW 2D Fwd Model of Gocad Reference Model (I08gocad2)

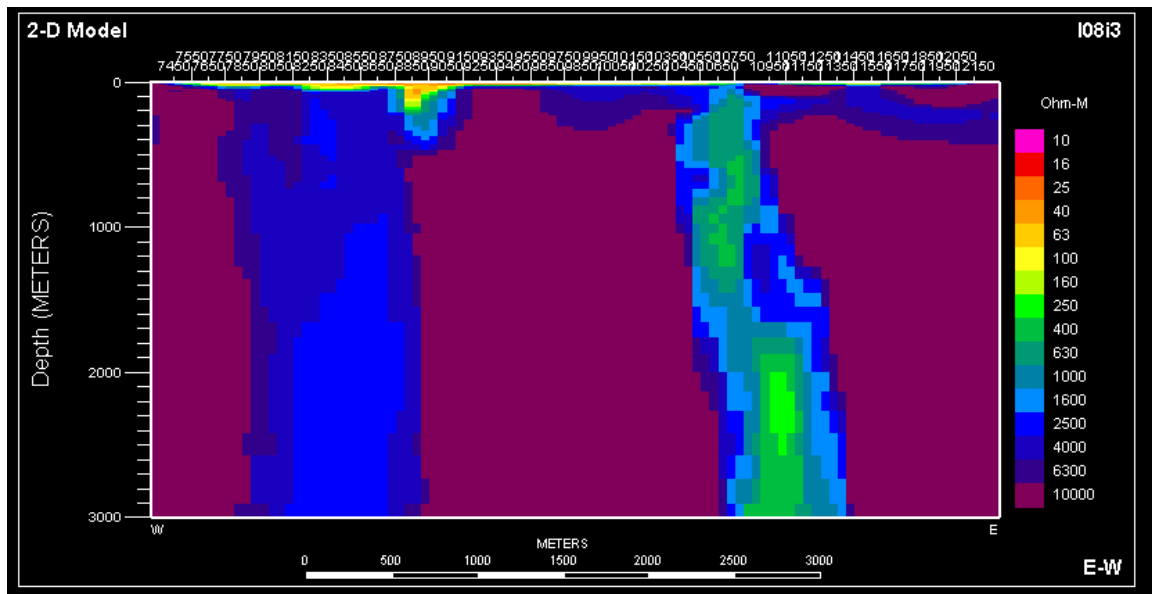
Showing In-line (TM) Rho/Phase(upper) and Cross-line (TE) Rho/Phase (lower)



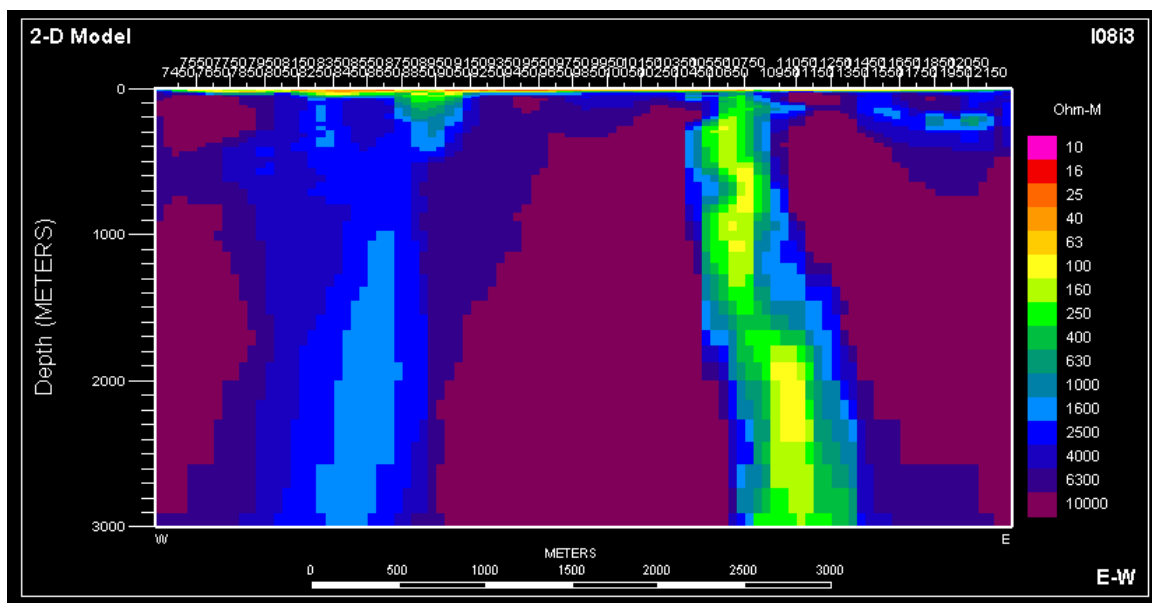
EVA-processed/Static-shifted RhoXY/PhXY & RhoYX/PhYX (I08ss1).



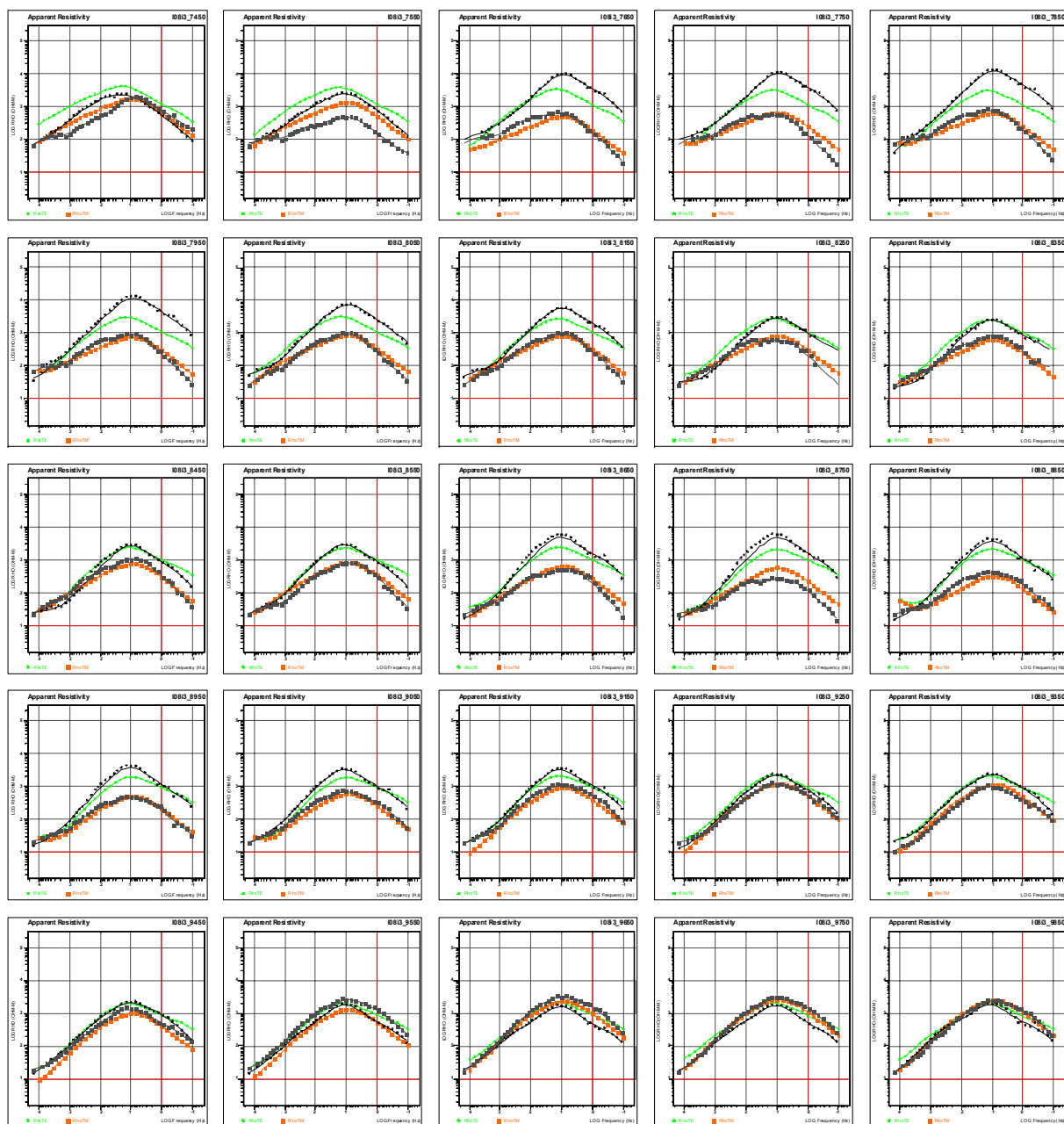
1D Occam Fit (using l108ss1) RhoXY/PhaXY & RhoYX/PhaYX



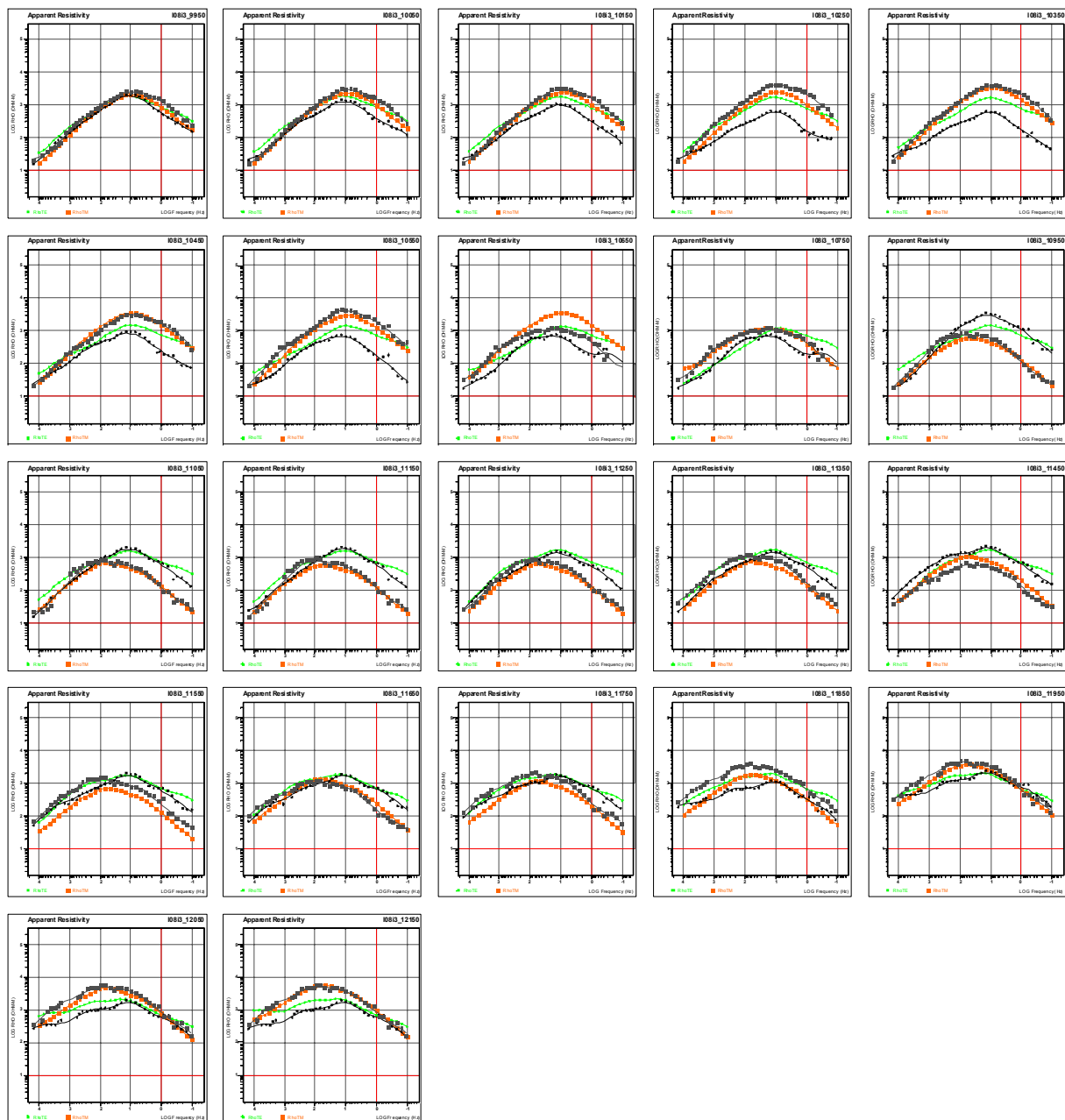
TM mode Resistivity Model (I08i3) @ 26 iterations (rms error = 4.9%,
FMRQ=12.8) using I108ss1



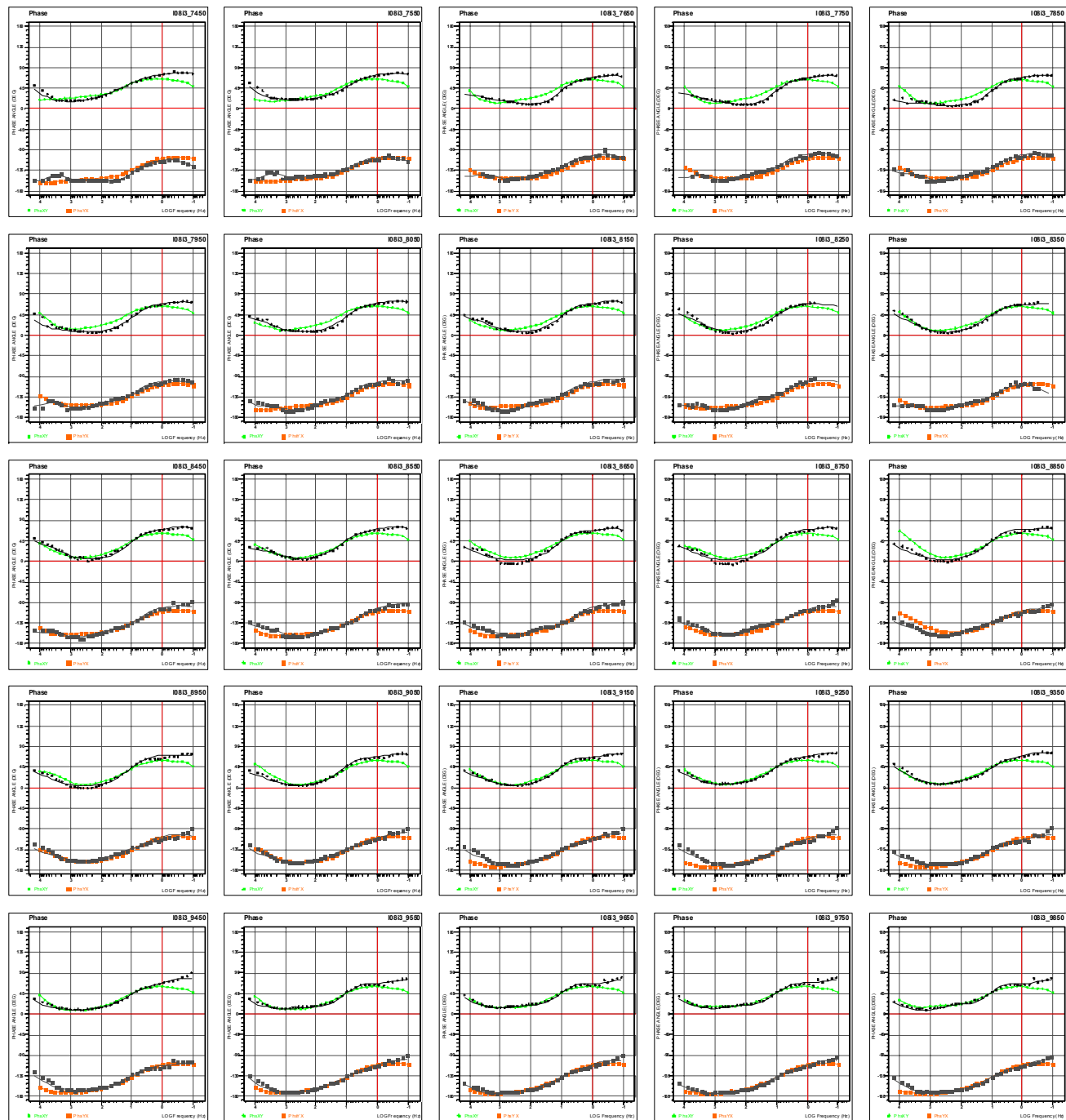
Final TM-TE mode Resistivity Model (I108i3) @ 18 iterations (rms error = 6.92,
FMRQ=3.2) using TM mode as starting model



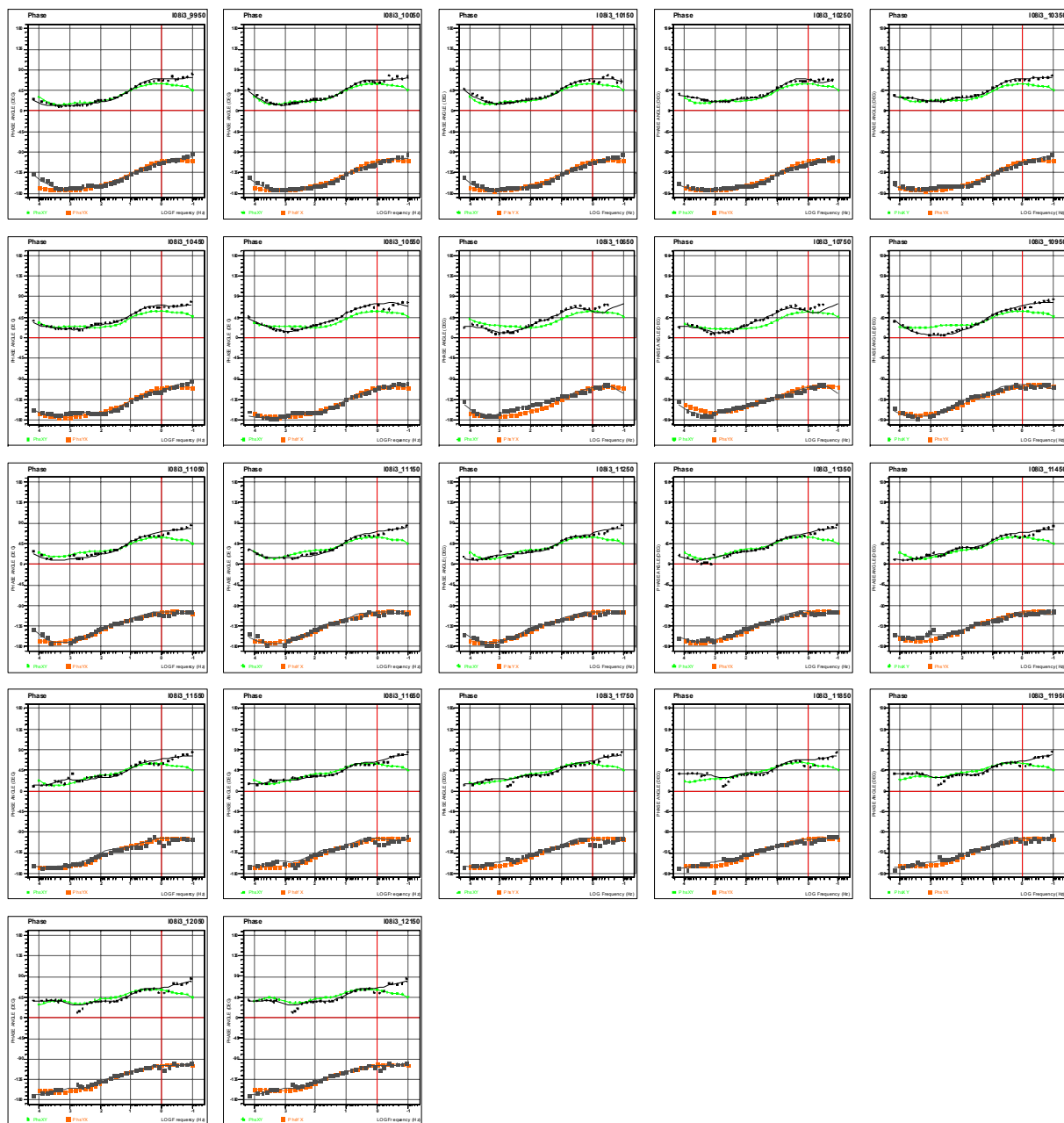
Response Comparison (1/2): L108i3 vs L108ss1 (7450E-9850E)



Resistivity Response Comparison (2/2): L108i3 vs L108ss1 (9950E-12150E)



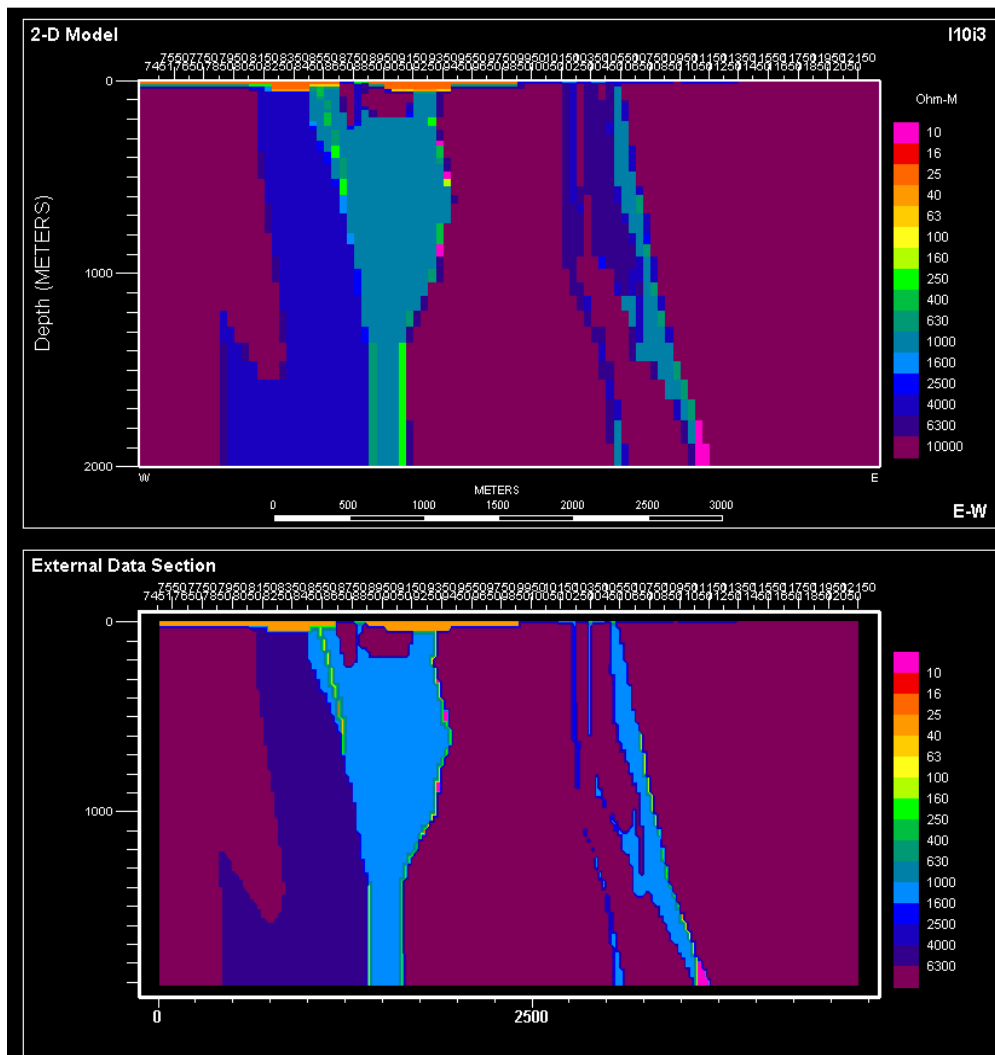
Phase Response Comparison (1/2): L108i3 vs L108ss1 (7450E-9850E)



