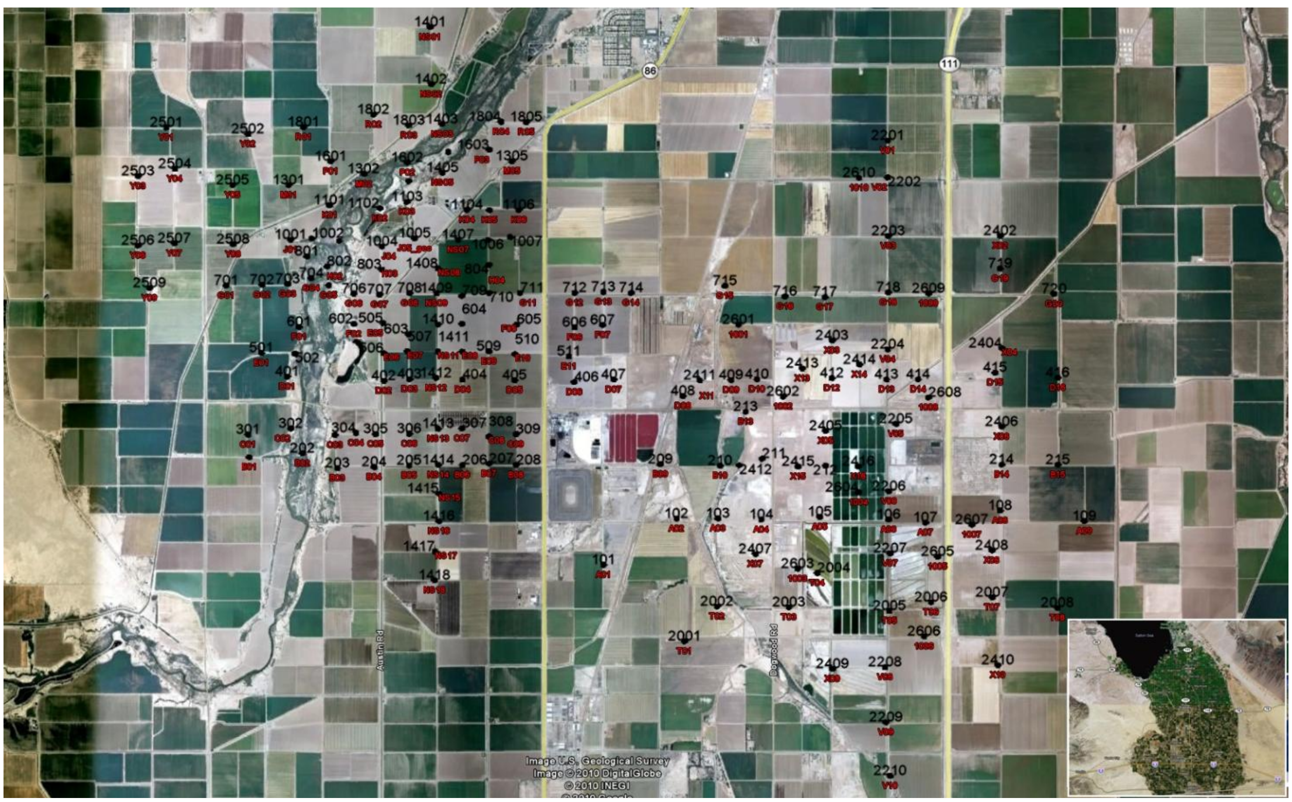
Leaders in Deep Exploration
Quantec Geoscience

Spartan Magnetotelluric Survey Geophysical Report

New River Project
California, USA
on behalf of
Ram Power Inc.
Reno, Nevada, USA



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EXECUTIVE SUMMARY

INTRODUCTION

This report reviews a Spartan MT survey carried out by Quantec Geoscience Limited over the New River Project in California, USA on behalf of Ram Power Inc. Data was acquired over a period of 29 days from 2010/06/26 to 2010/07/24.

The New River Project property is located approximately 25km south of the Salton Sea, near town of Brawley in Imperial County and approximately 150km east of San Diego, California.

A total of 182 MT Logger sites were completed covering the two separate Mesquite and New River grids. The data was collected over a frequency range of 320Hz to 0.001Hz with variable site spacing. A number of different inversion algorithms in 1D, 2D and 3D were used to produce resistivity-depth profiles and maps of subsurface resistivity variations over the survey area. For 2D inversions, a total of eighteen lines were constructed in east-west and north-south orientations crossing the entire survey area. For MT 3D inversion, the New River property was divided in two sub-grids, Mesquite and New River areas.

The report comprises of two parts. For the first part, inversions and geophysical interpretation results are presented with some recommendations of the potential targets for future follow up on the property. The second part of the report describes logistics of the survey, survey parameters, methodology and the survey results (data) in digital documents.

SURVEY OBJECTIVES

The objectives of the Spartan MT survey at New River Project are:

- Determining the resistivity structure from near surface to 5 km or more to provide a better understanding of the hydrothermal systems (e.g. size, depth and shape) present;
- Imaging the subsurface location and geometry of buried or concealed faults or structures and their associated fracture zones that may control reservoir flow and circulation;
- Comparing the resistivity structures inside and outside of the inferred resource or field boundaries;
- Basin mapping.

RESULTS

The MT 3D inversion models were considered for the final interpretation and results were presented in the report as interpreted plan maps, cross-sections and 3D volumetric illustrations of Mesquite and New River grids. These results allowed the characterization of resistivity defined from the MT datasets and helped to make a more realistic picture of sub-surface resistivity distribution and associated structures. A conceptual hydrothermal model was also considered in attempt to locate geothermal systems at New River project.

The 3D inversion results indicate that the subsurface resistivity, from the surface to a depth of ~5 km, varies over a small range of 1 Ωm to 50 Ωm. Two general regions with distinct resistivities are resolved at different depths in both Mesquite and New River grids.

In Mesquite grid, the surface to a depth of ~3 km is characterized with conductive materials of resistivities ranging from 1Ωm to ~5Ωm. The area of Mesquite grid below 3 km, to a depth of 4.5 km, hosts two dipping conductive zones, which extend northwest and southwest and covers major part of the grid. The increase in the resistivity of the subsurface in this depth range is more vivid and is considered as a transition zone from conductive to resistive material. Below 4 km to a depth of ~5 km the resistivity gradually increases with depth from ~20 Ωm to more than 50 Ωm.

The New River grid shows the most conductive zone is confined from surface to a depth of ~1.5km with resistivities ranging from 1Ωm to ~5Ωm. The area of New River grid below 1.5 km, to a depth of ~ 5 km, the resistivity increases to a range of 30Ωm to more than 50Ωm. This depth range hosts relatively horizontal resistive zone with few isolated conductive bodies of resistivity less than 10 Ωm.

A number of structural features are observed in both Mesquite and New River girds, which are usually below the conductive overburden and extends down to maximum depth of the models.

One the basis of 3D resistivity and conceptual models, three main areas in Mesquite and four in New River grids were identified presenting the potential geothermal system:

1. Mes_A is located on the north-east end of the Mesquite grid and is centered at MT site 2404 and 415;
2. Mes_B is located in the western margin of the grid, centered between MT sites 2412, 2415 and 211;
3. Mes_C is located in the south central part of the grid, centered between MT sites 2005, 2006 and 2606;
4. NR_A is located on the north end of the New River grid and is centered at MT site 1302;
5. NR_B is located on the central west part of the New River grid and is centered at MT site 703, 704 and 705;
6. NR_C is located on the south eastern part of the New River grid and is centered at MT site 1410 and 1411;
7. NR_D is located on the southern margins of the New River grid and is centered at MT site 304, 306 and 307;

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1 INTRODUCTION

This report reviews a Spartan MT survey carried out by Quantec Geoscience Limited over the New River Project in California, USA on behalf of Ram Power Inc. Data was acquired over a period of 29 days from 2010/06/26 to 2010/07/24.

The New River Project property is located approximately 25km south of the Salton Sea, near town of Brawley in Imperial County and approximately 150km east of San Diego, California (Figure 1-1).

A total of 182 MT Logger sites were completed covering the two separate Mesquite and New River grids. The data was collected over a frequency range of 320Hz to 0.001Hz with variable site spacing. A number of different inversion algorithms in 1D, 2D and 3D were used to produce resistivity-depth profiles and maps of subsurface resistivity variations over the survey area. For 2D inversions, a total of eighteen lines were constructed in east-west and north-south orientations crossing survey area. Additionally, two separate 3D inversion models were generated for both Mesquite and New River grids (Figure 1-2).

The contracted MT site names were modified to new MT site names to overcome the software limitations. The contracted and modified names are displayed in Table 1 shows the MT sites with their positions and site names. For consistency, only the new MT site names will be referenced in this report.

The report comprises of two parts. For the first part, inversions and geophysical interpretation results are presented with some recommendations of the potential targets for future follow up on the property. The second part of the report describes logistics of the survey, survey parameters, methodology and the survey results (data) in digital documents.

1.1 SURVEY OBJECTIVES

The objectives of the Spartan MT survey at New River Project are:

- Determining the resistivity structure from near surface to 5 km or more to provide a better understanding of the hydrothermal systems (e.g. size, depth and shape) present;
- Imaging the subsurface location and geometry of buried or concealed faults or structures and their associated fracture zones that may control reservoir flow and circulation;
- Comparing the resistivity structures inside and outside of the inferred resource or field boundaries;
- Basin mapping.

Spartan MT surveys will benefit your geothermal exploration program as follows:

- Mapping the resistivity of the subsurface to significant depths, assisting geologic interpretations
- Detect and delineate prospective zones from near surface, testing to approximately 5km or more in depth
- Image structure, alteration and geology related to geothermal targets
- Directly image geothermal reservoirs
- Focus deep drilling thereby reducing overall drilling costs

The MT resistivity method provides resistivity information from surface to depths beyond several kilometres, depending on frequencies and ground resistivities. The MT resistivity is useful for mapping geological contacts with resistivity contrasts and deep conductors that may potentially represent alteration or mineralization.

1.2 GENERAL SURVEY INFORMATION

Quantec Project No.:	US00503S
Client:	Ram Power Inc.
Client Address	6880 S. McCarran Boulevard Suite 1 Reno, NV 89509, USA
Client representative:	Onofre S. Espanola Phone: (775) 398-3716 Email: oespanola@ram-power.com
Project Name:	New River Project
Survey Type:	Spartan MT
Project Survey Period:	2010/06/26 to 2010/07/24
General Location:	South of Brawley town in Imperial County
Province	California
District/County	Imperial County
Nearest Settlement:	Brawley
Datum & Projection:	NAD83 Zone 11S
Latitude & Longitude:	Approx. 115°30'07.198"W, 32°55'02.212"N
UTM position:	Approx. 640074m E, 3643112m N
List of Grids Surveyed	Two (Mesquite + New River)

Figure 1-1: General Project Location[1].

[1] Image downloaded from Google Maps 2010/10/05.

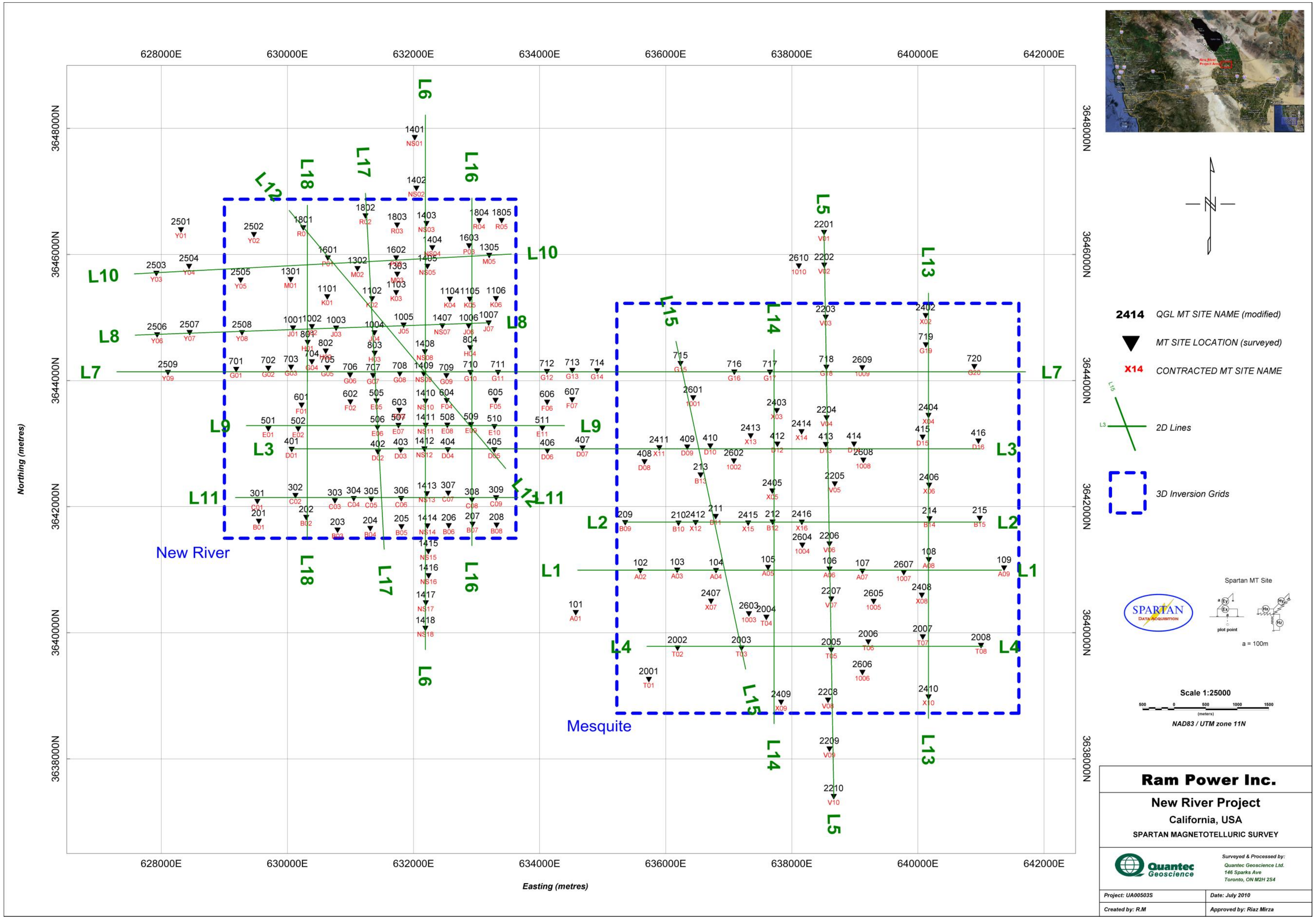


Figure 1-2: Spartan MT Sites Location Map with 2D Lines and areas selected for 3D Models

Table 1. Spartan MT Sites with their Locations and Elevations.

Number	Ram Power Site Names	Quantec Site Names	Easting (meters)	Northing (meters)	Latitude	Longitude	Elevation (meters)
1	A01	101	634573	3640330	32.53.34.39	-115.33.40.39	27
2	A02	102	635598	3640993	32.53.55.45	-115.33.00.60	33
3	A03	103	636182	3641004	32.53.55.55	-115.32.38.12	45
4	A04	104	636797	3640996	32.53.55.01	-115.32.14.45	43
5	A05	105	637623	3641046	32.53.56.26	-115.31.42.64	50
6	A06	106	638597	3641021	32.53.55.01	-115.31.05.18	38
7	A07	107	639119	3640986	32.53.53.64	-115.30.45.11	45
8	A08	108	640172	3641169	32.53.59.09	-115.30.04.49	46
9	A09	109	641366	3641037	32.53.54.25	-115.29.18.62	49
10	B01	201	629547	3641778	32.54.23.58	-115.36.53.05	24
11	B02	202	630299	3641840	32.54.25.27	-115.36.24.08	43
12	B03	203	630795	3641639	32.54.18.53	-115.36.05.09	23
13	B04	204	631315	3641663	32.54.19.09	-115.35.45.07	26
14	B05	205	631809	3641692	32.54.19.81	-115.35.26.04	25
15	B06	206	632559	3641707	32.54.19.97	-115.34.57.17	24
16	B07	207	632936	3641731	32.54.20.59	-115.34.42.65	31
17	B08	208	633318	3641717	32.54.19.97	-115.34.27.96	27
18	B09	209	635357	3641756	32.54.20.33	-115.33.09.47	35
19	B10	210	636202	3641748	32.54.19.69	-115.32.36.95	40
20	B11	211	636793	3641854	32.54.22.87	-115.32.14.15	45
21	B12	212	637695	3641766	32.54.19.60	-115.31.39.49	46
22	B13	213	636553	3642512	32.54.44.34	-115.32.23.04	44
23	B14	214	640184	3641818	32.54.20.15	-115.30.03.67	46
24	B15	215	640979	3641824	32.54.19.98	-115.29.33.07	42
25	C01	301	629524	3642094	32.54.33.85	-115.36.53.78	25
26	C02	302	630128	3642187	32.54.36.61	-115.36.30.48	24
27	C03	303	630754	3642104	32.54.33.64	-115.36.06.43	22
28	C04	304	631052	3642138	32.54.34.62	-115.35.54.95	24
29	C05	305	631329	3642127	32.54.34.14	-115.35.44.29	23
30	C06	306	631805	3642137	32.54.34.26	-115.35.25.97	27
31	C07	307	632550	3642223	32.54.36.73	-115.34.57.25	25
32	C08	308	632927	3642117	32.54.33.12	-115.34.42.80	28
33	C09	309	633310	3642150	32.54.34.03	-115.34.28.04	27
34	D01	401	630067	3642918	32.55.00.37	-115.36.32.46	27
35	D02	402	631436	3642877	32.54.58.45	-115.35.39.79	24
36	D03	403	631798	3642906	32.54.59.23	-115.35.25.84	27
37	D04	404	632544	3642910	32.54.59.03	-115.34.57.13	26
38	D05	405	633281	3642911	32.54.58.74	-115.34.28.76	29
39	D06	406	634124	3642895	32.54.57.85	-115.33.56.32	31
40	D07	407	634681	3642939	32.54.59.04	-115.33.34.86	36
41	D08	408	635663	3642722	32.54.51.55	-115.32.57.18	40
42	D09	409	636341	3642955	32.54.58.81	-115.32.30.96	43
43	D10	410	636707	3642971	32.54.59.17	-115.32.16.86	44
44	D12	412	637770	3643002	32.54.59.70	-115.31.35.93	46
45	D13	413	638539	3642994	32.54.59.09	-115.31.06.34	47
46	D14	414	638986	3643001	32.54.59.11	-115.30.49.13	46
47	D15	415	640074	3643112	32.55.02.21	-115.30.07.20	45
48	D16	416	640959	3643051	32.54.59.82	-115.29.33.17	43
49	E01	501	629698	3643246	32.55.11.17	-115.36.46.50	24
50	E02	502	630172	3643243	32.55.10.87	-115.36.28.25	25
51	E05	505	631413	3643686	32.55.24.72	-115.35.40.26	26
52	E06	506	631428	3643265	32.55.11.04	-115.35.39.90	26
53	E07	507	631761	3643297	32.55.11.94	-115.35.27.06	26
54	E08	508	632536	3643302	32.55.11.76	-115.34.57.23	26
55	E09	509	632913	3643311	32.55.11.89	-115.34.42.72	25
56	E10	510	633283	3643279	32.55.10.69	-115.34.28.49	27
57	E11	511	634044	3643256	32.55.09.61	-115.33.59.21	28
58	F01	601	630225	3643619	32.55.23.06	-115.36.26.02	24
59	F02	602	630999	3643671	32.55.24.41	-115.35.56.20	25
60	F03	603	631775	3643536	32.55.19.69	-115.35.26.40	25
61	F04	604	632527	3643692	32.55.24.43	-115.34.57.38	25
62	F05	605	633301	3643695	32.55.24.19	-115.34.27.58	33
63	F06	606	634119	3643665	32.55.22.85	-115.33.56.11	31
64	F07	607	634516	3643704	32.55.23.94	-115.33.40.81	34
65	G01	701	629188	3644187	32.55.41.94	-115.37.05.65	25
66	G02	702	629698	3644203	32.55.42.24	-115.36.46.01	24
67	G03	703	630058	3644221	32.55.42.67	-115.36.32.14	25
68	G04	704	630388	3644308	32.55.45.35	-115.36.19.40	45
69	G05	705	630634	3644212	32.55.42.13	-115.36.09.98	48
70	G06	706	630994	3644098	32.55.38.27	-115.35.56.18	25
71	G07	707	631359	3644090	32.55.37.86	-115.35.42.13	23
72	G08	708	631783	3644116	32.55.38.52	-115.35.25.80	30
73	G09	709	632522	3644087	32.55.37.25	-115.34.57.36	28
74	G10	710	632903	3644135	32.55.38.65	-115.34.42.67	29
75	G11	711	633340	3644139	32.55.38.58	-115.34.25.85	31
76	G12	712	634116	3644153	32.55.38.70	-115.33.55.97	33
77	G13	713	634518	3644170	32.55.39.07	-115.33.40.49	32
78	G14	714	634911	3644164	32.55.38.70	-115.33.25.36	35

Number	Ram Power Site Names	Quantec Site Names	Easting (meters)	Northing (meters)	Latitude	Longitude	Elevation (meters)
79	G15	715	636235	3644280	32.55.41.88	-115.32.34.33	42
80	G16	716	637088	3644144	32.55.37.08	-115.32.01.57	44
81	G17	717	637653	3644143	32.55.36.79	-115.31.39.82	41
82	G18	718	638548	3644220	32.55.38.88	-115.31.05.33	43
83	G19	719	640125	3644577	32.55.49.75	-115.30.04.43	46
84	G20	720	640894	3644231	32.55.38.16	-115.29.35.02	43
85	H01	801	630322	3644614	32.55.55.32	-115.36.21.78	26
86	H02	802	630608	3644477	32.55.50.75	-115.36.10.84	46
87	H03	803	631384	3644442	32.55.49.27	-115.35.40.99	25
88	H04	804	632898	3644530	32.55.51.47	-115.34.42.66	27
89	J01	1001	630090	3644844	32.56.02.88	-115.36.30.60	26
90	J02	1002	630390	3644865	32.56.03.43	-115.36.19.04	29
91	J03	1003	630773	3644840	32.56.02.46	-115.36.04.30	48
92	J04	1004	631380	3644767	32.55.59.83	-115.35.40.97	24
93	J05	1005	631843	3644889	32.56.03.59	-115.35.23.09	26
94	J06	1006	632875	3644876	32.56.02.71	-115.34.43.37	29
95	J07	1007	633192	3644924	32.56.04.13	-115.34.31.14	27
96	K01	1101	630632	3645339	32.56.18.72	-115.36.09.48	28
97	K02	1102	631343	3645306	32.56.17.34	-115.35.42.12	46
98	K03	1103	631725	3645404	32.56.20.36	-115.35.27.36	43
99	K04	1104	632577	3645300	32.56.16.61	-115.34.54.62	25
100	K05	1105	632894	3645301	32.56.16.50	-115.34.42.41	28
101	K06	1106	633308	3645308	32.56.16.55	-115.34.26.47	28
102	M01	1301	630053	3645612	32.56.27.83	-115.36.31.63	27
103	M02	1302	631112	3645785	32.56.32.99	-115.35.50.77	28
104	M03	1303	631743	3645696	32.56.29.83	-115.35.26.52	49
105	M05	1305	633201	3645994	32.56.38.87	-115.34.30.23	27
106	NS01	1401	632019	3647864	32.57.40.09	-115.35.14.78	32
107	NS02	1402	632046	3647060	32.57.13.98	-115.35.14.15	28
108	NS03	1403	632206	3646500	32.56.55.73	-115.35.08.28	28
109	NS04	1404	632298	3646115	32.56.43.19	-115.35.04.94	48
110	NS05	1405	632221	3645820	32.56.33.65	-115.35.08.05	32
111	NS07	1407	632458	3644876	32.56.02.90	-115.34.59.42	27
112	NS08	1408	632180	3644467	32.55.49.74	-115.35.10.33	28
113	NS09	1409	632162	3644119	32.55.38.45	-115.35.11.20	26
114	NS10	1410	632191	3643682	32.55.24.25	-115.35.10.31	26
115	NS11	1411	632194	3643299	32.55.11.82	-115.35.10.40	27
116	NS12	1412	632173	3642926	32.54.59.72	-115.35.11.40	25
117	NS13	1413	632212	3642214	32.54.36.58	-115.35.10.26	26
118	NS14	1414	632221	3641703	32.54.19.99	-115.35.10.18	24

Number	Ram Power Site Names	Quantec Site Names	Easting (meters)	Northing (meters)	Latitude	Longitude	Elevation (meters)
119	NS15	1415	632235	3641300	32.54.06.90	-115.35.09.85	24
120	NS16	1416	632240	3640914	32.53.54.37	-115.35.09.86	25
121	NS17	1417	632195	3640484	32.53.40.43	-115.35.11.81	23
122	NS18	1418	632189	3640081	32.53.27.35	-115.35.12.25	26
123	P01	1601	630641	3645955	32.56.38.71	-115.36.08.82	26
124	P02	1602	631725	3645955	32.56.38.24	-115.35.27.08	30
125	P03	1603	632882	3646147	32.56.43.97	-115.34.42.44	28
126	R01	1801	630251	3646432	32.56.54.37	-115.36.23.59	26
127	R02	1802	631238	3646622	32.57.00.11	-115.35.45.49	24
128	R03	1803	631740	3646476	32.56.55.15	-115.35.26.24	30
129	R04	1804	633042	3646545	32.56.56.82	-115.34.36.07	28
130	R05	1805	633397	3646546	32.56.56.70	-115.34.22.40	28
131	T01	2001	635732	3639270	32.52.59.46	-115.32.56.35	27
132	T02	2002	636187	3639766	32.53.15.36	-115.32.38.58	42
133	T03	2003	637202	3639767	32.53.14.93	-115.31.59.53	40
134	T04	2004	637596	3640255	32.53.30.60	-115.31.44.11	45
135	T05	2005	638625	3639735	32.53.13.25	-115.31.04.79	45
136	T06	2006	639212	3639864	32.53.17.17	-115.30.42.14	45
137	T07	2007	640077	3639944	32.53.19.37	-115.30.08.81	46
138	T08	2008	641000	3639810	32.53.14.59	-115.29.33.37	45
139	V01	2201	638511	3646358	32.56.48.30	-115.31.05.60	42
140	V02	2202	638514	3645839	32.56.31.45	-115.31.05.76	36
141	V03	2203	638538	3645015	32.56.04.69	-115.31.05.29	43
142	V04	2204	638551	3643418	32.55.12.84	-115.31.05.65	46
143	V05	2205	638681	3642370	32.54.38.76	-115.31.01.21	46
144	V06	2206	638597	3641419	32.54.07.93	-115.31.04.96	48
145	V07	2207	638626	3640545	32.53.39.54	-115.31.04.32	43
146	V08	2208	638574	3638942	32.52.47.53	-115.31.07.18	42
147	V09	2209	638597	3638166	32.52.22.33	-115.31.06.72	39
148	V10	2210	638665	3637414	32.51.57.88	-115.31.04.51	40
149	X02	2402	640123	3645039	32.56.04.74	-115.30.04.26	44
150	X03	2403	637761	3643532	32.55.16.90	-115.31.36.00	46
151	X04	2404	640167	3643456	32.55.13.34	-115.30.03.43	44
152	X05	2405	637690	3642258	32.54.35.58	-115.31.39.41	47
153	X06	2406	640177	3642350	32.54.37.43	-115.30.03.65	44
154	X07	2407	636719	3640509	32.53.39.24	-115.32.17.72	46
155	X08	2408	640061	3640606	32.53.40.87	-115.30.09.07	45
156	X09	2409	637830	3638907	32.52.46.73	-115.31.35.83	40
157	X10	2410	640168	3638992	32.52.48.42	-115.30.05.83	43
158	X11	2411	635898	3642945	32.54.58.69	-115.32.48.02	39

Number	Ram Power Site Names	Quantec Site Names	Easting (meters)	Northing (meters)	Latitude	Longitude	Elevation (meters)
159	X12	2412	636474	3641757	32.54.19.86	-115.32.26.48	43
160	X13	2413	637347	3643133	32.55.04.14	-115.31.52.14	47
161	X14	2414	638154	3643198	32.55.05.88	-115.31.21.05	46
162	X15	2415	637307	3641750	32.54.19.26	-115.31.54.43	47
163	X16	2416	638158	3641764	32.54.19.33	-115.31.21.67	45
164	Y01	2501	628312	3646401	32.56.54.19	-115.37.38.26	28
165	Y02	2502	629469	3646324	32.56.51.19	-115.36.53.75	26
166	Y03	2503	627922	3645710	32.56.31.92	-115.37.53.63	26
167	Y04	2504	628441	3645820	32.56.35.27	-115.37.33.59	27
168	Y05	2505	629259	3645602	32.56.27.84	-115.37.02.20	27
169	Y06	2506	627934	3644734	32.56.00.23	-115.37.53.65	26
170	Y07	2507	628450	3644771	32.56.01.21	-115.37.33.77	26
171	Y08	2508	629280	3644769	32.56.00.79	-115.37.01.82	26
172	Y09	2509	628106	3644138	32.55.40.81	-115.37.47.33	27
173	1001	2601	636436	3643736	32.55.24.13	-115.32.26.89	44
174	1002	2602	637081	3642734	32.54.51.31	-115.32.02.60	45
175	1003	2603	637319	3640310	32.53.32.51	-115.31.54.74	46
176	1004	2604	638166	3641398	32.54.07.44	-115.31.21.56	45
177	1005	2605	639297	3640508	32.53.38.04	-115.30.38.52	44
178	1006	2606	639119	3639382	32.53.01.56	-115.30.45.98	42
179	1007	2607	639775	3640964	32.53.52.62	-115.30.19.88	48
180	1008	2608	639134	3642748	32.54.50.83	-115.30.43.57	45
181	1009	2609	639117	3644213	32.55.38.39	-115.30.43.43	43
182	1010	2610	638111	3645827	32.56.31.25	-115.31.21.29	40

[2] The contracted (Ram Power) MT site names were modified to new (Quantec) MT site names to overcome the software limitations. The contracted and modified names are displayed in Table 1 shows the MT sites with their positions and site names. For consistency, only the new MT site names will be referenced in this report.

2 INVERSIONS

2.1 OVERVIEW OF INVERSION PROCEDURE

The objective of this work is to interpret the MT data collected by Quantec Geoscience Ltd. at 182 MT sites over the New River Project Property, California. The interpretation is based on the results from the unconstrained inversions using the 1D, 2D and 3D inversion algorithms.

The results of 1D, 2D and 3D inversions of MT data are presented as resistivity-depth profiles, cross-sections along selected lines and plan maps at various depths as well as volumetric illustrations, respectively. The observed anomalies are described and discussed as potential drilling targets.

The MT method is used to resolve the resistivity distribution of the subsurface by measuring the variation of natural source electric and magnetic fields (MT). Resistivity can be an indicator of metallic mineralization, but is more often than not controlled by rock porosity and is therefore an indirect indicator of alteration and mineral grain fabric.

In the following sections, details of the inversion processes and the results are discussed. Comprehensive illustration of the inversions results in 2D and 3D, are presented in Appendices F and G. The complete results of the individual 1D inversion for each site are presented as resistivity-depth profiles along with observed and calculated curves in digital archives.

2.2 MAGNETOTELLURIC INVERSIONS

The Magnetotelluric (MT) method is a natural source method that measures the variation of both the electric (E) and magnetic (H) field on the surface of the earth in order to determine the distribution at depth of the resistivity of the underlying rocks. A complete review of the method is presented in Vozoff (1972) and Orange (1989).

The measured MT impedance Z, defined by the ratio between the E and H fields, is a tensor of complex numbers. This tensor is generally represented by its two off-diagonal elements. In a 1D earth model, i.e. when the resistivity varies only with depth, there is no strike direction and the two off-diagonal impedances are equal. In the 2D case, i.e. when the resistivity varies with depth and perpendicularly to the strike, and when the profile is set perpendicular to the strike direction, the two off-diagonal elements are not equal but reflect the variation of the resistivity along two directions, one parallel and the other perpendicular to the strike, i.e., the TE (Transverse Electric; E parallel to the strike) and the TM (Transverse Magnetic; E perpendicular to the strike) modes.

Both TE and TM impedances are represented by an apparent resistivity (a parameter proportional to the modulus of Z) and a phase (argument of Z). The variation of those parameters with frequency relates the variations of the resistivity with depth, the high frequencies sampling the sub-surface and the low frequencies the deeper part of the earth. However the apparent resistivity and the phase have an opposite behaviour. An increase of the phase indicates a more conductive zone than the host rocks, and is associated with a decrease of the apparent resistivity. The objective of the inversion of MT data is to compute a distribution of the resistivity of the surface that explains the variations of the MT parameters, i.e. the response of the model that fits the observed data. The solution however is not unique and different inversions must be performed (different programs, different conditions) in order to test and compare solutions for artefacts versus a target anomaly.

The depth of investigation is determined primarily by the frequency content of the measurement. Depth estimates from any individual sounding may easily exceed 20 km. However, the data can only be confidently interpreted when the aperture of the array is comparable to the depth of investigation.

The inversion models are dependent on the data, but also on the associated data errors, and the model norm. The inversion models are not unique, may contain artefacts of the inversion process, and may not therefore accurately reflect all of the information apparent in the actual data. Inversions are a tool, but not a "solution". Inversion models need to be reviewed in context of the observed data, model fit, an understanding of the model norm used and if the model is geologically plausible.

2.3 1D INVERSION

In the 1D inversion, a total of 182 MT sites (Table 1) were utilized and 546 inversions were completed using different components as input data. The Occam algorithm was used for this set of inversions. In the Occam inversion a solution which is simplest, or smoothest, among all the possible solutions is sought. Therefore, the results represent a "least structure" model which explains the main features of the data.

The data used in this set of inversions include resistivity and phase in XY, YX, and the determinate (DET) of the impedance tensor. A half-space earth model with homogeneous resistivity of 100 Ωm is used as the starting model for all 1D inversions. The number of predefined layers per decade was set to 10 and inversions were allowed to iterate up to a maximum of 10 iterations.

2.4 2D INVERSION

The 2D inversions were completed along 18 MT lines over the New River Project property. A total of 156 MT sites were used to construct the lines (Figure 1-2). If the site did not fall on the line, the actual site location was perpendicularly projected onto the line.

The 2D inversions were performed using the "un-rotated" data which assumes the strike direction is perpendicular to the profile for all sites: the TM mode is then defined by the inline E-field (and cross line H-field), and the TE mode is defined by the cross line E-field (and inline H-field) data. Table 2 describes azimuth degree of each line.

All inversions utilised the TE and TM resistivity and phase from 320Hz to 0.001Hz, interpolated at 6 frequencies per decade, and assume 5% error for the resistivity and 3 degrees error for the phase. The starting model for each 2D inversion is a half space model of 100 Ohm-m.

MT models were calculated with the RLM code (Rodi and Mackie, 2001) and with the PWm code (development Quantec Geoscience; based on deLugao and Wannamaker, 1996). Both the PWM and the RLM 2D inversion codes result in good data fits (see RMS errors in Table 2).

Generally, the TM mode data are fitted better than the TE mode. Note that there is a general difference in the way that the PWM and the RLM fit the data. The PWM code has a tendency to accentuate anomalies with sharp vertical boundaries and to locate these anomalies at a greater depth than the RLM code. In contrast, the RLM code has a tendency to accentuate anomalies with a layered (horizontal) aspect resulting in a smooth lateral variation and lower depth to top of the anomalous bodies. Therefore, the choice of the inversion algorithm and the inversion results to be used in interpretation is generally dataset definitive and must confirm with the geological setting of the survey area.

The final 2D inversion MT model presented in this report, and used in the interpretation is the PWm inversion starting from a half space model of 100 Ohm-m, and using TM and TE apparent resistivity and phase from 320Hz to 0.001Hz because of its fit to the data.

Table 2. Summary of the line azimuths and percentage RMS errors for the 2D PWM and RLM inversions.

Line ID	MT Sites	Azimuth (degrees)	PWM (%)	RLM (%)
L1	101-102-103-104-105-106-107-108-109	90	1.2	0.9
L2	209-210-2412-211-2415-212-2416-2206-214	90	1.4	0.9
L3	401-402-403-1412-404-405-406-407-408-2411-409-410-2602-2413-2414-413-414-2608-415-416	90	1.5	0.9
L4	2001-2002-2003-2004-2005-2006-2007-2008	90	1.2	0.9
L5	2210-2209-2208-2005-2207-106-2206-2205-413-2204-718-	359	1.4	0.99
L6	1418-1417-1416-1415-1414-1412-1411-1410-1409-1408-1407-1405-1404-1403-1402-1401	360	1.9	0.99
L7	2509-701-702-703-704-705-706-707-708-1409-709-710-711-712-713-715-716-717-718-2609-719-720	90	1.7	0.9
L8	2506-2507-2508-1001-1002-1003-1004-1005-1407-1006	88	1.5	0.9
L9	501-502-506-507-1411-508-509-510-511	90	2.0	0.9
L10	2503-2504-2505-1301-1601-1302-1602-1405-1603-1305	87	2.9	1.4
L11	301-302-303-304-305-306-307-308-309	90	2.0	0.9
L12	405-509-604-709-1409-1408-1005-1004-1102-1302-1601-1801	320	2.6	0.9
L13	2410-2007-2408-108-214-2406-415-2404-719-2402	0	0.9	0.99
L14	2409-2004-105-212-2405-412-2403-717	0	1.8	0.9
L15	2003-2603-2407-104-211-213-409-2601-715	348	2.2	0.9
L16	207-308-405-509-605-710-804-1006-1105-1305-1603-1804	0	2.9	1.3
L17	204-305-402-506-505-707-803-1004-1102-1302-1802	357	1.8	0.9
L18	202-302-401-502-601-704-801-1002-1101-1301-1601-1801	0	2.1	0.9

2.5 3D INVERSION

For 3D inversion, the New River Project property was divided into two grids (Mesquite and New River) in order to cover the densely occupied areas for both grids with more regular grid size, which minimize the inversion artifacts and ambiguities at the outer margins of the 3D grids.

The Mesquite grid covered 67 MT sites and a total of 90 MT sites were selected for New River grid in their respective grid boundaries (Figure 1-2). Homogenous half space with resistivities of 10Ωm was used as the starting model in the inversions with a uniform mesh of 250m and 200m cell size in horizontal directions for Mesquite and New River grids, respectively. Prior to final 3D models, two coarser meshes with cell sizes of 300m and 250m were used in the preliminary runs to examine the convergence of the inverse process as well as to produce a model with highest resolution and minimum artifacts. The parameters used in the final 3D inversions are summarized in Table 3.

3D inversions were carried out using the Weerachai Siripunvaraporn and Gary Egbert 3D inversion code[3] (WSINV3DMT). The inversion algorithm is based on a data space variant of the Occam approach. In this inversion algorithm the inverse problem, involving the construction and inversion of a model space

[3] Weerachai Siripunvaraporn, et.al, 2005, Three-dimensional magnetotelluric inversion: data-space method, Physics of the Earth and Planetary Interiors, 150, 3–14.

matrix, is transformed into a data space inverse problem. This reduces the computational efforts and allows inversion of the 3D MT datasets on a PC.

Note that the MT 3D inversion was completed using flat-earth mode; i.e. no surface topography was included in the inversion.

At each site, off-diagonal elements of the MT complex impedance tensor were used as input data. A relatively high conductivity subsurface results in a limited depth of penetration of the data due to high attenuation in electromagnetic field.

Table 3. Summary of the data and parameters used in the 3D inversions

Model	No. of sites	Data	Frequency	No. of block (no padding)	Block size (m)	No. of iteration	Inversion time (h)	RMS (%)
RPZ15 (Mesquite)	67	Z_{xy}, Z_{yx}	320-0.01 Hz @ 3/decade Number of Periods =14	x (NS): 39, y (EW): 39, z: 62	M_x=250, M_y=250, M_z=5x50; 20x100; 15x150 15x200	6	341	2.6 @ iter #5
RPZ21 (New River)	88		320-0.001 Hz @ 3/decade Number of Periods =16	x (NS): 40, y (EW): 36, z: 62	M_x=200, M_y=200, M_z=5x50; 20x100; 15x150 15x200	6	~247	4.5 @ iter #3

A dense subsample of the MT data with 18 frequencies at each site in the range of 320Hz and 0.001Hz was used. The original density of the MT data is usually considered as redundant and a subsample of the data is generally adequate to represent the MT response curve. It significantly reduces the processing time in the 3D inversion while maintaining the main features of the data. An example of the MT data and the re-sampled data is shown in Figure 2-1. This curve represents general characteristics of the MT data observed in the survey area. It is evident that the variations in the apparent resistivity curve are adequately represented in the sub-sampled dataset.

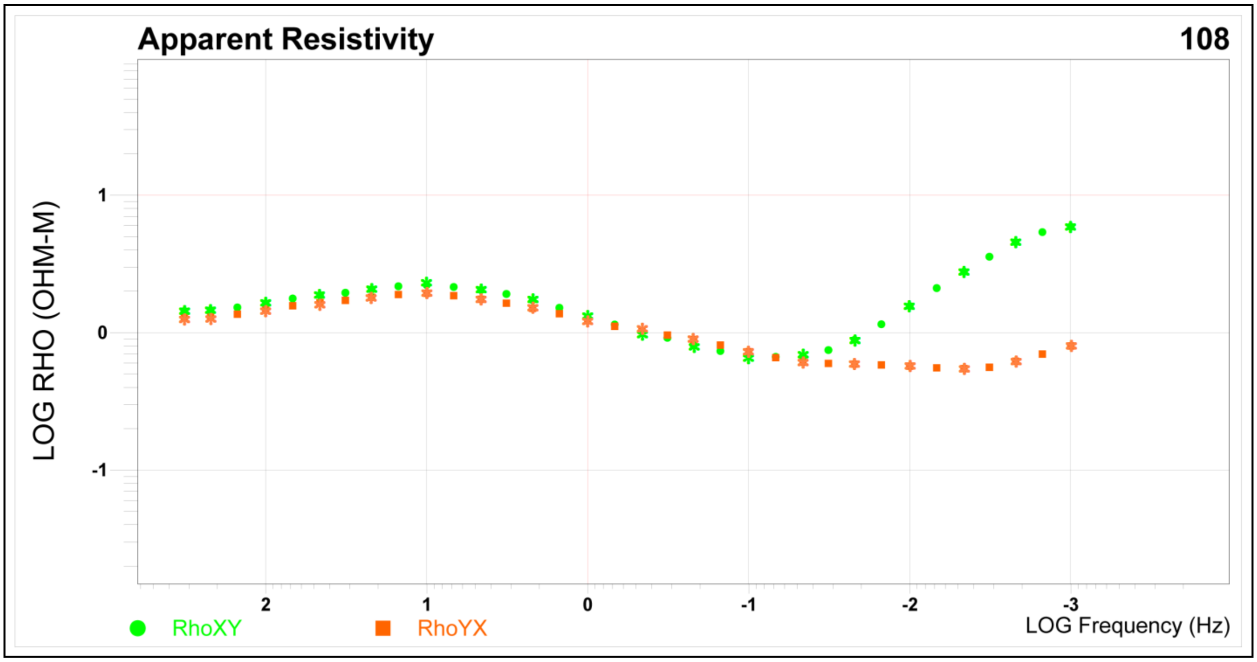


Figure 2-1. Example of the apparent resistivity data in New River survey area. Solid Asterisk denote the selected frequencies used in the 3D inversions.

Grids of 39×39×62 blocks (plus padding) and 40×36×62 blocks (plus padding) were used in the RPZ15 (Mesquite) and RPZ21 (New River) inversions (Table 3), respectively. The 3D inversion code requires that the MT site be located at the center of the block at the surface of the model. This may imply a lateral shift of a maximum of ~140 m and ~100 m of the site from its actual location in the RPZ15 (Mesquite) and RPZ21 (New River) models, respectively. The vertical mesh for both RPZ15 (Mesquite) and RPZ21 (New River) consists of fine blocks of 4×50 m, 20×100 m, 15×150 m, and 15×200 m.

The 3D inversions were allowed to run for a maximum of 6 iterations using a multi-core processor computer. Figure 2-2 displays plots of the RMS misfit errors at each iteration. At 5th and 3rd Iterations a minimum RMS misfit errors were achieved in both inversions. The RPZ21 (New River) inversions displays slightly a better fit to the data at 3rd iteration, however examining the RPZ21 (New River) inversion results show a higher resolution due to finer mesh size used. Therefore, the results from the RPZ21 (New River) inversion at 3rd iteration are presented and used in this report.

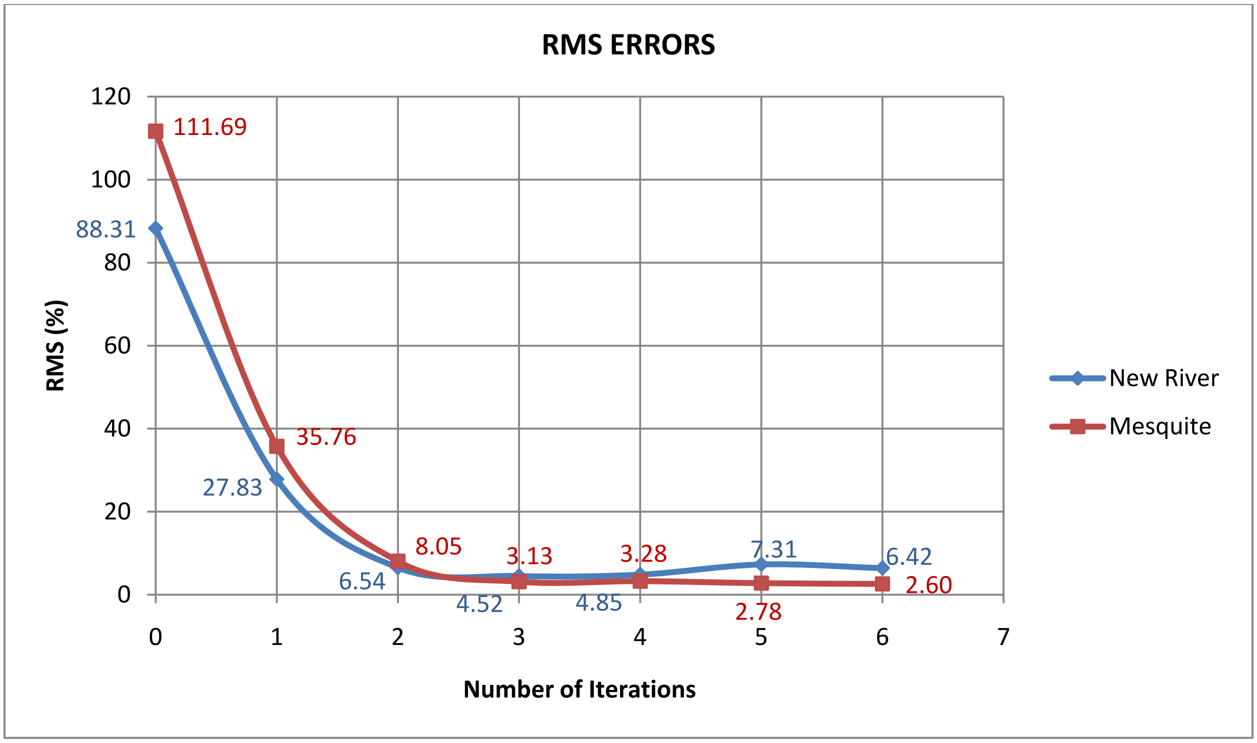


Figure 2-2. Plot of the RMS misfit error vs. iteration for the 3D inversions.

3 DISCUSSION OF RESULTS

For discussion purposes, only the results of the 3D inversions of both Mesquite and New River grids are presented as depth plan maps at various depth levels to illustrate the resistivity distribution from near surface to a depth of 5km. A geophysical interpretation is drawn on the plan maps to define the subsurface structure, which potentially associated with hydrothermal source.

3.1 TIPPER DATA

All the tipper data for Mesquite and New River grids are represented in Figure 3-1, which illustrates higher tipper values at 1Hz and at lower frequencies. Plan maps of the induction vectors at 1Hz and 0.01Hz (Re-Parkinson) are presented in Figure 3-2, Figure 3-3, Figure 3-4 and Figure 3-5, respectively.

Figure 3-2 illustrates that the vertical transfer function is small from 320Hz to 1Hz, indicating that the Mesquite 3D model is mainly 1D at high frequency, i.e., subsurface, and that it is mainly defined by its Tzy component (X is pointing to north) at lower frequency (F<0.1Hz), suggesting that the main contact or faults in the survey area (or its vicinity) are nearly in north-south orientation.

The Mesquite 3D grid induction vectors (Re-Parkinson) at 0.01Hz, i.e., maximum of Tzy, are displayed in Figure 3-3. The induction vectors are pointing in the center of the survey grid, which suggests that a potential major contact or structural feature is located in the center of the Mesquite grid running NS. That might also correspond to the neighbouring Brawler Seismic zone or other major structural faults in the area.

Figure 3-4 (New River 3D grid) illustrates that the vertical transfer function is small from a frequency range between 320Hz to 1Hz, which is also showing a very similar 1D model at high frequencies as of Mesquite 3D model.

The New River 3D grid induction vectors (Re-Parkinson) at 0.01Hz, i.e., maximum of Tzy, are displayed in Figure 3-5. All the induction vectors are pointing to the east. This confirms that a potential major contact or structural feature is located east of the New River grid.

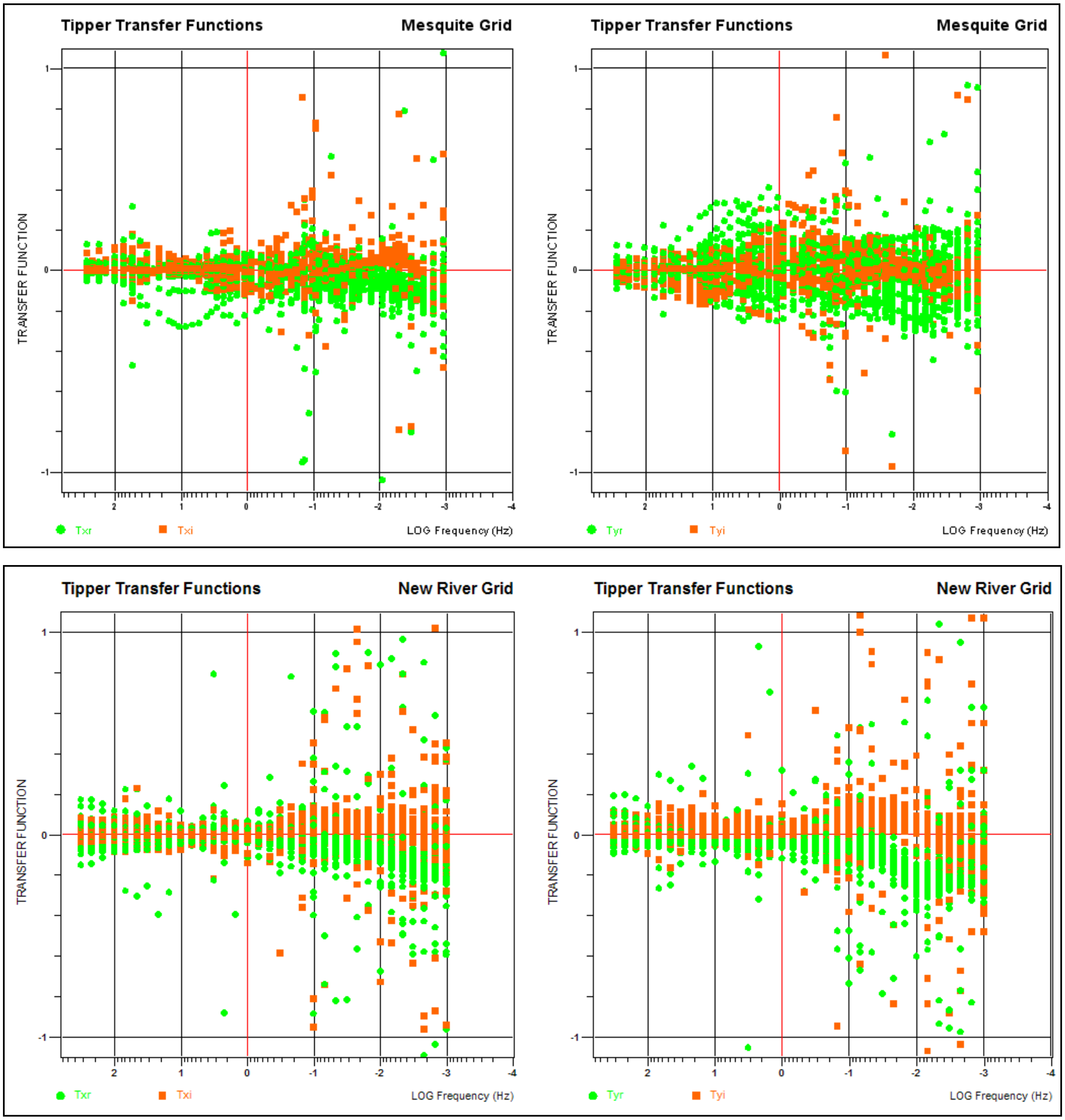


Figure 3-1: Tzx (left) and Tzy (right) Tipper sounding curves at Mesquite (top) and New River (bottom) grids.

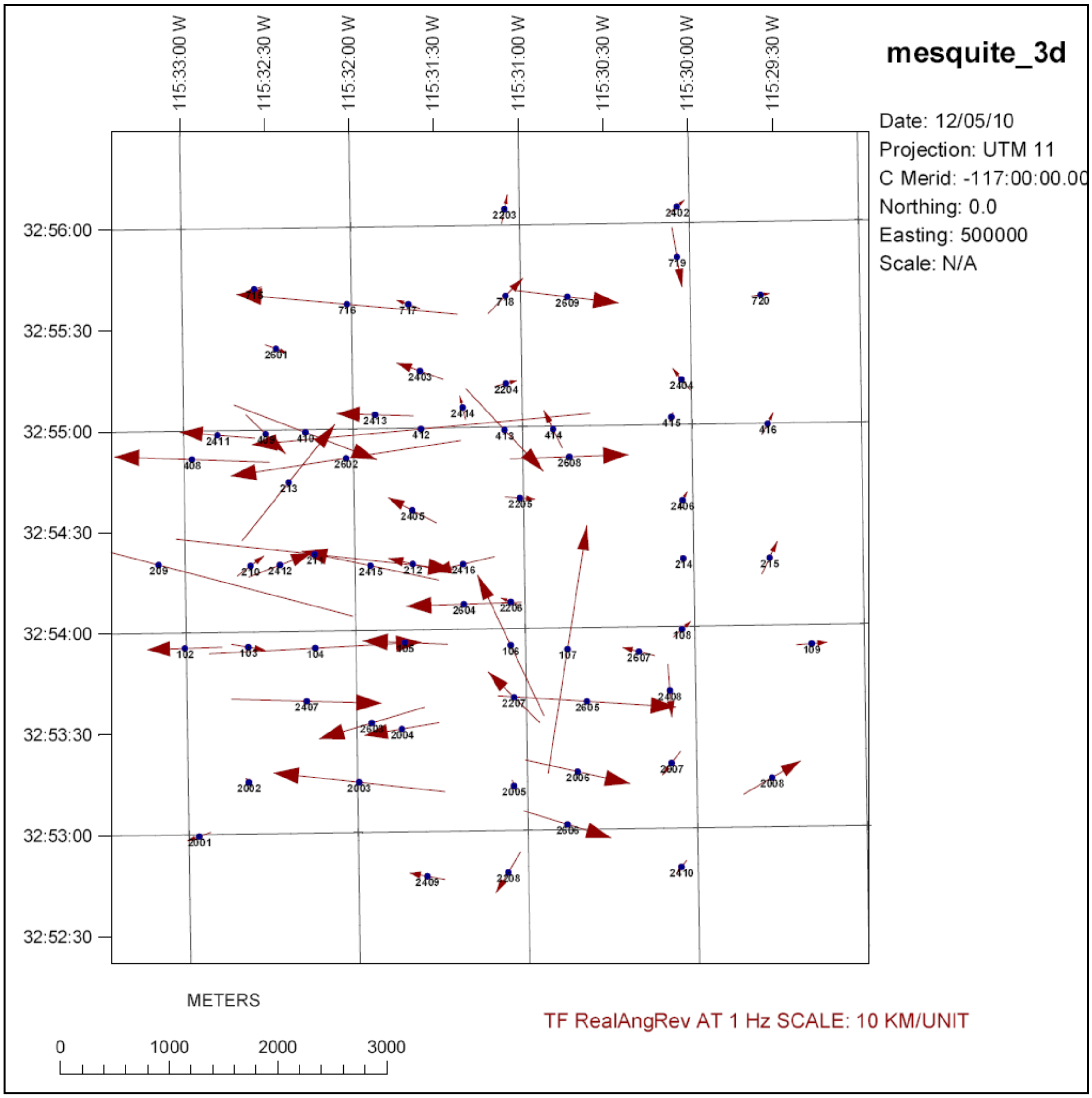


Figure 3-2: Mesquite grid Tipper induction vector (Re-Parkinson) at 1Hz.

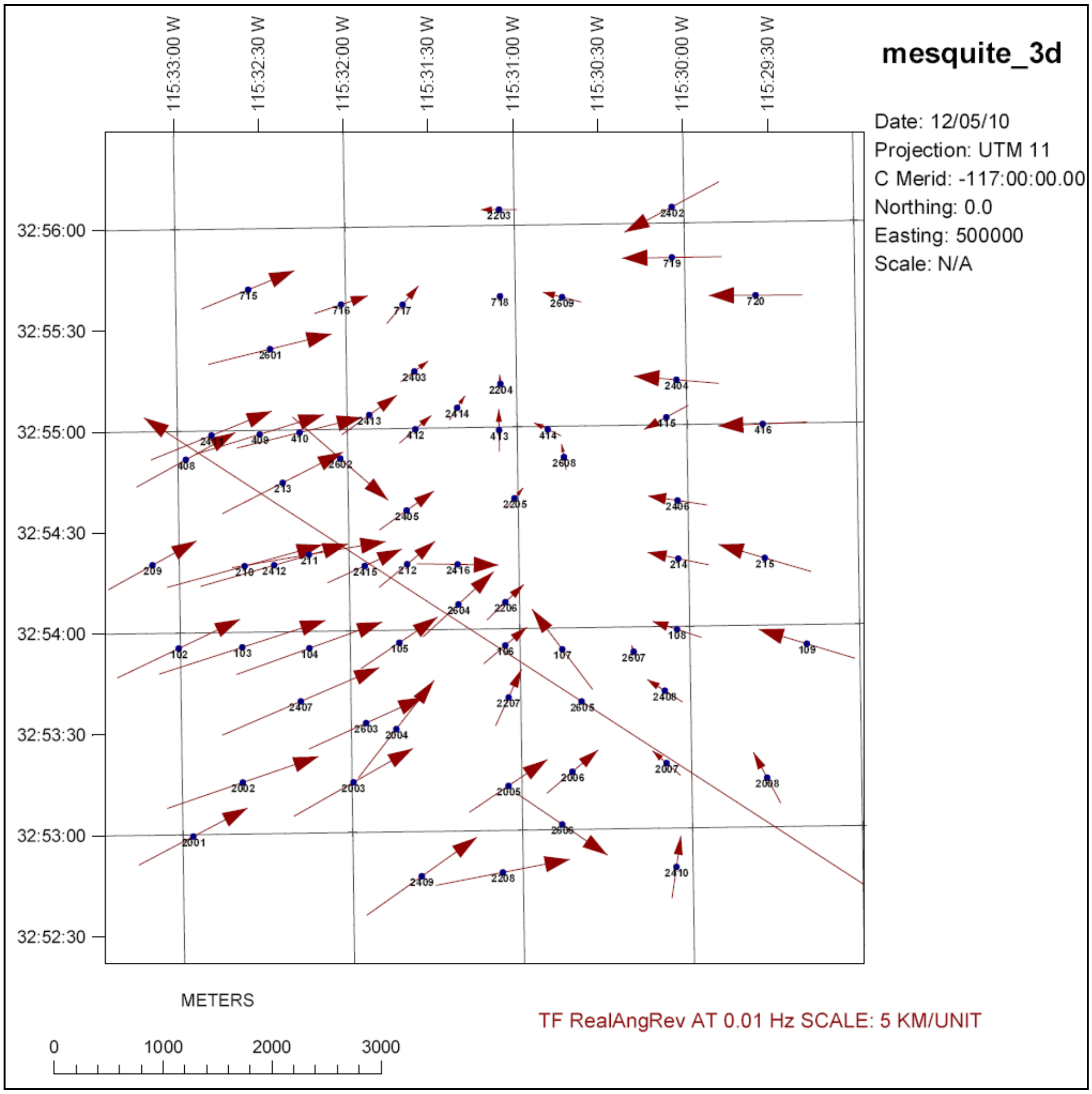


Figure 3-3: Mesquite grid Tipper induction vector (Re-Parkinson) at 0.01Hz.

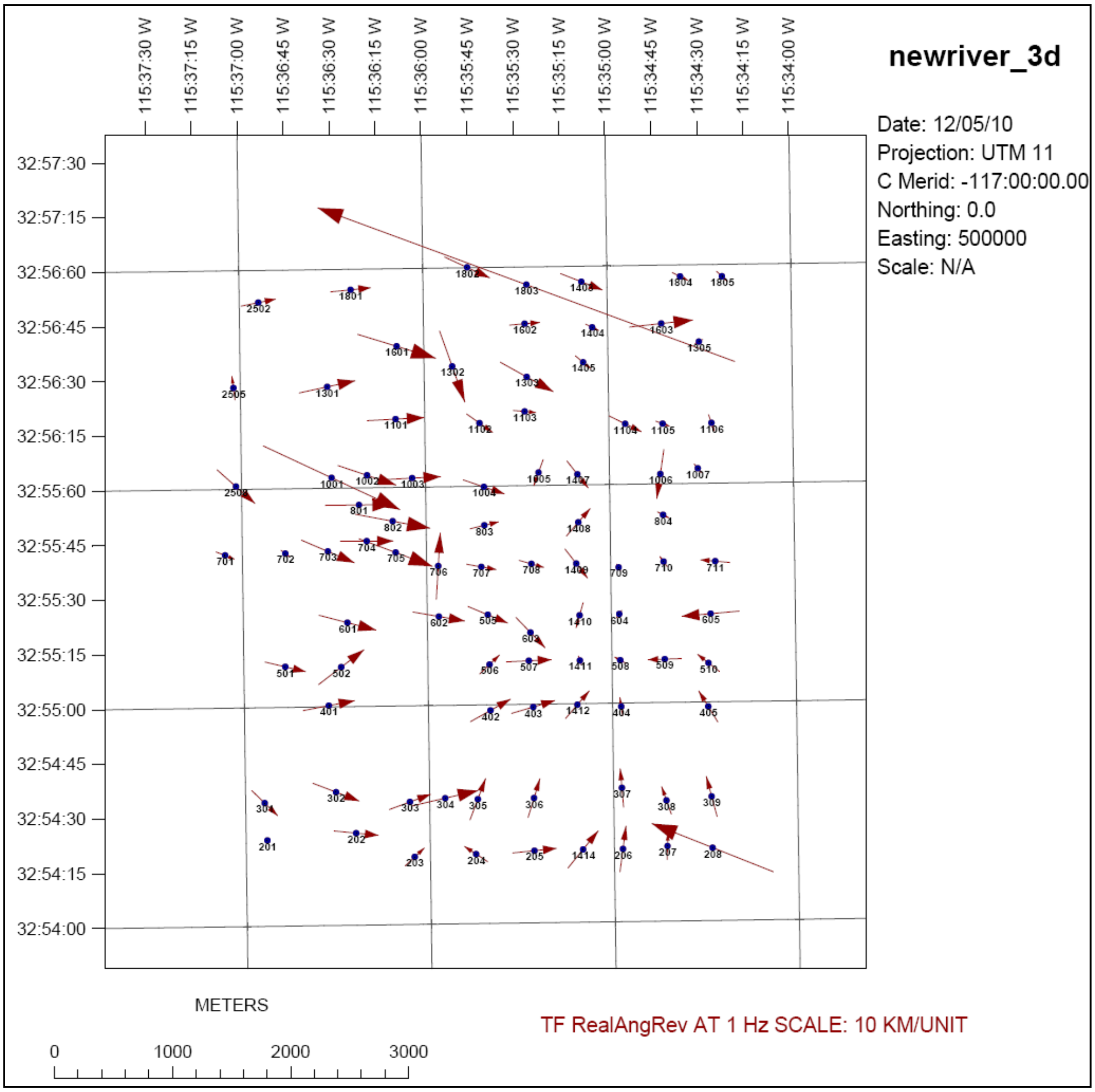


Figure 3-4: New River grid Tipper induction vector (Re-Parkinson) at 1Hz.

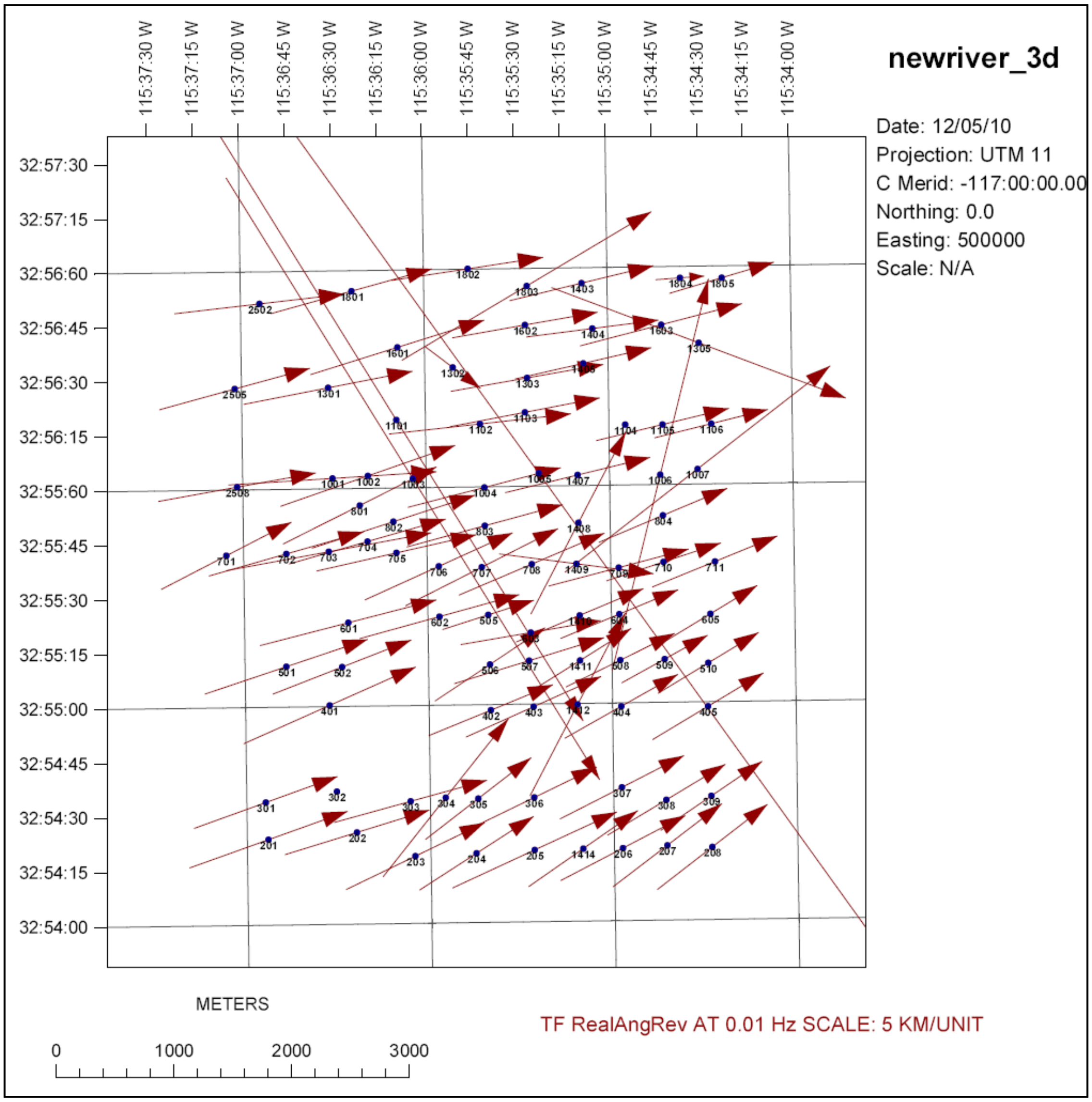


Figure 3-5: New River grid Tipper induction vector (Re-Parkinson) at 0.01Hz.

3.2 3D INVERSION RESULTS

The results of the 3D inversion are illustrated in a number of selected resistivity plan maps at different depth levels starting from 500m down to 4500m for both Mesquite and New River models. Volumetric illustration of the resistivity distribution for the model is also available as Geosoft Voxel in electronic format. For quality control of the inversion results the raw MT data and the inversion model response curves for 157 MT sites used in the 3D inversions are illustrated in Appendices H and I.

All plan maps are plotted on a consistent and constant logarithmic scale color bar between 1Ωm to 50Ωm (Figure 3-6).

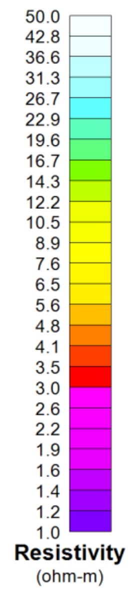


Figure 3-6: Interpretation colour bar

Figure 3-7 through Figure 3-15 display plan maps of the resistivity distribution over the survey area at different depths from 500 m to 4500 m. Based on the common features observed, the overall resistivity of the area is relatively low. A number of layers with low to moderate to high resistivity are observed at different depths. Deeper conductive zones are associated with structural features (lineaments/faults), which are potential source of geothermal energy.

Depth 500m: From shallow subsurface to a depth of approximately 500m, the central parts of both Mesquite and New River grids show a conductive zone (Mes_CL1 and NR_CL1). The resistivity of this zone varies over a small range of 1 Ωm to 15 Ωm. The upper 400m show a dominant conductive zone with a resistivity less than 5 Ωm and covering major part of both grids (Figure 3-7). A minor variation in resistivity at the margins of both grids can be seen, where the resistivity increases to more than 30Ωm.

Depth 1000m: Figure 3-8 displays the plan map at a depth of 1000m. A number of conductive zones with resistivities of less than 5 Ωm to 10 Ωm are resolved at the major parts of both Mesquite and New River grids. This indicates the continuity of conductive zone (Mes_CL1 and NR_CL1) from upper depth to this level and a second conductive zone (Mes_CL2) in the north central extents of Mesquite grid is observed, which is separated from Mes_CL1 with a relatively high resistive zone (Mes_R1). The Mesquite grid illustrates two resistive zones (Mes_R1 and Mes_R2) in the northwest and southwest parts of the grid. A number of structural features (lineament/faults) are separating the central conductive zones from the resistive zone.

The conductive zones (NR_CL1 and NR_CL2) in New River grid appear to extend laterally with depth and interconnect in the centre and southeast part of the grid. These conductive zones show the highest conductivity level with a resistivity as low as 1 Ωm. The small high resistivity zones in the center of the grid depict the presence of structural features at shallow depths.

Depth 1500m: Figure 3-9 illustrates the continuity of conductive zones (Mes_CL1 and NR_CL1) further at a depth of 1500m in both grids. The center of the both grids shows highly conductive areas, surrounded by relatively high resistivity zones (Mes_R1, Mes_R2, Mes_R3 and NR_R1, NR_R2, NR_R3).

Depth 2000m: At this depth level the resistivity gradually increases and three new conductive zones are formed in Mesquite grid (Mes_CL2, Mes_CL3 & Mes_CL4), which extends to the margins of the grid. However the central conductive zone (Mes_CL1) reduces in size. A number of structural features separate the central conductive zone from relatively high resistivity zones.

The resistivity of New River grid changes from upper depth level 1000m to 1500m. The resistivity varies from less than 5 Ωm to more than 30 Ωm, which indicates the transition zone at this depth level (Figure 3-10).

Depth 2500m to 4500m: Figure 3-11 through Figure 3-15 illustrates resistivity distribution of very similar fashion. Mesquite grid shows number of conductive zones with their dipping trends and the resistivity of these zones is in the range of 1 Ωm to 10 Ωm. A transition zone can be marked at depth of 3500m to 4000m.

In the New River grid bbelow 2500m depth, the subsurface displays a relatively homogeneous distribution with resistivity monotonically increases with depth to the maximum depth of the resistivity model of ~5 km. The dominant resistivity at a depth of 2500m and to the maximum depth of 5 km is more than 50Ωm (Figure 3-11 through Figure 3-15).

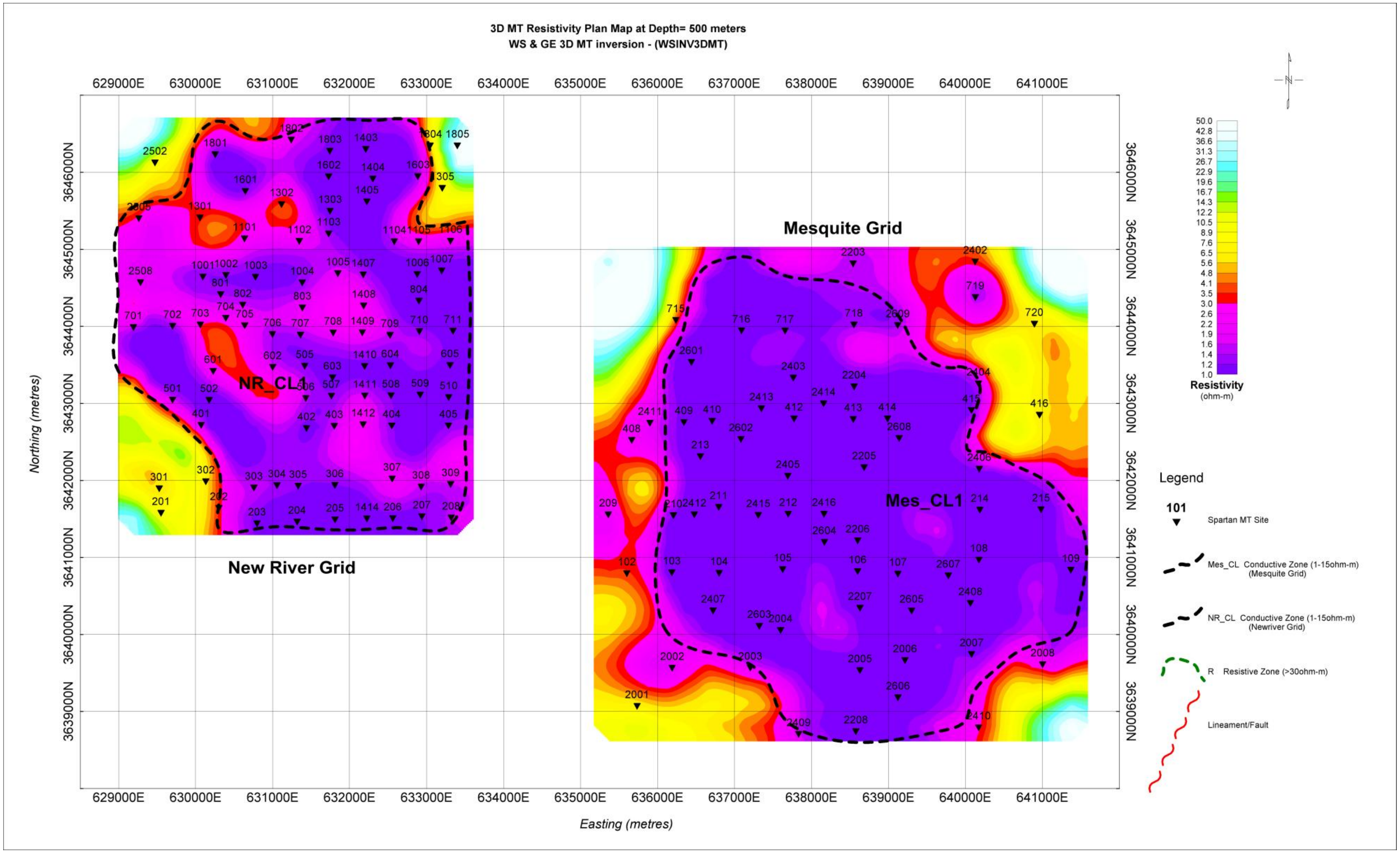


Figure 3-7: Resistivity Plan Map of MT 3D Inversion at Depth of 500m

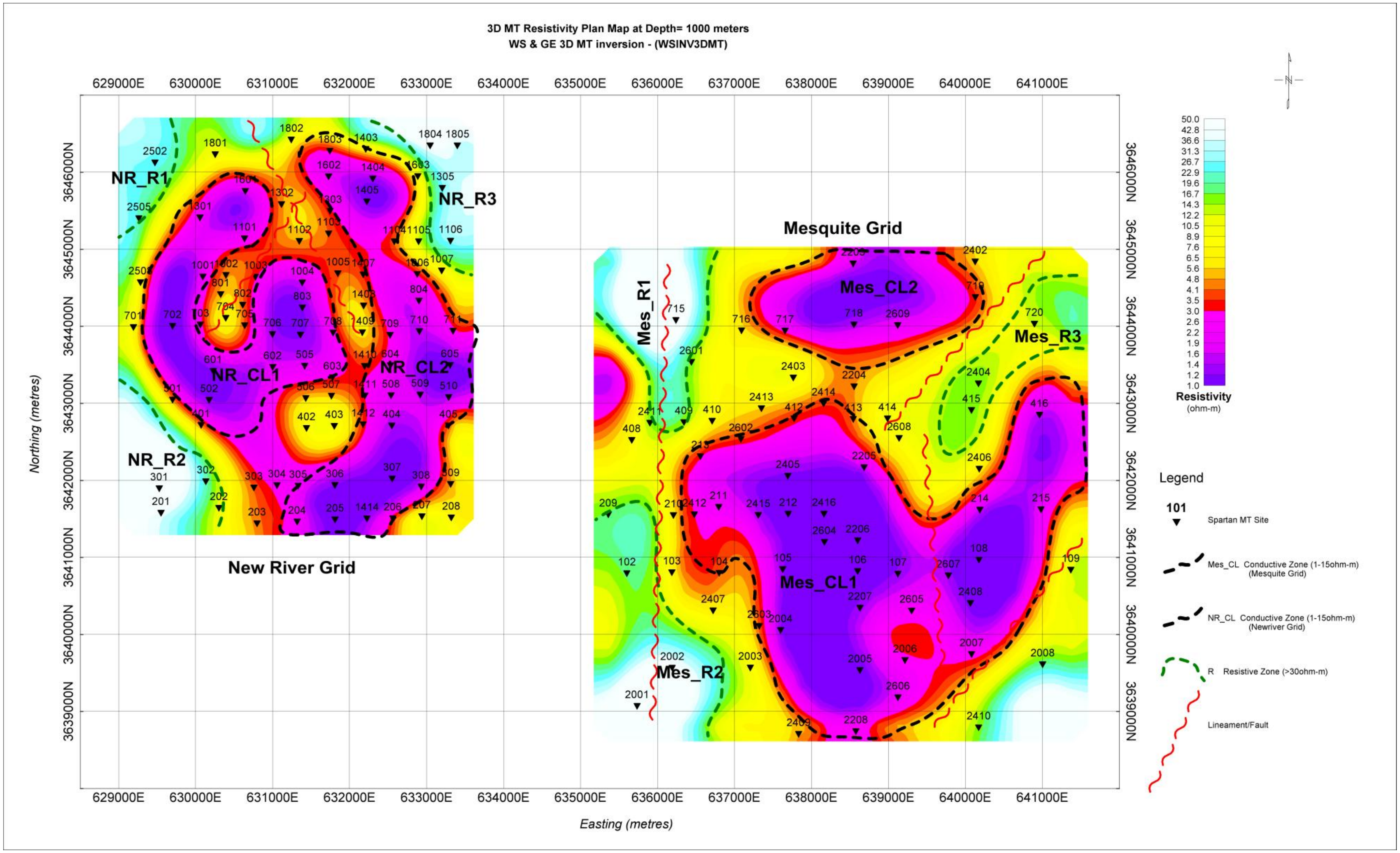


Figure 3-8: Resistivity Plan Map of MT 3D Inversion at Depth of 1000m

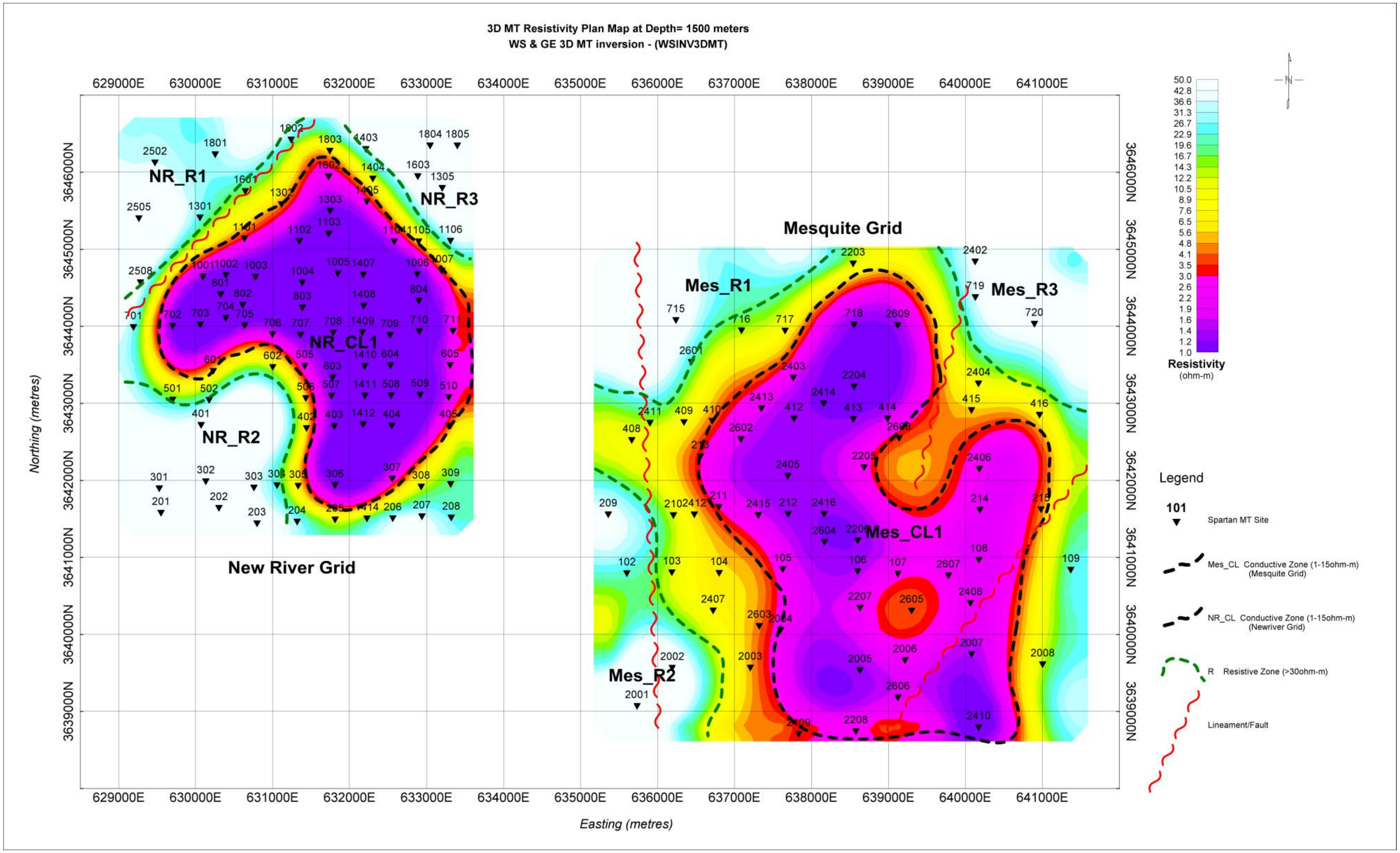


Figure 3-9: Resistivity Plan Map of MT 3D Inversion at Depth of 1500m

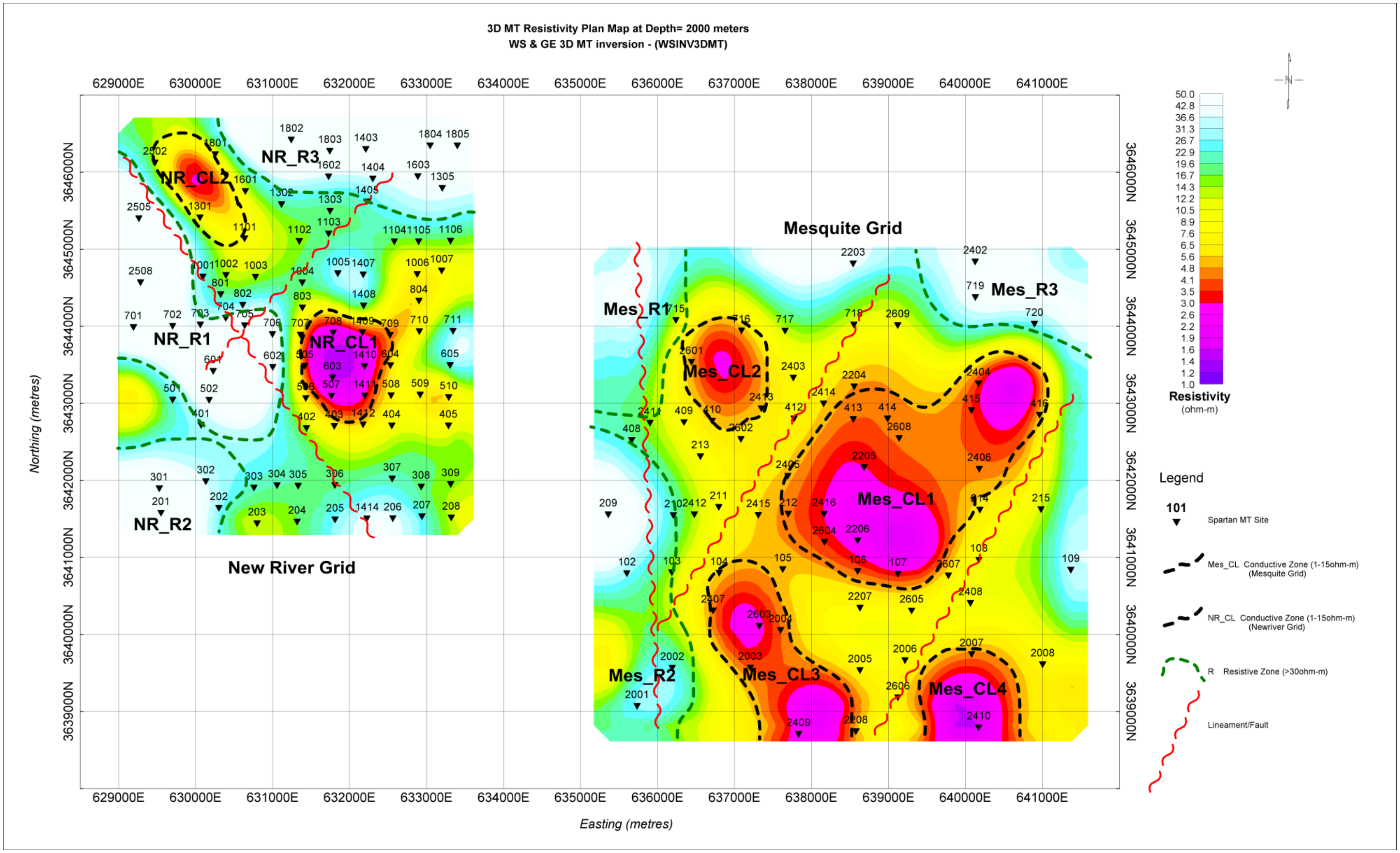


Figure 3-10: Resistivity Plan Map of MT 3D Inversion at Depth of 2000m

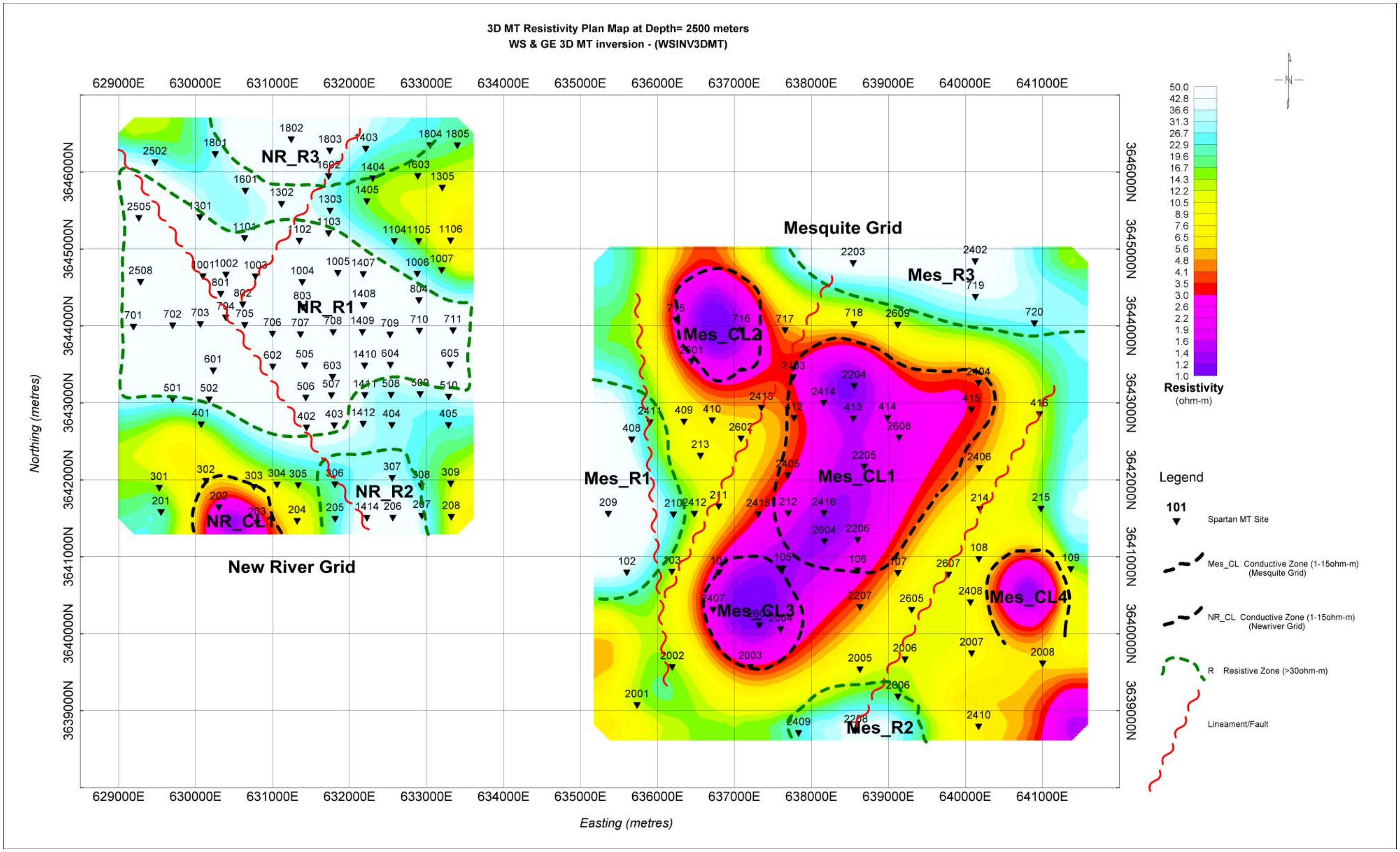


Figure 3-11: Resistivity Plan Map of MT 3D Inversion at Depth of 2500m

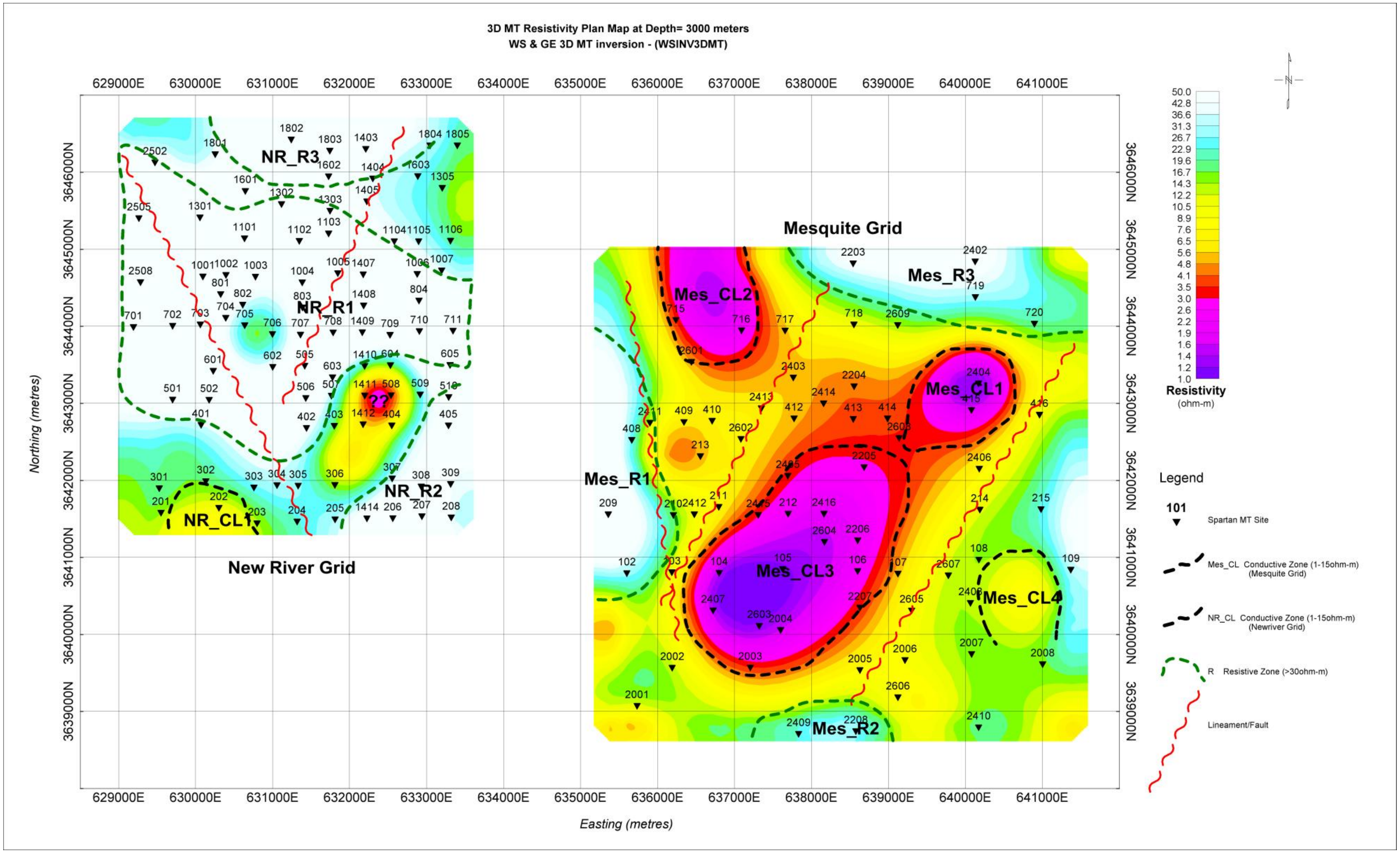


Figure 3-12: Resistivity Plan Map of MT 3D Inversion at Depth of 3000m

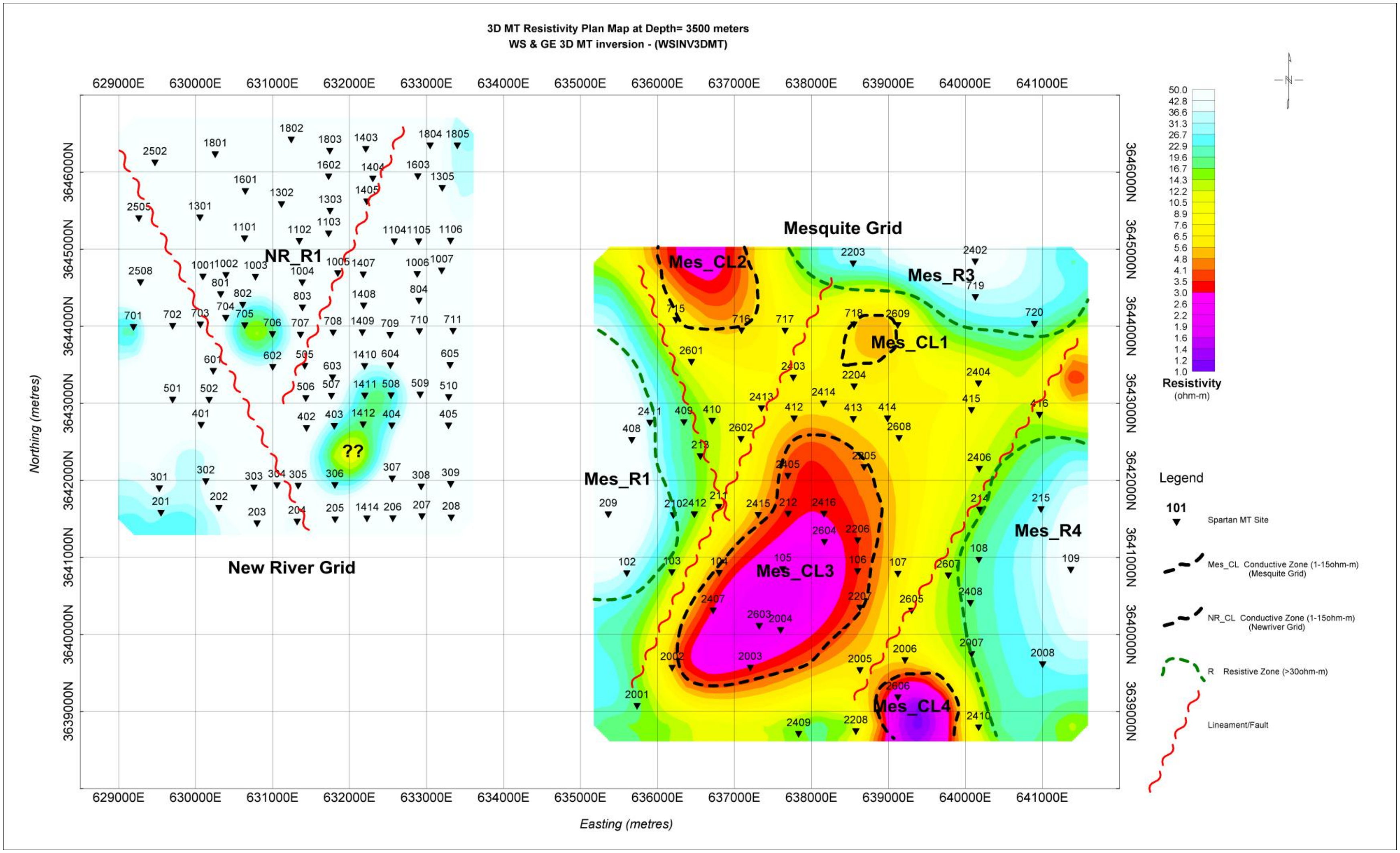
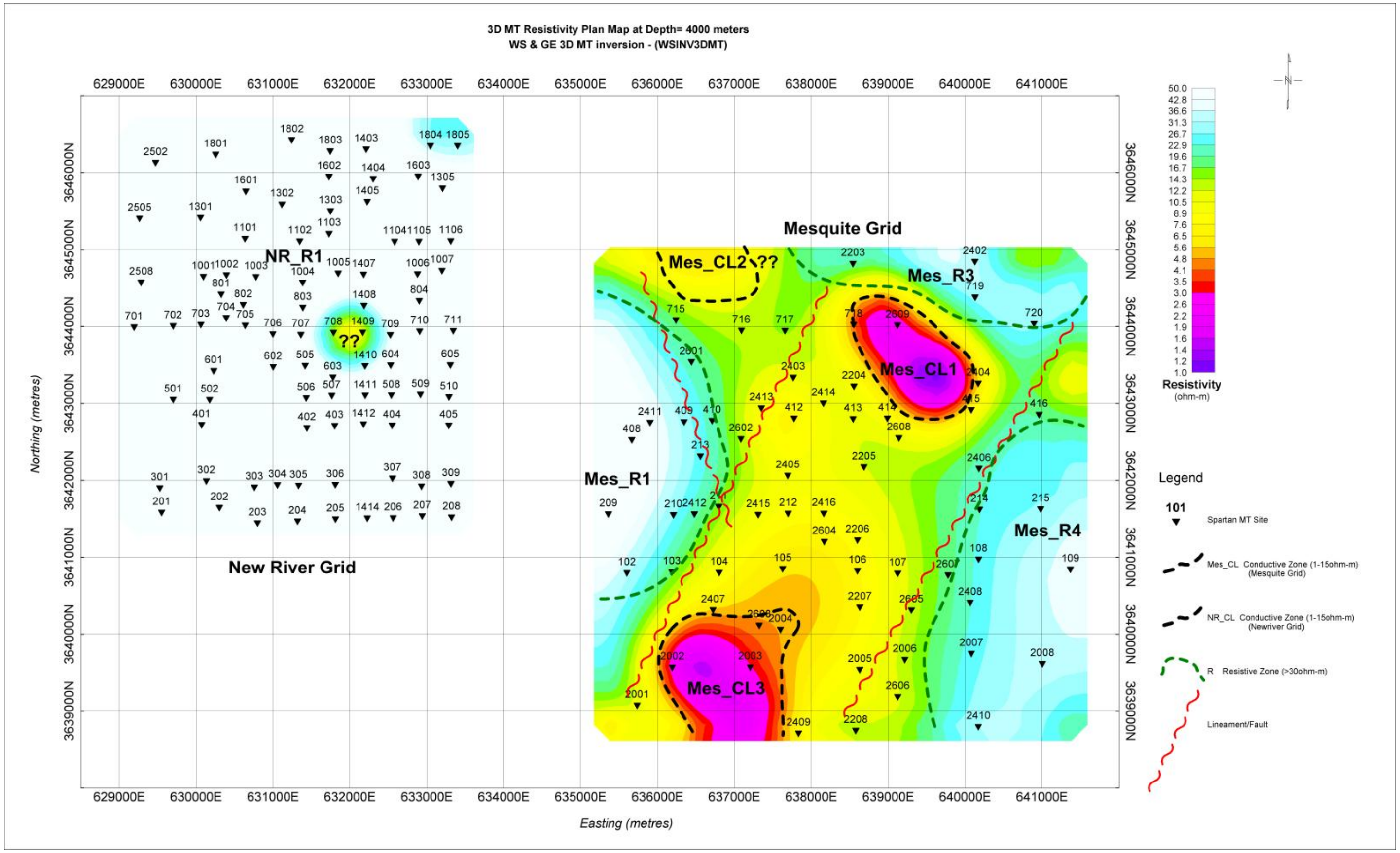
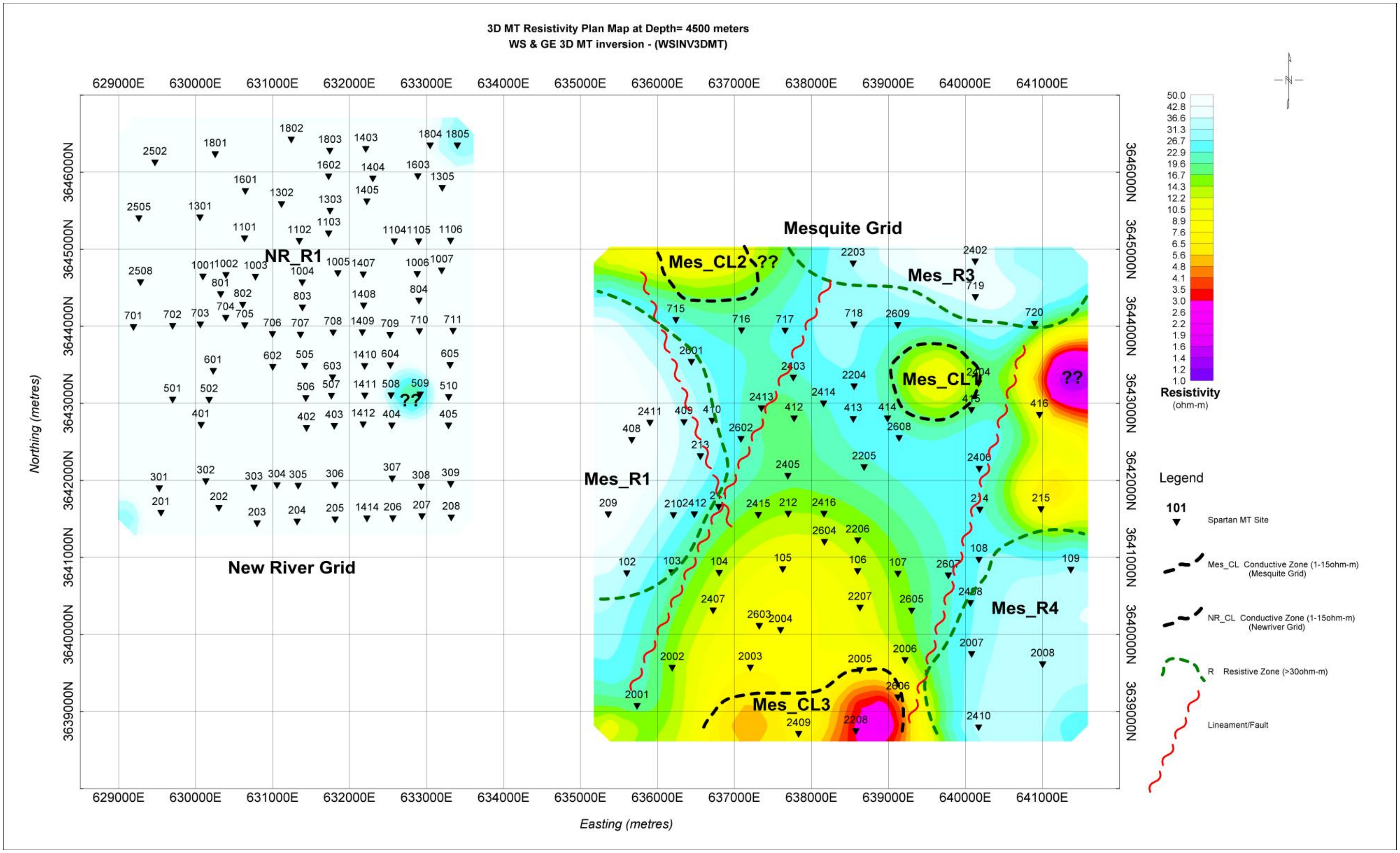


Figure 3-13: Resistivity Plan Map of MT 3D Inversion at Depth of 3500m



<u>Figure 3-14: Resistivity Plan Map of MT 3D Inversion at Depth of 4000m</u>



<u>Figure 3-15: Resistivity Plan Map of MT 3D Inversion at Depth of 4500m</u>

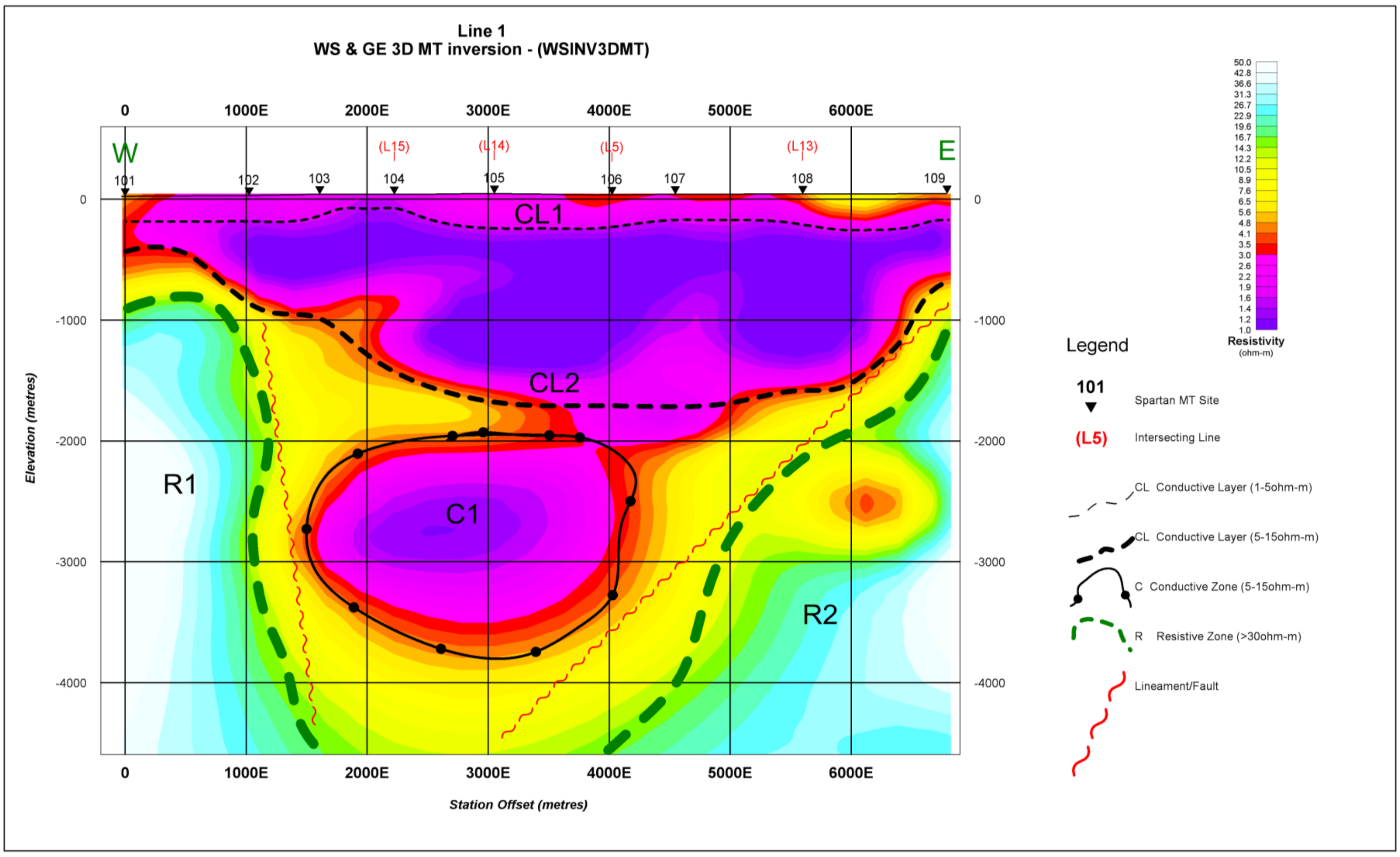
3.3 THE 3D VS. 2D INVERSION RESULTS

For comparison purposes, in Figure 3-16 through Figure 3-20 the cross-sections of the 3D inversion results extracted along the 2D lines (Figure 1-2) are displayed together with the 2D RLM inversion results along selected lines oriented in east west direction. Note that the grid mesh and resolution are different for the 3D and 2D inversions. Also, because no surface topography was included in the 3D inversion the 3D extracted cross-sections were shifted upwards 45 m (the average surface elevation over the survey area) to nearly match the elevation of the 2D cross-sections, for a one-to-one comparison.

Results from the 3D and 2D inversions display a close similarity, particularly from the surface to ~2 km depth. The 3D inversion results, however, reproduce the anomalies with better depth and lateral definitions. Because of the 2D assumption, the 2D inversion results could be biased by 3D effects of which the off profile anomalies are projected along the 2D models. Furthermore, when constructing the 2D lines, the MT sites were projected on to the lines for inversion. These two could cause mis-location of the resolved anomalies and occasionally producing spurious anomalous features.

Below the depth of ~2 km, the 2D inversion results generally display resistive subsurface and nearly vertical conductive bodies that extend to the maximum depth of the model of ~5 km. However, this depth range is characterized with relatively less resistive materials in the 3D inversion results. The 3D inversion results show better position of conductive zones both vertically and laterally. This difference can be explained by the different inversion parameters used in the 2D and 3D inversions. The 2D inversion model was constructed to a maximum of 5 km in depth to allow a fine mesh in the shallow part of the subsurface for higher resolution. This maximum depth of the 2D model, however, does not allow the inversion to resolve the more conductive subsurface that is located below ~3 km in depth. Due to a relatively more conductive environment, materials that are located below ~3 km depth extend to the maximum depth of the 2D model through extrapolation and introduce inversion artifacts, and the extrapolation results in slightly over-estimation of the resistivity in this depth range. Also the areas with less data coverage introduce vertical more conductive features and treated as inversion artifacts. In contrast, the 3D models were constructed to a maximum depth of 7.5 km at the expense of a lower resolution in the shallow part of the model. This depth is adequate to accurately resolve the resistivity variation in 1 km to 5 km range and gives more confidence to interpret the resistivity distribution related structures at greater depth.

An illustrative interpretation is drawn on the sections presented in Figure 3-16 through Figure 3-20. For a complete comparison of line by line basis, more sections along 2D lines are presented in Appendix F.



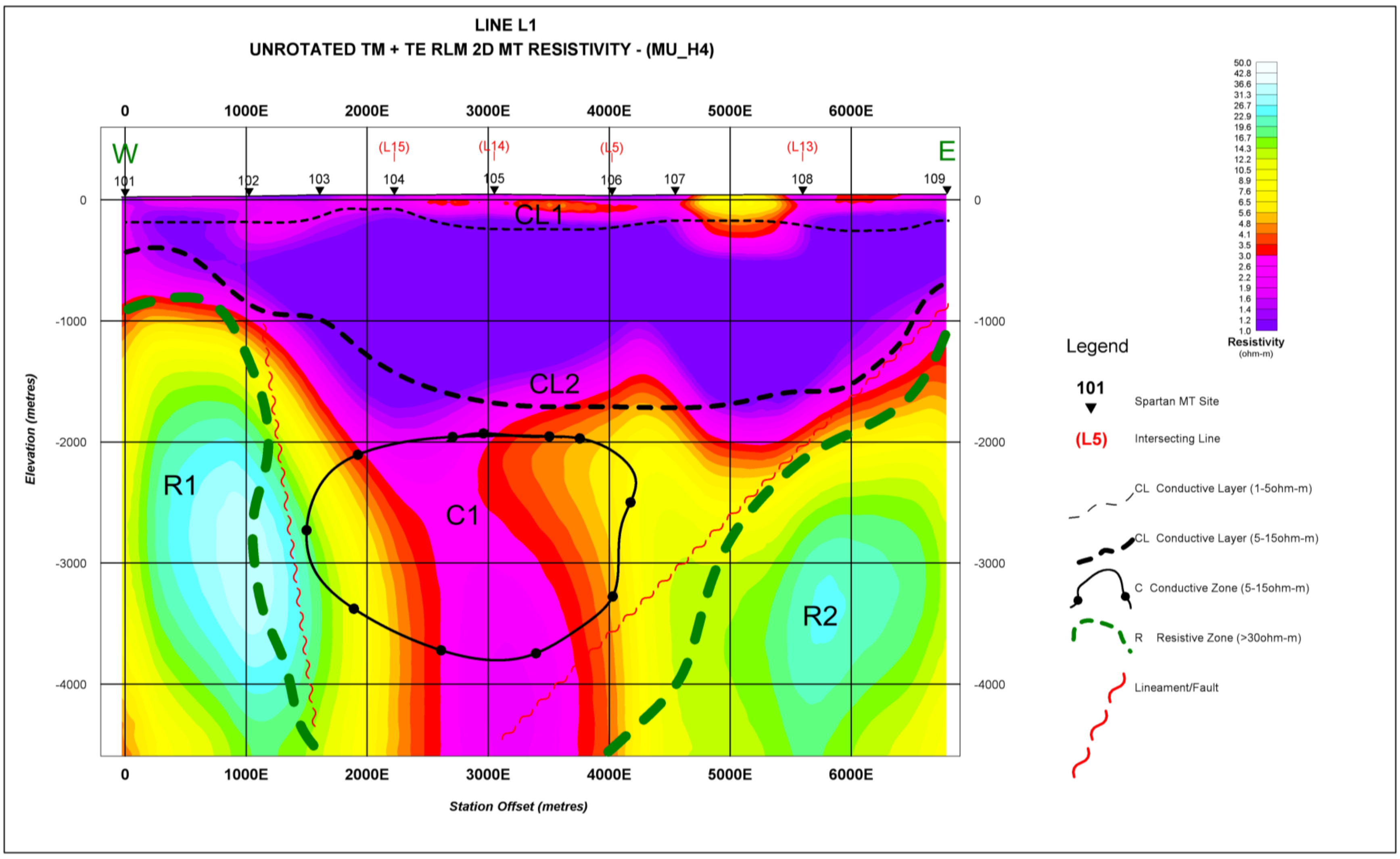
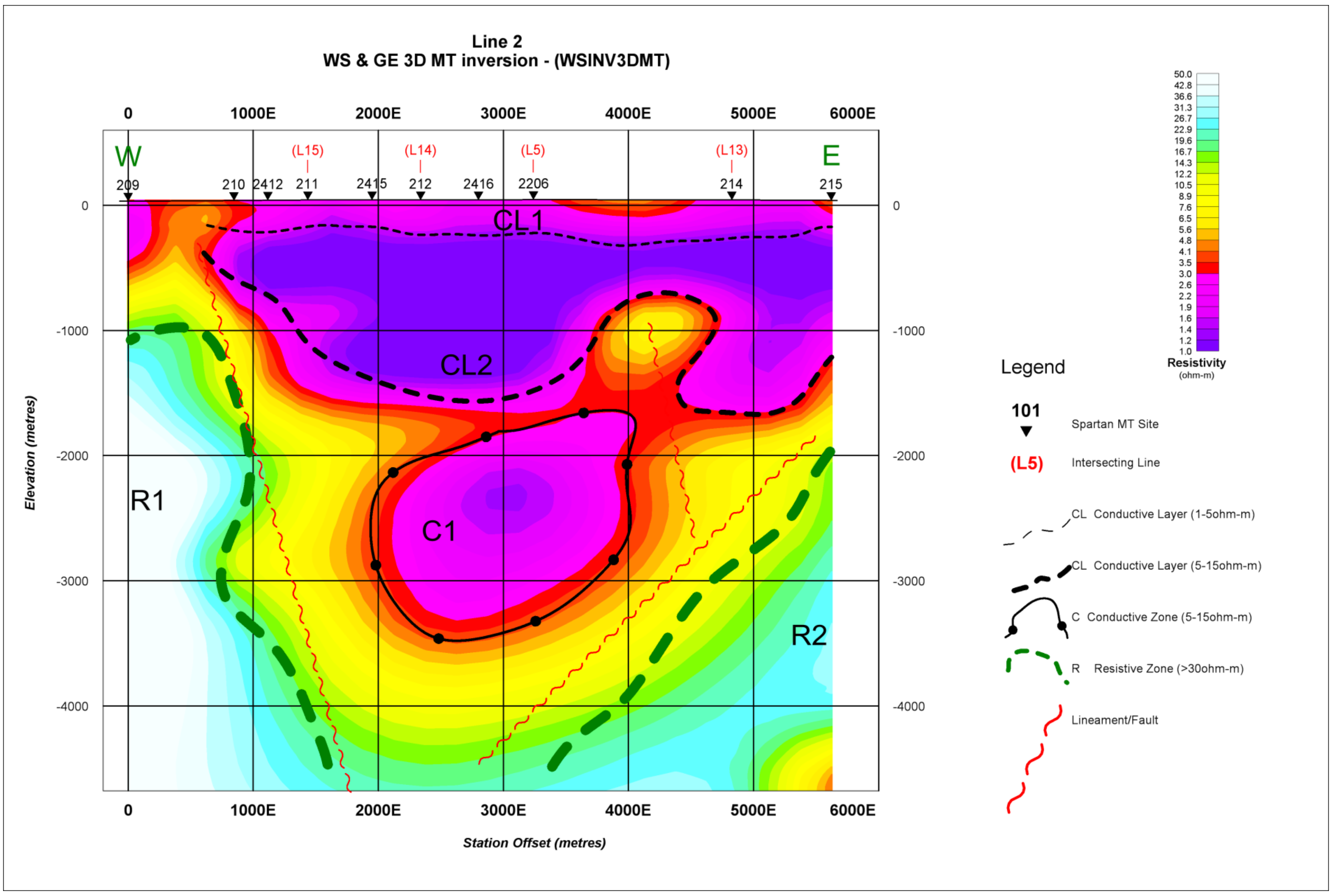


Figure 3-16: Cross-sections of the 3D inversion results (top) and the RLM 2D inversion results (bottom) along line 1.



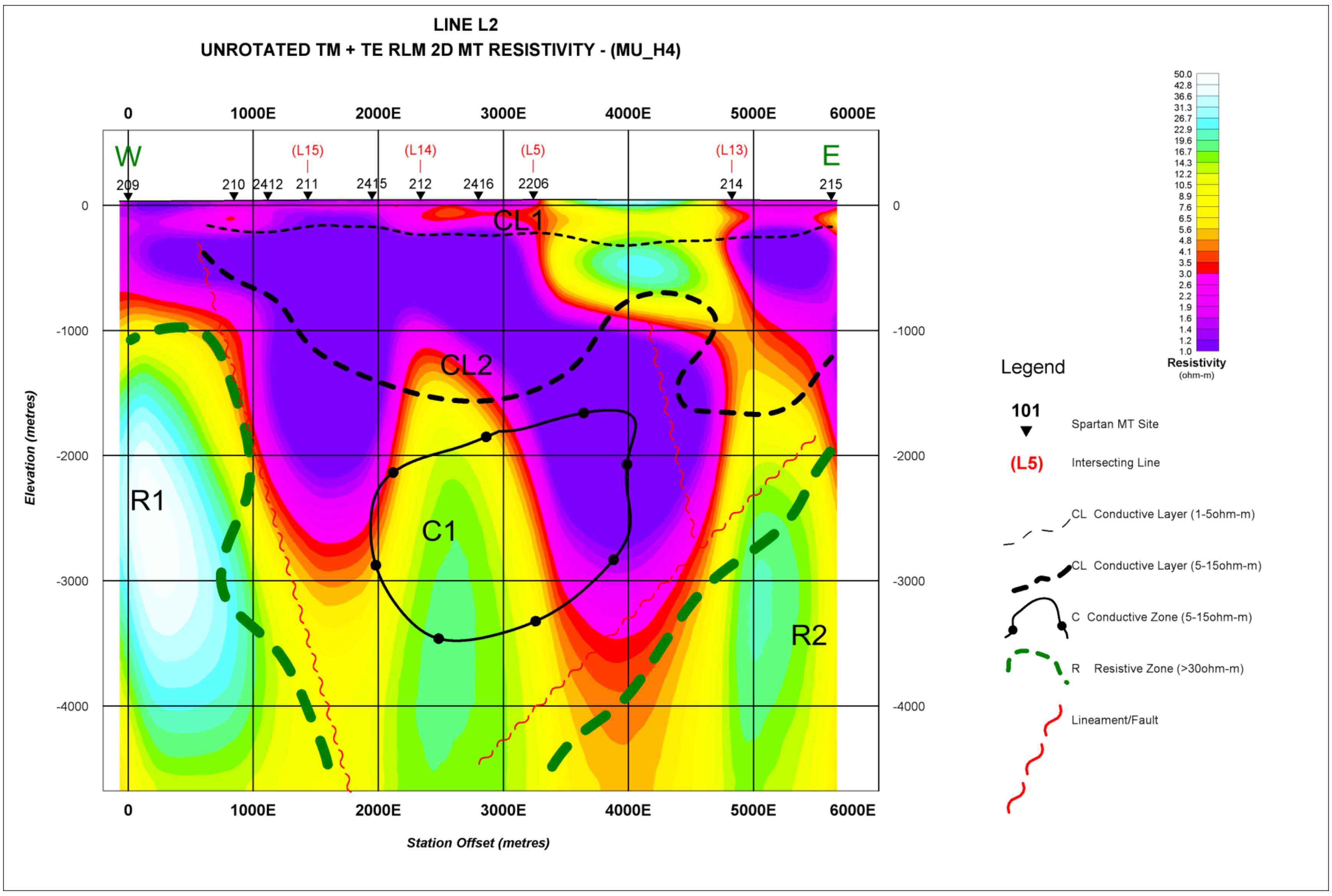
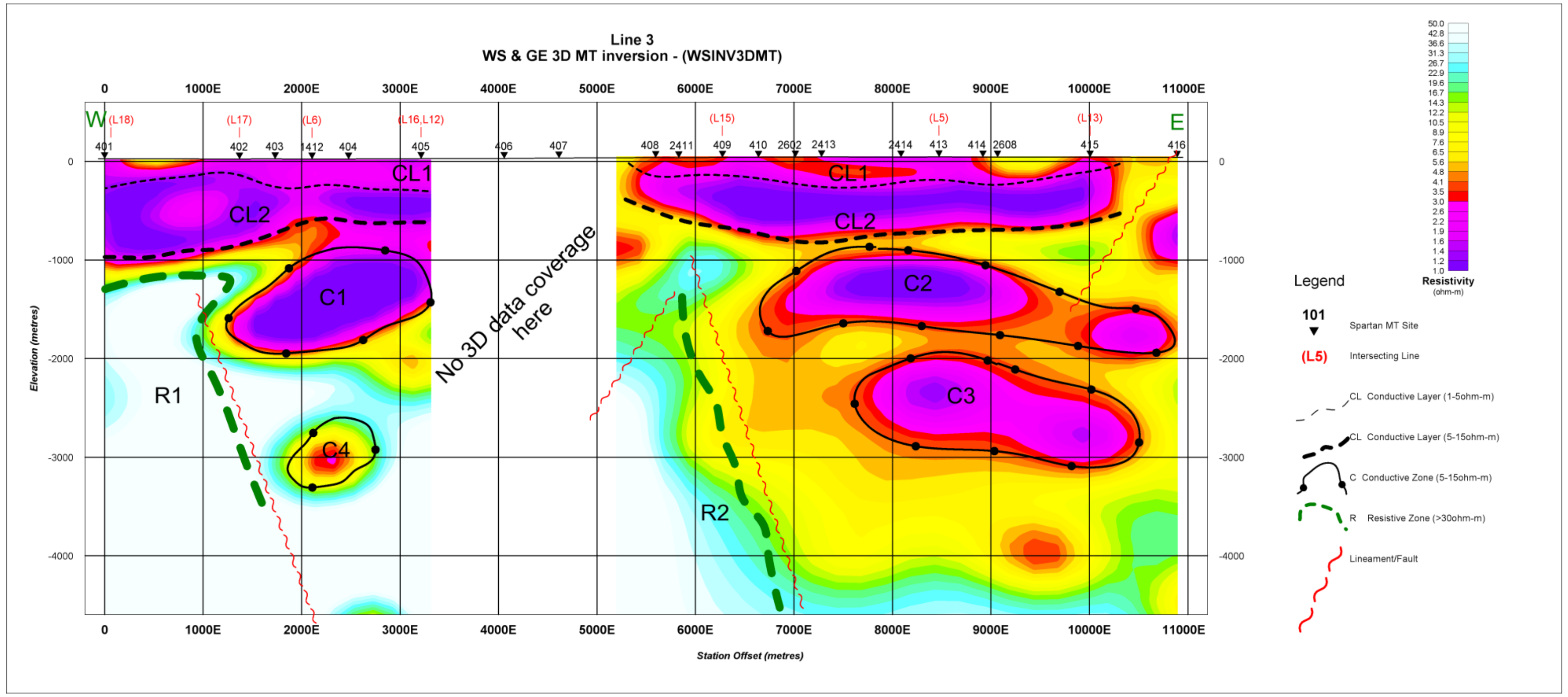


Figure 3-17: Cross-sections of the 3D inversion results (top) and the RLM 2D inversion results (bottom) along line 2.



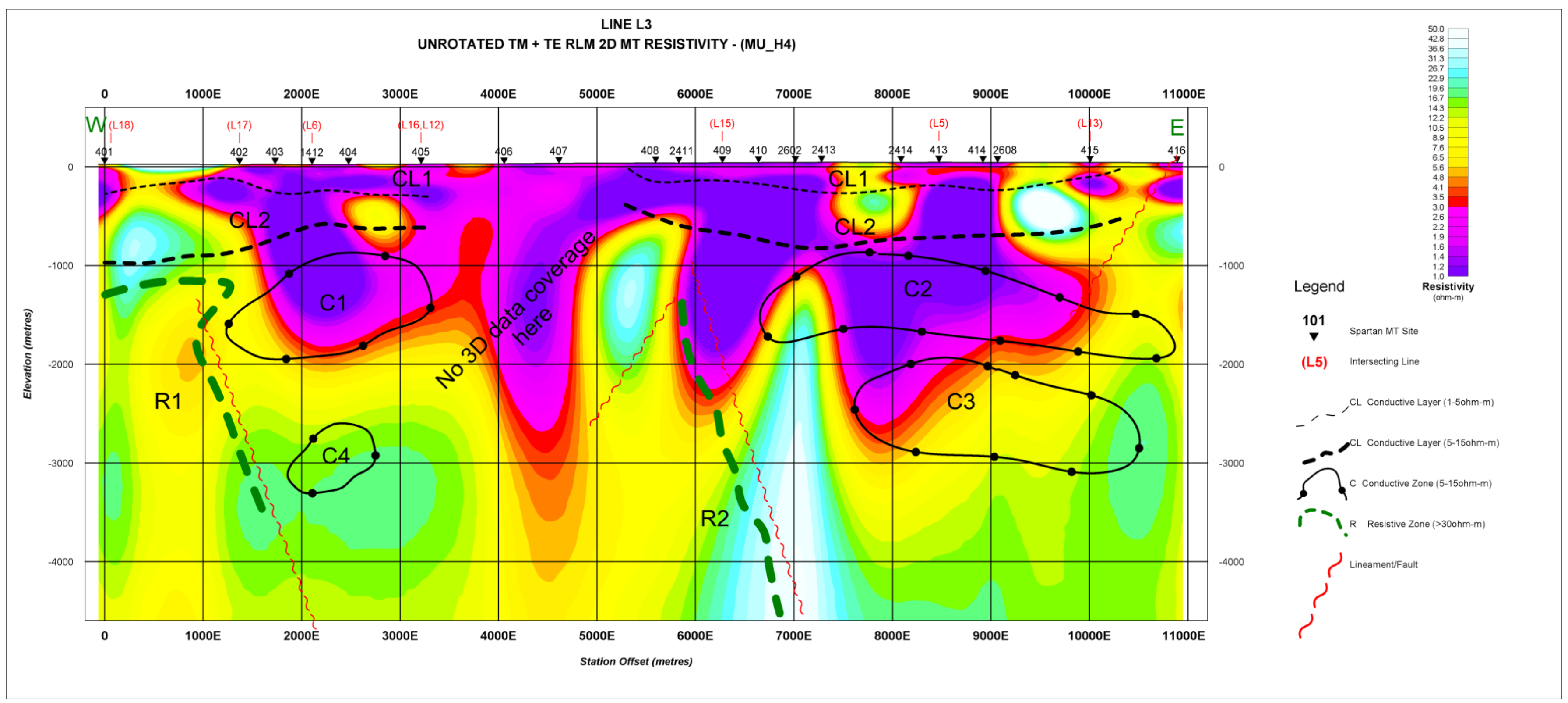
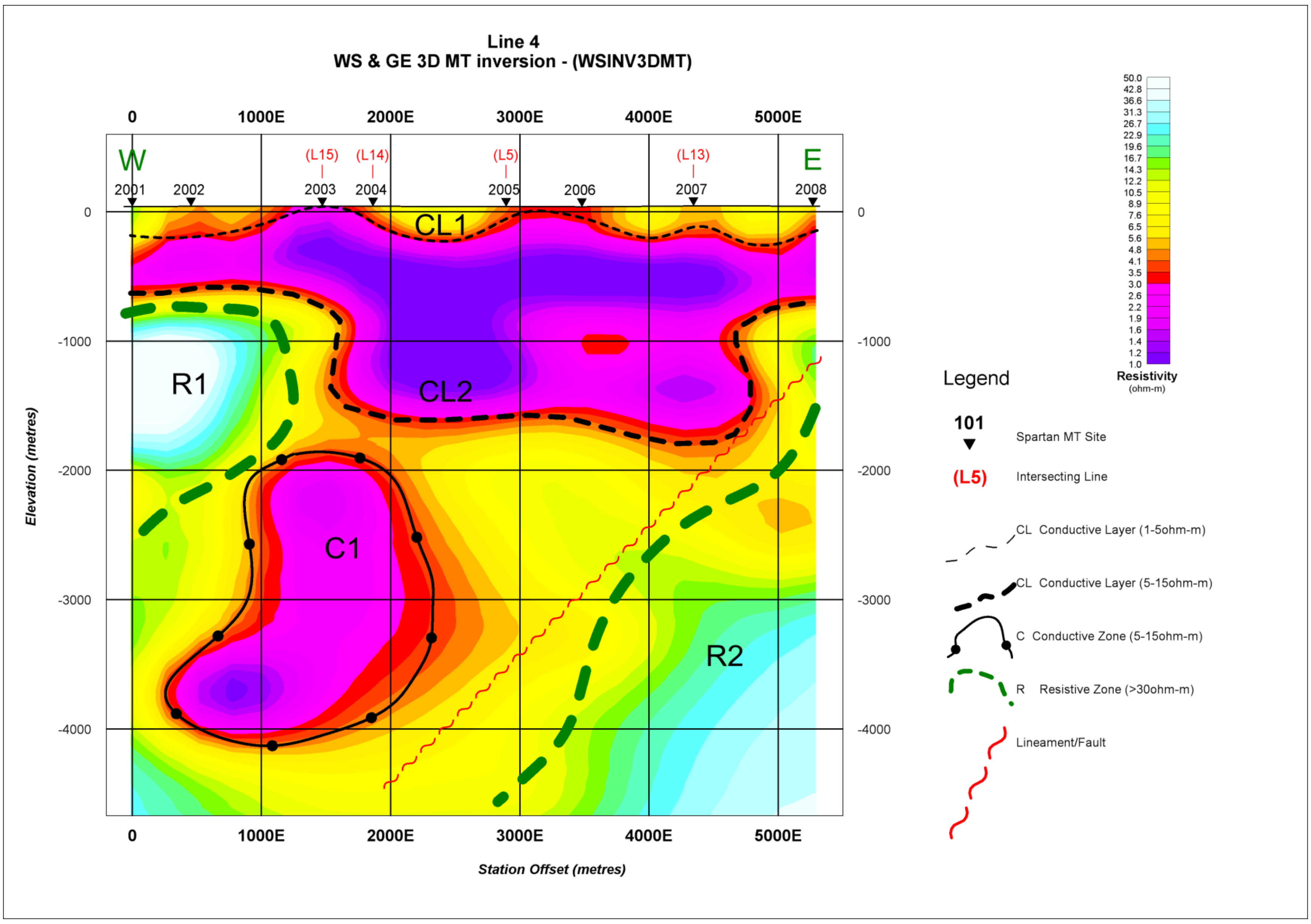


Figure 3-18: Cross-sections of the 3D inversion results (top) and the RLM 2D inversion results (bottom) along line 3.



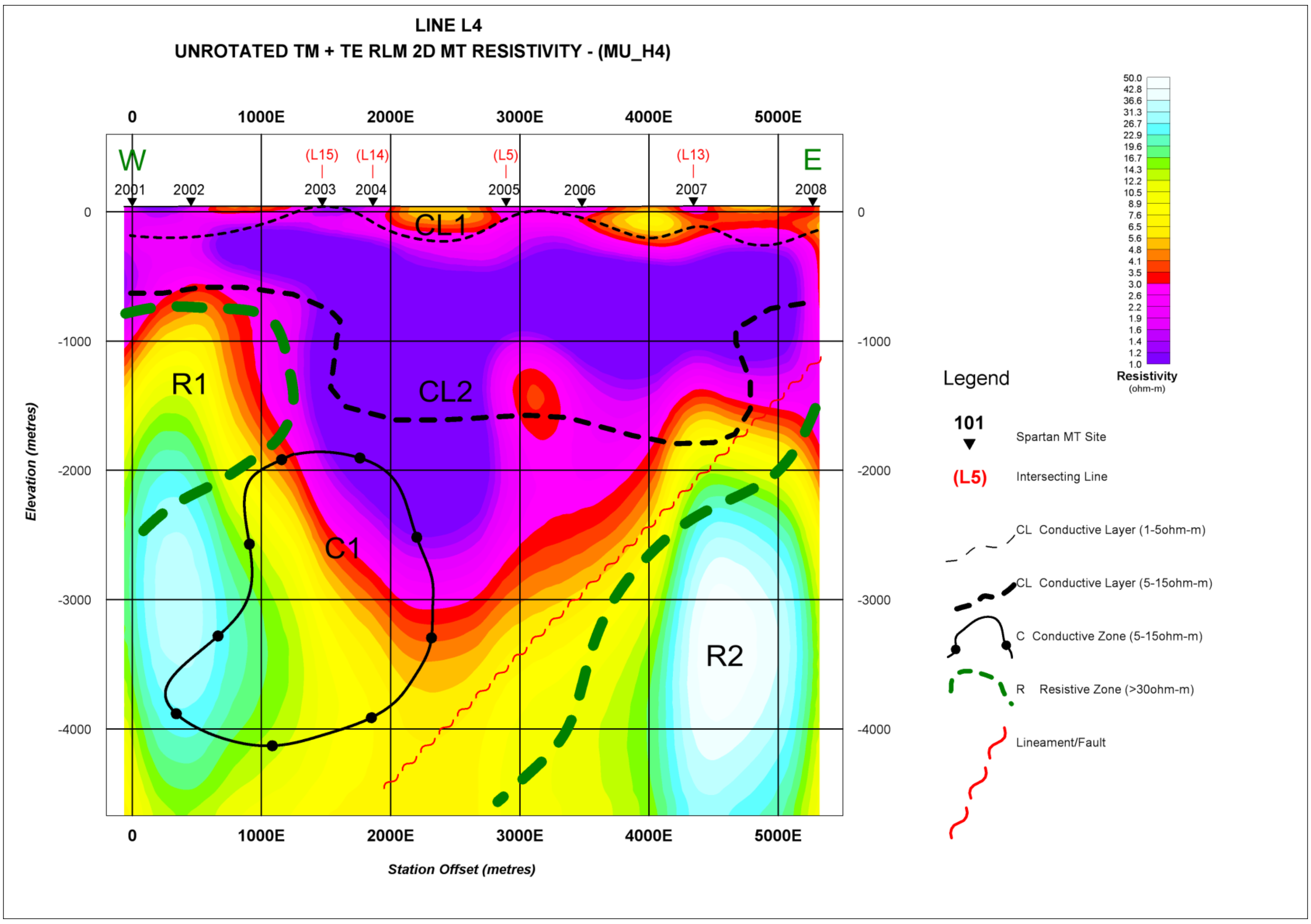


Figure 3-19: Cross-sections of the 3D inversion results (top) and the RLM 2D inversion results (bottom) along line 4.

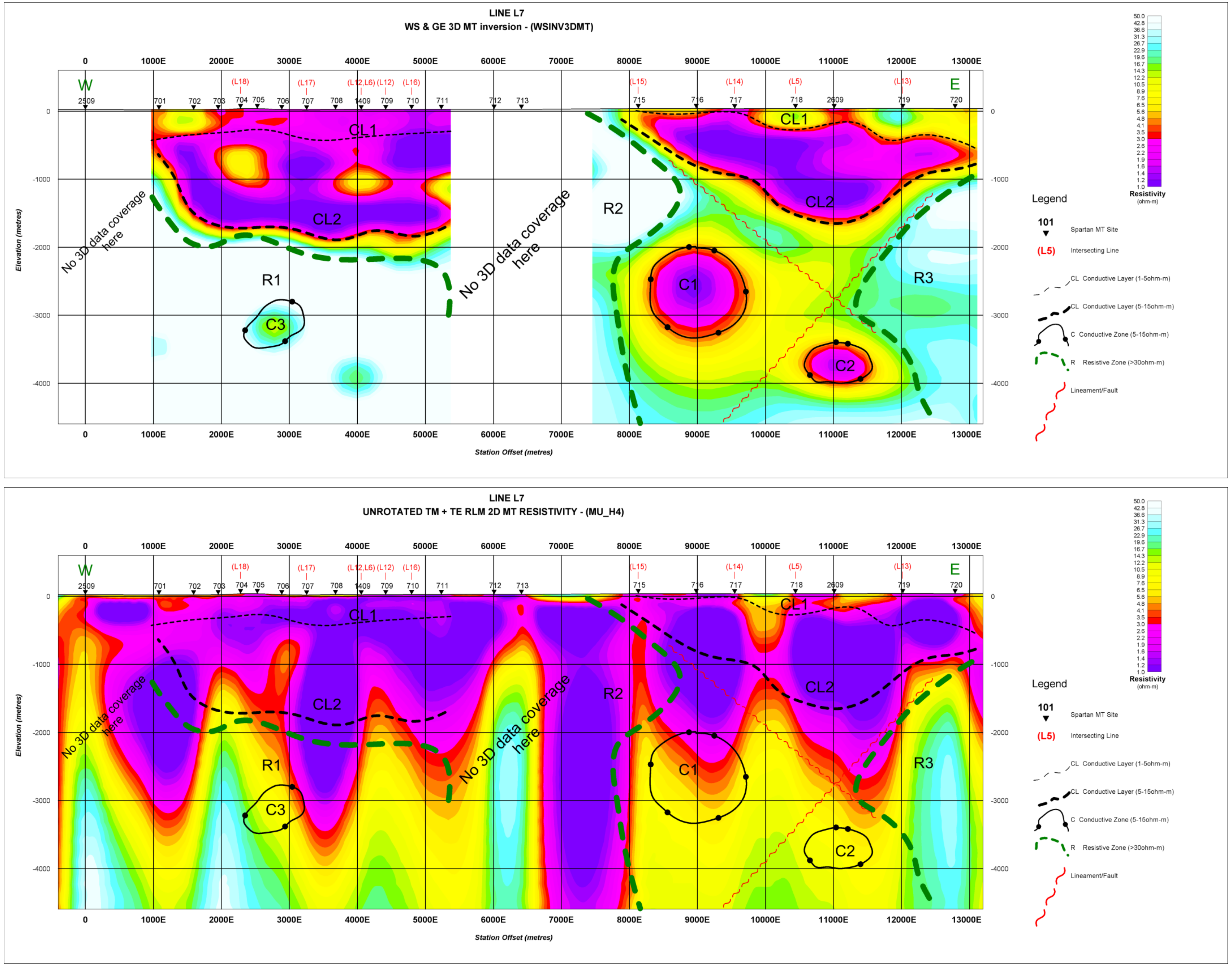


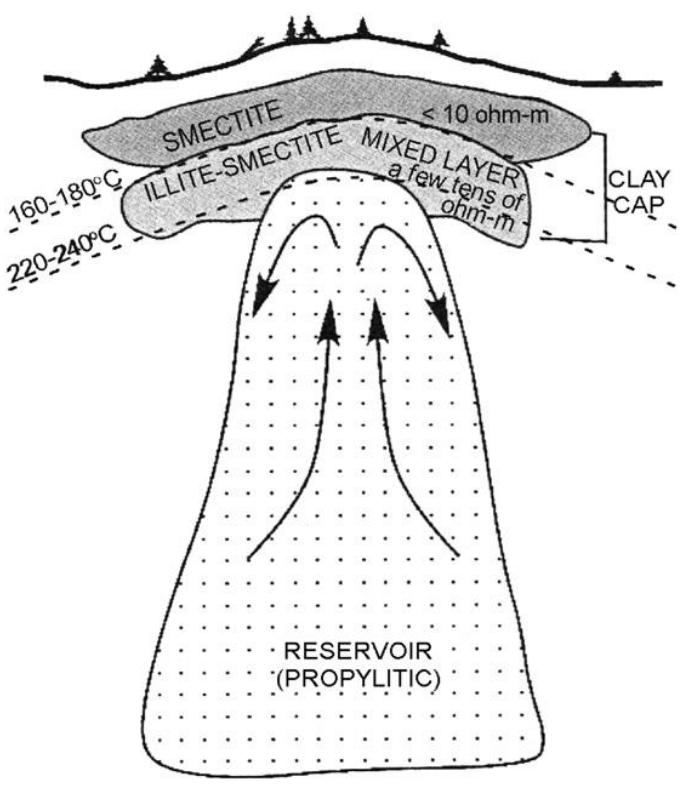
Figure 3-20: Cross-sections of the 3D inversion results (top) and the RLM 2D inversion results (bottom) along line 7.

4 GEOTHERMAL MODEL

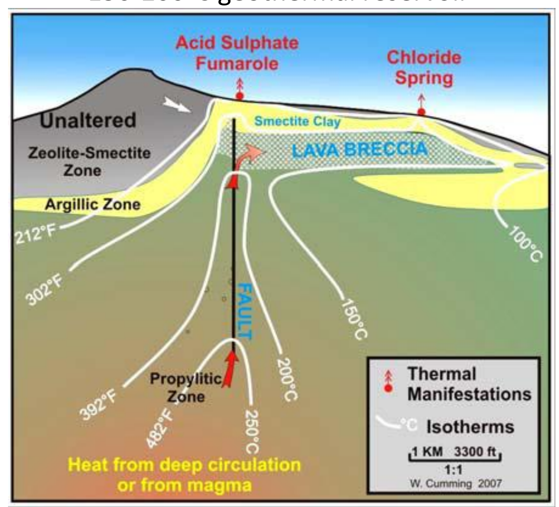
The resistivity or conductivity of rocks is a function of several factors including the temperature, the porosity and the conductivity of the mineralized pore-fluids as well as the rock formation.

It is then very important to define a conceptual model to best interpret the anomalous resistivity distribution in relation with the geothermal resource, in order to identify potential geothermal targets

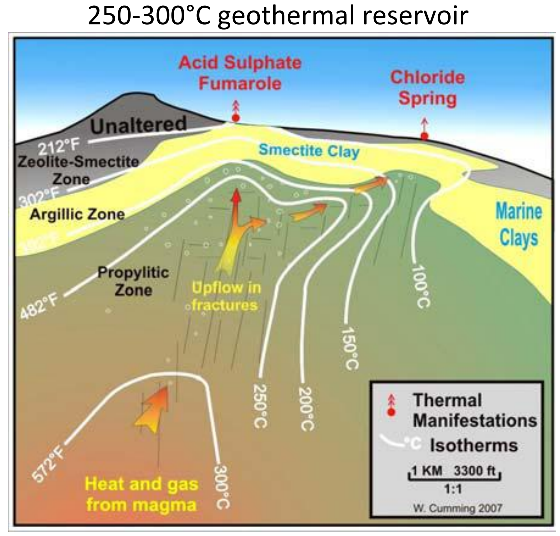
The conceptual model that is now generally accepted for the geothermal reservoir is presented in Figure 4-1. That model and its variations have been discussed in several papers (Anderson et al., 200; Cumming, 2000, Spichak, et al, 2009). In that model, at the depths corresponding to temperatures above 70°C, smectite (a conductive clay) is formed and delineates the conductive cap of the deeper geothermal activity. At higher temperatures, increasing contribution of illite (a less conductive clay) with other high-temperature alteration minerals is observed, delineating a resistive core beneath the conductive cap.



150-200°C geothermal reservoir



250-300°C geothermal reservoir



(from Spichak and Manzella, 2009)	(from Cumming, 2009)

Figure 4-1: Conceptual Geothermal models.

Cumming (2009) has presented an example of a MT resistivity cross-section and a geothermal interpretation (Figure 4-2). Such example provides a good starting point to evaluate our MT results.

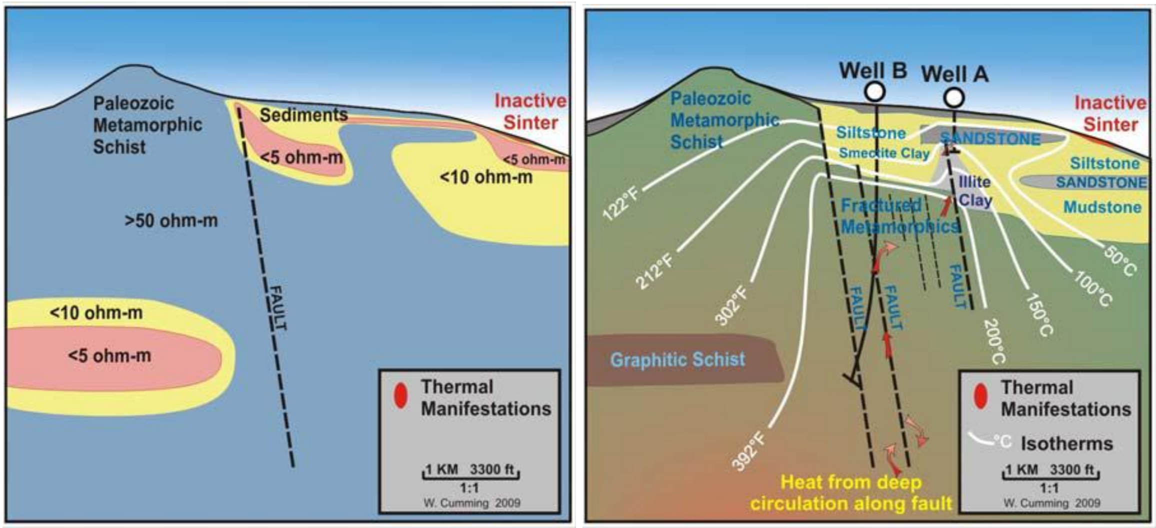


Figure 4-2: MT cross-section and its conceptual model (from Cumming 2009).

Following the conceptual model described above, we might interpret more conductive features in the first conductive layer of resistivity range from 1 Ωm to 5 Ωm as a potential 'conductive' cap of a geothermal system. In such a case, a relatively more resistive zone (10-30 Ωm) below those conductive areas represent good target for geothermal reservoirs. Figure 4-6 compiles the conductive and resistive features interpreted from 500m to 4.5km in depth. Generally, the transition between the conductive and resistive zones is near 3.5km in depth for Mesquite grid and 1.5km for New River grid.

A total of seven areas, three in Mesquite and four in New River girds are identified, which are categorized on the basis of different combinations of conductive and resistive features as well as structural features. Figure 4-3, Figure 4-4 and Figure 4-5 are presenting these combinations at different depth levels:

1. Mes_A:
    a. It is defined by the conductive zone Mes_CL1**s** over the resistive zone Mes_R3s;
    b. It is located on the north-east end of the Mesquite grid and is centered at MT site 2404 and 415;
    c. Inferred contacts are bounding this area;
    d. Depth of the transition is near 3.5km in depth;
    e. Note: no known borehole in the area;
2. Mes_B:
    a. It is defined by the conductive zone Mes_CL1-2 over the resistive zone Mes_R1;
    b. It is located in the western margin of the grid, centered between MT sites 2412, 2415 and 211;

   c. Depth of the transition is near 3.5km in depth;
   d. Inferred lineament/faults potentially bound this area;
   e. Note: no known borehole in the area;
3. Mes_C:
   a. It is defined by the conductive zone Mes_CL3 over the resistive zone Mes_R4;
   b. It is located in the south central part of the grid, centered between MT sites 2005, 2006 and 2606;
   c. Depth of the transition is near 2.5km in depth;
   d. Inferred lineament/faults potentially bound this area;
   e. Note: no known borehole in the area;
4. NR_A:
   a. It is defined by the conductive zone NR_CL1**s** over the resistive zone NR_R1s;
   b. It is located on the north end of the New River grid and is centered at MT site 1302;
   c. Inferred contacts are bounding this area;
   d. Depth of the transition is near 1.5km in depth;
   e. Note: no known borehole in the area;
5. NR_B:
   a. It is defined by the conductive zone NR_CL1**s** over the resistive zone NR_R1s;
   b. It is located on the central west part of the New River grid and is centered at MT site 703, 704 and 705;
   c. Inferred contacts are bounding this area;
   d. Depth of the transition is near 1.2km in depth;
   e. Note: no known borehole in the area;
6. NR_C:
   a. It is defined by the conductive zone NR_CL1-2**s** over the resistive zone NR_R1-4s;
   b. It is located on the south eastern part of the New River grid and is centered at MT site 1410 and 1411;
   c. Depth of the transition is near 1.5km in depth;
   d. Note: no known borehole in the area;
7. NR_D:
   a. It is defined by the conductive zone NR_CL1-3**s** over the resistive zone NR_R1-2s;
   b. It is located on the southern margins of the New River grid and is centered at MT site 304, 306 and 307;
   c. Inferred contacts are bounding this area;

d. Depth of the transition is near 1.5km in depth;

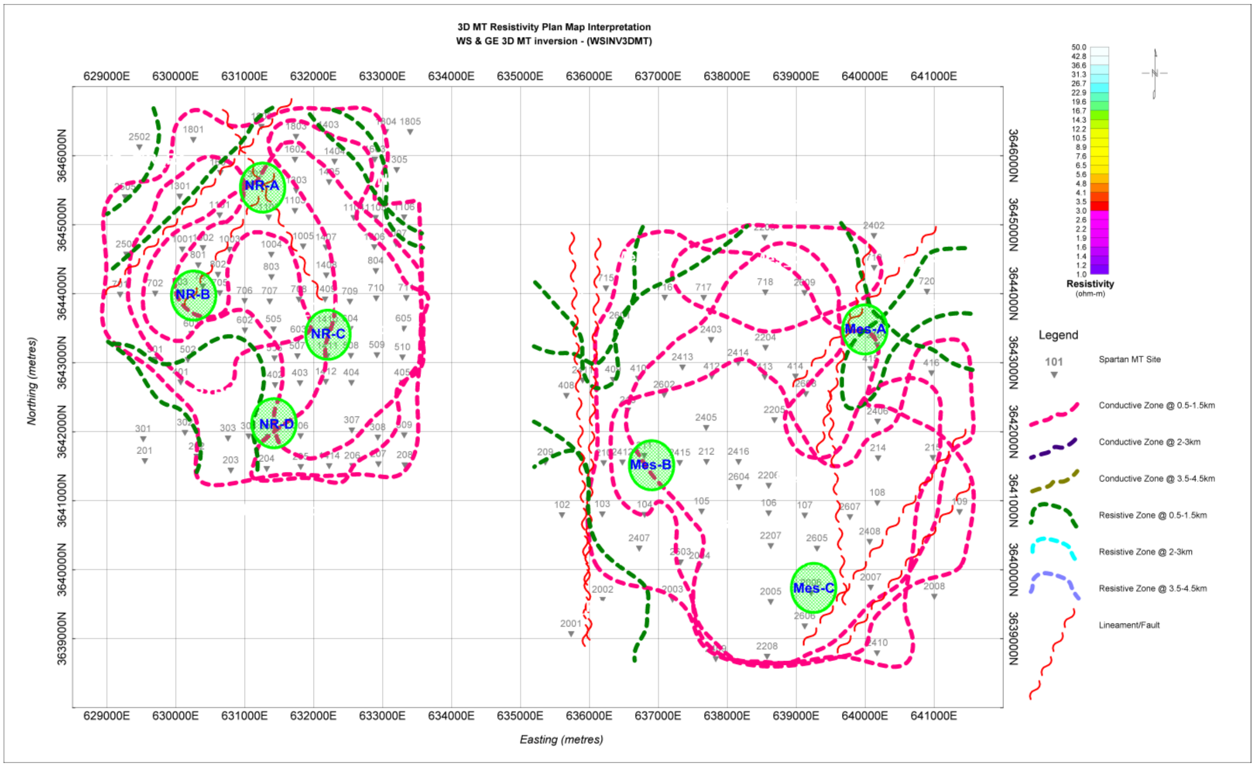


Figure 4-3: Interpreted plan map of Mesquite and New River grids at 0.5-1.5km

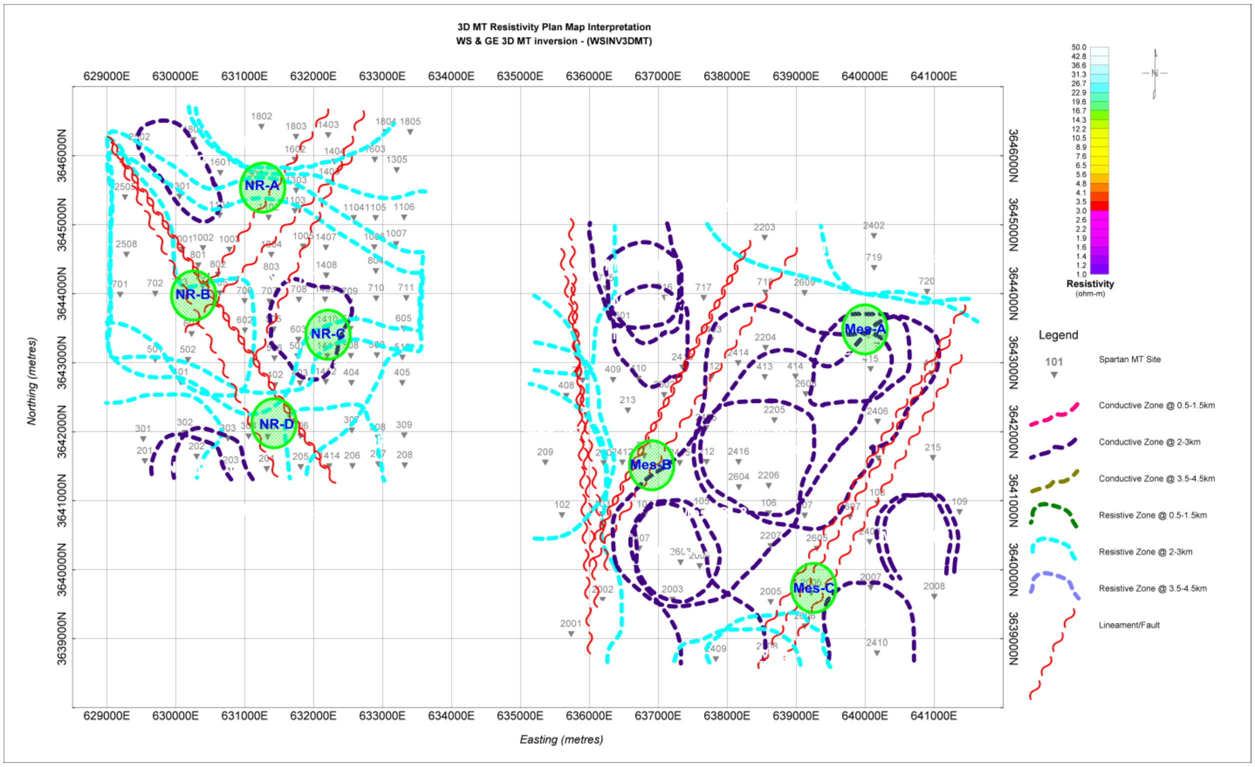


Figure 4-4: Interpreted plan map of Mesquite and New River grids at 2-3km

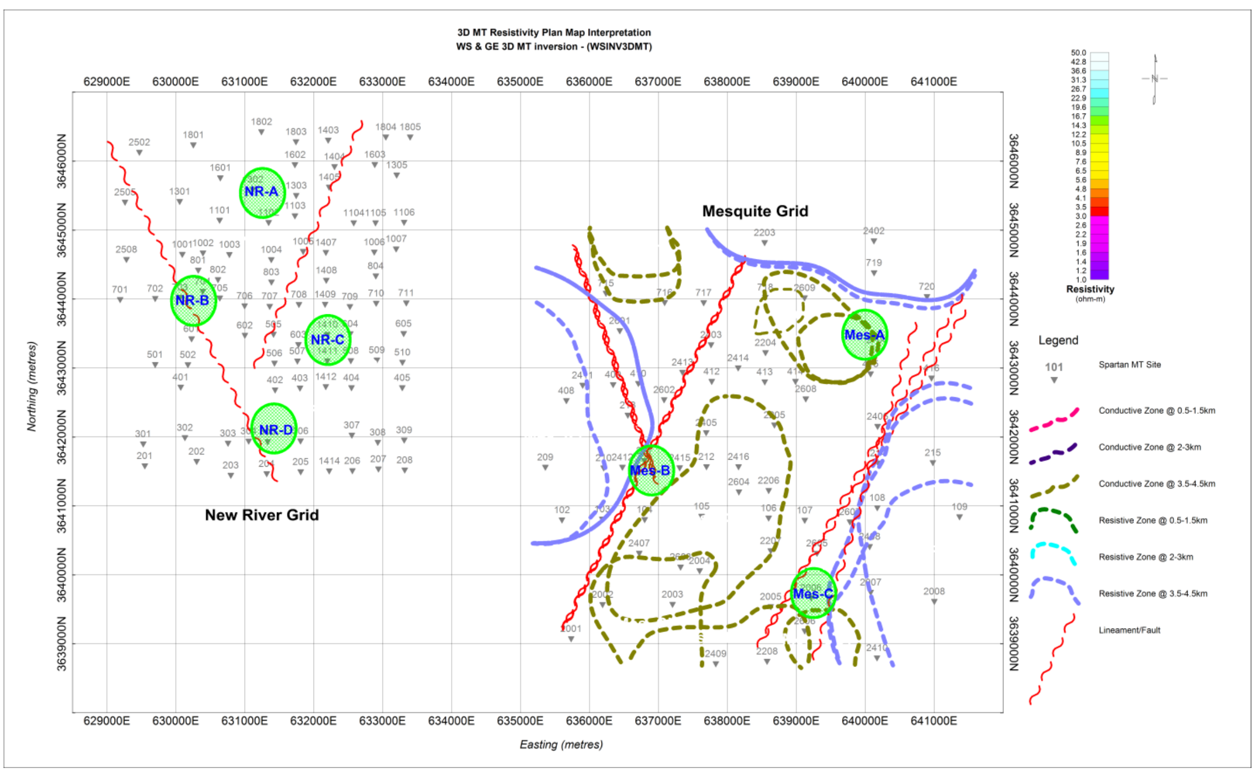


Figure 4-5: Interpreted plan map of Mesquite and New River grids at 3.5-4.5km

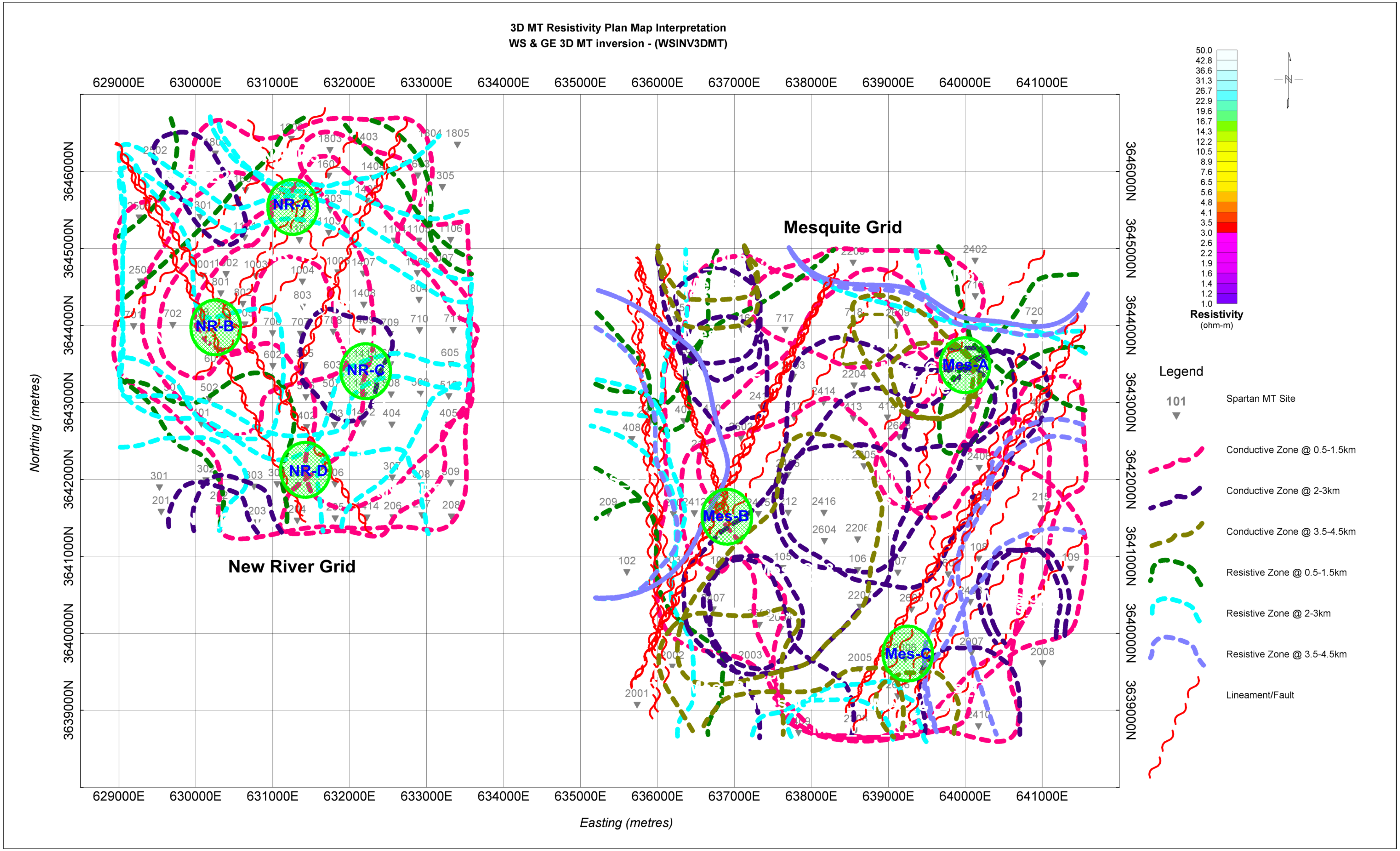


Figure 4-6: Interpreted plan map of Mesquite and New River grids (compilation).

5 CONCLUSIONS

A Tensor Magnetotelluric (MT) survey was completed by Quantec Geoscience Limited over the New River Project, California, USA on behalf of Ram Power Inc. The survey was carried out over the period of 29 days from 2010/06/26 to 2010/07/24.

The MT 3D inversion models were considered for the final interpretation and results were presented in the report as interpreted plan maps, cross-sections and 3D volumetric illustrations of Mesquite and New River grids. These results allowed the characterization of the resistivity defined from the MT dataset and helped to make a more realistic picture of sub-surface resistivity distribution and associated structures. A conceptual hydrothermal model was also considered in attempt to locate geothermal systems at New River project.

The 3D inversion results indicate that the subsurface resistivity, from the surface to a depth of ~5 km, varies over a small range of 1 Ωm to 50 Ωm. Figure 5-1 displays the volumetric illustrations of the 3D inversion results with cut-off resistivity values of 5 Ωm, 10 Ωm, 15 Ωm, and 30Ωm. Two general regions with distinct resistivities are resolved at different depths in both Mesquite and New River grids (Figure 5-2).

In Mesquite grid, the surface to a depth of ~3 km is characterized with conductive materials with resistivities ranging from 1Ωm to ~5Ωm. The area of Mesquite grid below 3 km, to a depth of ~ 4.5 km, hosts two dipping conductive zones, which extend northwest and southwest and covers major part of the grid. The increase in the resistivity of the subsurface in this depth range is more vivid in Figure 5-2, where the iso-surface of 5 Ωm, 10 Ωm, 15 Ωm, and 30 Ωm are displayed. Below 4 km to a depth of ~5 km the resistivity gradually increases with depth from ~20 Ωm to more than 50 Ωm.

The New River grid shows the most conductive zone is confined from surface to a depth of ~1.5km with resistivities ranging from 1Ωm to ~5Ωm. The area of New River grid below 1.5 km, to a depth of ~ 5 km, the resistivity increases to a range of 30Ωm to more than 50Ωm. This depth range hosts relatively horizontal resistive zone with few isolated conductive bodies of resistivity less than 10 Ωm. The increase in the resistivity of the subsurface in this depth range is more vivid in Figure 5-2 where the iso-surface of 5 Ωm, 10 Ωm, 15 Ωm, and 30 Ωm are displayed.

A number of structural features are observed in both Mesquite and New River girds, which are usually below the conductive overburden and extends down to maximum depth of the models.

One the basis of 3D resistivity and conceptual models, seven main areas were identified presenting the potential geothermal system:

1. Mes_A is located on the north-east end of the Mesquite grid and is centered at MT site 2404 and 415;
2. Mes_B is located in the western margin of the grid, centered between MT sites 2412, 2415 and 211;
3. Mes_C is located in the south central part of the grid, centered between MT sites 2005, 2006 and 2606;
4. NR_A is located on the north end of the New River grid and is centered at MT site 1302;
5. NR_B is located on the central west part of the New River grid and is centered at MT site

703, 704 and 705;

6. NR_C is located on the south eastern part of the New River grid and is centered at MT site 1410 and 1411;
7. NR_D is located on the southern margins of the New River grid and is centered at MT site 304, 306 and 307;

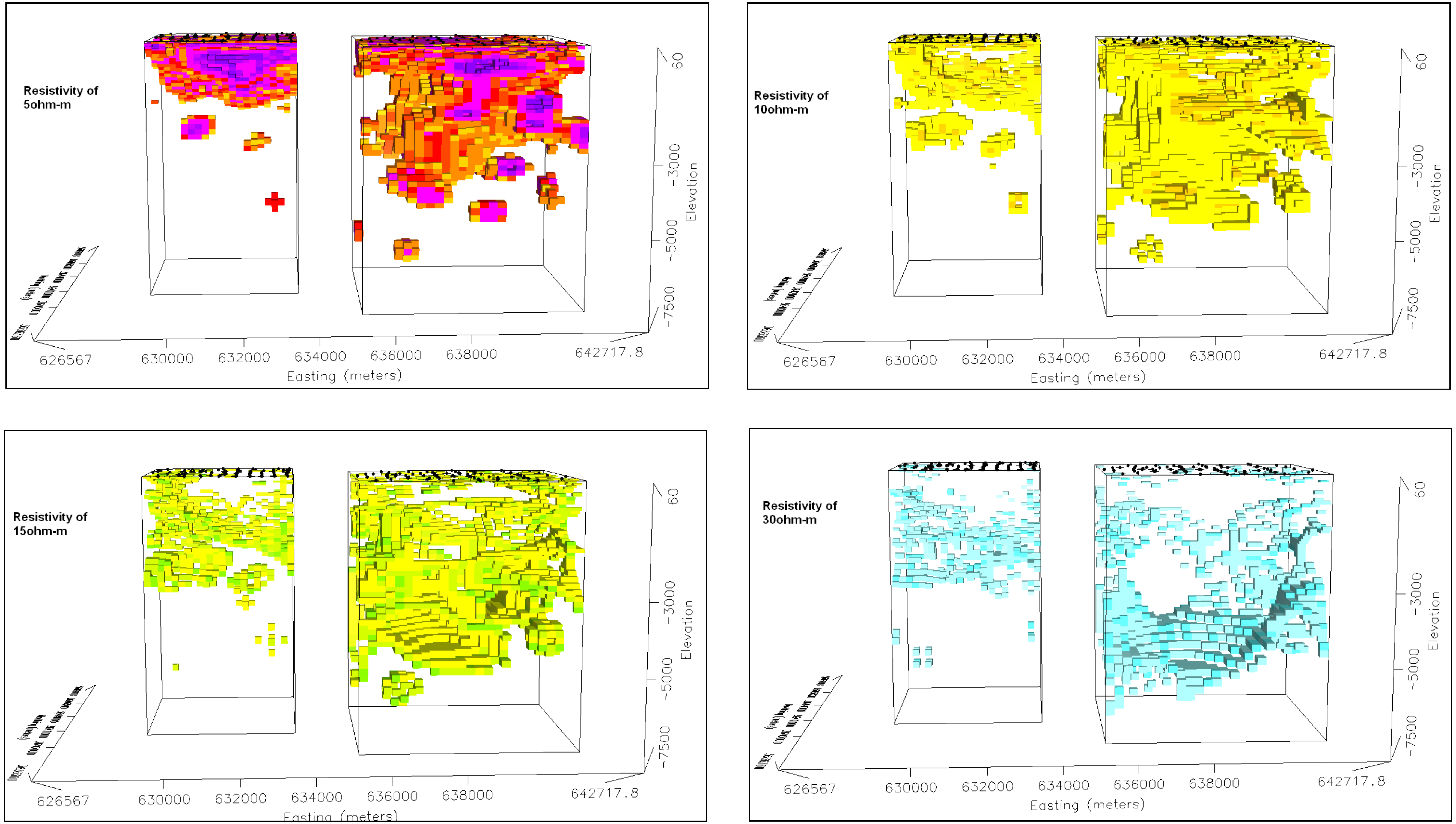


Figure 5-1: 3D illustrations of the 3D inversion results with cut-off resistivities of less 5 Ωm (top-left), 10 Ωm (top-right), 15 Ωm (bottom-left), and 30 Ωm (bottom-right).The MT site locations are denoted as solid black circle at the surface.