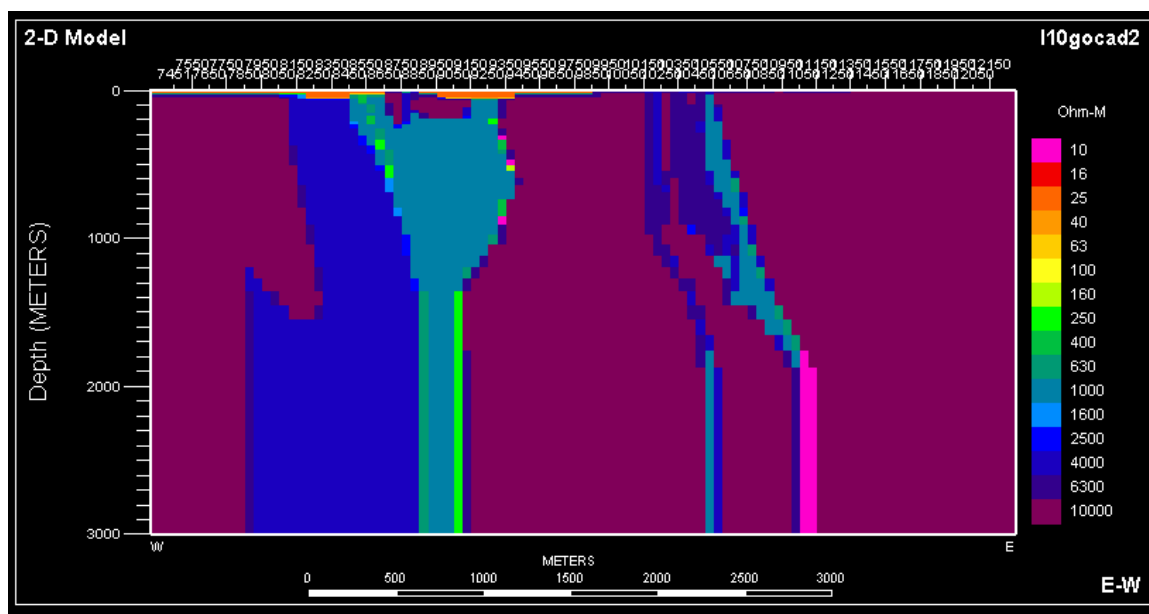
Phase Response Comparison (2/2): L08i3 vs L08ss1 (9950E-12150E)

Line 11000N: Gocad Constrained Resistivity Model #3 (I10i3) with Rhyolite = 1000 ohm-m (I10gocad2)

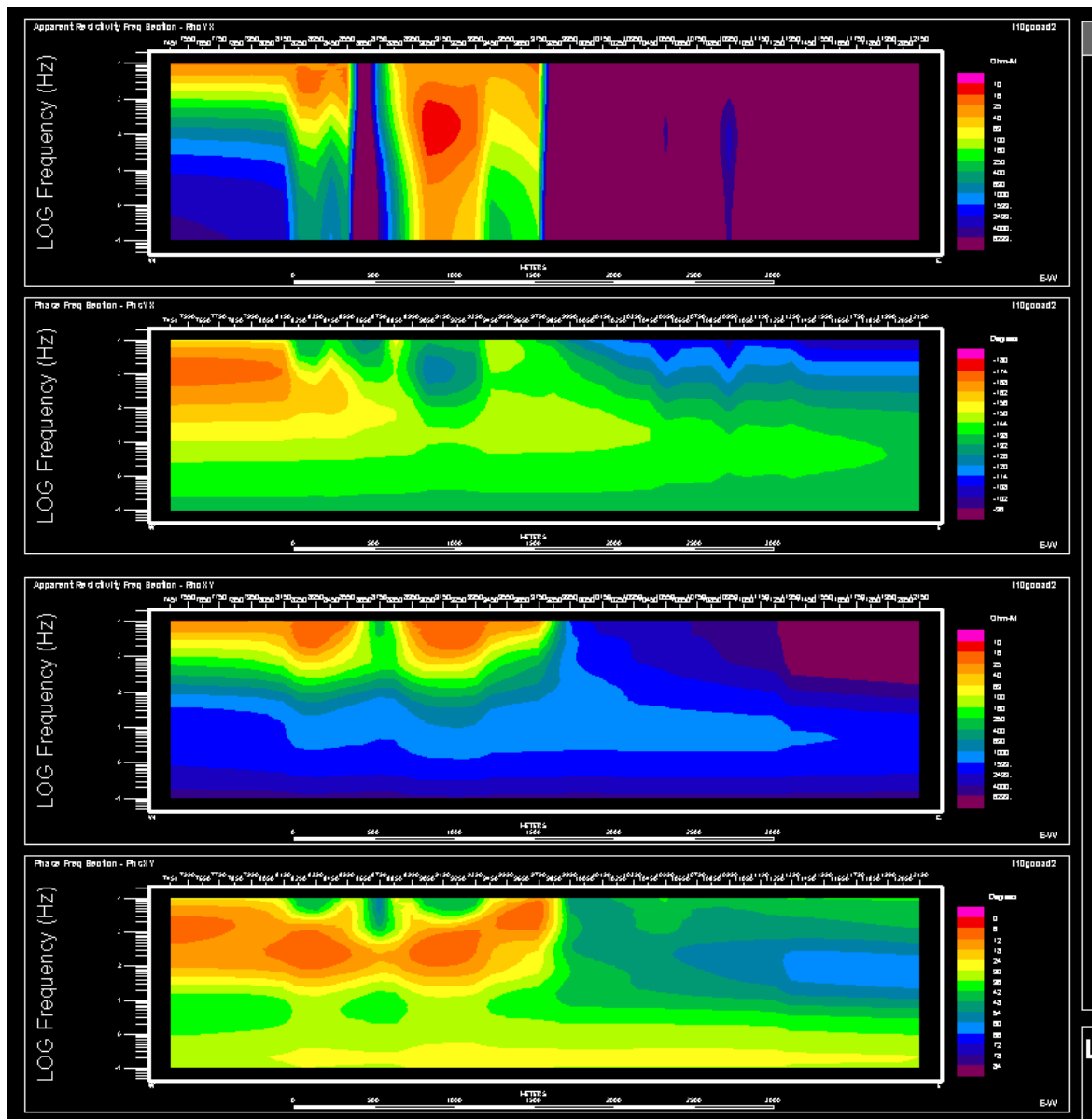
- Mafic volcanic = 10k ohm-m (purple)
- Ultramafic volcanic = 7k ohm-m (navy-blue)
- Sediments = 5k ohm-m (blue)
- Rhyolite = 1000 ohm-m (royal blue)
- Overburden = 30 ohm-m (red)
- Graphite/Massive Sulphide = 10 ohm-m (pink to yellow)



Geotools PW Starting Model (I108gocad2 - top) and Gocad Reference (bottom)

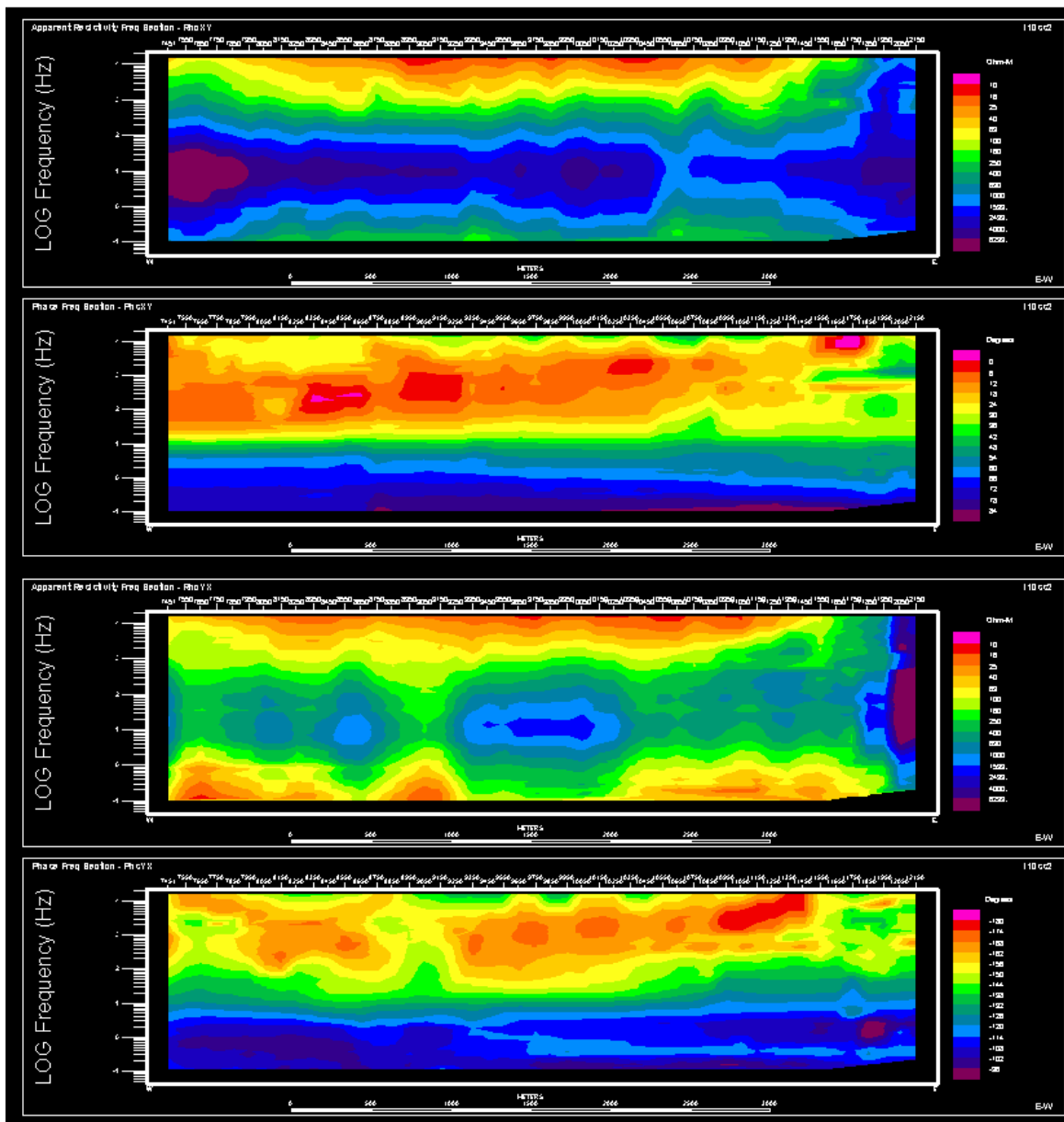


Gocad Reference Model (I10gocad2) for Constrained 2D Inversion.

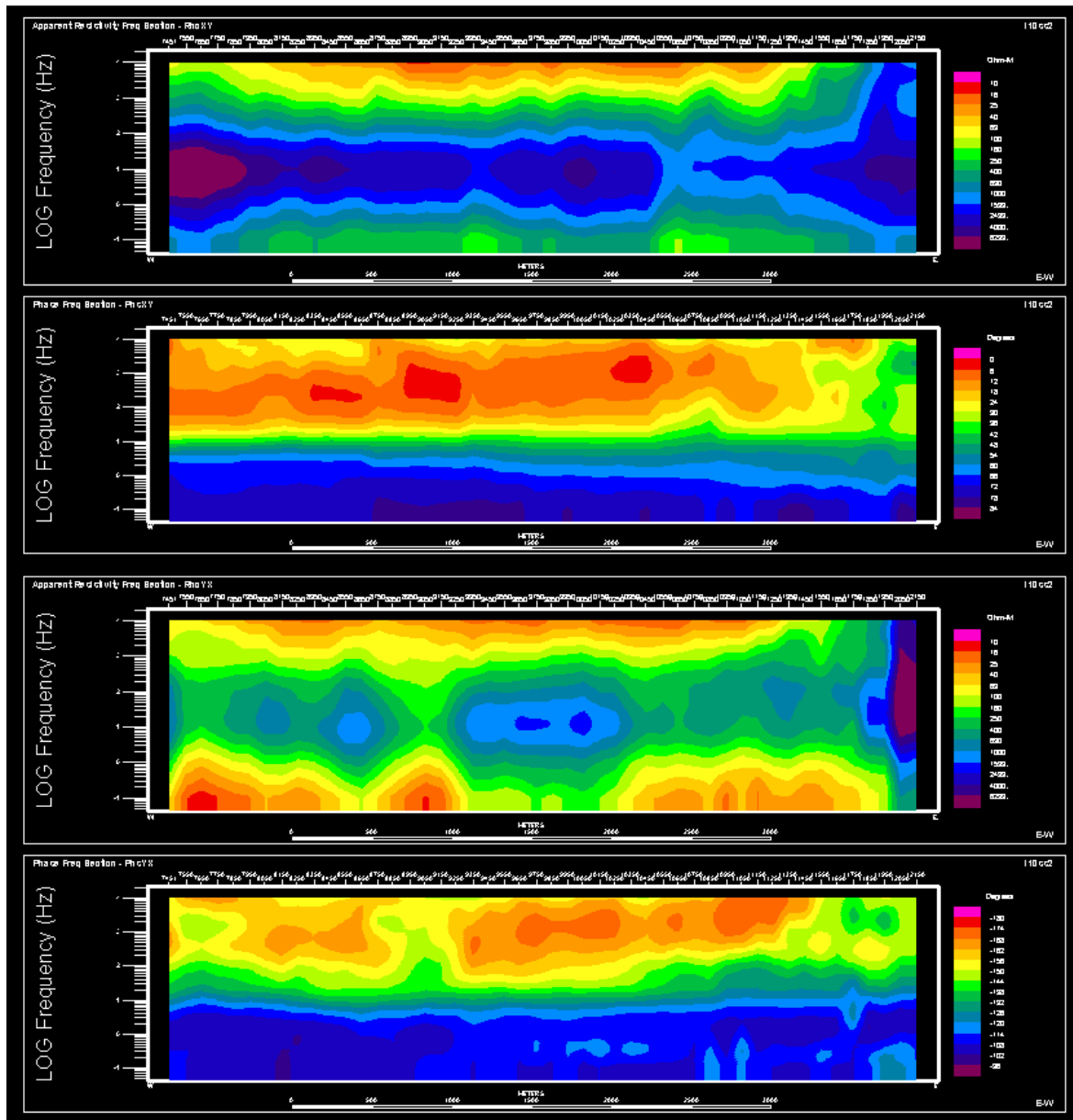


PW 2D Forward MT Model for Gocad Reference (I10gocad2)

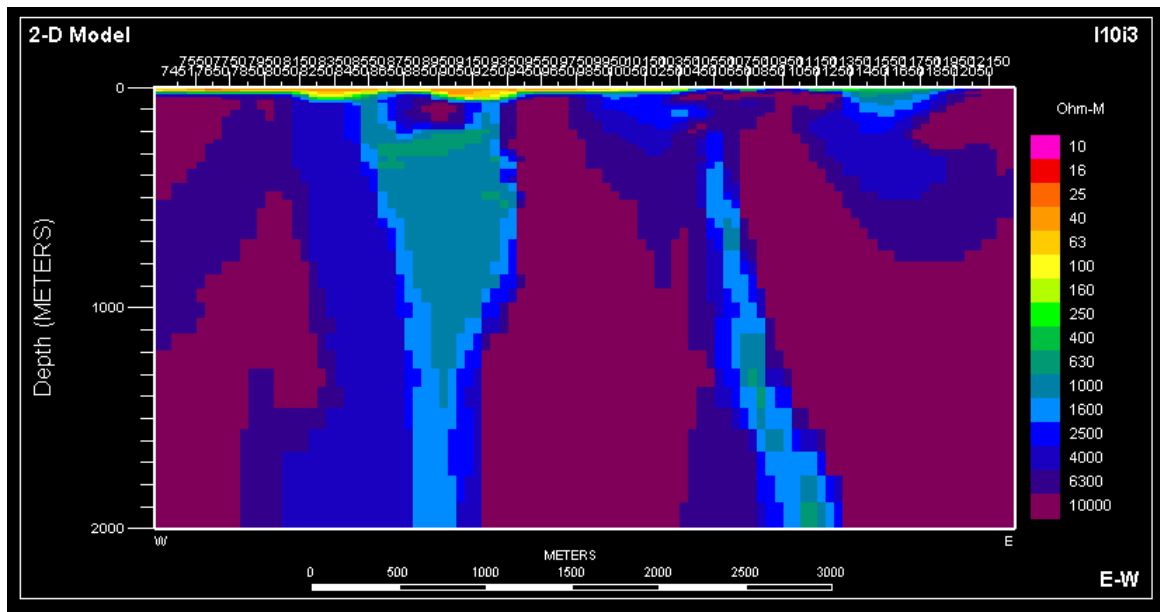
Showing In-line (TM) Rho/Phase(upper) and Cross-line (TE) Rho/Phase (lower)



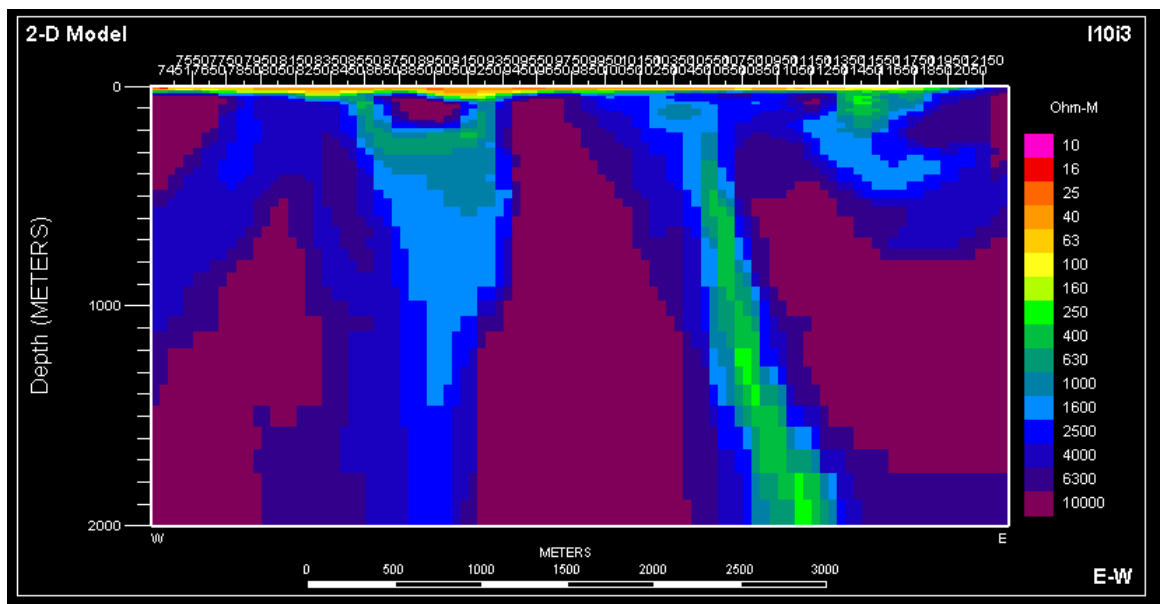
EVA-processed/Static-shifted RhoXY/PhaXY & RhoYX/PhaYX (L10ss2)



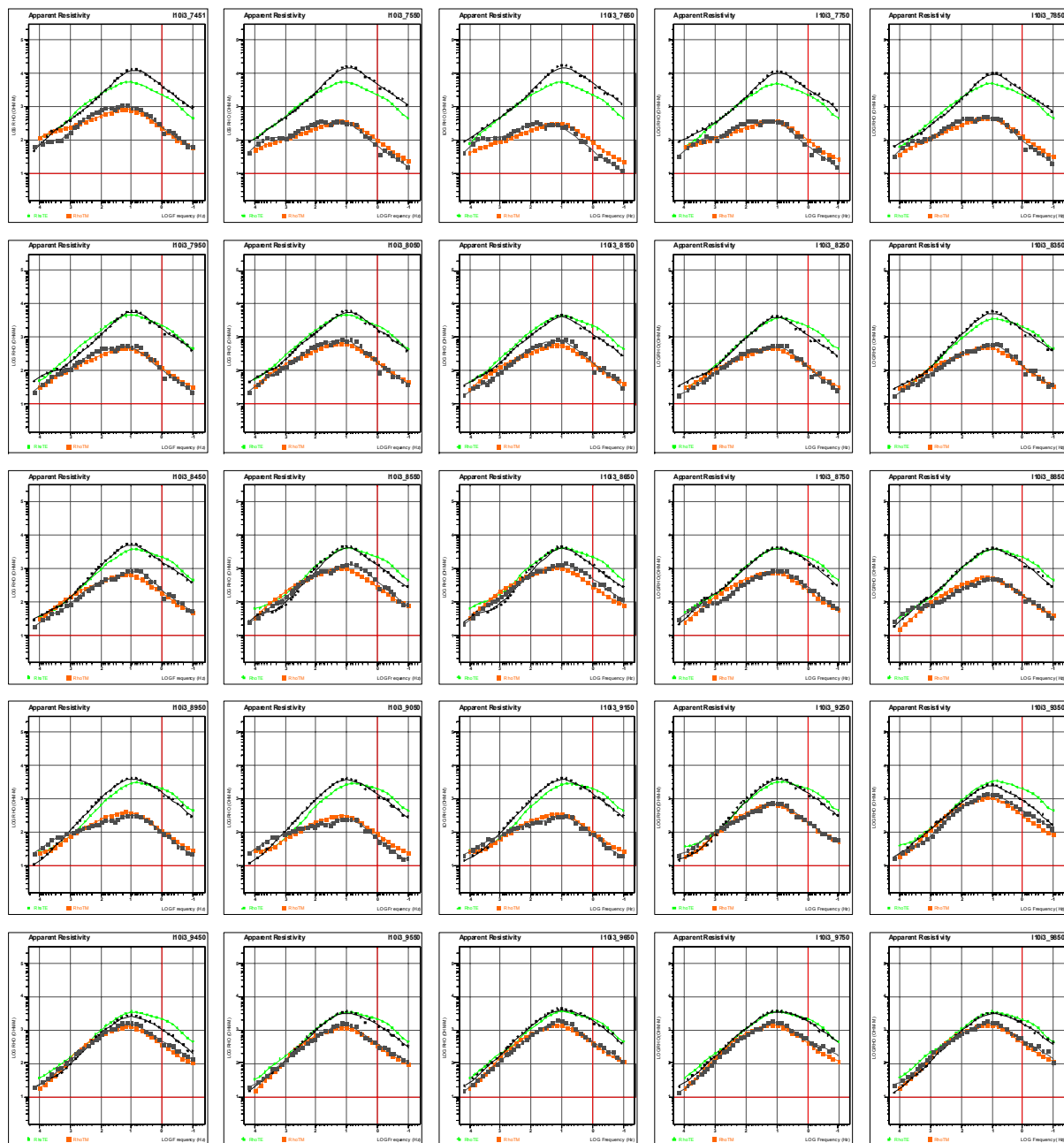
1D Occam Fit (using l110ss2) RhoXY/PhaXY & RhoYX/PhaYX