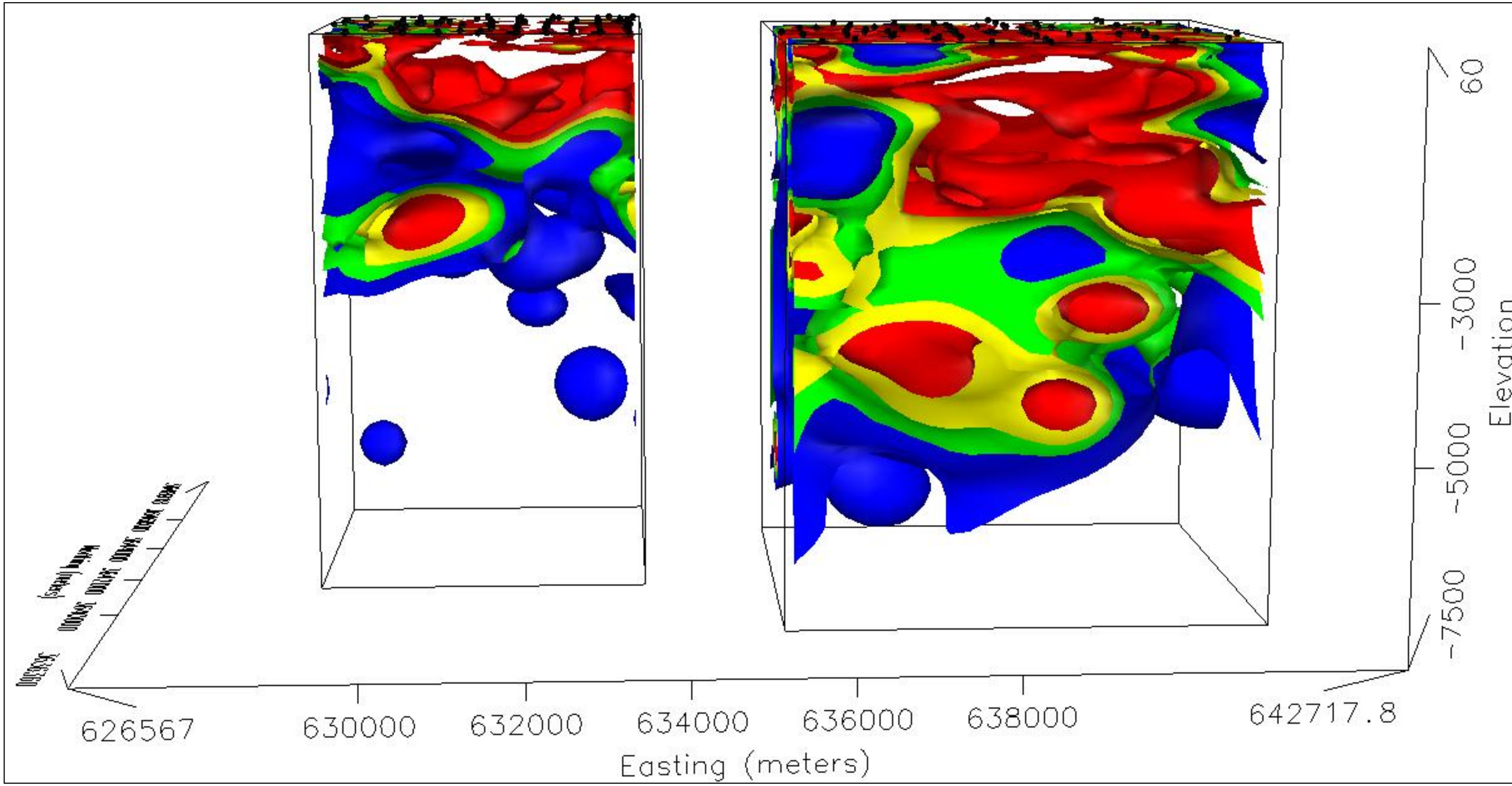


Figure 5-2: Volumetric illustration of the Mesquite (left) and New River (right) 3D inversion results for the iso-surfaces of 5 Ωm (red), 10 Ωm (yellow), 15 Ωm (green), and 30 Ωm (blue. The MT site locations are denoted as solid black circle at the surface.

Respectfully Submitted

Toronto, ON, the 07/12/2010,

Riaz Mirza

Quantec Geoscience Ltd.

Emily Data

Quantec Geoscience Ltd.

6 STATEMENT OF QUALIFICATIONS

RIAZ MIRZA

I, Riaz Mirza, declare that

- I am a senior geophysicist with residence in Brampton, Ontario and I am presently employed in this capacity with Quantec Geoscience Ltd., Toronto, Ontario.
- I hold the following academic qualifications: Bachelor of Science Degree (B.Sc.), Applied Geology from University of the Punjab, Pakistan in 1997, a Master of Science Degree (M.Sc.), Geophysics, Seismic Methods, from Quaid-e-Azam University, Pakistan in 2000, and an Advanced Master of Science Degree (M.Sc.), Applied Environmental Geoscience from University of Tuebingen, Germany in 2003.
- I am a member of Canadian Exploration Geophysicists Society (KEGS).
- I have practiced my profession continuously since 1997 in Southeast Asia, Europe, and Canada.
- I have no interest, nor do I expect to receive any interest in the properties or securities of Ram Power Inc., its subsidiaries or its joint-venture partners.
- I have authored this Geophysical Interpretation report and executed the Quality Control and Assurance of the acquired data and executed the 1D, 2D and 3D MT inversions and interpretation. I have reviewed the logistic report.

Toronto, Ontario

07/12/2010

Riaz Mirza, M.Sc

Quantec Geoscience Ltd.

EMILY DATA

I, Emily Data, declare that

> I am a data processor with residence in Toronto, Ontario and am presently employed in this capacity with Quantec Geoscience Ltd., Toronto, Ontario.
>
> I obtained a Bachelor of Science Degree, with Honours, in Earth Sciences (B.Sc.) at York University, Toronto, ON, in spring of 2003.
>
> I have practiced my profession continuously since May, 2003 in North America, Europe and Africa.
>
> I have no interest, nor do I expect to receive any interest in the properties or securities of Ram Power Inc., its subsidiaries or its joint-venture partners;
>
> I was the data processor and responsible for the quality control of data acquired throughout the survey. I compiled and edited the logistics report. The statements made in this report represent my professional opinion based on my consideration of the information available to me at the time of writing this report.

Toronto, Ontario

07/12/2010

Emily Data, B.Sc.

Quantec Geoscience Ltd.

7 DIGITAL ARCHIVE

The DVD attached to this report contains a copy of all the inversion results, final processed data, including the survey files, the daily processing (and field) notes, and an electronic copy of this report.

A Survey Logistics

A.1 Access

Base of Operation: Brawley Inn
575 West Main Street
Brawley, CA 92227
(619) 344-1199

Mode of Access to Grid/Sites: Truck

A.2 Survey Grid Area

Established by: Raw Power

Coordinate Reference System: Grid referenced to UTM Coordinates

Datum & Projection: NAD83 Zone 11S

Direction of Acquisition: X-orientation at 90° (east), Y at 0° (north)

Magnetic Declination: 12E

Station interval: variable

Site Location: Hand held GPS surveyed (with WAAS)

Surveyed MT sites coordinates.

Number	Ram Power Site Names	Quantec Site Names	Easting (meters)	Northing (meters)	Latitude	Longitude	Elevation (meters)
1	A01	101	634573	3640330	32.53.34.39	-115.33.40.39	27
2	A02	102	635598	3640993	32.53.55.45	-115.33.00.60	33
3	A03	103	636182	3641004	32.53.55.55	-115.32.38.12	45
4	A04	104	636797	3640996	32.53.55.01	-115.32.14.45	43
5	A05	105	637623	3641046	32.53.56.26	-115.31.42.64	50
6	A06	106	638597	3641021	32.53.55.01	-115.31.05.18	38
7	A07	107	639119	3640986	32.53.53.64	-115.30.45.11	45
8	A08	108	640172	3641169	32.53.59.09	-115.30.04.49	46
9	A09	109	641366	3641037	32.53.54.25	-115.29.18.62	49
10	B01	201	629547	3641778	32.54.23.58	-115.36.53.05	24
11	B02	202	630299	3641840	32.54.25.27	-115.36.24.08	43
12	B03	203	630795	3641639	32.54.18.53	-115.36.05.09	23
13	B04	204	631315	3641663	32.54.19.09	-115.35.45.07	26
14	B05	205	631809	3641692	32.54.19.81	-115.35.26.04	25
15	B06	206	632559	3641707	32.54.19.97	-115.34.57.17	24
16	B07	207	632936	3641731	32.54.20.59	-115.34.42.65	31
17	B08	208	633318	3641717	32.54.19.97	-115.34.27.96	27
18	B09	209	635357	3641756	32.54.20.33	-115.33.09.47	35
19	B10	210	636202	3641748	32.54.19.69	-115.32.36.95	40
20	B11	211	636793	3641854	32.54.22.87	-115.32.14.15	45

Number	Ram Power Site Names	Quantec Site Names	Easting (meters)	Northing (meters)	Latitude	Longitude	Elevation (meters)
21	B12	212	637695	3641766	32.54.19.60	-115.31.39.49	46
22	B13	213	636553	3642512	32.54.44.34	-115.32.23.04	44
23	B14	214	640184	3641818	32.54.20.15	-115.30.03.67	46
24	B15	215	640979	3641824	32.54.19.98	-115.29.33.07	42
25	C01	301	629524	3642094	32.54.33.85	-115.36.53.78	25
26	C02	302	630128	3642187	32.54.36.61	-115.36.30.48	24
27	C03	303	630754	3642104	32.54.33.64	-115.36.06.43	22
28	C04	304	631052	3642138	32.54.34.62	-115.35.54.95	24
29	C05	305	631329	3642127	32.54.34.14	-115.35.44.29	23
30	C06	306	631805	3642137	32.54.34.26	-115.35.25.97	27
31	C07	307	632550	3642223	32.54.36.73	-115.34.57.25	25
32	C08	308	632927	3642117	32.54.33.12	-115.34.42.80	28
33	C09	309	633310	3642150	32.54.34.03	-115.34.28.04	27
34	D01	401	630067	3642918	32.55.00.37	-115.36.32.46	27
35	D02	402	631436	3642877	32.54.58.45	-115.35.39.79	24
36	D03	403	631798	3642906	32.54.59.23	-115.35.25.84	27
37	D04	404	632544	3642910	32.54.59.03	-115.34.57.13	26
38	D05	405	633281	3642911	32.54.58.74	-115.34.28.76	29
39	D06	406	634124	3642895	32.54.57.85	-115.33.56.32	31
40	D07	407	634681	3642939	32.54.59.04	-115.33.34.86	36
41	D08	408	635663	3642722	32.54.51.55	-115.32.57.18	40
42	D09	409	636341	3642955	32.54.58.81	-115.32.30.96	43
43	D10	410	636707	3642971	32.54.59.17	-115.32.16.86	44
44	D12	412	637770	3643002	32.54.59.70	-115.31.35.93	46
45	D13	413	638539	3642994	32.54.59.09	-115.31.06.34	47
46	D14	414	638986	3643001	32.54.59.11	-115.30.49.13	46
47	D15	415	640074	3643112	32.55.02.21	-115.30.07.20	45
48	D16	416	640959	3643051	32.54.59.82	-115.29.33.17	43
49	E01	501	629698	3643246	32.55.11.17	-115.36.46.50	24
50	E02	502	630172	3643243	32.55.10.87	-115.36.28.25	25
51	E05	505	631413	3643686	32.55.24.72	-115.35.40.26	26
52	E06	506	631428	3643265	32.55.11.04	-115.35.39.90	26
53	E07	507	631761	3643297	32.55.11.94	-115.35.27.06	26
54	E08	508	632536	3643302	32.55.11.76	-115.34.57.23	26
55	E09	509	632913	3643311	32.55.11.89	-115.34.42.72	25
56	E10	510	633283	3643279	32.55.10.69	-115.34.28.49	27
57	E11	511	634044	3643256	32.55.09.61	-115.33.59.21	28
58	F01	601	630225	3643619	32.55.23.06	-115.36.26.02	24
59	F02	602	630999	3643671	32.55.24.41	-115.35.56.20	25

Number	Ram Power Site Names	Quantec Site Names	Easting (meters)	Northing (meters)	Latitude	Longitude	Elevation (meters)
60	F03	603	631775	3643536	32.55.19.69	-115.35.26.40	25
61	F04	604	632527	3643692	32.55.24.43	-115.34.57.38	25
62	F05	605	633301	3643695	32.55.24.19	-115.34.27.58	33
63	F06	606	634119	3643665	32.55.22.85	-115.33.56.11	31
64	F07	607	634516	3643704	32.55.23.94	-115.33.40.81	34
65	G01	701	629188	3644187	32.55.41.94	-115.37.05.65	25
66	G02	702	629698	3644203	32.55.42.24	-115.36.46.01	24
67	G03	703	630058	3644221	32.55.42.67	-115.36.32.14	25
68	G04	704	630388	3644308	32.55.45.35	-115.36.19.40	45
69	G05	705	630634	3644212	32.55.42.13	-115.36.09.98	48
70	G06	706	630994	3644098	32.55.38.27	-115.35.56.18	25
71	G07	707	631359	3644090	32.55.37.86	-115.35.42.13	23
72	G08	708	631783	3644116	32.55.38.52	-115.35.25.80	30
73	G09	709	632522	3644087	32.55.37.25	-115.34.57.36	28
74	G10	710	632903	3644135	32.55.38.65	-115.34.42.67	29
75	G11	711	633340	3644139	32.55.38.58	-115.34.25.85	31
76	G12	712	634116	3644153	32.55.38.70	-115.33.55.97	33
77	G13	713	634518	3644170	32.55.39.07	-115.33.40.49	32
78	G14	714	634911	3644164	32.55.38.70	-115.33.25.36	35
79	G15	715	636235	3644280	32.55.41.88	-115.32.34.33	42
80	G16	716	637088	3644144	32.55.37.08	-115.32.01.57	44
81	G17	717	637653	3644143	32.55.36.79	-115.31.39.82	41
82	G18	718	638548	3644220	32.55.38.88	-115.31.05.33	43
83	G19	719	640125	3644577	32.55.49.75	-115.30.04.43	46
84	G20	720	640894	3644231	32.55.38.16	-115.29.35.02	43
85	H01	801	630322	3644614	32.55.55.32	-115.36.21.78	26
86	H02	802	630608	3644477	32.55.50.75	-115.36.10.84	46
87	H03	803	631384	3644442	32.55.49.27	-115.35.40.99	25
88	H04	804	632898	3644530	32.55.51.47	-115.34.42.66	27
89	J01	1001	630090	3644844	32.56.02.88	-115.36.30.60	26
90	J02	1002	630390	3644865	32.56.03.43	-115.36.19.04	29
91	J03	1003	630773	3644840	32.56.02.46	-115.36.04.30	48
92	J04	1004	631380	3644767	32.55.59.83	-115.35.40.97	24
93	J05	1005	631843	3644889	32.56.03.59	-115.35.23.09	26
94	J06	1006	632875	3644876	32.56.02.71	-115.34.43.37	29
95	J07	1007	633192	3644924	32.56.04.13	-115.34.31.14	27
96	K01	1101	630632	3645339	32.56.18.72	-115.36.09.48	28
97	K02	1102	631343	3645306	32.56.17.34	-115.35.42.12	46

Number	Ram Power Site Names	Quantec Site Names	Easting (meters)	Northing (meters)	Latitude	Longitude	Elevation (meters)
98	K03	1103	631725	3645404	32.56.20.36	-115.35.27.36	43
99	K04	1104	632577	3645300	32.56.16.61	-115.34.54.62	25
100	K05	1105	632894	3645301	32.56.16.50	-115.34.42.41	28
101	K06	1106	633308	3645308	32.56.16.55	-115.34.26.47	28
102	M01	1301	630053	3645612	32.56.27.83	-115.36.31.63	27
103	M02	1302	631112	3645785	32.56.32.99	-115.35.50.77	28
104	M03	1303	631743	3645696	32.56.29.83	-115.35.26.52	49
105	M05	1305	633201	3645994	32.56.38.87	-115.34.30.23	27
106	NS01	1401	632019	3647864	32.57.40.09	-115.35.14.78	32
107	NS02	1402	632046	3647060	32.57.13.98	-115.35.14.15	28
108	NS03	1403	632206	3646500	32.56.55.73	-115.35.08.28	28
109	NS04	1404	632298	3646115	32.56.43.19	-115.35.04.94	48
110	NS05	1405	632221	3645820	32.56.33.65	-115.35.08.05	32
111	NS07	1407	632458	3644876	32.56.02.90	-115.34.59.42	27
112	NS08	1408	632180	3644467	32.55.49.74	-115.35.10.33	28
113	NS09	1409	632162	3644119	32.55.38.45	-115.35.11.20	26
114	NS10	1410	632191	3643682	32.55.24.25	-115.35.10.31	26
115	NS11	1411	632194	3643299	32.55.11.82	-115.35.10.40	27
116	NS12	1412	632173	3642926	32.54.59.72	-115.35.11.40	25
117	NS13	1413	632212	3642214	32.54.36.58	-115.35.10.26	26
118	NS14	1414	632221	3641703	32.54.19.99	-115.35.10.18	24
119	NS15	1415	632235	3641300	32.54.06.90	-115.35.09.85	24
120	NS16	1416	632240	3640914	32.53.54.37	-115.35.09.86	25
121	NS17	1417	632195	3640484	32.53.40.43	-115.35.11.81	23
122	NS18	1418	632189	3640081	32.53.27.35	-115.35.12.25	26
123	P01	1601	630641	3645955	32.56.38.71	-115.36.08.82	26
124	P02	1602	631725	3645955	32.56.38.24	-115.35.27.08	30
125	P03	1603	632882	3646147	32.56.43.97	-115.34.42.44	28
126	R01	1801	630251	3646432	32.56.54.37	-115.36.23.59	26
127	R02	1802	631238	3646622	32.57.00.11	-115.35.45.49	24
128	R03	1803	631740	3646476	32.56.55.15	-115.35.26.24	30
129	R04	1804	633042	3646545	32.56.56.82	-115.34.36.07	28
130	R05	1805	633397	3646546	32.56.56.70	-115.34.22.40	28
131	T01	2001	635732	3639270	32.52.59.46	-115.32.56.35	27
132	T02	2002	636187	3639766	32.53.15.36	-115.32.38.58	42
133	T03	2003	637202	3639767	32.53.14.93	-115.31.59.53	40
134	T04	2004	637596	3640255	32.53.30.60	-115.31.44.11	45
135	T05	2005	638625	3639735	32.53.13.25	-115.31.04.79	45

Number	Ram Power Site Names	Quantec Site Names	Easting (meters)	Northing (meters)	Latitude	Longitude	Elevation (meters)
136	T06	2006	639212	3639864	32.53.17.17	-115.30.42.14	45
137	T07	2007	640077	3639944	32.53.19.37	-115.30.08.81	46
138	T08	2008	641000	3639810	32.53.14.59	-115.29.33.37	45
139	V01	2201	638511	3646358	32.56.48.30	-115.31.05.60	42
140	V02	2202	638514	3645839	32.56.31.45	-115.31.05.76	36
141	V03	2203	638538	3645015	32.56.04.69	-115.31.05.29	43
142	V04	2204	638551	3643418	32.55.12.84	-115.31.05.65	46
143	V05	2205	638681	3642370	32.54.38.76	-115.31.01.21	46
144	V06	2206	638597	3641419	32.54.07.93	-115.31.04.96	48
145	V07	2207	638626	3640545	32.53.39.54	-115.31.04.32	43
146	V08	2208	638574	3638942	32.52.47.53	-115.31.07.18	42
147	V09	2209	638597	3638166	32.52.22.33	-115.31.06.72	39
148	V10	2210	638665	3637414	32.51.57.88	-115.31.04.51	40
149	X02	2402	640123	3645039	32.56.04.74	-115.30.04.26	44
150	X03	2403	637761	3643532	32.55.16.90	-115.31.36.00	46
151	X04	2404	640167	3643456	32.55.13.34	-115.30.03.43	44
152	X05	2405	637690	3642258	32.54.35.58	-115.31.39.41	47
153	X06	2406	640177	3642350	32.54.37.43	-115.30.03.65	44
154	X07	2407	636719	3640509	32.53.39.24	-115.32.17.72	46
155	X08	2408	640061	3640606	32.53.40.87	-115.30.09.07	45
156	X09	2409	637830	3638907	32.52.46.73	-115.31.35.83	40
157	X10	2410	640168	3638992	32.52.48.42	-115.30.05.83	43
158	X11	2411	635898	3642945	32.54.58.69	-115.32.48.02	39
159	X12	2412	636474	3641757	32.54.19.86	-115.32.26.48	43
160	X13	2413	637347	3643133	32.55.04.14	-115.31.52.14	47
161	X14	2414	638154	3643198	32.55.05.88	-115.31.21.05	46
162	X15	2415	637307	3641750	32.54.19.26	-115.31.54.43	47
163	X16	2416	638158	3641764	32.54.19.33	-115.31.21.67	45
164	Y01	2501	628312	3646401	32.56.54.19	-115.37.38.26	28
165	Y02	2502	629469	3646324	32.56.51.19	-115.36.53.75	26
166	Y03	2503	627922	3645710	32.56.31.92	-115.37.53.63	26
167	Y04	2504	628441	3645820	32.56.35.27	-115.37.33.59	27
168	Y05	2505	629259	3645602	32.56.27.84	-115.37.02.20	27
169	Y06	2506	627934	3644734	32.56.00.23	-115.37.53.65	26
170	Y07	2507	628450	3644771	32.56.01.21	-115.37.33.77	26
171	Y08	2508	629280	3644769	32.56.00.79	-115.37.01.82	26
172	Y09	2509	628106	3644138	32.55.40.81	-115.37.47.33	27
173	1001	2601	636436	3643736	32.55.24.13	-115.32.26.89	44

Number	Ram Power Site Names	Quantec Site Names	Easting (meters)	Northing (meters)	Latitude	Longitude	Elevation (meters)
174	1002	2602	637081	3642734	32.54.51.31	-115.32.02.60	45
175	1003	2603	637319	3640310	32.53.32.51	-115.31.54.74	46
176	1004	2604	638166	3641398	32.54.07.44	-115.31.21.56	45
177	1005	2605	639297	3640508	32.53.38.04	-115.30.38.52	44
178	1006	2606	639119	3639382	32.53.01.56	-115.30.45.98	42
179	1007	2607	639775	3640964	32.53.52.62	-115.30.19.88	48
180	1008	2608	639134	3642748	32.54.50.83	-115.30.43.57	45
181	1009	2609	639117	3644213	32.55.38.39	-115.30.43.43	43
182	1010	2610	638111	3645827	32.56.31.25	-115.31.21.29	40

A.3 PRODUCTION AND COVERAGE

Survey Period/days: June 26th to July 24th, 2010
30 days

Survey Days (read time): 27 days

Mob/Demob: 2 days

Safety Inductions: 0 days

Parallel Sensor Test: 1 day

Weather/down Days: 0 days

Number of Sites surveyed: 182

A.4 PERSONNEL

Project Manager: Kevin Blackshaw

Responsible Geophysicist: Riaz Mirza

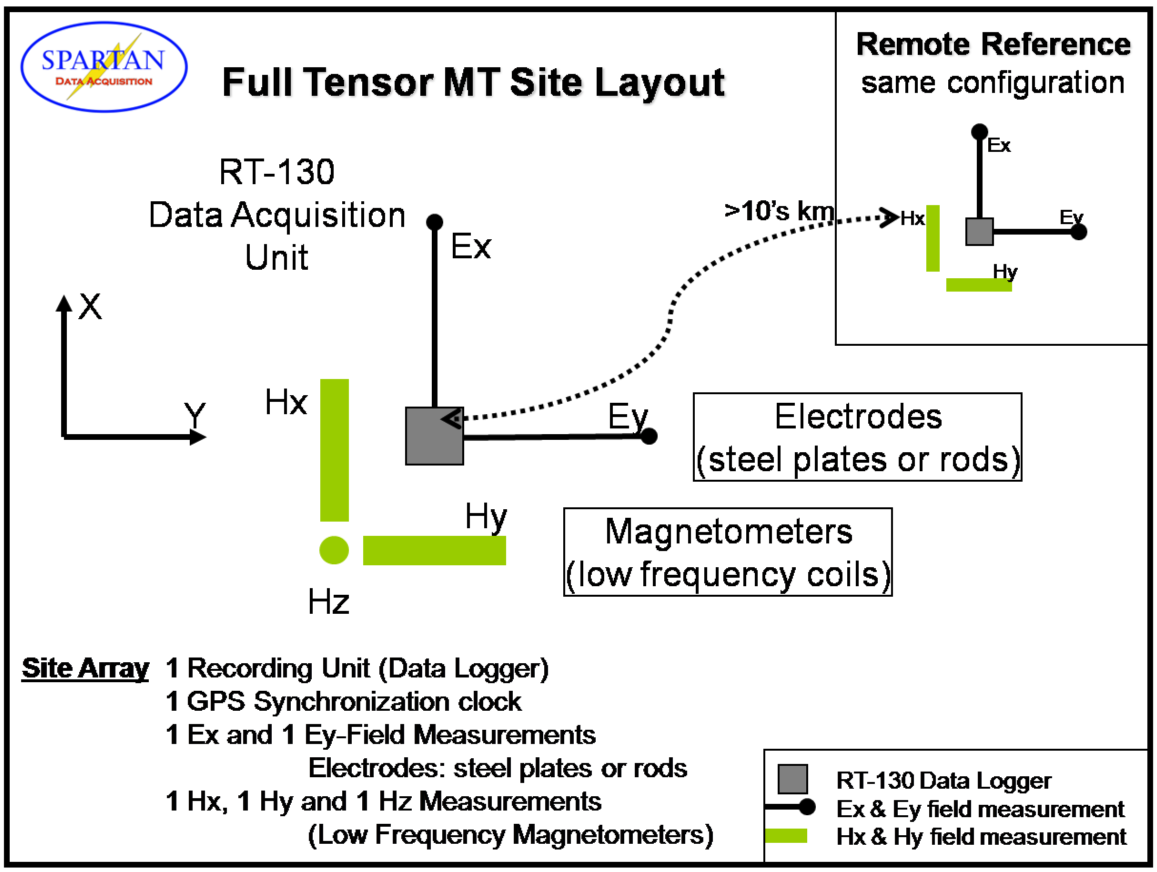
Data Processing (in field): Daniel Sponagle

Crew Chief: Shane Montechelle

Field Technicians: Jeremy Pierce
Scott Carlin
Rodrick James
Justin Harger
Josh Tenorio

A.5 INSTRUMENTATION

Receiver System:	Quantec RT-130 Data Logger, comprising: 6 channels max. per system (5 channels operationally) with internal A/D conversion (24bit @120db, and buffer memory (6Mb). 8 Recording Units (loggers), deployed simultaneously for recording site and remote reference; each unit: 1 GPS synchronization clock (10nsec precision /12.3MHz clock-speed).
Receiver Electrodes:	Ground contacts using stainless steel rods
Receiver Coils (MT Surveys):	22 Phoenix model P50 Magnetic Field Sensors {0.00002 to 400 Hz) 7 EMI model BF4 Magnetic Field Sensors {0.0001 to 1000 Hz } 4 EMI model BF7 Magnetic Field Sensors {0.0001 to 1000 Hz }



Spartan MT Schematic Site Layout.

A.6 MT SURVEY SPECIFICATION

A.6.1 GEOMETRY

Technique:	Tensor soundings, remote-referenced
Site Configuration:	'L' shaped E-field array with 3 Low frequency coils (Hx, Hy, Hz) Acquisition with Ex/Hx at 90° (East) Ey/Hy at 0° (North)
Remote Configuration:	'L' shaped E-field array with 2 Low frequency coils (Hx, Hy) Acquisition with Ex/Hx at 90° (East) Ey/Hy at 0° (North)
Dipole size:	100 metres
Remote Reference Position:	RM01: 696307m E, 3646106m N (NAD83 UTM Zone 11s)

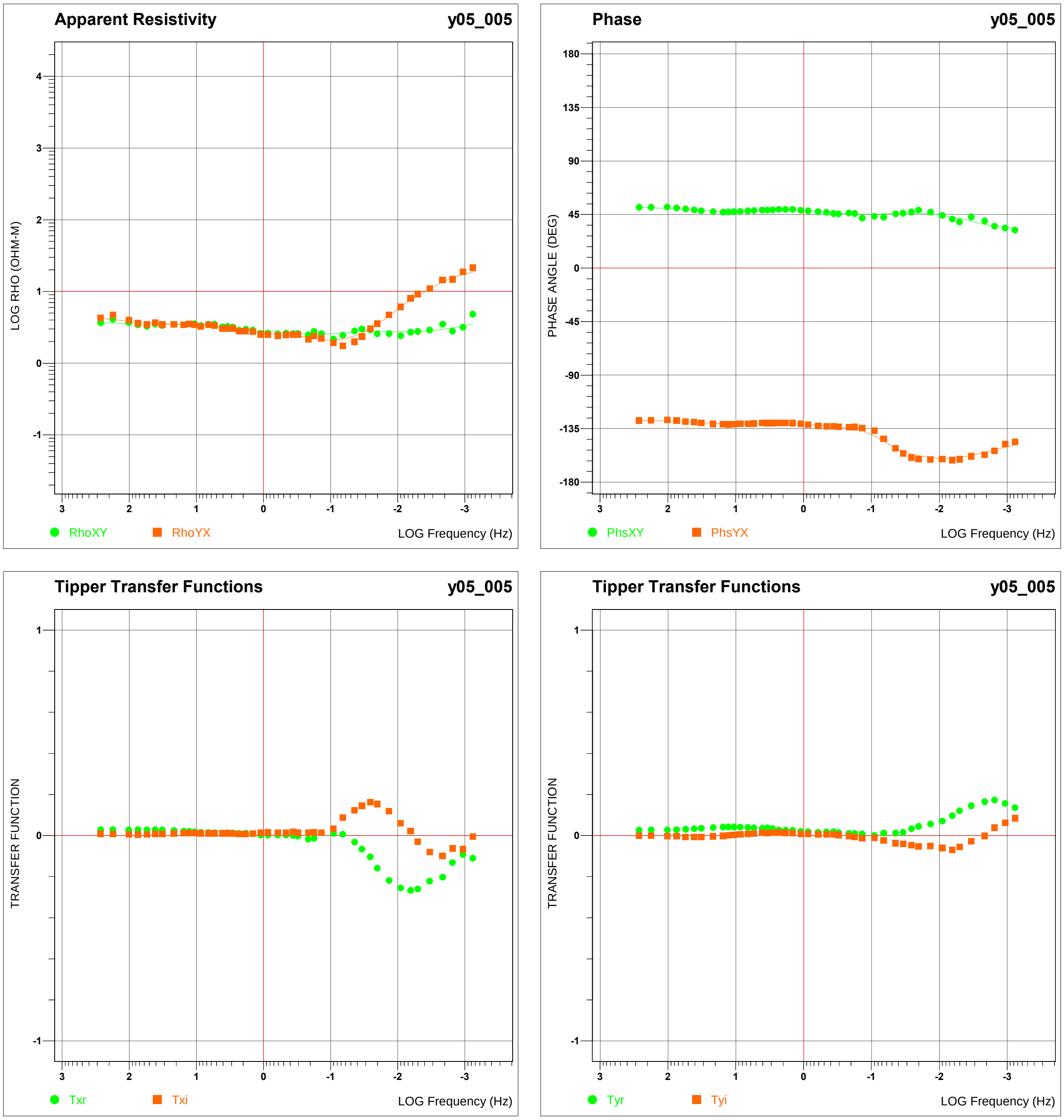
A.6.2 ACQUISITION & PROCESSING

Data Acquisition:	Full-waveform time-series acquisition Data processing/output in frequency-domain.
Remote-Base Synchronization:	GPS clocks (10μsec time-accuracy)
Frequency Bandwidth:	0.001 to 250 Hz
Time-series Sampling:	High Range: 1000 samples/sec Low Range: 40 samples/sec (resample from HR)
Sample/Record Time:	at least 3 events @ 4 hours per event (total recording and retrieving time approx. 12-19 hrs)
Post-Processing:	using Quantec proprietary QuickLay v.4.00.04 1) Coherent noise rejection using remote-reference 2) Proprietary digital filtering (scrubbing) 3) Coherency sorting 4) Impedance estimate stacking

A.6.3 DATA PRESENTATION

Parallel Sensor Test:	Result of the test of the equipment (PST) is presented in detail in Appendix Parallel Sensor Test.
Data Error:	Apparent Resistivity = <1/20TH decade average. Phase = <3 degrees average
Sounding Curves:	Apparent resistivity and phase (XY and YX), and Tipper (Tzx, Tzy) sounding curves versus the frequency (8 pts. per decade) using Geotools™ viewer.

Pseudo-Section Plots:	MT Apparent Resistivity and Phase Pseudo-Sections (XY, and YX) posted, contoured (equal area zoning), and plotted in grid units using Geotools™ viewer.
Raw Data (digital):	(external Hard Drive) Base and Remote Raw Event Log File Folders (i.e. Base-Eventxxx.dat; Remote-Eventxxxx.dat). Also contains AU.txt and Event.log files, which contain information on the location and time of the event in QuickLay digital format (external Hard Drive). (Raw data output to Matlab format upon request)
Processed Data (digital):	MT DATA in EDI (Electronic Data Interchange) file created in Geotools™ containing Auto and Cross-power Spectral estimates for individual stations (sites) and profiles (site-sets); Spectra are in Right Hand positive down co-ordinate system, and for profiles, EDI files are created with X as the profile direction. For this study, final EDI have X at 90deg (ROTSPEC= 90) EDI is a format conforming to SEG standard for the storage of magnetotelluric (MT) data (Wight, D. E., 1987).



Example of Apparent Resistivity, Phase, and Tipper Sounding Curves.

B PRODUCTION SUMMARY

DATE	New River Project											
25/06/2010	MOB to Brawley, California											
26/06/2010	Parallel Sensor Test											
27/06/2010	ACQUISITION START											
DATE	**DESCRIPTION**	**SITES**									**Day # Sites**	**Total # Sites**
27/06/2010	SET UP	A02B	A03	A04	A05	B09	B10	X12	X15	REM	8	8
	READ											
28/06/2010	SET UP	A06	A07	B12	T05	V05	V06	V07	X05	REM	8	16
	READ	**A02B**	A03	A04	A05	B09	B10	X12	X15	**REM**		
29/06/2010	SET UP	T03	T06	V08	V09	V10	X09	X10	X16	REM	8	24
	READ	A06	A07	B12	T05	V05	**V06**	V07	X05	**REM**		
30/06/2010	SET UP	A02bR	A08	T02	T07	T08	V06R	X08	X16R	REM	8	29
	READ	T03	T06	V08	V09	V10	X09	X10	**X16**	**REM**		
01/07/2010	SET UP	A09	B11	B14	B15	D14	T01	X06	X07	REM	8	37
	READ	A02b	A08	T02	T07	T08	V06	X08	X16	**REM**		
02/07/2010	SET UP	D12	D13	D15	D16	G19	X04	X13	X14	REM	8	45
	READ	A09	B11	B14	B15	D14	T01	X06	X07	**REM**		
03/07/2010	SET UP	D09	D10	D08	G20	V01	V02	X02	X11	REM	8	53
	READ	D12	D13	D15	D16	G19	X04	X13	X14	**REM**		
04/07/2010	SET UP	B13	D06	D07	E10	G18	V03	V04	X11	REM	8	61
	READ	D09	D10	D08	G20	V01	V02	X02	X11	**REM**		
05/07/2010	SET UP	E11	F06	G12	G13	G14	G15	G16	G17	REM	8	69
	READ	B13	D06	D07	E10	G18	V03	V04	X11	**REM**		
06/07/2010	SET UP	**G09**	F03	F04	F05	G10	**G11**	NS09	**NS10**	REM	8	77
	READ	E11	F06	G12	G13	G14	G15	G16	G17	**REM**		
07/07/2010	SET UP	E08	E07	E09	G09R	H04	J06	NS08	NS11	REM	8	84

	READ	F03	F04	F05	G10	G11	NS09	NS10		**REM**		
08/07/2010	SET UP	D02	D03	D05	F07	J05	NS08	NS12	T04	REM	8	92
	READ	E08	E07	E09	G09	H04	J06	NS08	NS11	**REM**		
09/07/2010	SET UP	C07	C08	C09	K04	K05	K06	M04	NS13	REM	8	99
	READ	D02	D03	D05	F07	J05	NS08	NS12	T04	**REM**		
10/07/2010	SET UP	B07	B08	D04	G11R	NS10R	P03	R04	R05	REM	8	105
	READ	C07	C08	C09	K04	K05	K06	M04	NS13	**REM**		
11/07/2010	SET UP	B04	B06	C05	E05	G07	H03	J04	NS14	REM	8	113
	READ	B07	B08	D04	G11R	NS10R	P03	R04	R05	**REM**		
12/07/2010	SET UP	C03	G08	**NS15**	NS16	NS17	NS18			REM	6	119
	READ	B04	B06	C05	E05	G07	H03	J04	NS14	**REM**		
13/07/2010	SET UP	B05	C04	C06	NS01	NS02	NS03	NS15R	R03	REM	8	126
	READ	C03	G08	**NS15**	NS16	NS17	NS18			**REM**		
14/07/2010	SET UP	A01	B03	C01	G15T	R01	R02	P01	P02	REM	8	133
	READ	B05	C04	C06	NS01	NS02	NS03	NS15	R03	**REM**		
15/07/2010	SET UP	F02	G06	K03	M01	NS05	Y01	Y02	Y05	REM	8	141
	READ	A01	B03	C01	G15R	R01	R02	P01	P02	**REM**		
16/07/2010	SET UP	B01	B02	C02	C04R	R01R	Y03	Y04	Y06	REM	8	147
	READ	F02	G06	K03	M01	NS05	Y01	Y02	Y05	**REM**		
17/07/2010	SET UP	1001	1002	1003	G17R	J01	R01R	Y07	Y08	REM	8	153
	READ	B01	B02	C02	C04R	R01R	Y03	Y04	Y06	**REM**		
18/07/2010	SET UP	1004	1005	1006	1007	G01	H01	J02	Y09	REM	8	161
	READ	1001	1002	1003	G17R	J01	R01R	Y07	Y08	**REM**		
19/07/2010	SET UP	1008	1009	G02	G03	G04	H02	M03	NS04	REM	8	169
	READ	1004	1005	1006	1007	G01	H01	J02	Y09	**REM**		
20/07/2010	SET UP	E01	E02	F01	G05	J03	K01	K02	M02	REM	8	177
	READ	1008	1009	G02	G03	G04	H02	M03	NS04	**REM**		
21/07/2010	SET UP	E06	H04R	J05R	J07	M05	P03R	R04R	NS05	REM	8	179
	READ	E01	E02	**F01**	G05	J03	K01	K02	M02	**REM**		
22/07/2010	SET UP	1007	C04R	F01R	K02R	M03R	NS05R			REM	6	179

	READ	**E06**	H04R	J05R	J07	M05	P03R	R04R	**NS05**	**REM**		
23/07/2010	SET UP	1001r	1010	d01r	e06r	j07r				REM	5	181
	READ	1007	C04R	F01R	K02R	M03R	NS05R			**REM**		
24/07/2010	SET UP									REM	0	181
	READ	1001r	1010	d01r	e06r	j07r				**REM**		
24/07/2010	ACQUISITION END											
24/07/2010	MOB to XXX											

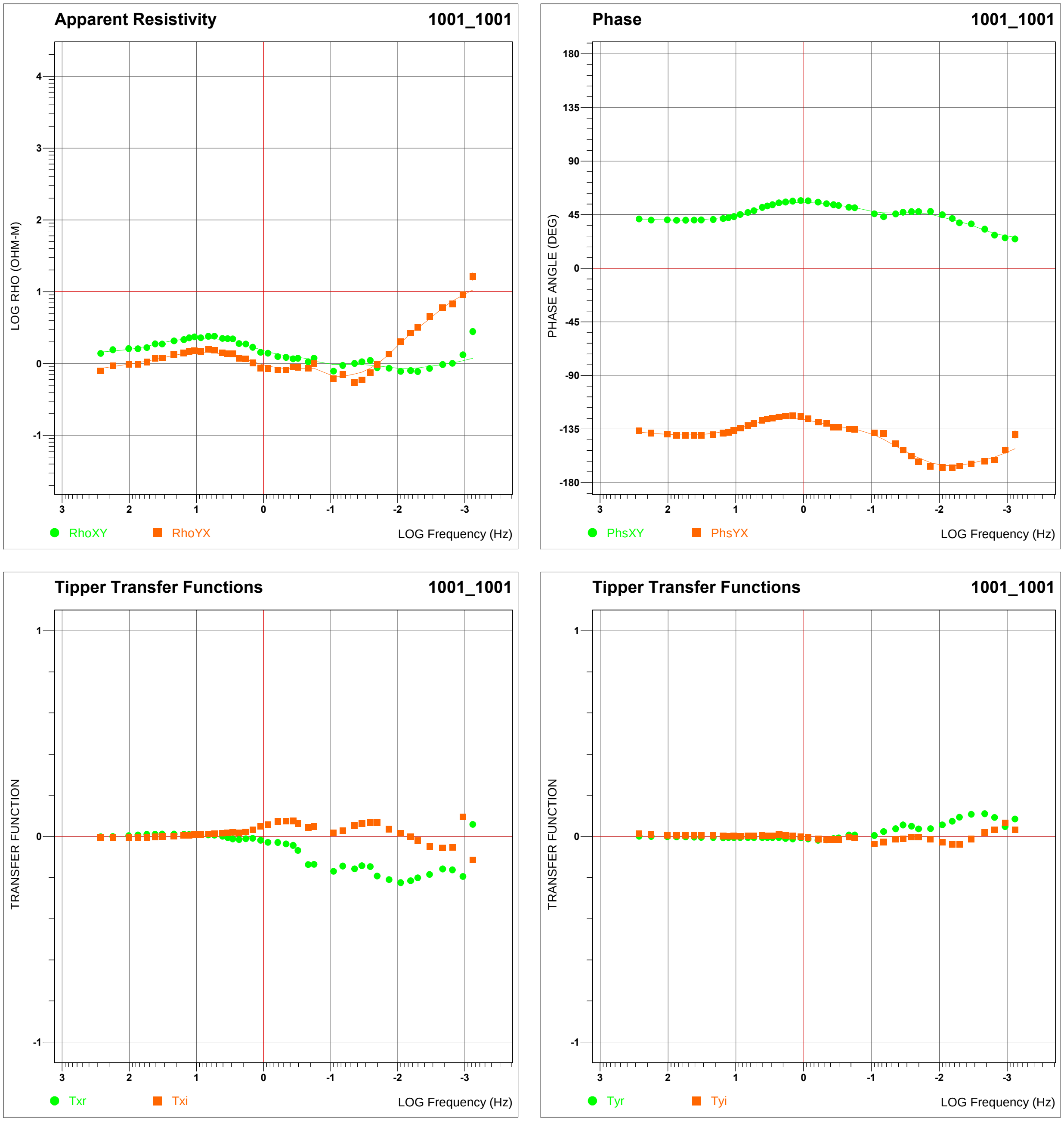
SUMMARY	**Total Billable Sites**	**181**
	Parallel Sensor Test (PST)	1
	Standby Days	0
	Induction Days	0
	Mobilisation Days	2
	Survey Days	28

Legend:

MT01	Site Read
MT01	Site to be reacquired due to equipment
MT01	Site to be reacquired due to external causes

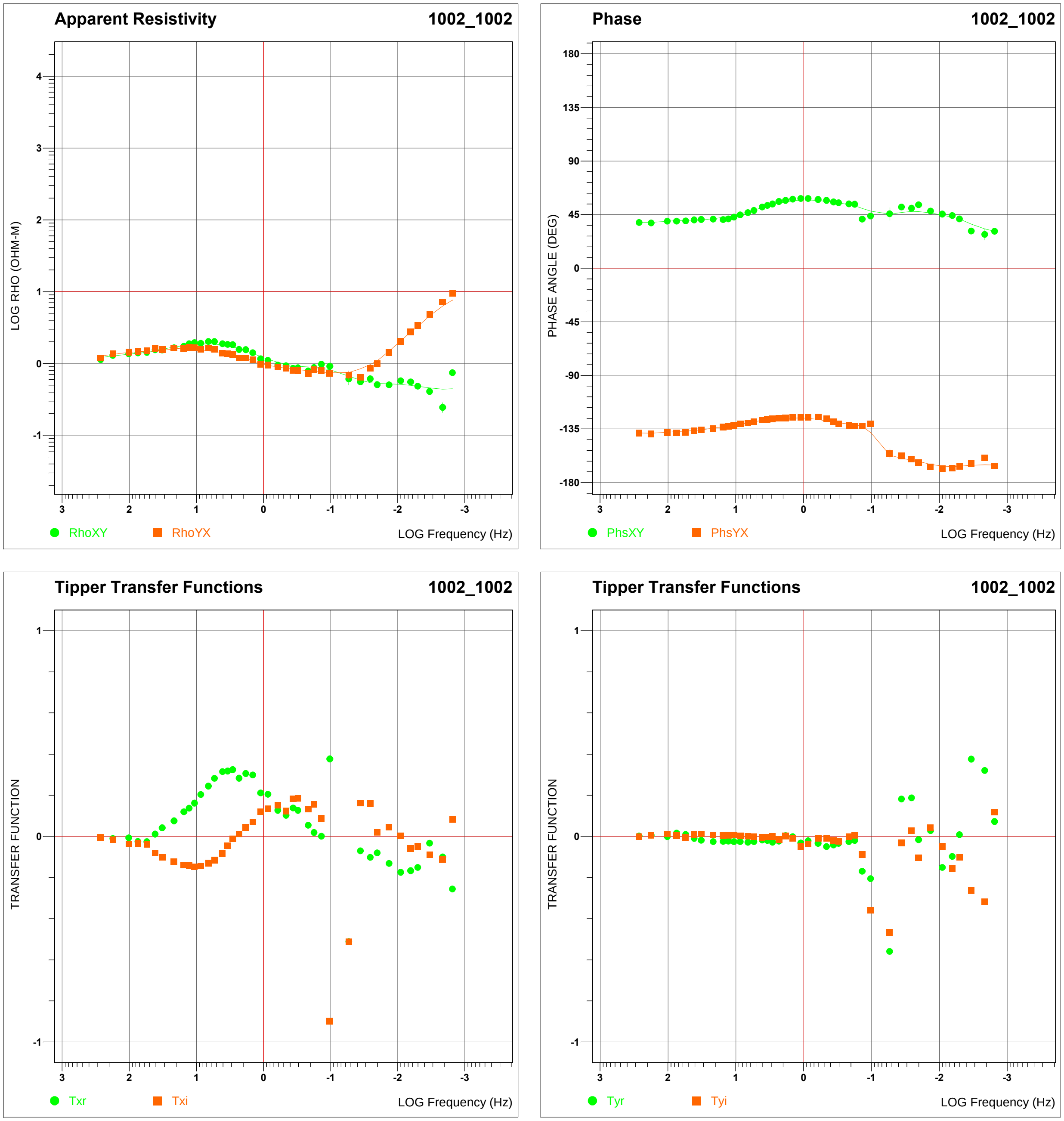
C MT SOUNDINGS CURVES OF FINAL PROCESSED DATA

C.1.1 SITE 1001-001 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



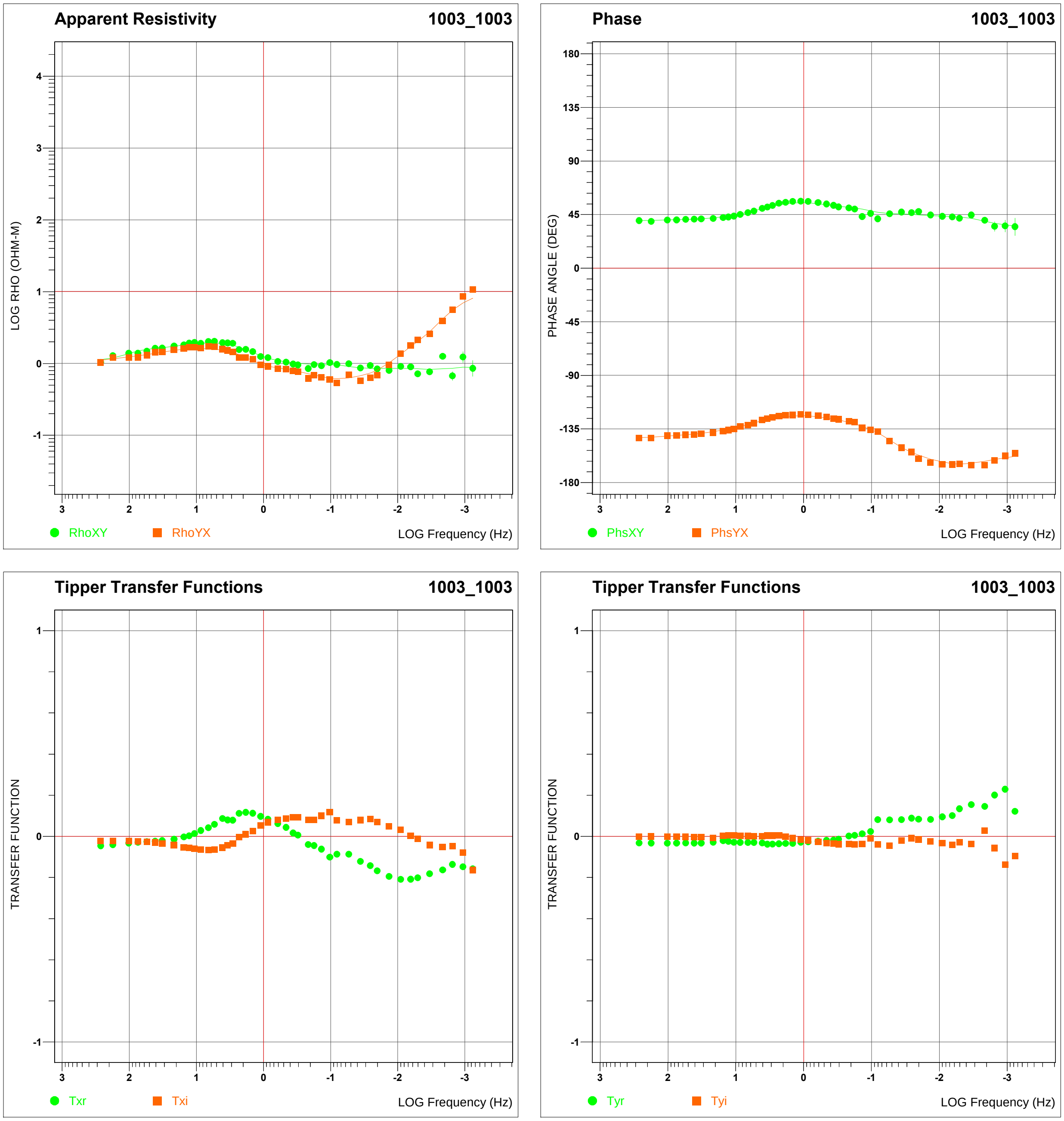
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.2 SITE 1002-002 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



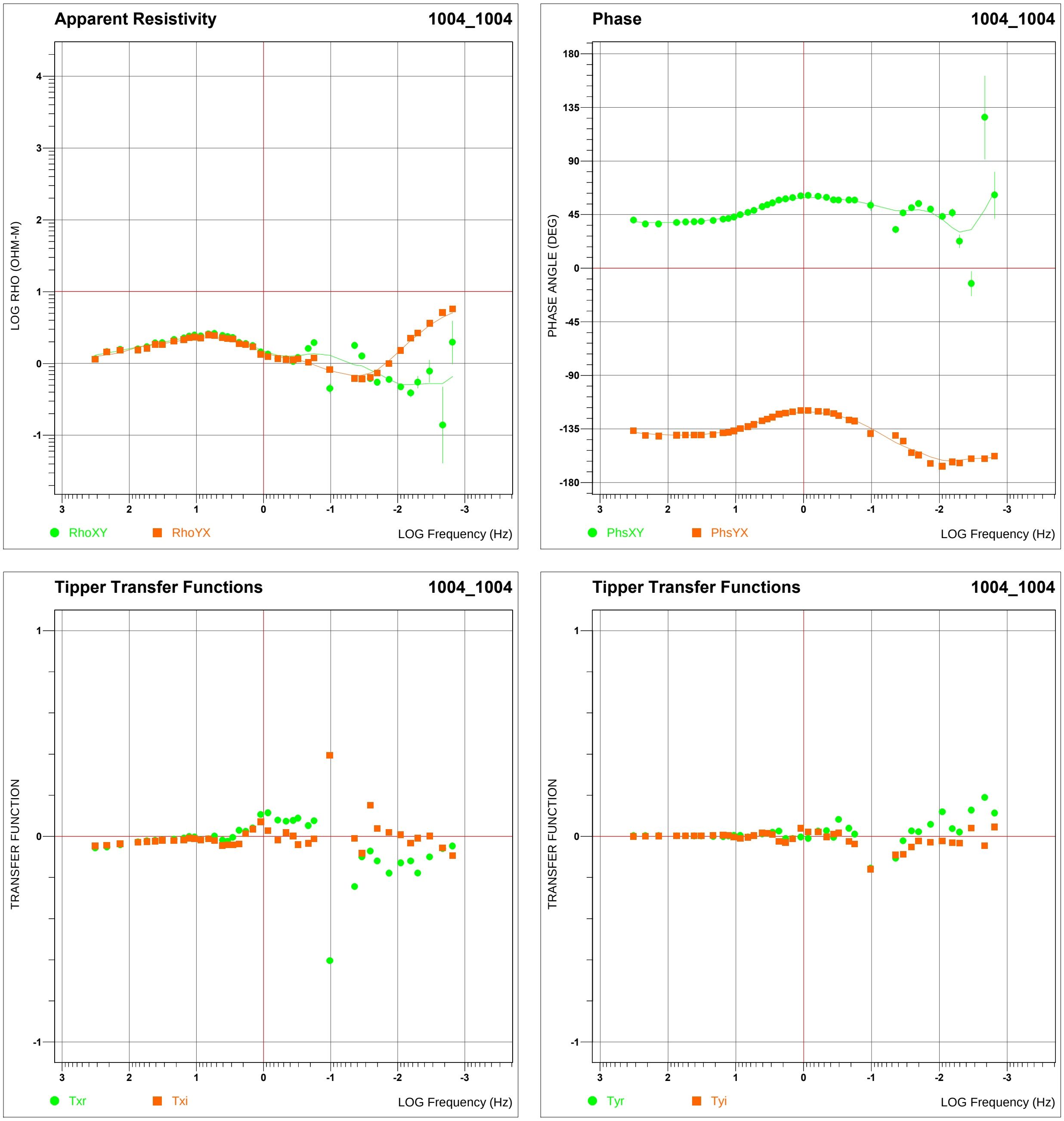
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.3 SITE 1003-003 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



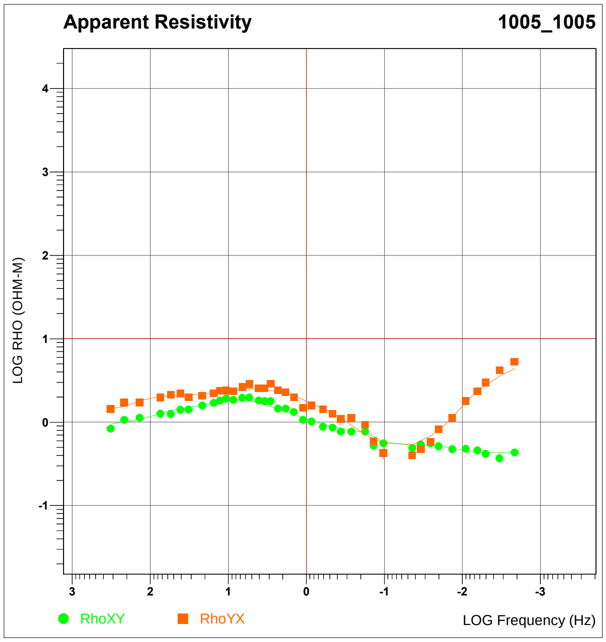
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

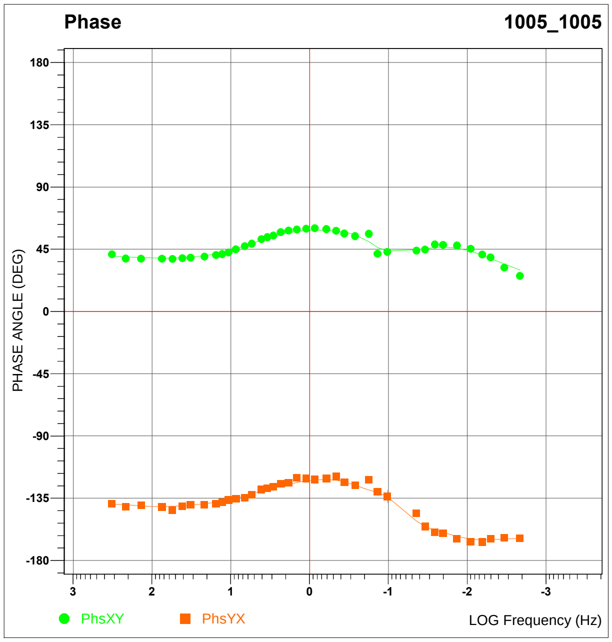
C.1.4 *SITE 1004-004 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY*

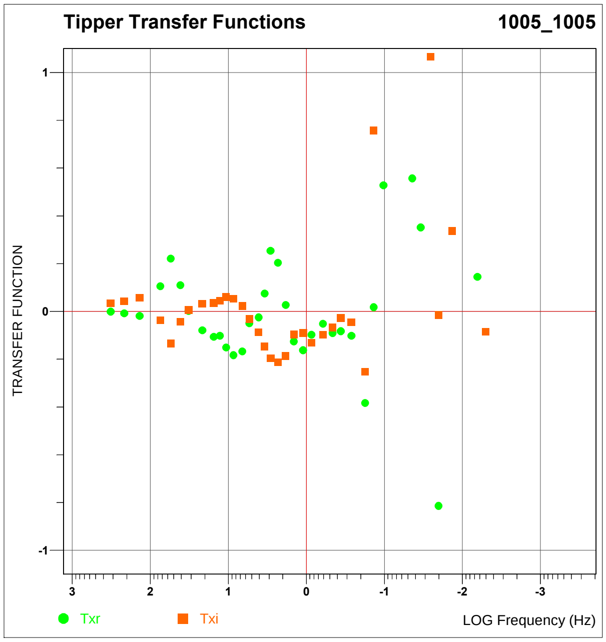


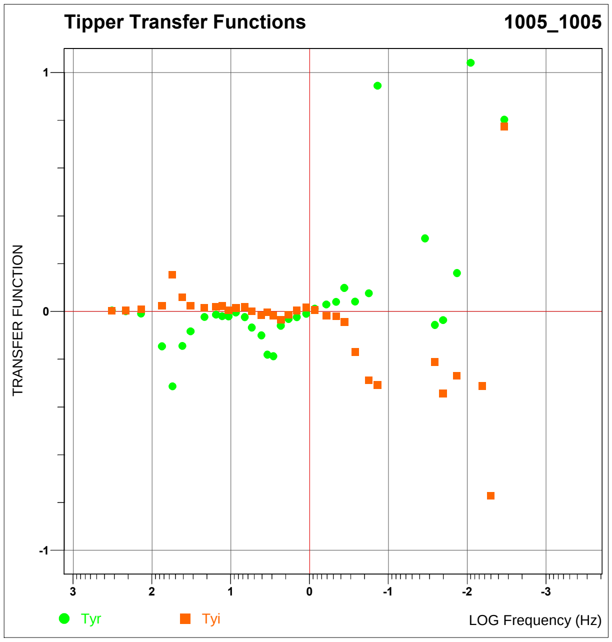
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.5 SITE 1005-005 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



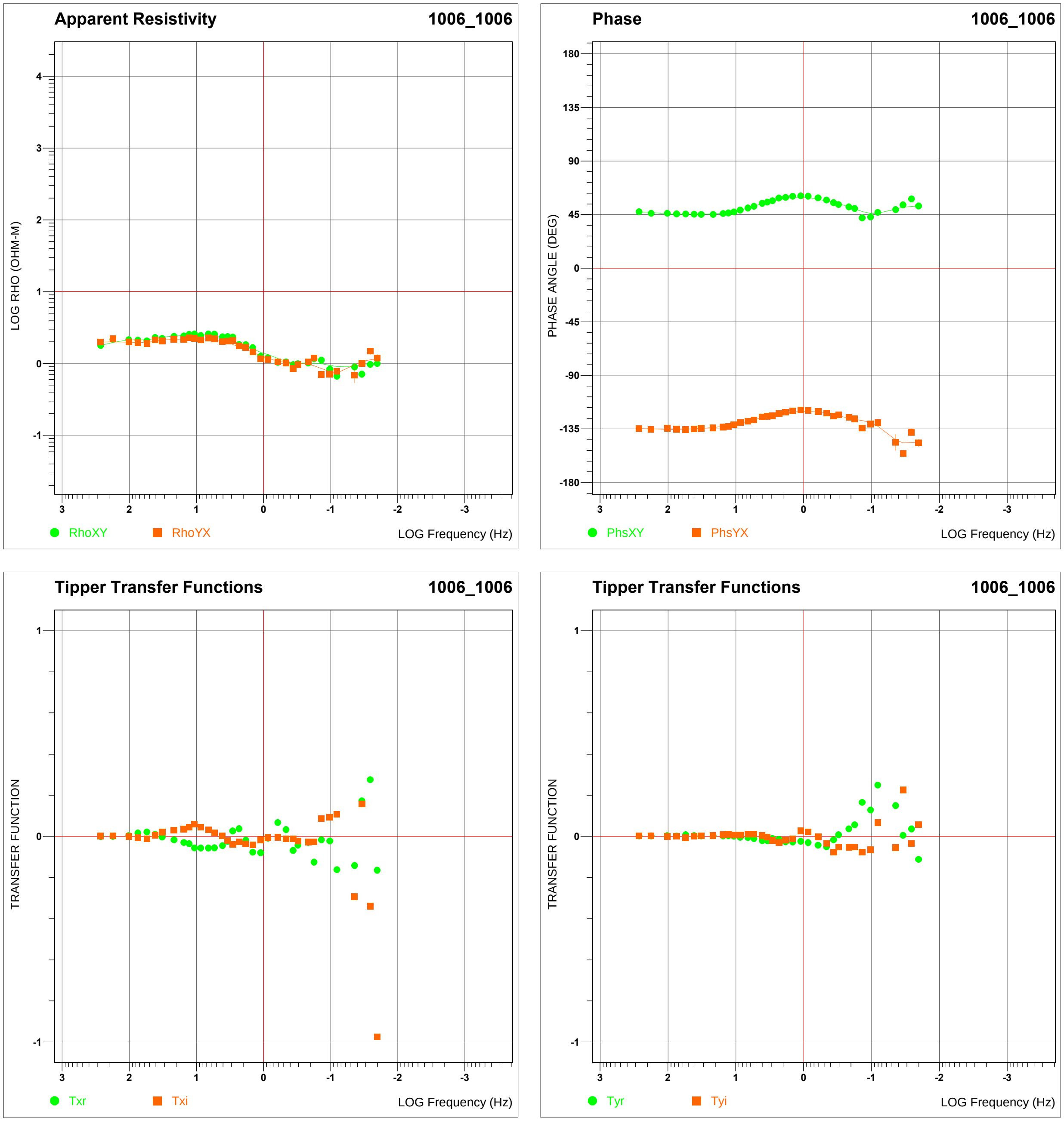






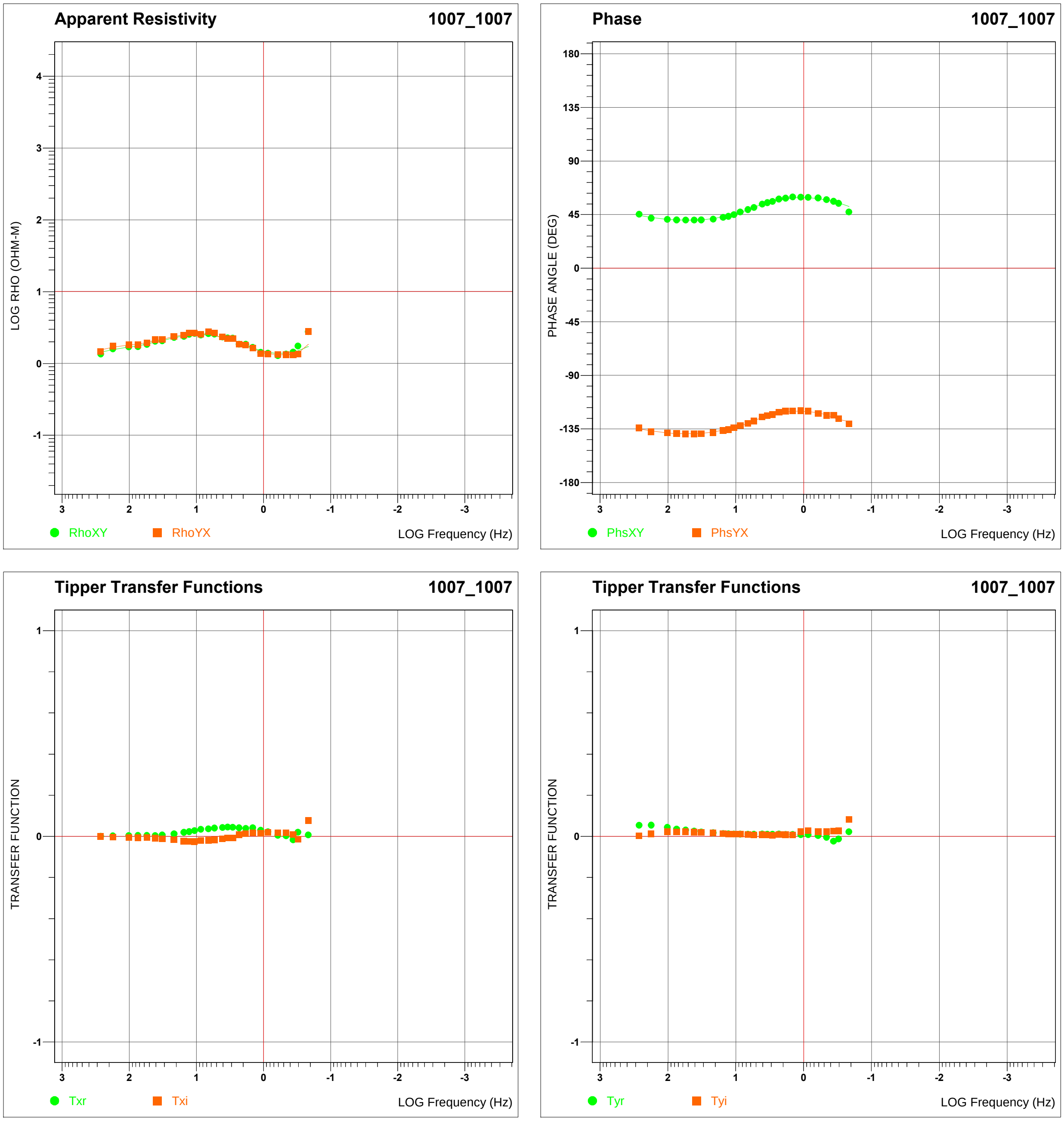
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.6 SITE 1006-006 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



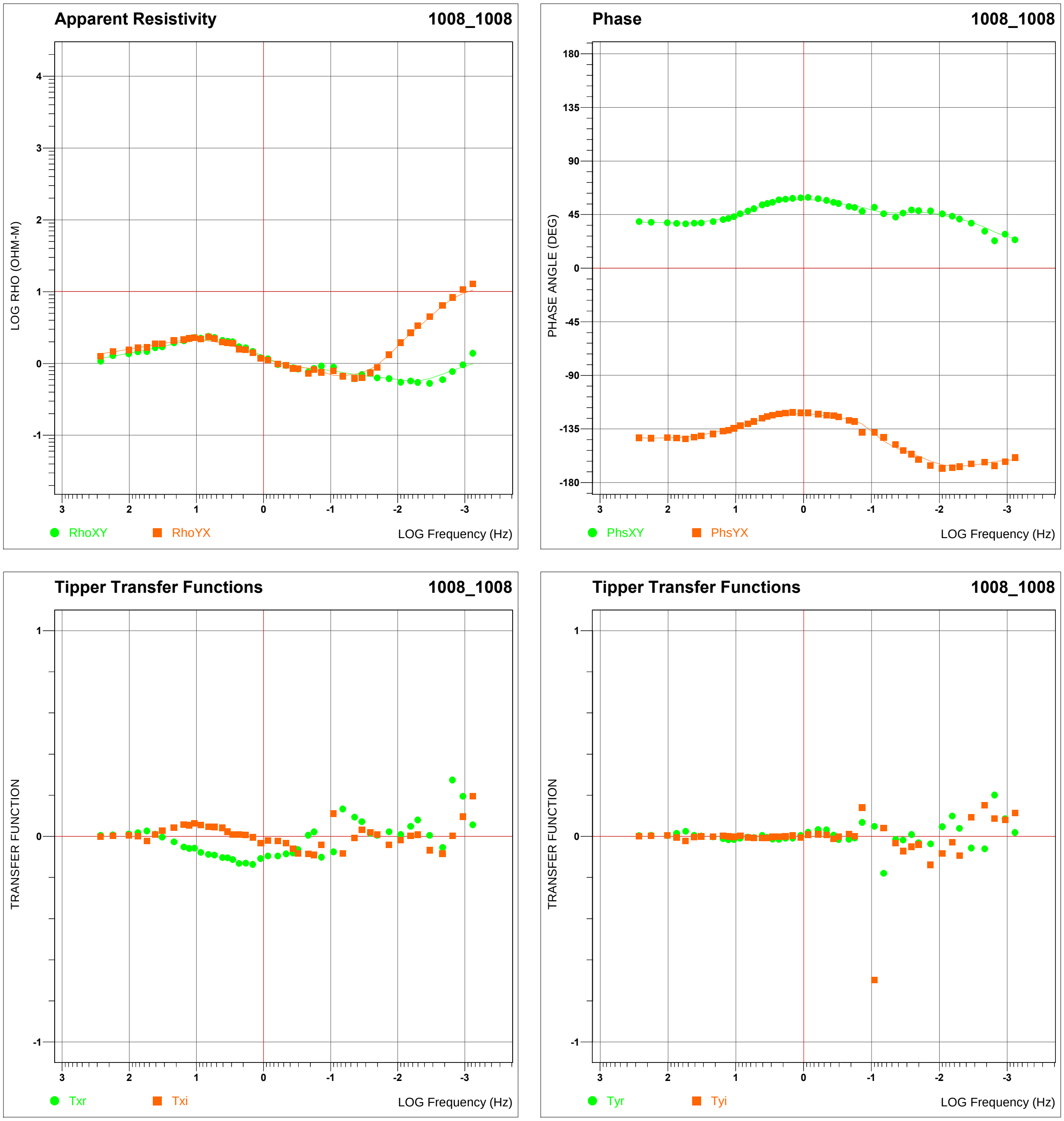
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.7 SITE 1007-007 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



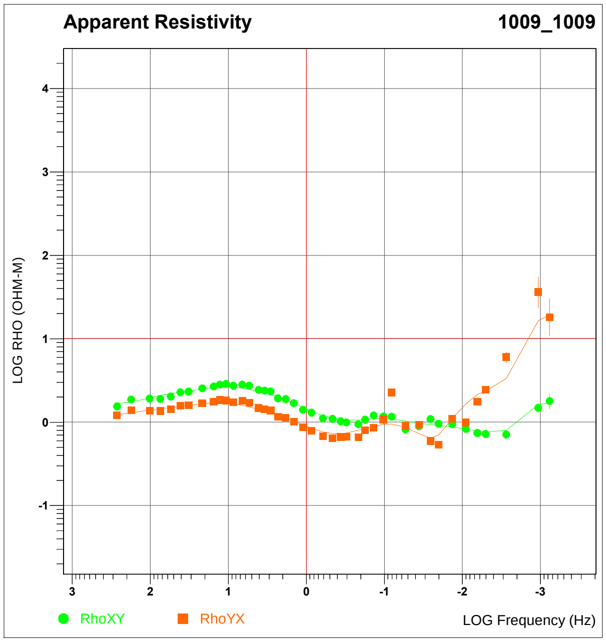
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

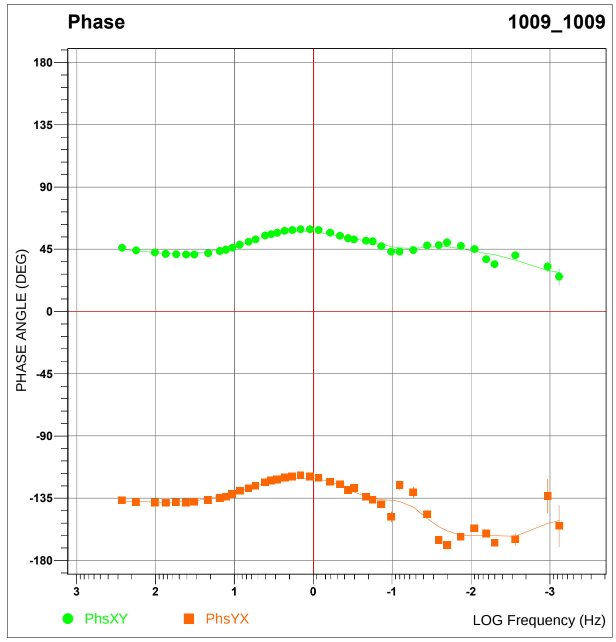
C.1.8 SITE 1008-008 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY

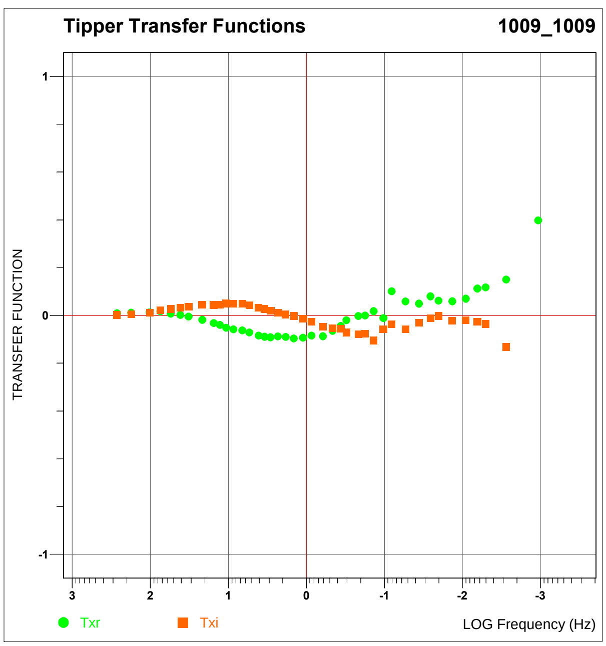


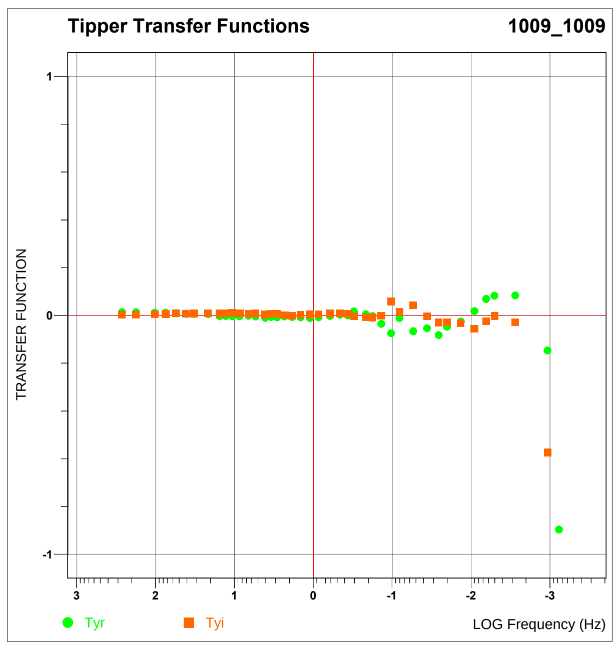
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.9 Site 1009-009 – Apparent Resistivity, Phase, & Tipper Sounding Curves vs Frequency



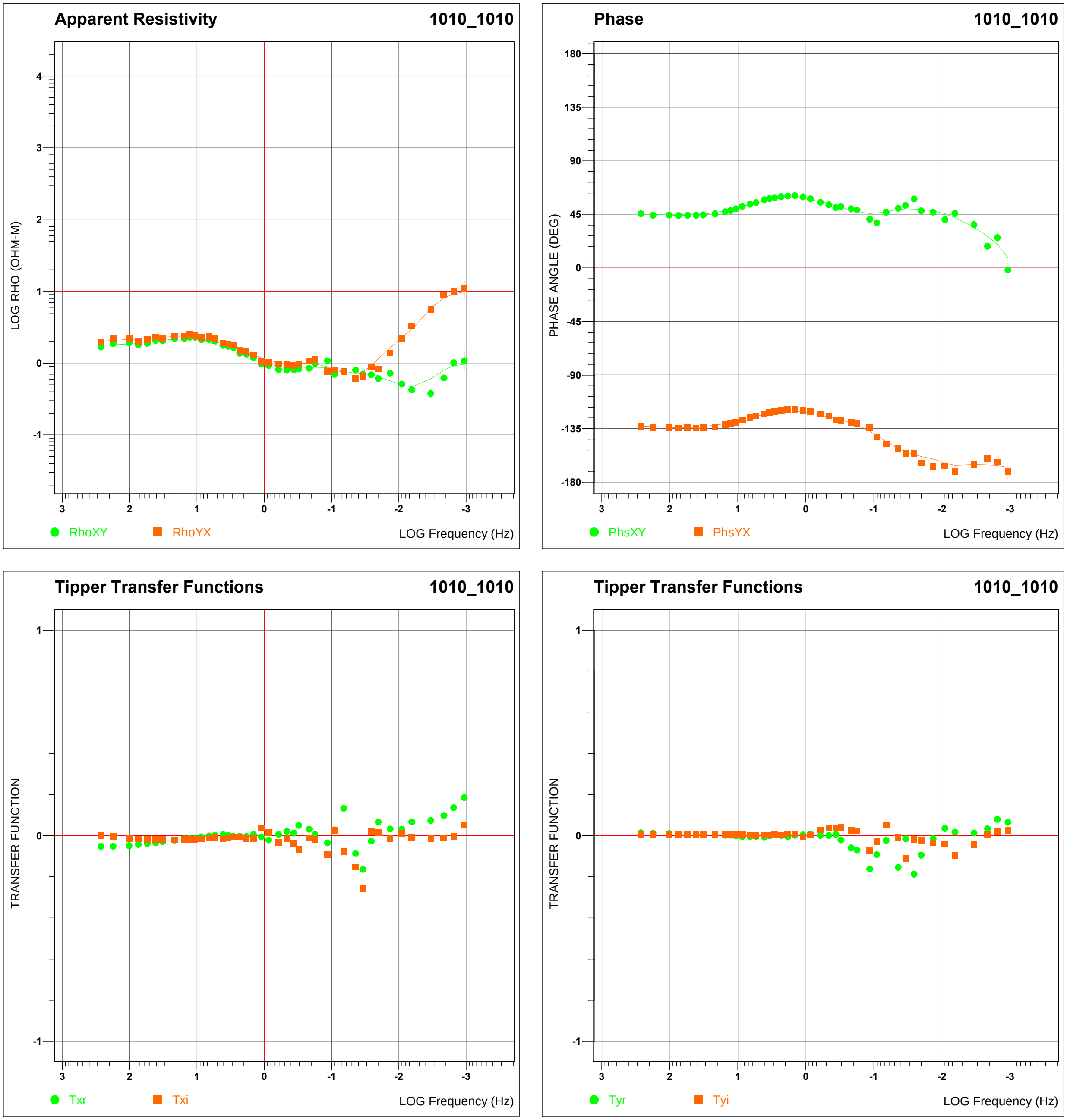






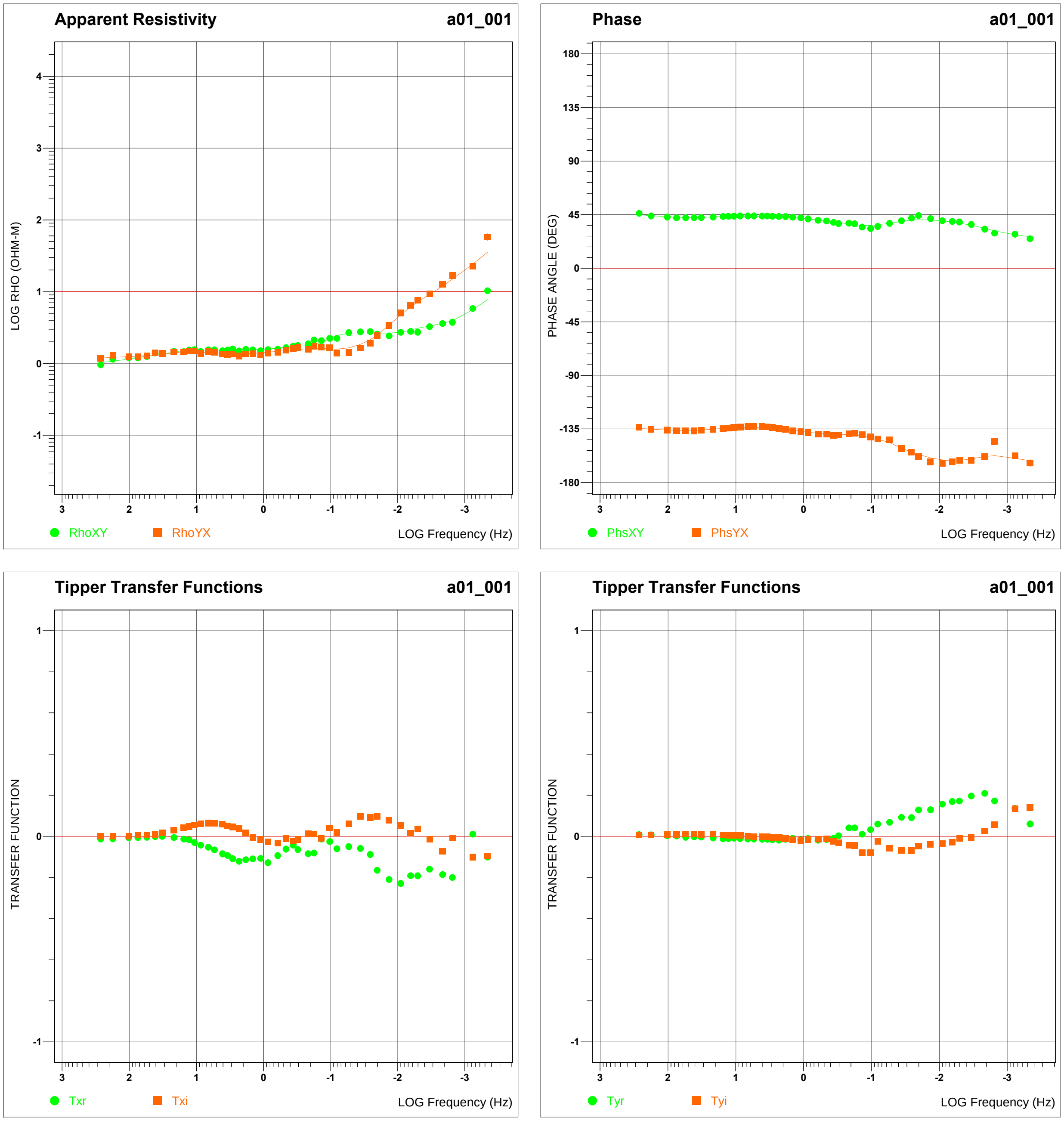
X is pointing to 90deg ; Y is perpendicular to X
(right hand positive down coordinate system)
Mode XY (Green) denotes Electrical (**Ex**) field and orthogonal Magnetic (**Hy**) field (=Ex/Hy)
Mode YX (Orange) denotes Electrical (**Ey**) field and orthogonal Magnetic (**Hx**) field (=Ey/Hx)

C.1.10 SITE 1010-010 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



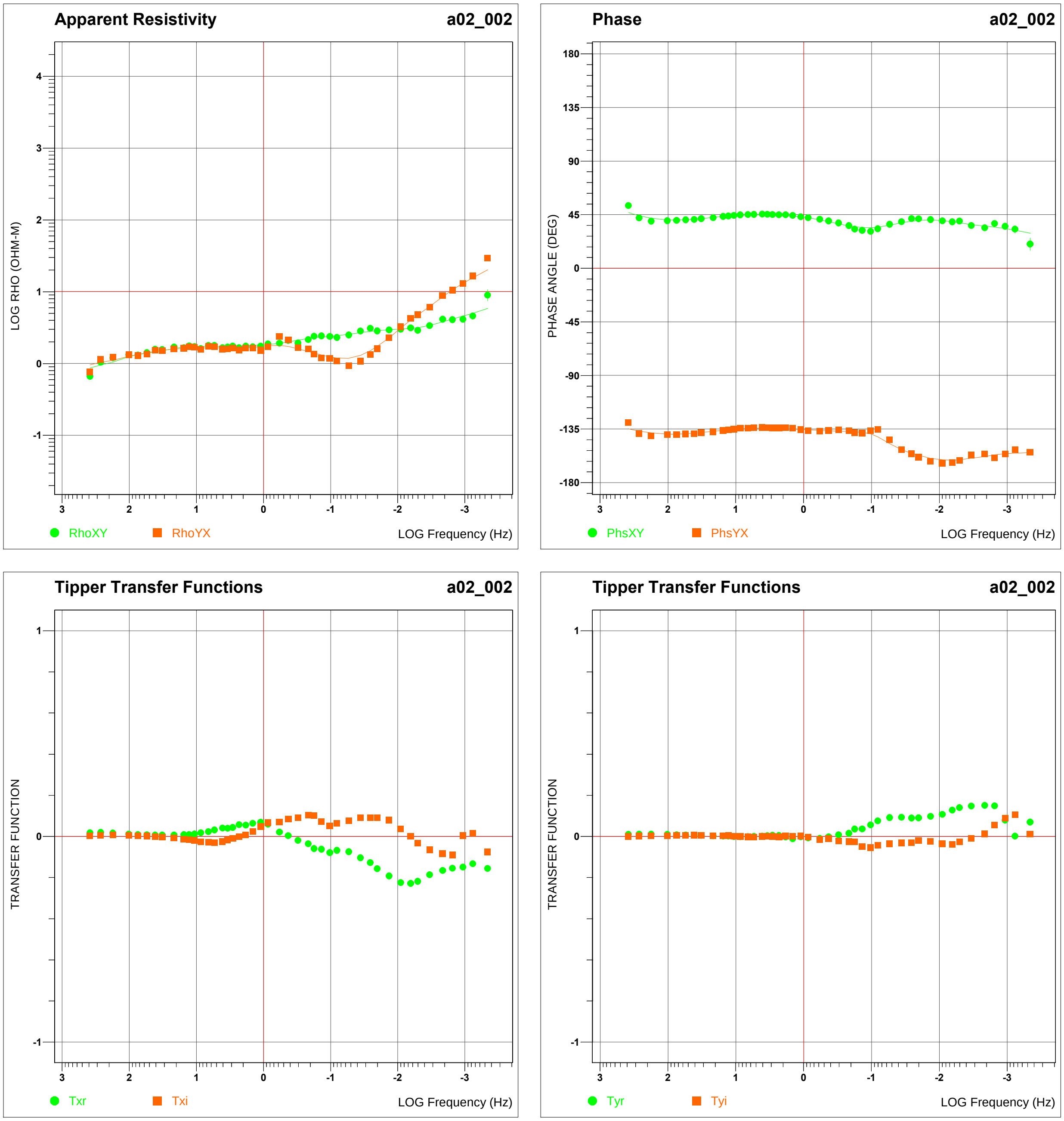
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.11 SITE A01-001 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



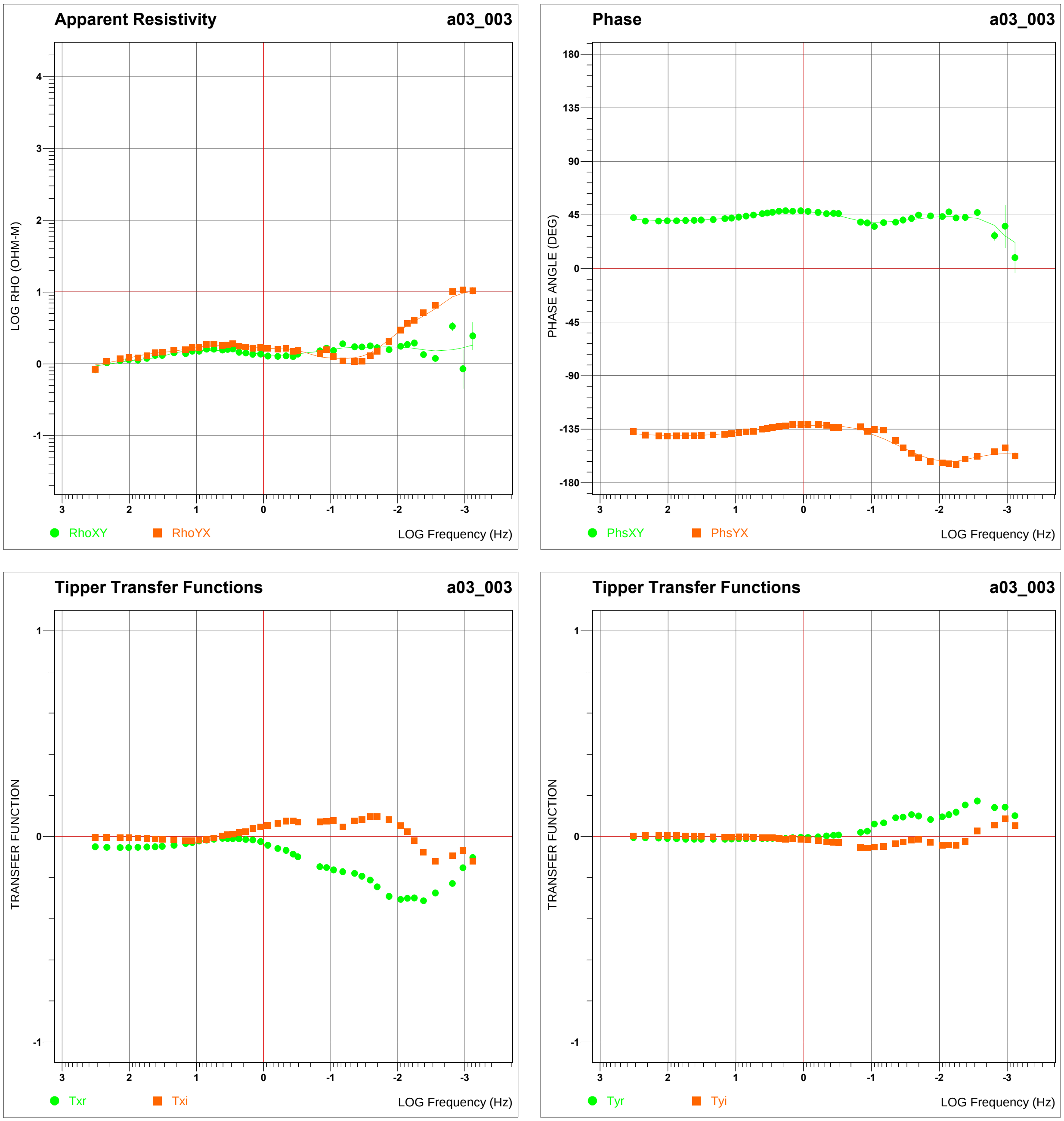
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.12 SITE A02-002 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



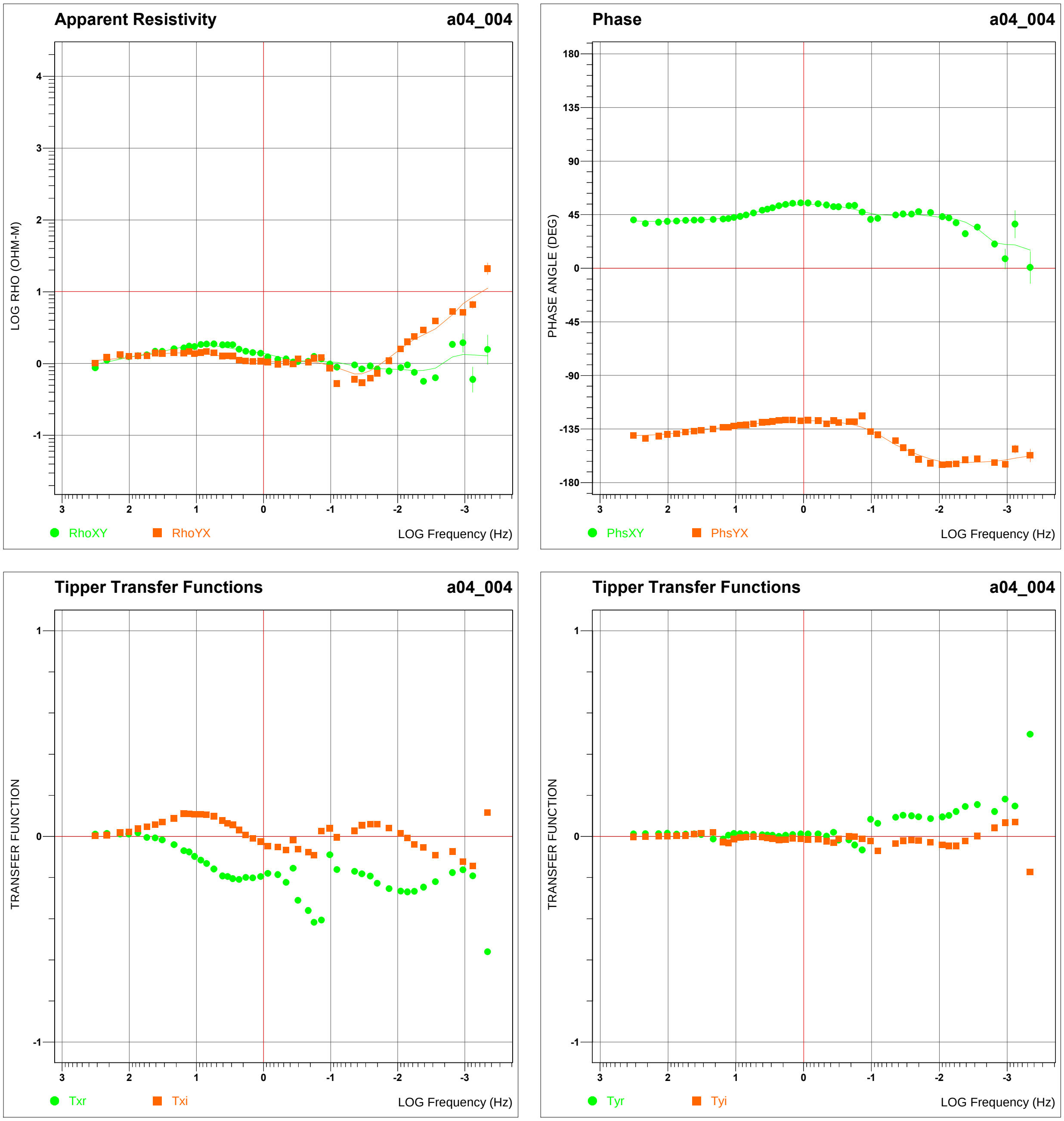
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.13 SITE A03-003 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



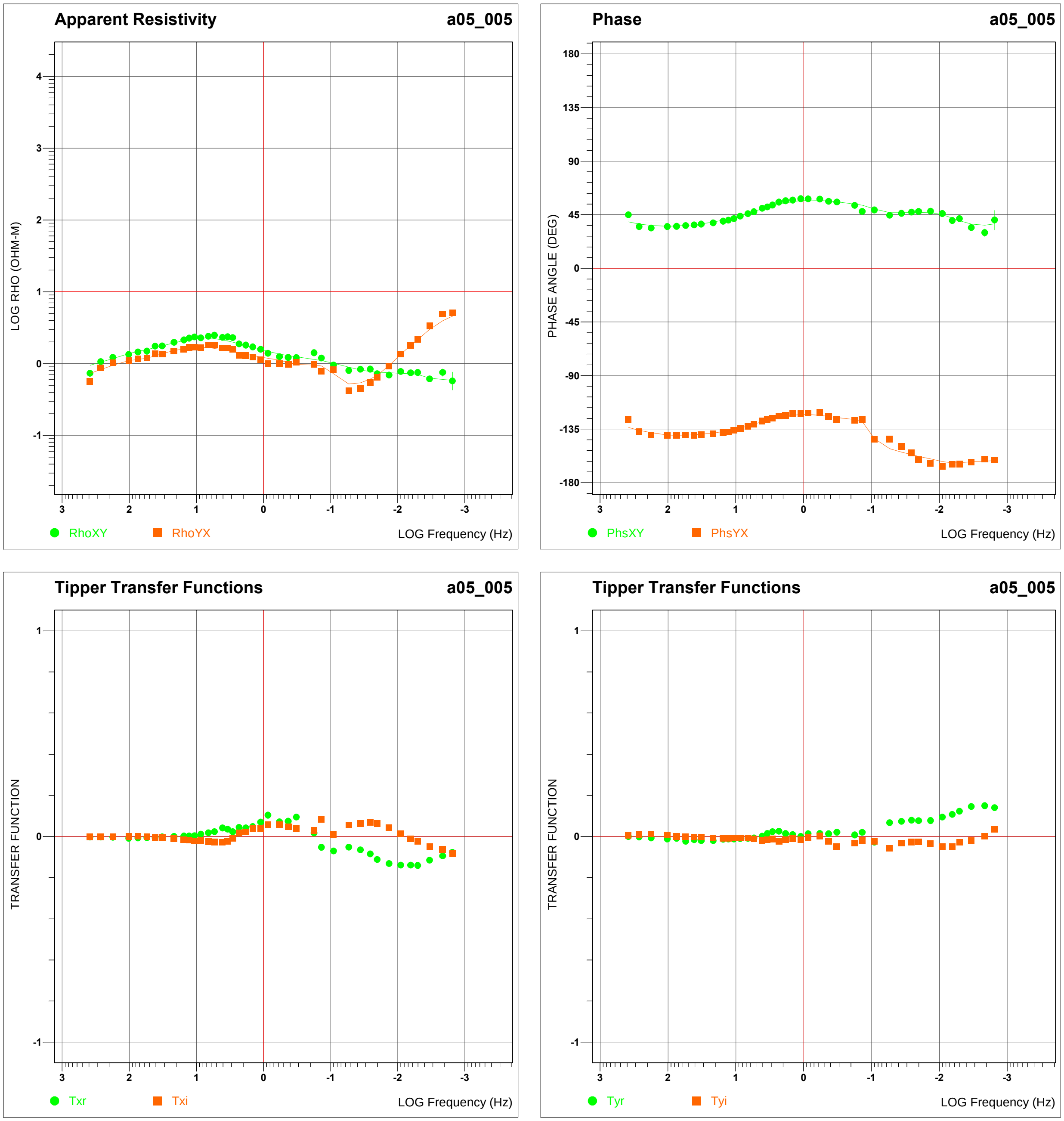
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.14 SITE A04-004 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



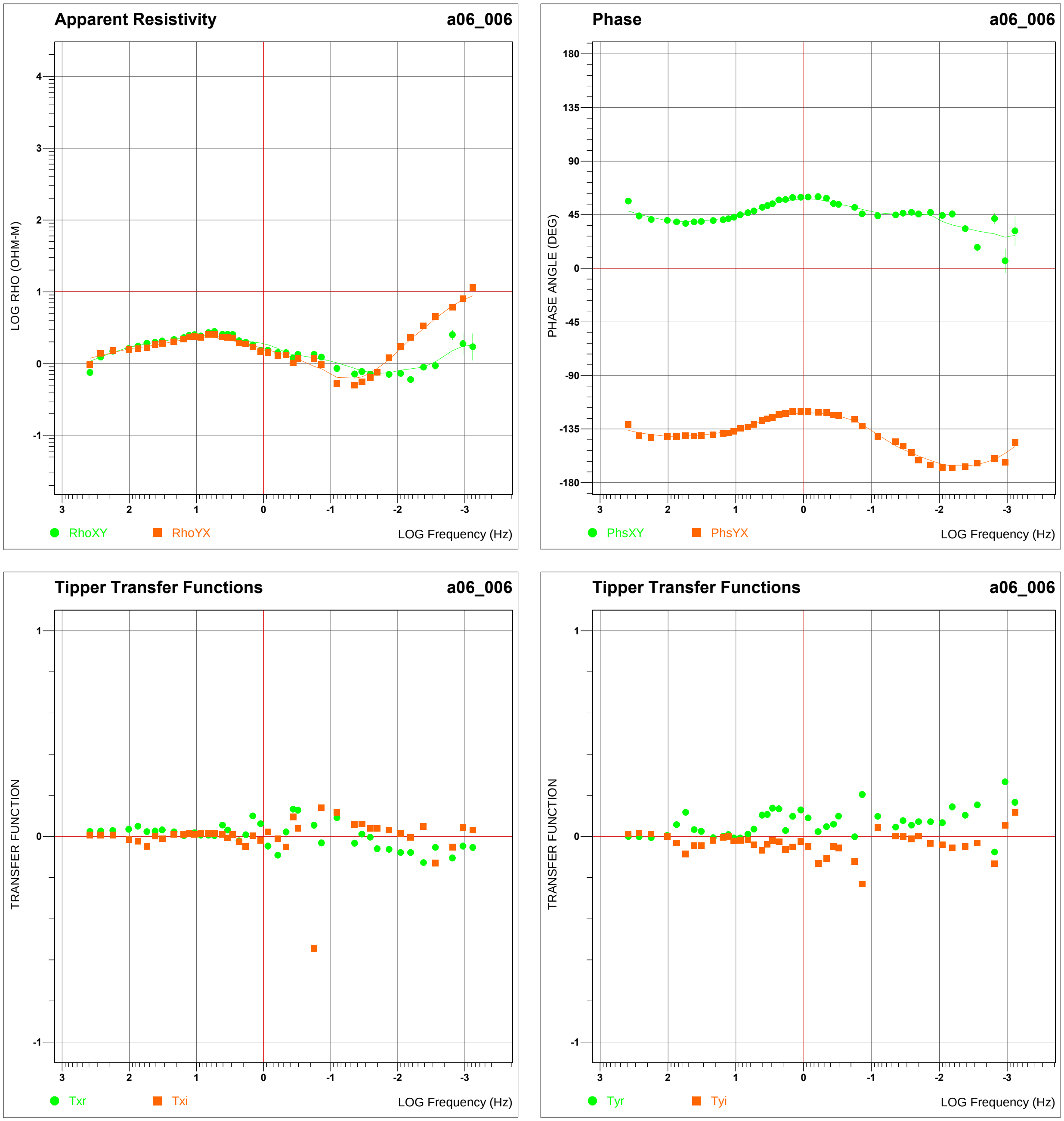
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.15 SITE A05-005 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.16 SITE A06-006 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



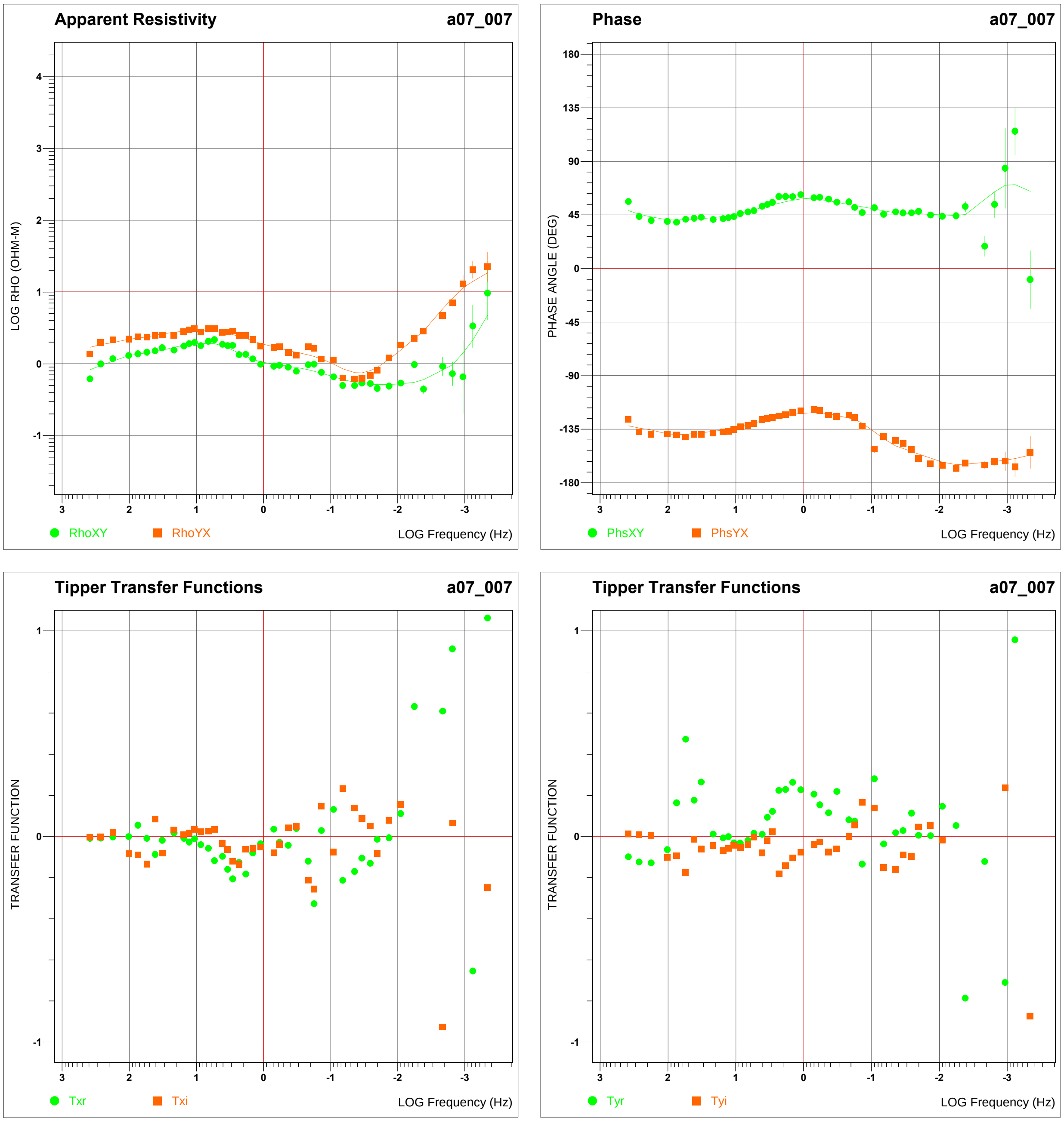
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X

(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

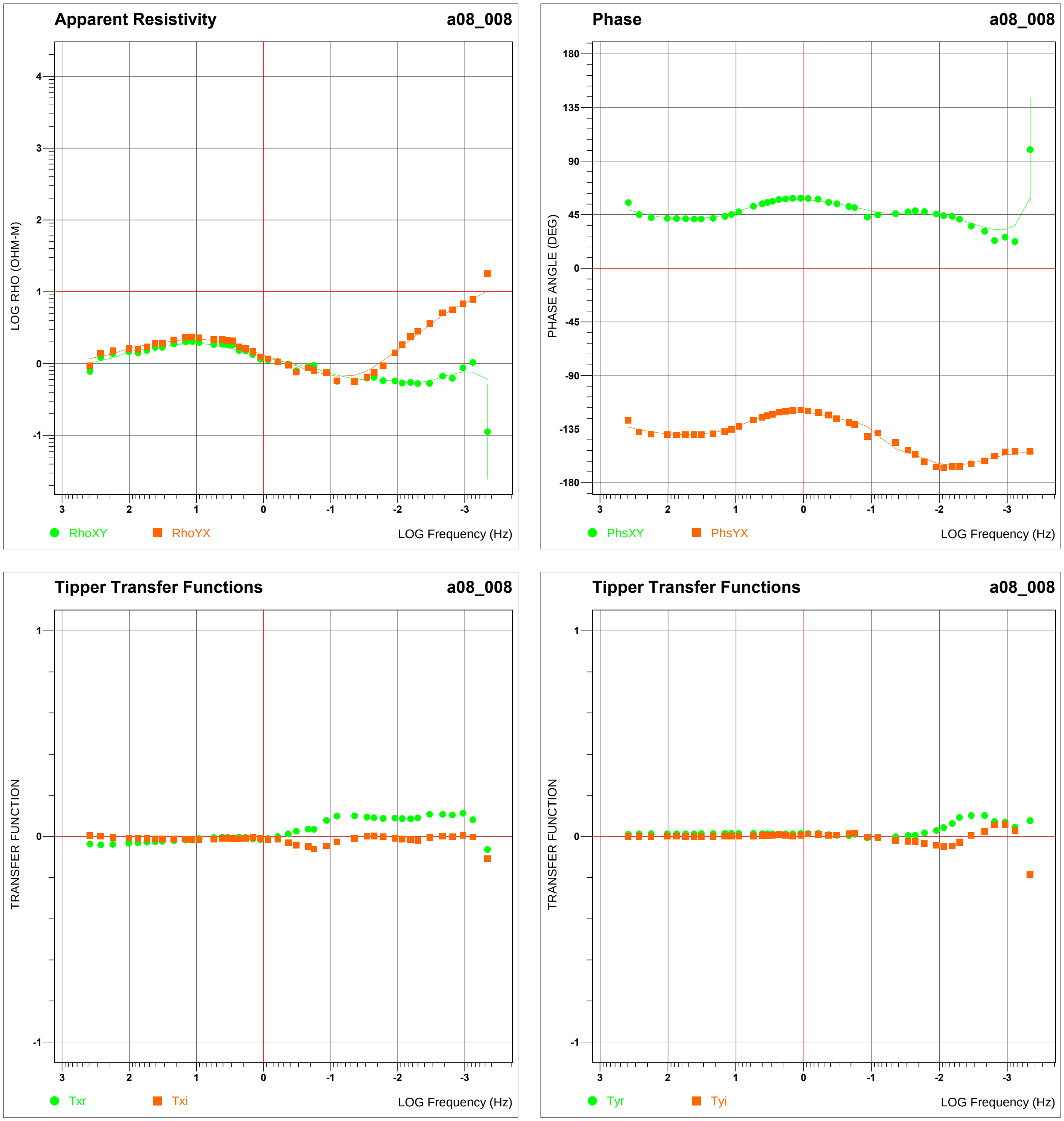
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.17 SITE A07-007 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



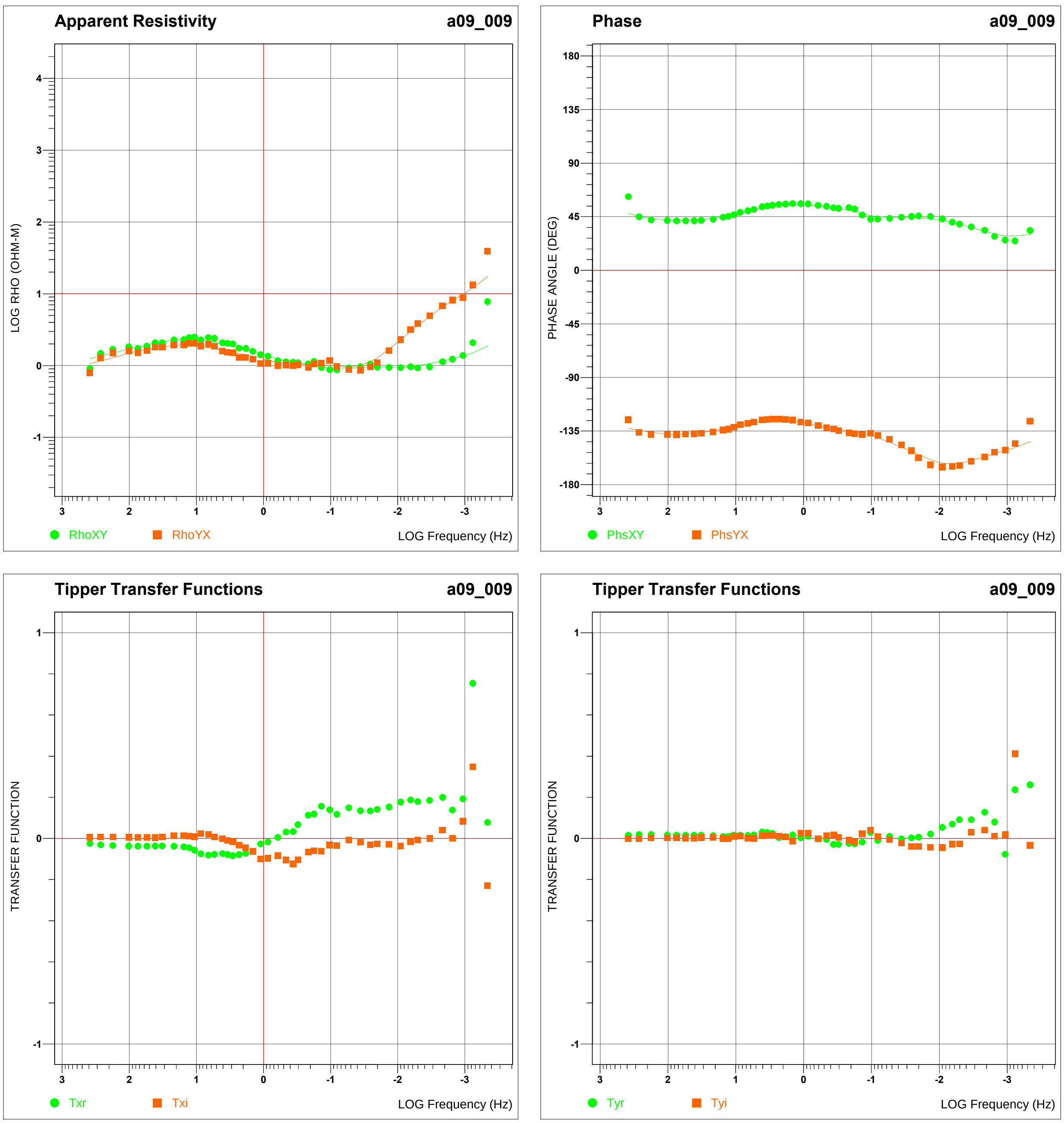
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.18 SITE A08-008 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



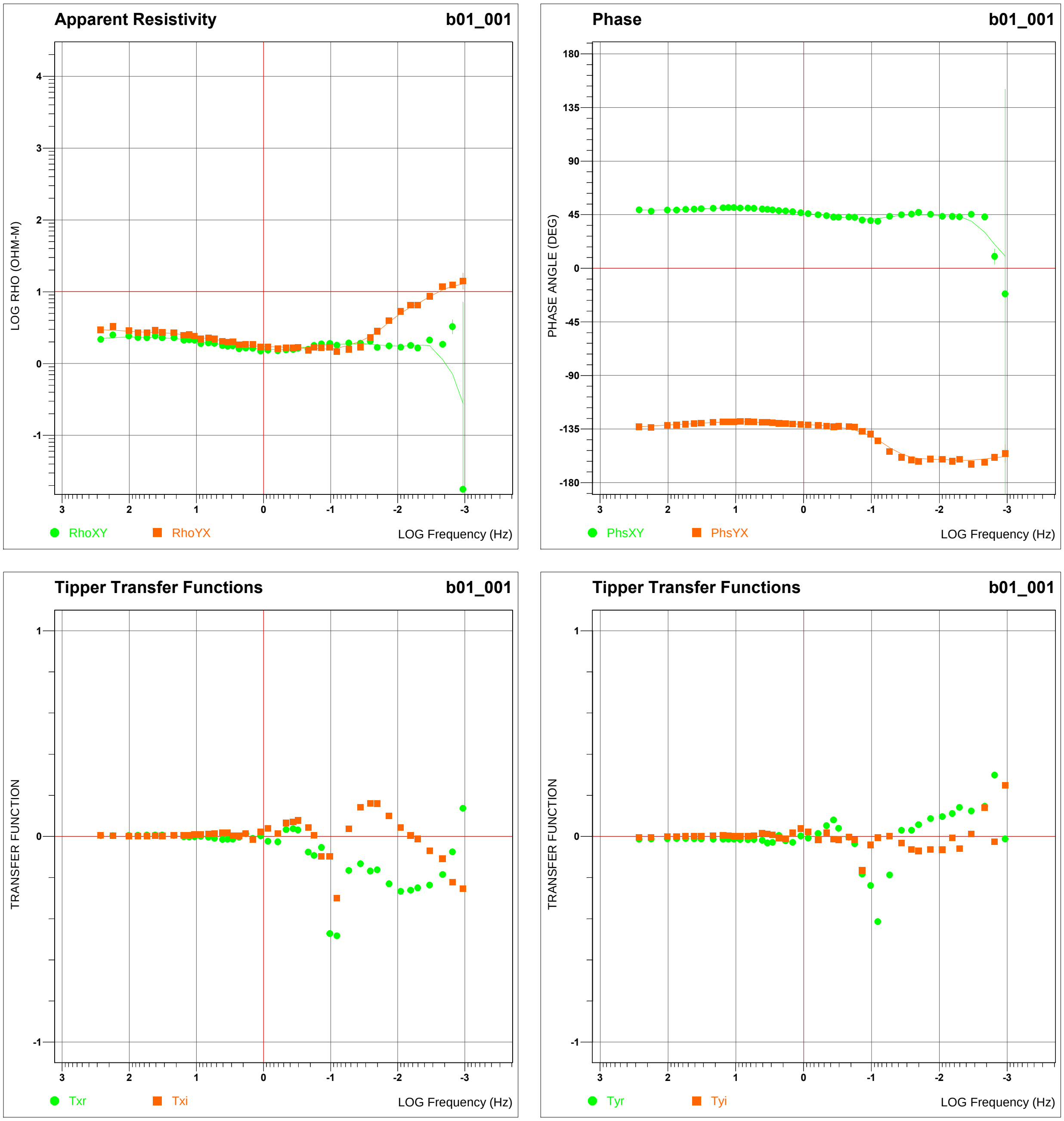
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.19 SITE A09-009 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.20 SITE B01-001 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



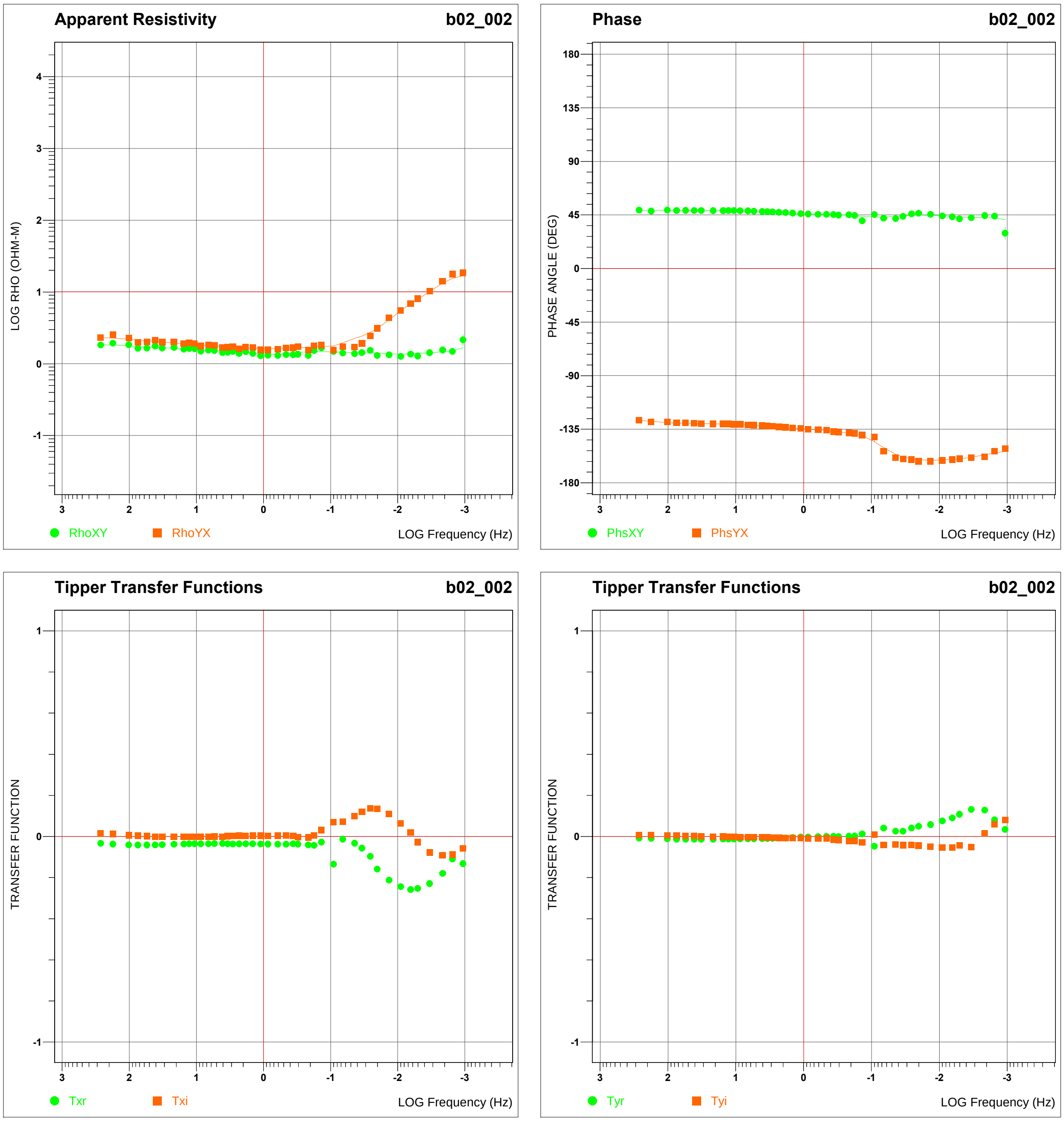
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X

(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.21 SITE B02-002 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



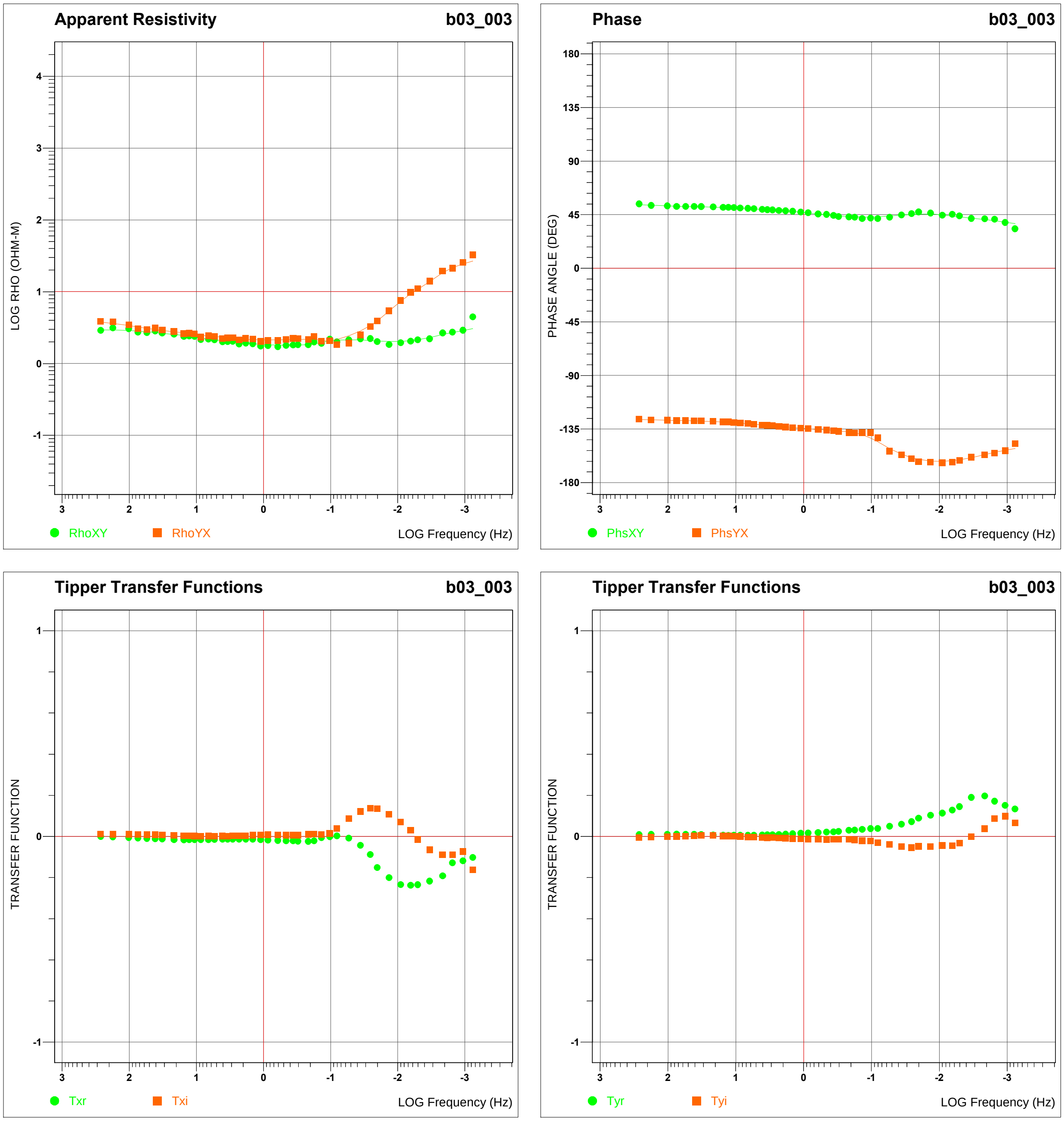
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X

(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.22 SITE B03-003 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



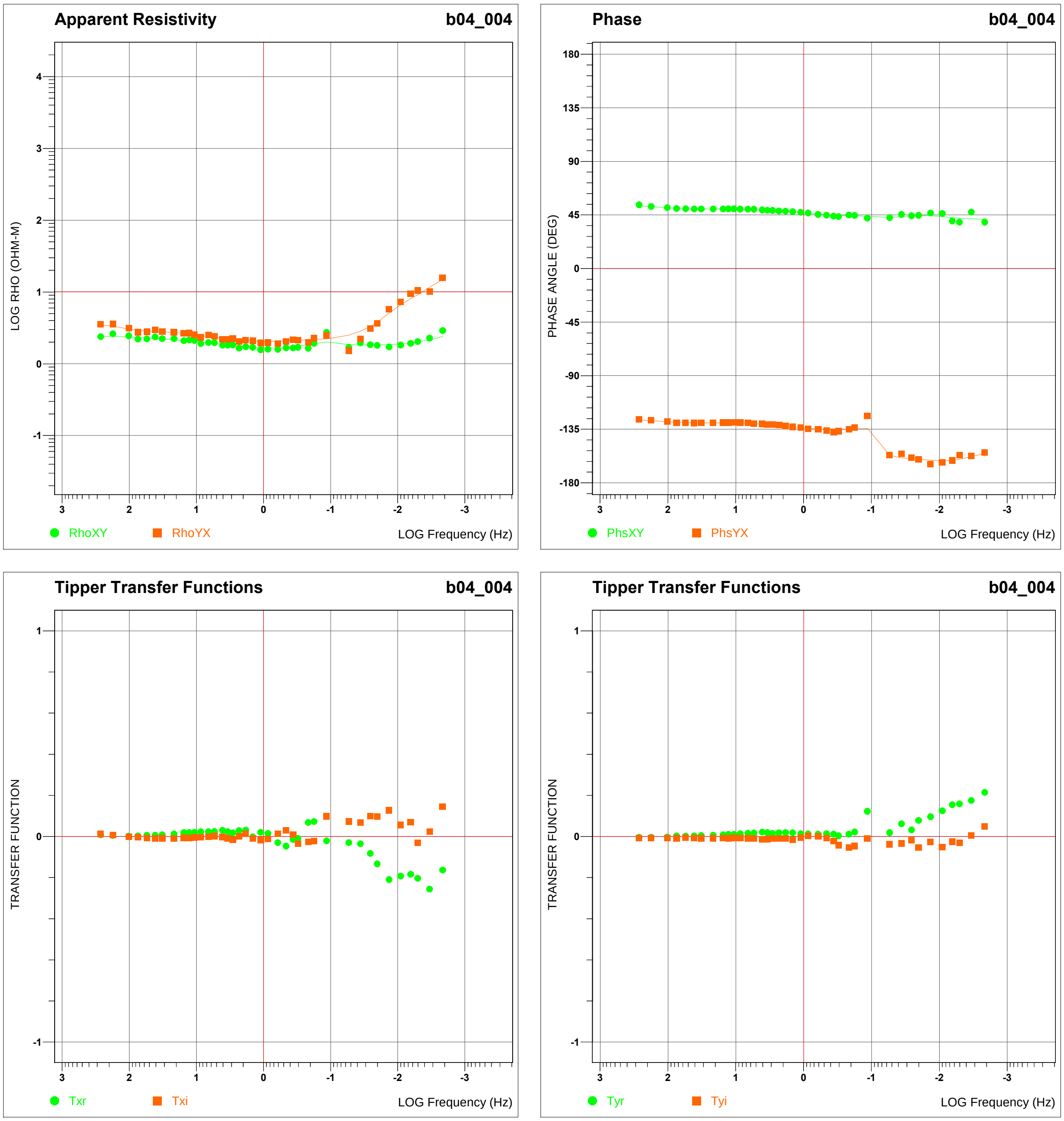
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X

(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

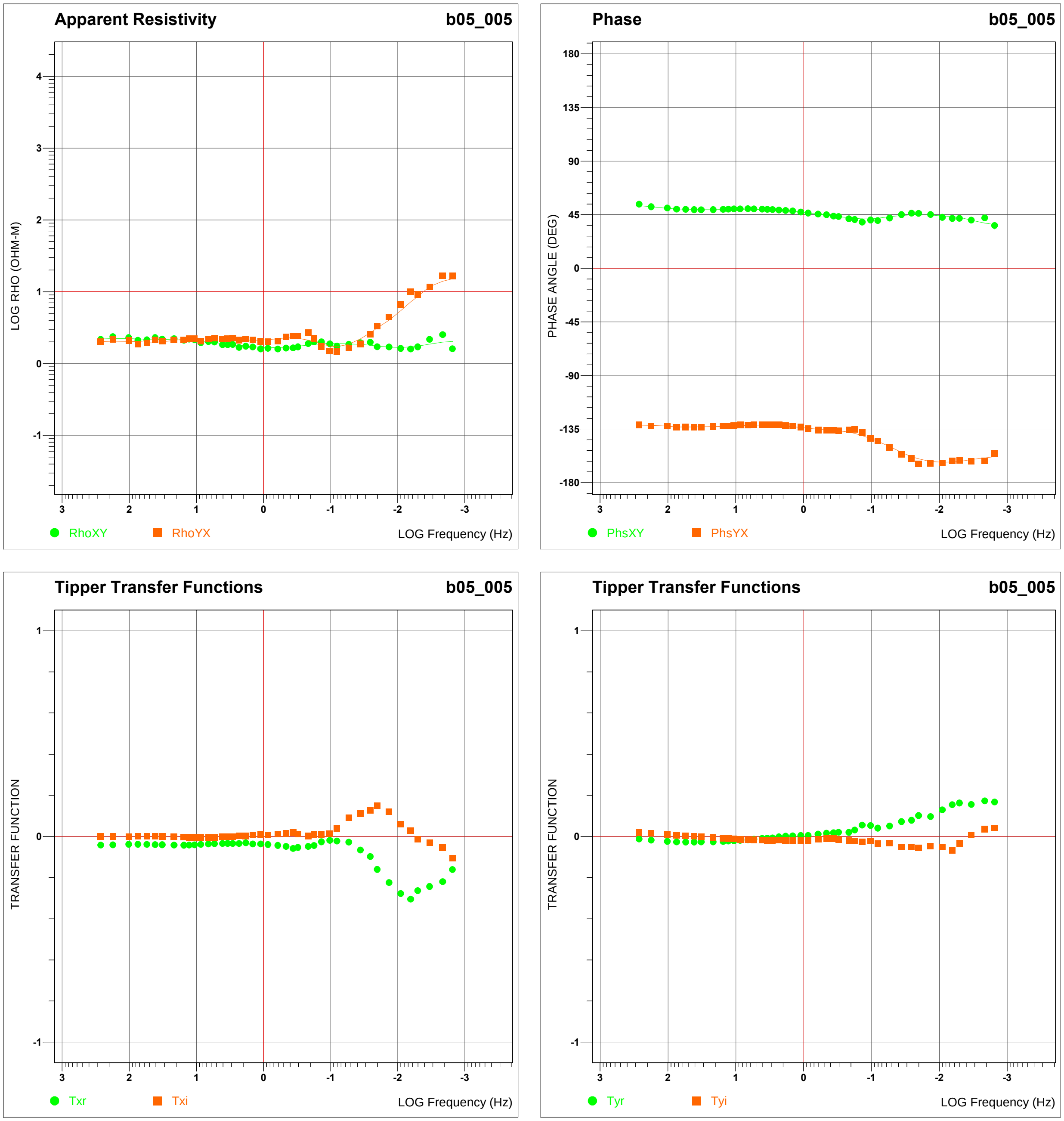
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.23 SITE B04-004 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



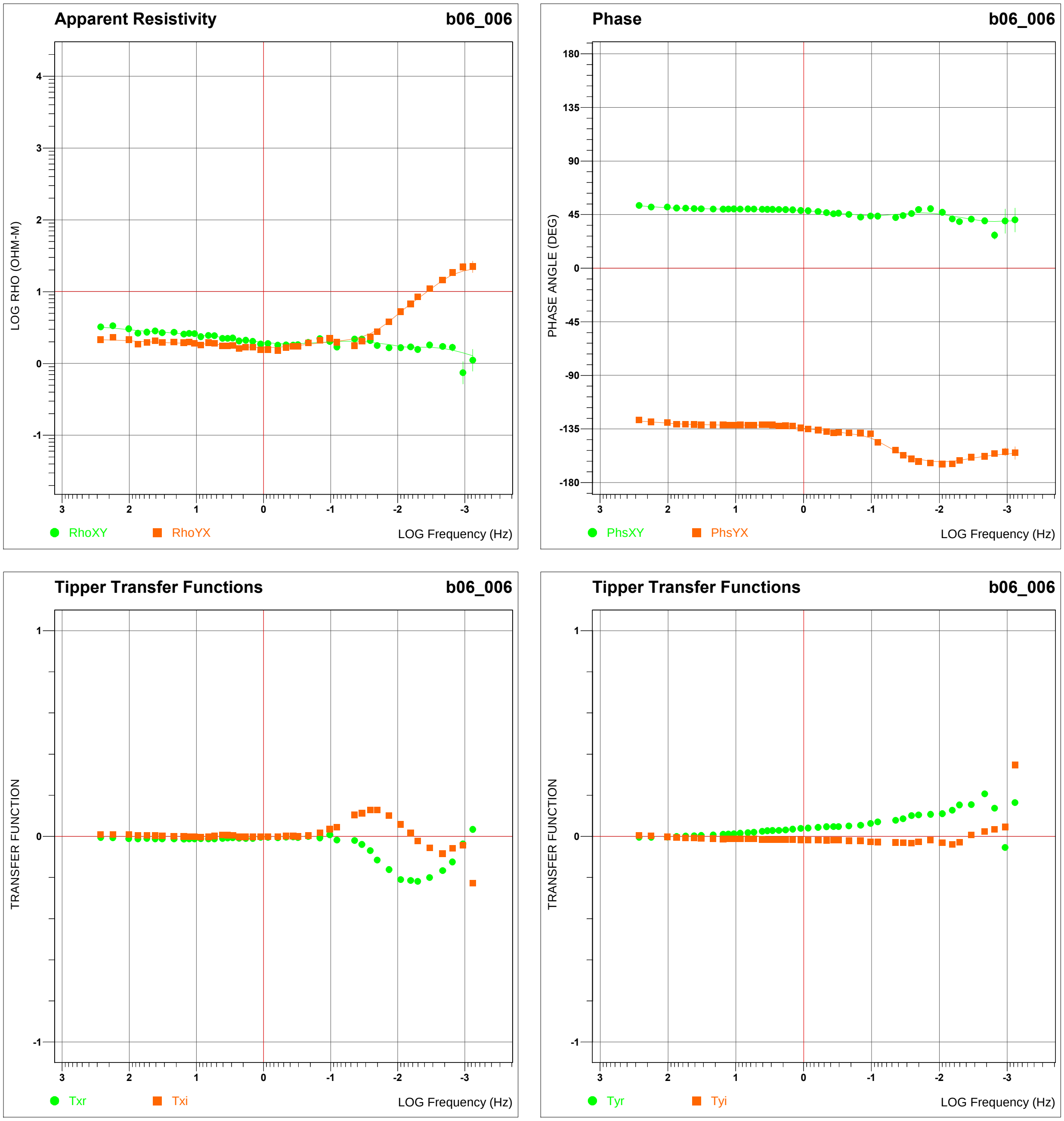
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.24 SITE B05-005 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



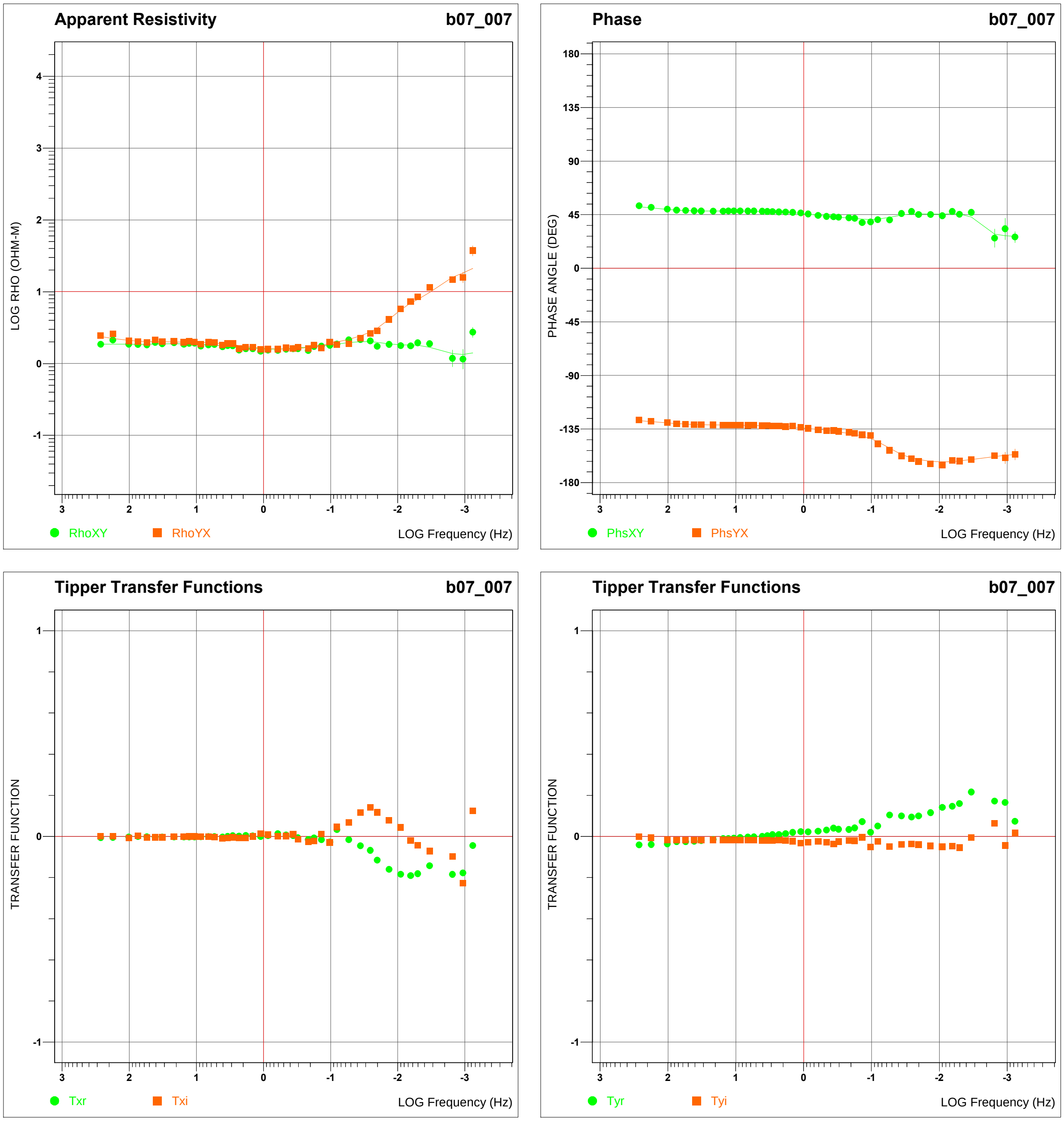
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.25 SITE B06-006 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



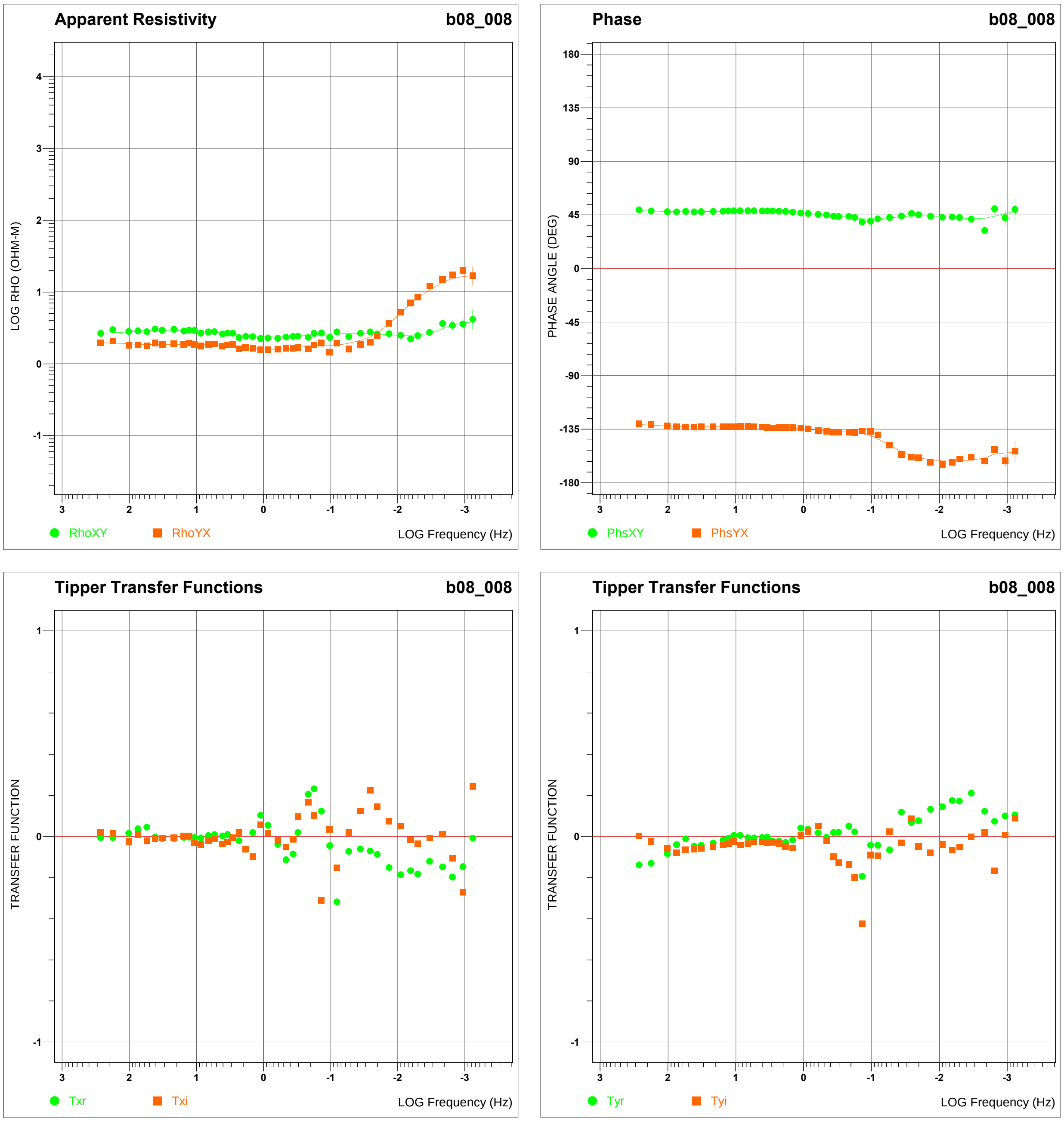
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.26 SITE B07-007 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.27 SITE B08-008 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



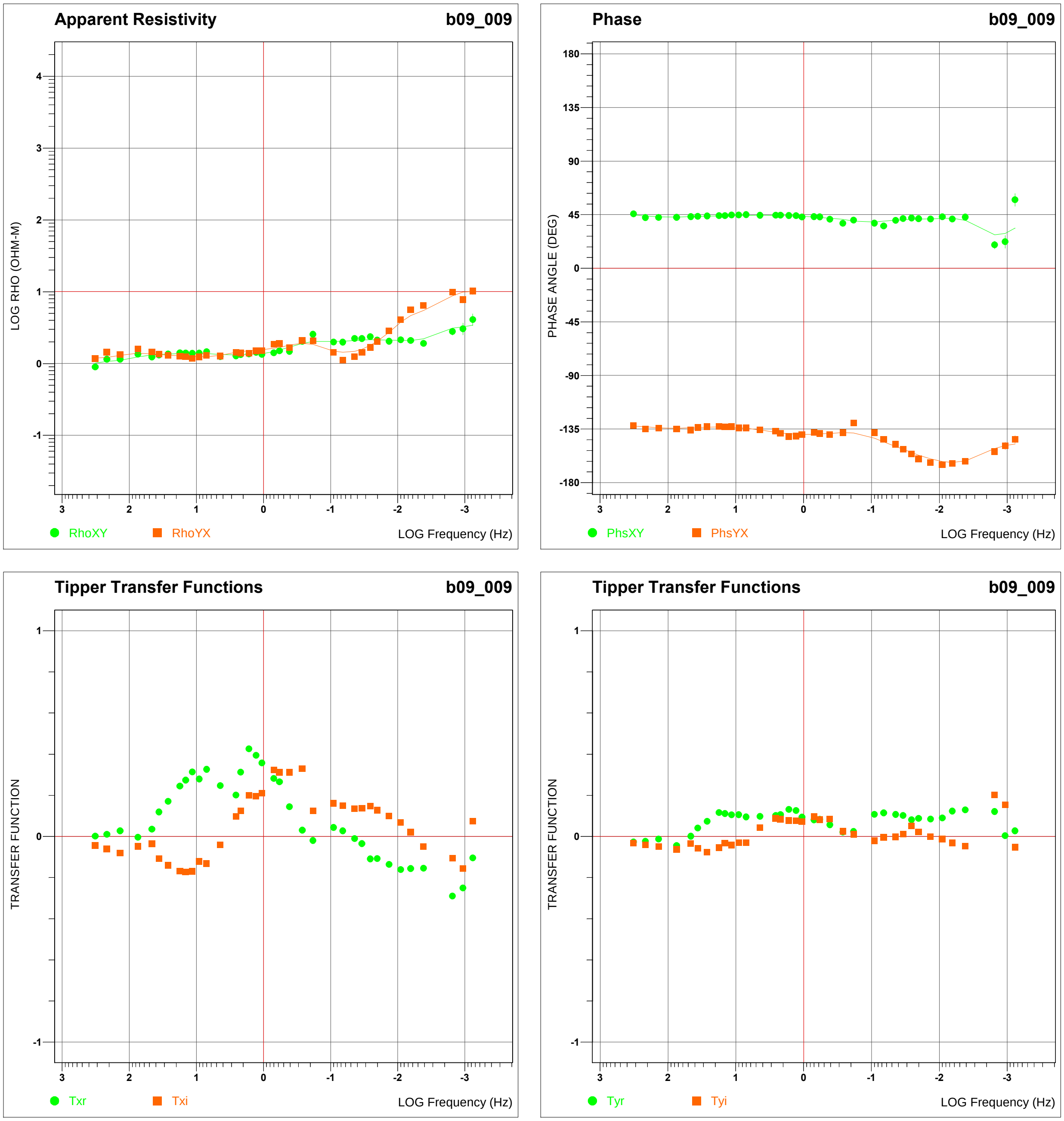
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X

(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

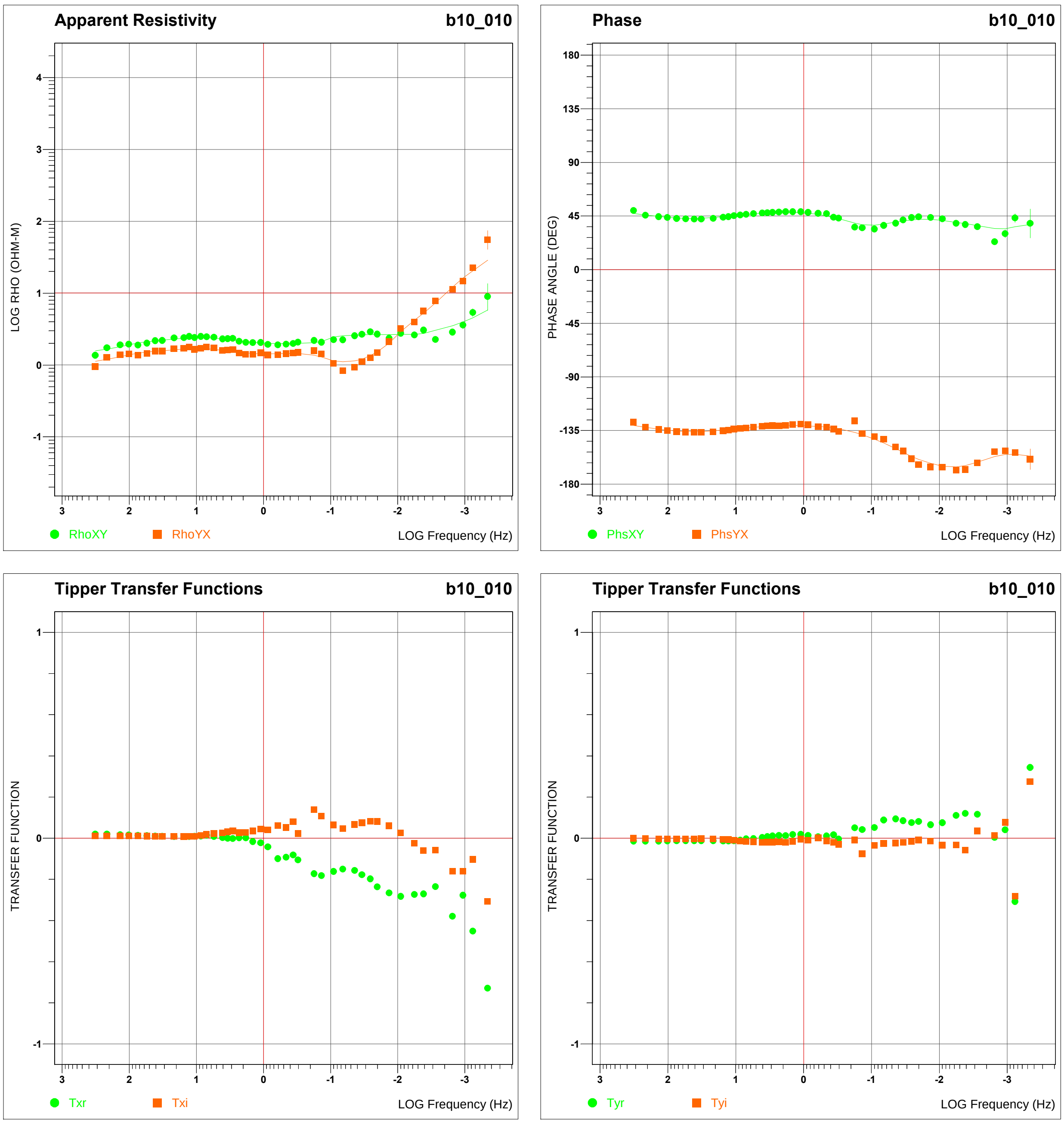
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.28 SITE B09-009 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



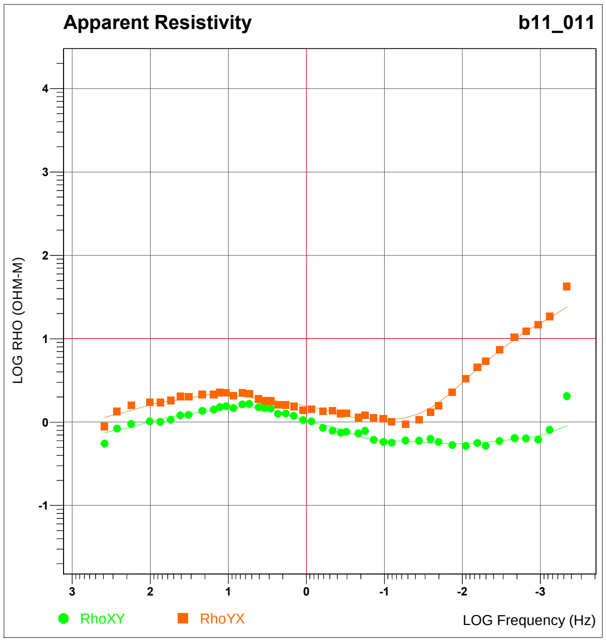
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

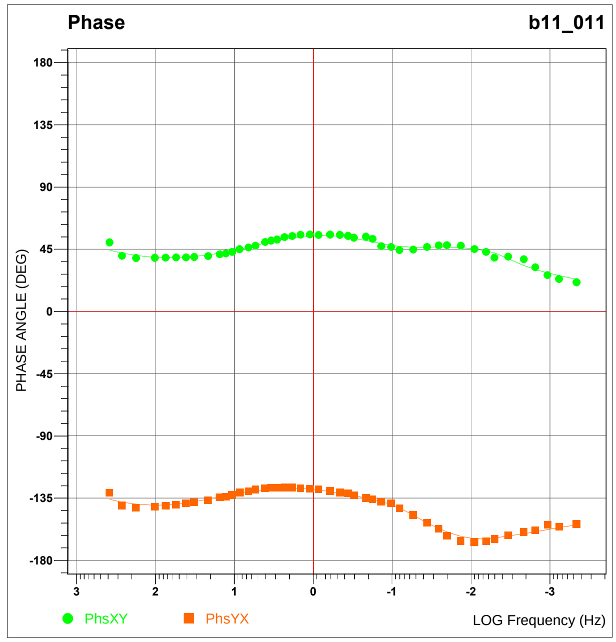
C.1.29 SITE B10-010 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY

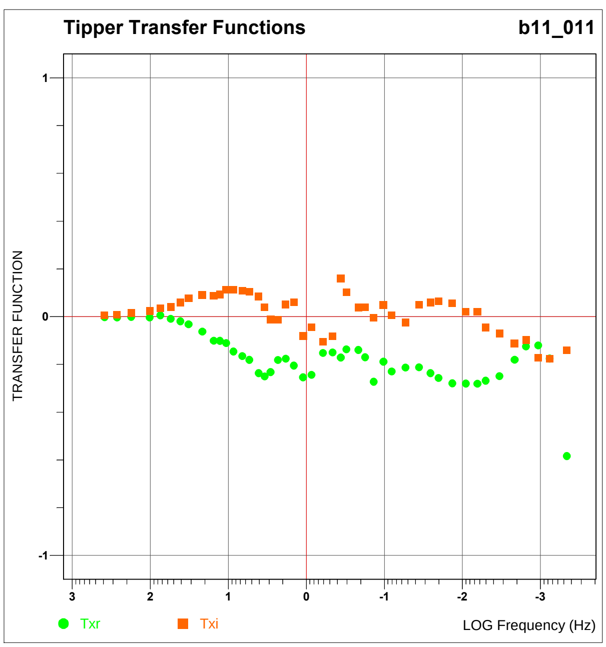


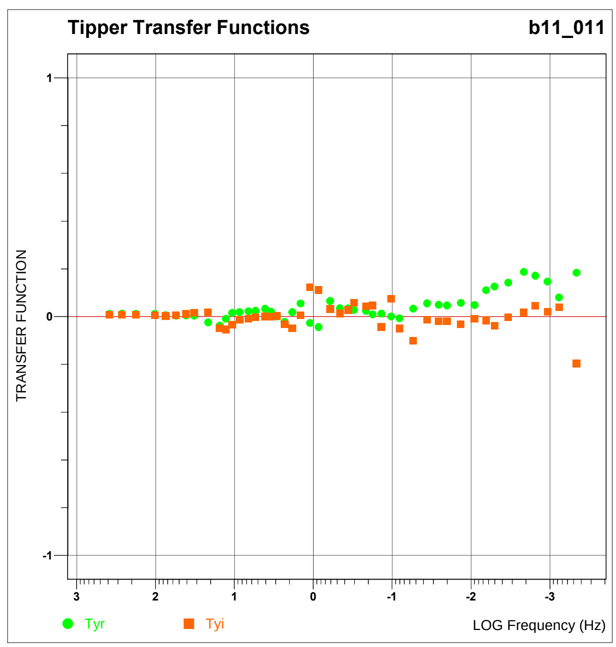
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.30 SITE B11-011 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



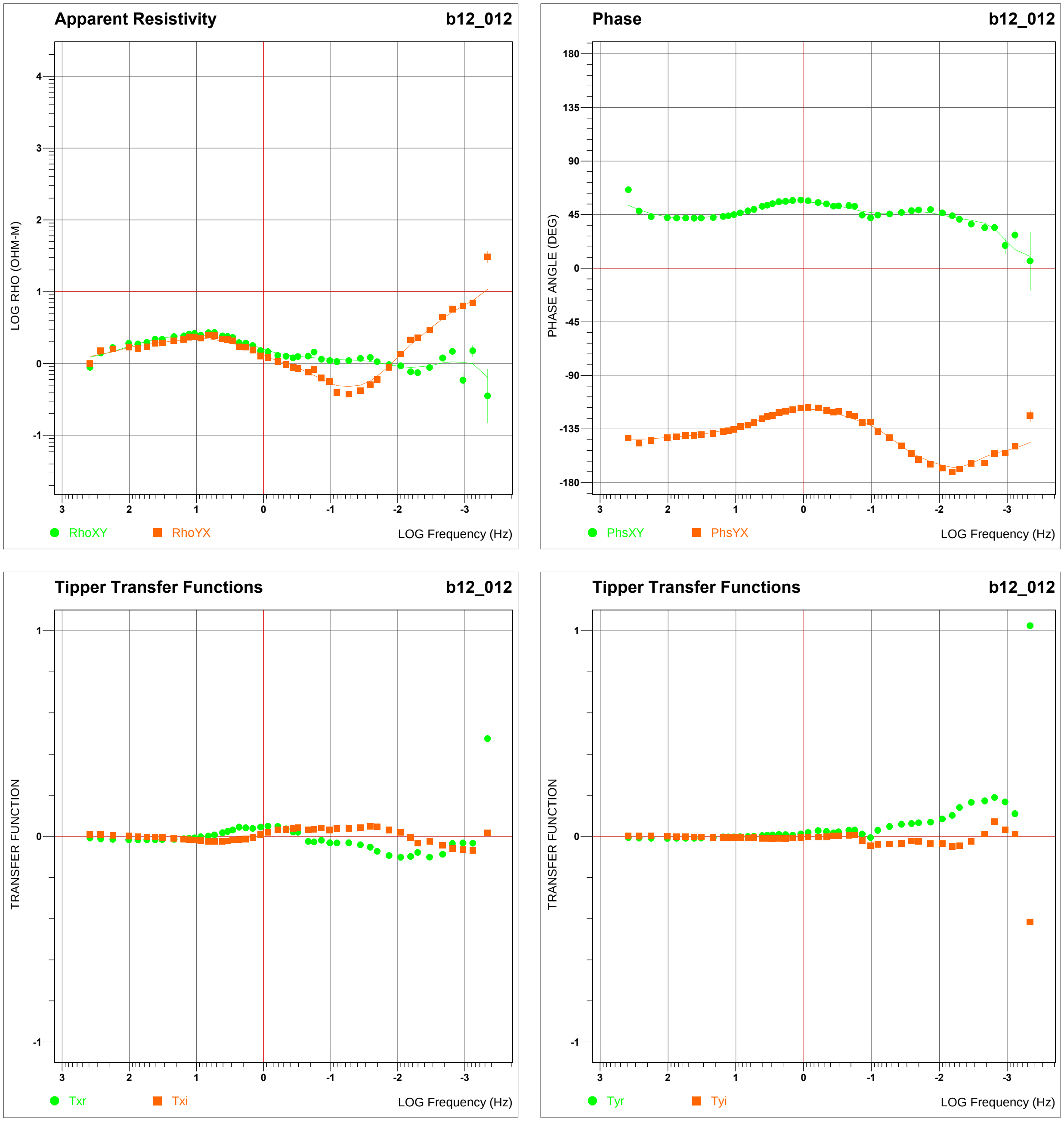






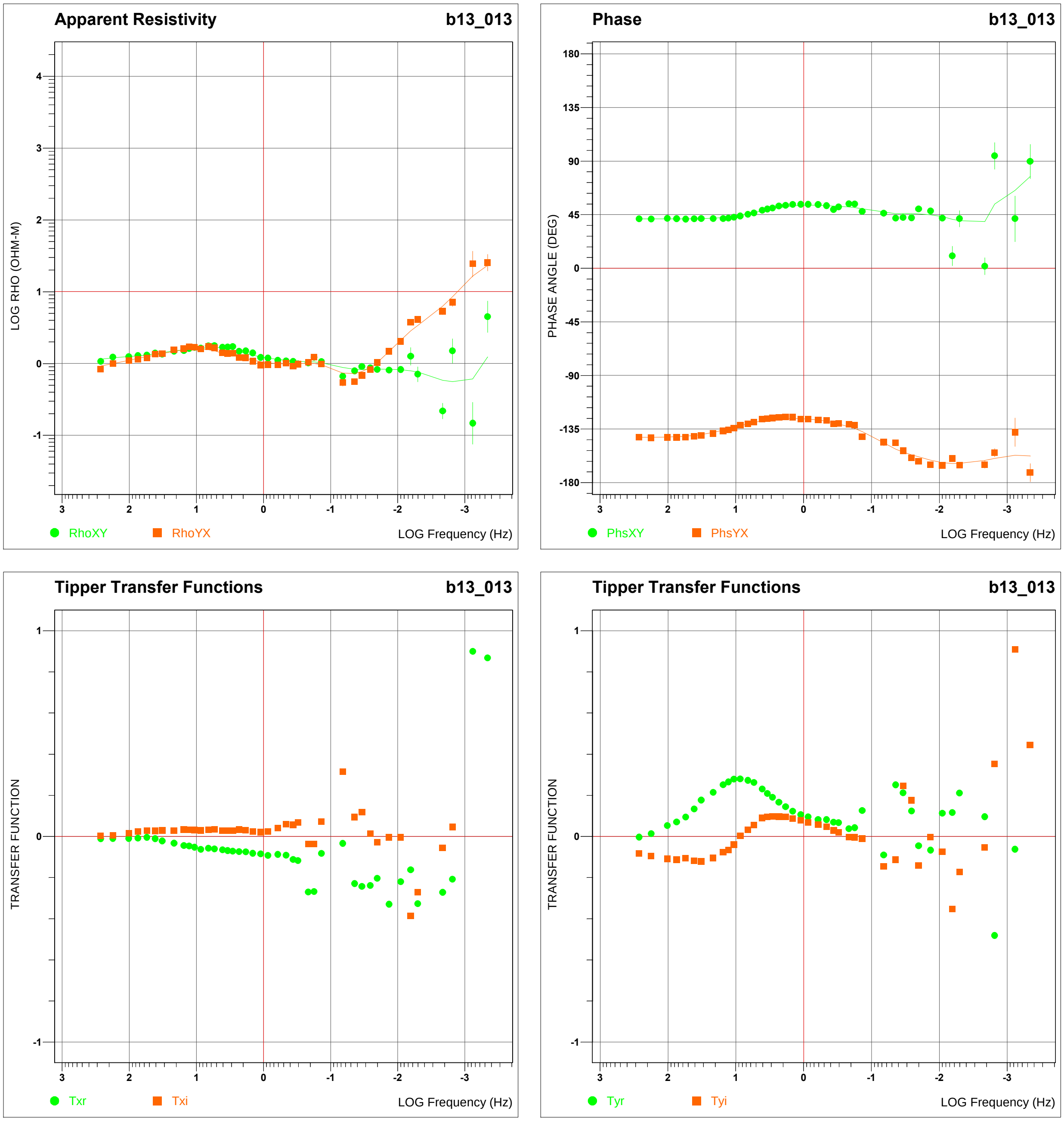
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.31 *SITE B12-012 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY*



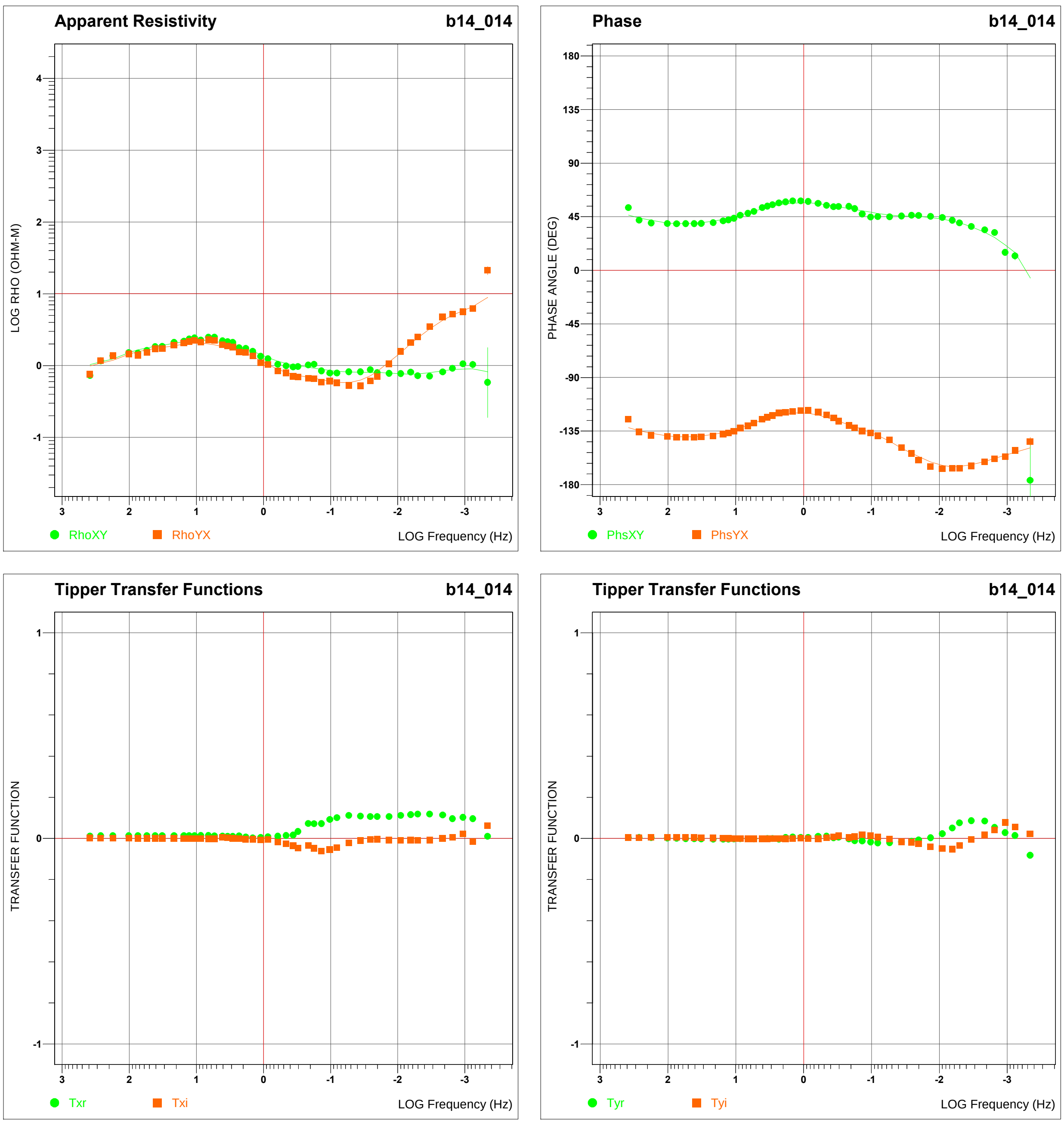
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.32 SITE B13-013 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