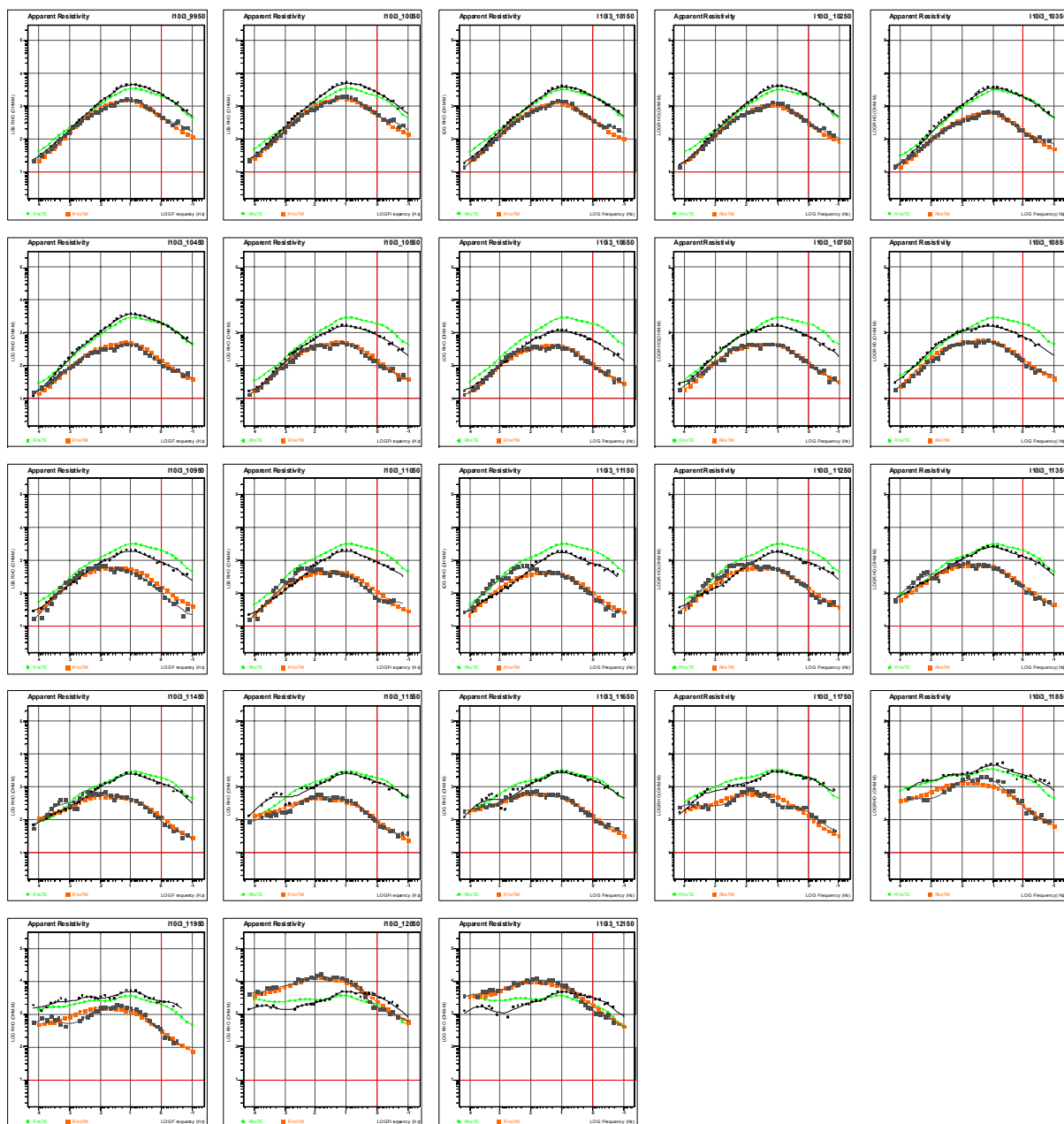
TM mode (I110i3) @ 15 iterations (rms error = 6.97%, FMRQ=3.2) using I110ss2 and Gocad Reference (I110gocad2)



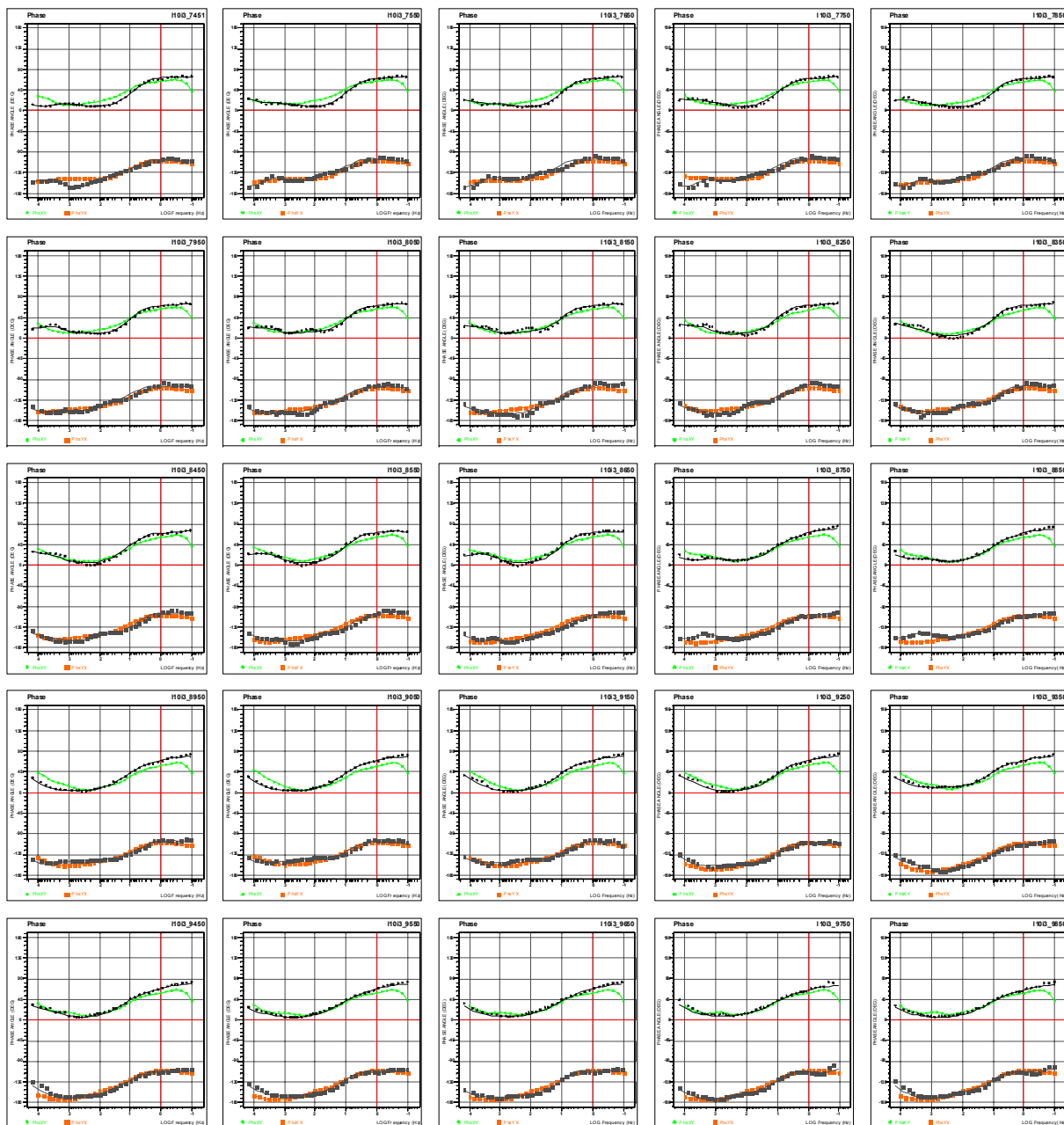
TE-TM mode (I110i3) @ 17 iterations (rms error = 5.24%, FMRQ=1.6) using TM as Starting Model



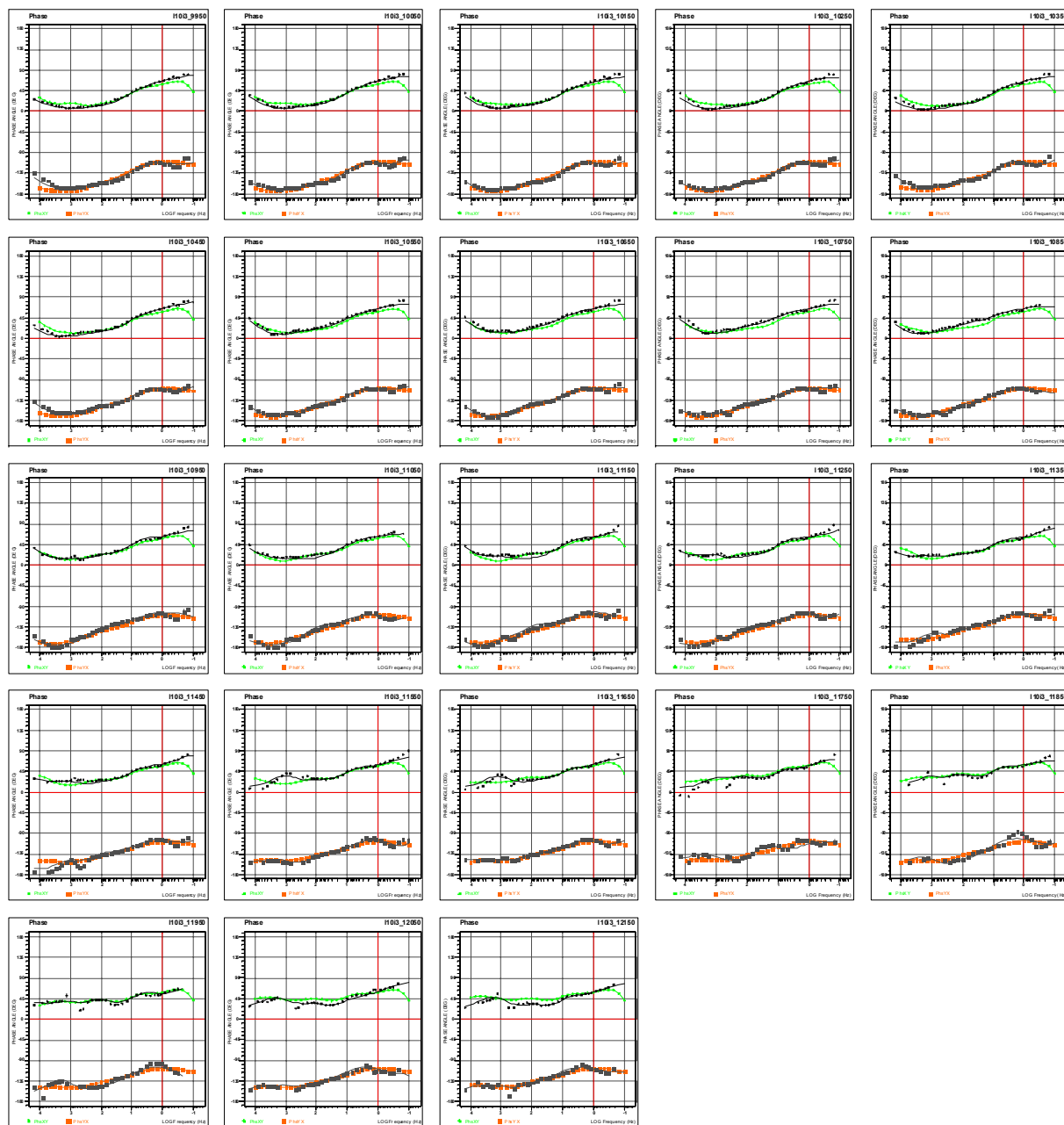
Resistivity Response Comparison (1/2): L110i1 vs I110ss2 (7450E-9850E)



Resistivity Response Comparison (2/2): L110i1 vs I110ss2 (9950E-12150E)



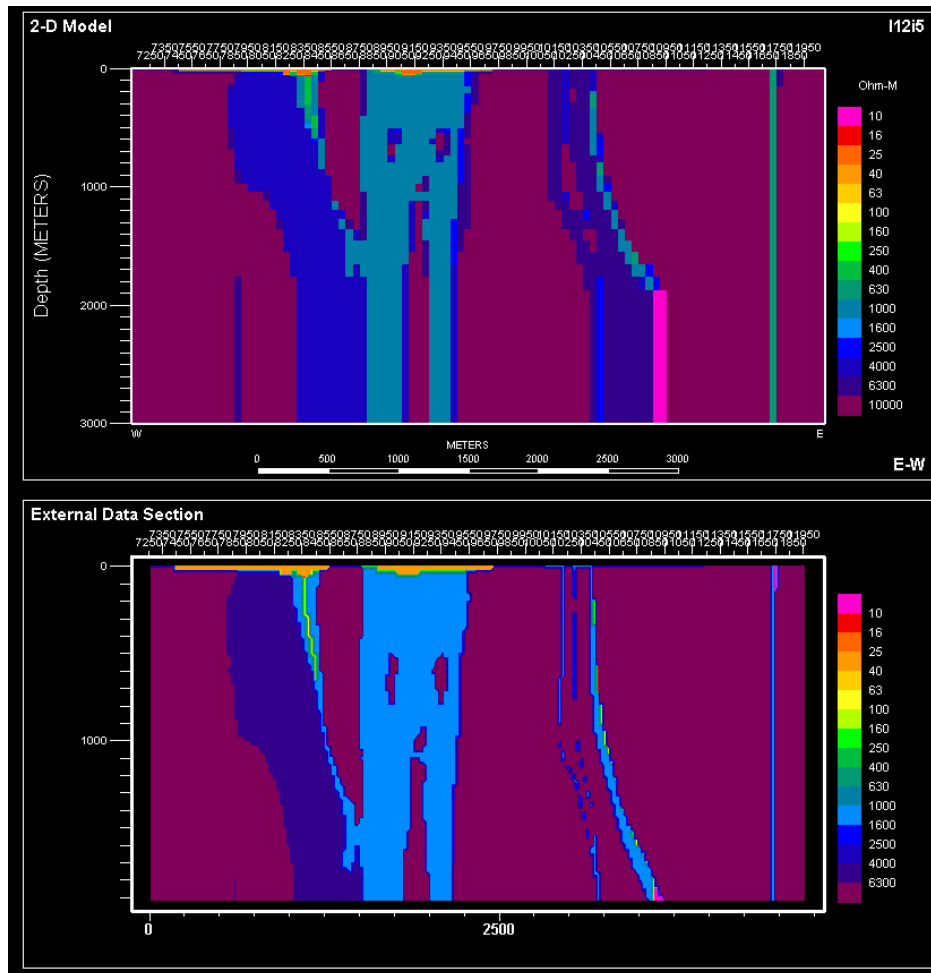
Phase Response Comparison (1/2): L110i1 vs I110ss2 (7450E-9850E)



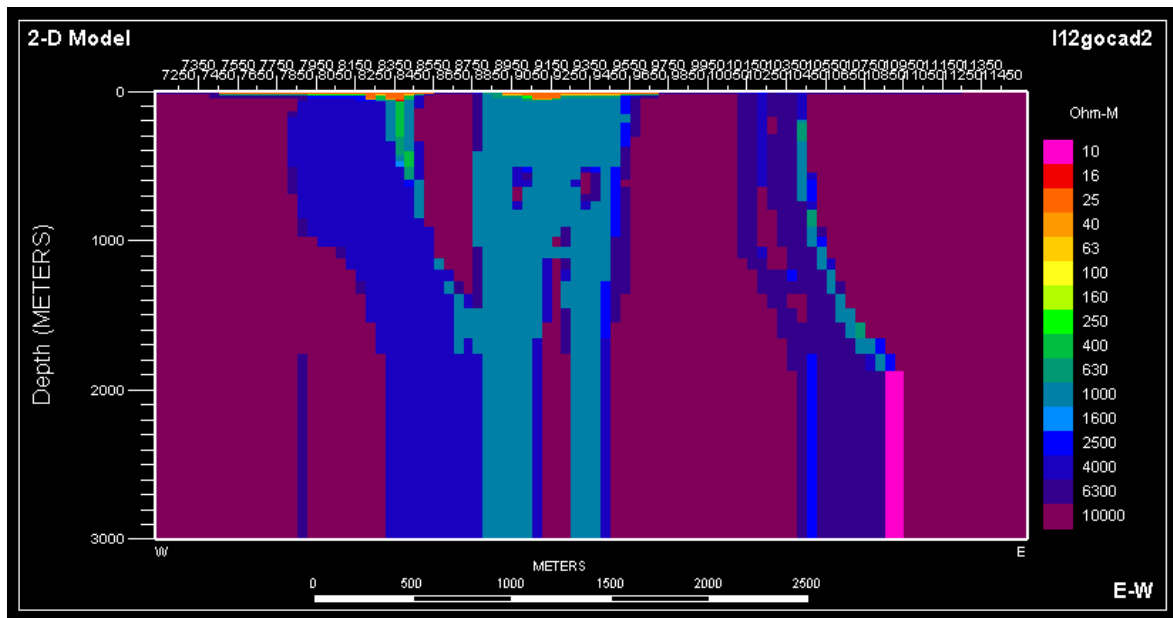
Phase Response Comparison (2/2): L110i1 vs I110ss2 (9950E-12150E)

Line 11200E: Gocad-Constrained Resistivity Model #3 (I12i3+I12i5) with Rhyolite @ 1k (I12gocad2) Note: using data for I12i3 (7250E-11450E) combined with windowed I12i5 (11550E-11950E).

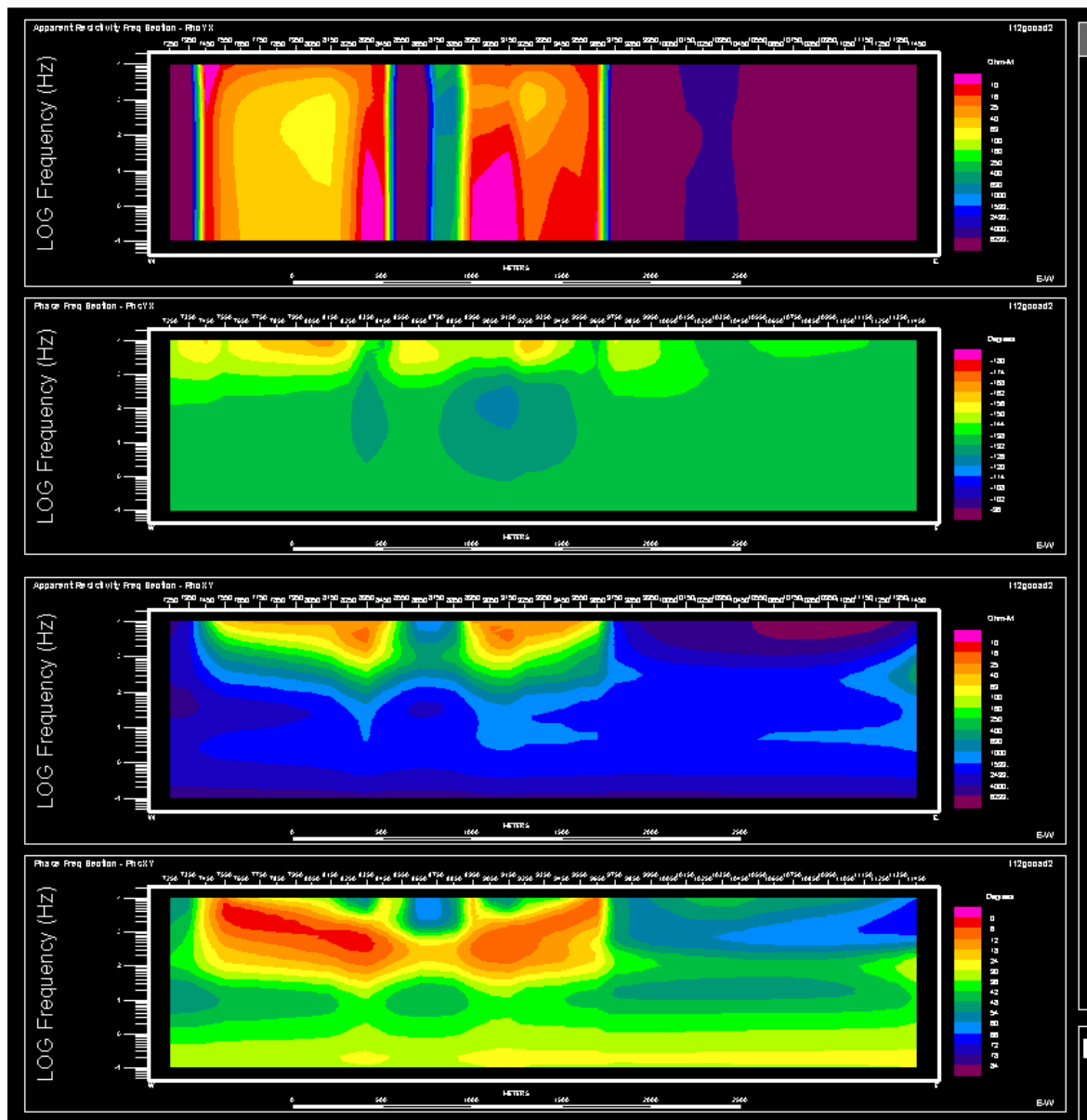
- Mafic volcanic = 10k ohm-m (purple)
- Ultramafic volcanic = 7k ohm-m (navy-blue)
- Sediments = 5k ohm-m (blue)
- Rhyolite = 1000 ohm-m (royal blue)
- Overburden = 30 ohm-m (orange)
- Graphite/Massive Sulphide = 10 ohm-m (pink to yellow)



Geotools PW Starting Model (I12gocad2 -top) and Gocad Reference (bottom)