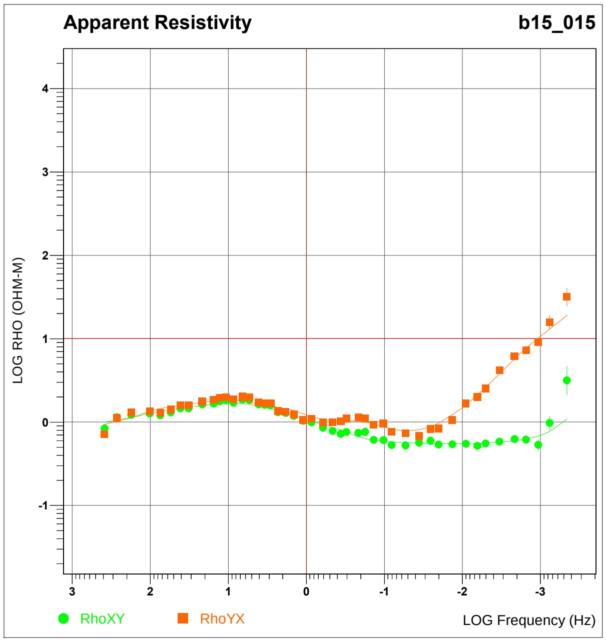
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

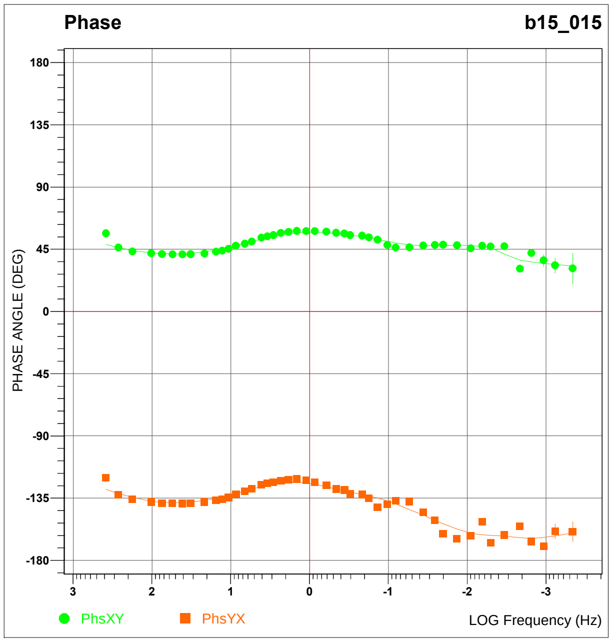
C.1.33 SITE B14-014 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY

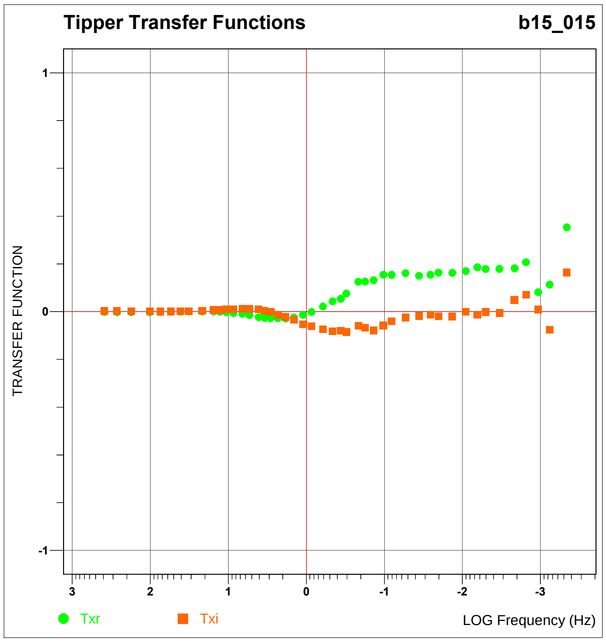


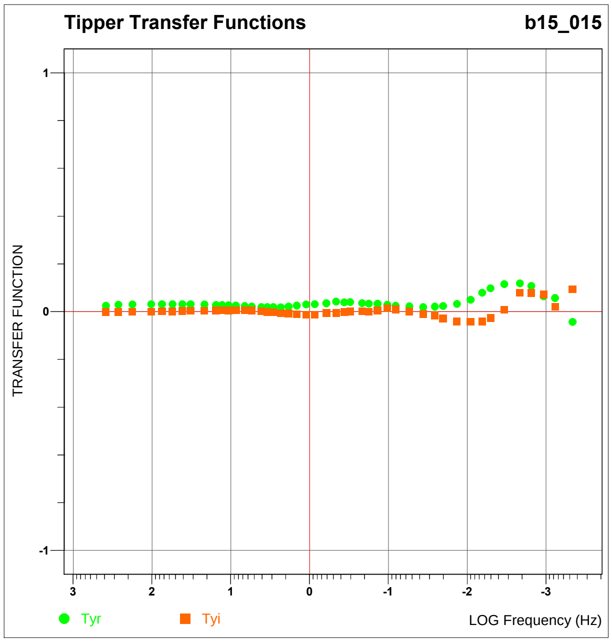
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.34 SITE B15-015 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



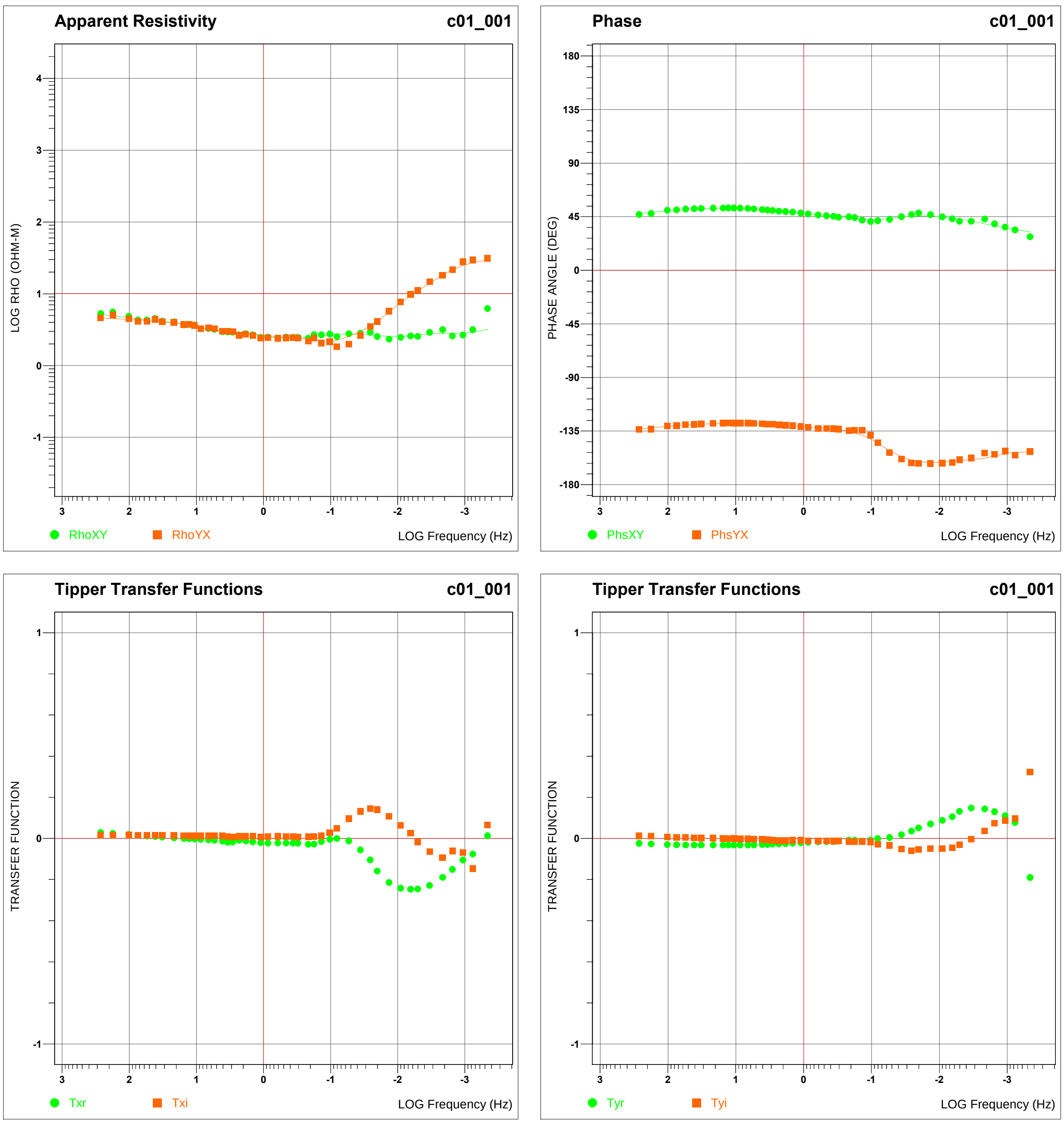






X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.35 SITE C01-001 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



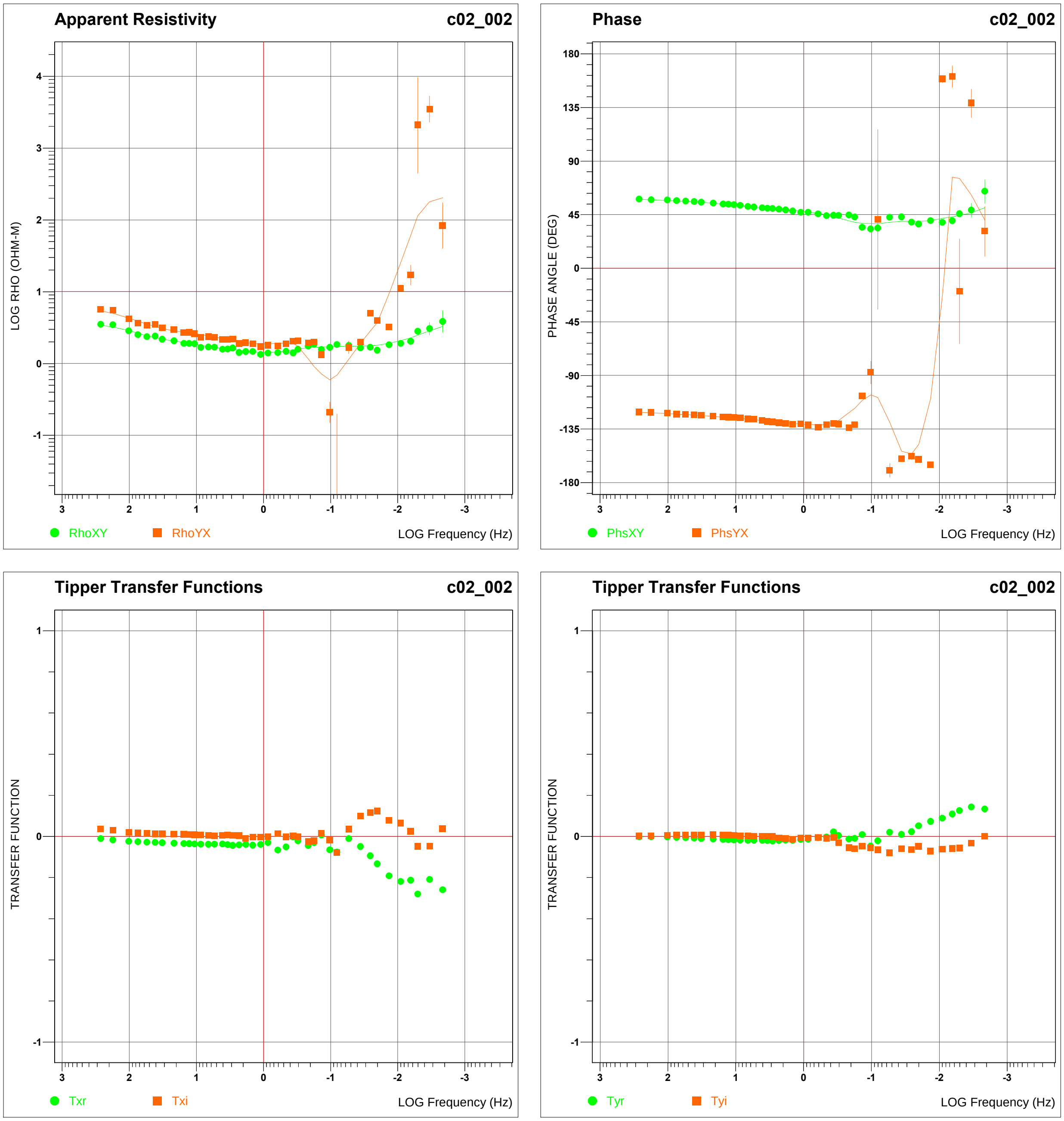
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X

(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

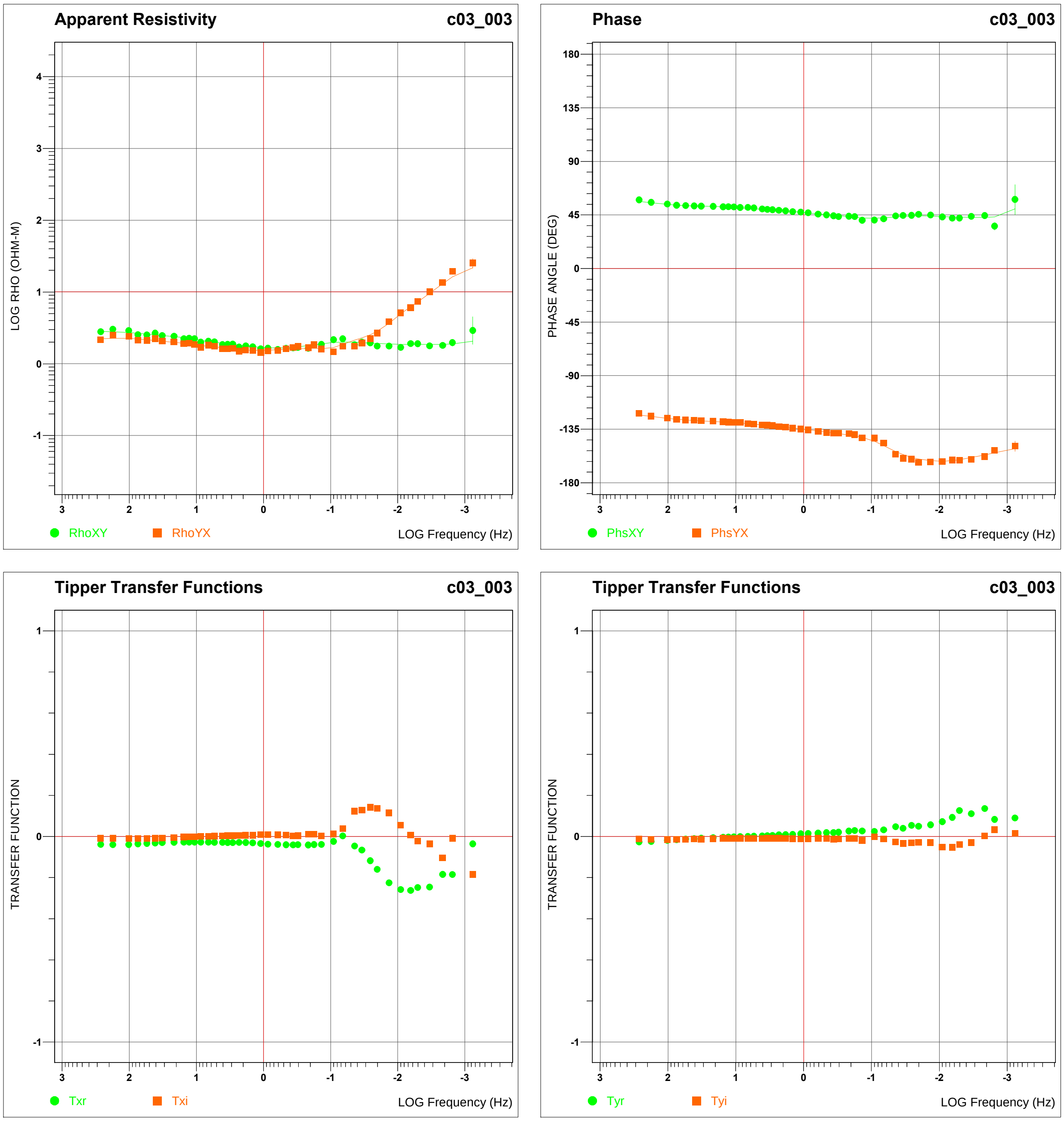
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.36 *SITE C02-002 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY*



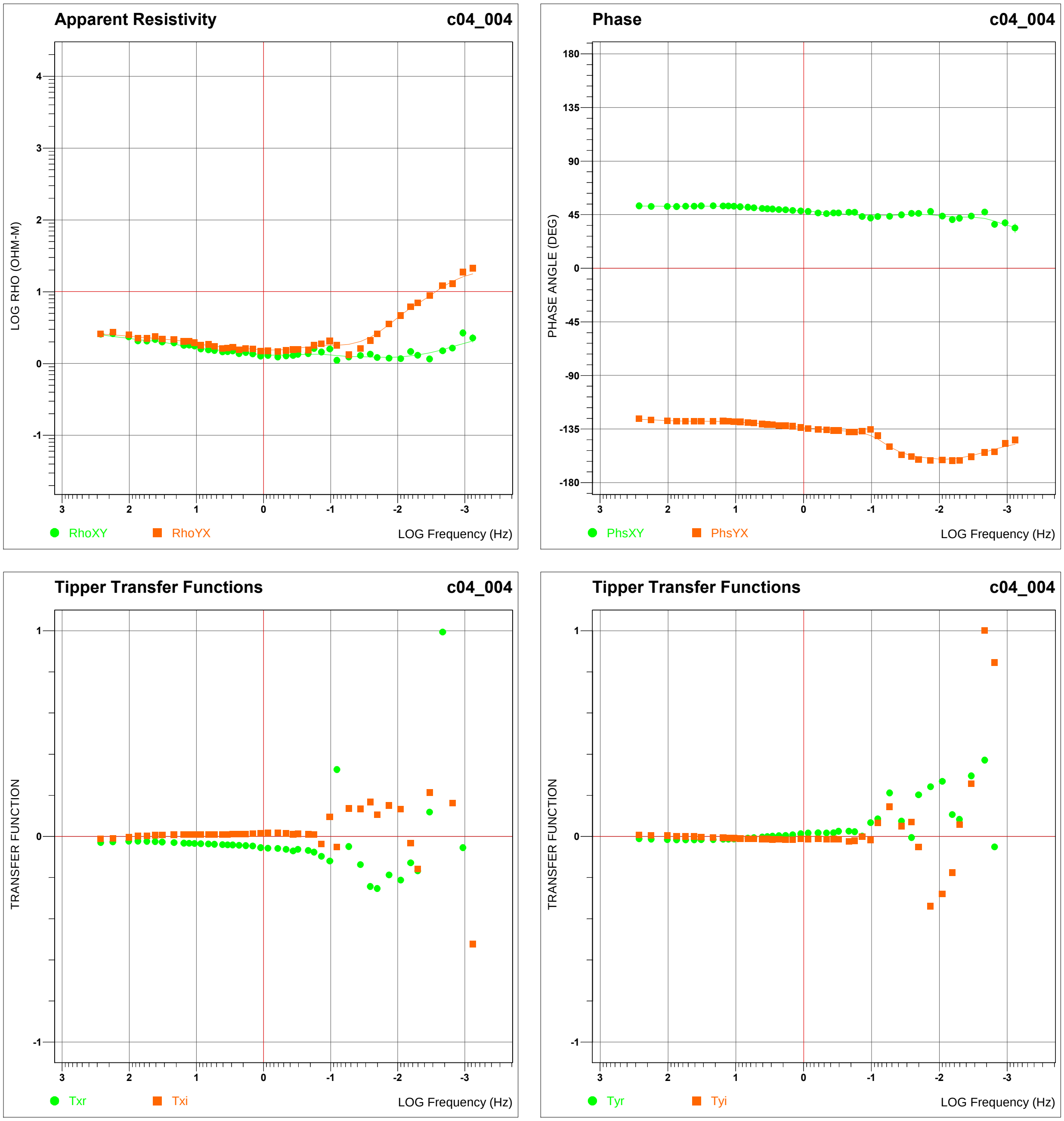
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.37 SITE C03-003 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.38 SITE C04-004 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY

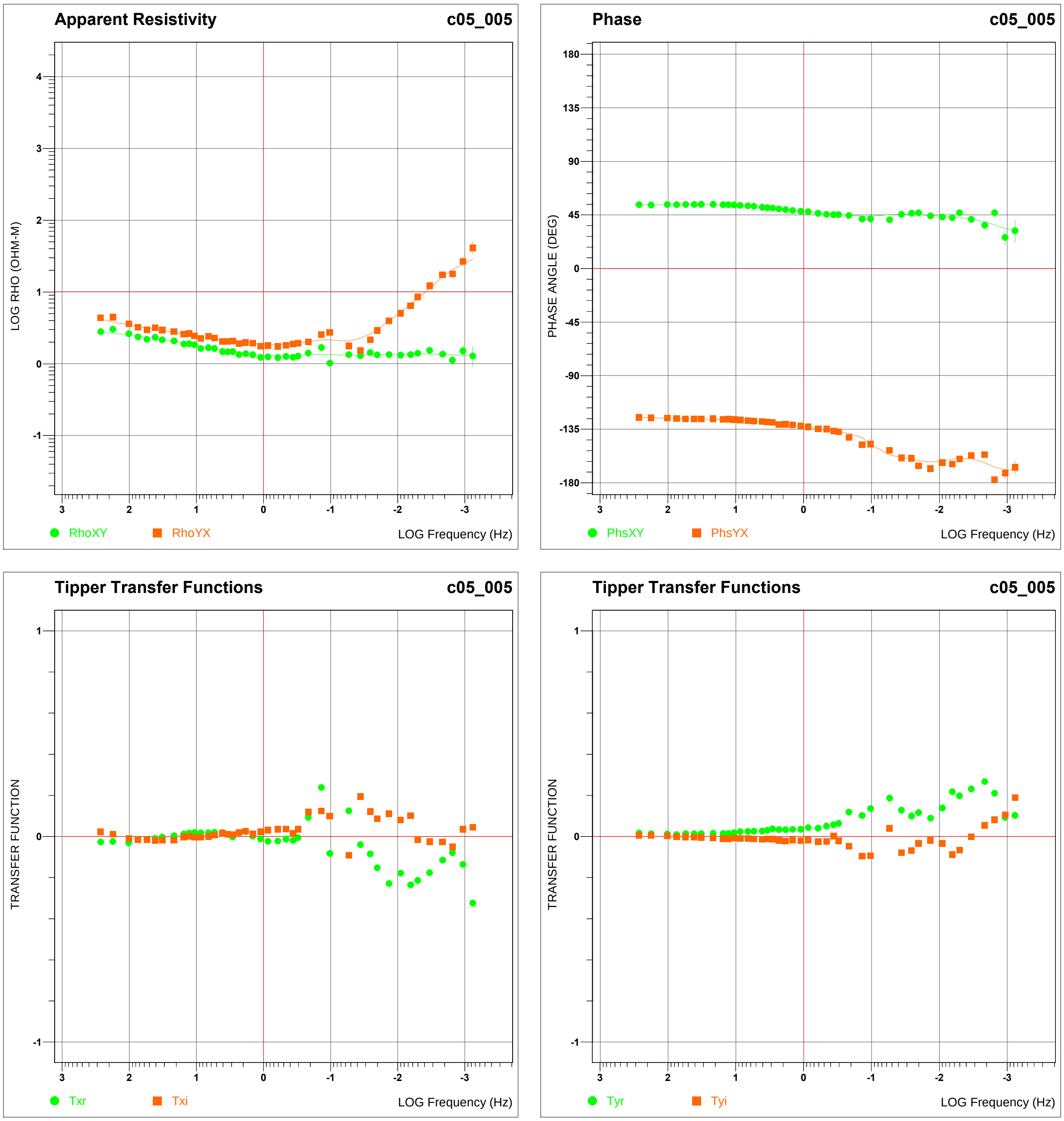


X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

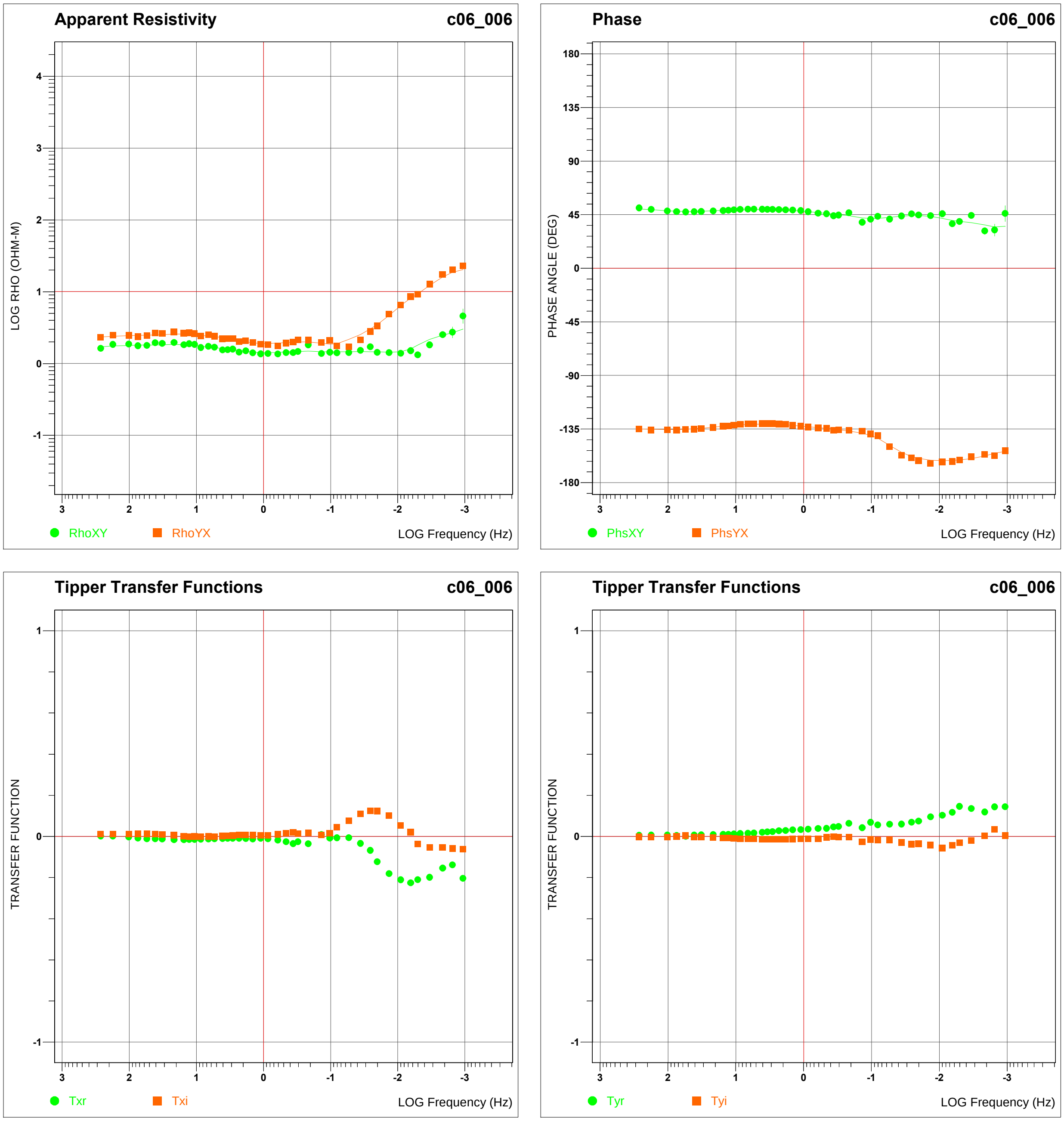
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.39 Site C05-005 – Apparent Resistivity, Phase, & Tipper Sounding Curves vs Frequency



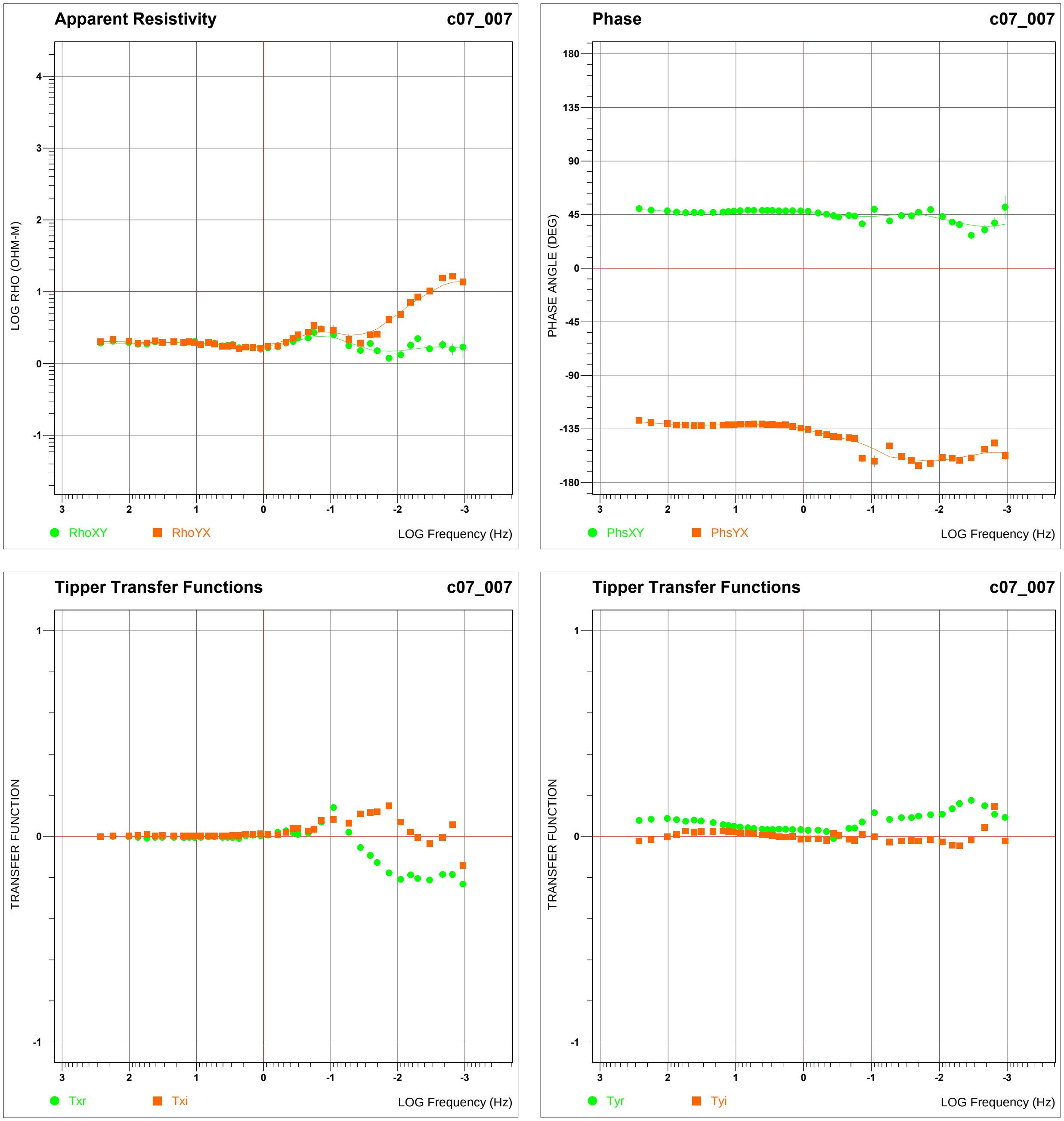
X is pointing to 90deg ; Y is perpendicular to X
(right hand positive down coordinate system)
Mode XY (green) denotes Electrical (**Ex**) field and orthogonal Magnetic (**Hy**) field (=Ex/Hy)
Mode YX (orange) denotes Electrical (**Ey**) field and orthogonal Magnetic (**Hx**) field (=Ey/Hx)

C.1.40 SITE C06-006 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



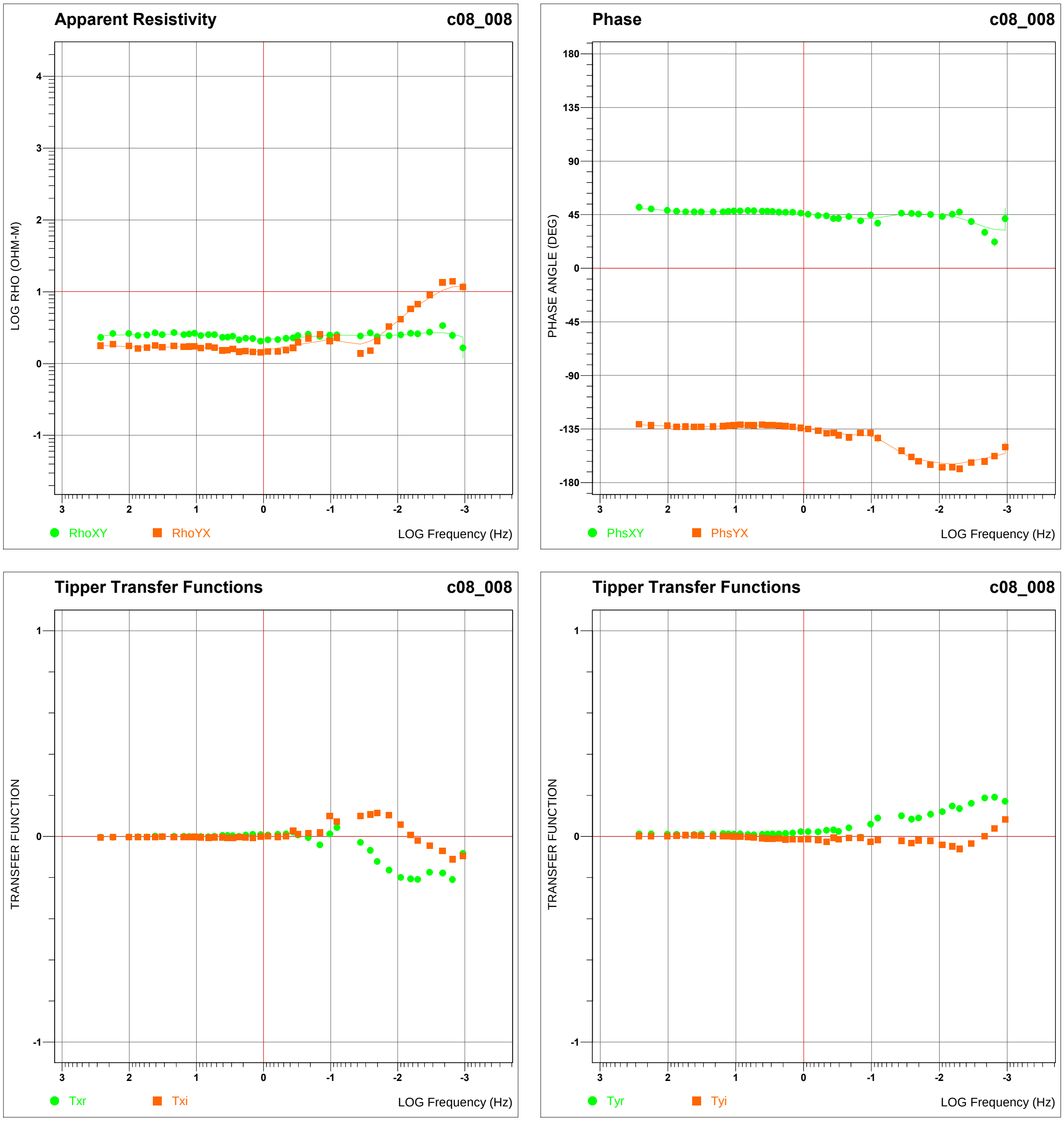
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.41 SITE C07-007 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



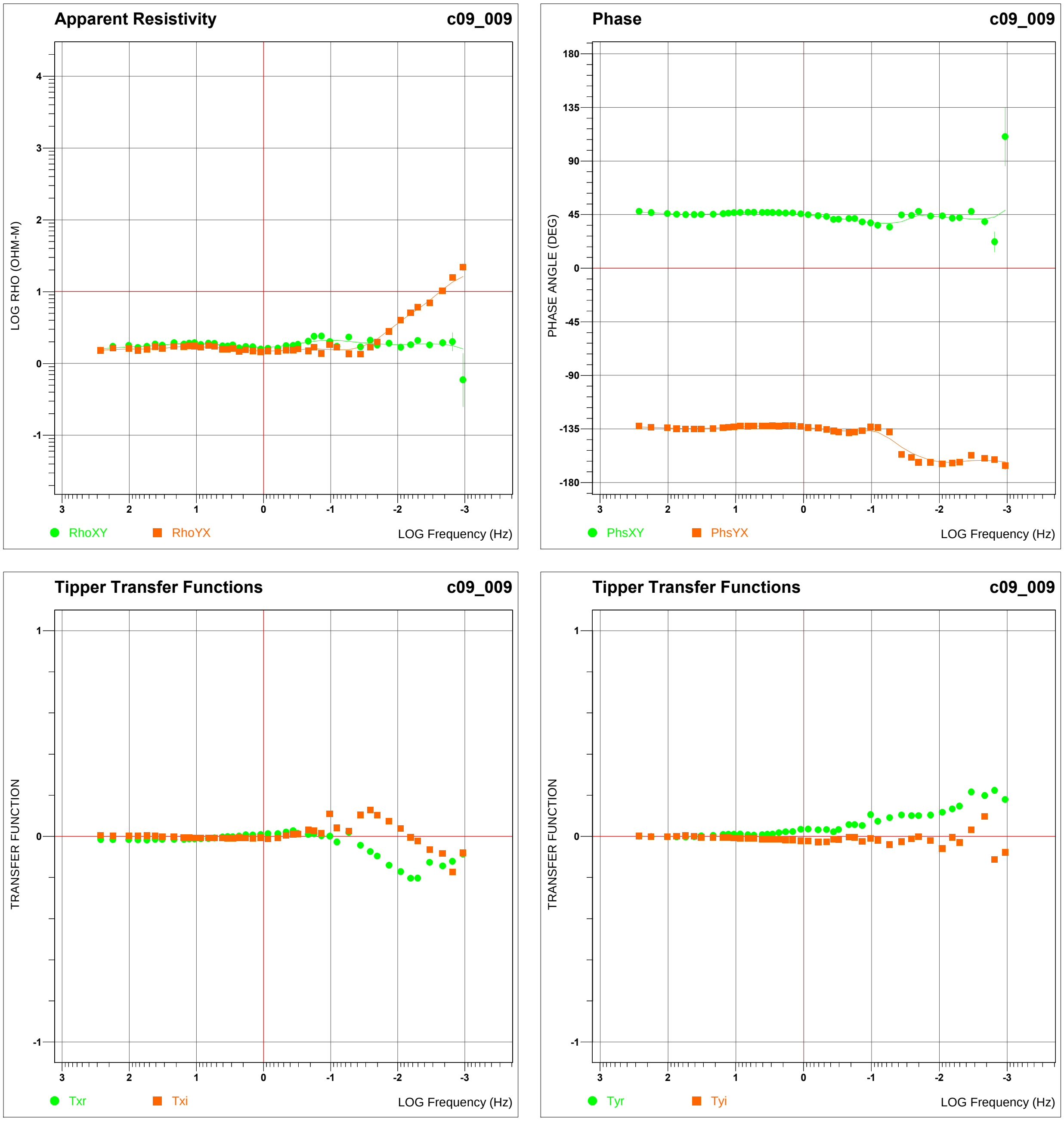
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.42 SITE C08-008 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



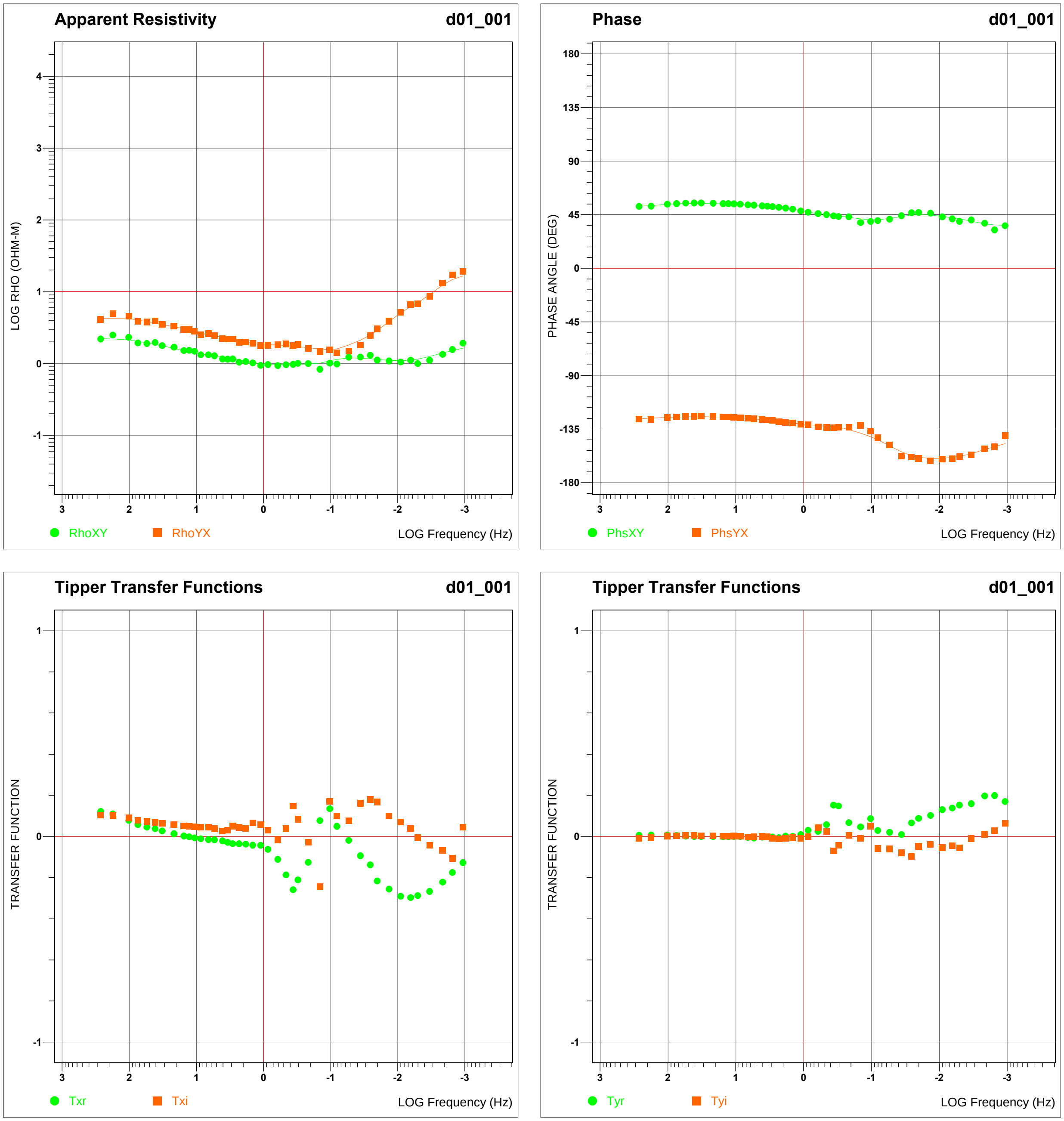
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.43 SITE C09-009 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



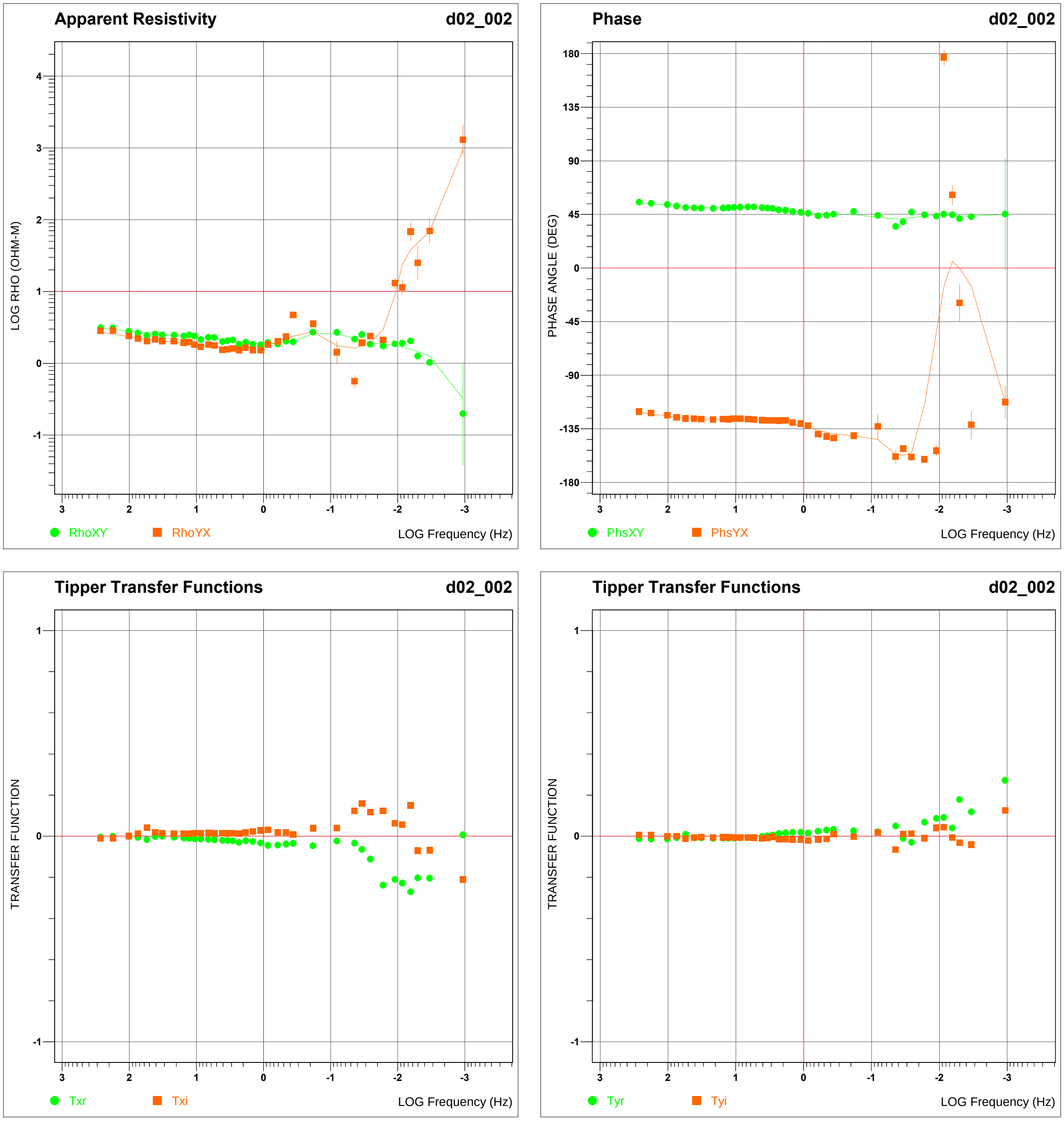
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.44 *SITE D01-001 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY*



X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.45 SITE D02-002 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



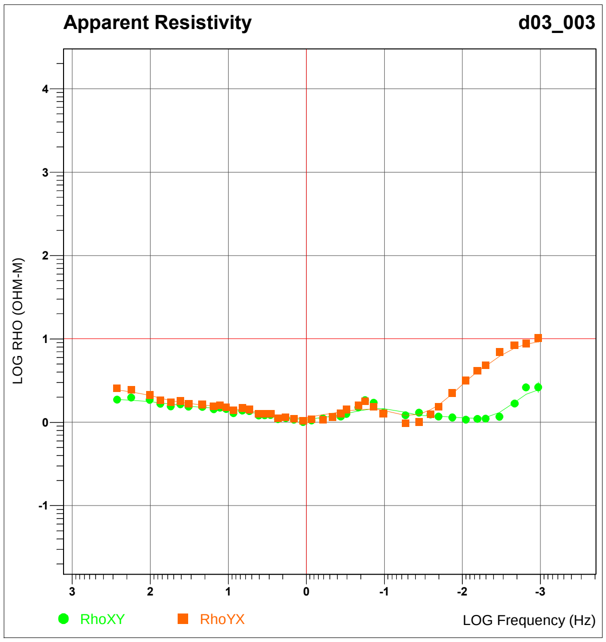
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X

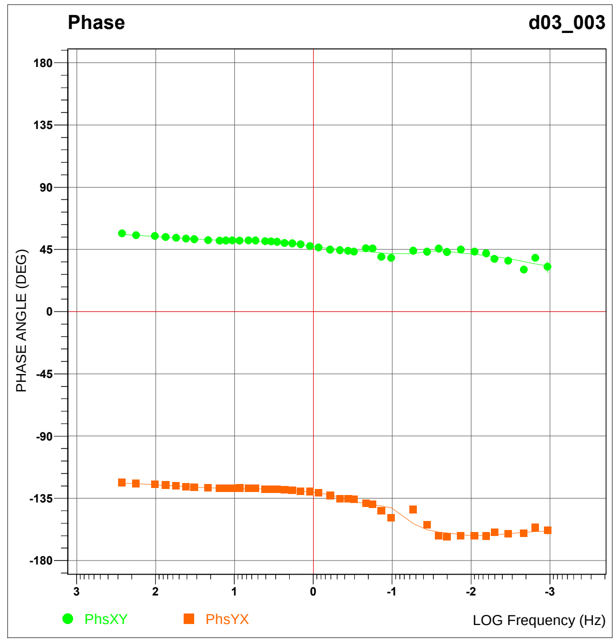
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

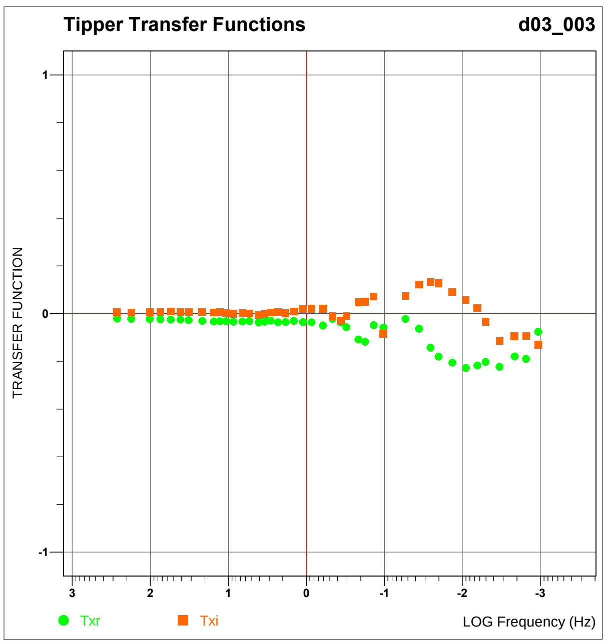
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

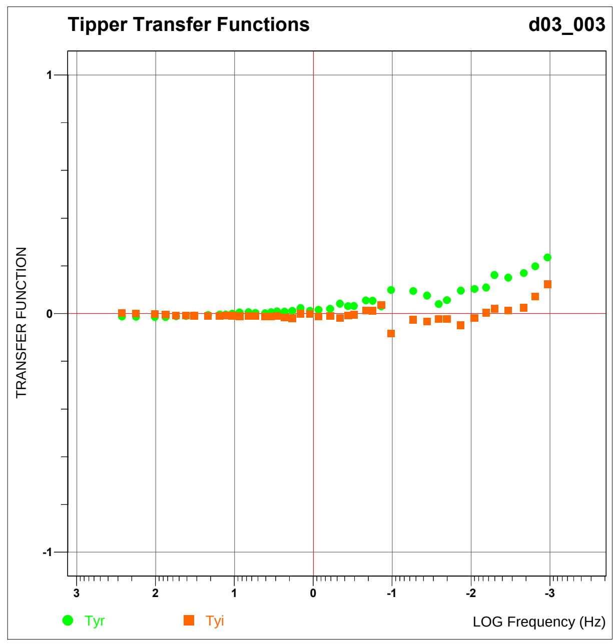
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.46 Site D03-003 – Apparent Resistivity, Phase, & Tipper Sounding Curves vs Frequency



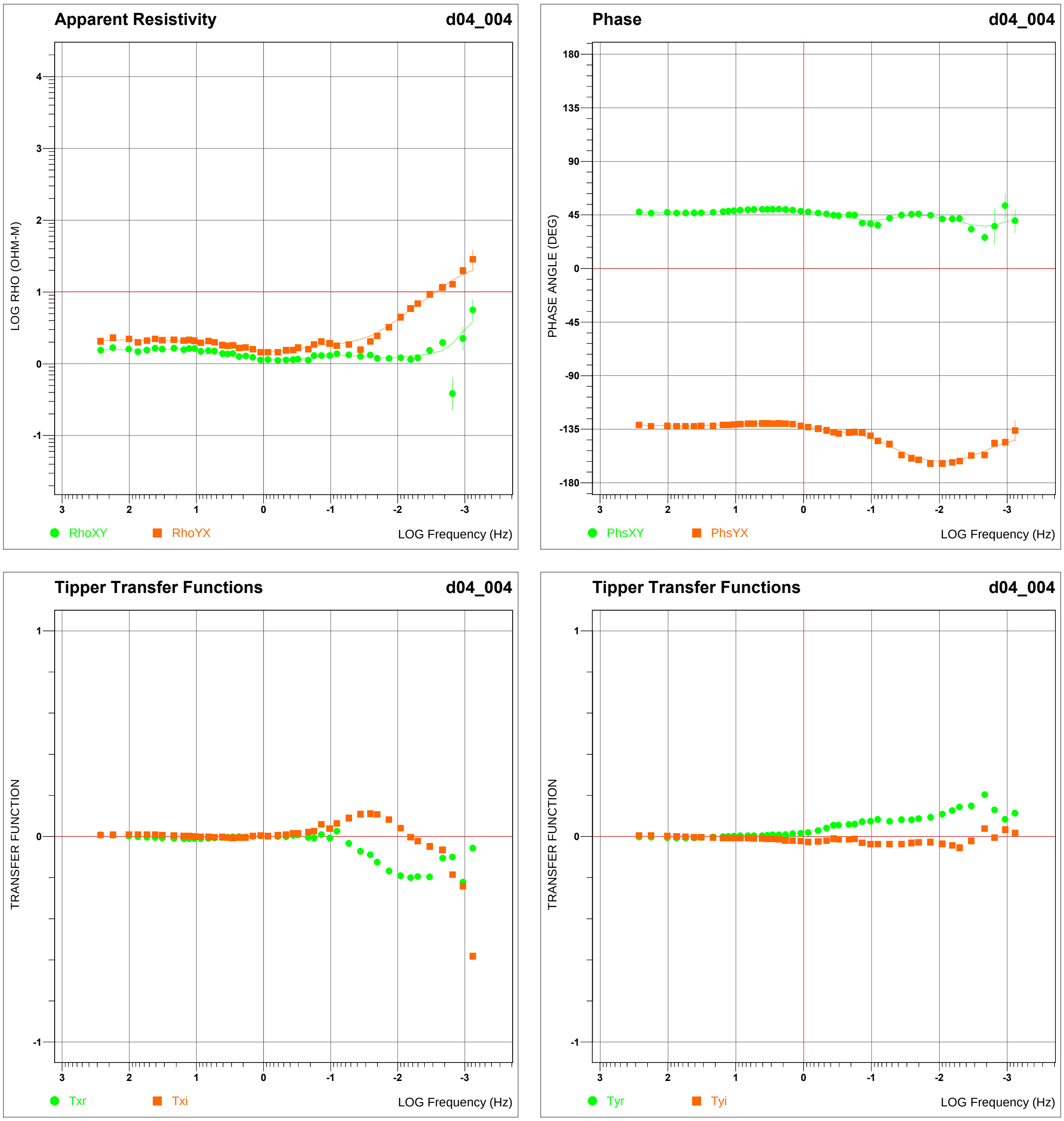






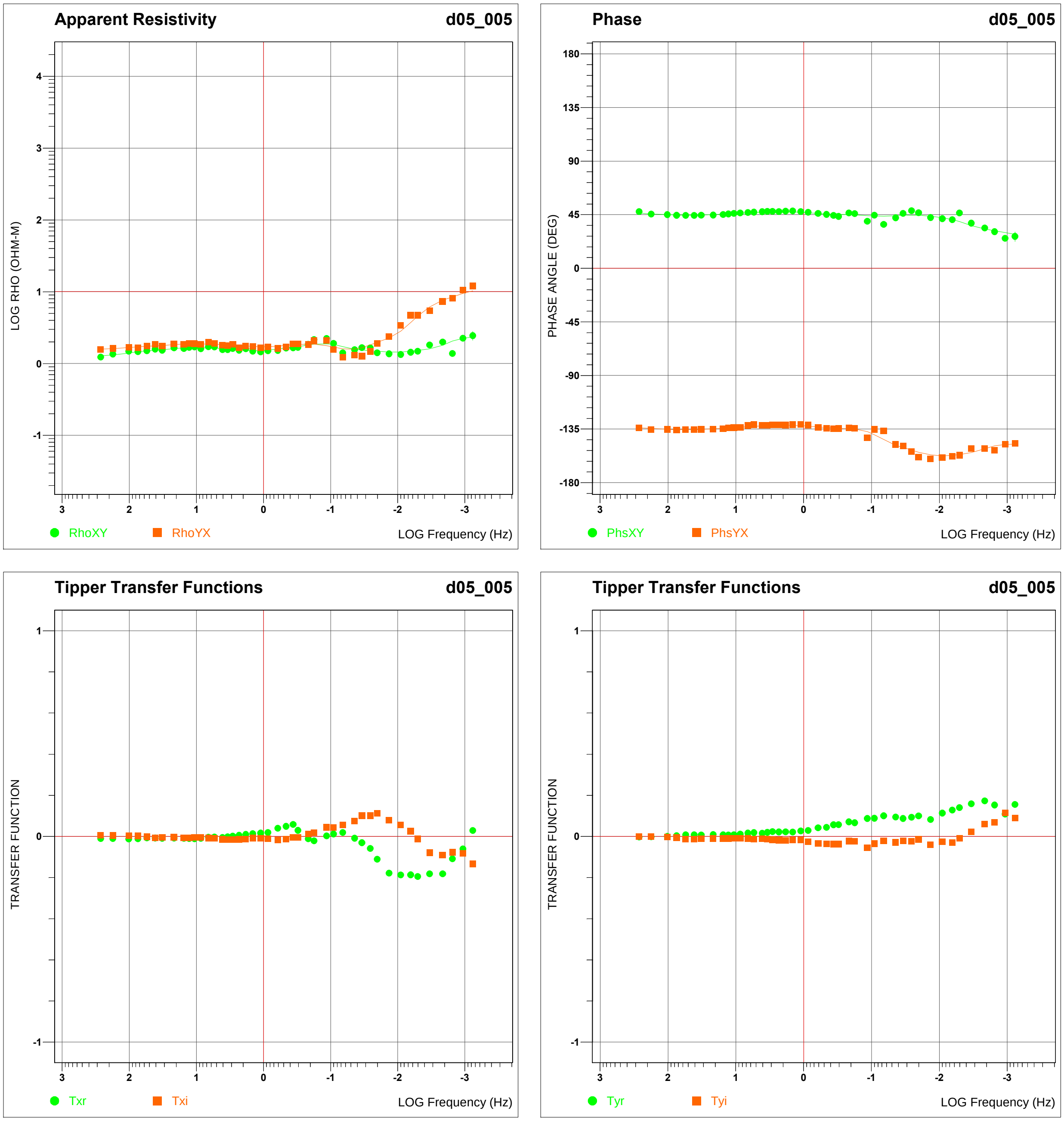
X is pointing to 90deg ; Y is perpendicular to X
(right hand positive down coordinate system)
Mode XY (green) denotes Electrical (**Ex**) field and orthogonal Magnetic (**Hy**) field (=Ex/Hy)
Mode YX (orange) denotes Electrical (**Ey**) field and orthogonal Magnetic (**Hx**) field (=Ey/Hx)

C.1.47 SITE D04-004 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.48 SITE D05-005 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



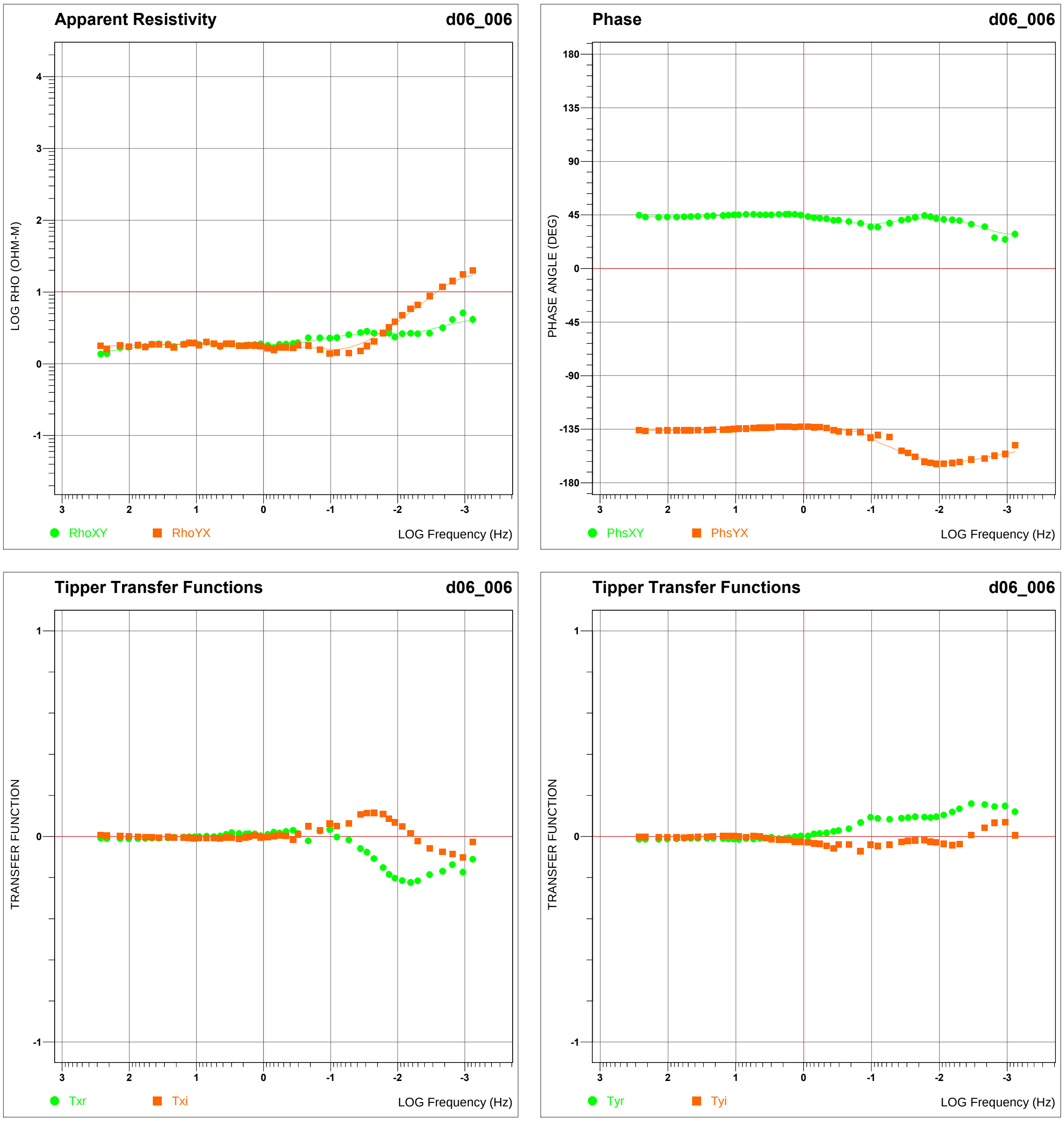
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X

(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

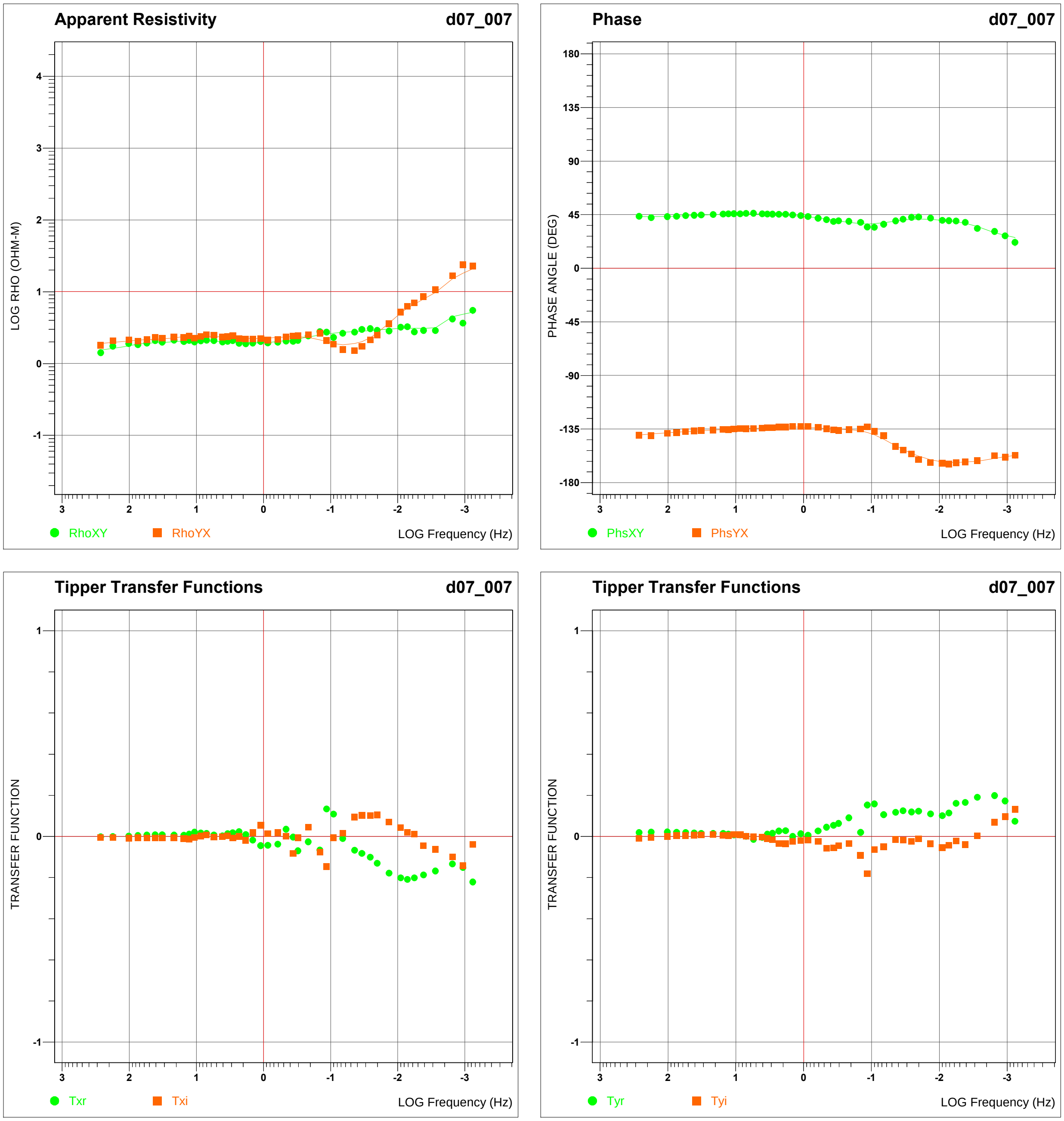
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.49 SITE D06-006 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.50 SITE D07-007 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



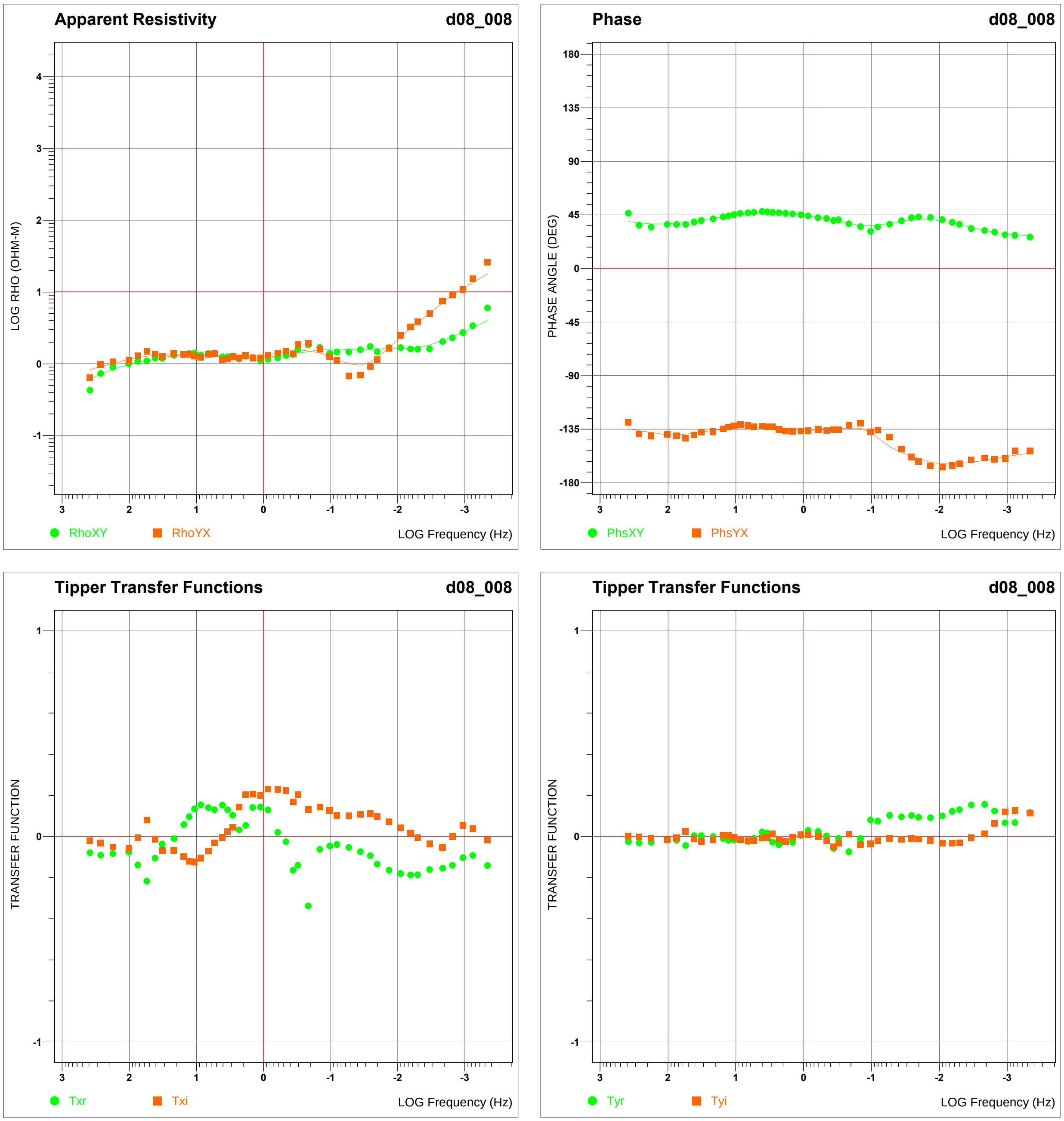
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X

(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

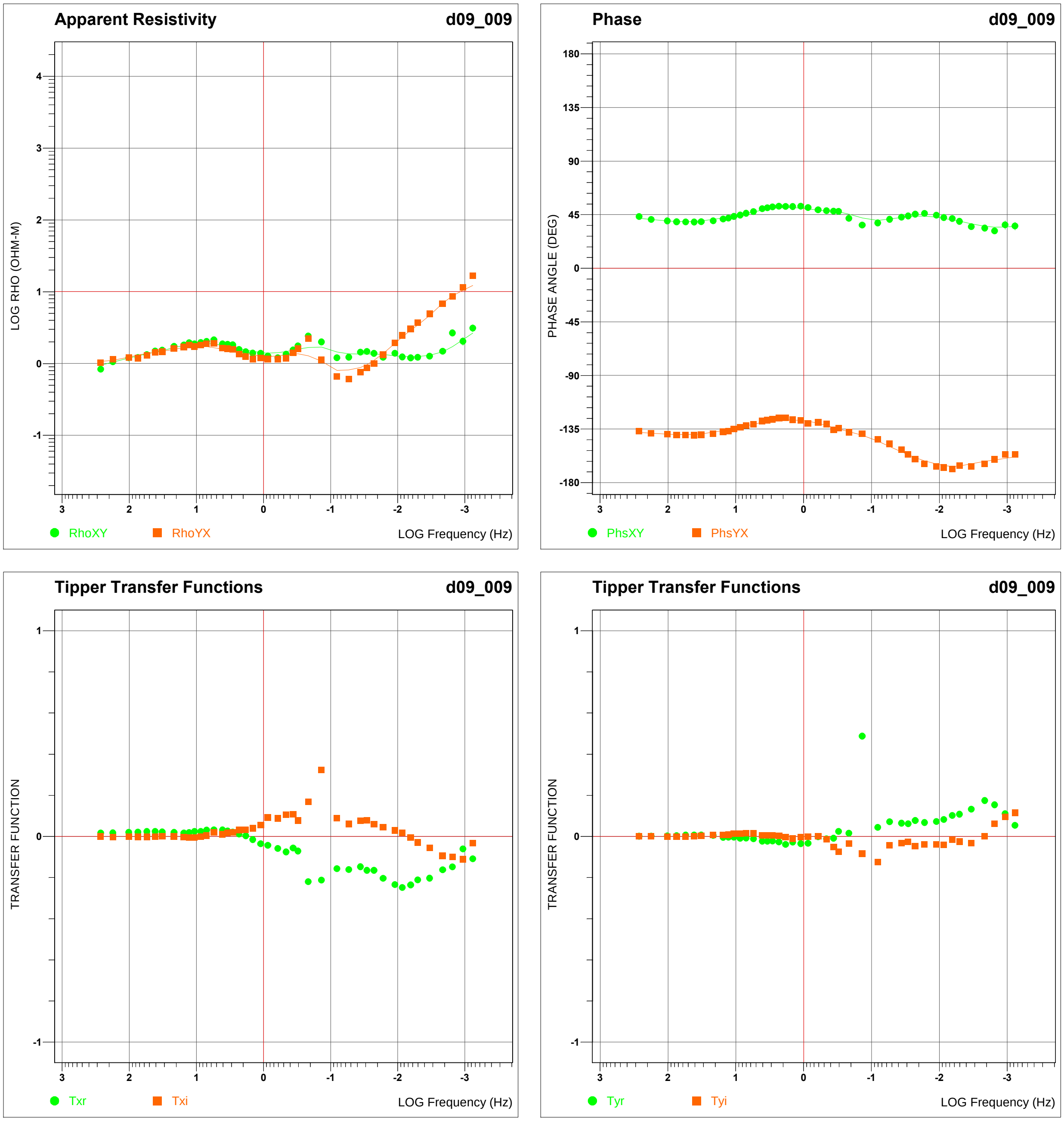
C.1.51 SITE D08-008 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.52 SITE D09-009 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



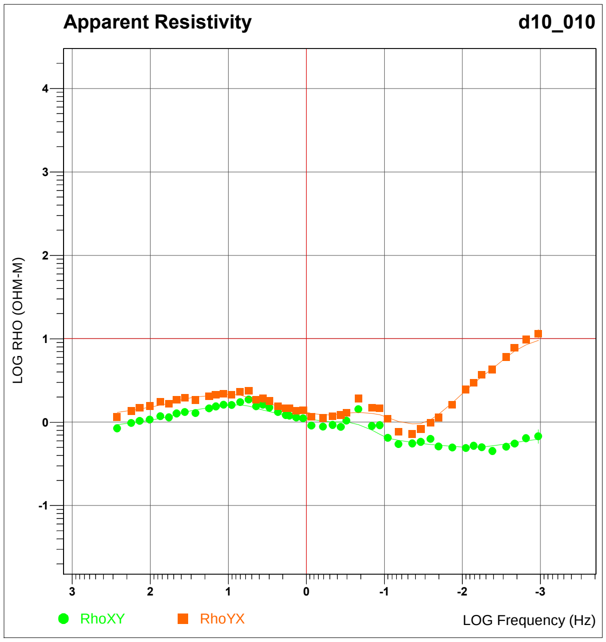
X IS POINTING TO **90**DEG ; **Y** IS PERPENDICULAR TO **X**

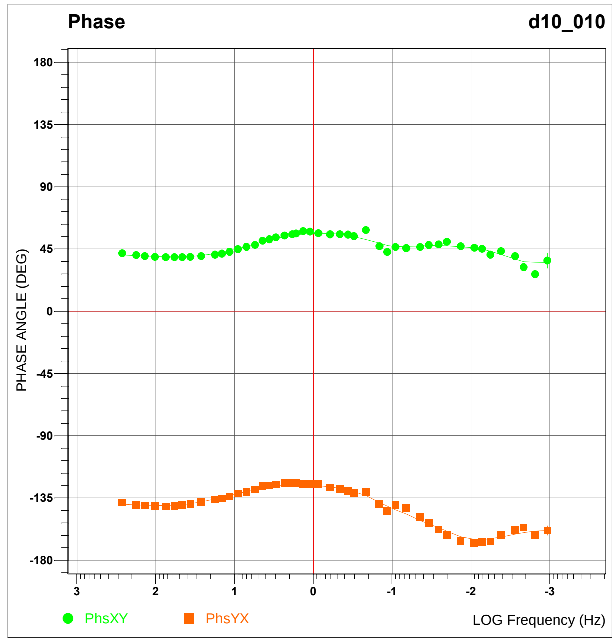
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM**)**

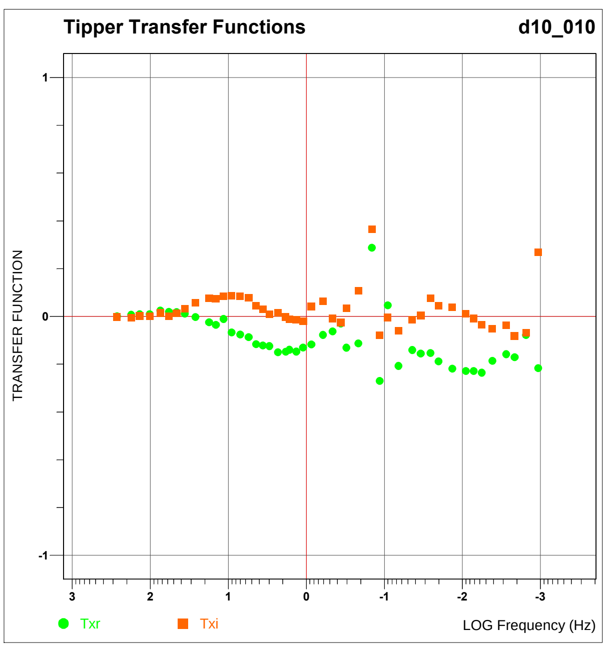
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

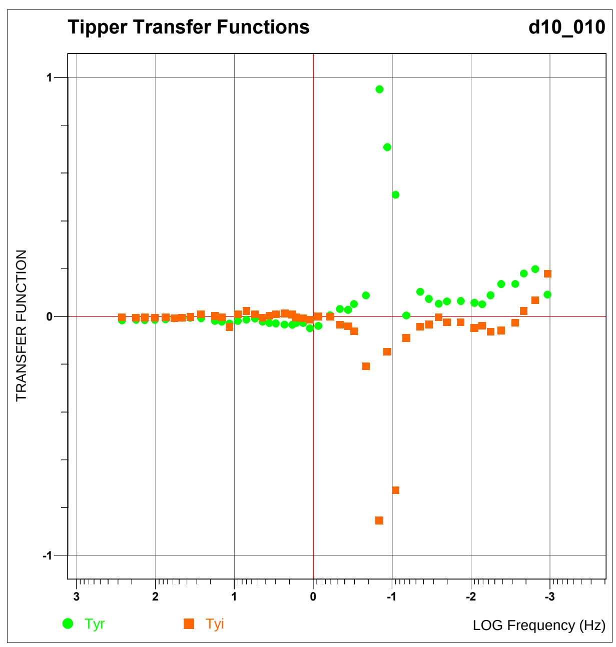
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.53 SITE D10-010 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY









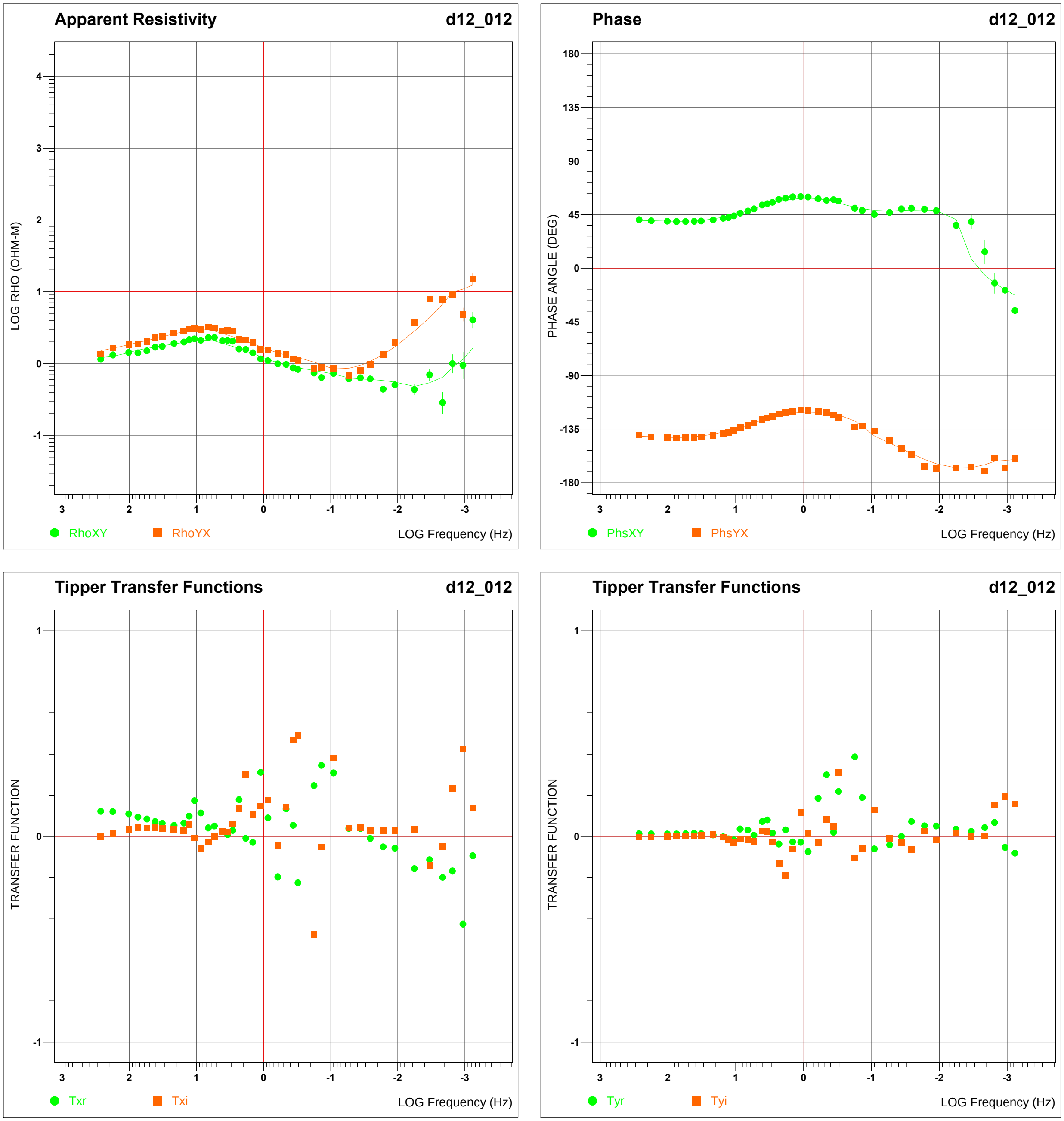
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X