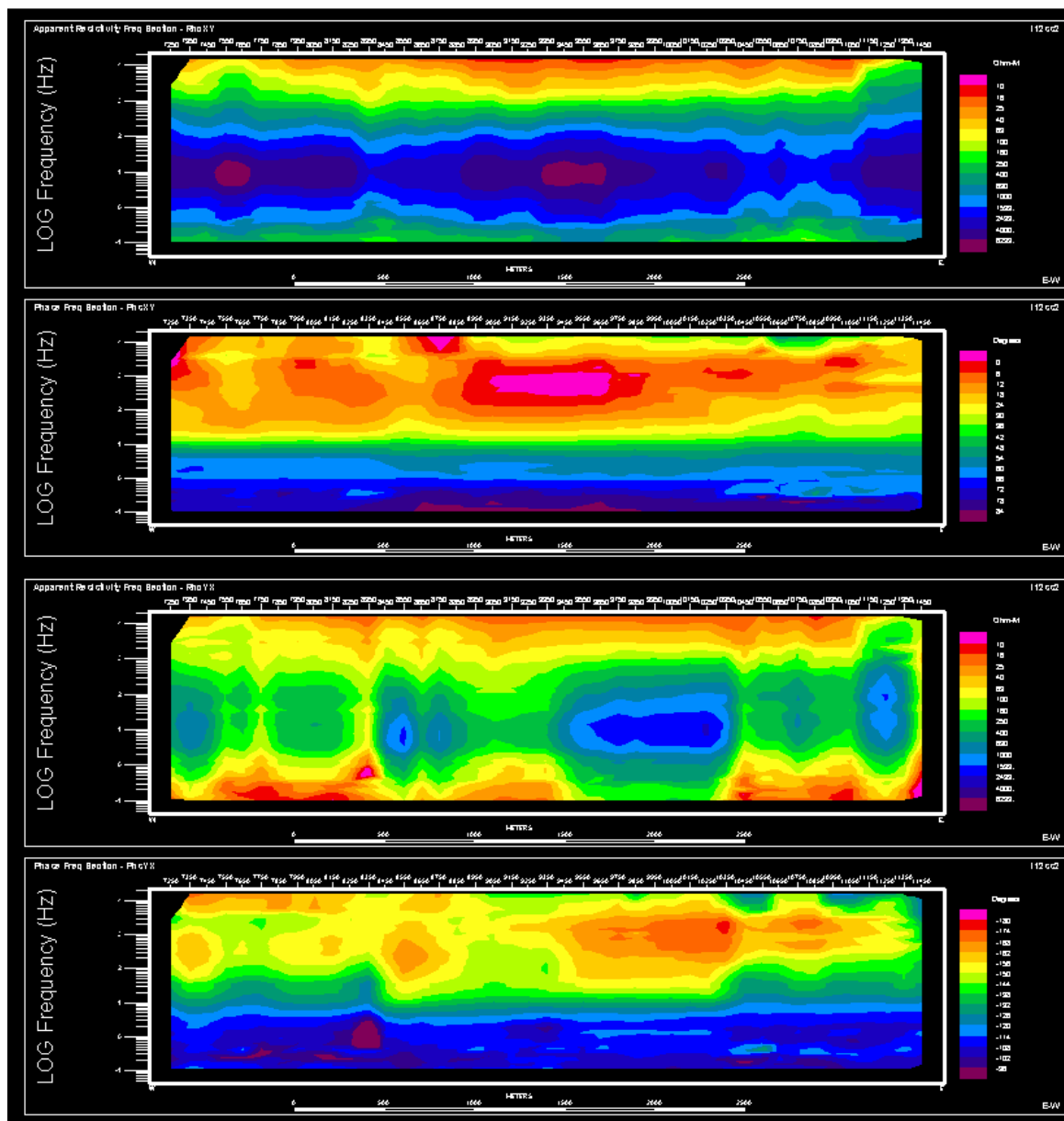


Gocad Reference Model (I12gocad2) for Constrained 2D Inversion

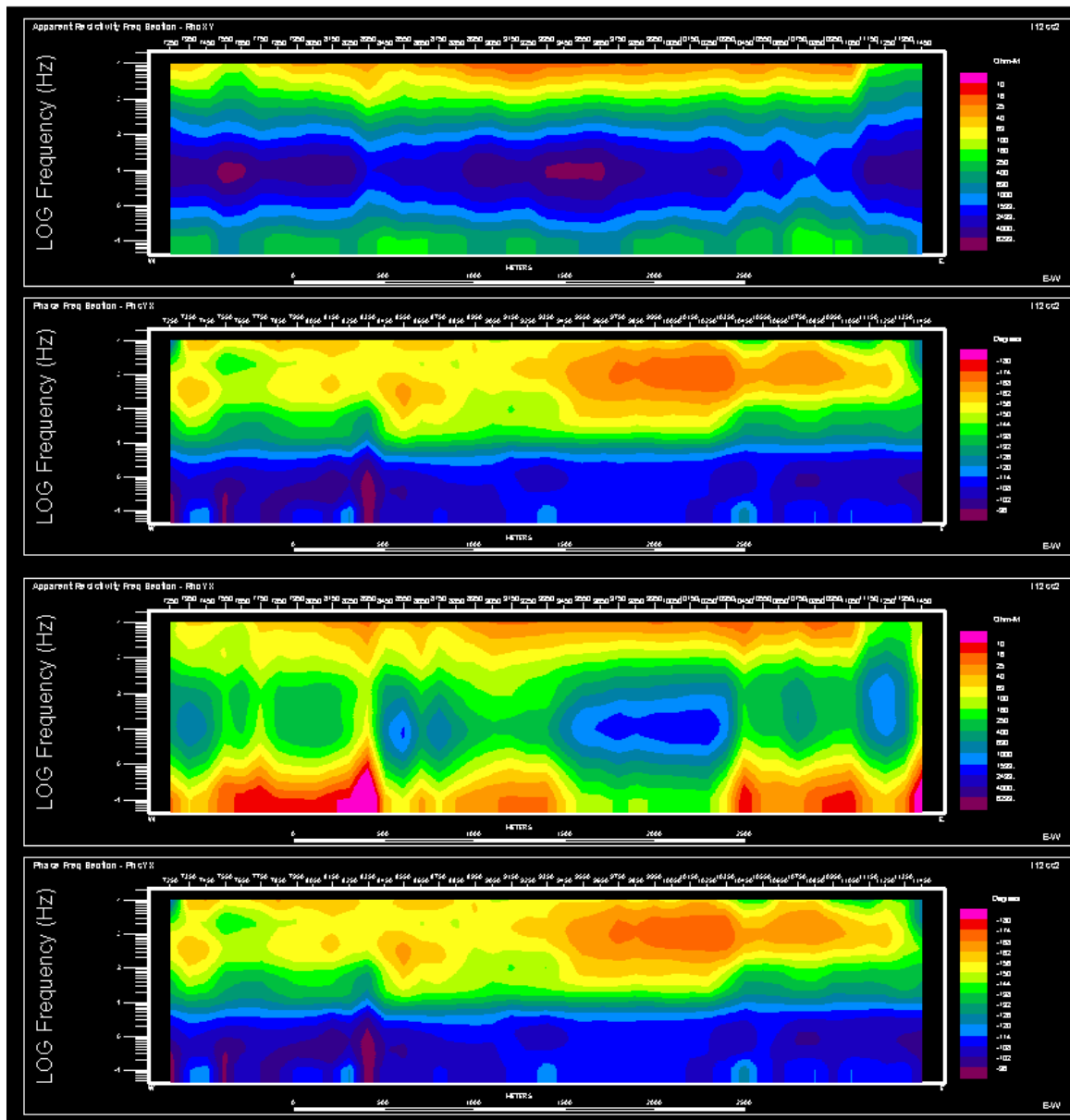


PW 2D Forward MT Model for Gocad Reference (I12gocad2)

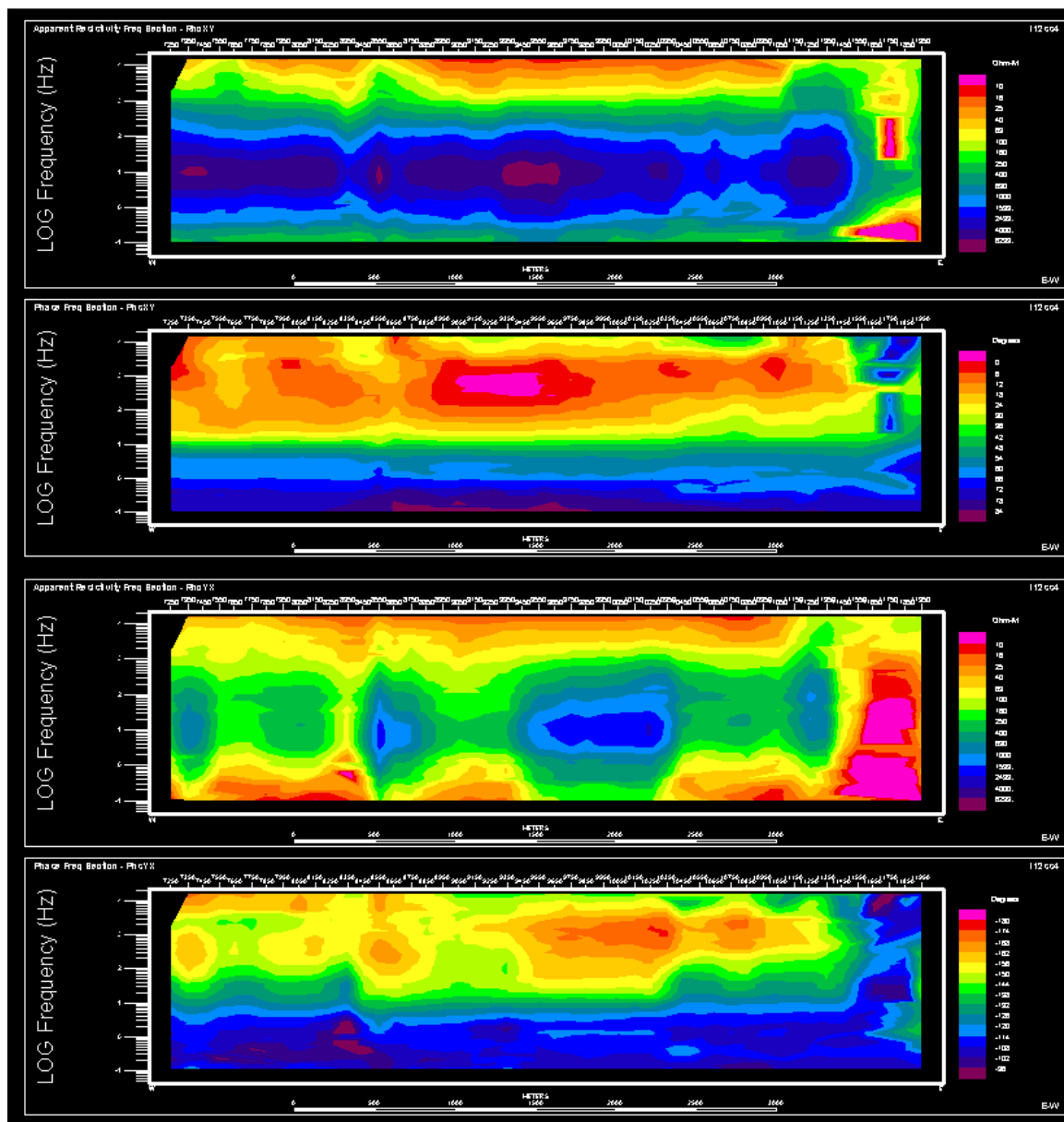
Showing In-line (TM) Rho/Phase(upper) and Cross-line (TE) Rho/Phase (lower)



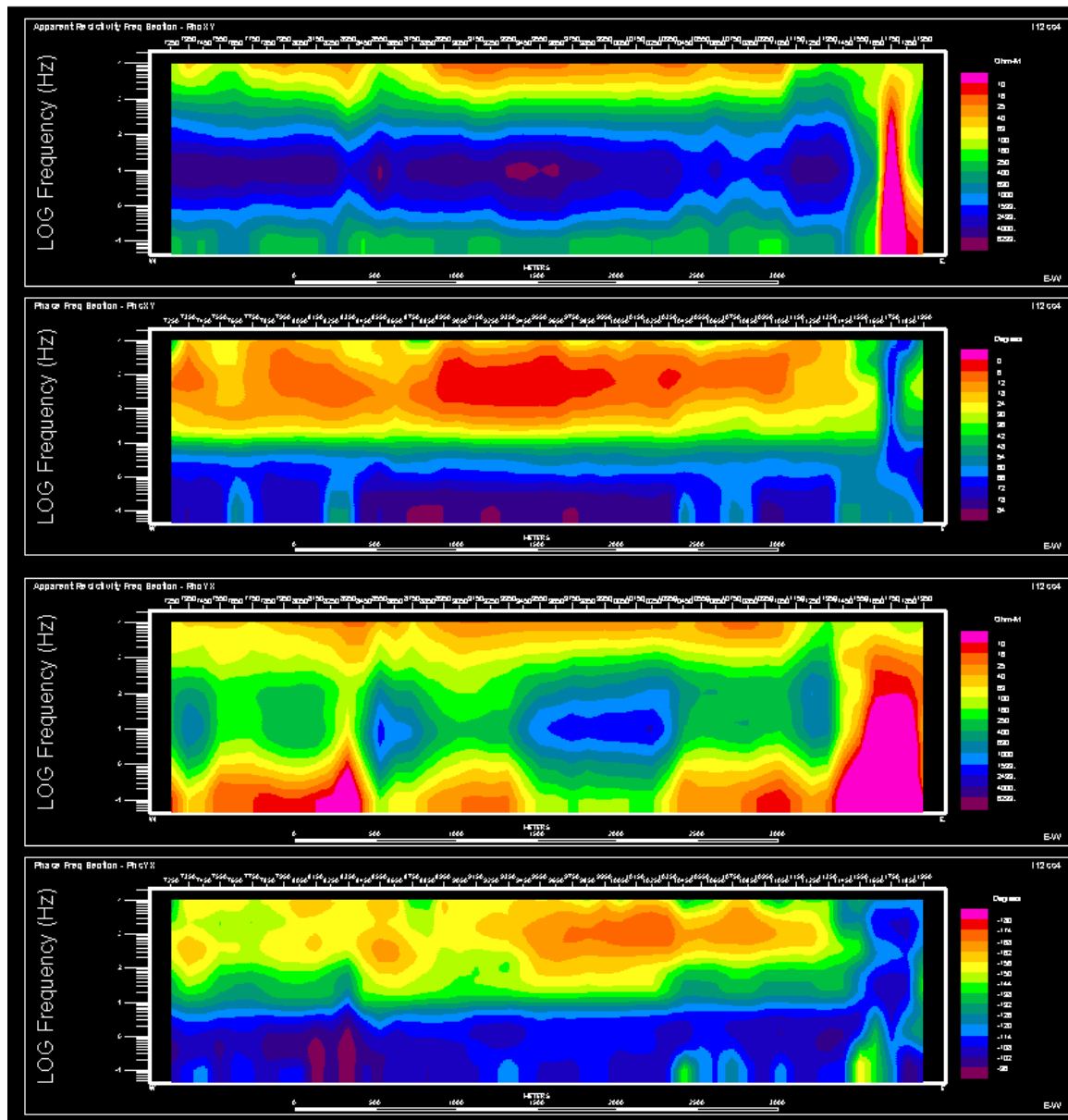
EVA-processed/Static-shifted RhoXY/PhaXY & RhoYX/PhaYX (L12ss2) for stations 7250E-11450E.



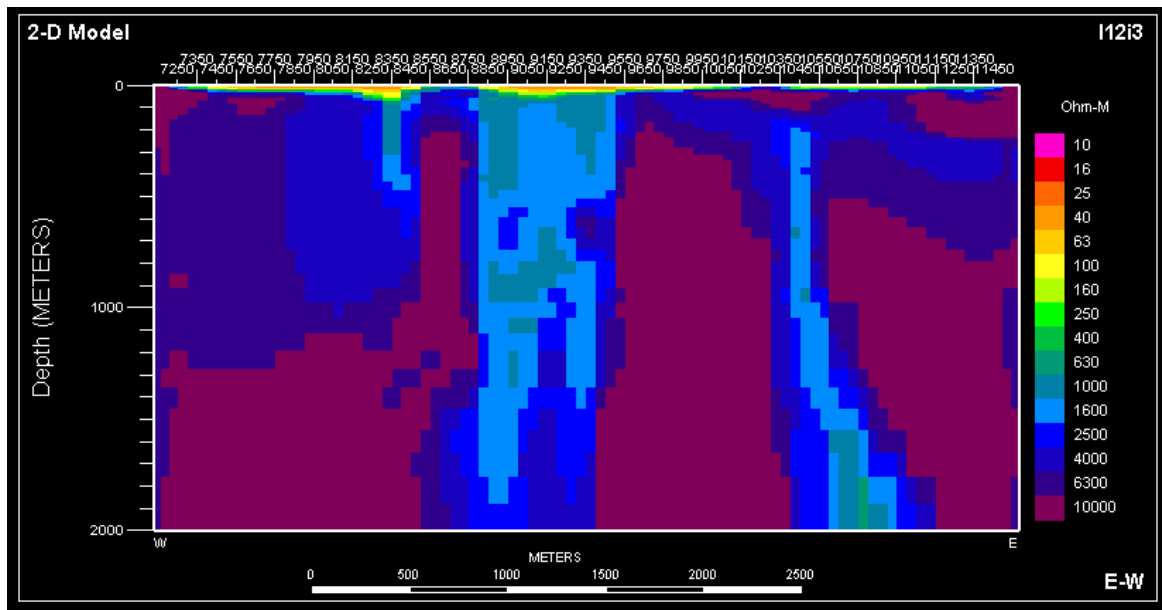
1D Occam Fit (using l12ss2) RhoXY/PhaXY & RhoYX/PhaYX for stations 7250E-11450E



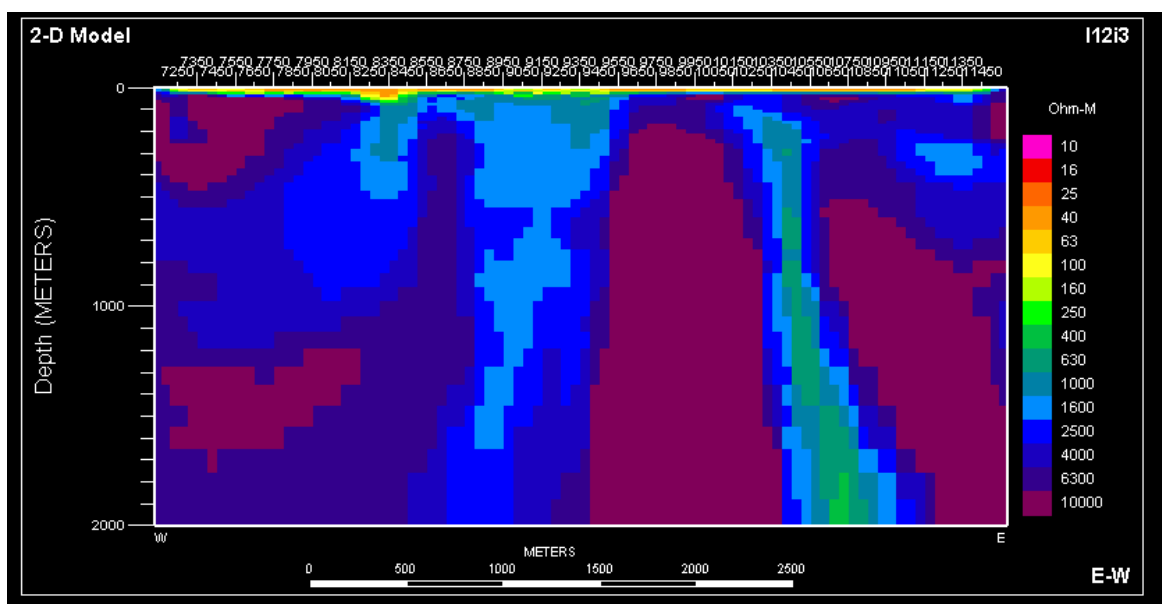
Processed/Static shifted (I12ss4) Data (RhoXY/PhaXY, RhoYX/PhaYX) – note only stations 11450E-11950E used.



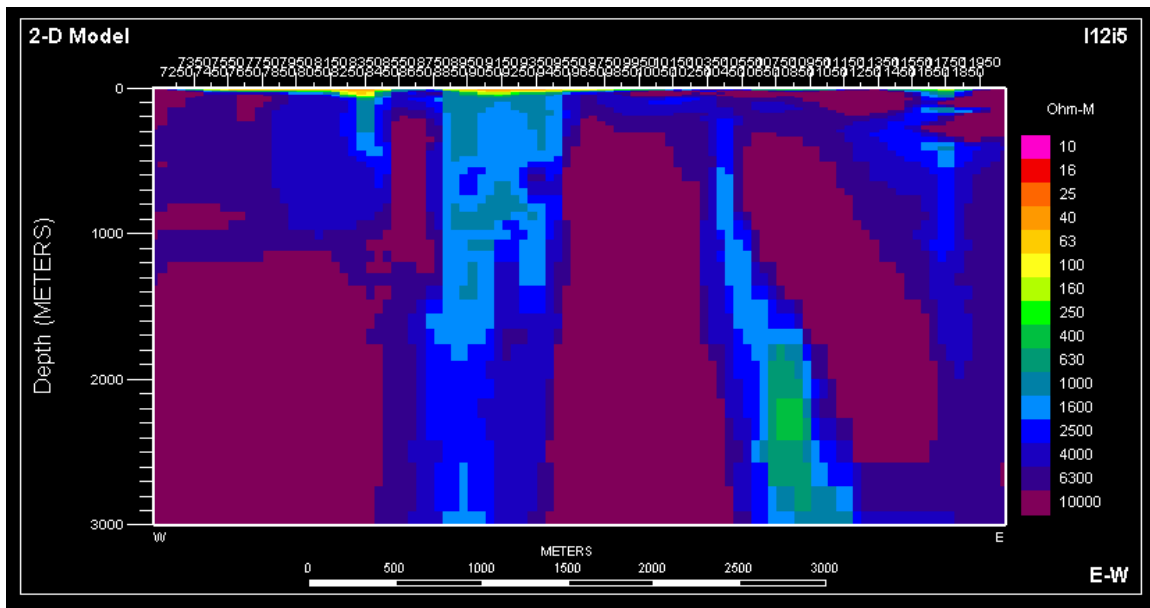
1D Occam Fit (using I12ss4) RhoXY/PhaXY & RhoYX/PhaYX – note only stations 11450R-11950E used.



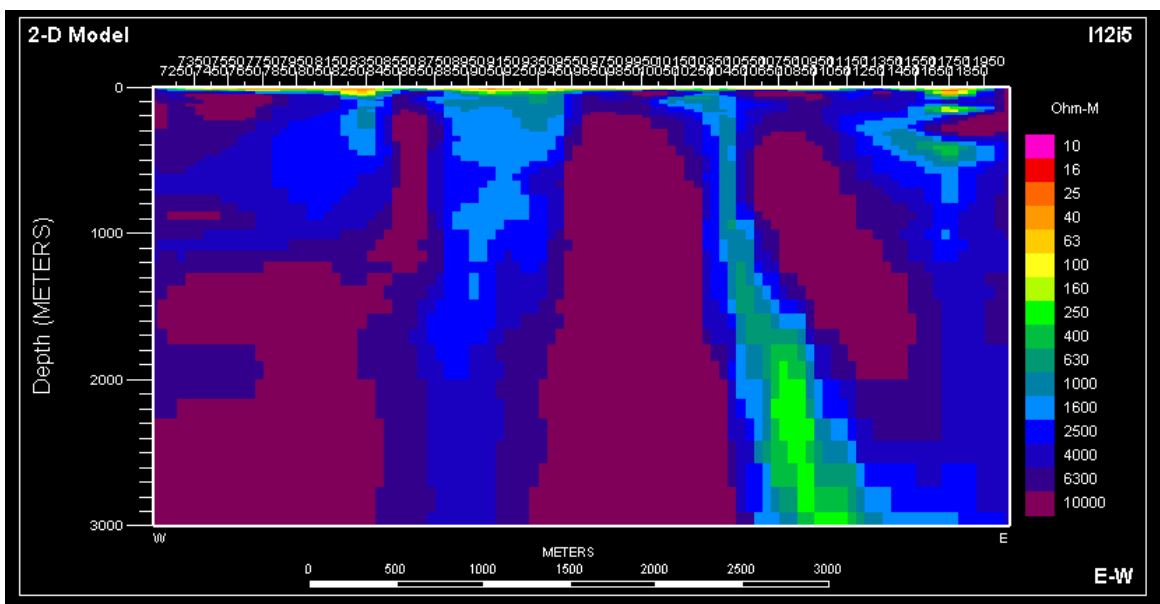
TM mode(I12i3) @ iteration 18 (rms error = 6.7, FMRQ=3.2) using I12ss2 and I12gocad2 starting model