(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

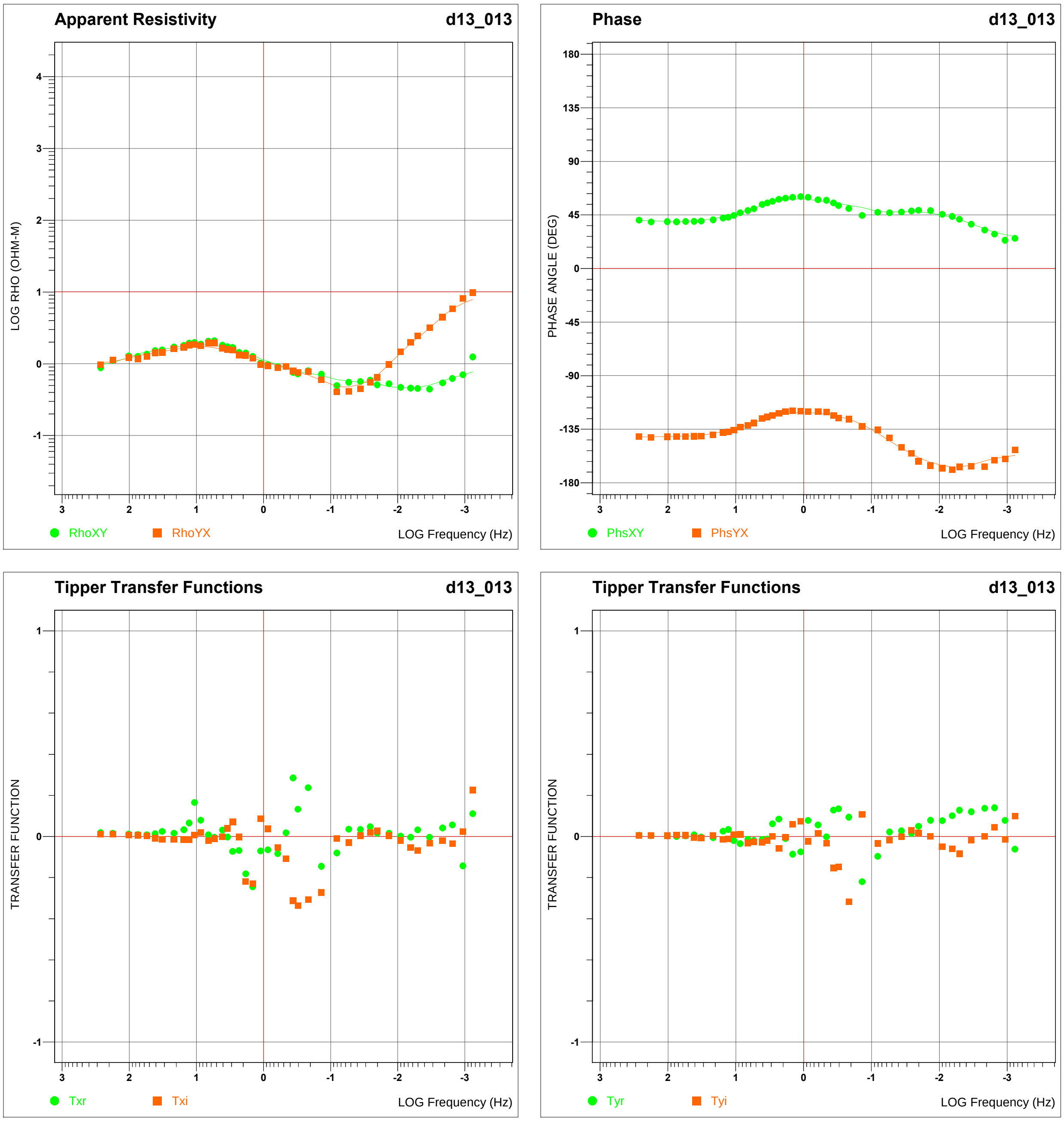
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.54 SITE D12-012 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.55 SITE D13-013 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



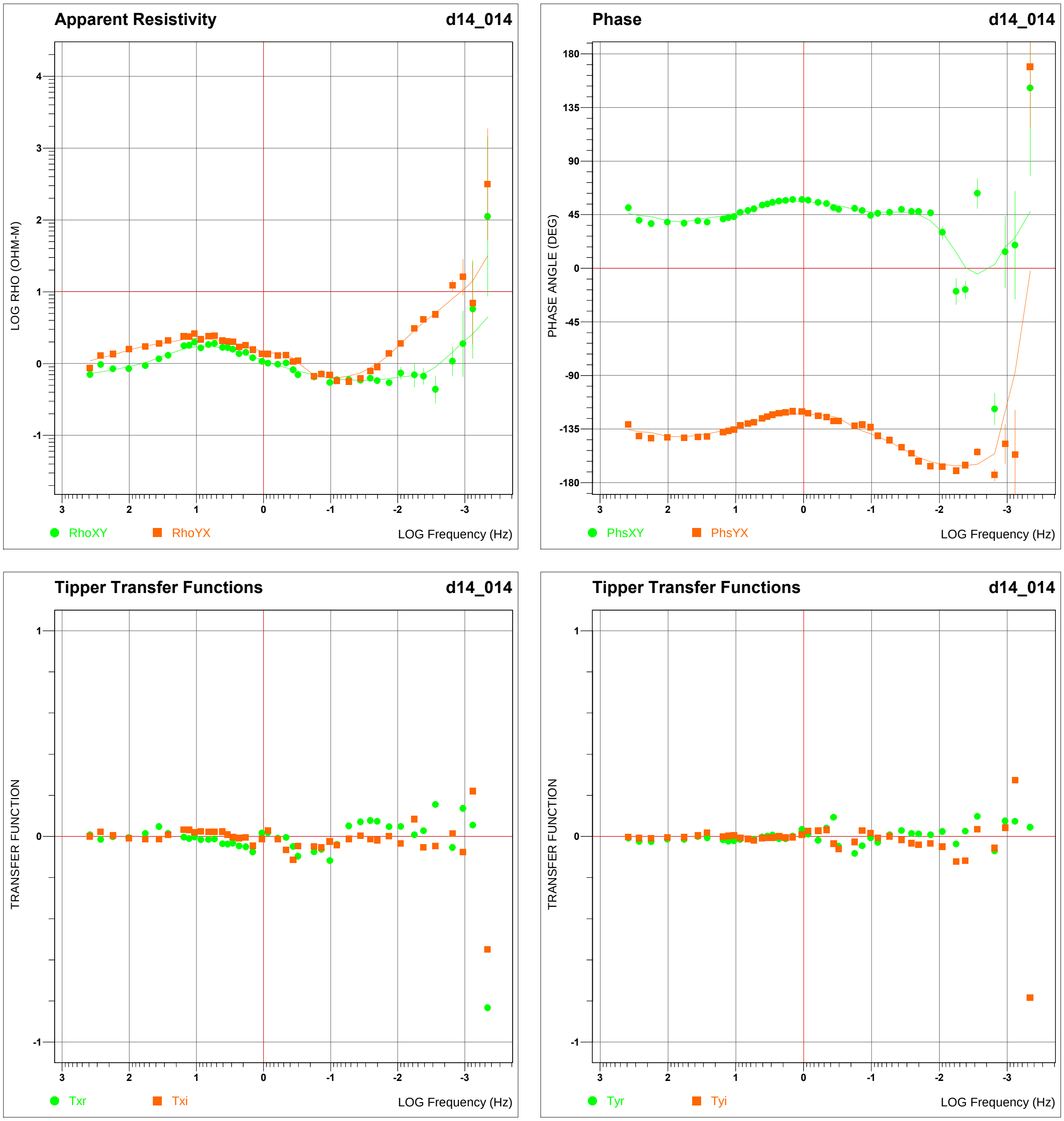
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X

(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.56 SITE D14-014 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



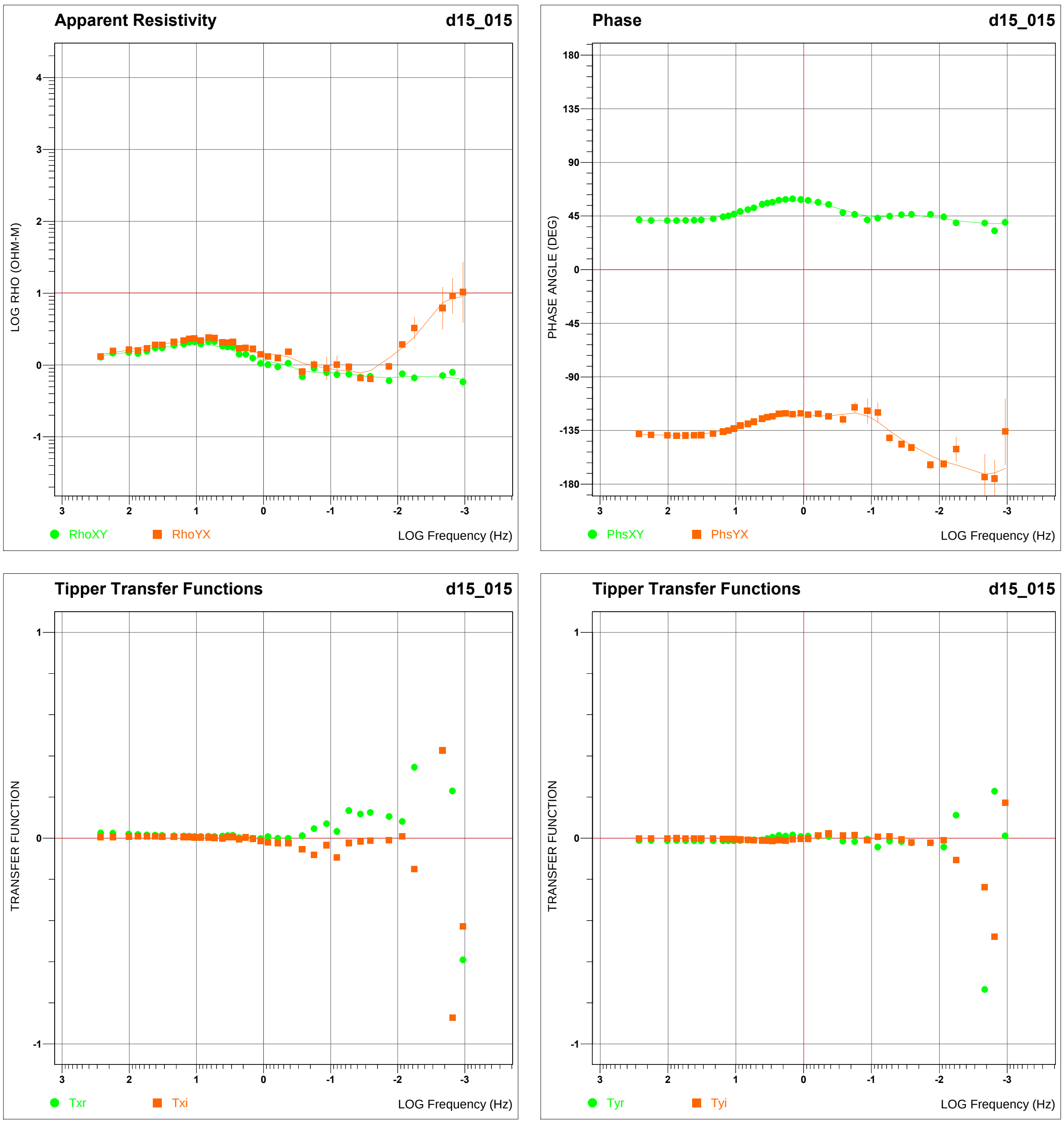
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X

(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

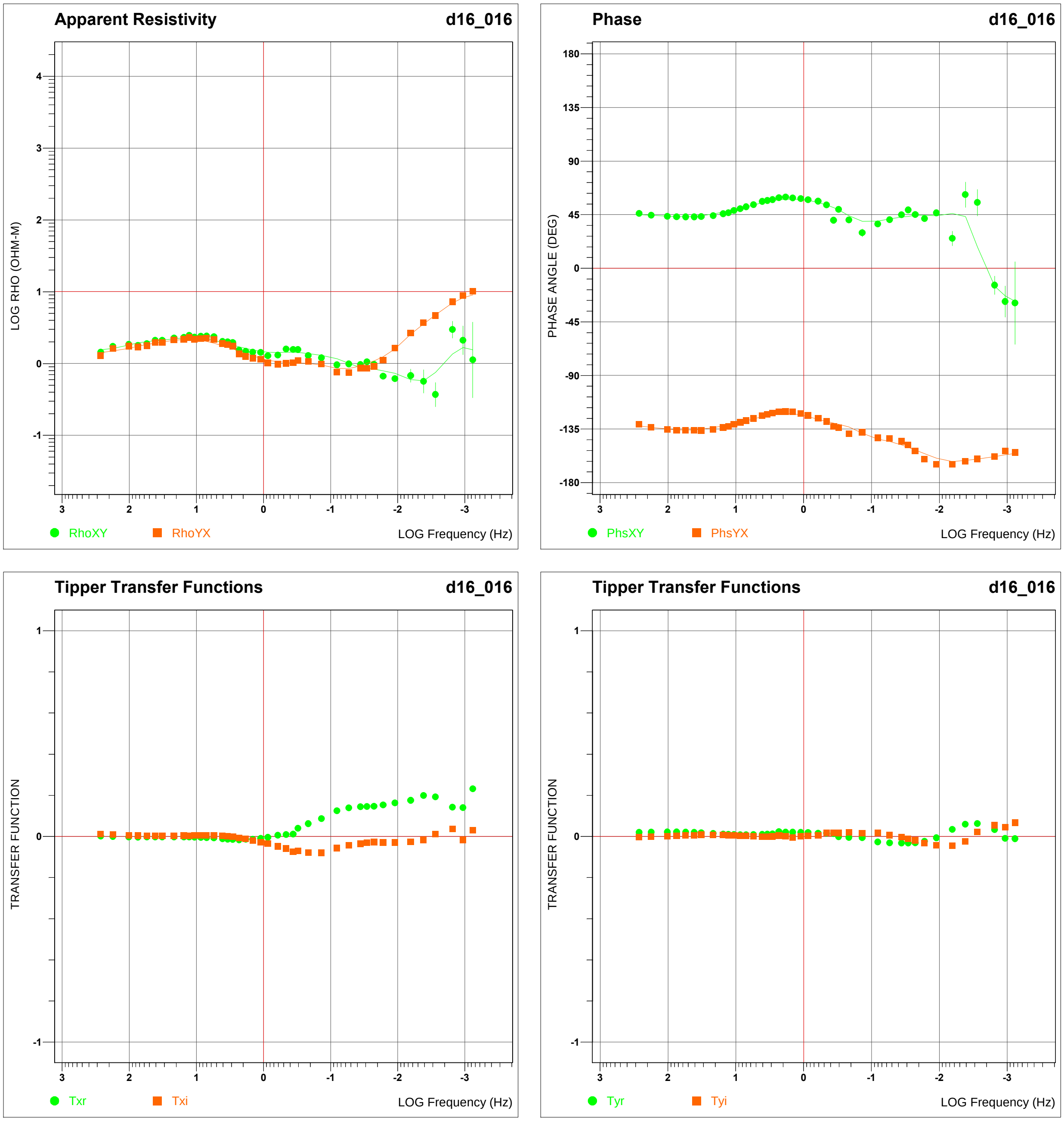
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.57 Site D15-015 – Apparent Resistivity, Phase, & Tipper Sounding Curves vs Frequency



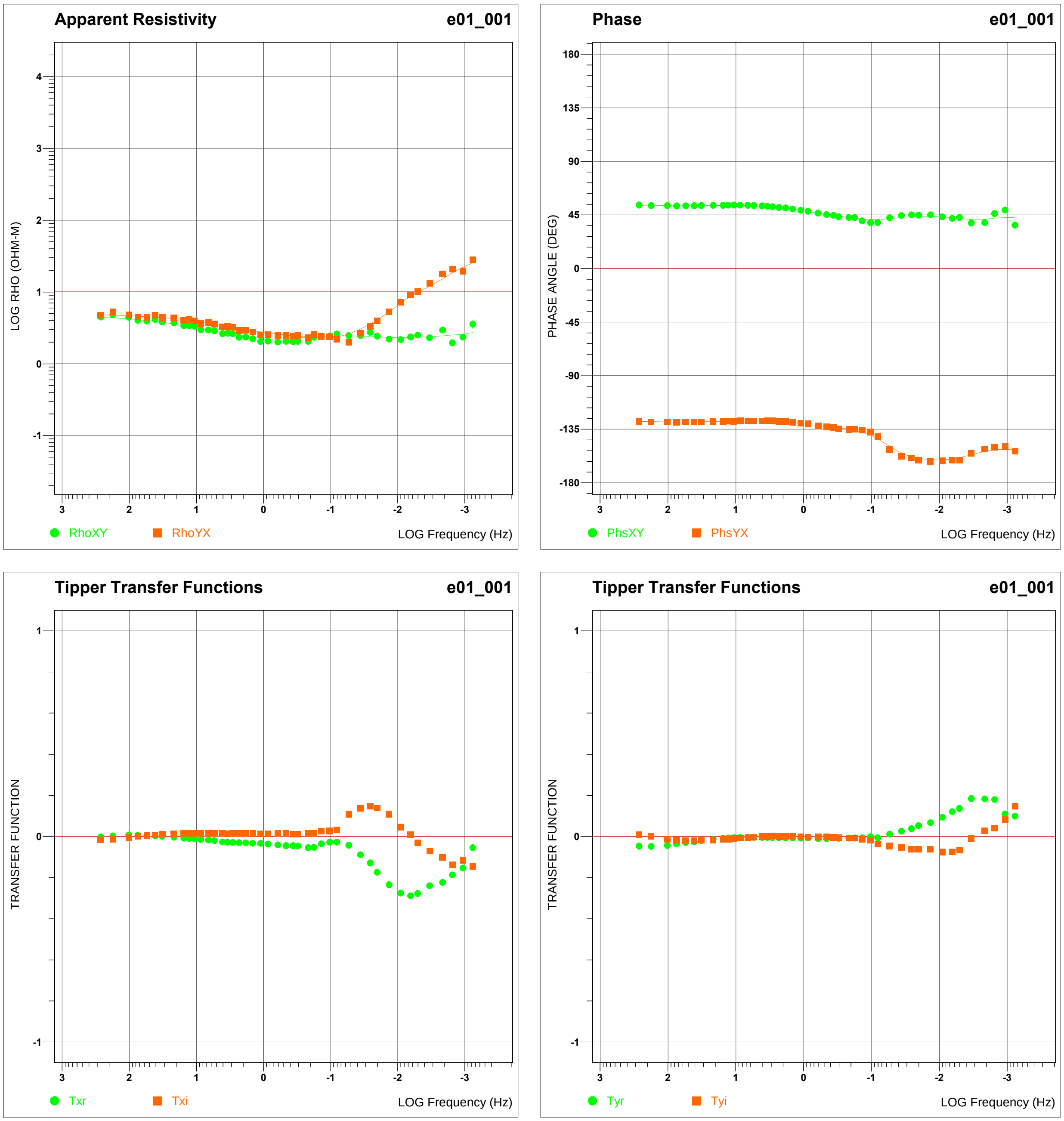
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.58 Site D16-016 – Apparent Resistivity, Phase, & Tipper Sounding Curves vs Frequency



X is pointing to 90deg ; Y is perpendicular to X
(right hand positive down coordinate system)
Mode XY (green) denotes Electrical (**Ex**) field and orthogonal Magnetic (**Hy**) field (=Ex/Hy)
Mode YX (orange) denotes Electrical (**Ey**) field and orthogonal Magnetic (**Hx**) field (=Ey/Hx)

C.1.59 Site E01-001 – Apparent Resistivity, Phase, & Tipper Sounding Curves vs Frequency



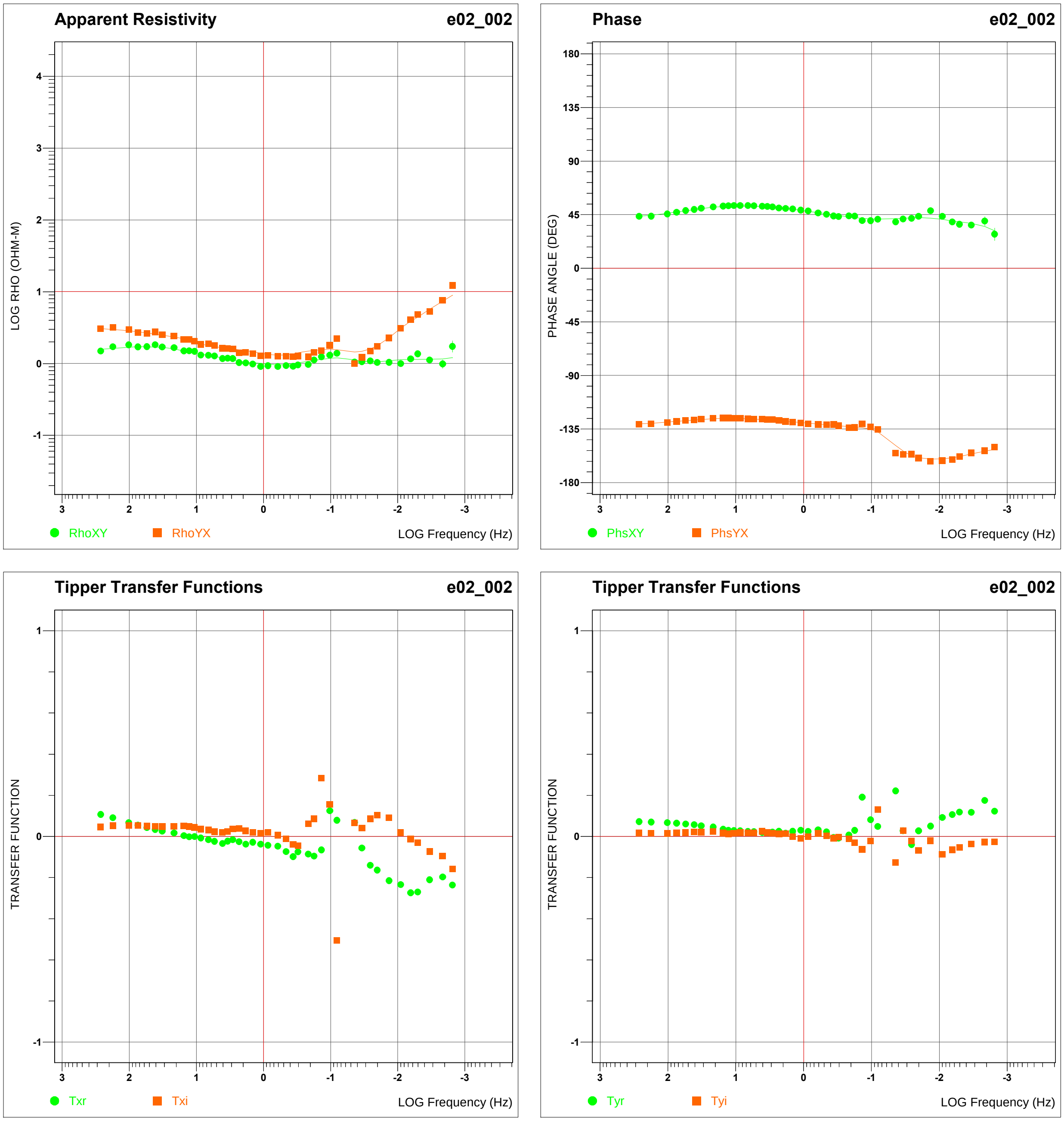
X is pointing to 90deg ; Y is perpendicular to X

(right hand positive down coordinate system)

Mode XY (green) denotes Electrical (**Ex**) field and orthogonal Magnetic (**Hy**) field (=Ex/Hy)

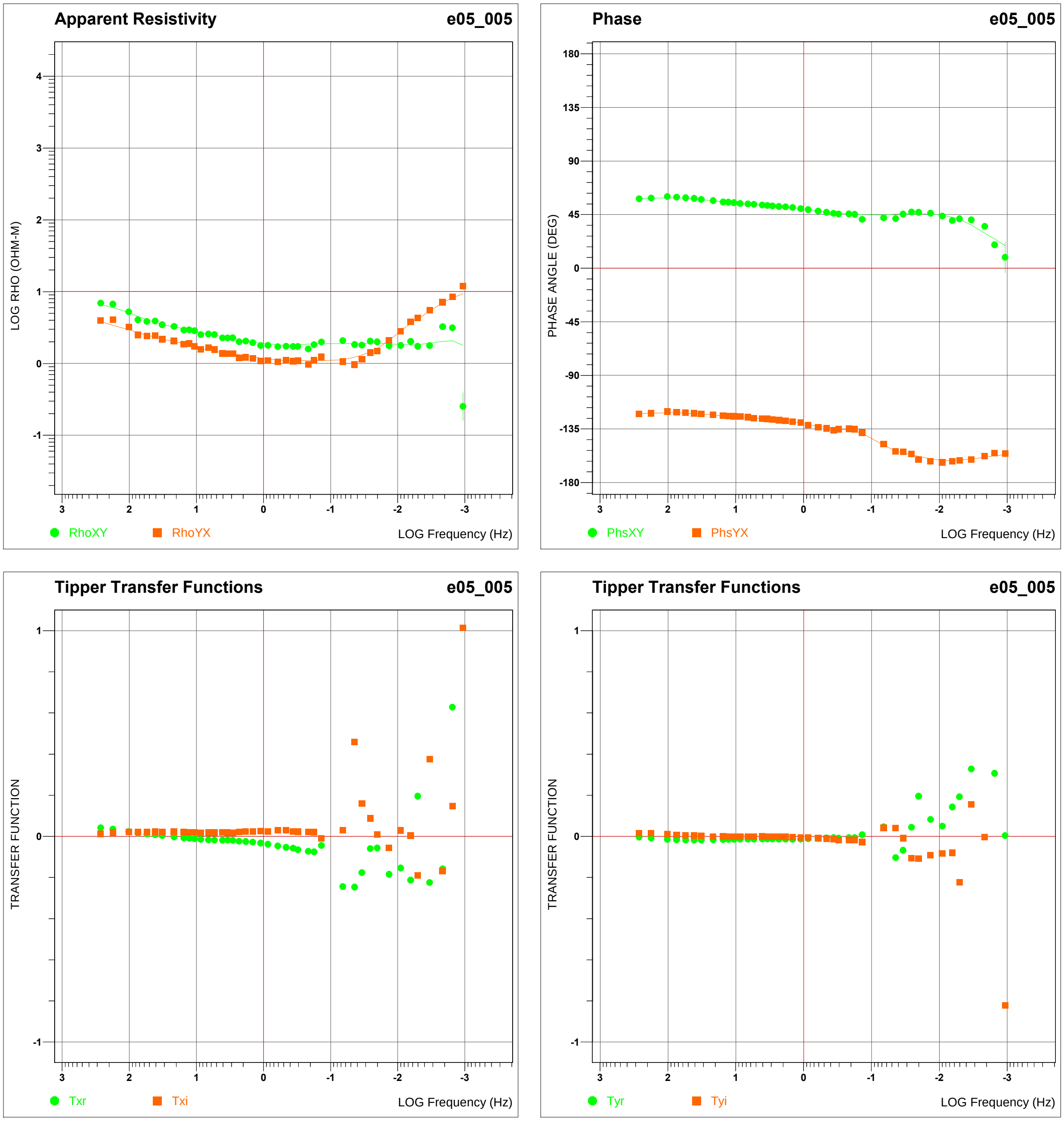
Mode YX (orange) denotes Electrical (**Ey**) field and orthogonal Magnetic (**Hx**) field (=Ey/Hx)

C.1.60 SITE E02-002 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.61 SITE E05-005 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY

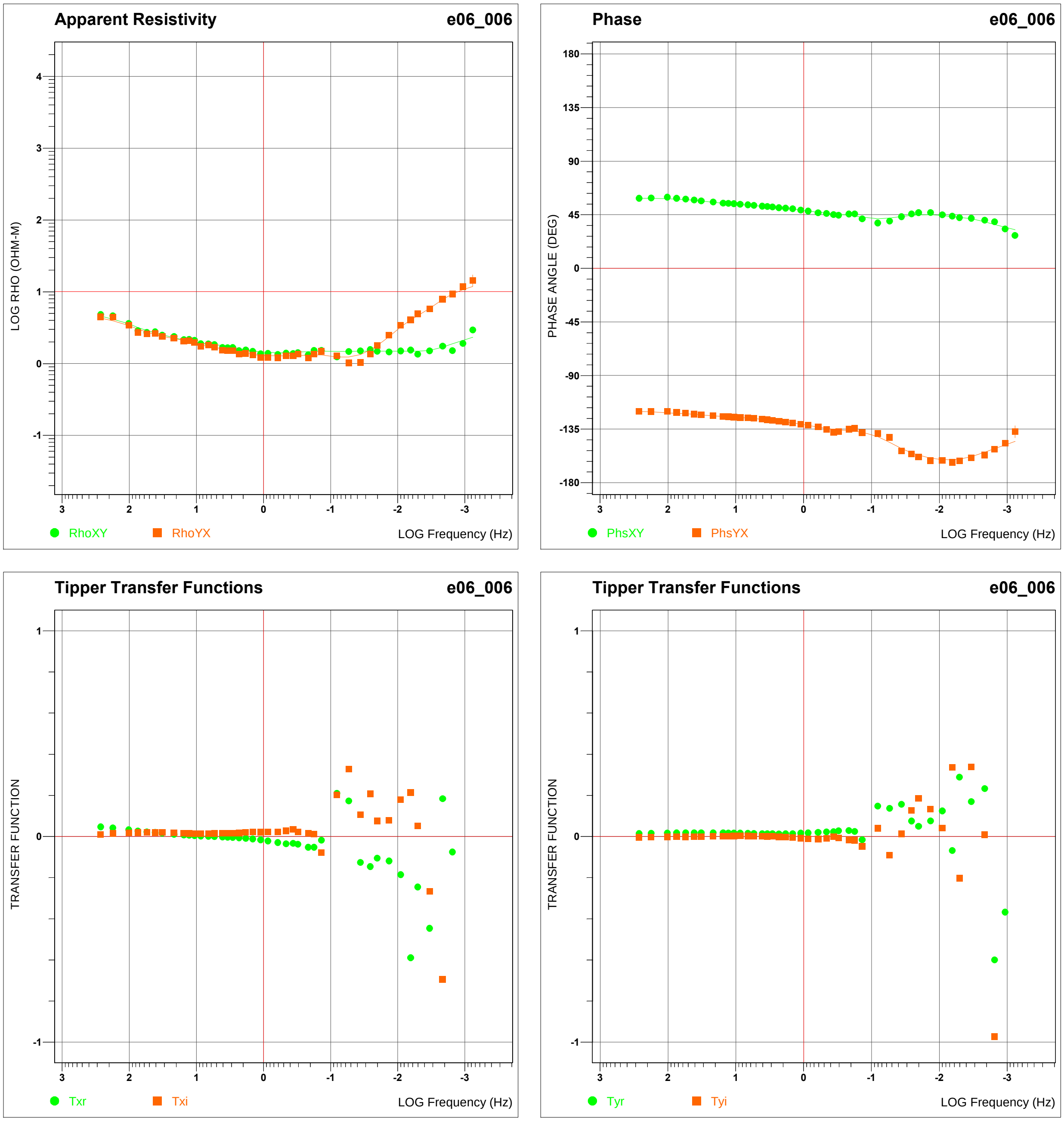


X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

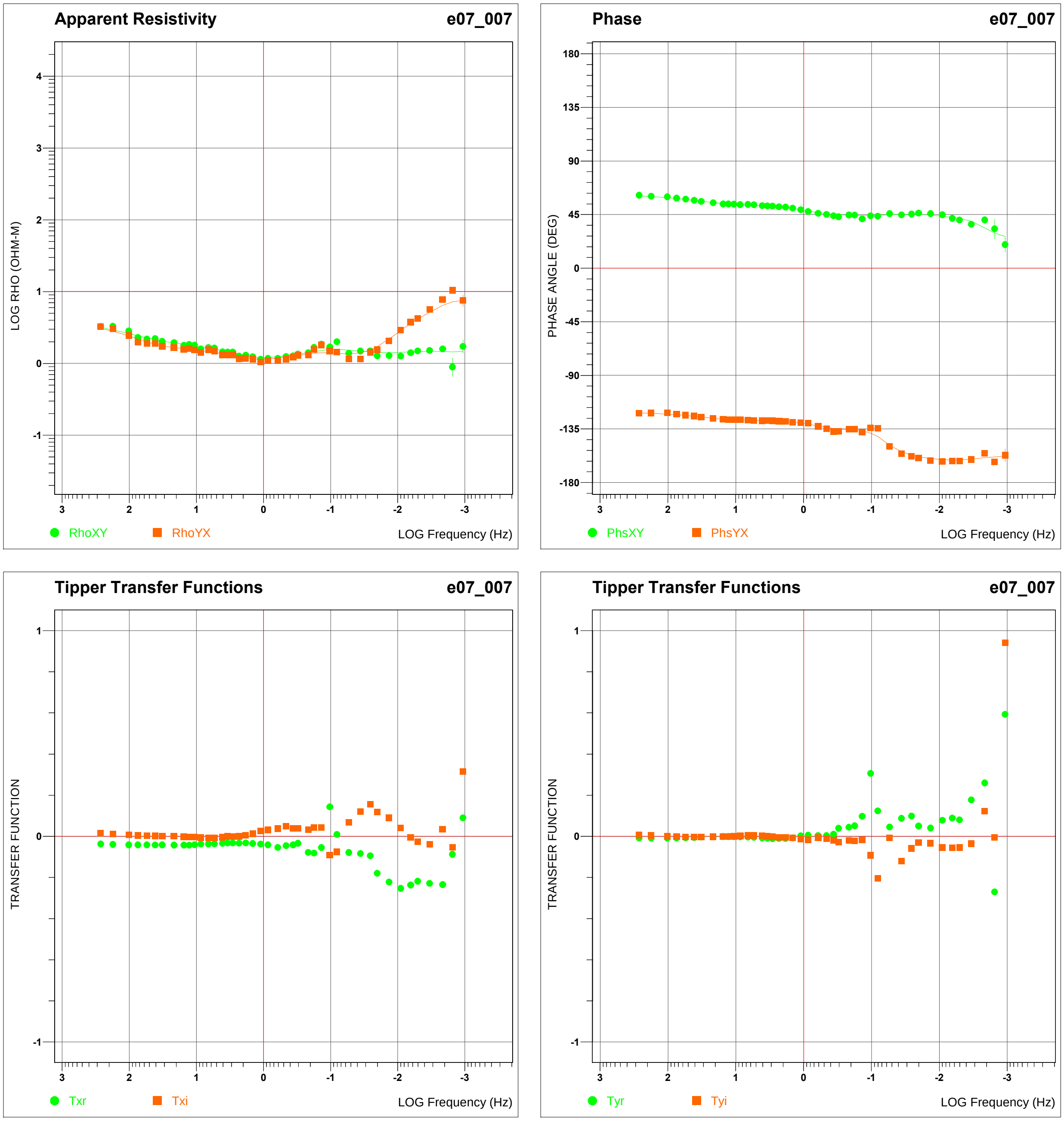
C.1.62 SITE E06-006 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

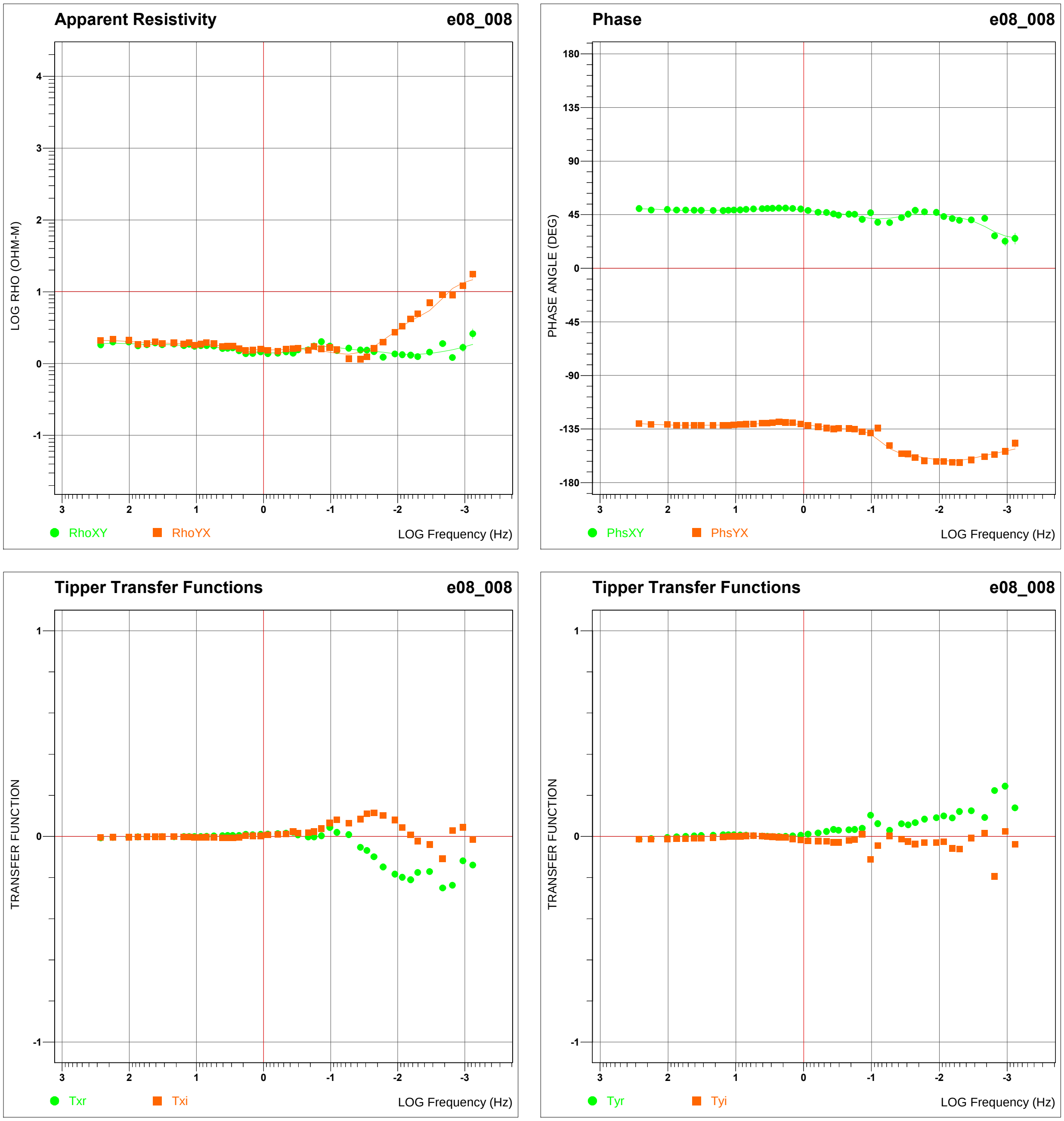
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.63 SITE E07-007 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



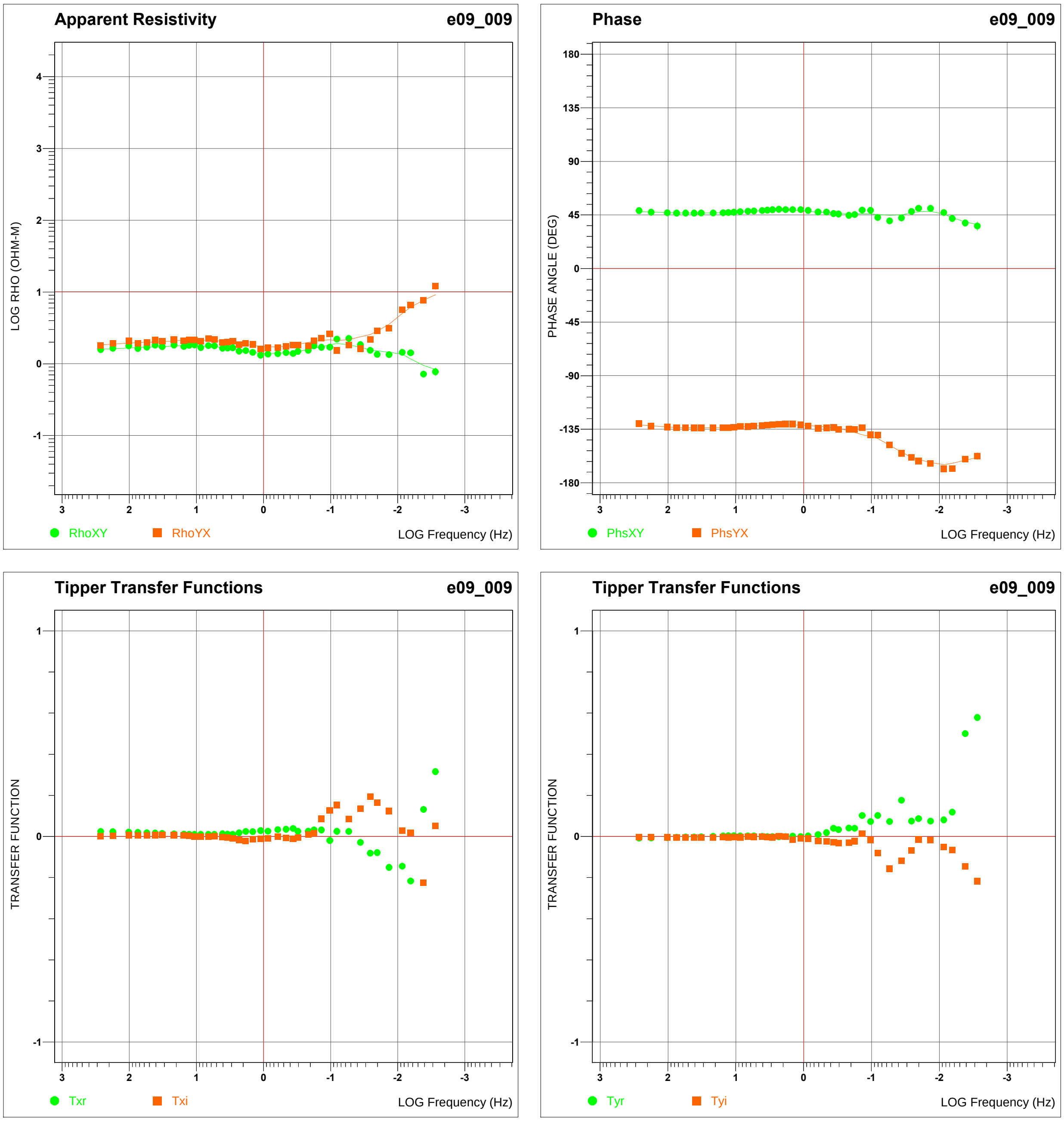
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.64 Site E08-008 – Apparent Resistivity, Phase, & Tipper Sounding Curves vs Frequency



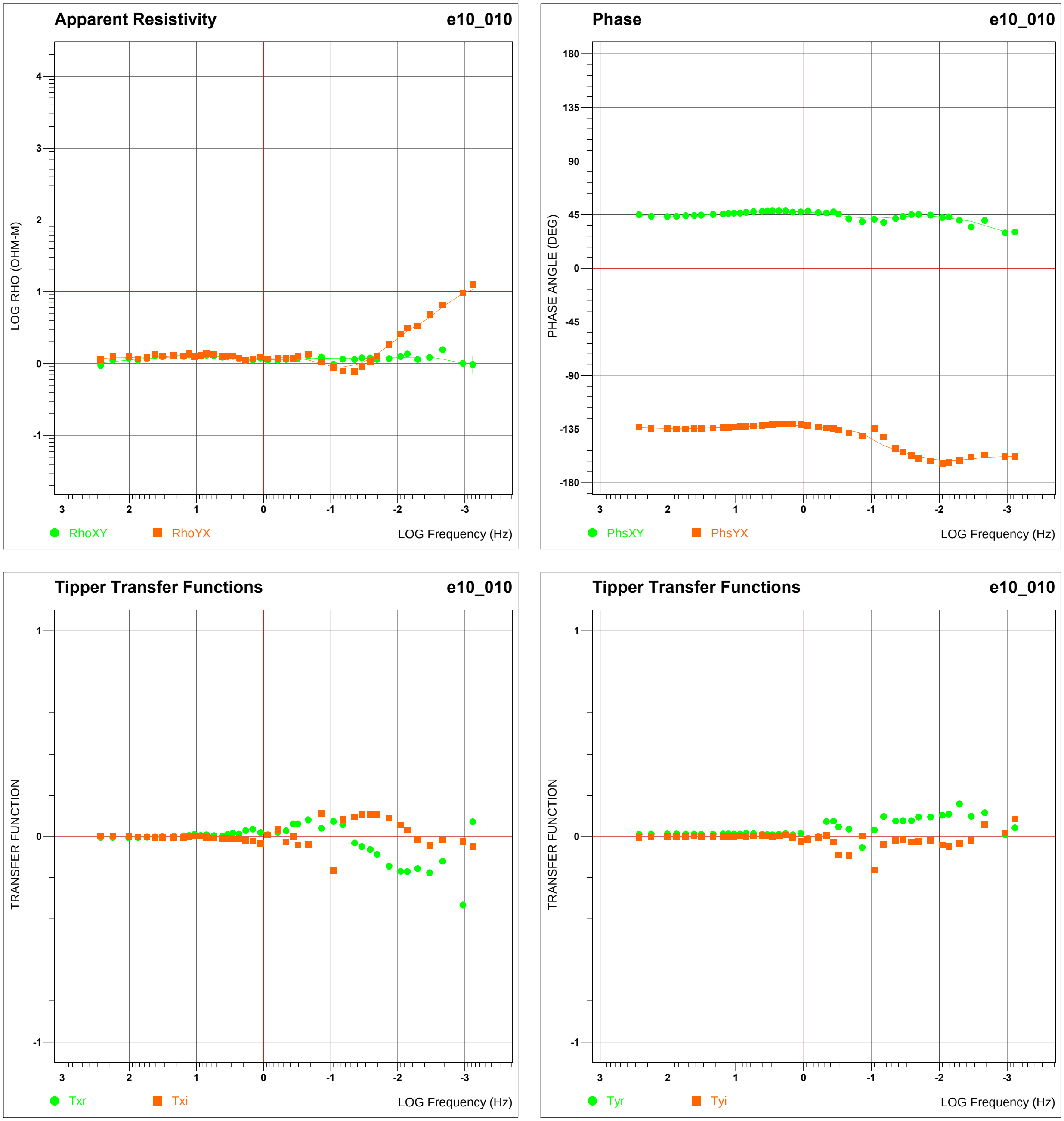
X is pointing to 90deg ; Y is perpendicular to X
(right hand positive down coordinate system)
Mode XY (green) denotes Electrical (**Ex**) field and orthogonal Magnetic (**Hy**) field (=Ex/Hy)
Mode YX (orange) denotes Electrical (**Ey**) field and orthogonal Magnetic (**Hx**) field (=Ey/Hx)

C.1.65 SITE E09-009 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



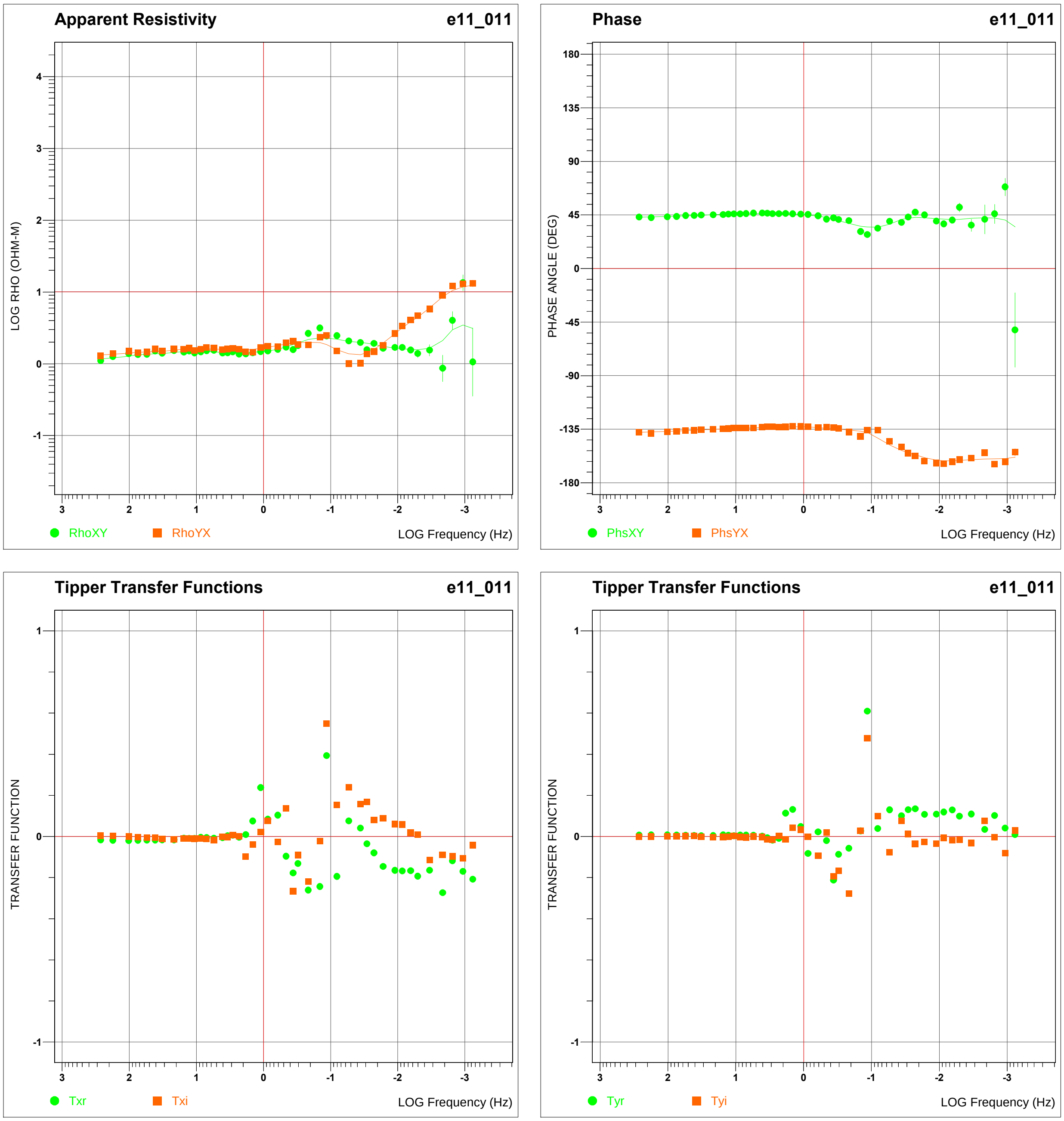
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.66 SITE E10-010 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



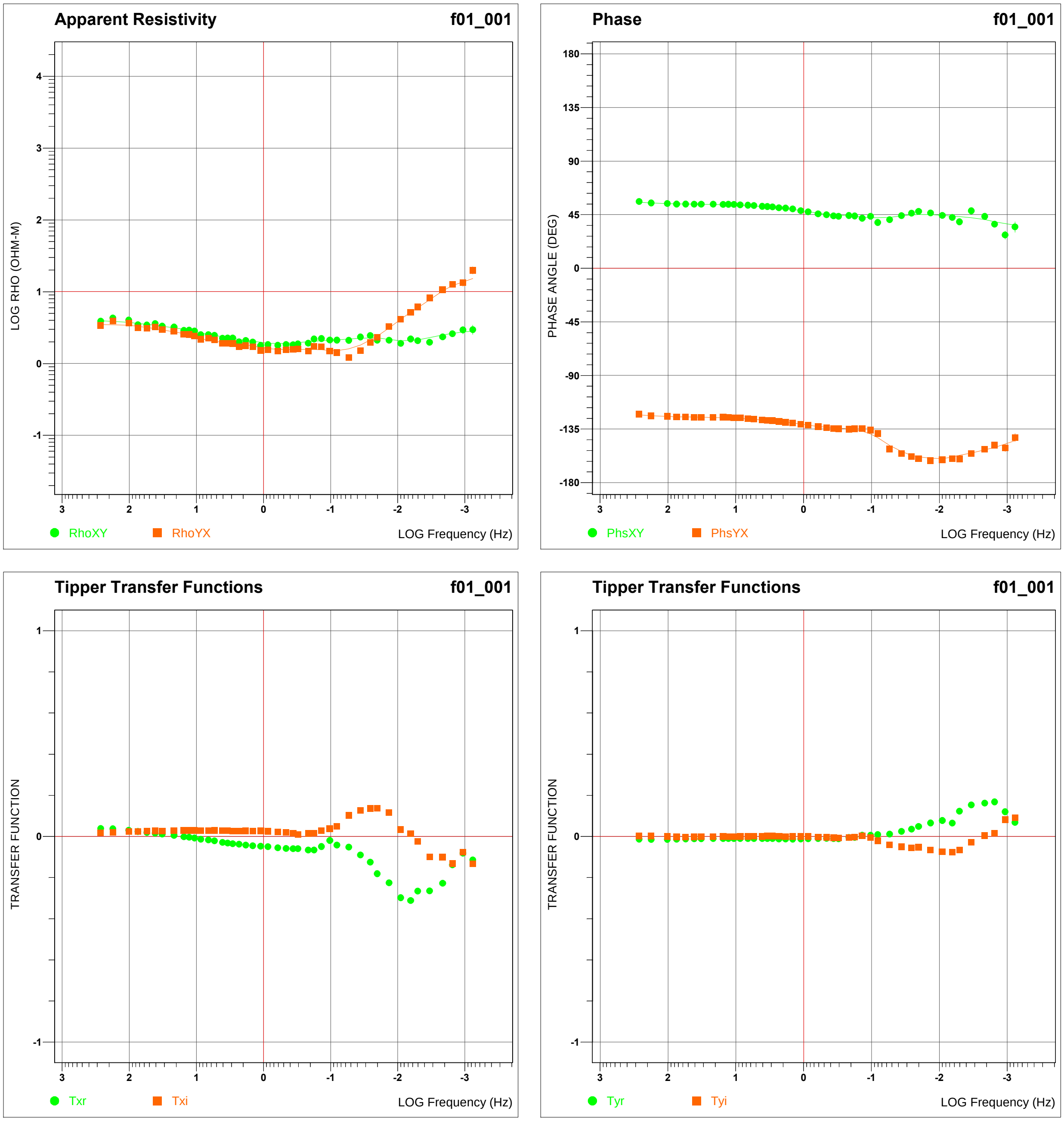
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.67 SITE E11-011 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



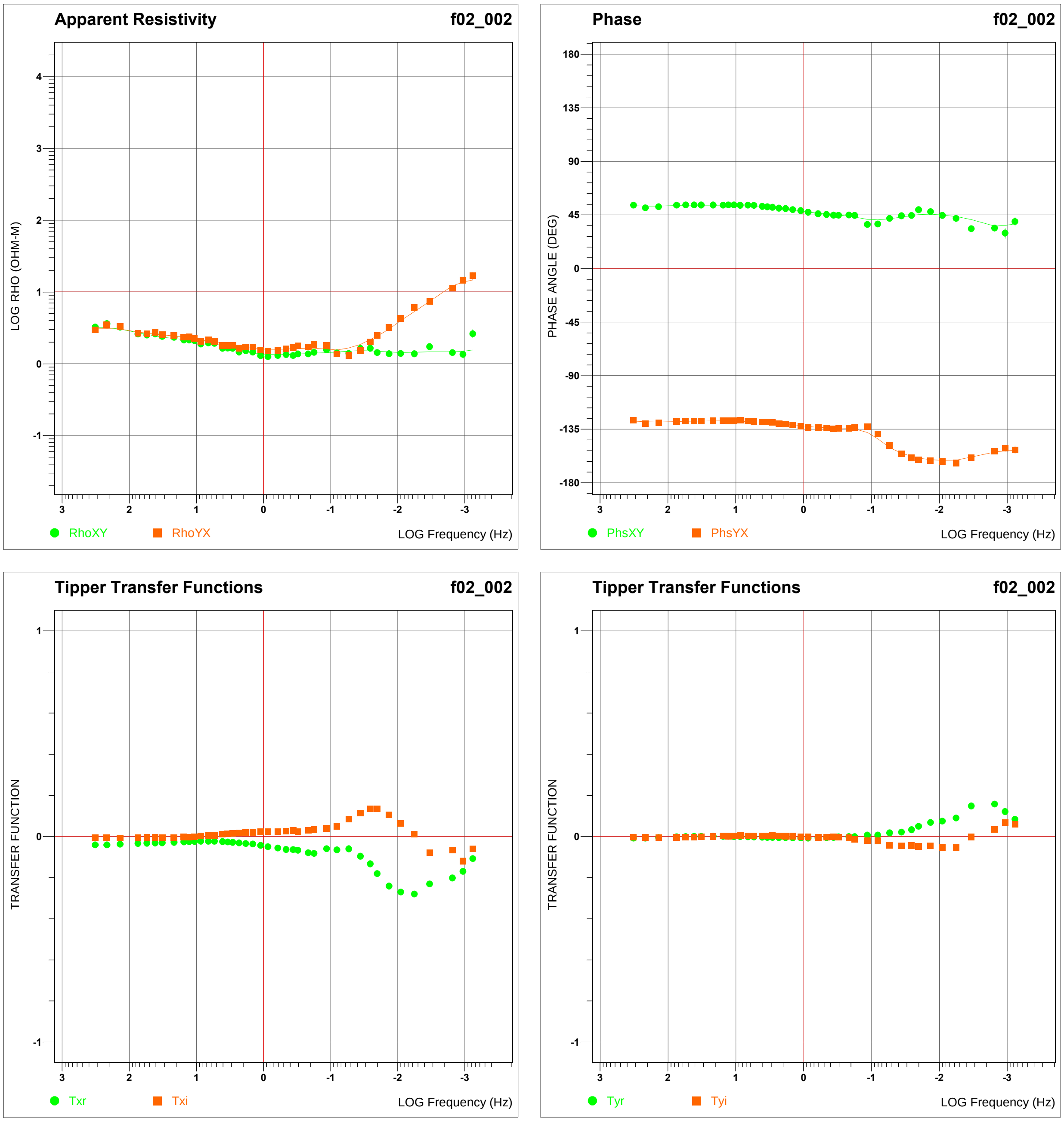
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.68 SITE F01-001 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.69 SITE F02-002 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY

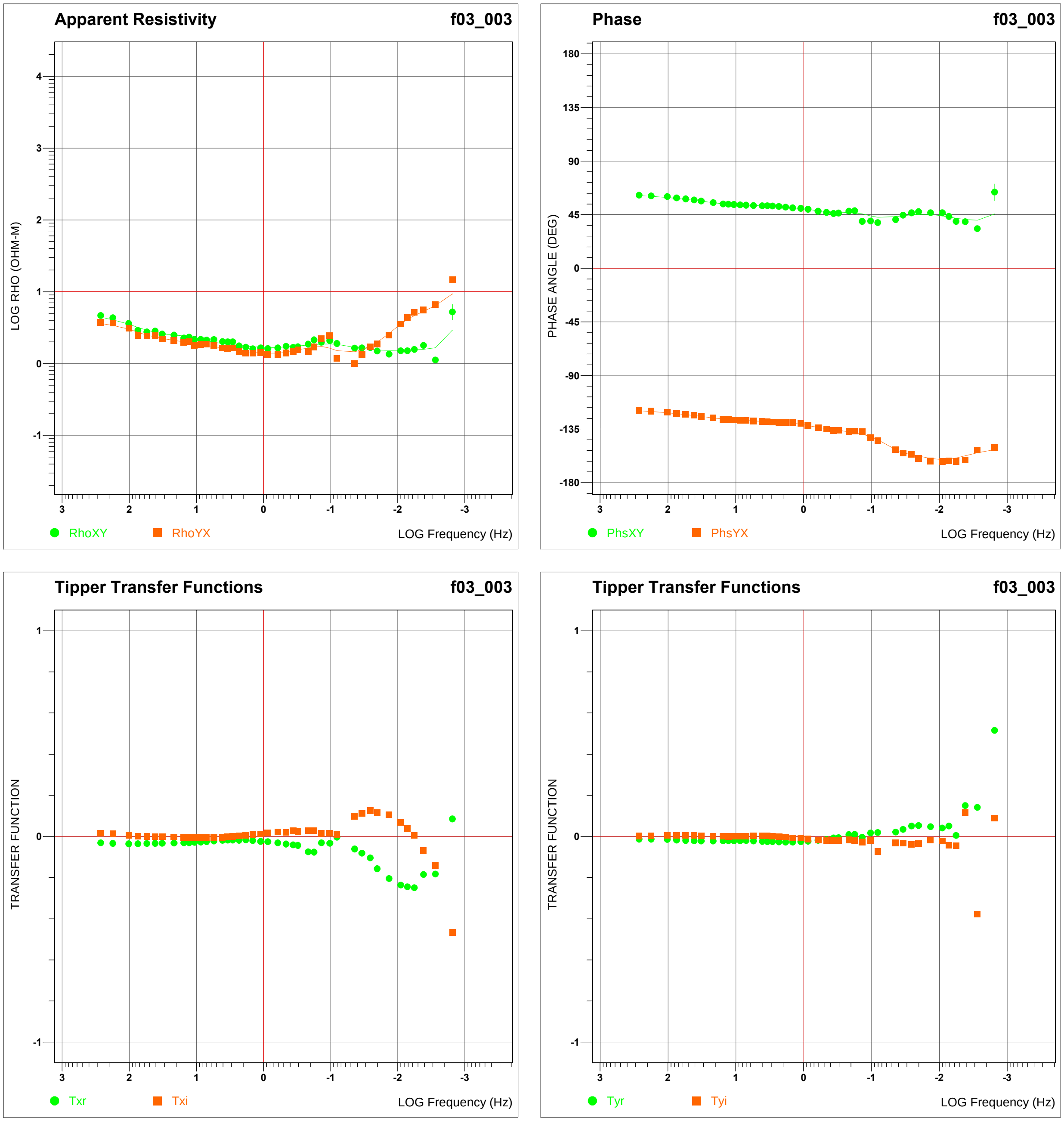


X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

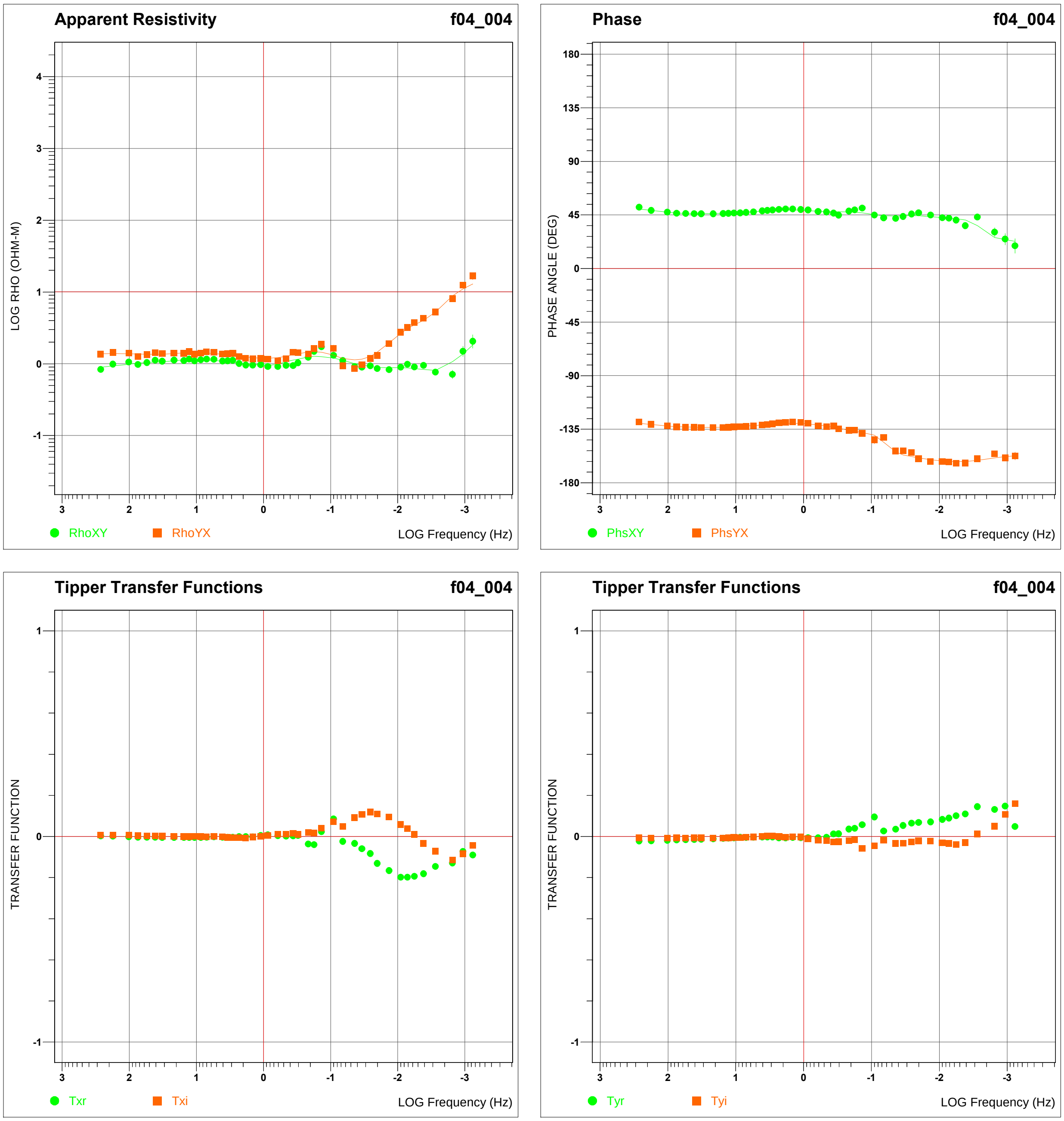
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.70 SITE F03-003 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.71 Site F04-004 – Apparent Resistivity, Phase, & Tipper Sounding Curves vs Frequency

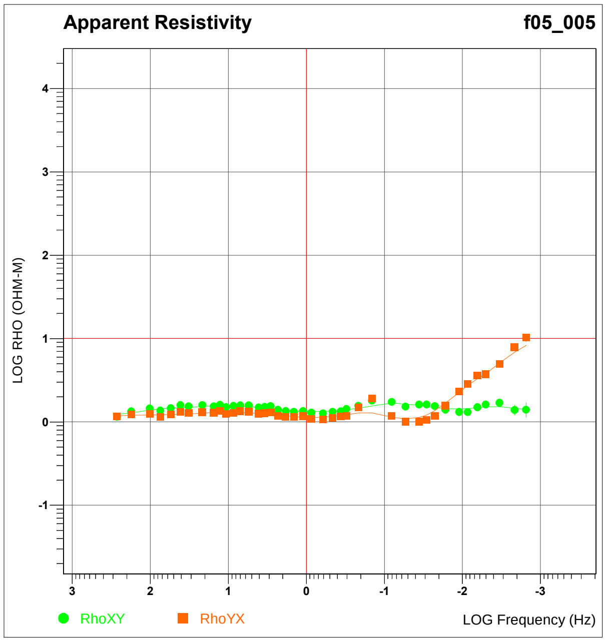


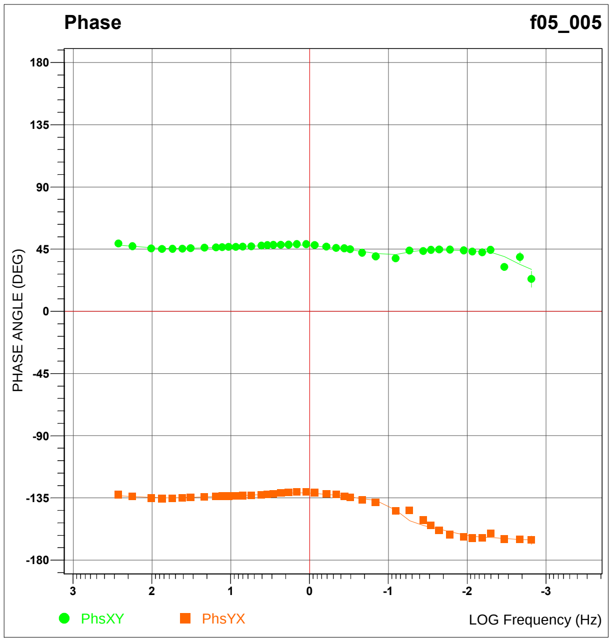
X is pointing to 90deg ; Y is perpendicular to X
(right hand positive down coordinate system)

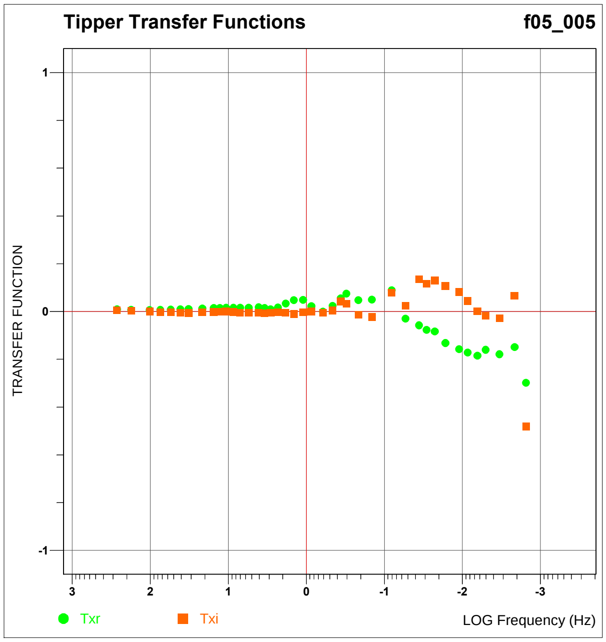
Mode XY (green) denotes Electrical (**Ex**) field and orthogonal Magnetic (**Hy**) field (=Ex/Hy)

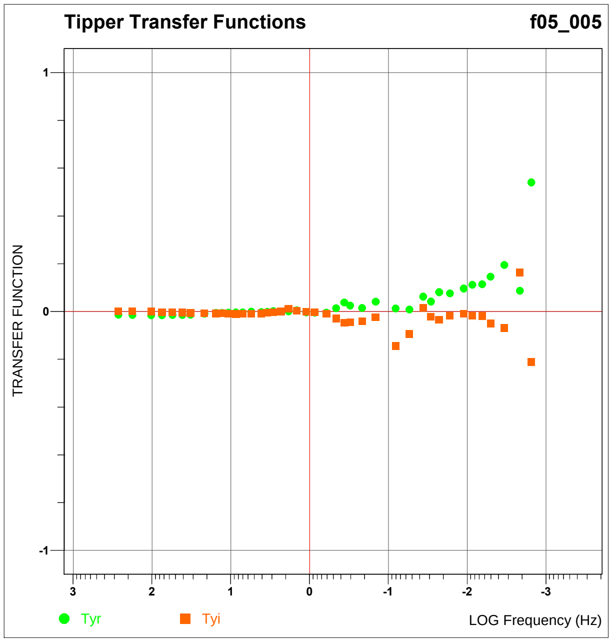
Mode YX (orange) denotes Electrical (**Ey**) field and orthogonal Magnetic (**Hx**) field (=Ey/Hx)

C.1.72 SITE F05-005 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



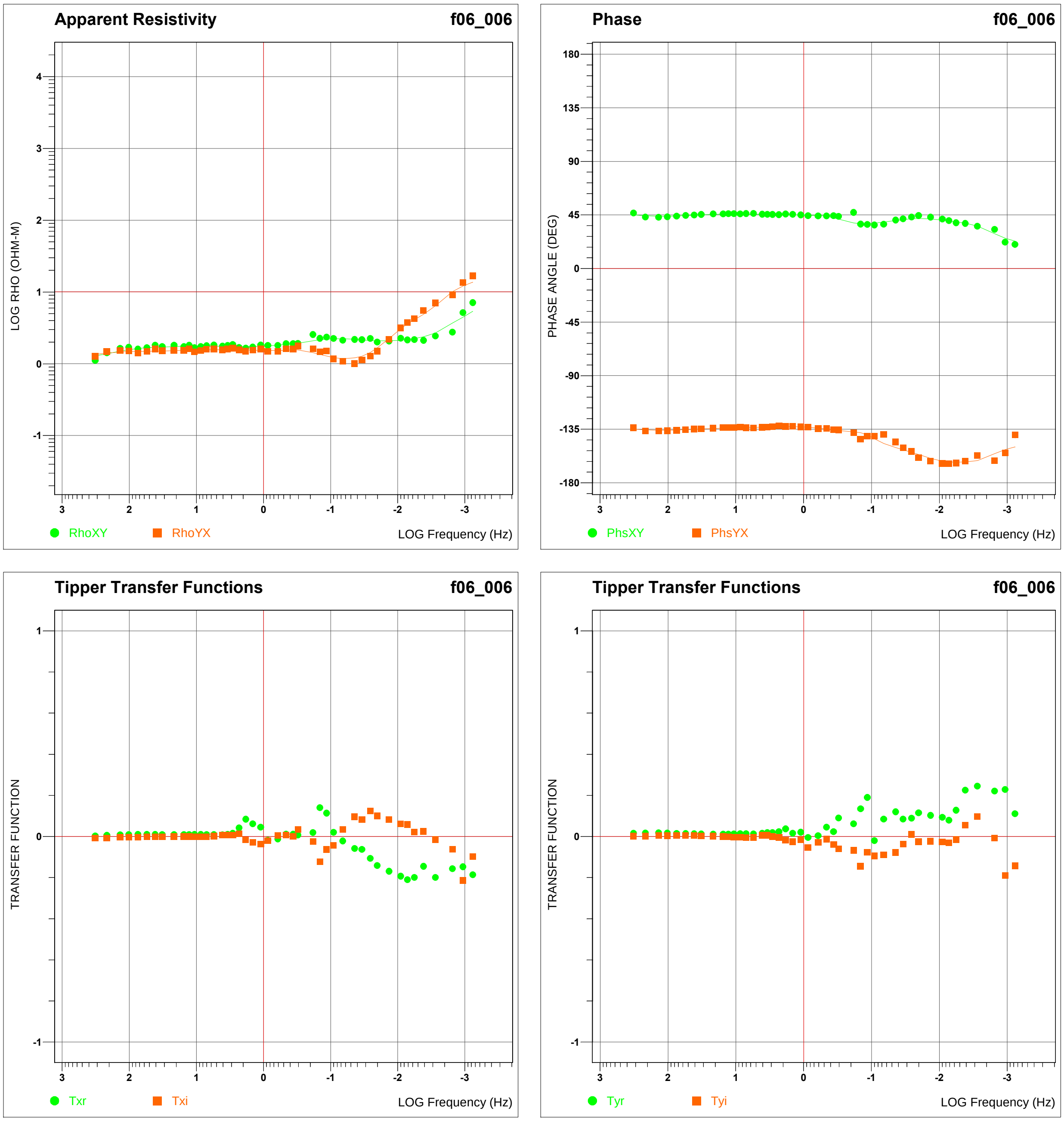






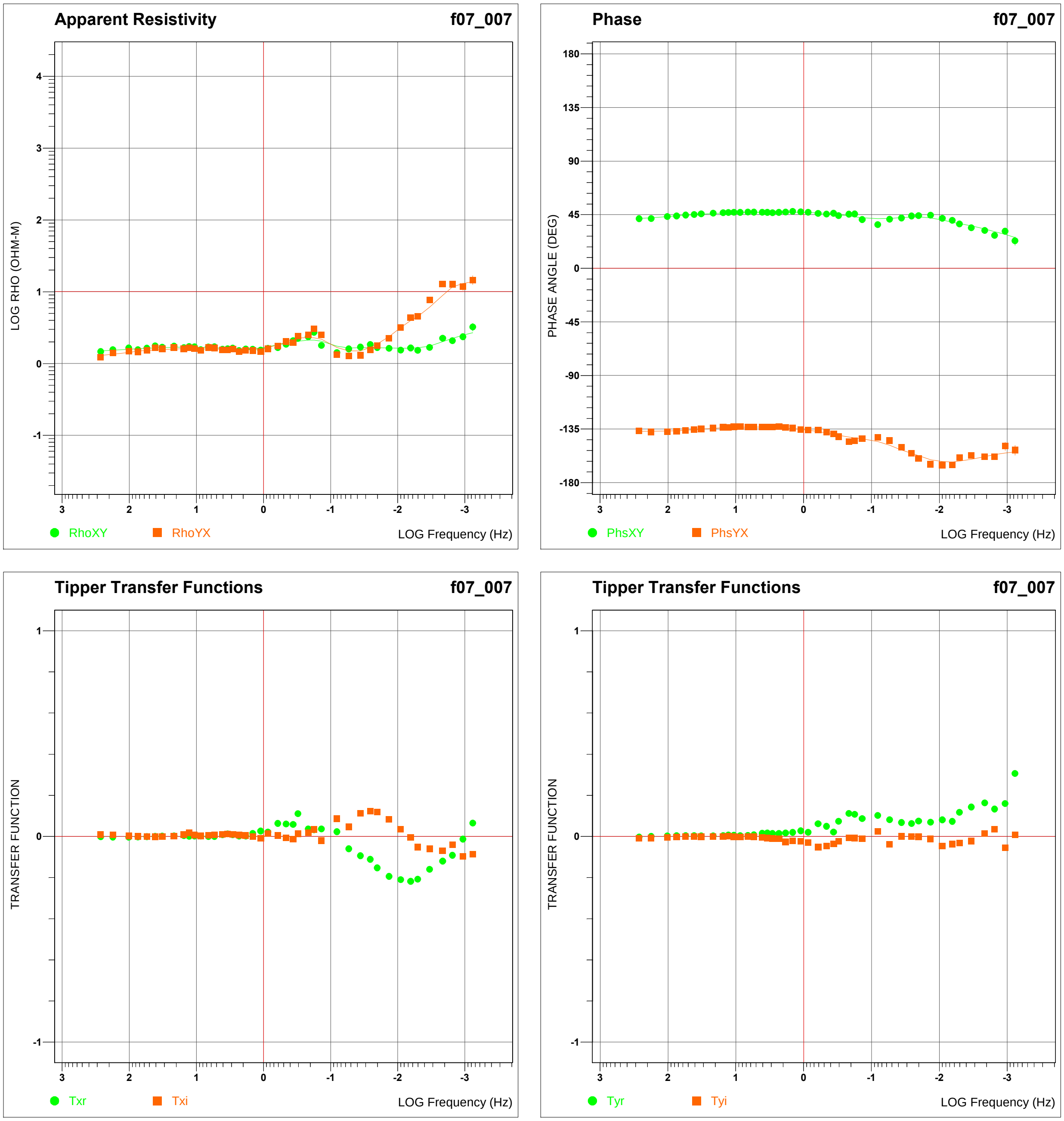
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.73 SITE F06-006 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



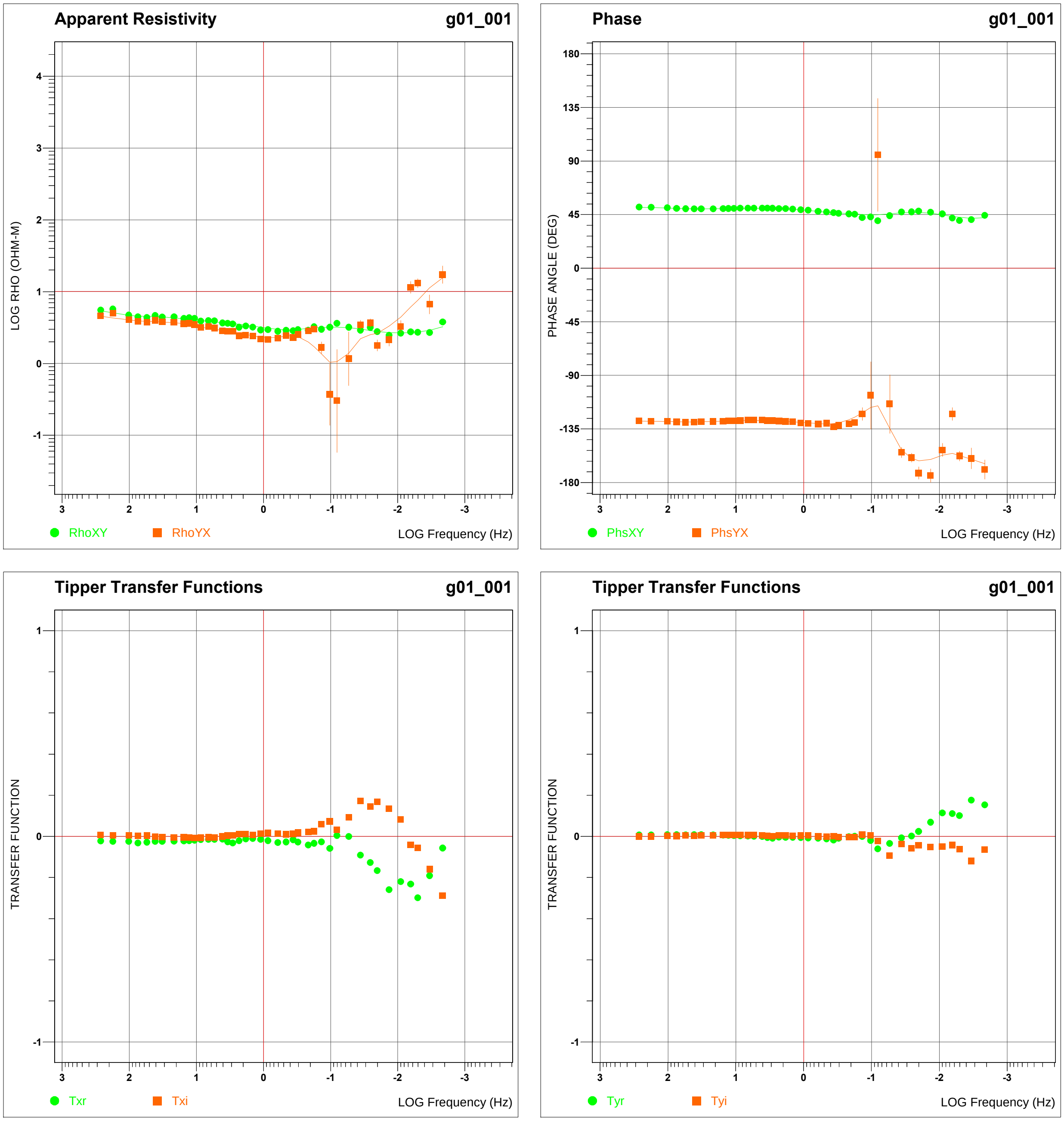
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.74 SITE F07-007 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



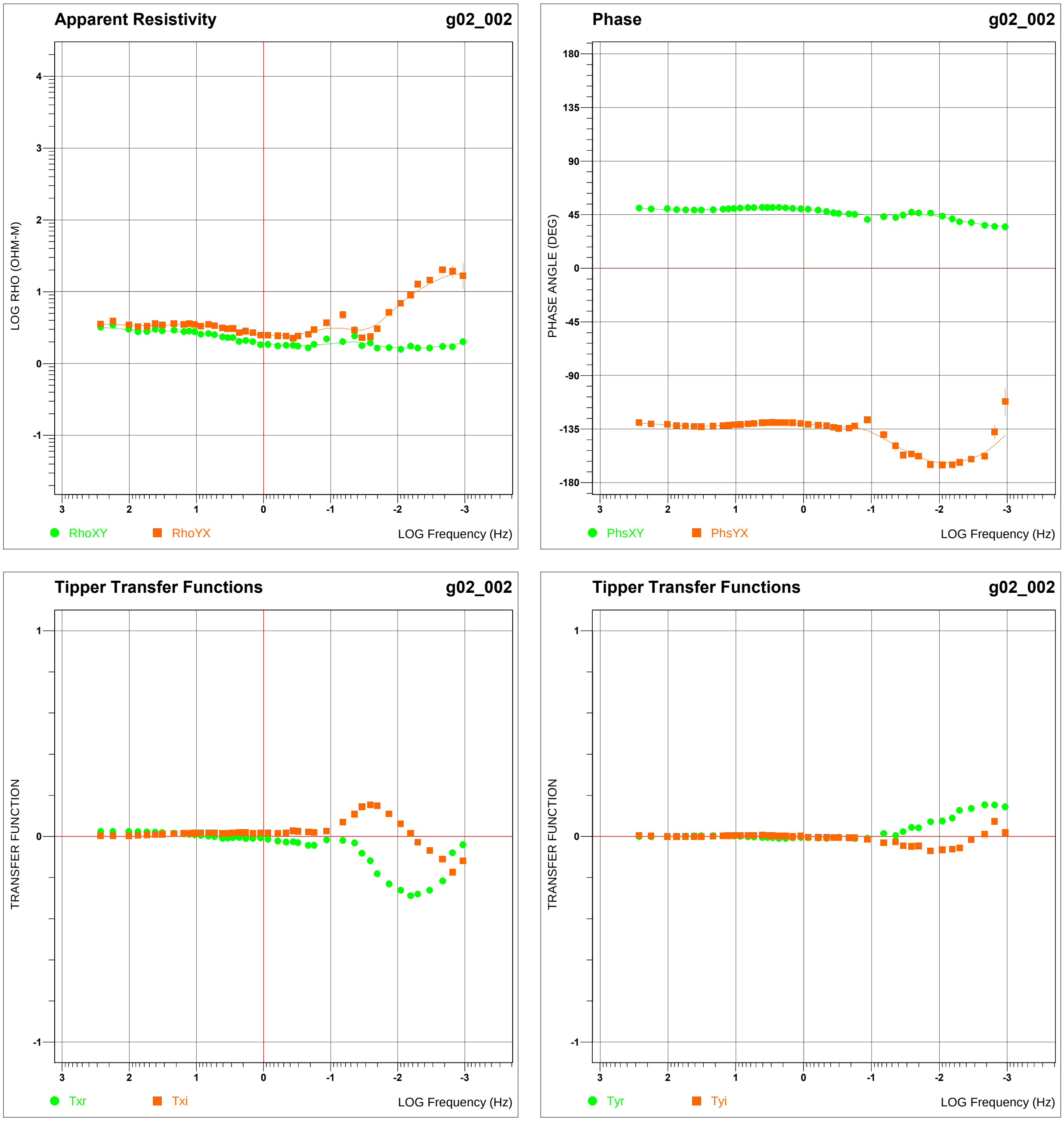
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.75 SITE G01-001 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.76 Site G02-002 – Apparent Resistivity, Phase, & Tipper Sounding Curves vs Frequency