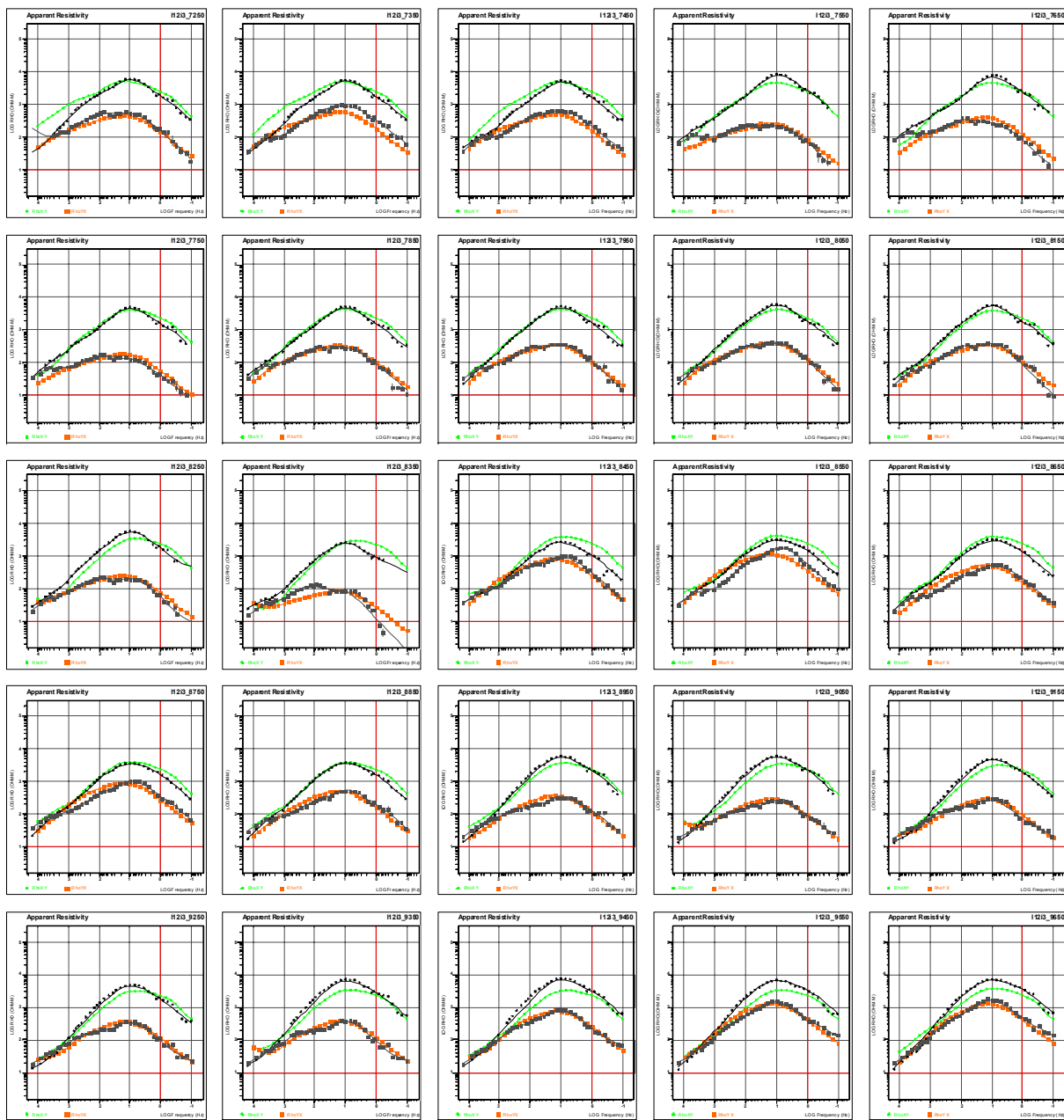
TM-TE mode (I12i3) @ 16 iterations (rms error = 5.5%, FMRQ=3.2) using TM starting model



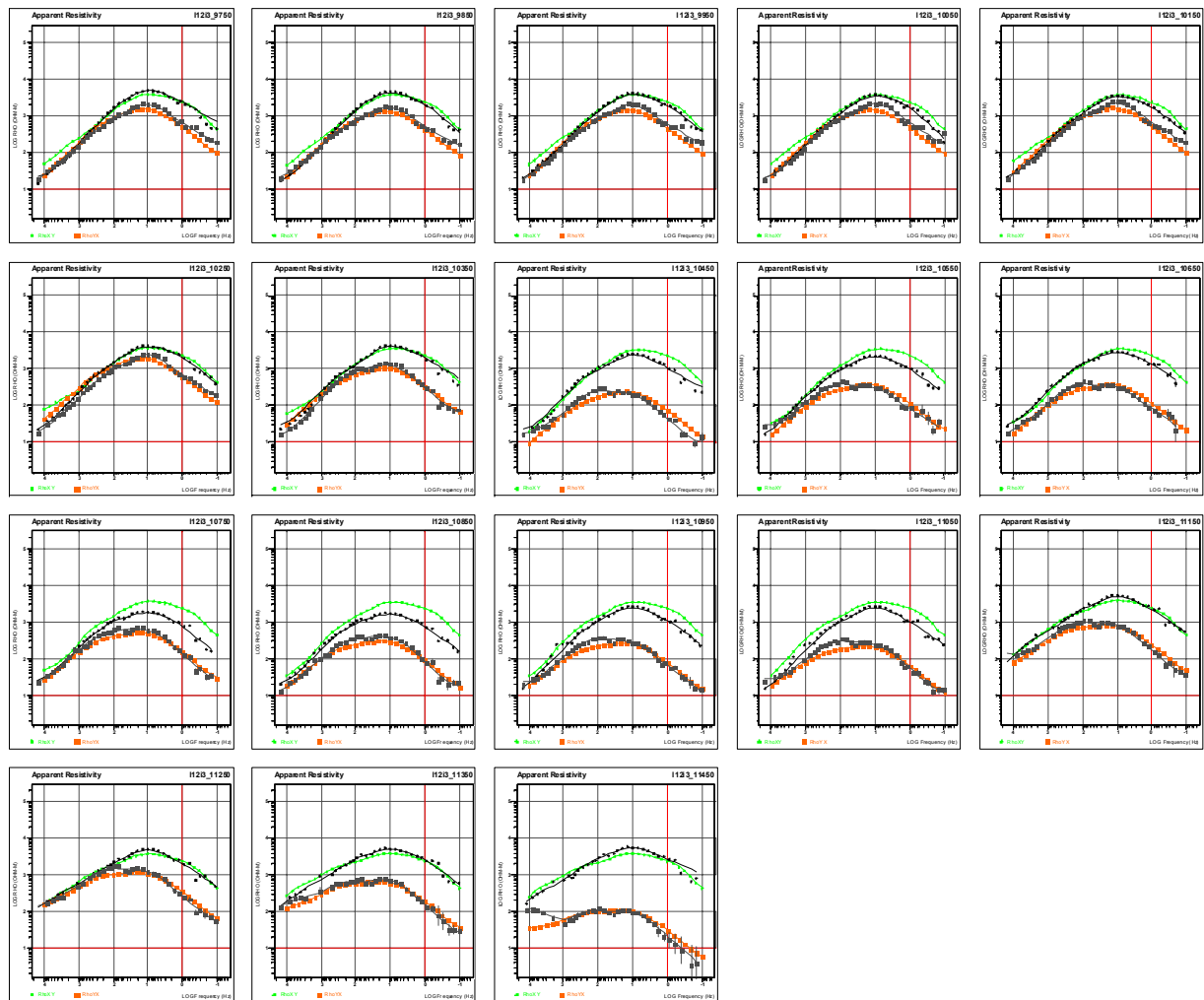
TM mode(I12i5) @ 45 iterations (rms error = 8.0, FMRQ=51.2) using I12ss4 and I12gocad2 reference (note only stations 11550E-11950E used)



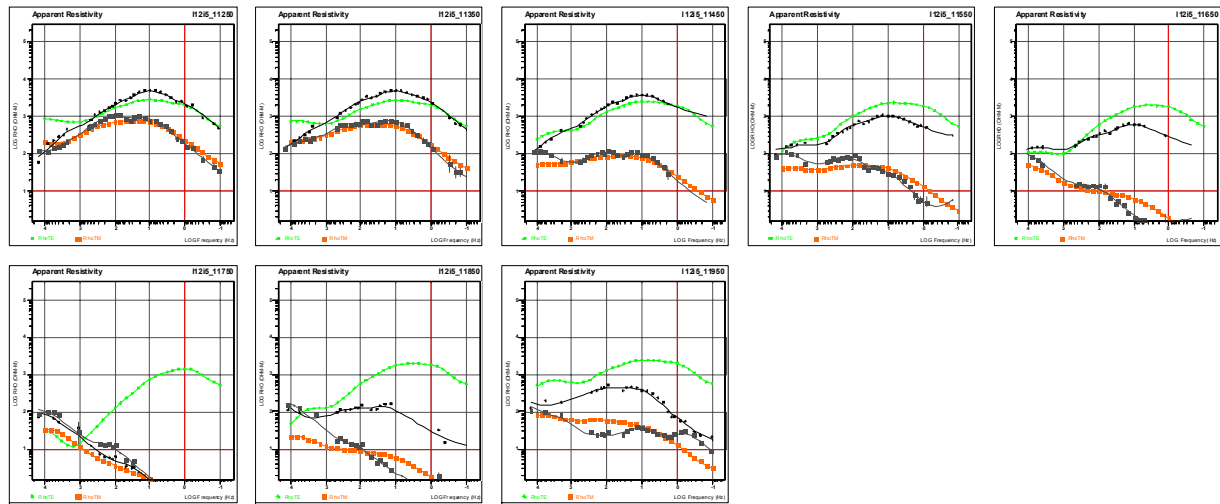
Final TM-TE model (I12i5) @ 19 iterations (rms error = 11.3%, FMRQ=3.2) using TM starting model (note only stations 11550E-11950E used)



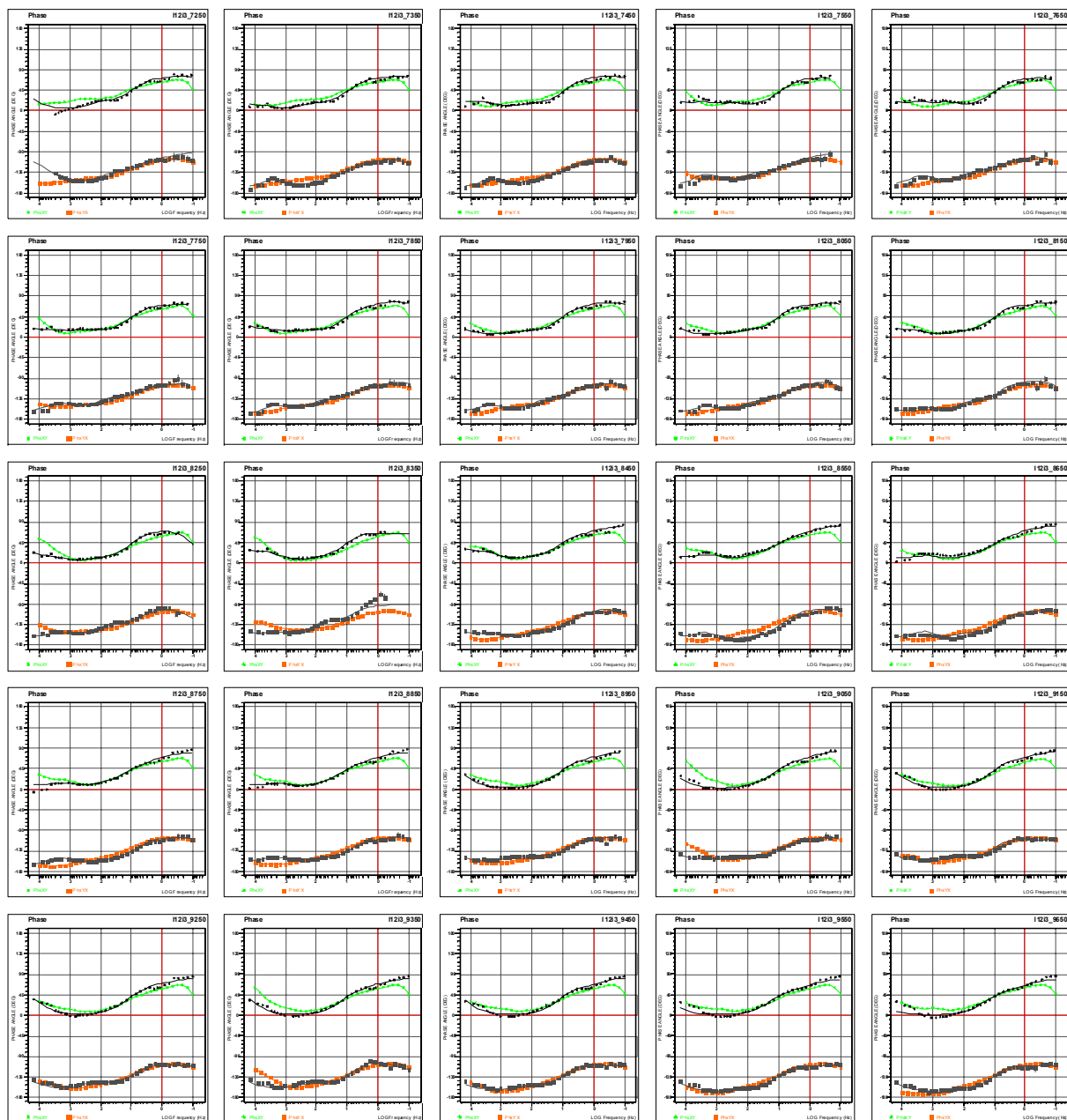
Resistivity Response Comparison (1/3): L112i3 vs I112ss2 (7250E-9650E).



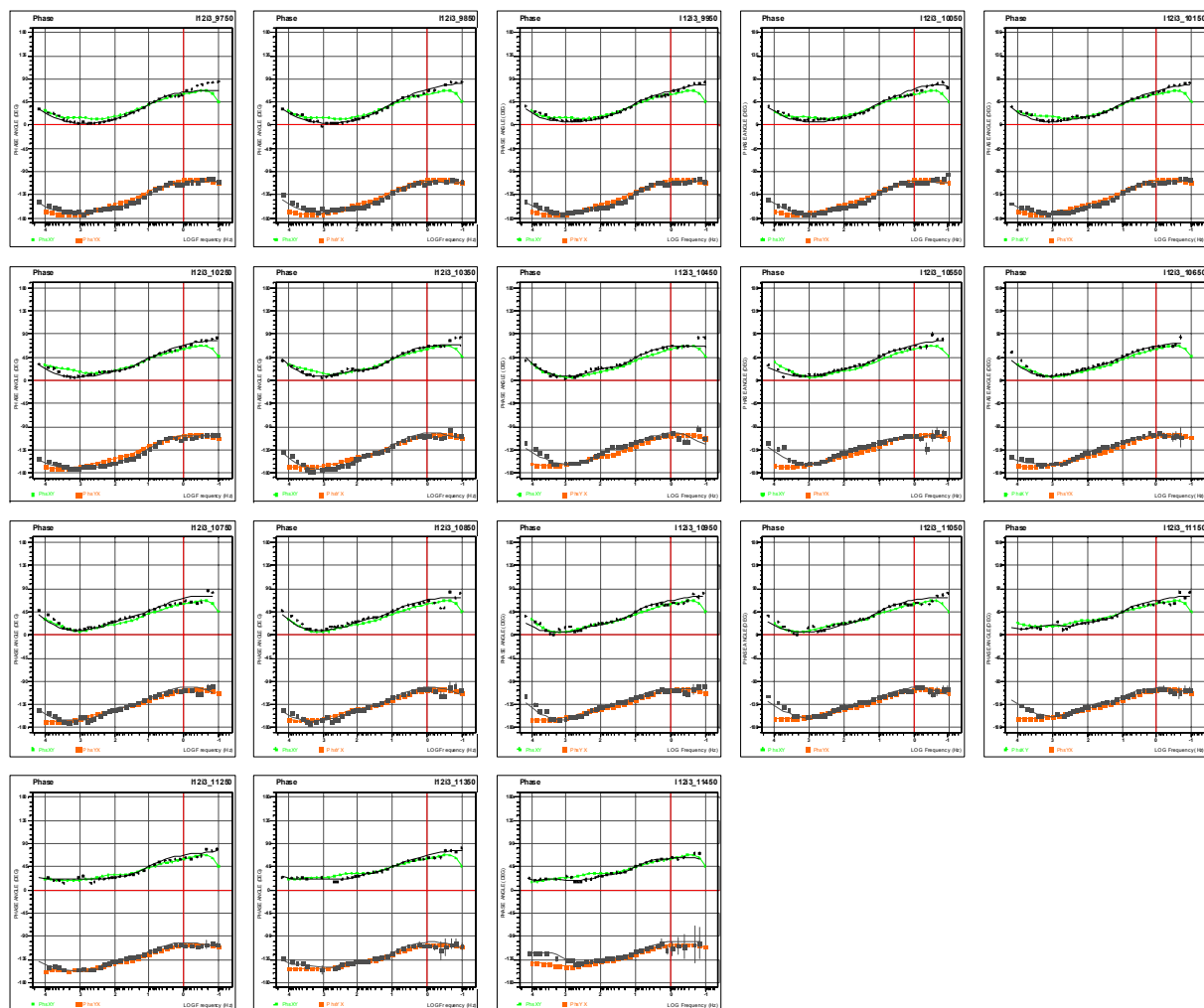
Resistivity Response Comparison (2/3): L112i3 vs I112ss2 (9750E-11450E)



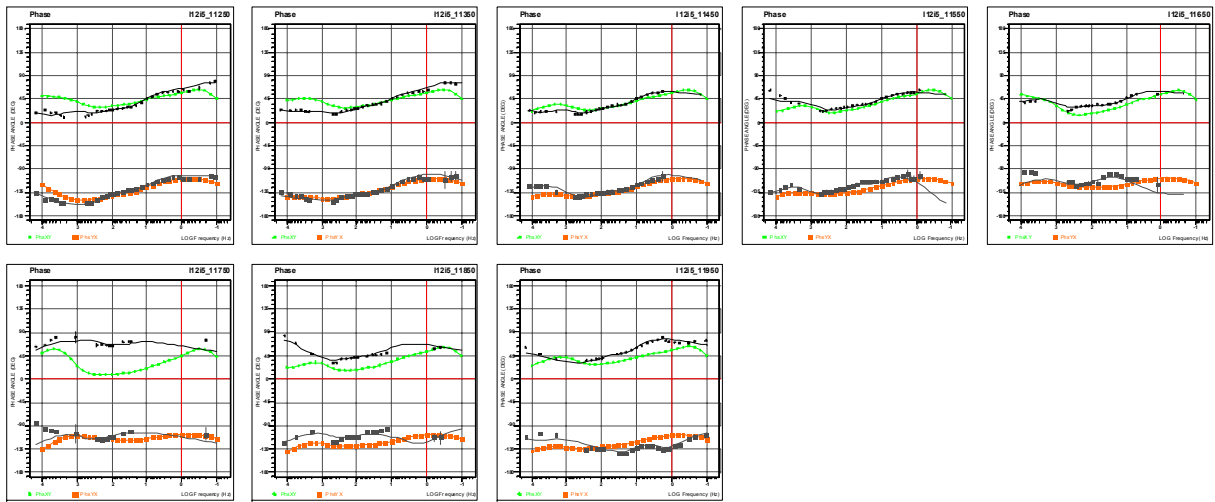
Resistivity Response Comparison (3/3): L112i5 vs I112ss4 (11250E-11950E)
 (note only 11450E-11950E used)



Phase Response Comparison (1/3): L112i3 vs I112ss2 (7250E-9650E)



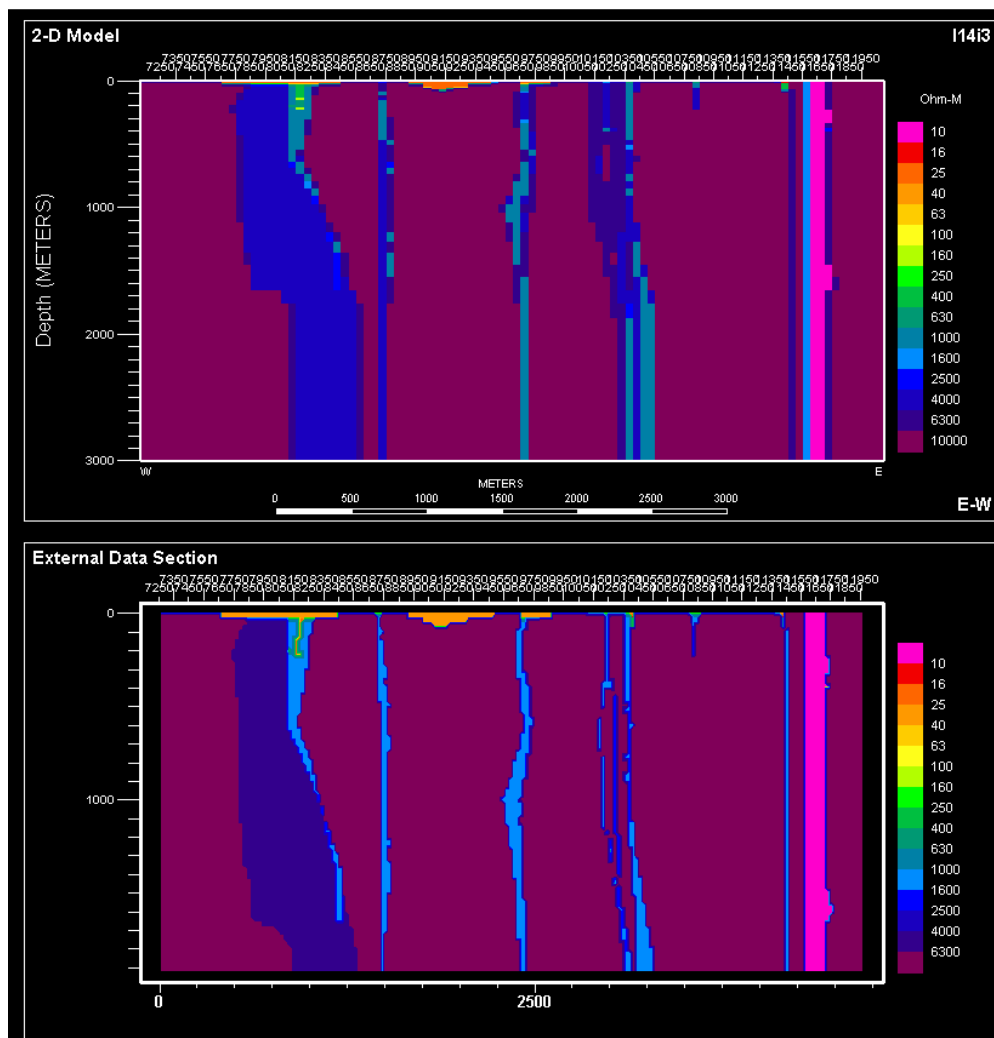
Phase Response Comparison (2/3): L112i3 vs I112ss2 (9750E-11450E)



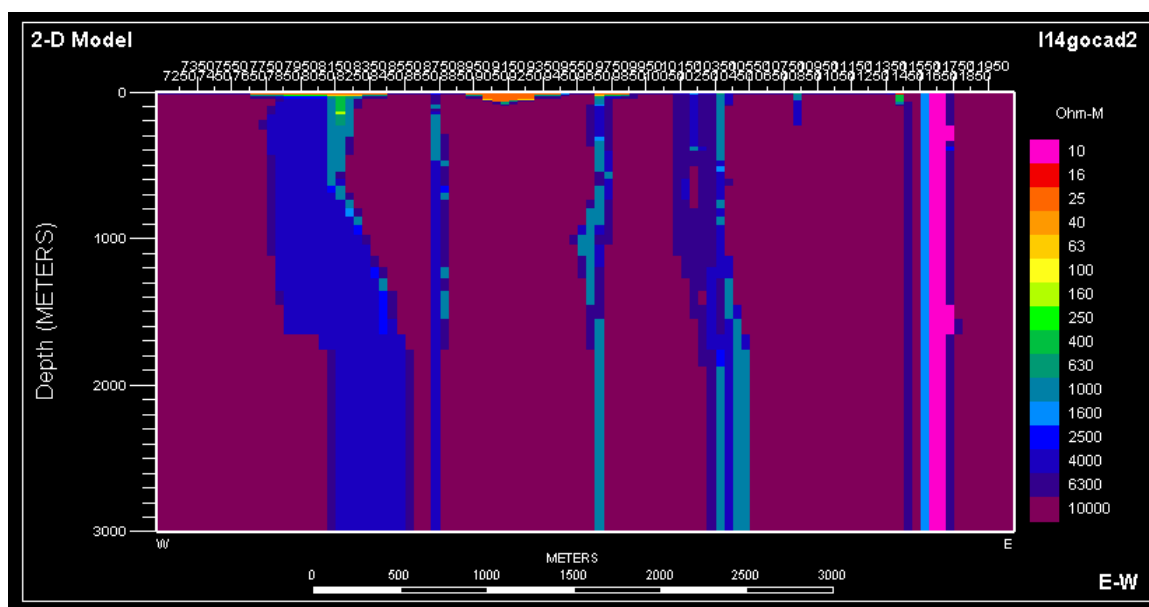
Phase Response Comparison (2/3): L112i5 vs L112ss4 (9750E-11950E)
(note only 11550E-11950E used)

Line 11400N: Gocad Constrained Resistivity Model #3 (I14i3) with Rhyolite = 1000 ohm-m (I14gocad2).