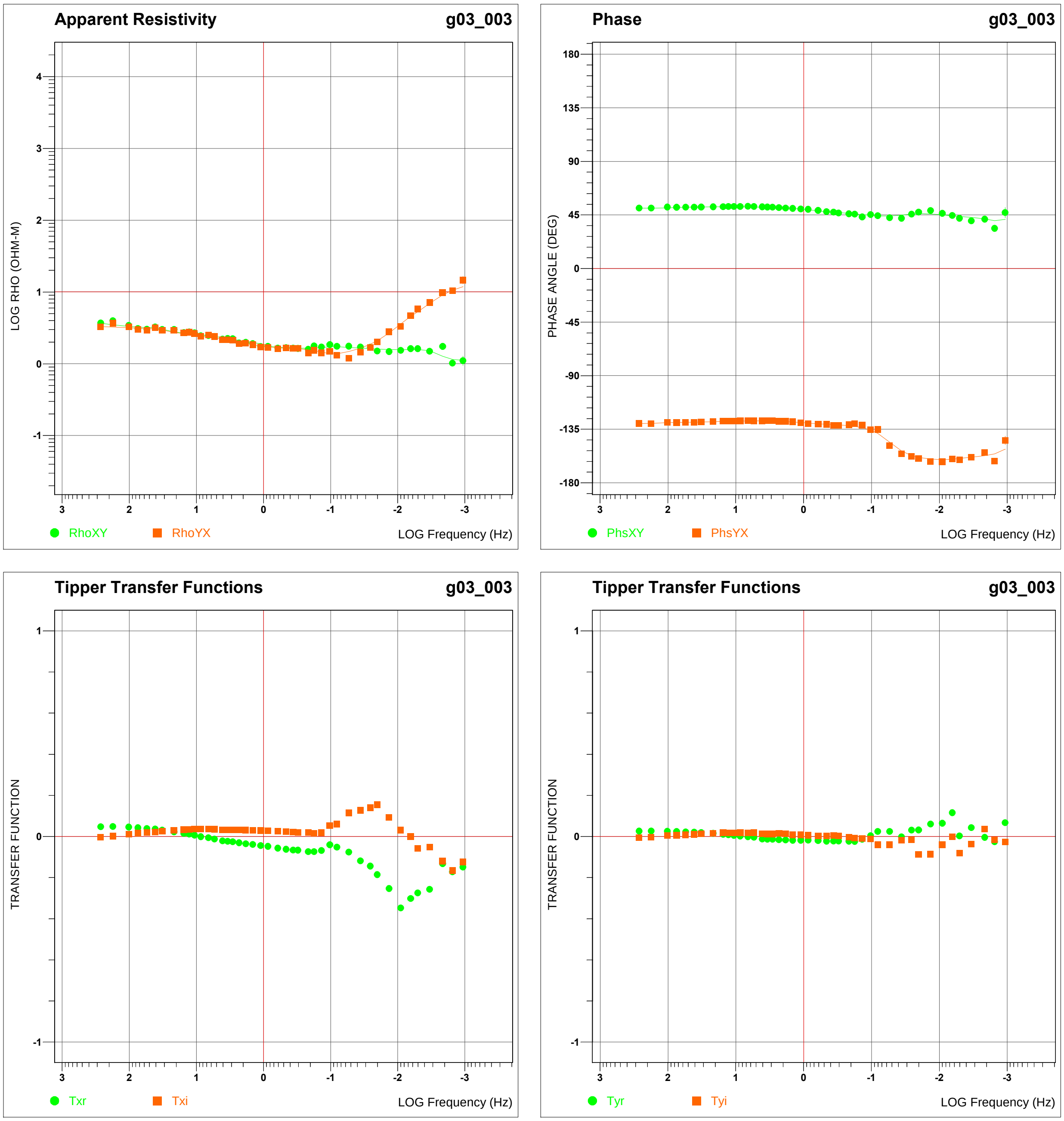
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X

(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

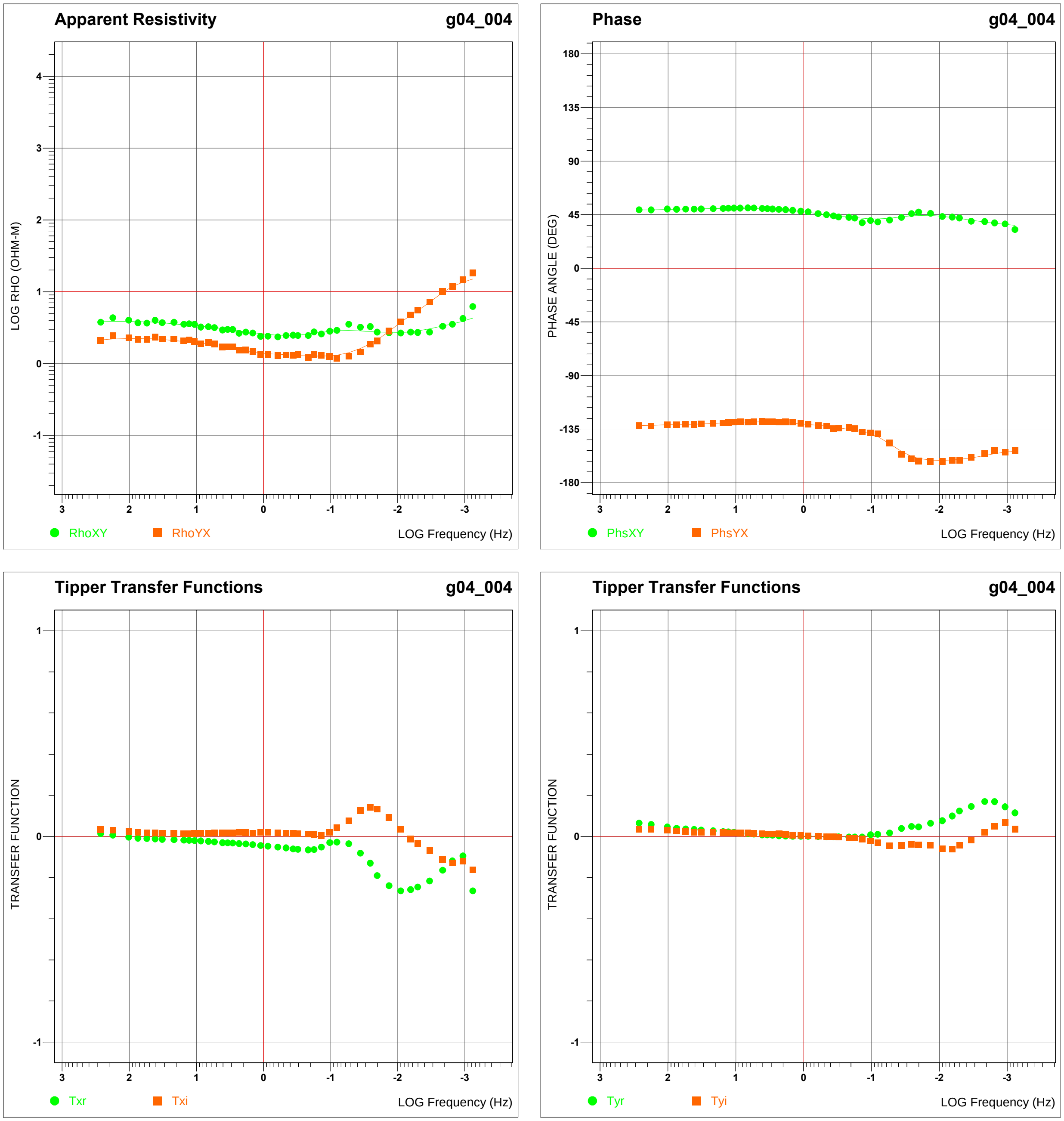
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.77 SITE G03-003 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



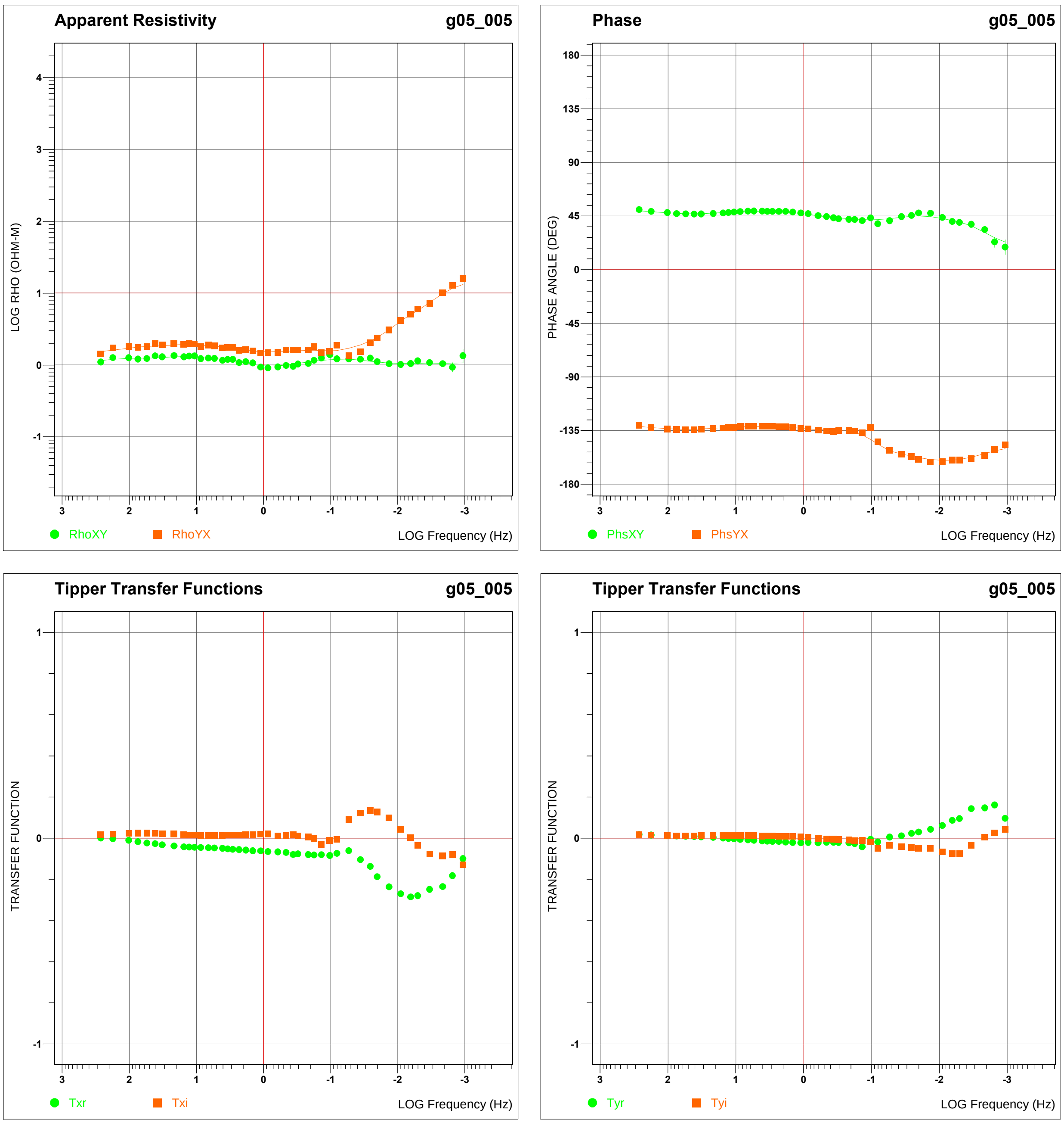
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.78 SITE G04-004 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



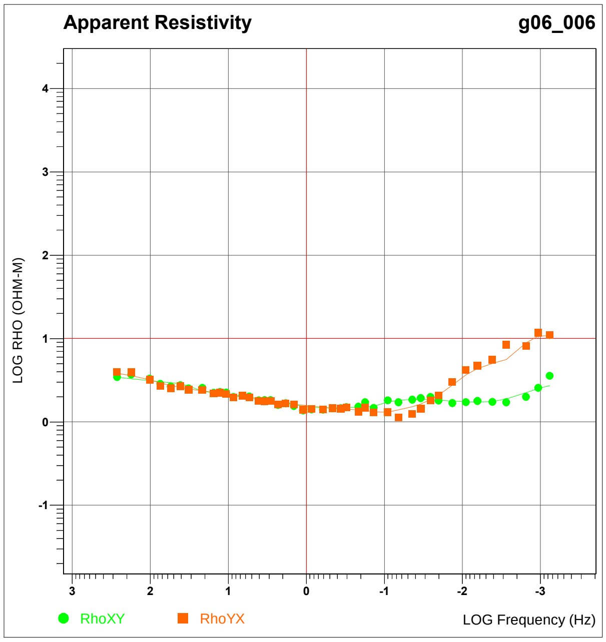
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

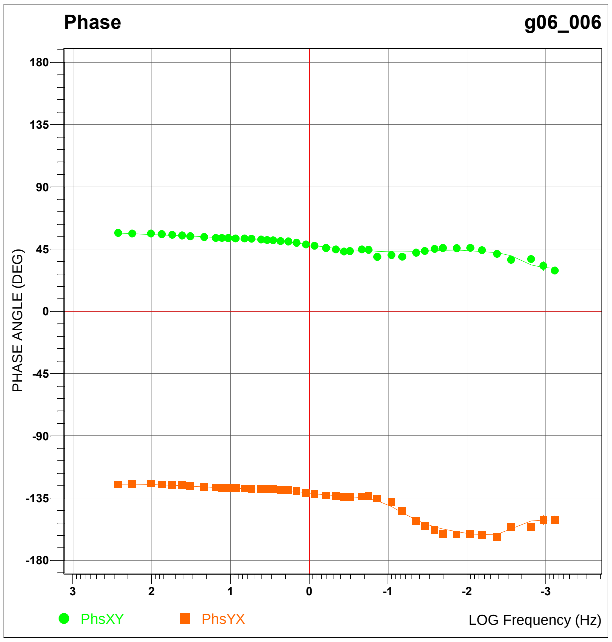
C.1.79 SITE G05-005 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY

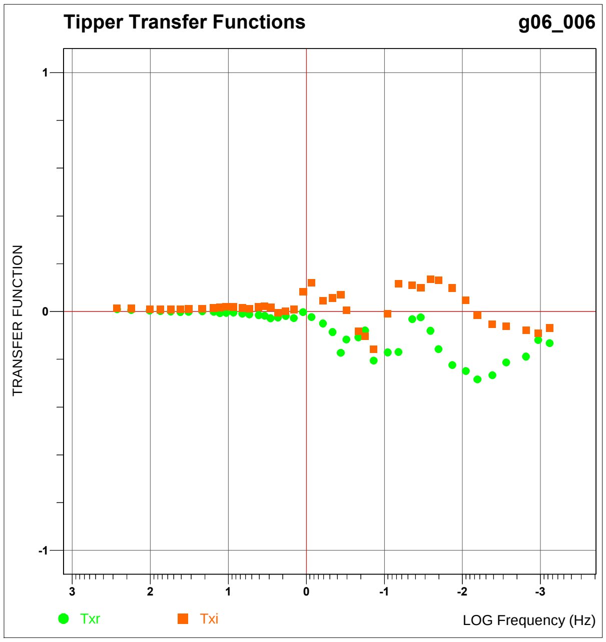


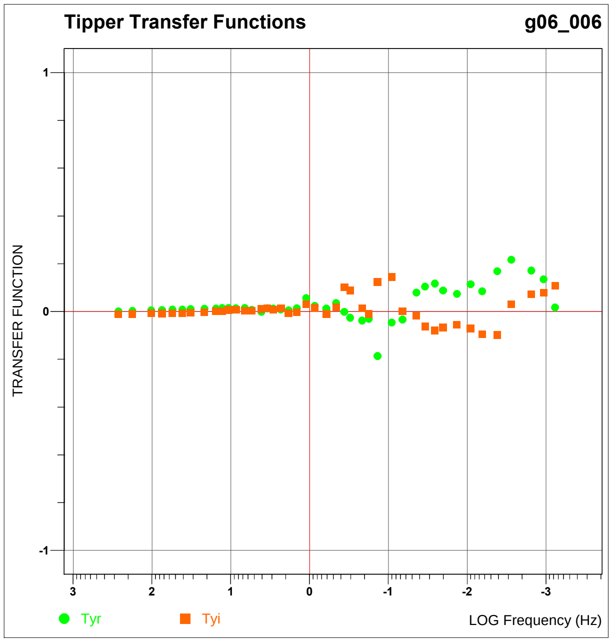
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.80 SITE G06-006 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



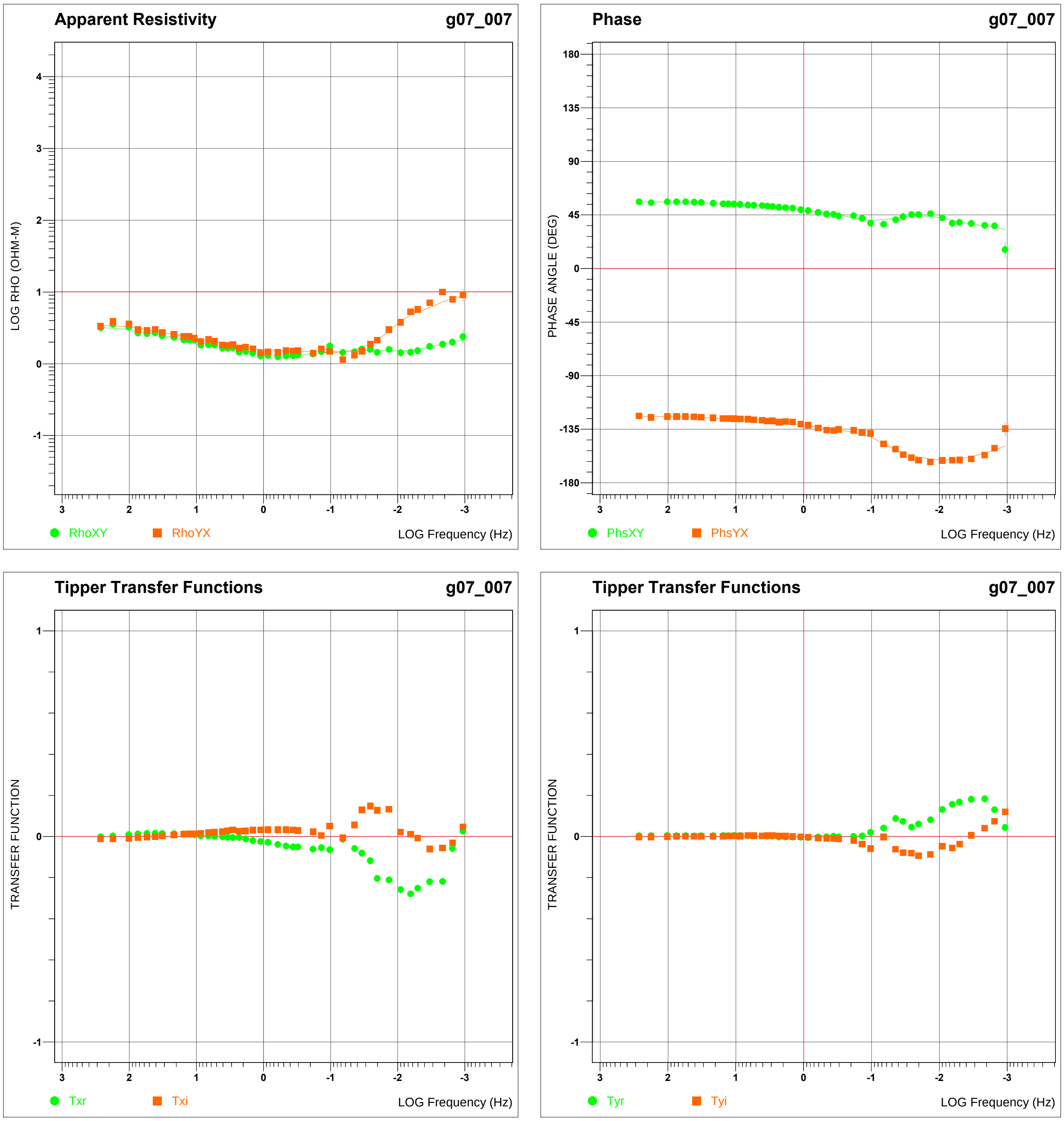






X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.81 Site G07-007 – Apparent Resistivity, Phase, & Tipper Sounding Curves vs Frequency



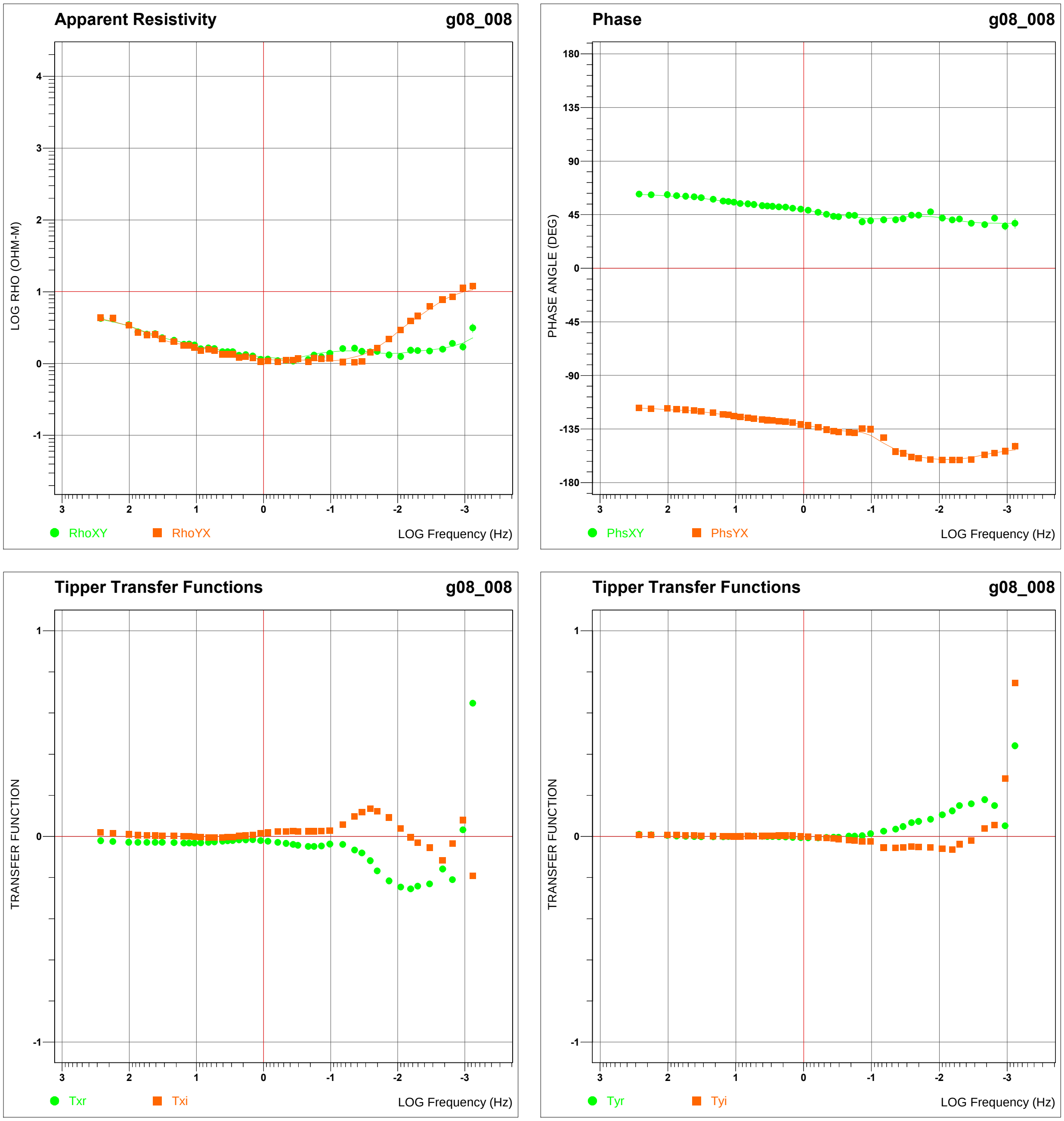
X is pointing to 90deg ; Y is perpendicular to X

(right hand positive down coordinate system)

Mode XY (green) denotes Electrical (**Ex**) field and orthogonal Magnetic (**Hy**) field (=Ex/Hy)

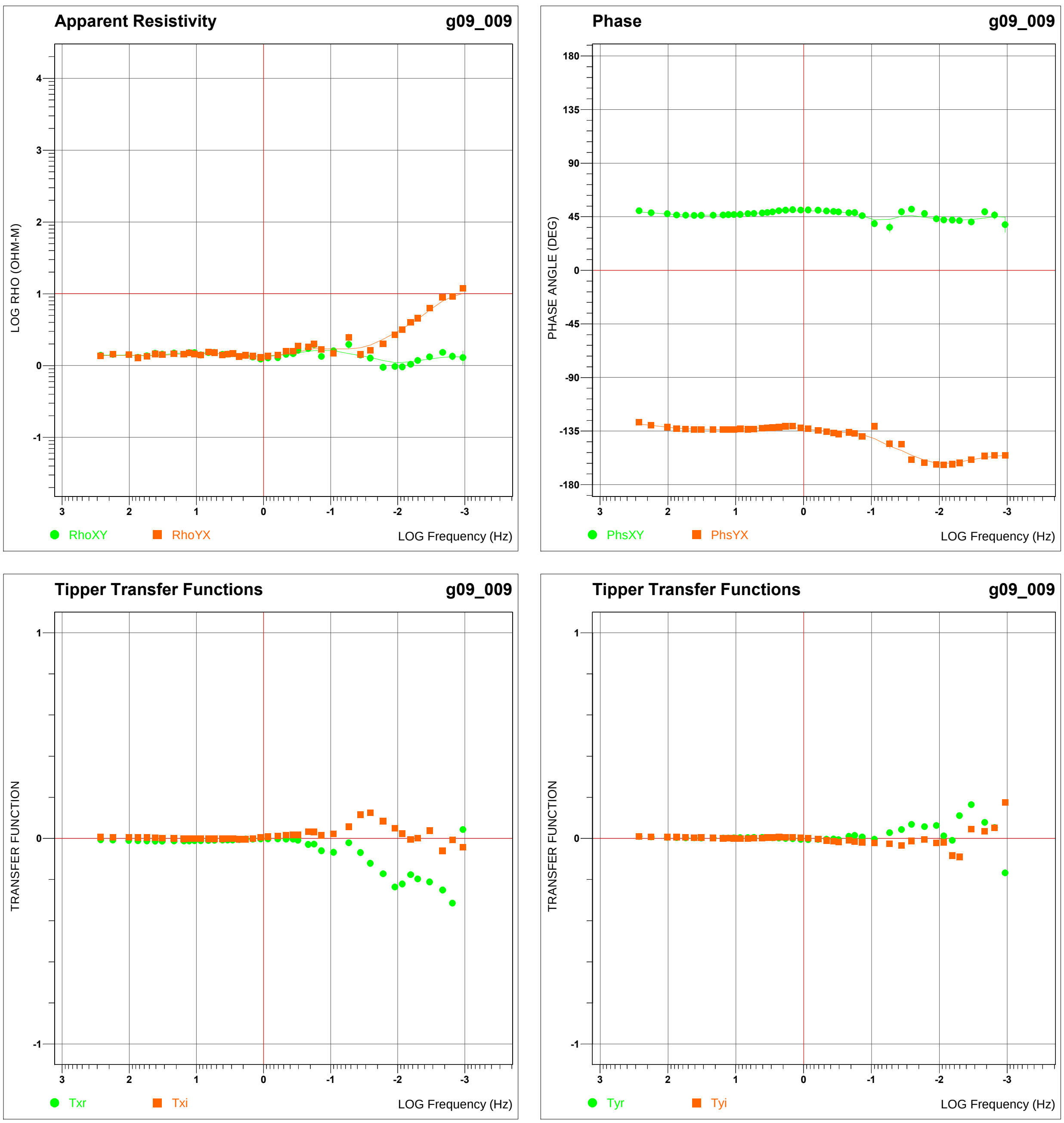
Mode YX (orange) denotes Electrical (**Ey**) field and orthogonal Magnetic (**Hx**) field (=Ey/Hx)

C.1.82 Site G08-008 – Apparent Resistivity, Phase, & Tipper Sounding Curves vs Frequency



X is pointing to 90deg ; Y is perpendicular to X
(right hand positive down coordinate system)
Mode XY (green) denotes Electrical (**Ex**) field and orthogonal Magnetic (**Hy**) field (=Ex/Hy)
Mode YX (orange) denotes Electrical (**Ey**) field and orthogonal Magnetic (**Hx**) field (=Ey/Hx)

C.1.83 SITE G09-009 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



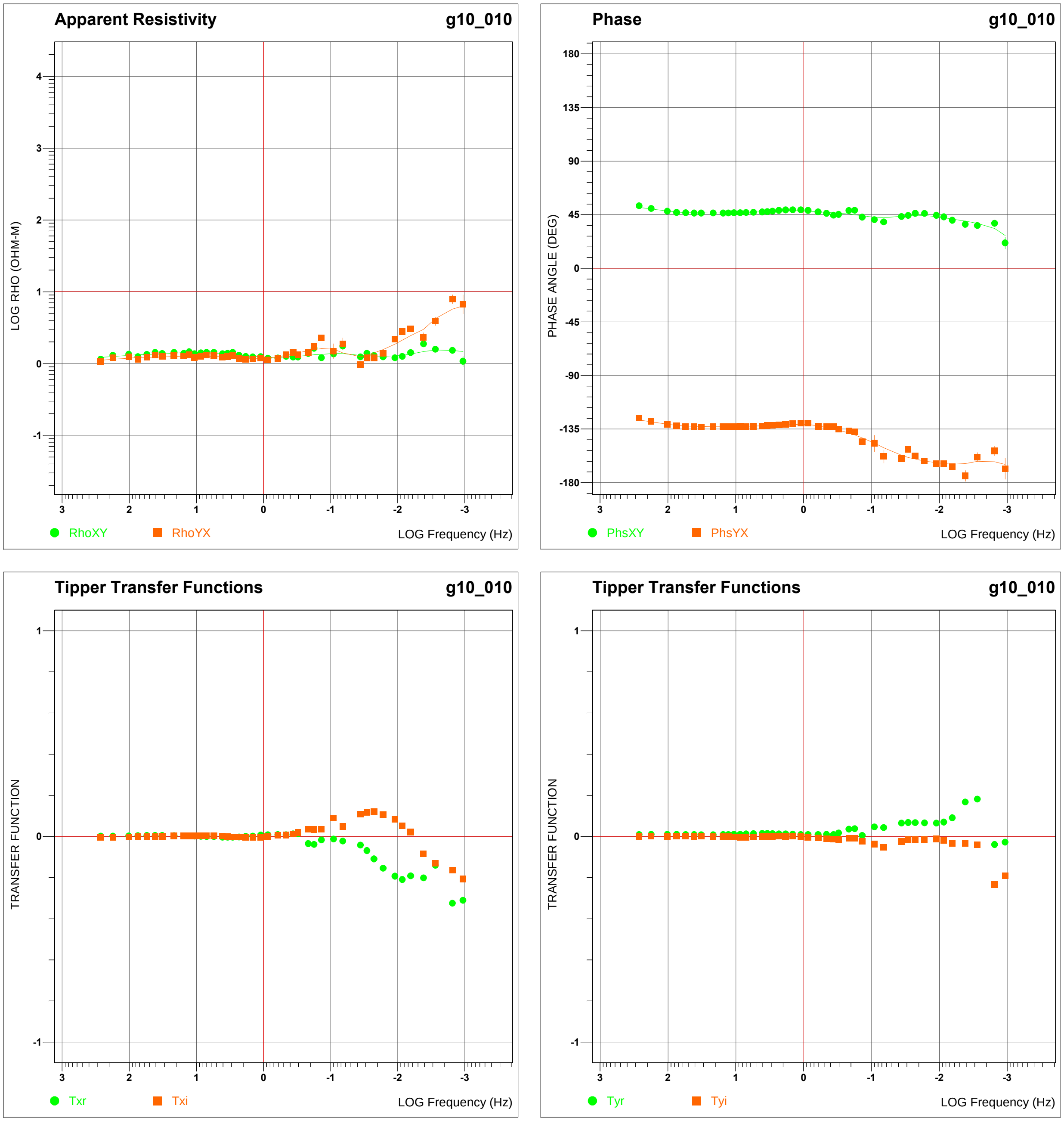
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X

(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

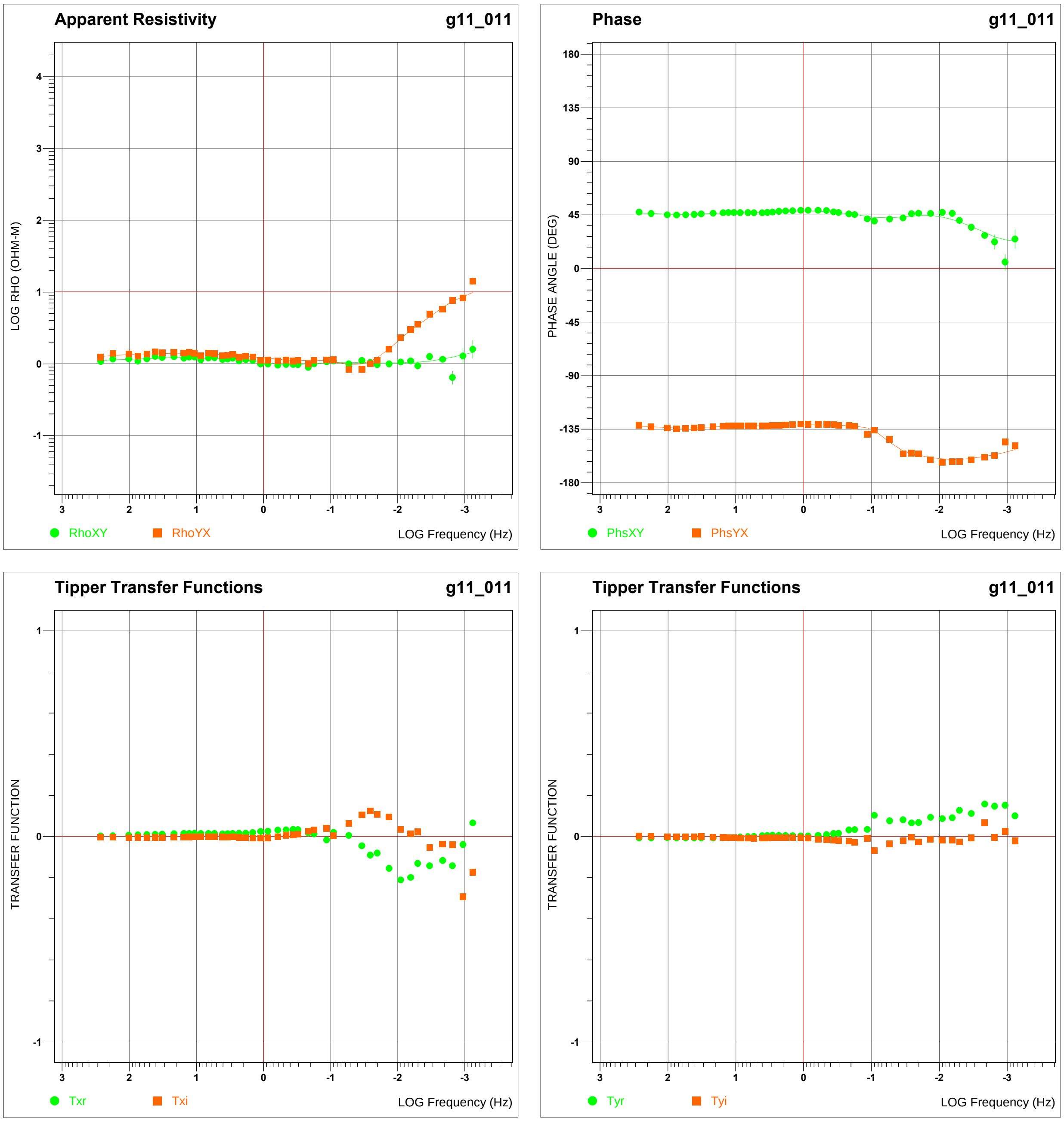
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.84 SITE G10-010 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



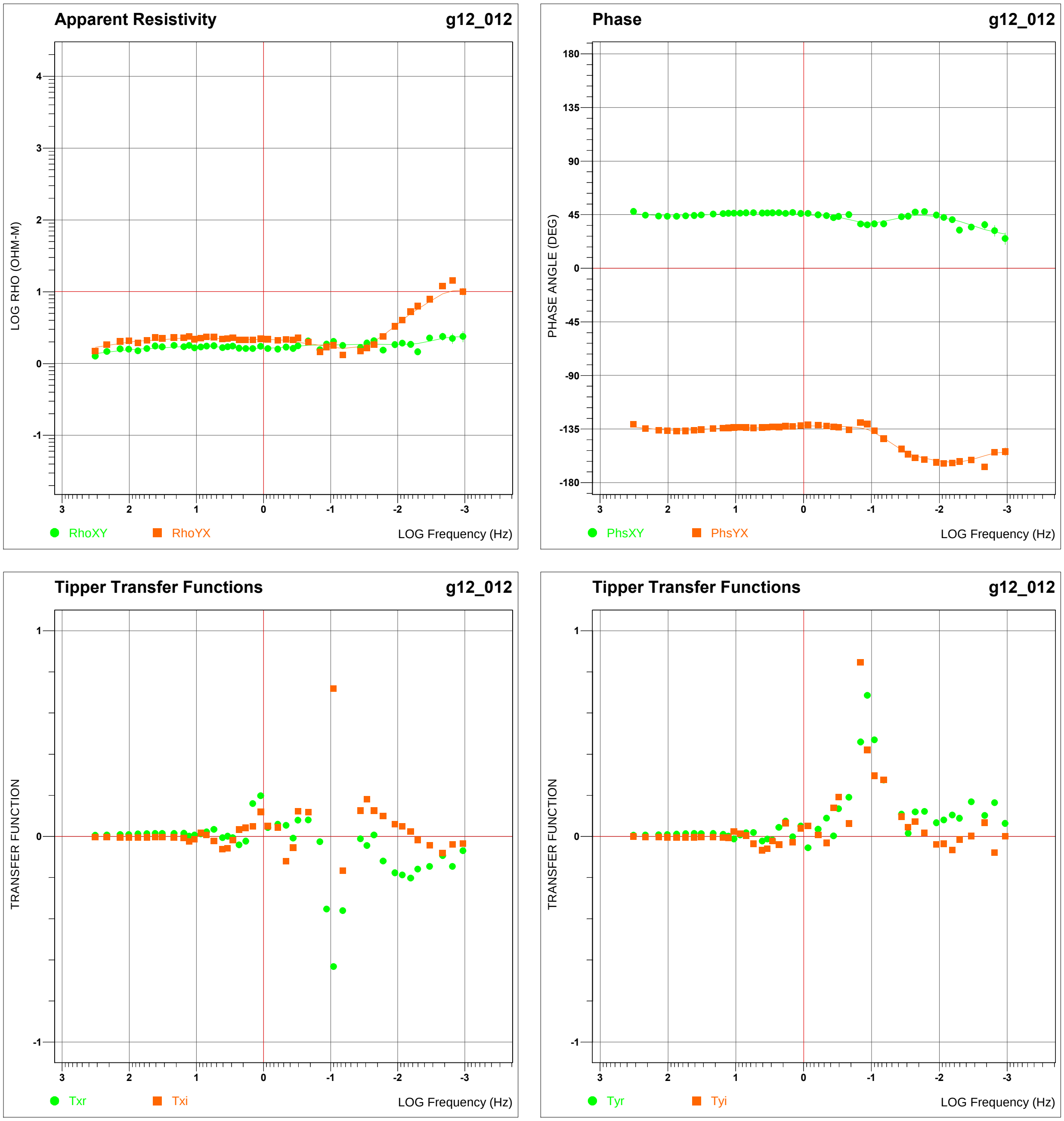
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.85 SITE G11-011 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.86 SITE G12-012 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



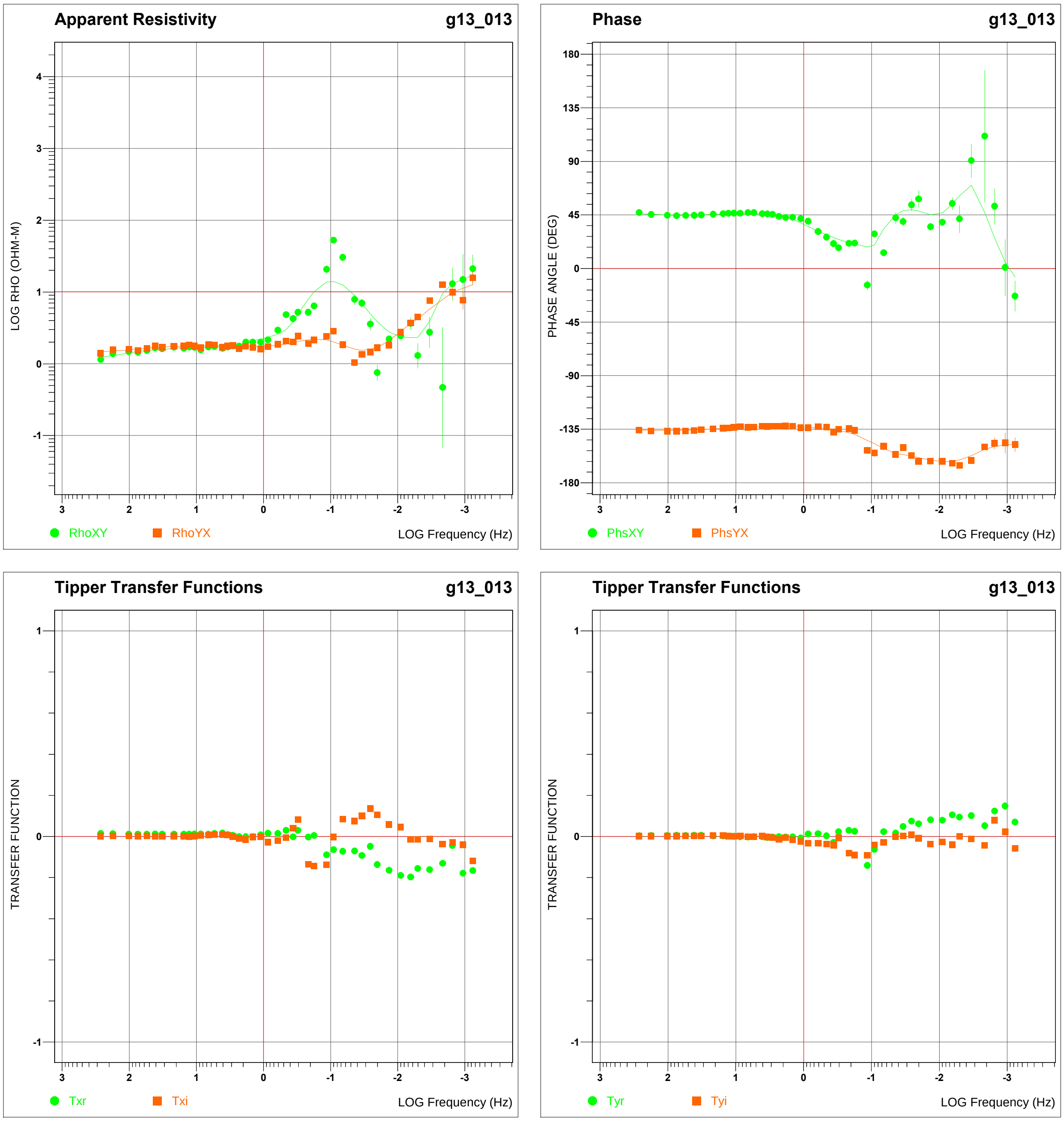
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X

(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

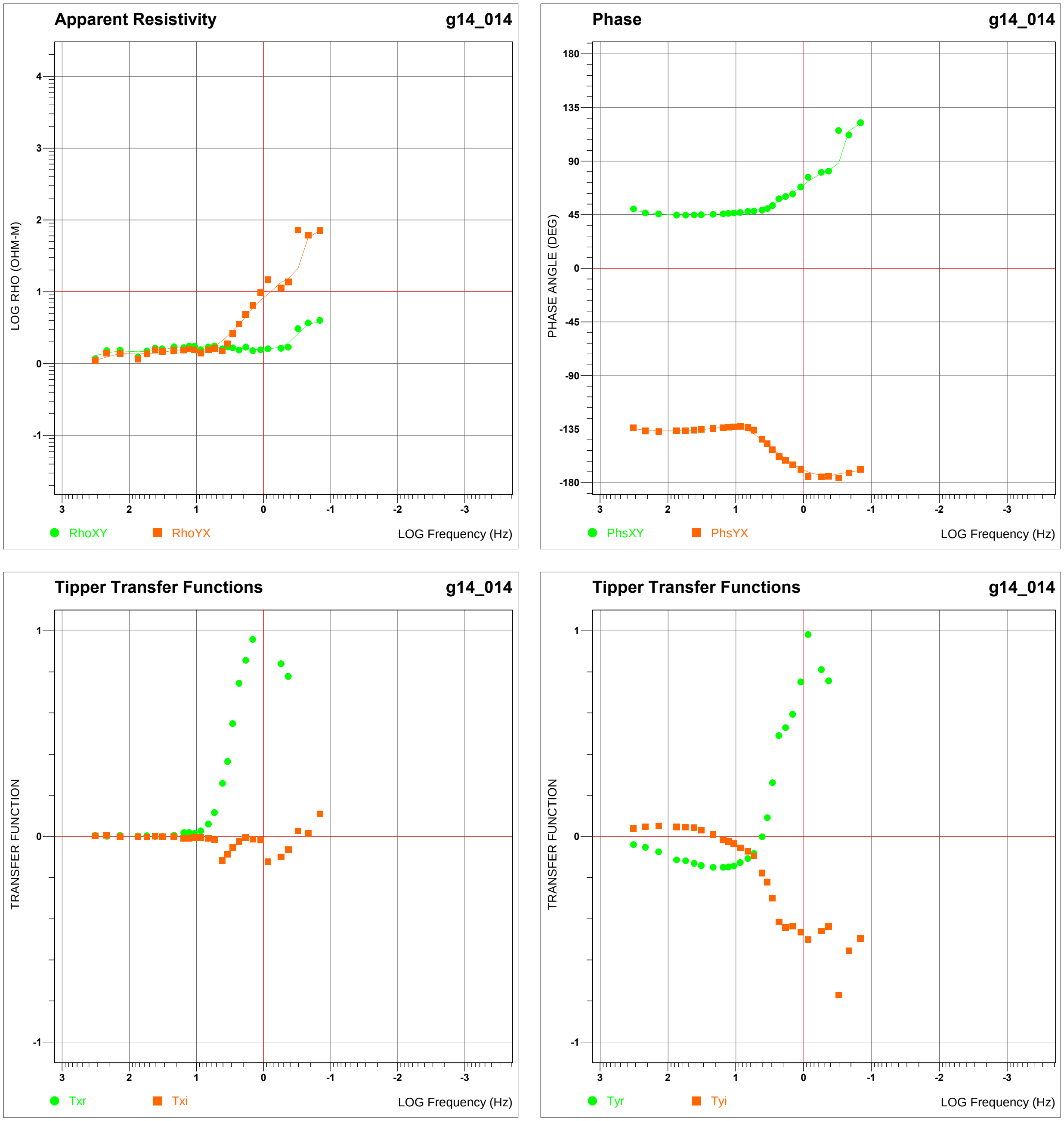
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.87 Site G13-013 – Apparent Resistivity, Phase, & Tipper Sounding Curves vs Frequency



X is pointing to 90deg ; Y is perpendicular to X
(right hand positive down coordinate system)
Mode XY (green) denotes Electrical (**Ex**) field and orthogonal Magnetic (**Hy**) field (=Ex/Hy)
Mode YX (orange) denotes Electrical (**Ey**) field and orthogonal Magnetic (**Hx**) field (=Ey/Hx)

C.1.88 Site G14-014 – Apparent Resistivity, Phase, & Tipper Sounding Curves vs Frequency



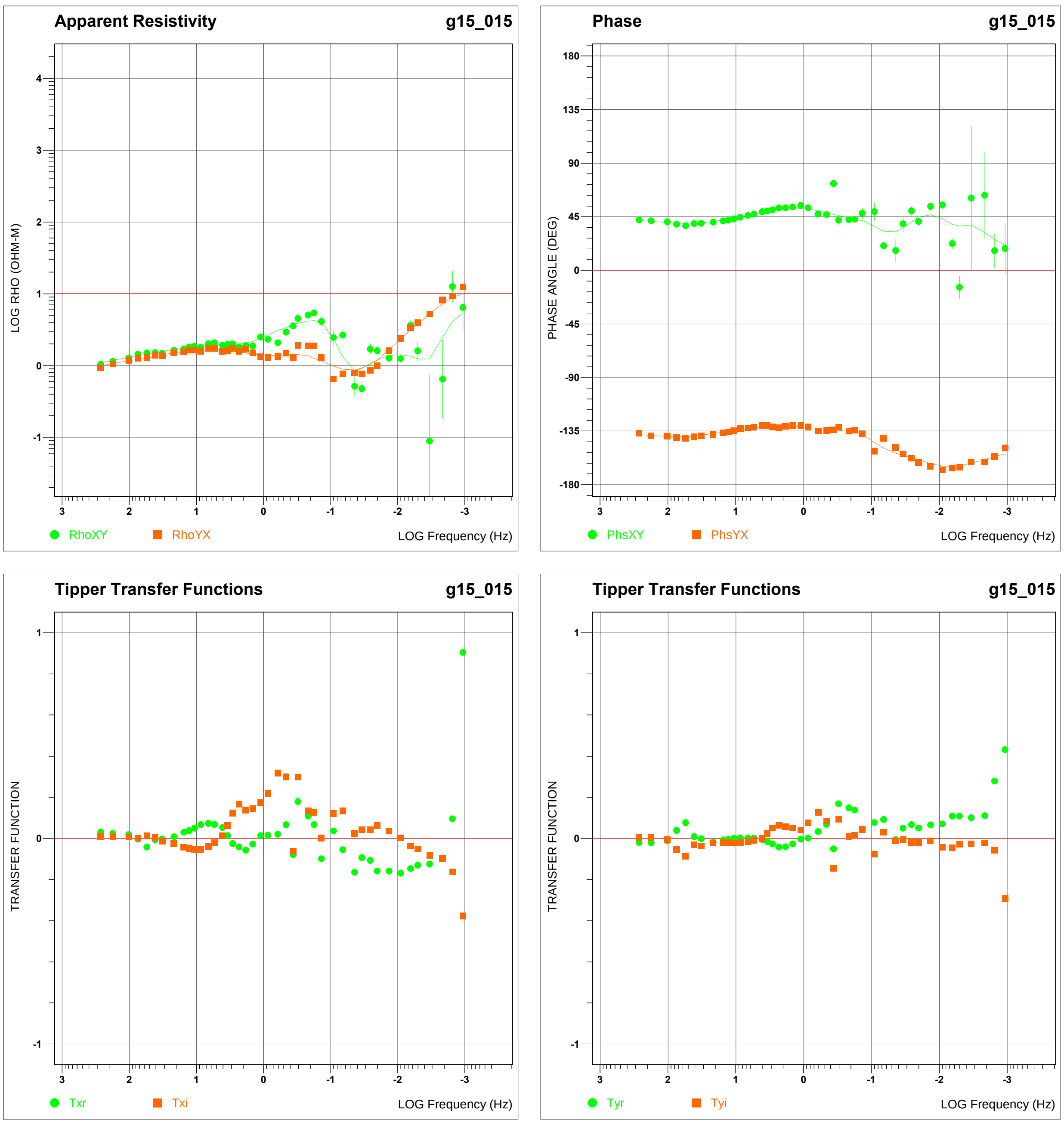
X is pointing to 90deg ; Y is perpendicular to X

(right hand positive down coordinate system)

Mode XY (green) denotes Electrical (**Ex**) field and orthogonal Magnetic (**Hy**) field (=Ex/Hy)

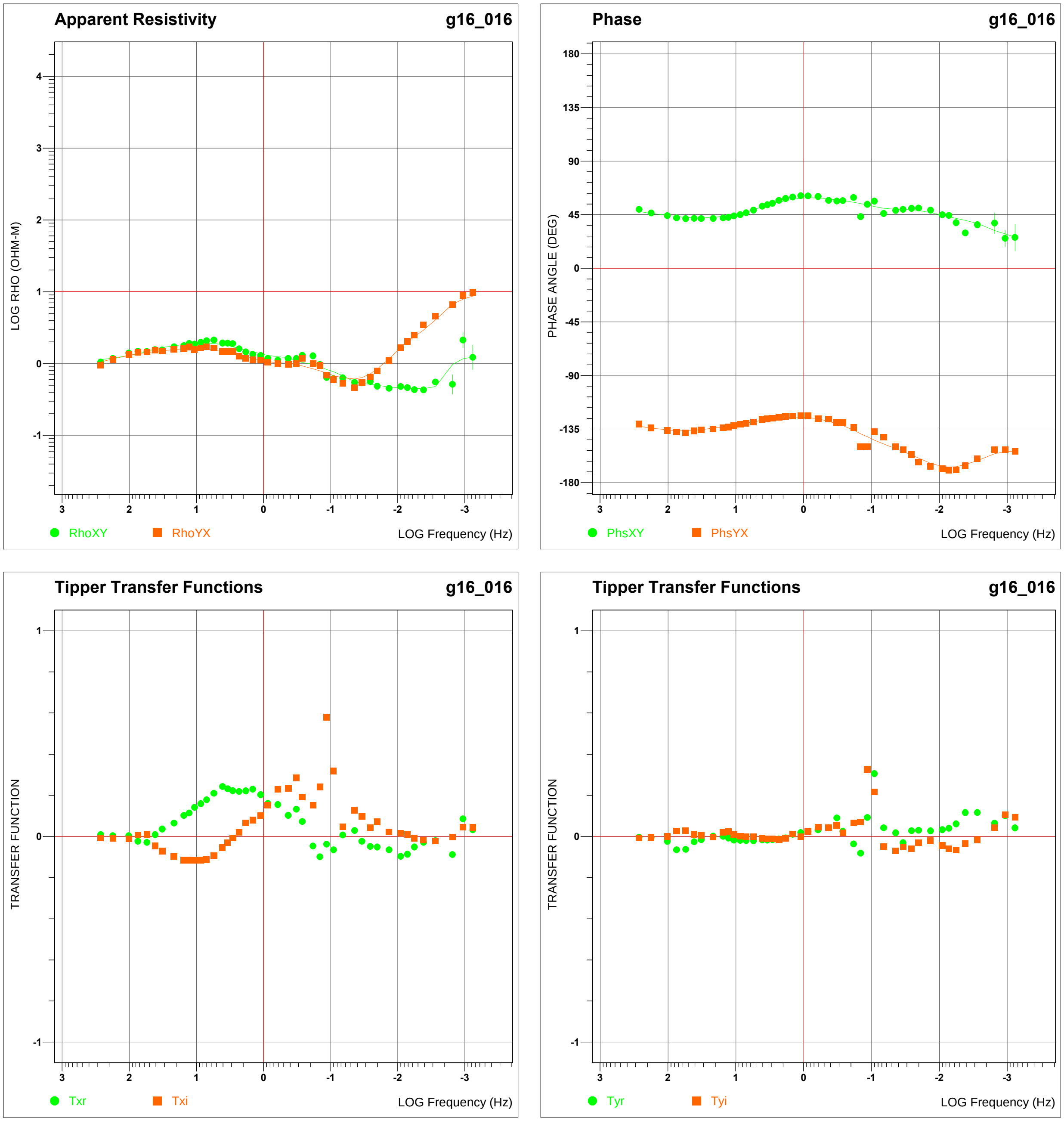
Mode YX (orange) denotes Electrical (**Ey**) field and orthogonal Magnetic (**Hx**) field (=Ey/Hx)

C.1.89 SITE G15-015 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.90 SITE G16-016 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



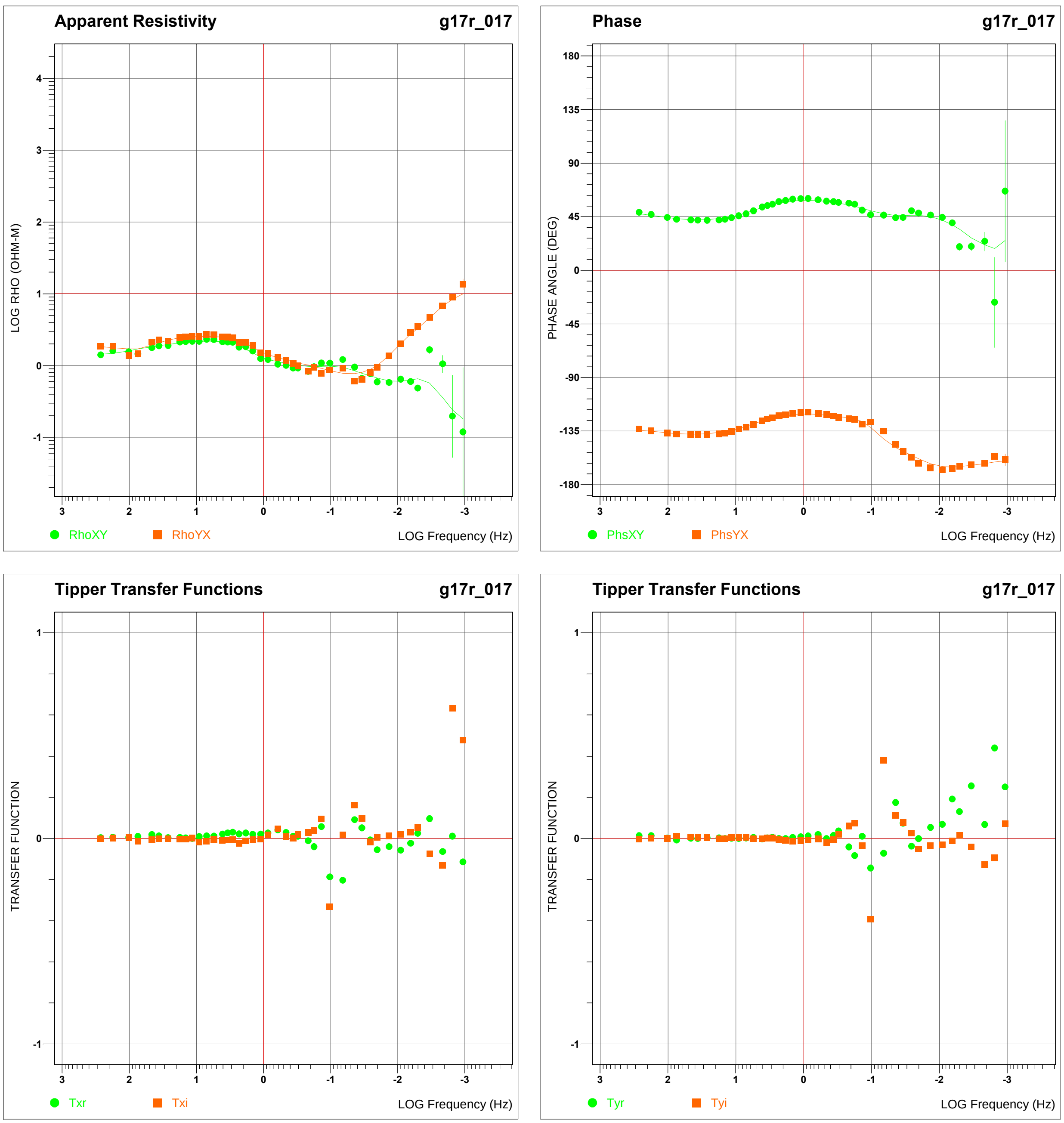
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X

(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

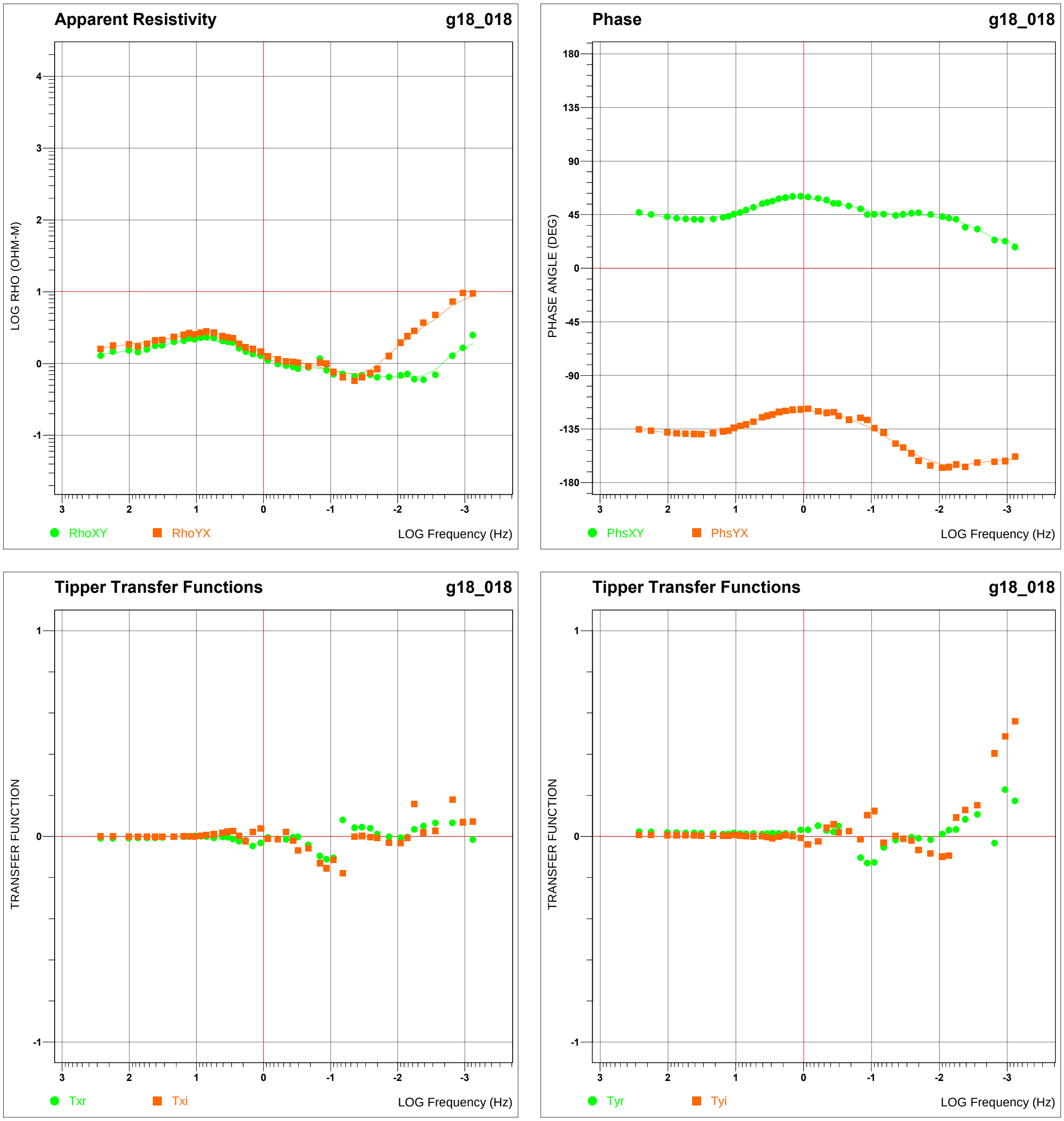
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.91 SITE G17R-017 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



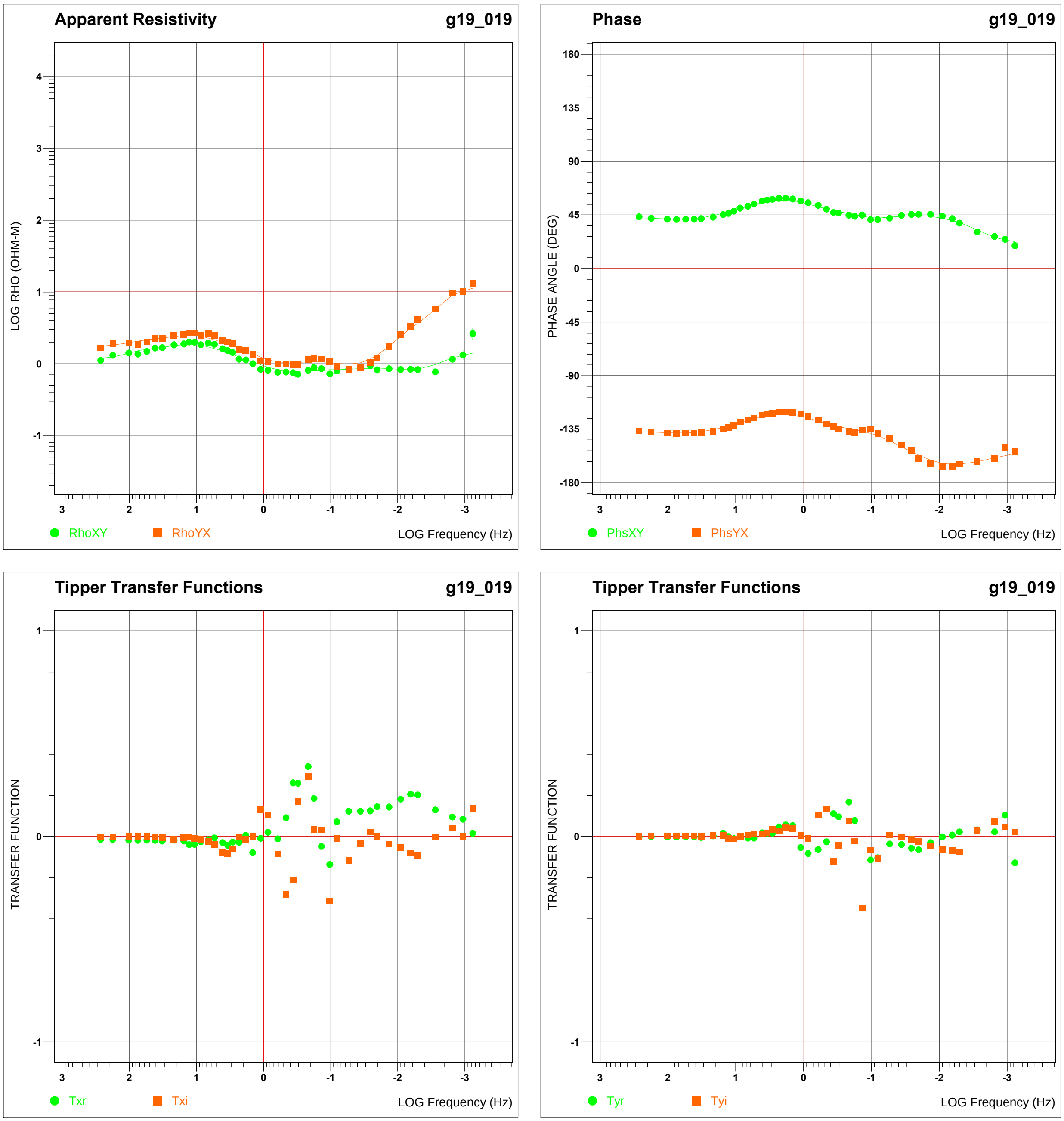
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.92 SITE G18-018 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.93 SITE G19-019 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



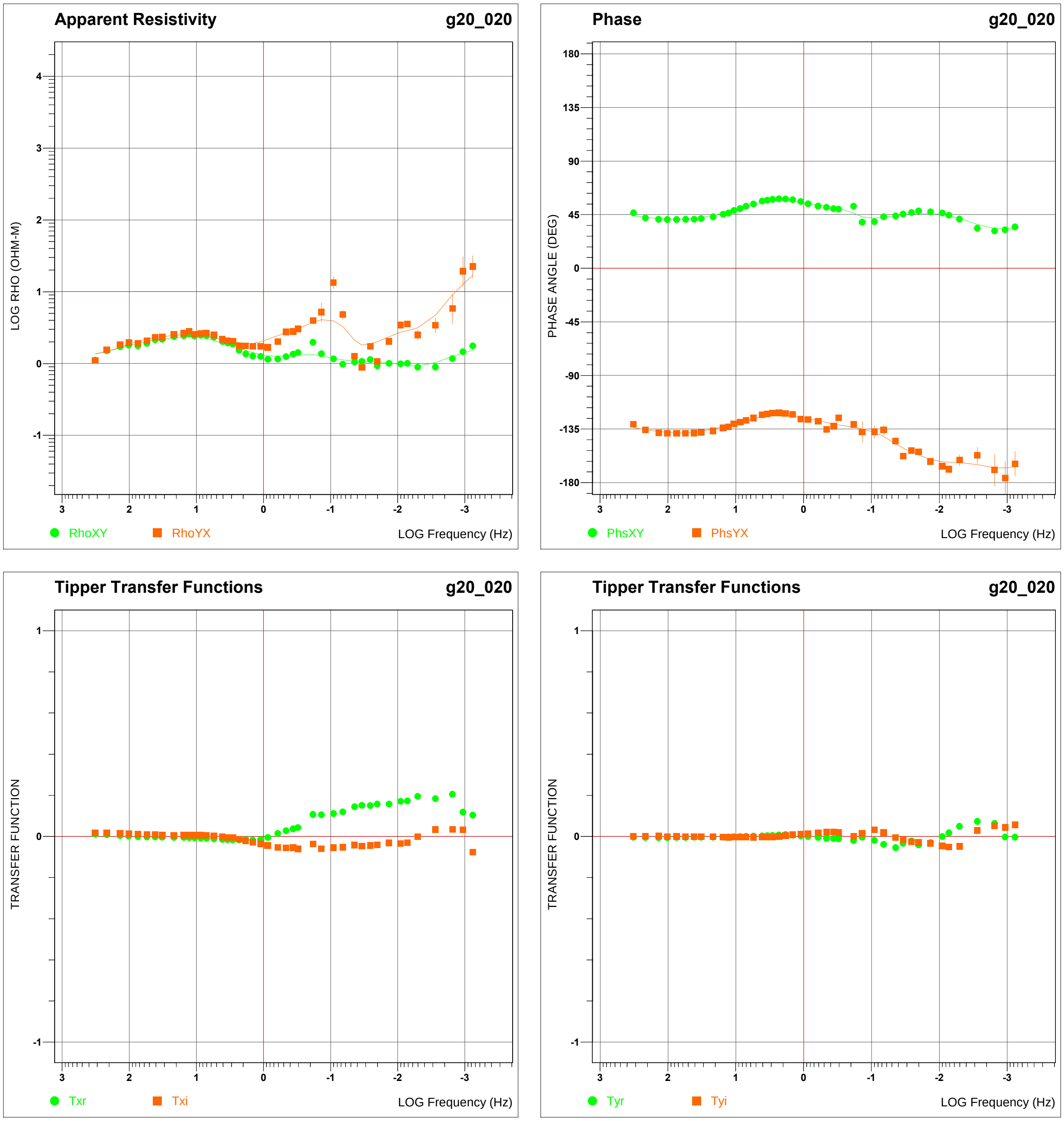
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X

(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.94 SITE G20-020 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



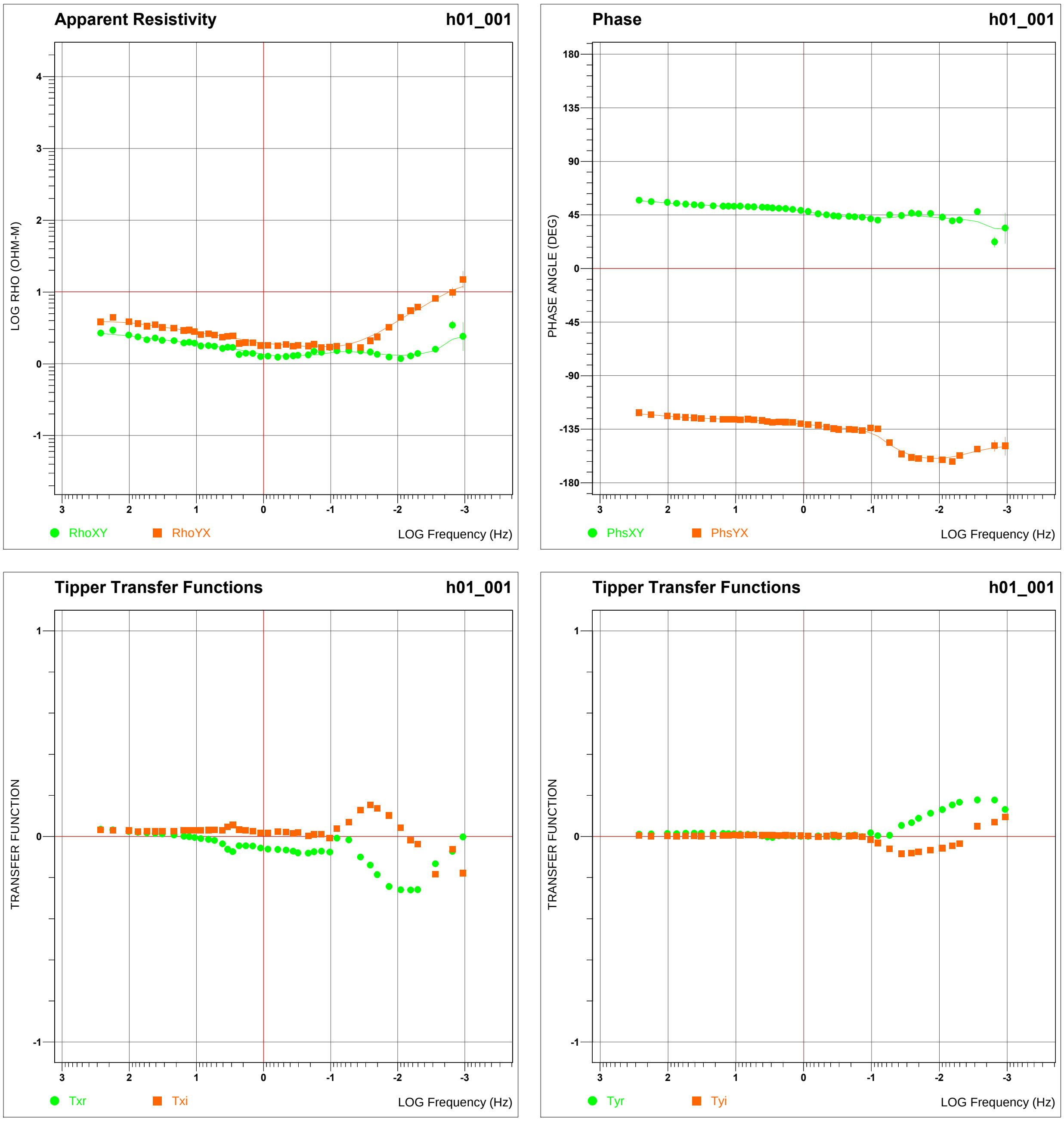
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X

(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

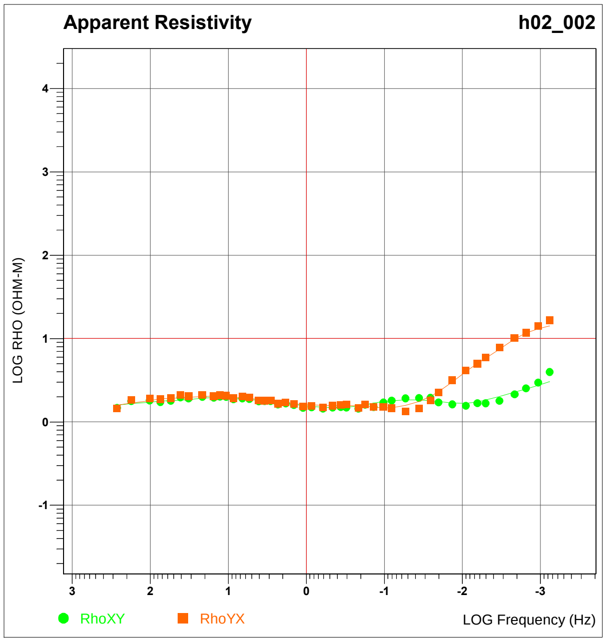
C.1.95 SITE H01-001 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY

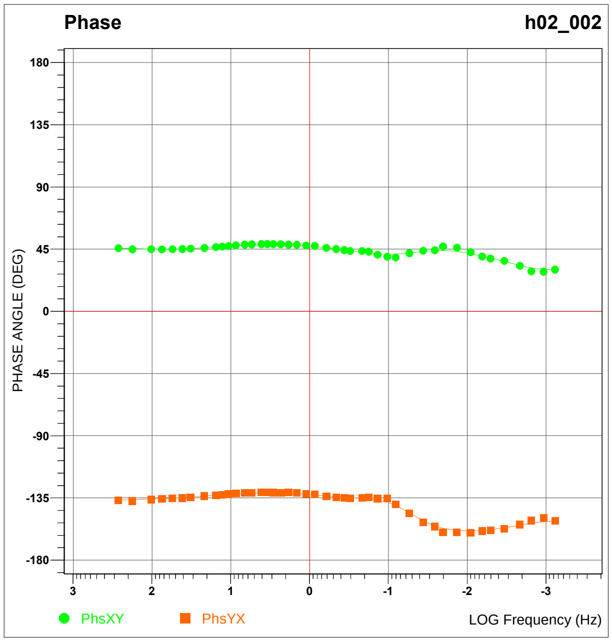


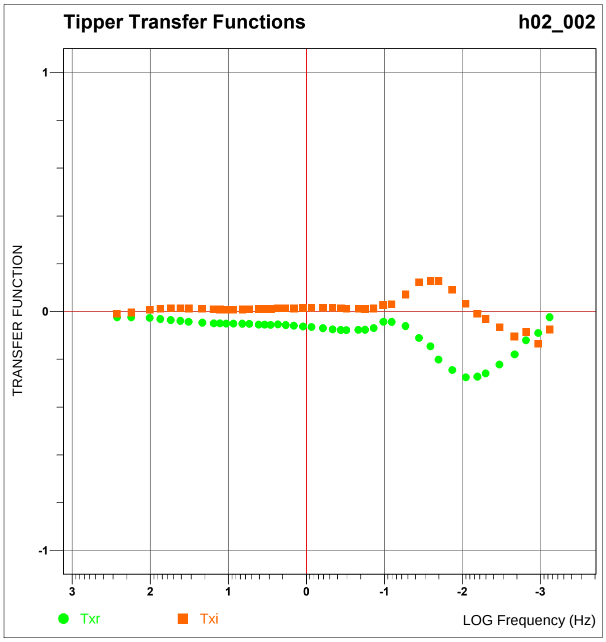
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

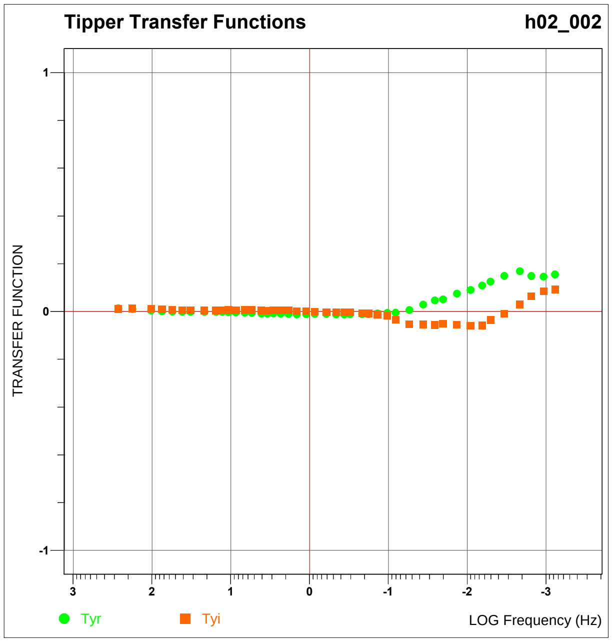
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.96 SITE H02-002 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



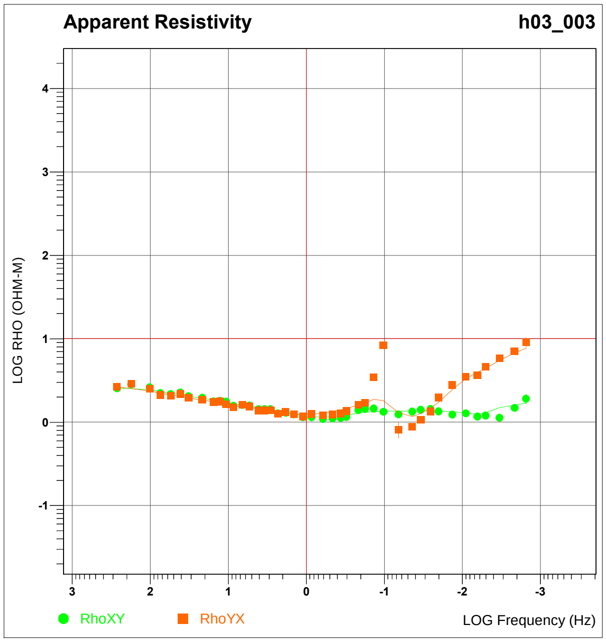


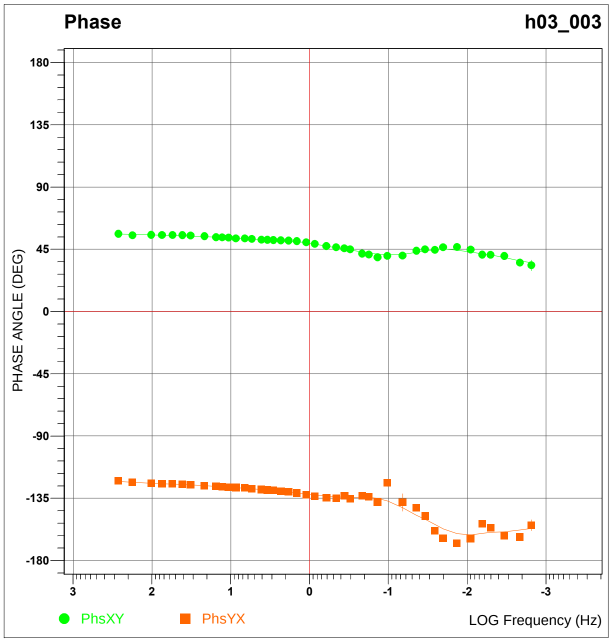


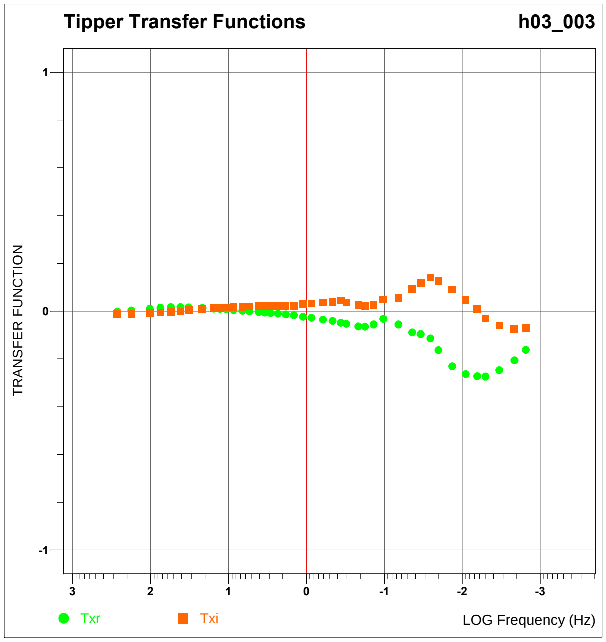


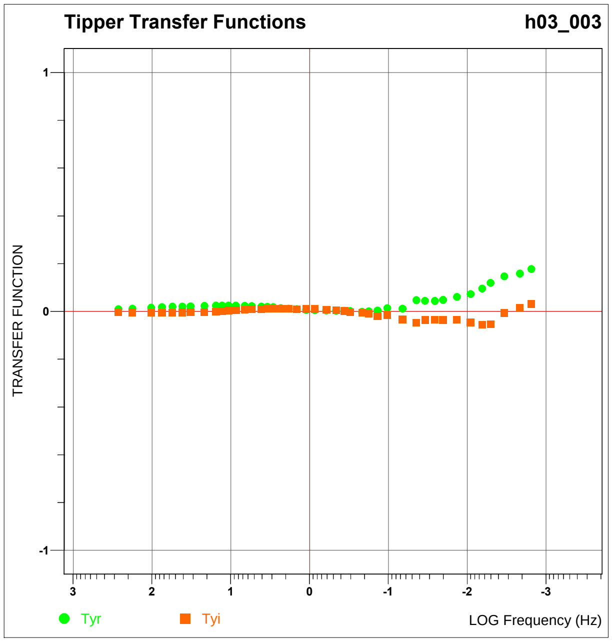
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.97 SITE H03-003 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