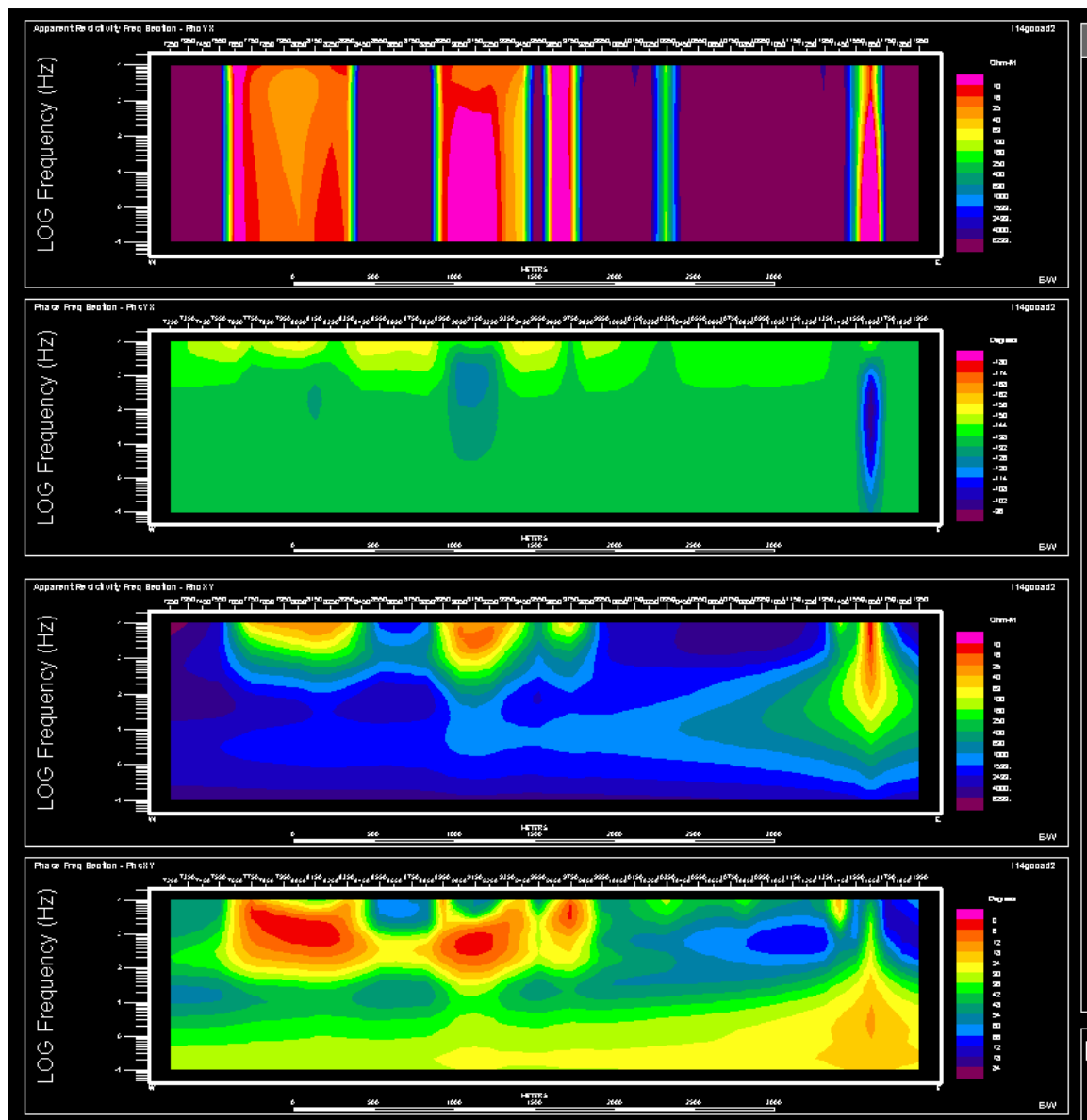
- Mafic volcanic = 10k ohm-m (purple)
- Ultramafic volcanic = 7k ohm-m (navy-blue)
- Sediments = 5k ohm-m (blue)
- Rhyolite = 1000 ohm-m (royal blue)
- Overburden = 30 ohm-m (orange)
- Graphite/Massive Sulphide = 10 ohm-m (pink to yellow)



Geotools Starting Model (I14gocad2 - top) and Gocad Reference (bottom)

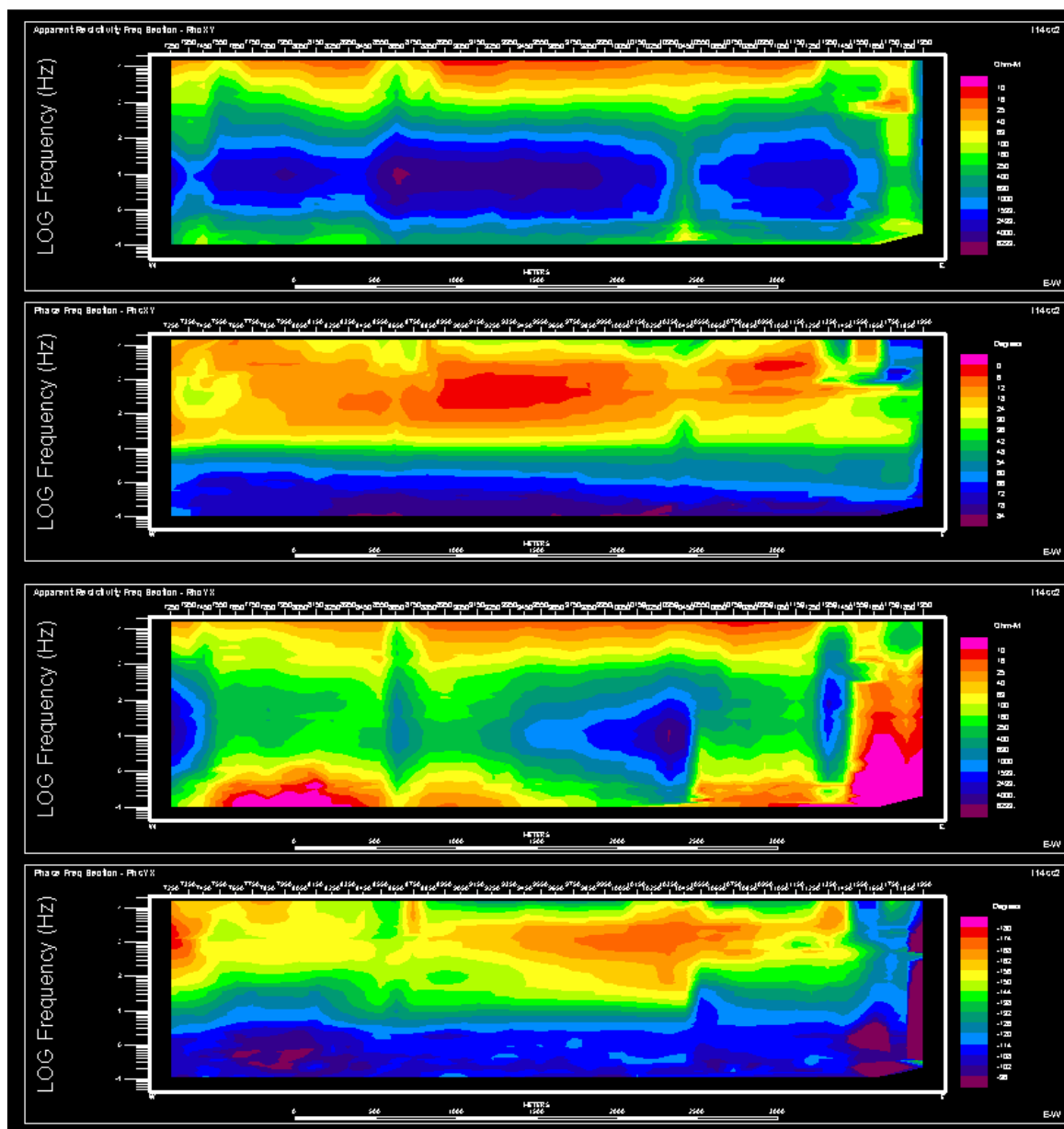


Gocad Reference Model (I14gocad2) for Constrained 2D Inversion

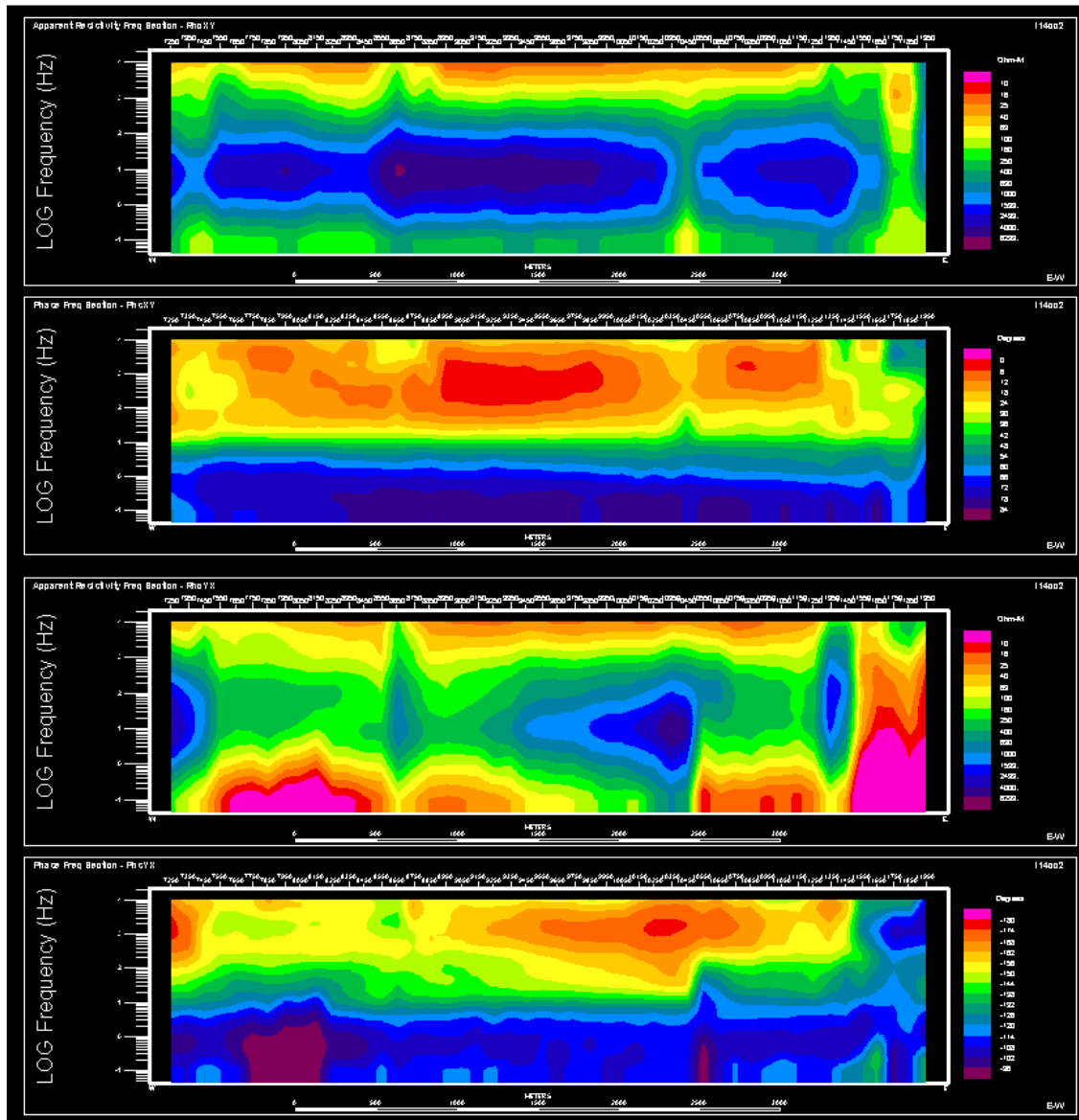


PW 2D Forward MT Model for Gocad Reference (I14gocad2)

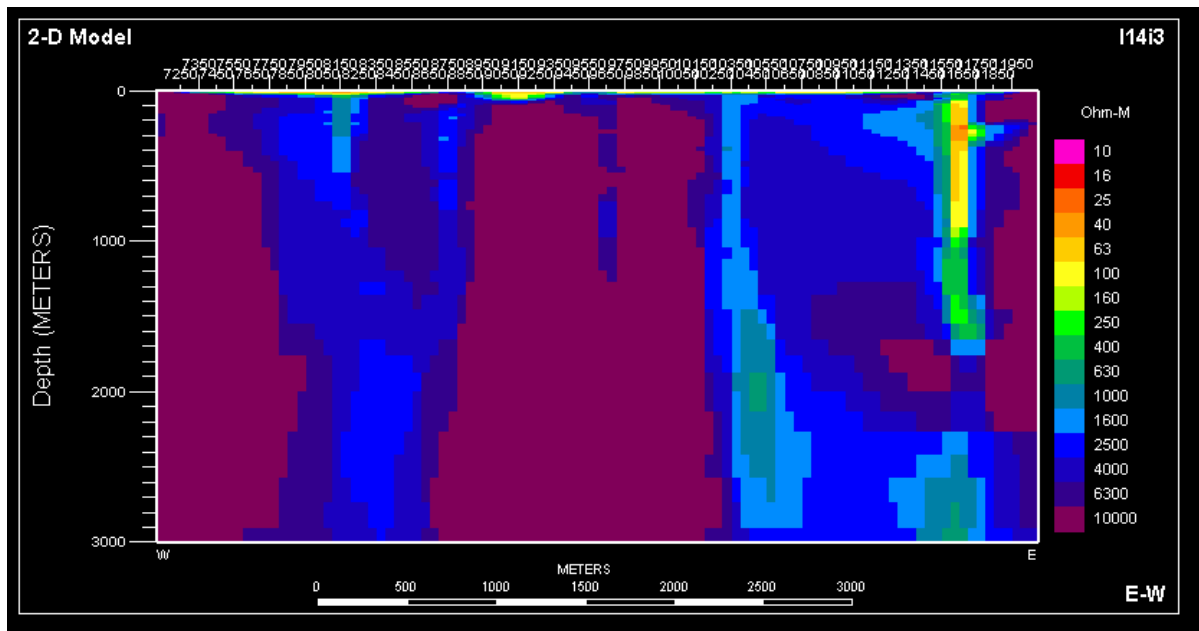
Showing In-line (TM) Rho/Phase(upper) and Cross-line (TE) Rho/Phase (lower)



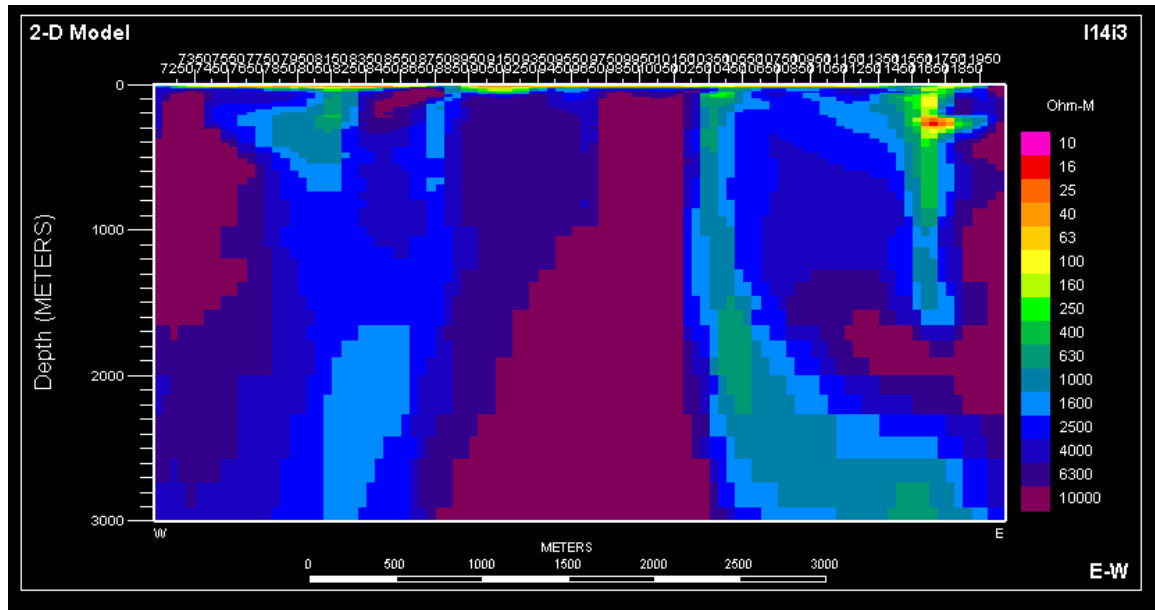
EVA-processed/Static-shifted RhoXY/PhaXY & RhoYX/PhaYX (L14ss2)



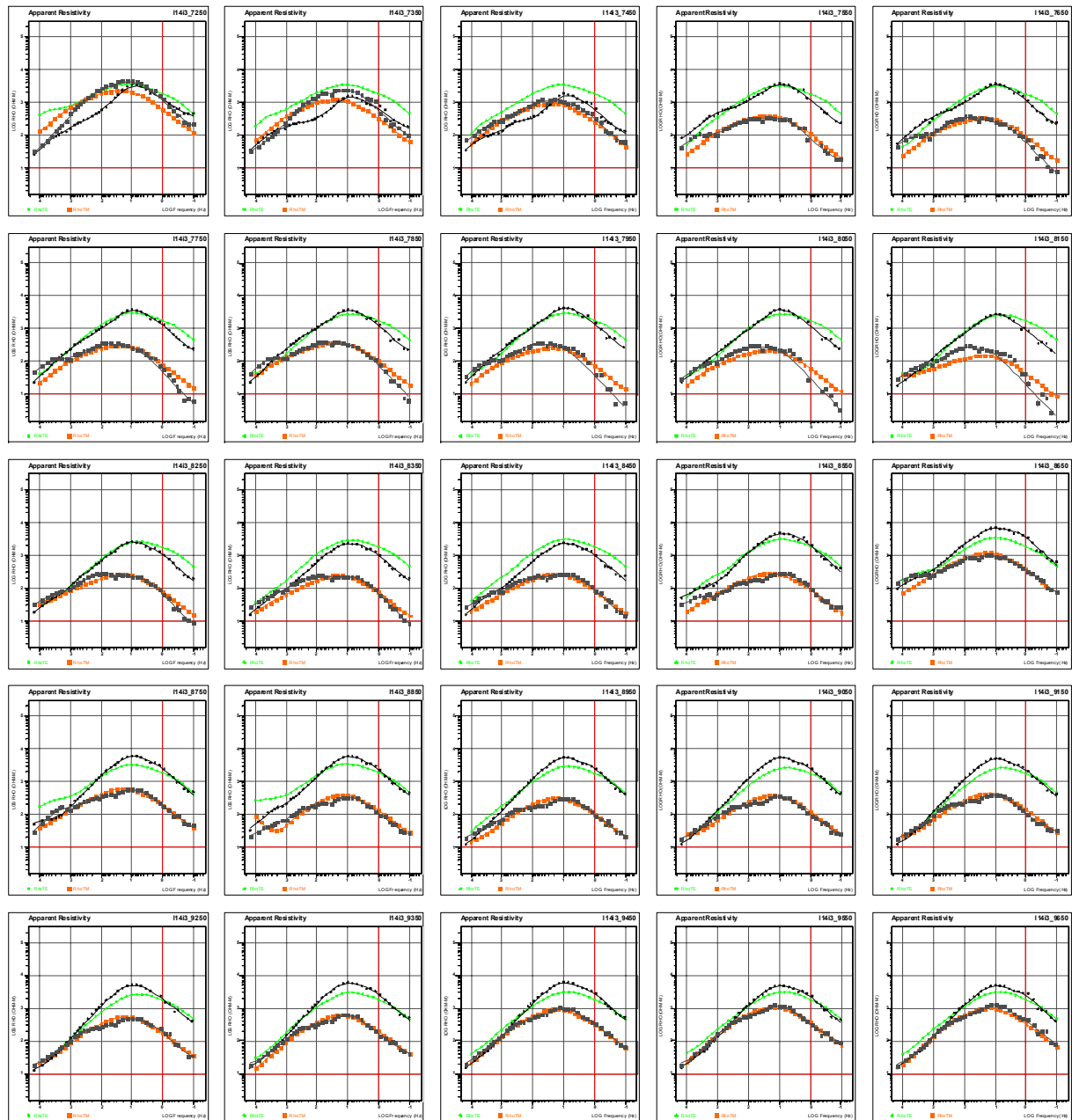
1D Occam Fit (using I14ss2) RhoXY/PhaXY & RhoYX/PhaYX (I14oc2)



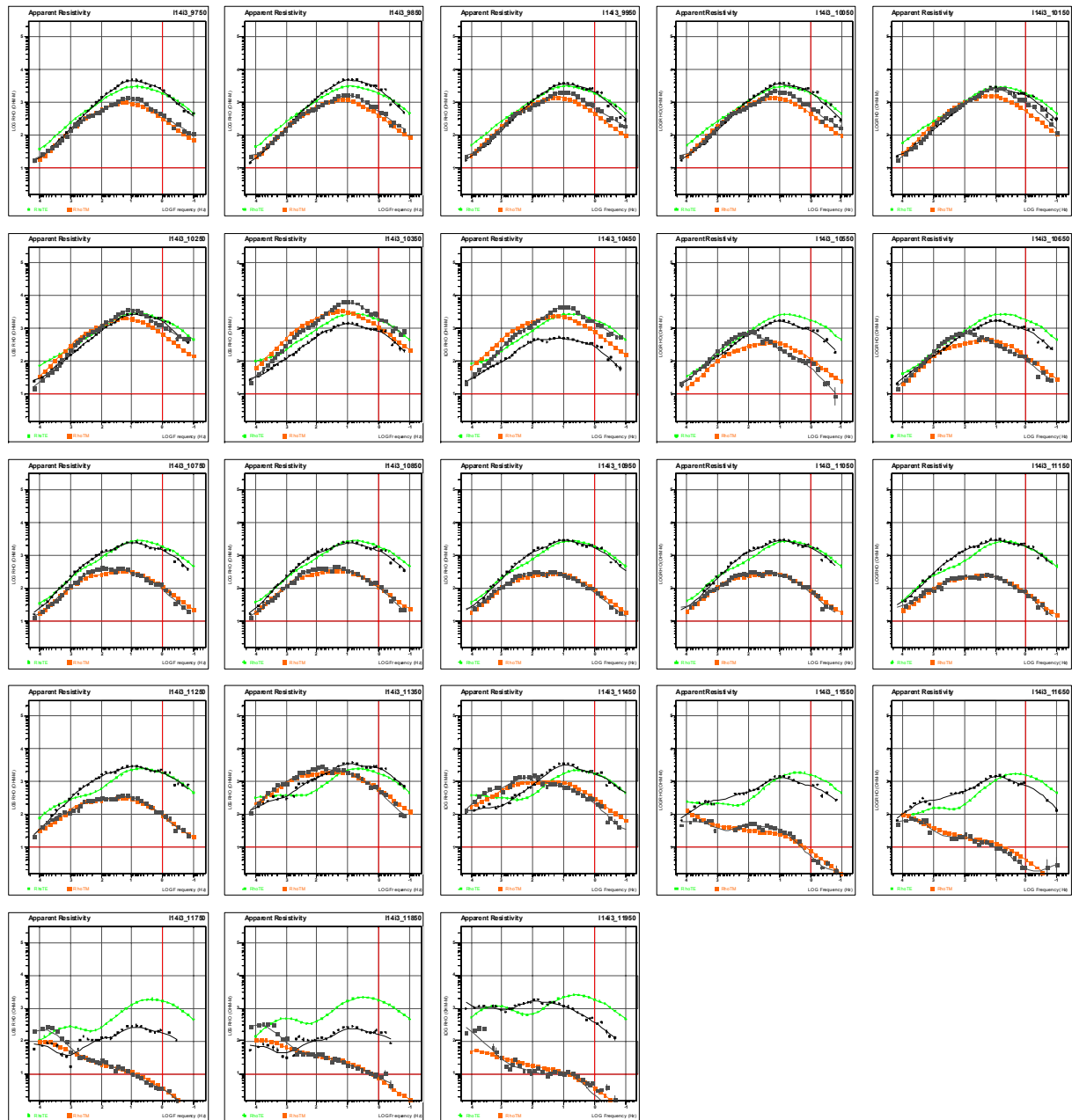
TM mode (I14i3) @ 20 iterations (rms error = 8.3% @ FMRQ=12.8) using I14oc2 and I14gocad2 reference.



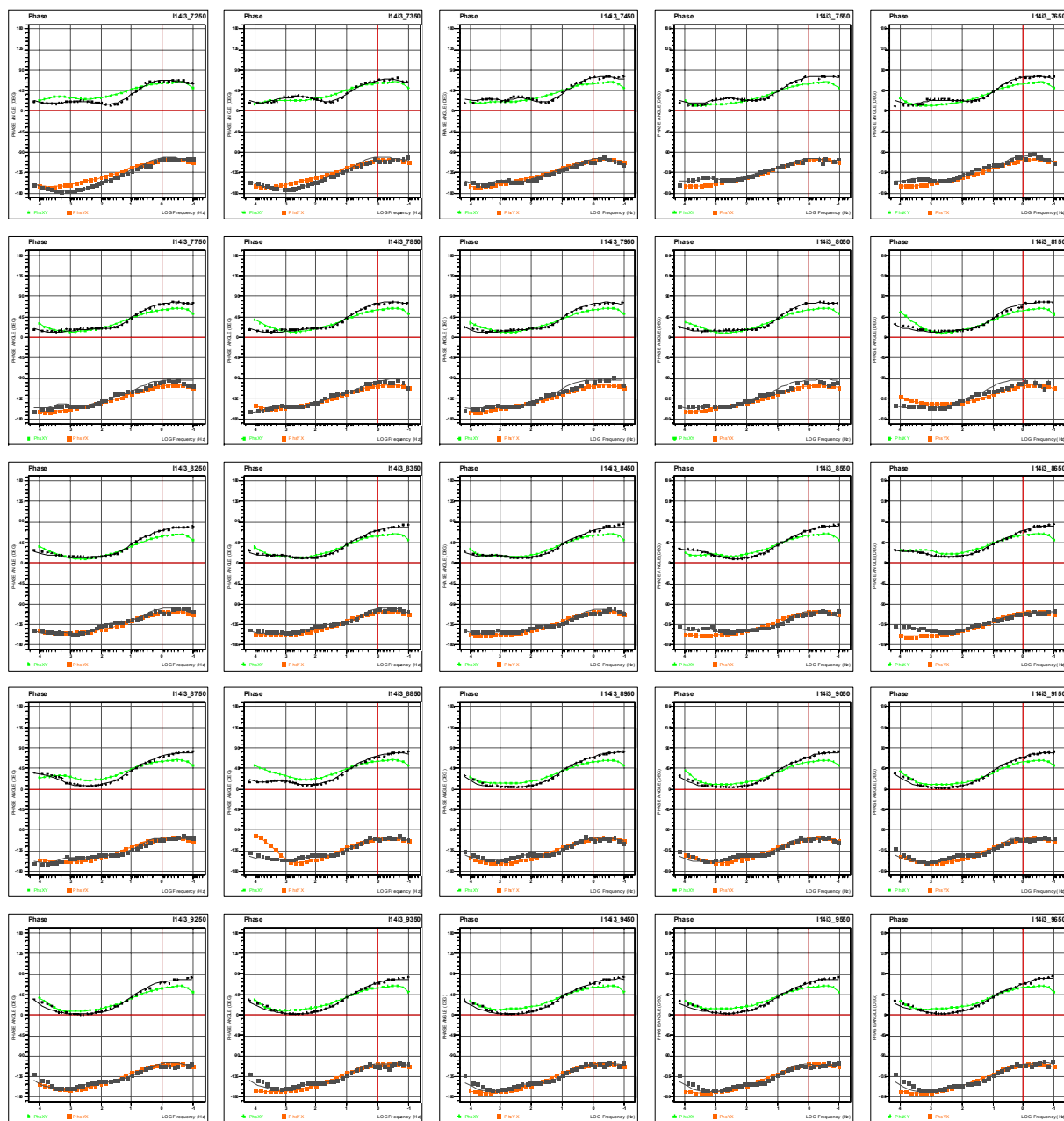
Final TM-TE Model (I14i3) @ 16 iterations (rms error = 8.2% @ FMRQ=6.4) using TM starting model.



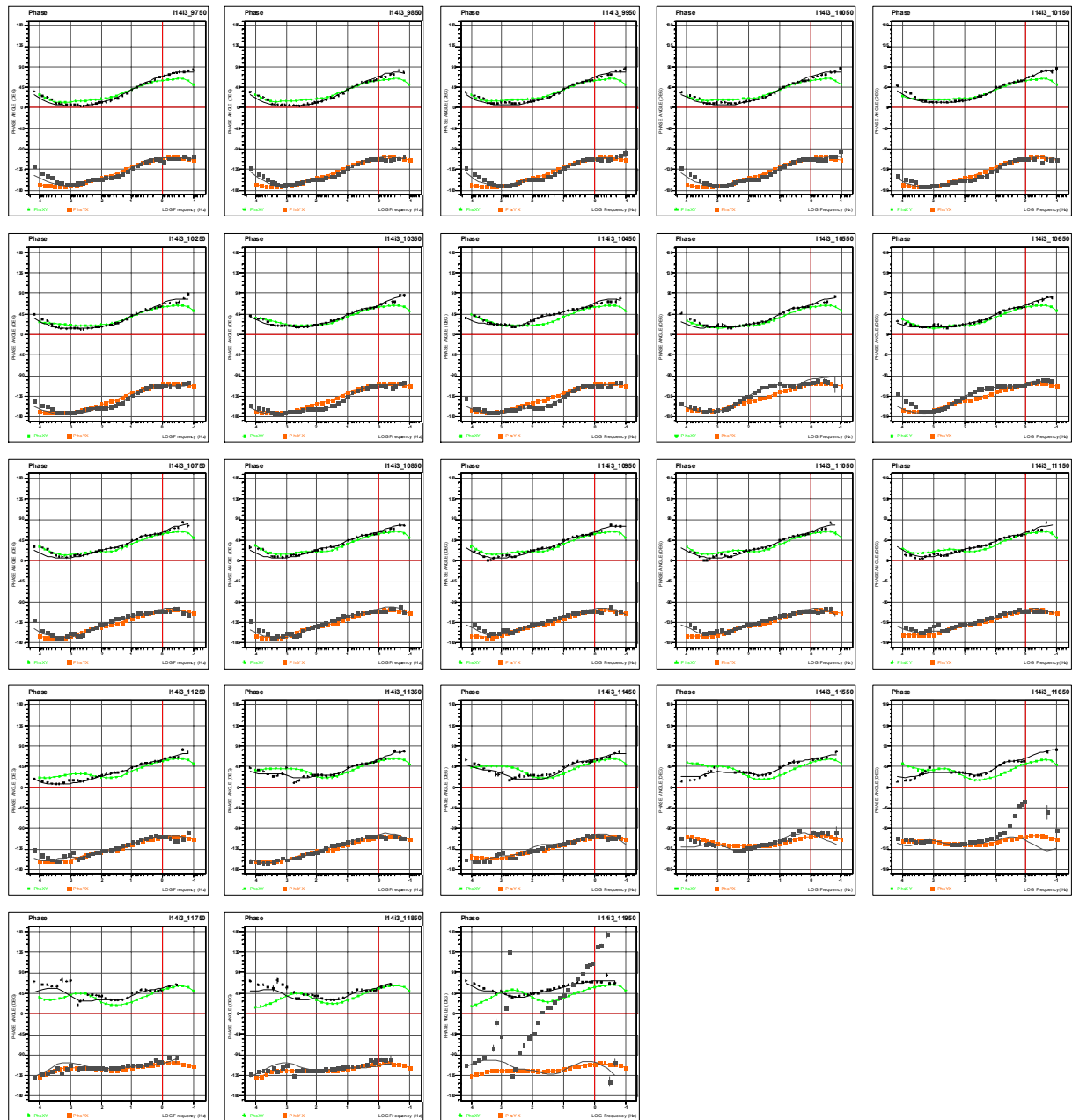
Resistivity Response Comparison (1/2): L14i3 vs I14oc2 (7250E-9650E)



Resistivity Response Comparison (2/2): L14i3 vs I14oc2 (9750E-11950E)



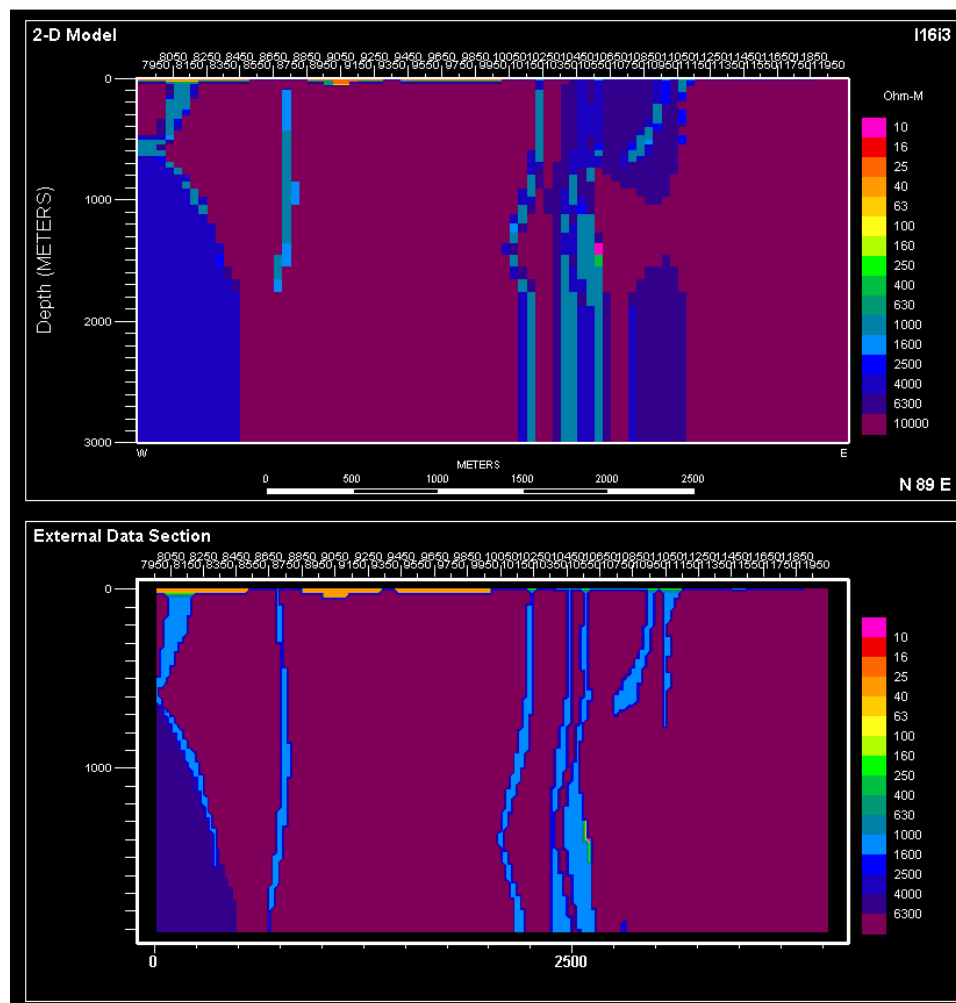
Phase Response Comparison (1/2): L14i3 vs L14oc2 (7250E-9650E)



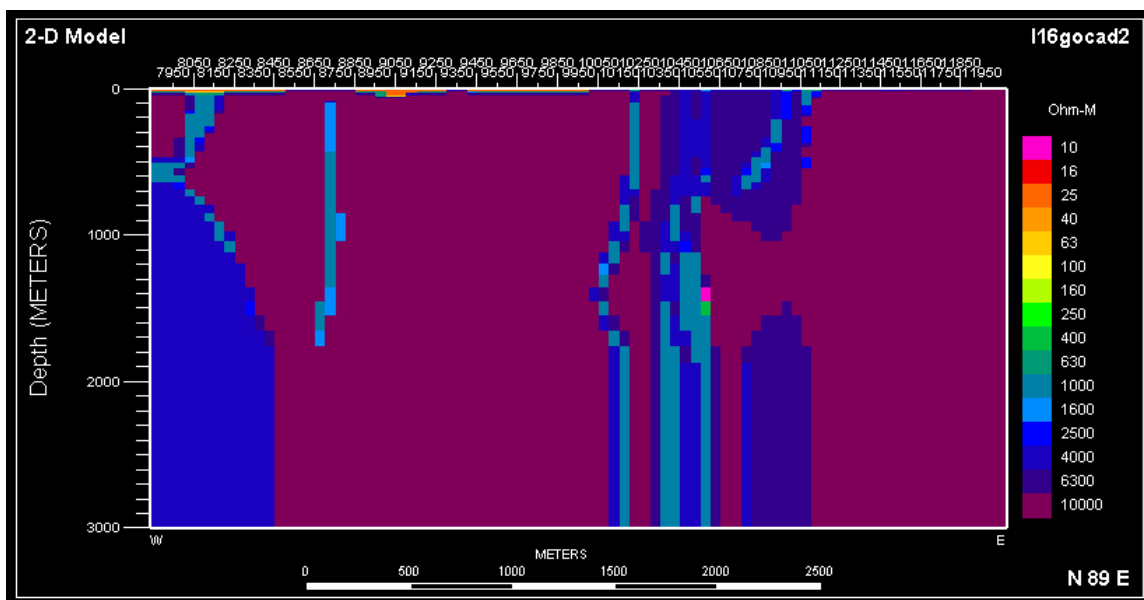
Phase Response Comparison (2/2): L14i3 vs I14oc2 (9750E-11950E)

Line 11600N: Gocad Constrained Resistivity Model #3 (I16i3) Rhyolite = 1000 ohm-m (I16gocad2)

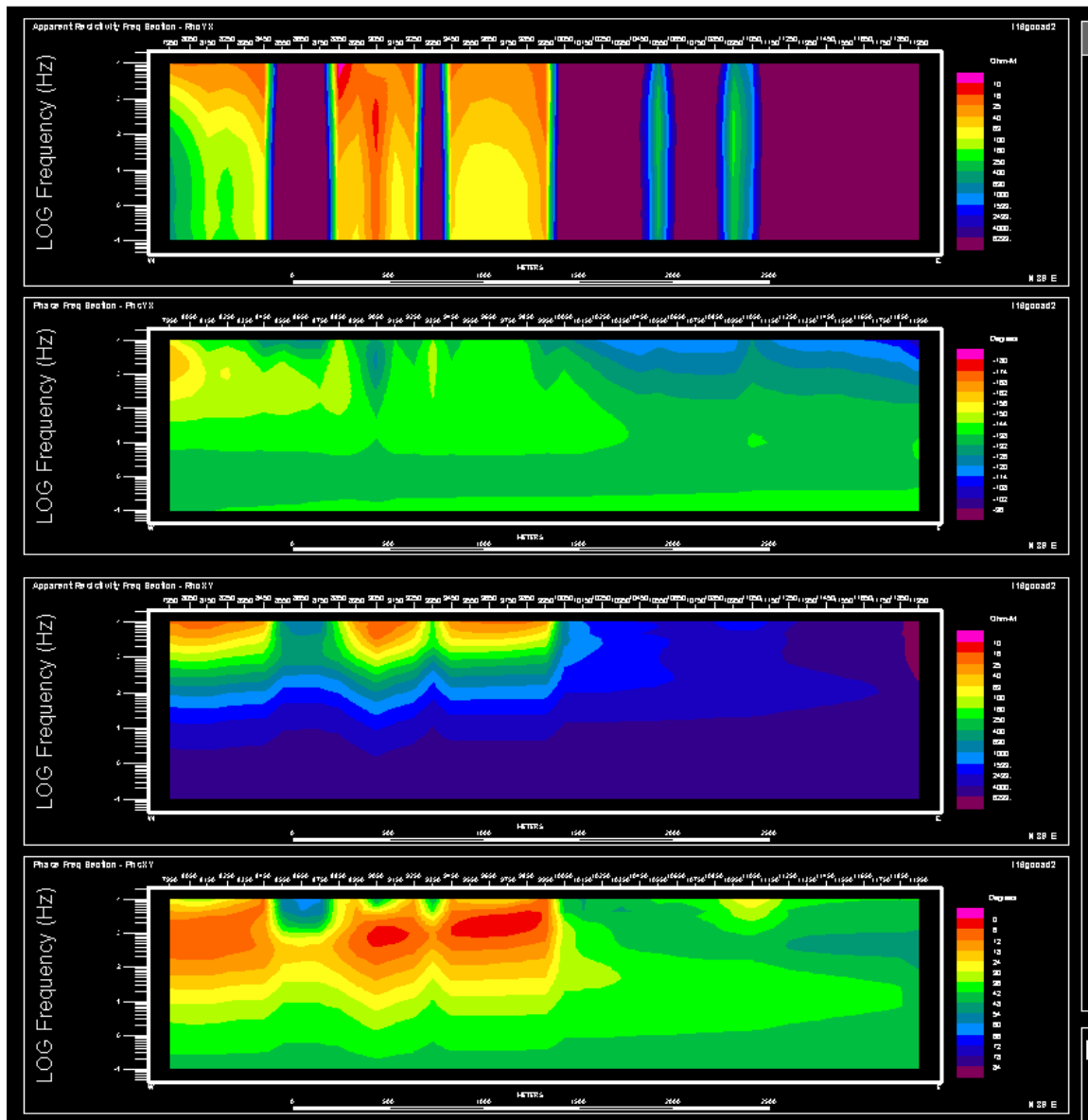
- Mafic volcanic = 10k ohm-m (purple)
- Ultramafic volcanic = 7k ohm-m (navy-blue)
- Sediments = 5k ohm-m (blue)
- Rhyolite = 1000 ohm-m (royal blue)
- Overburden = 30 ohm-m (orange)
- Graphite/Massive Sulphide = 10 ohm-m (pink to yellow)



Geotools Starting Model (I16gocad2 - top) and Gocad Reference (bottom)

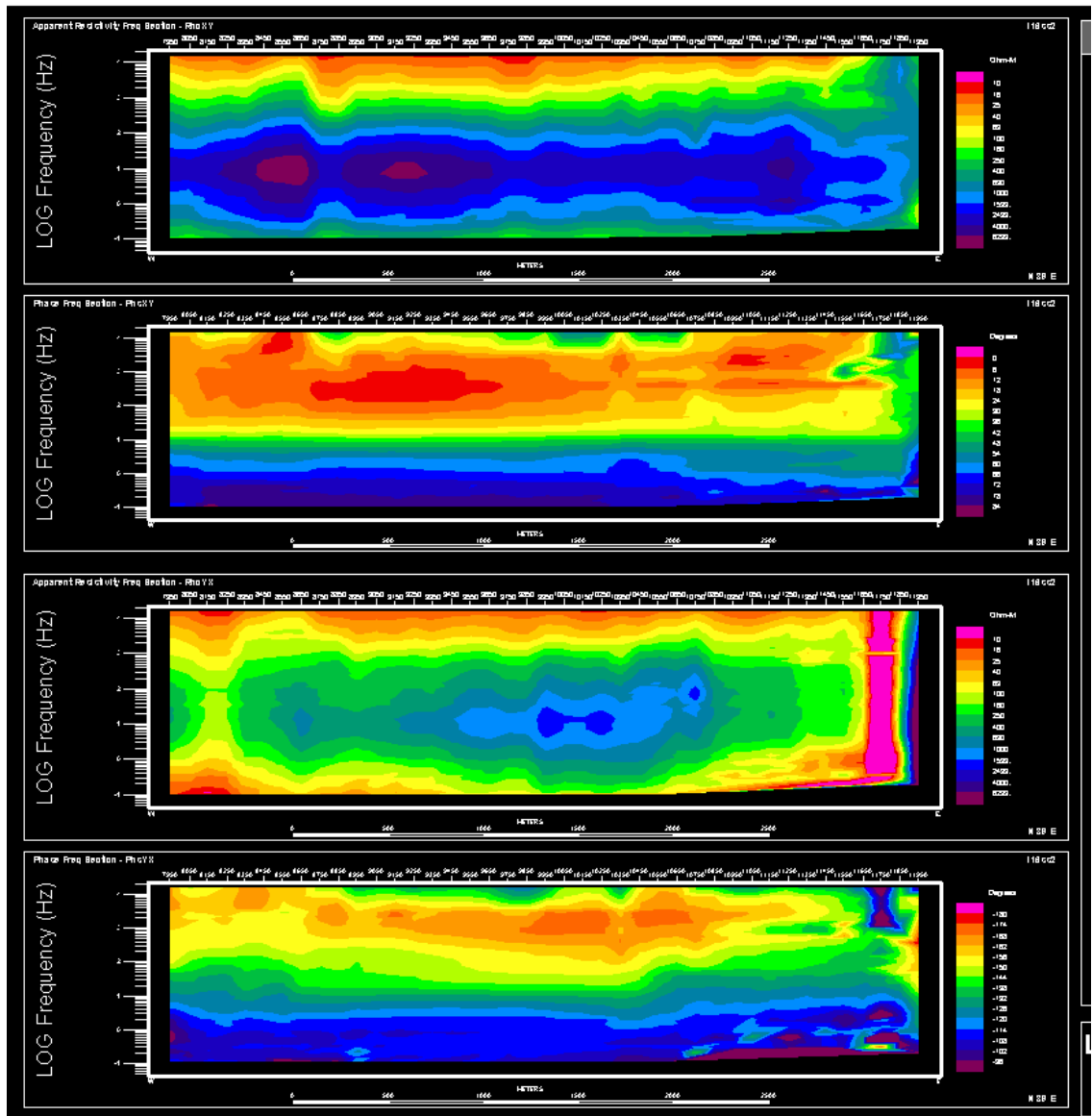


Gocad Reference Model (I16gocad2) for Constrained 2D Inversion

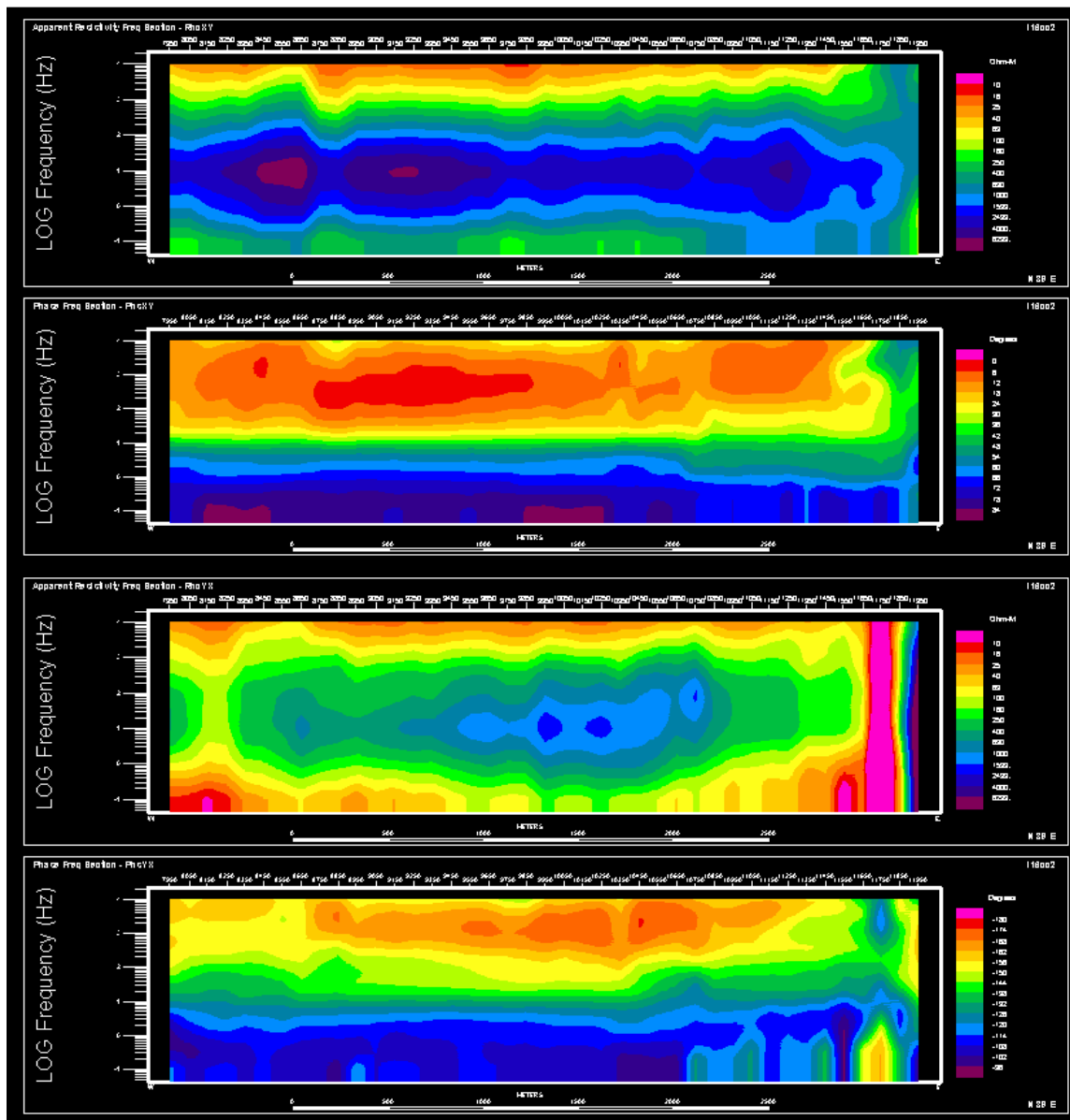


PW 2D Forward MT Model for Gocad Reference (I16gocad2)

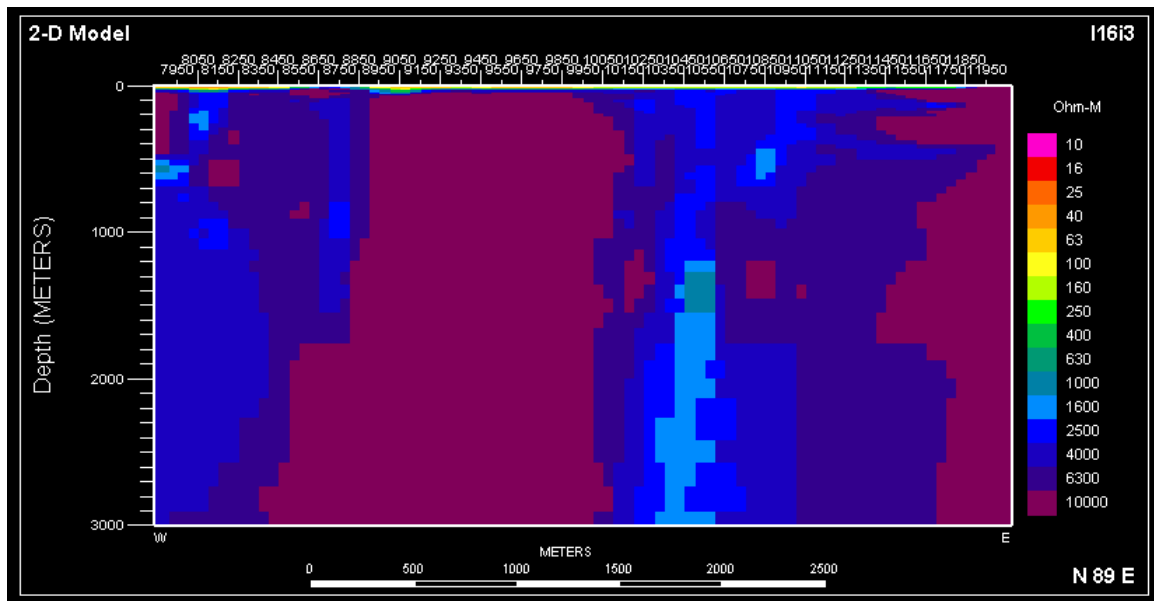
Showing In-line (TM) Rho/Phase(upper) and Cross-line (TE) Rho/Phase (lower)



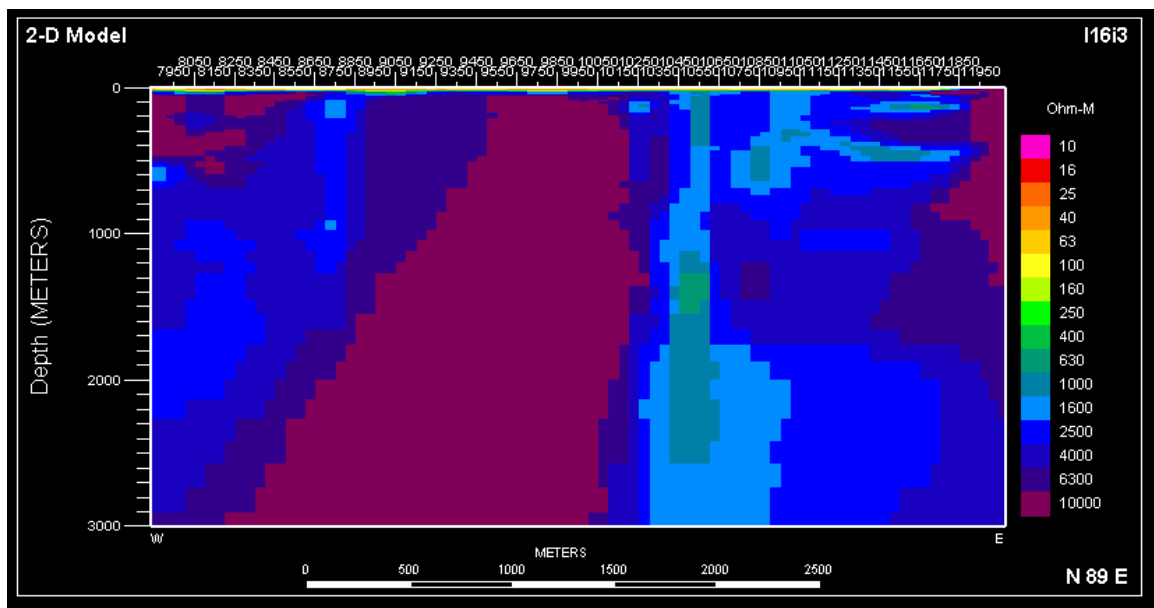
EVA-processed/Static-shifted RhoXY/PhaXY & RhoYX/PhaYX (L16ss2)



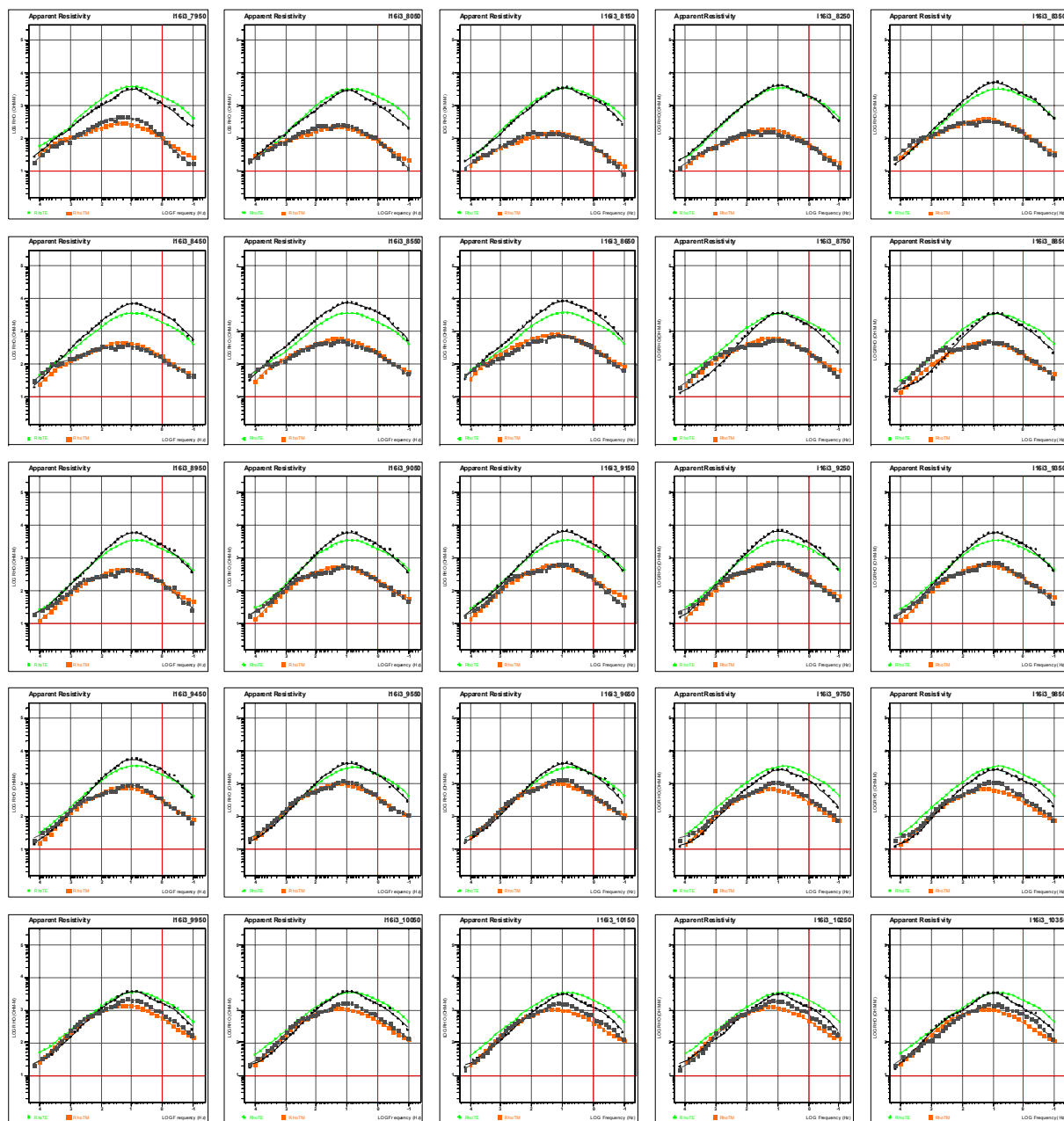
1D Occam Fit (using I16ss2) RhoXY/PhaXY & RhoYX/PhaYX (I16oc2)



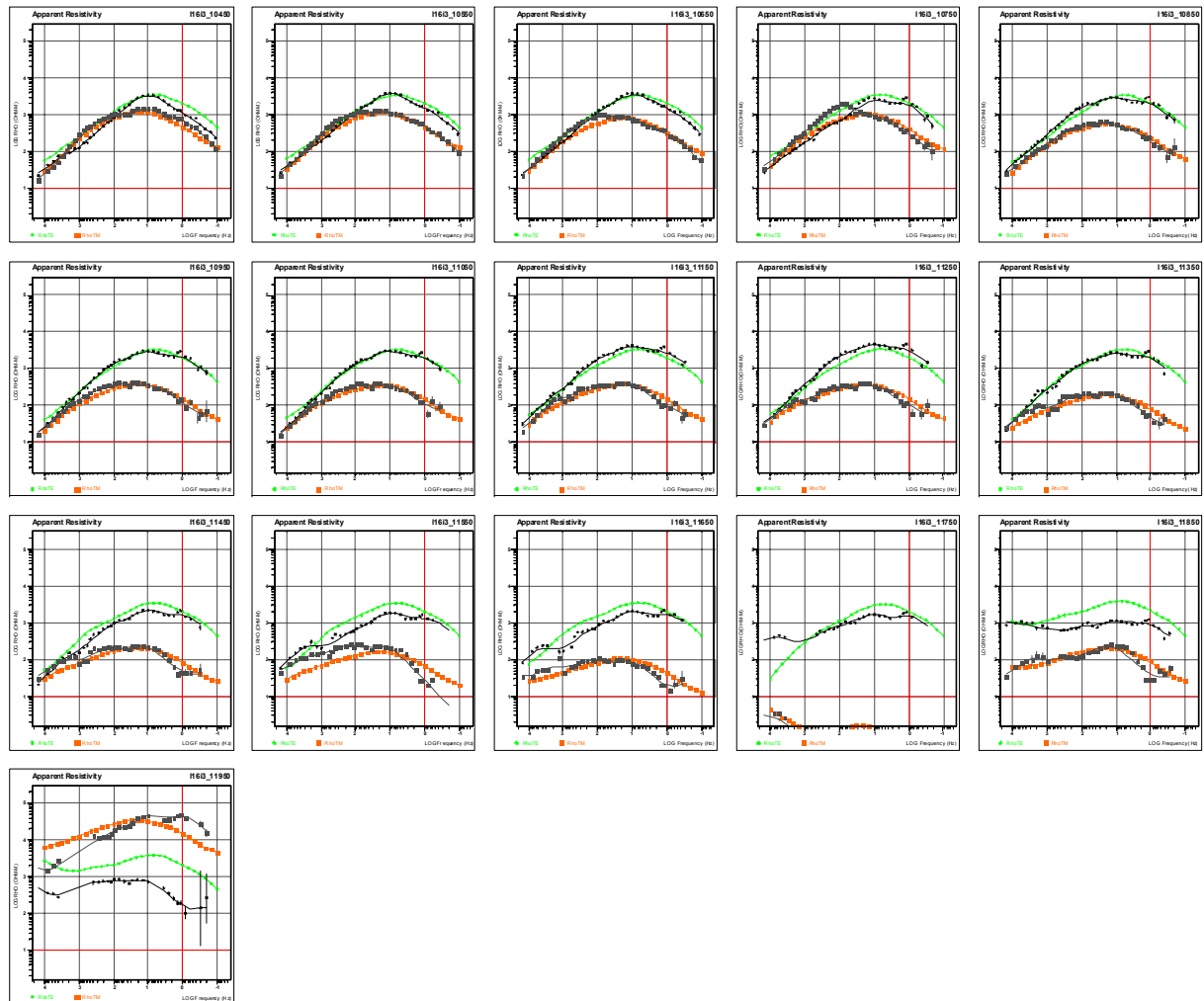
TM model (I16i3) for iteration25 (rms error = 8.4% @ FMRQ=51.2) – using I16oc2 and I16gocad2 reference



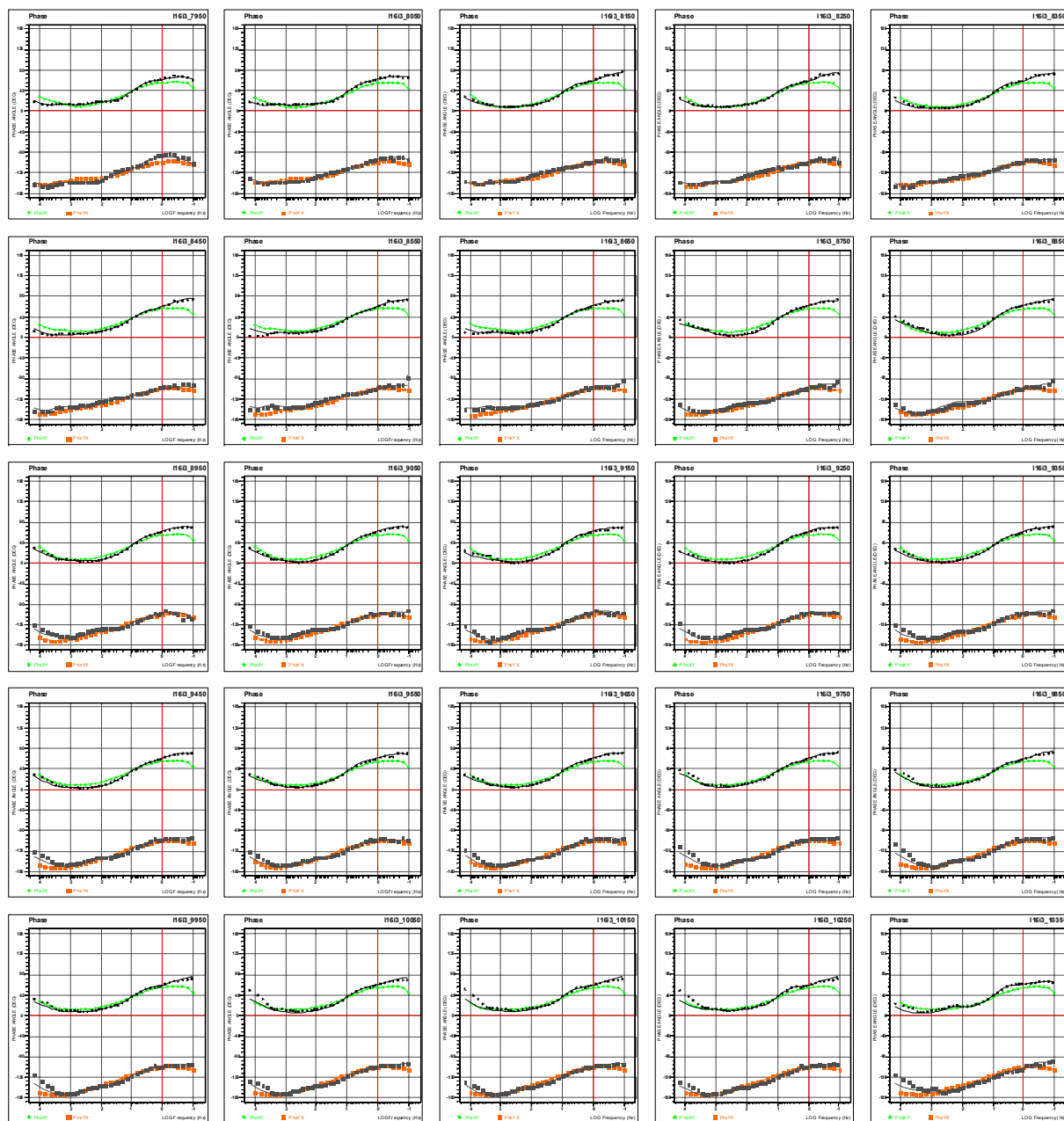
Final TM-TE Model (I16i3) at iteration 38 (rms error = 6.4% @ FMRQ = 51.2) using TM starting model.



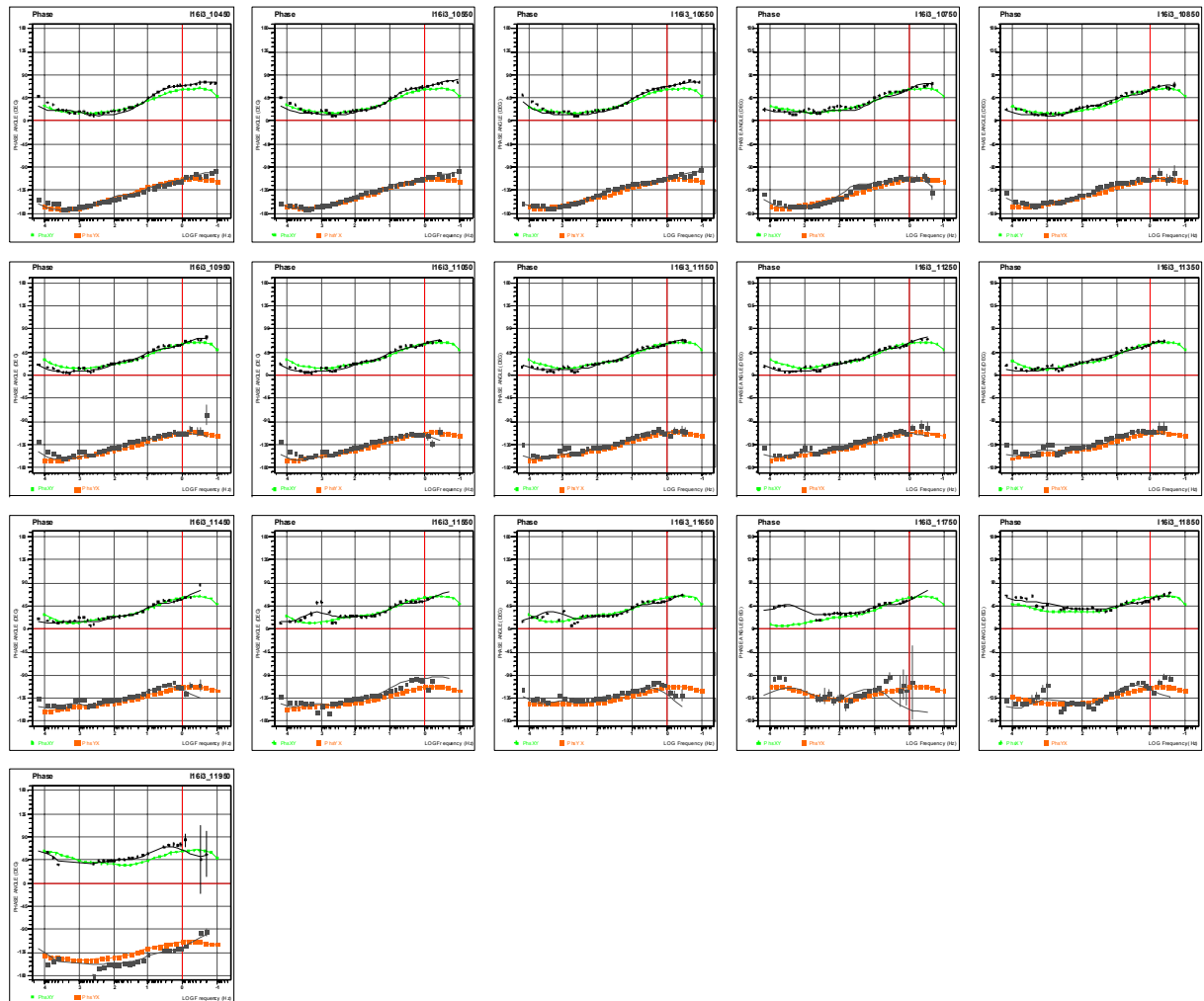
Resistivity Response Comparison (1/2): L16i3 vs I16oc2 (7950E-10350E).



Resistivity Response Comparison (2/2): L16i3 vs I16oc2 (10450E-11950E).



Phase Response Comparison (1/2): L16i3 vs I16oc2 (7950E-10350E).



Phase Response Comparison (2/2): L16i3 vs I16oc2 (10450E-11950E).