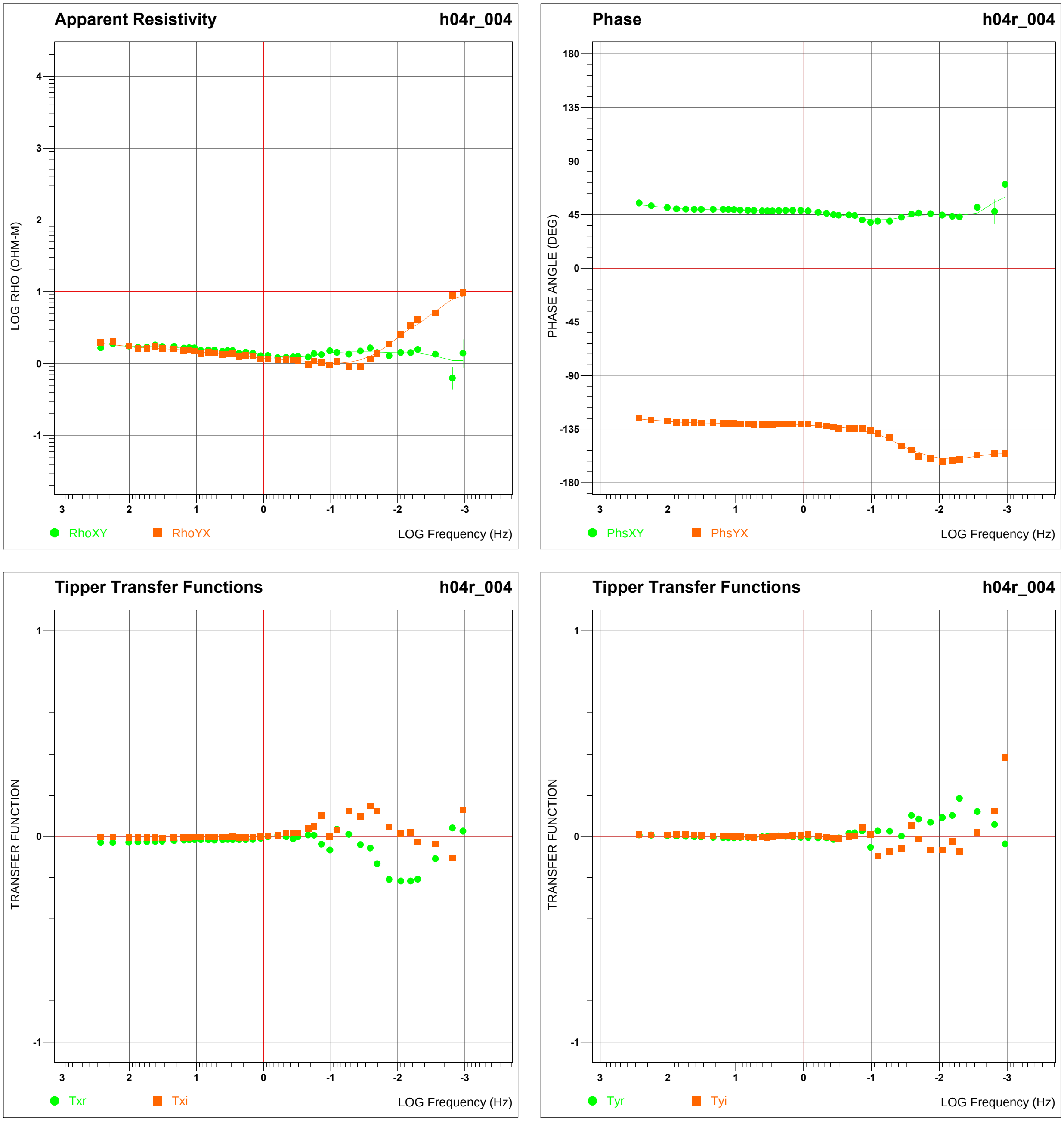






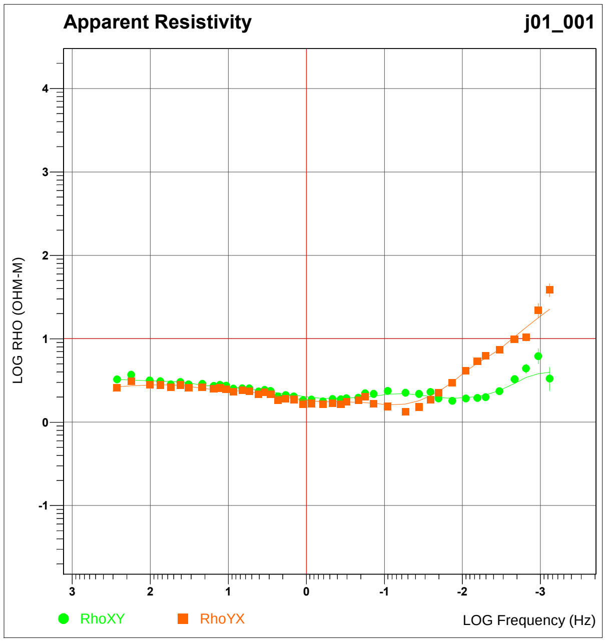
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

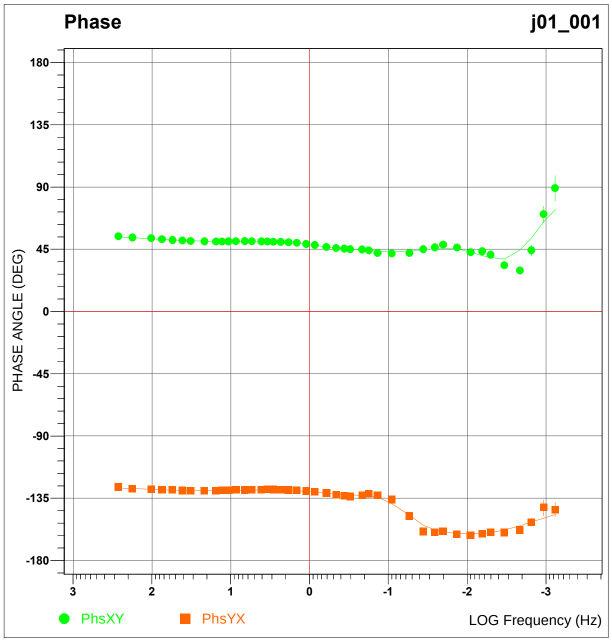
C.1.98 SITE H04R-004 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY

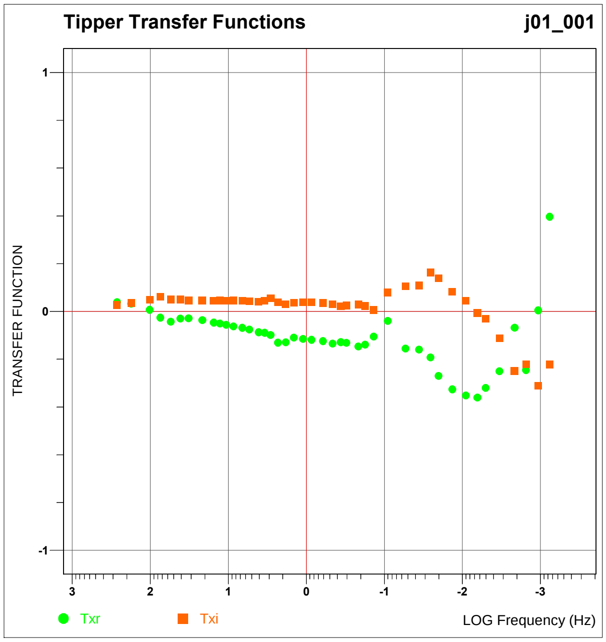


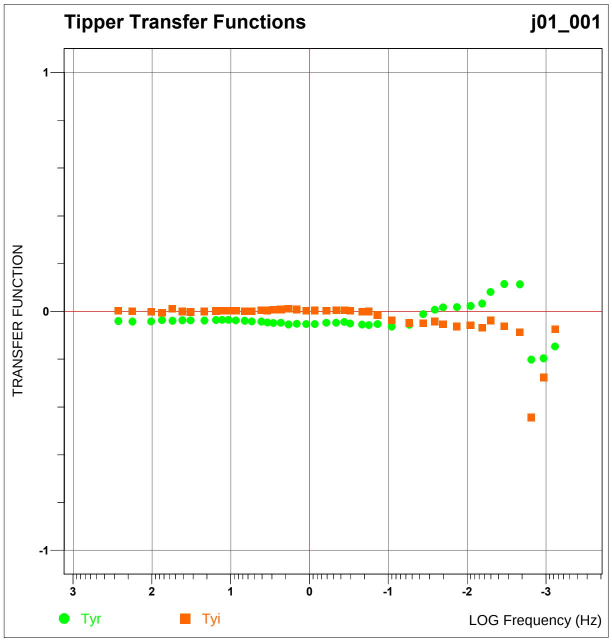
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.99 SITE J01-001 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



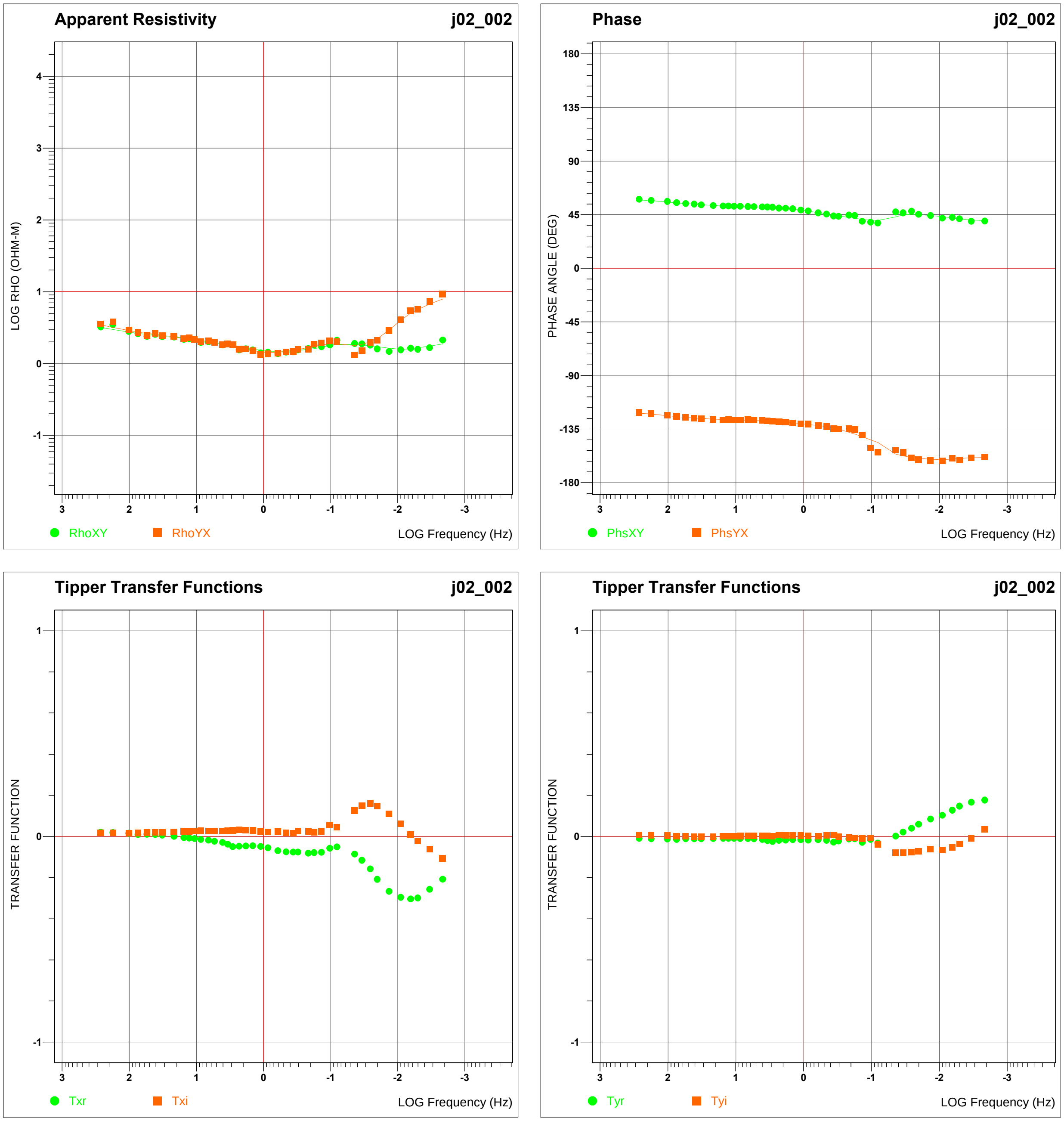






X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.100 SITE J02-002 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



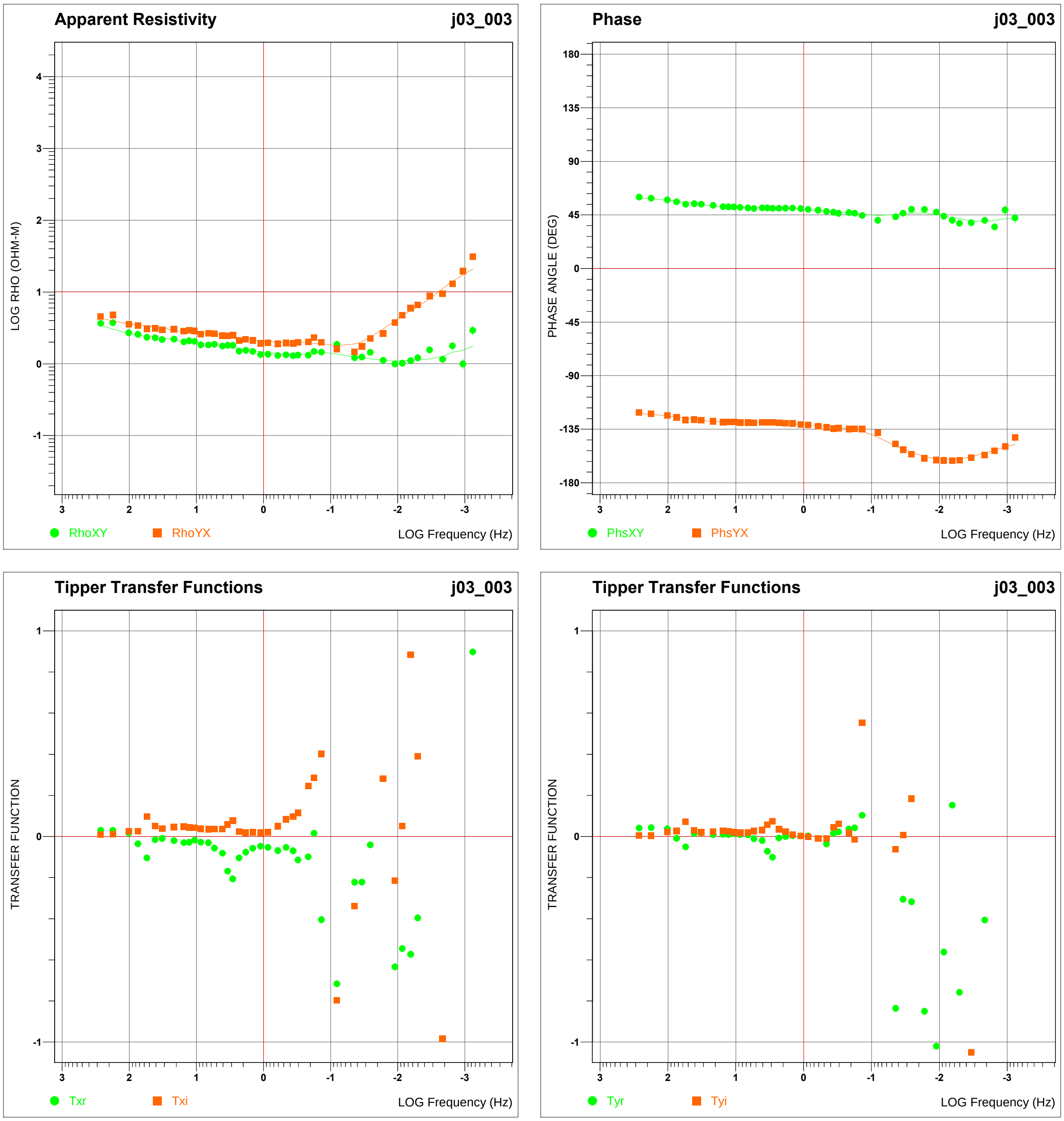
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X

(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

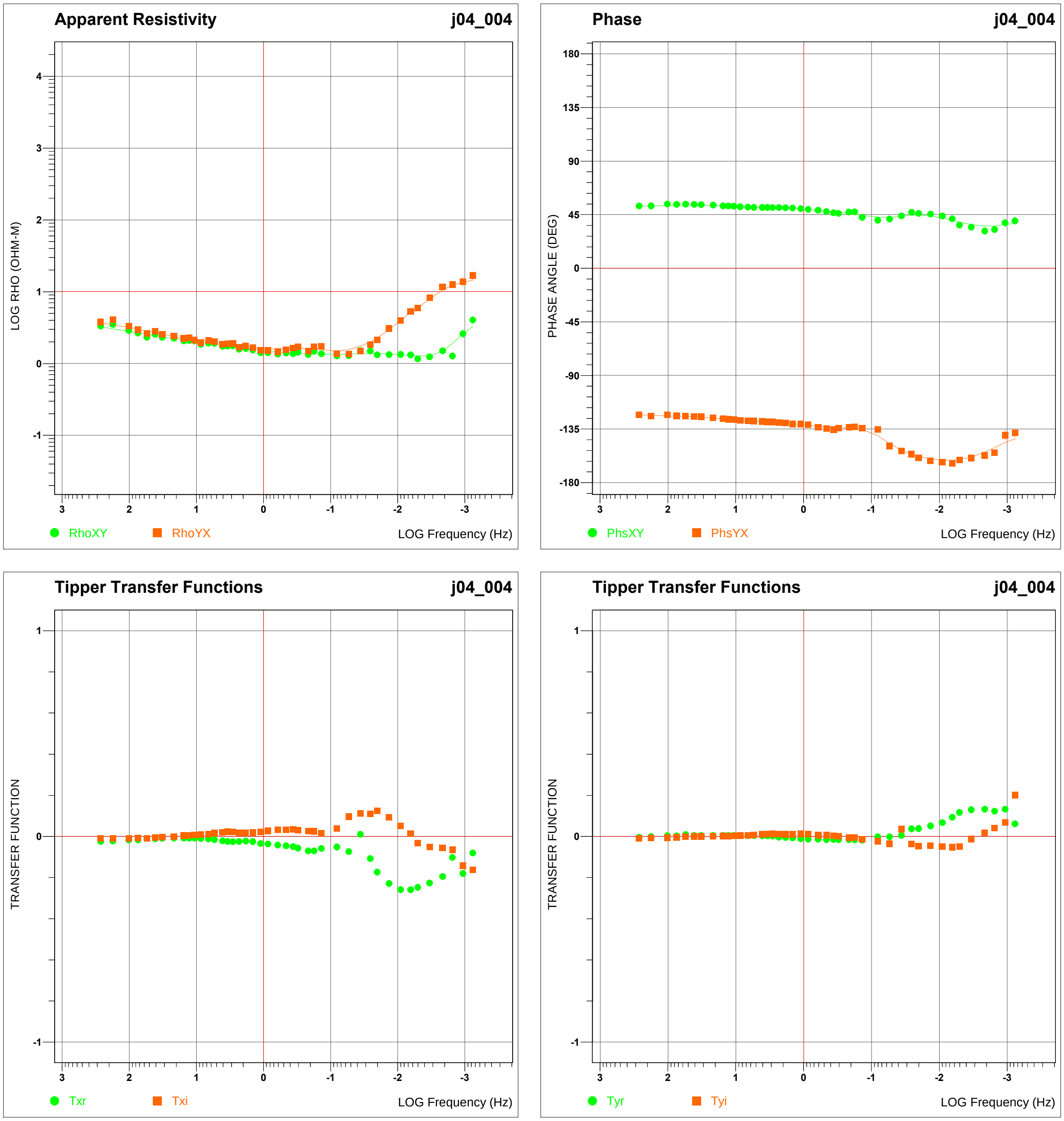
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.101 SITE J03-003 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



X IS POINTING TO **90**DEG ; **Y** IS PERPENDICULAR TO **X**
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM**)**
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.102 SITE J04-004 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



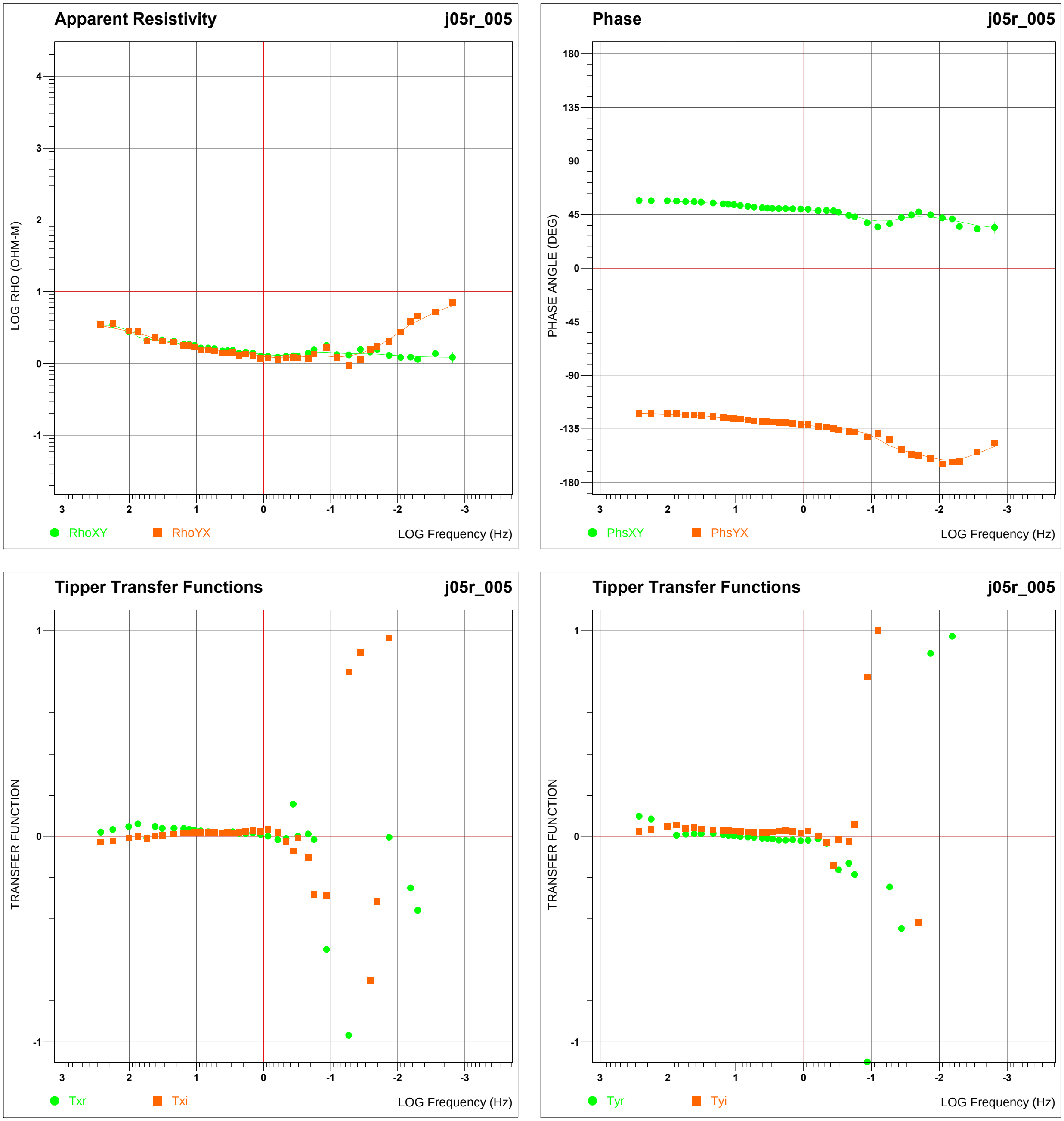
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X

(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

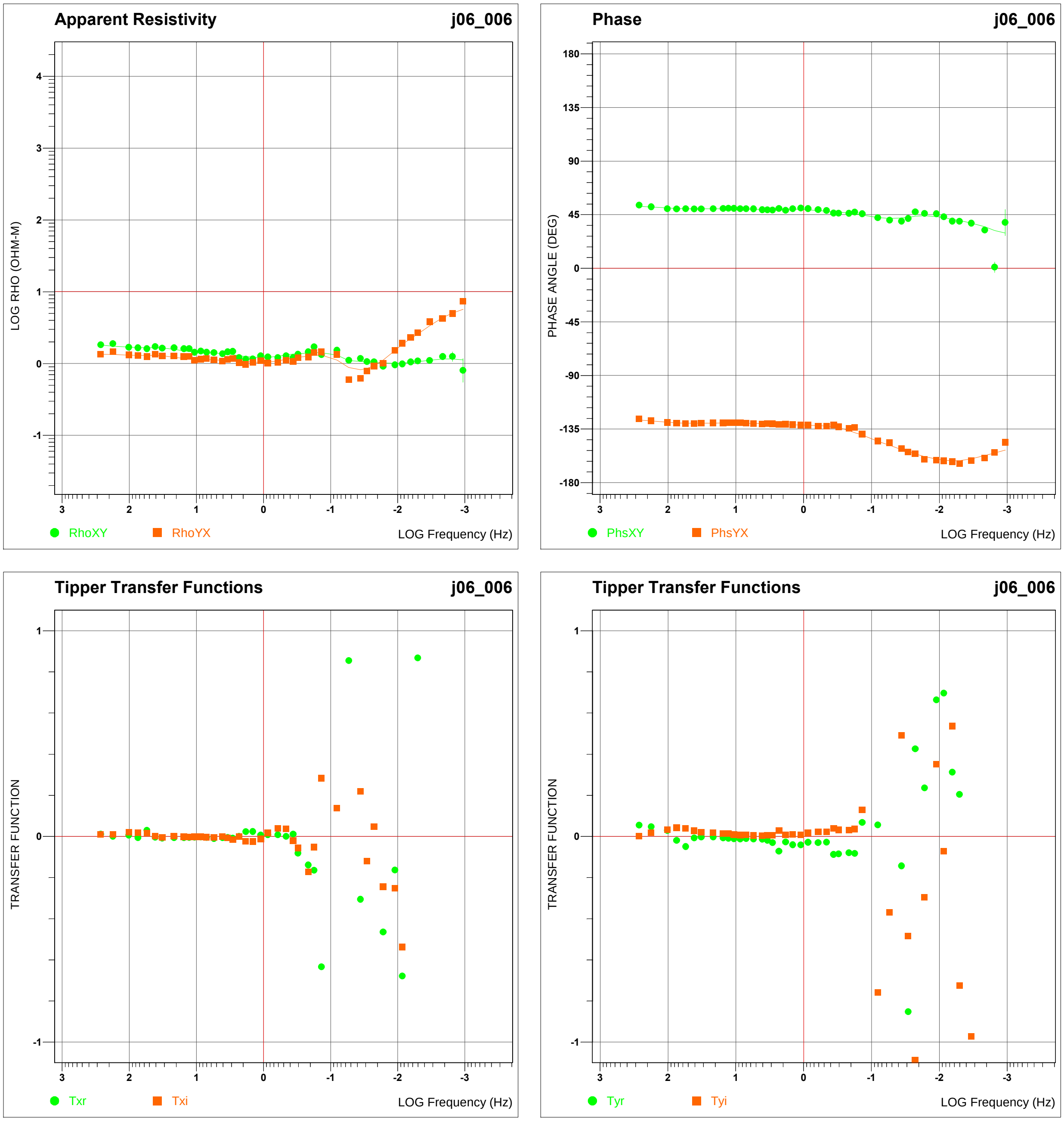
C.1.103 SITE J05-005 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

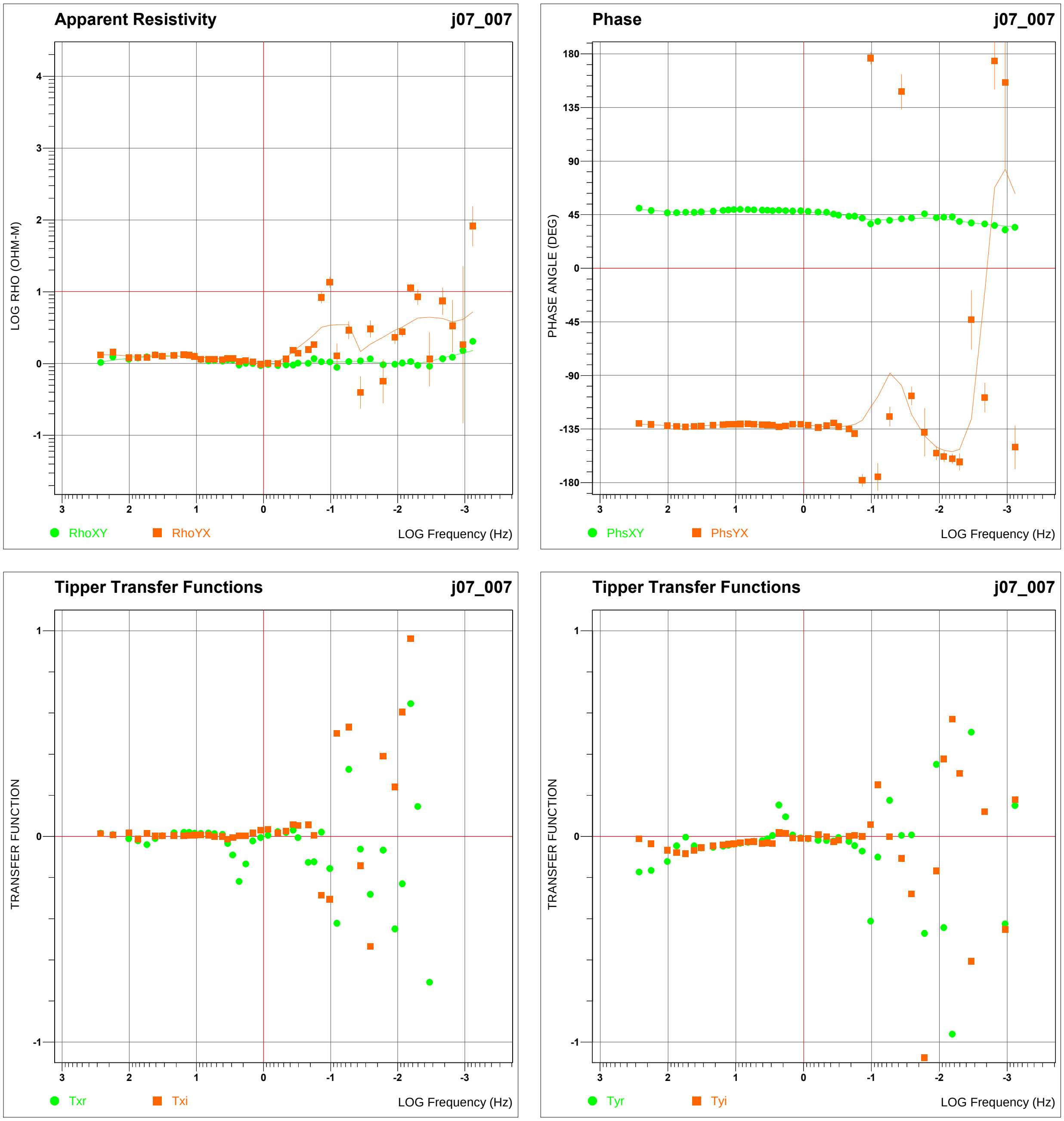
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.104 SITE J06-006 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



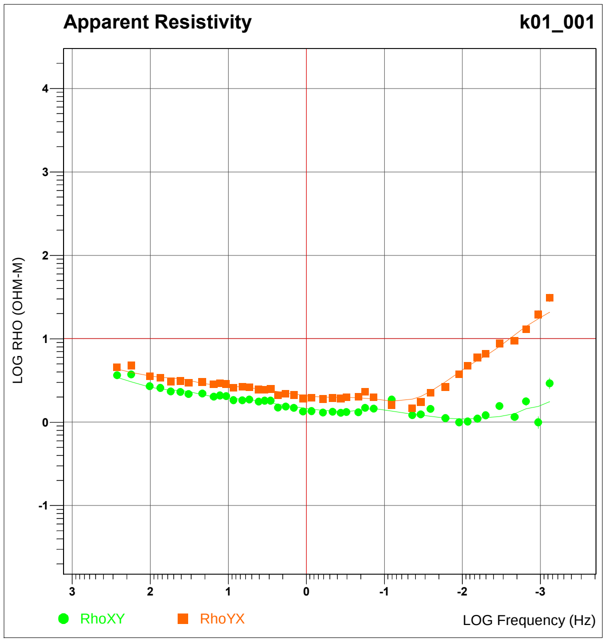
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

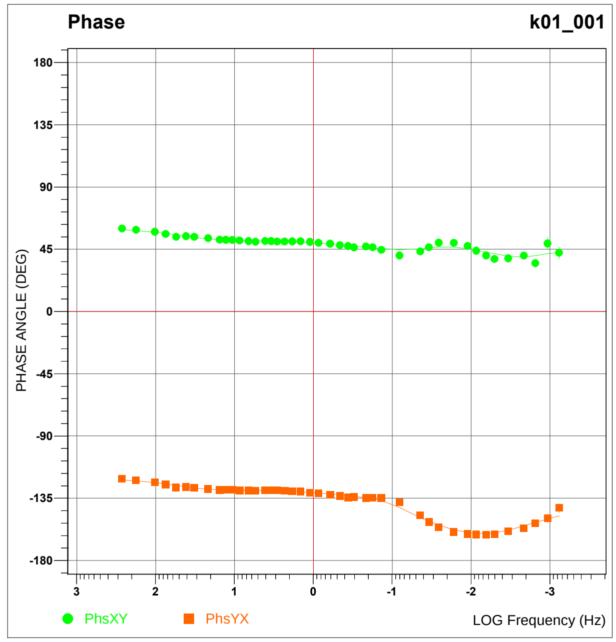
C.1.105 SITE J07-007 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY

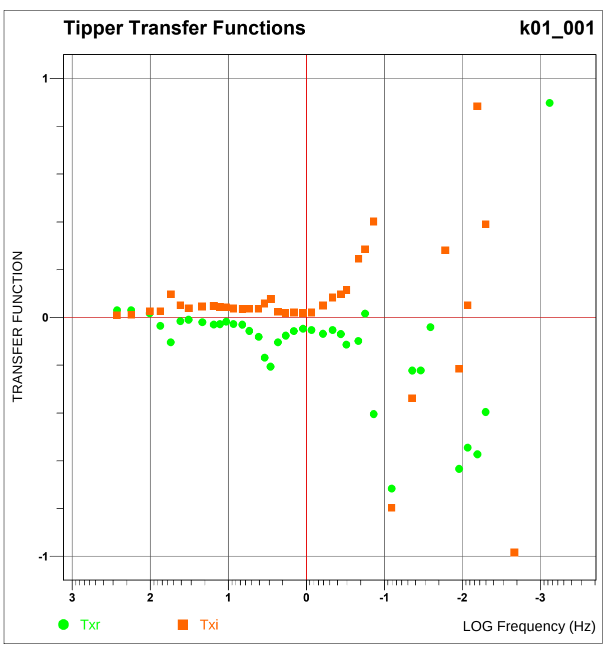


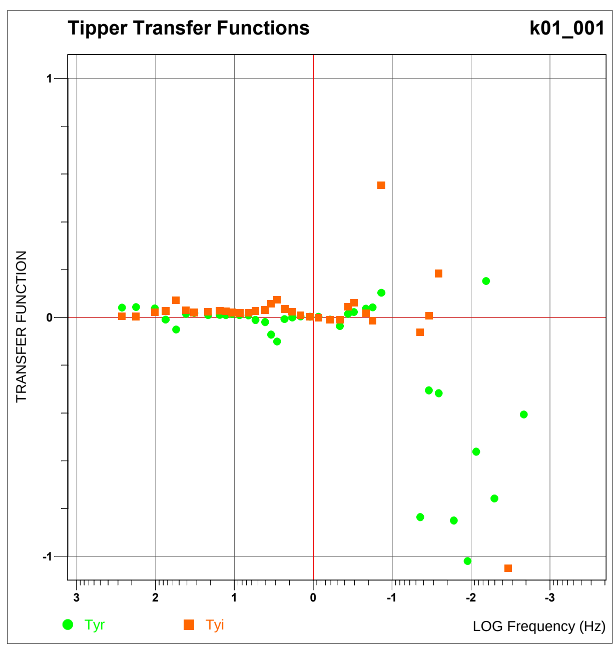
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.106 SITE K01-001 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



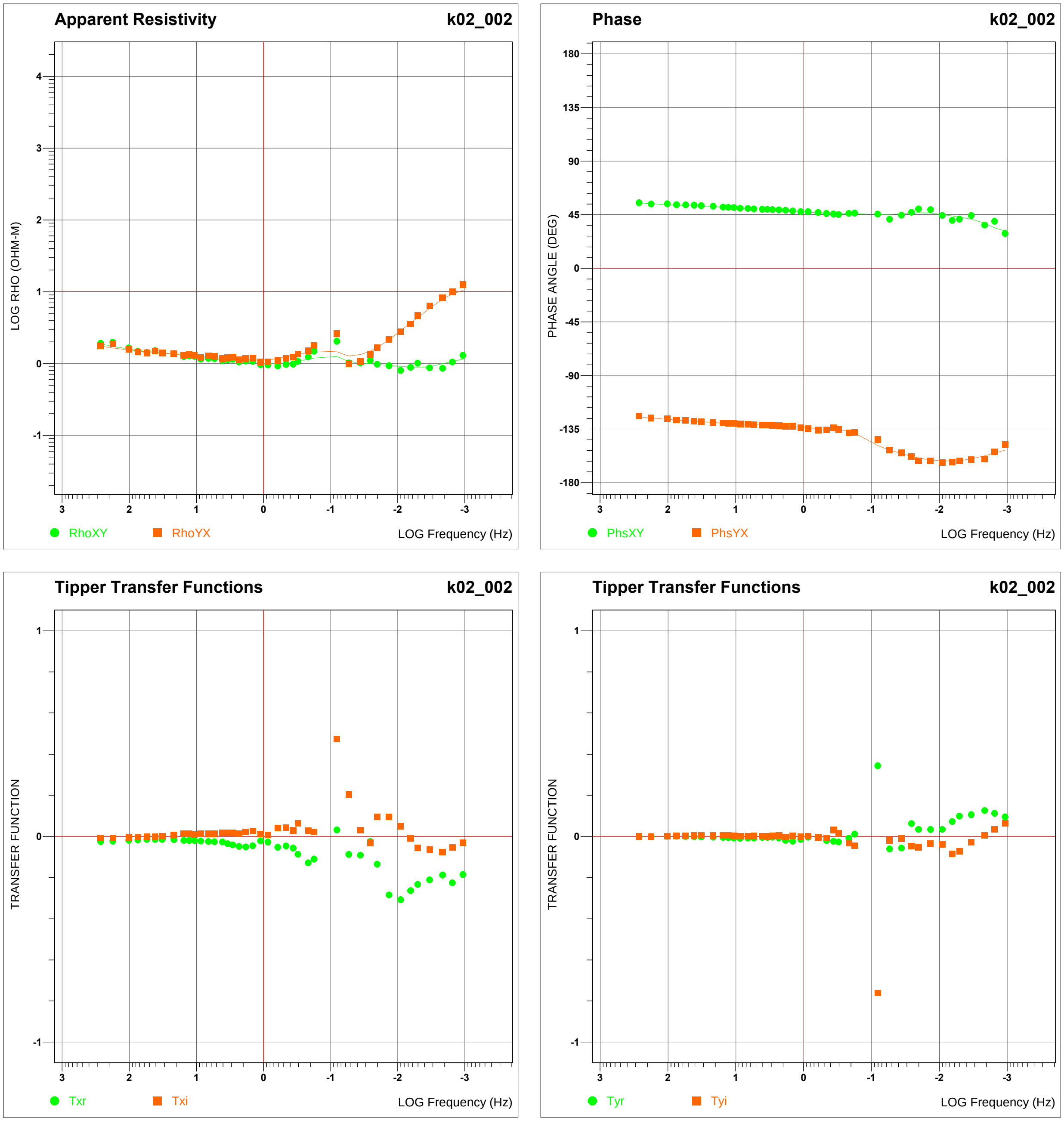






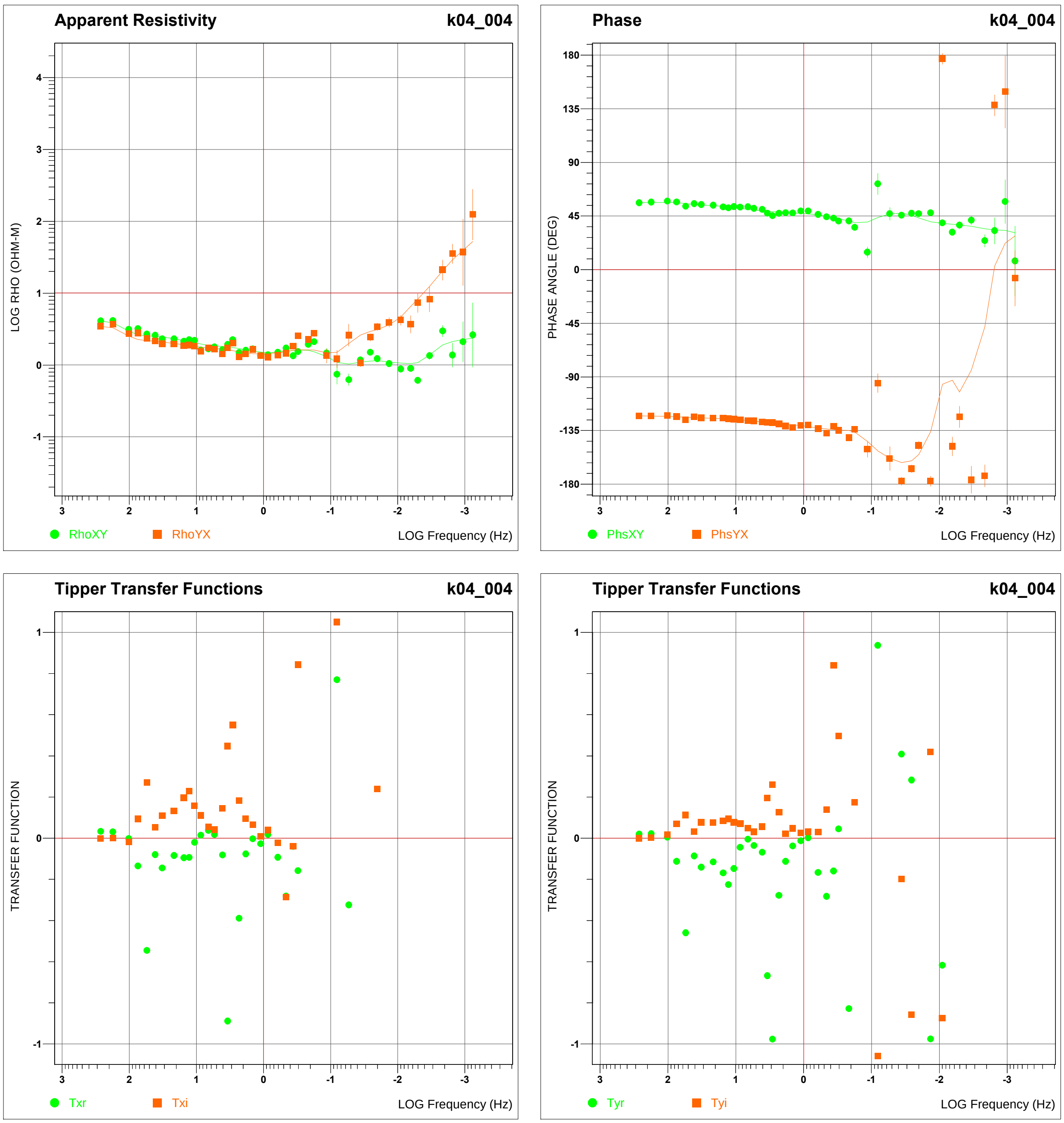
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.107SITE K02-002 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.108 SITE K03-003 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



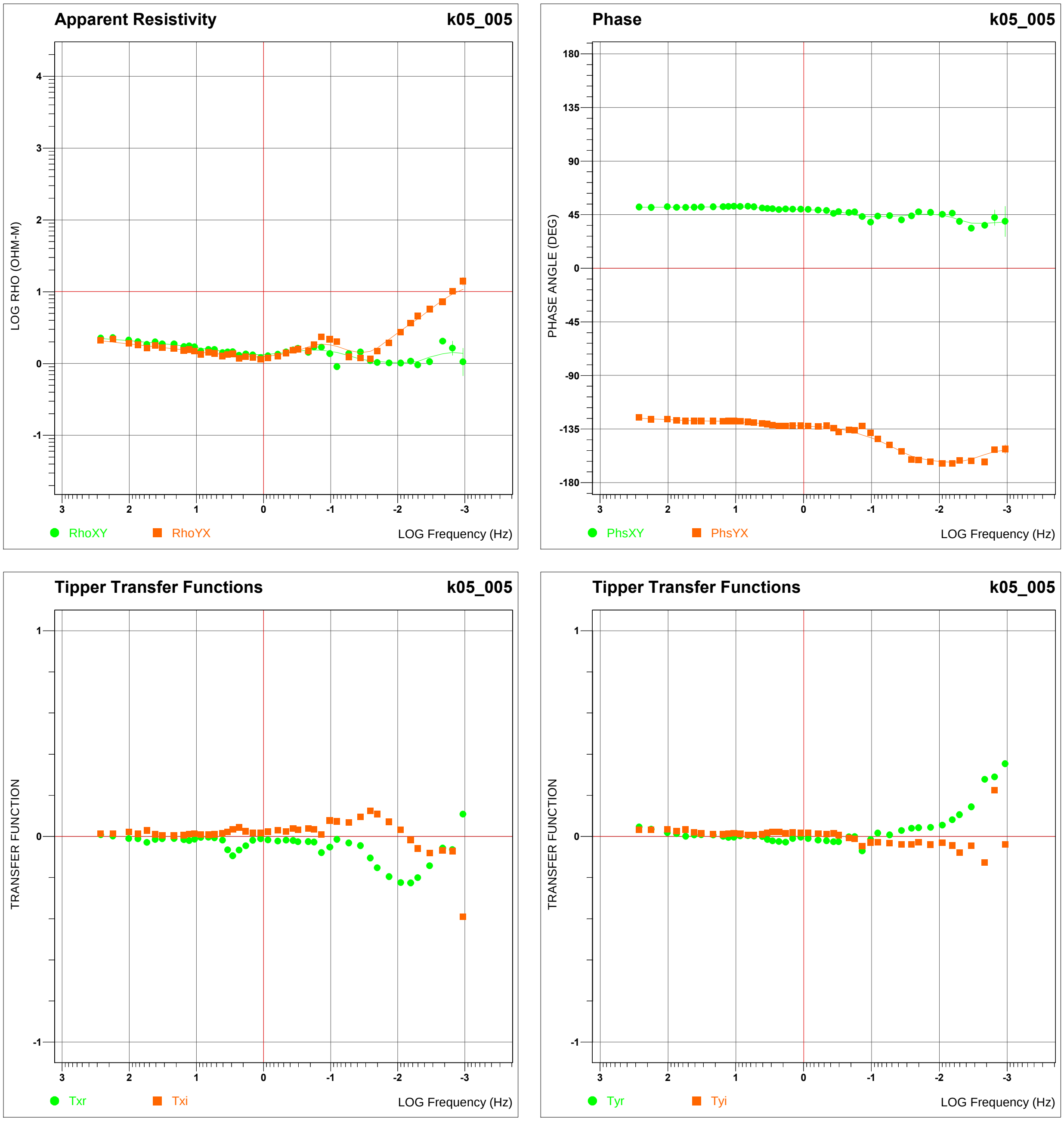
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X

(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.109 SITE K05-005 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY

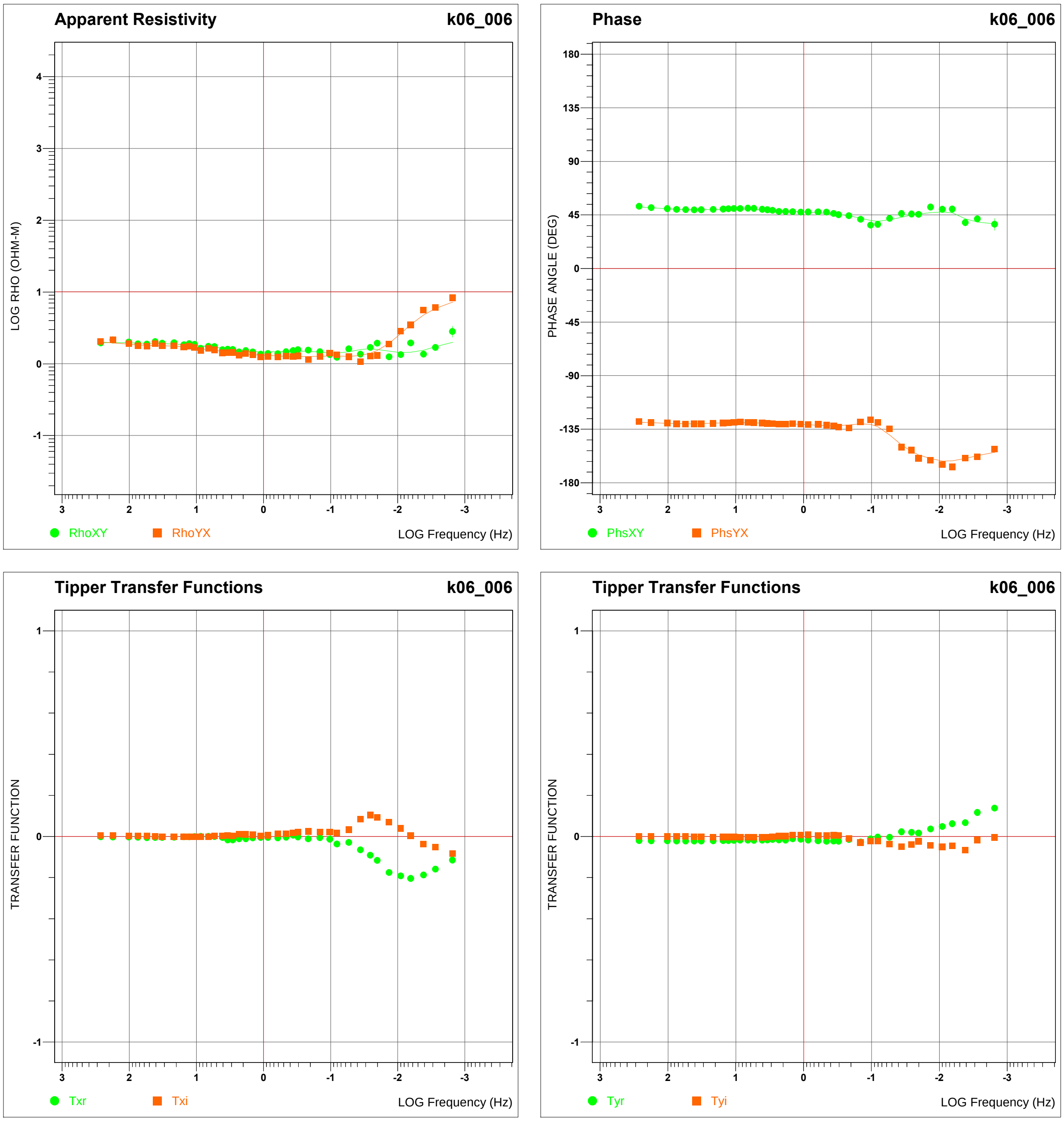


X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

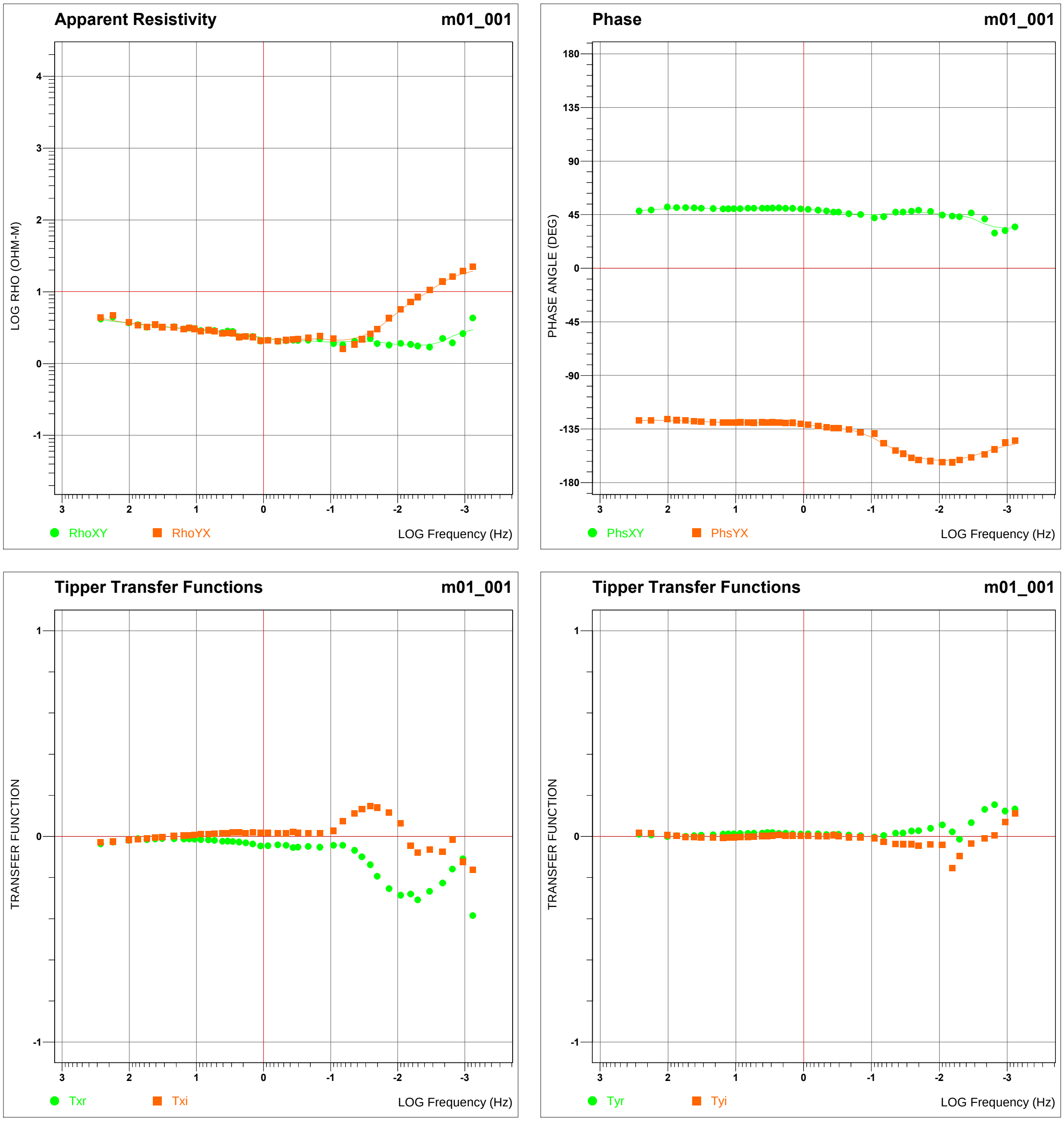
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.110SITE K06-006 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



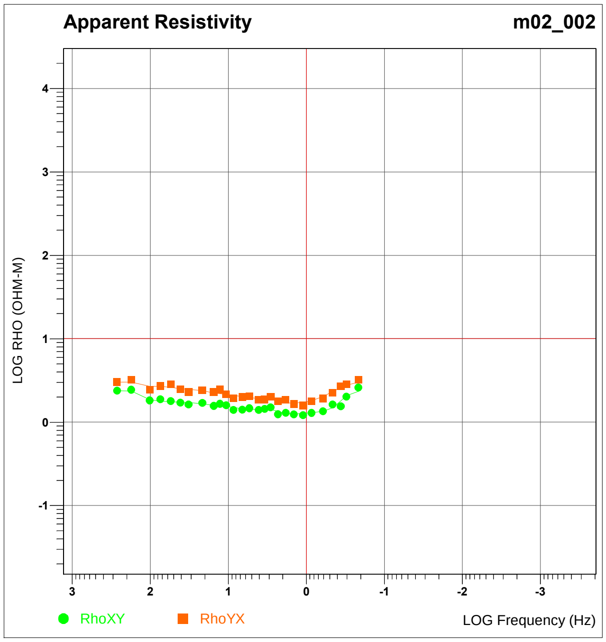
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

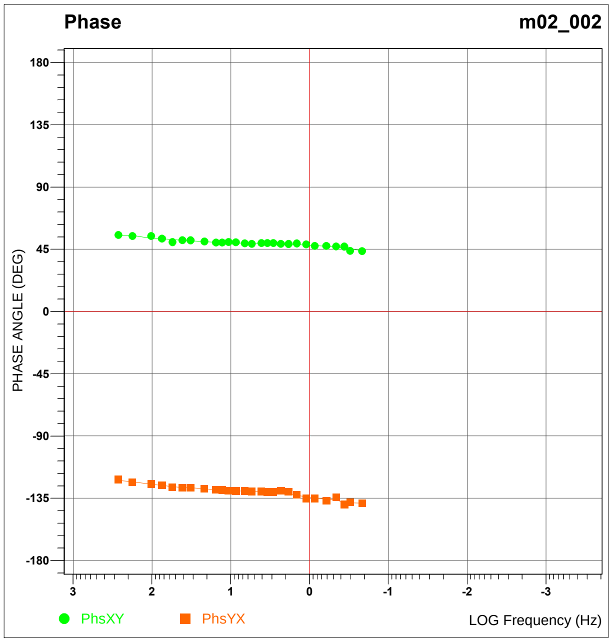
C.1.111 SITE M01-001 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY

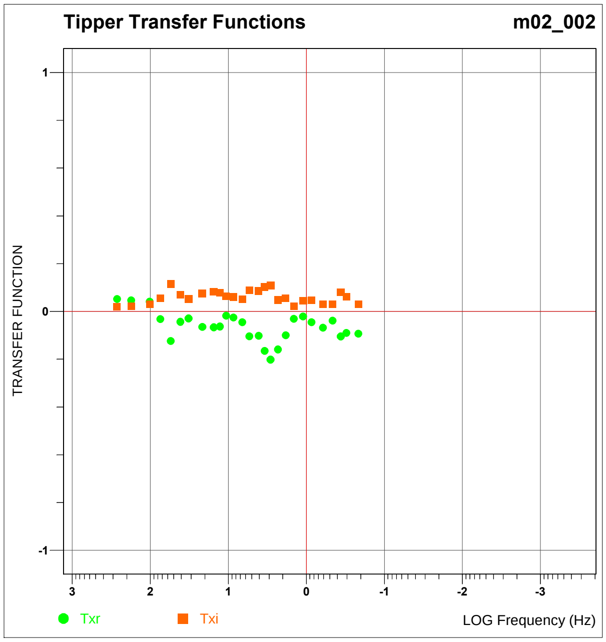


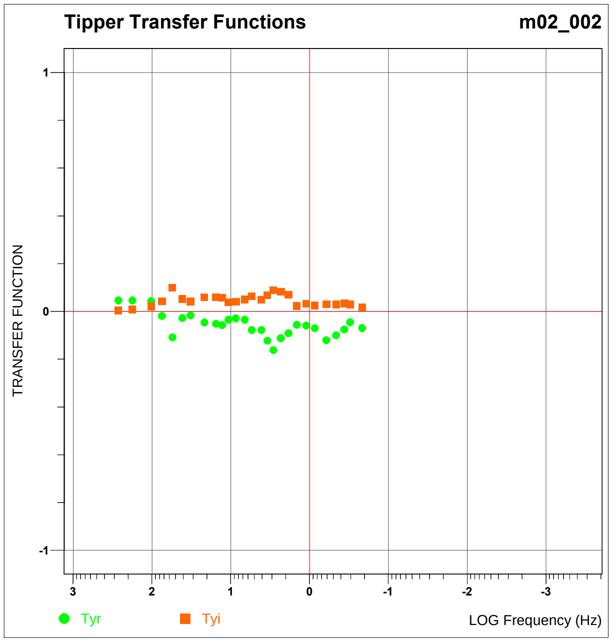
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.112 SITE M02-002 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



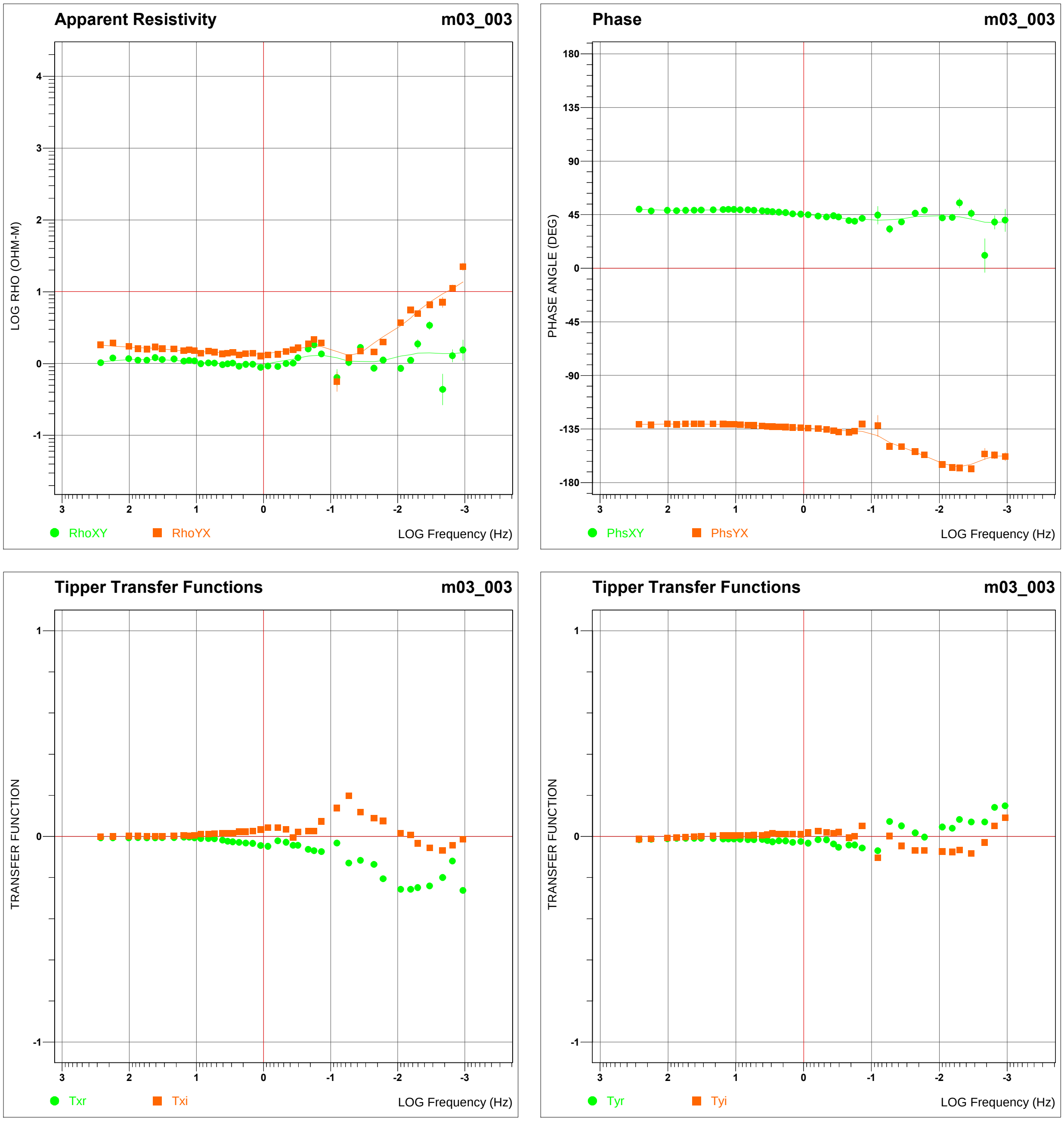






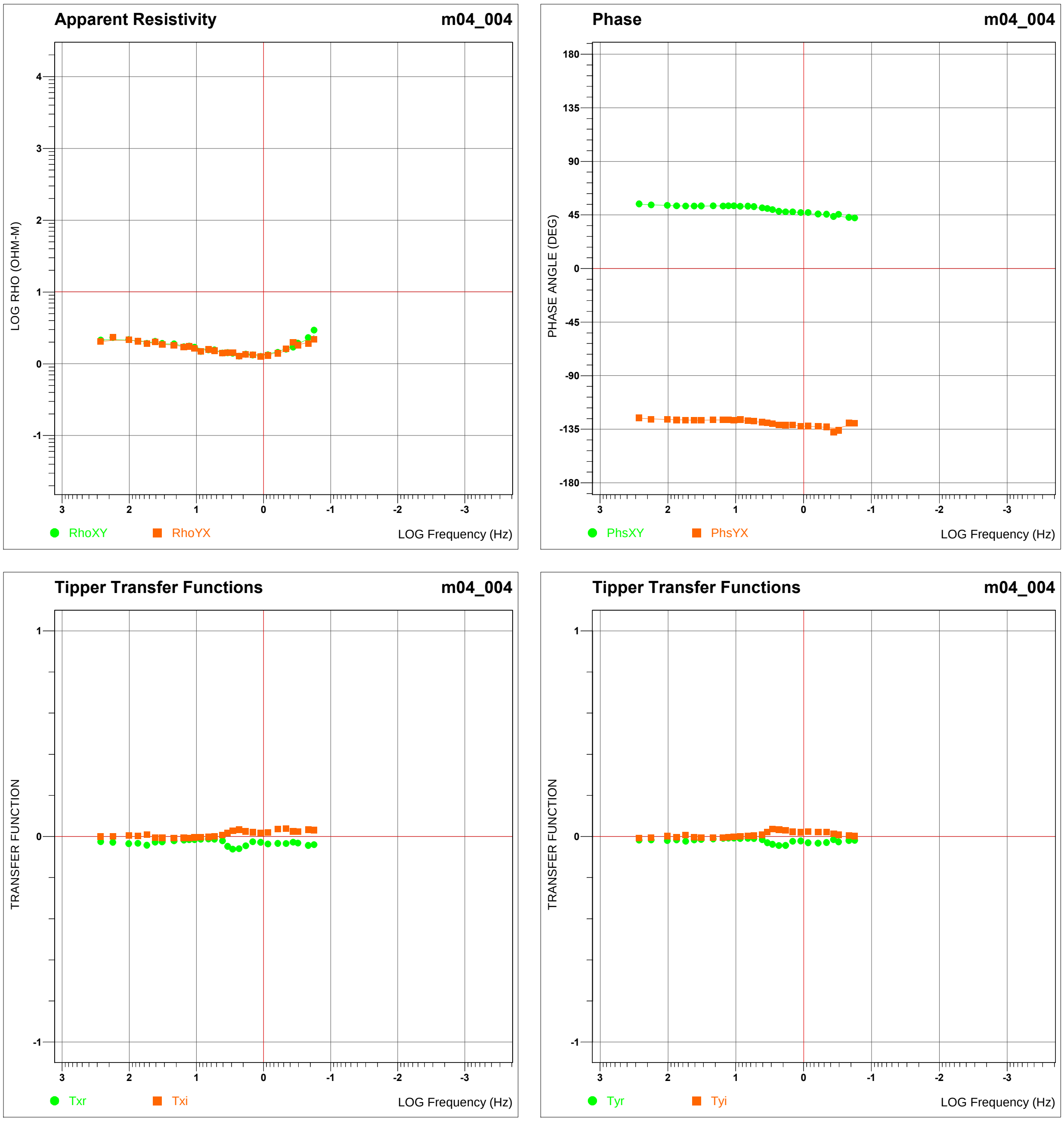
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.113 SITE M03-003 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.114 SITE M04-004 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



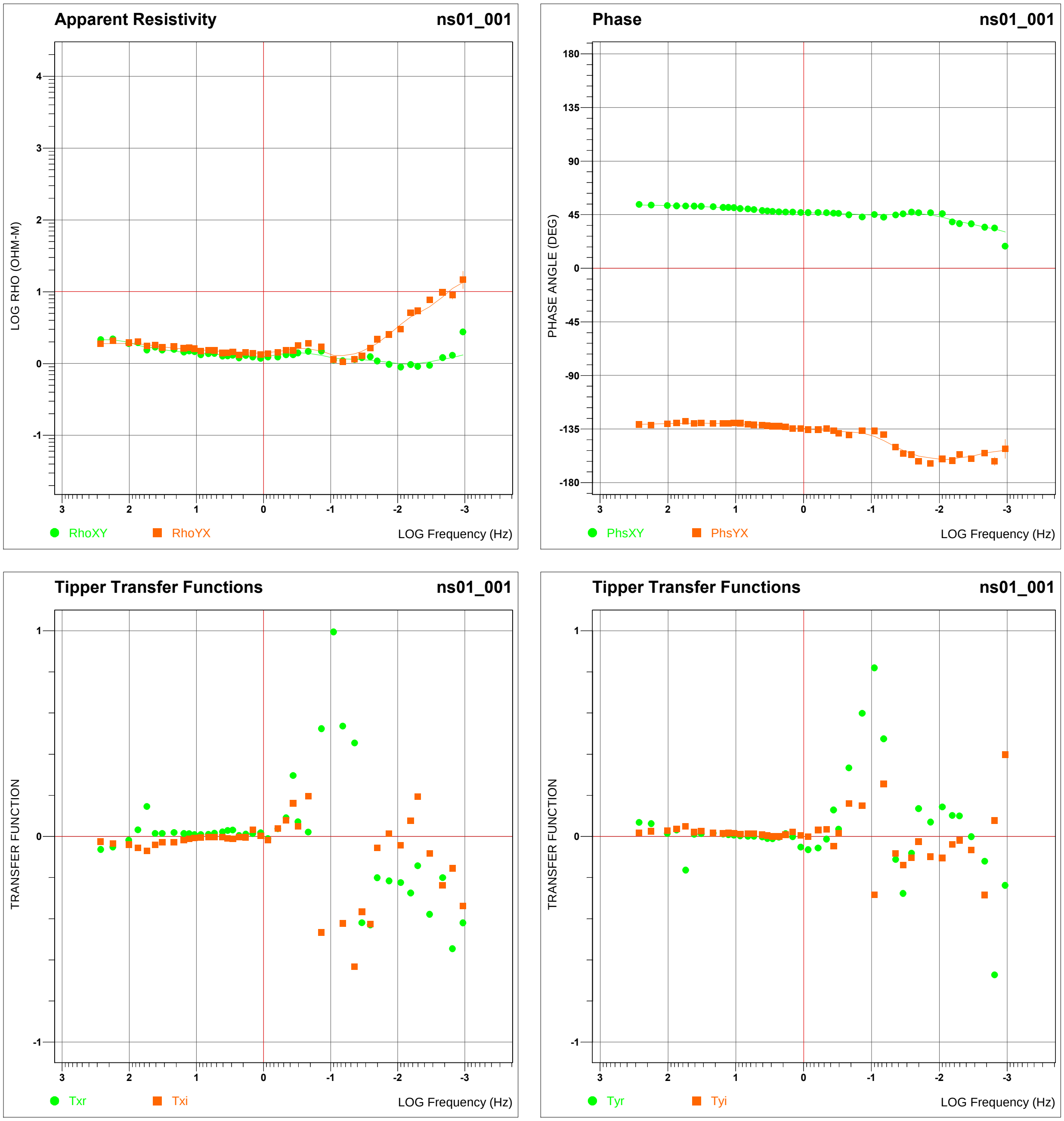
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X

(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

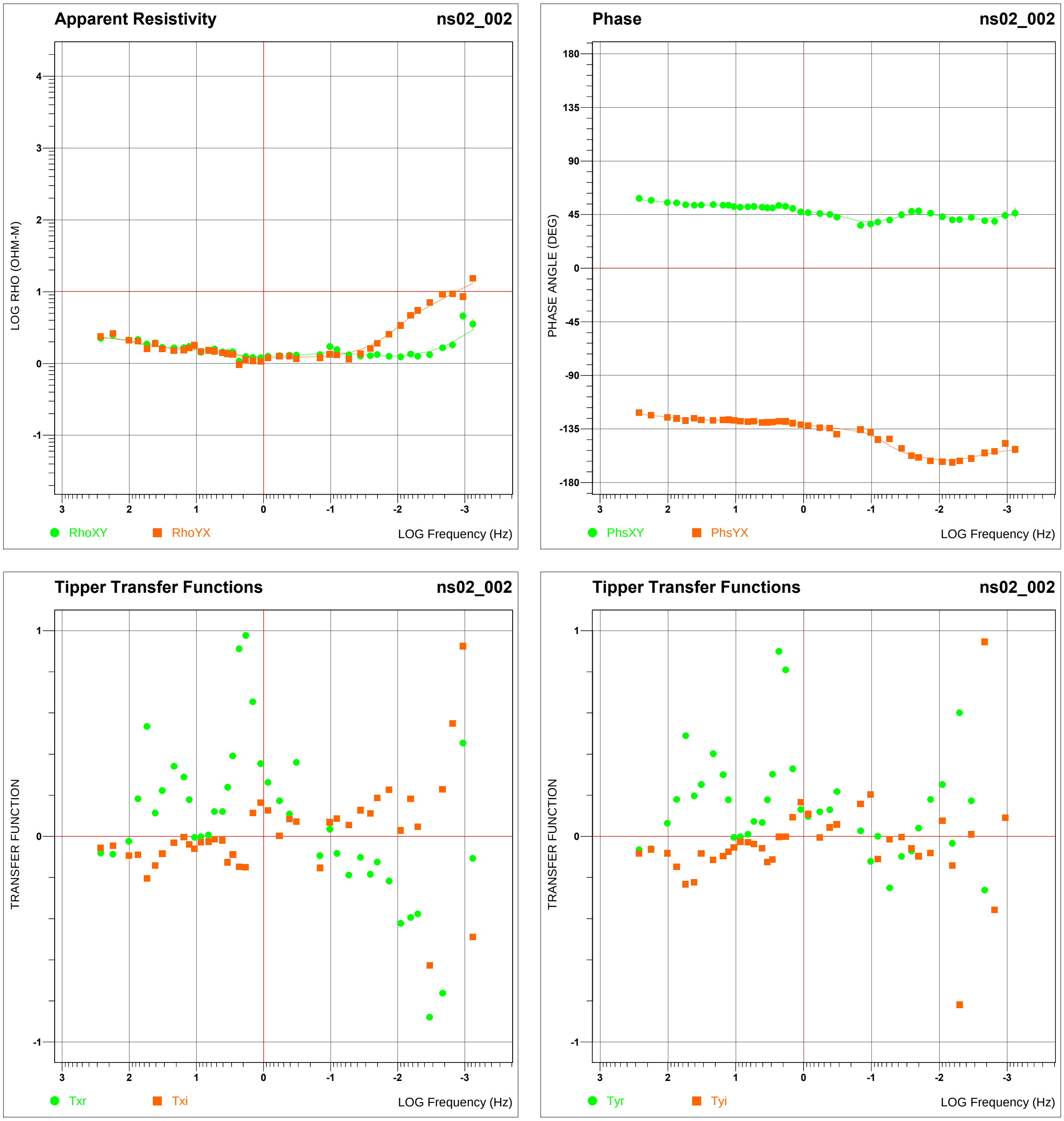
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.115 SITE NS01-001 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



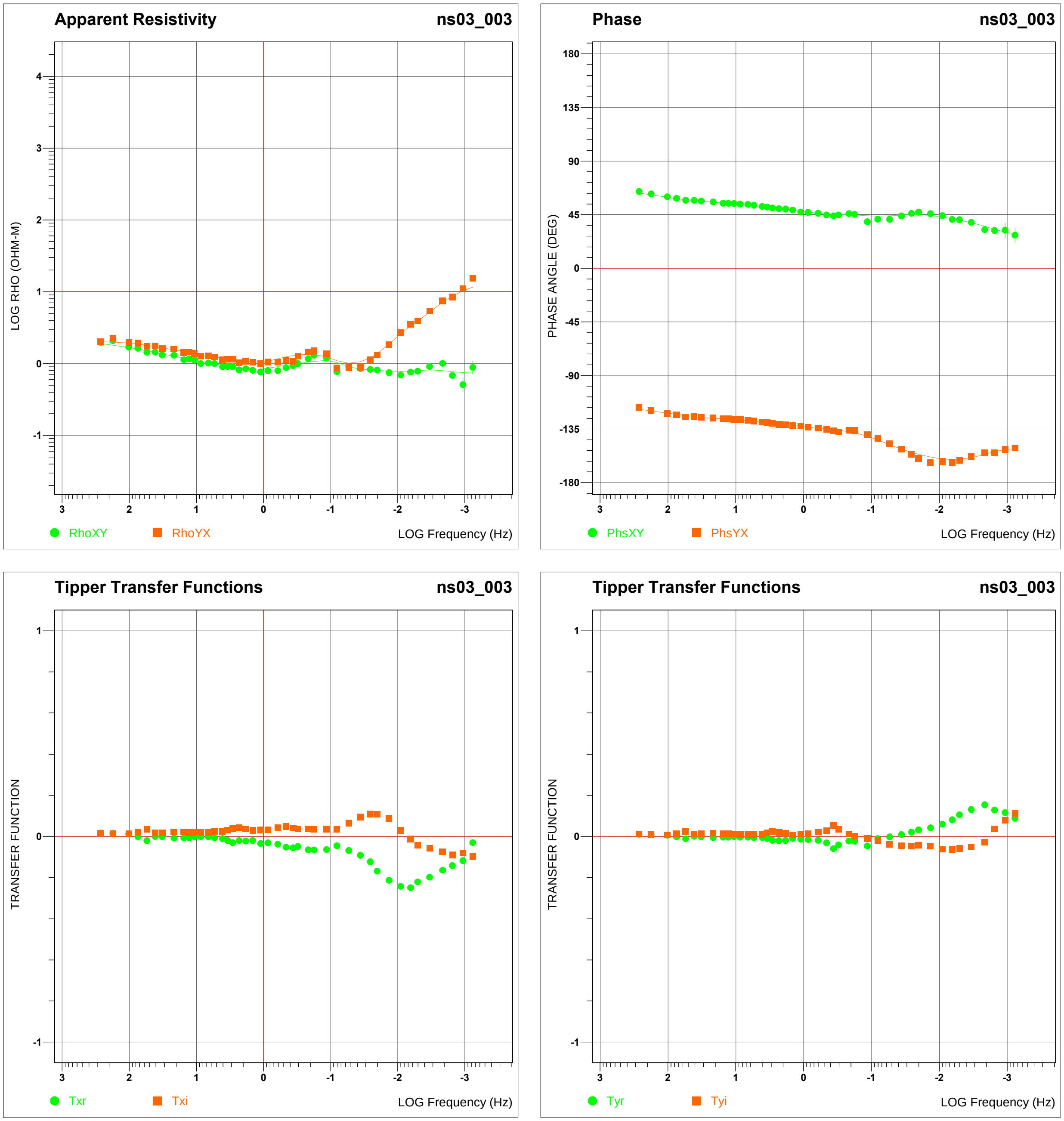
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.116 SITE NS02-002 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.117 SITE NS03-003 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



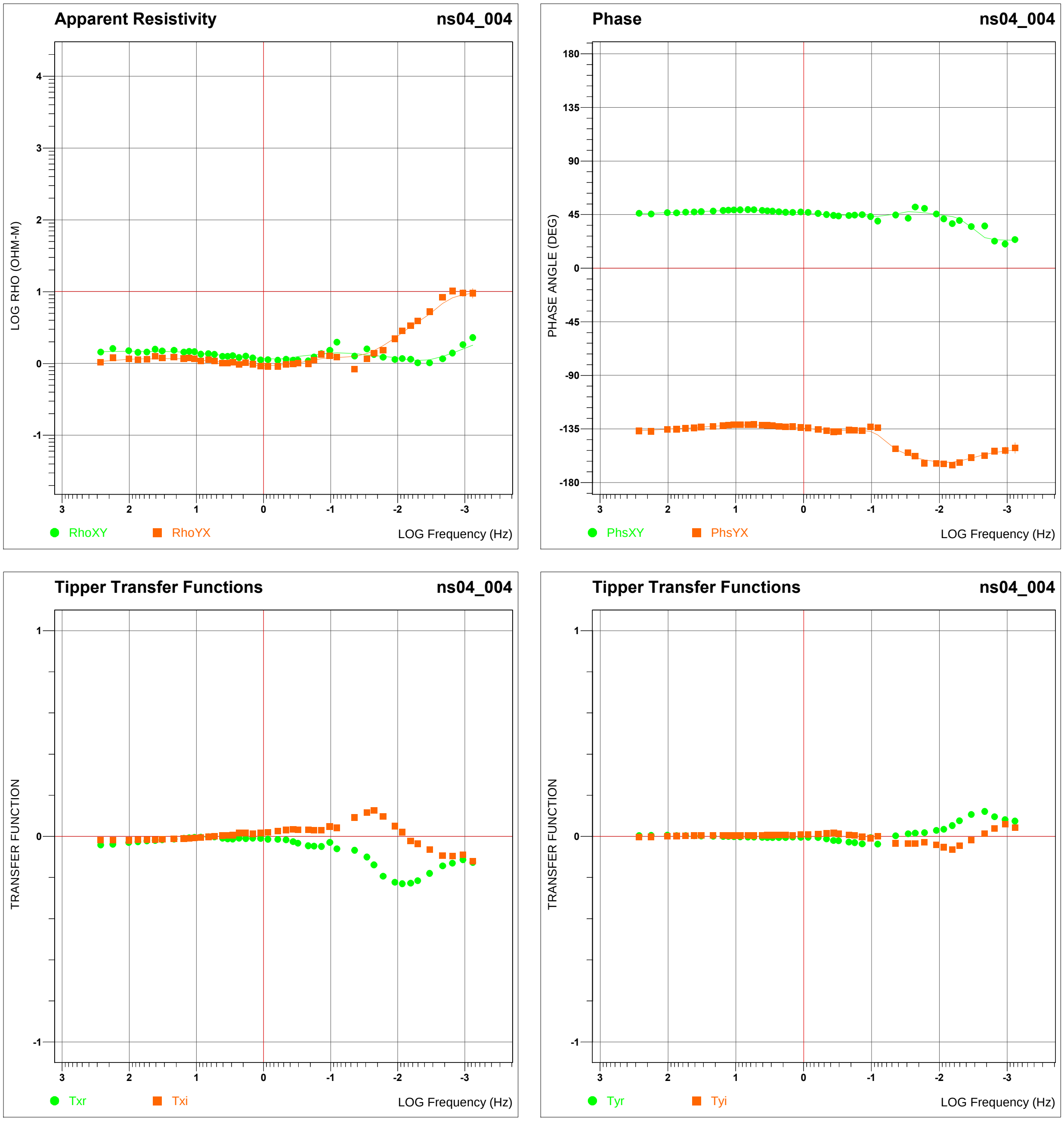
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X

(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.118 SITE NS04-004 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



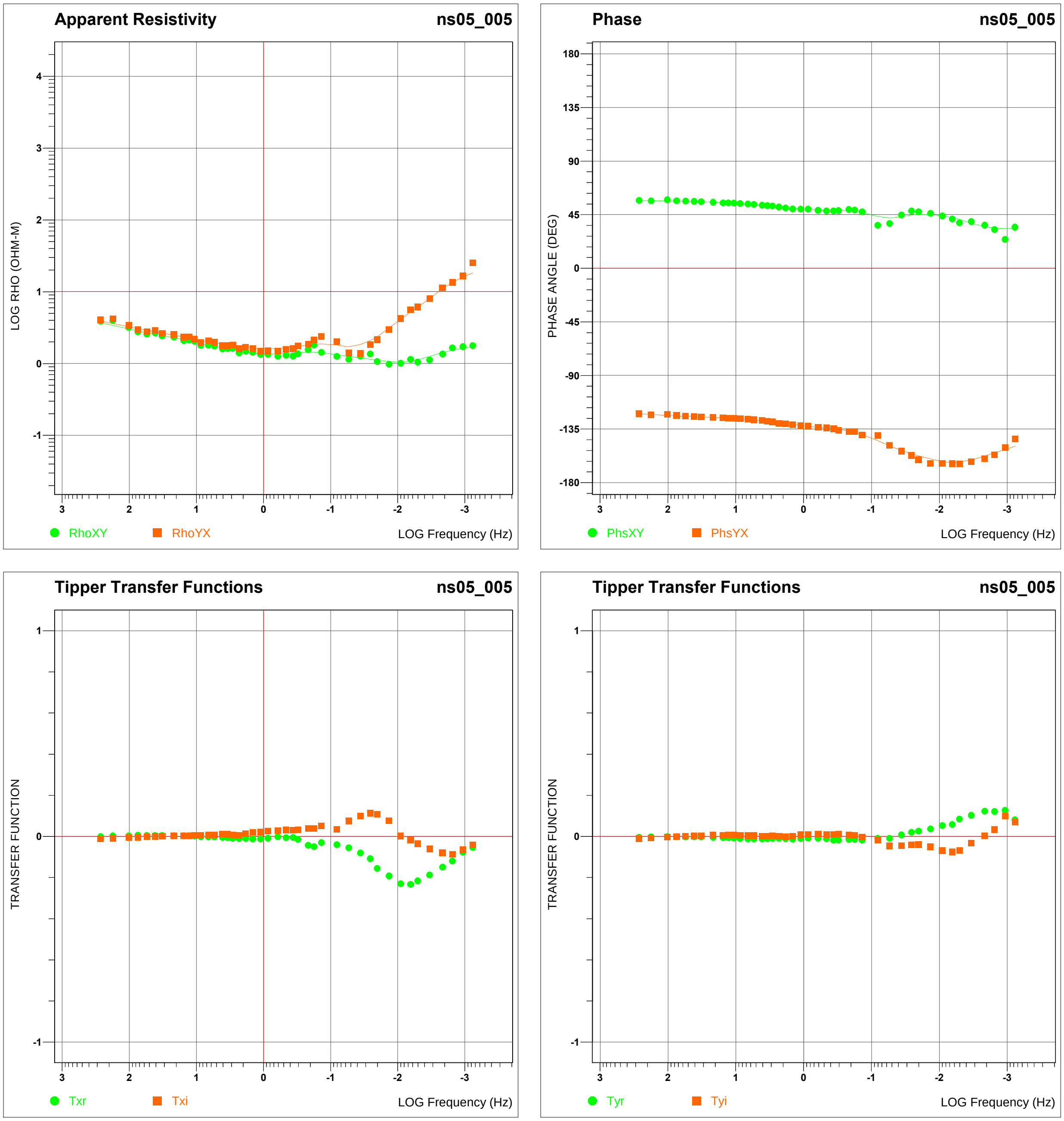
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X

(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

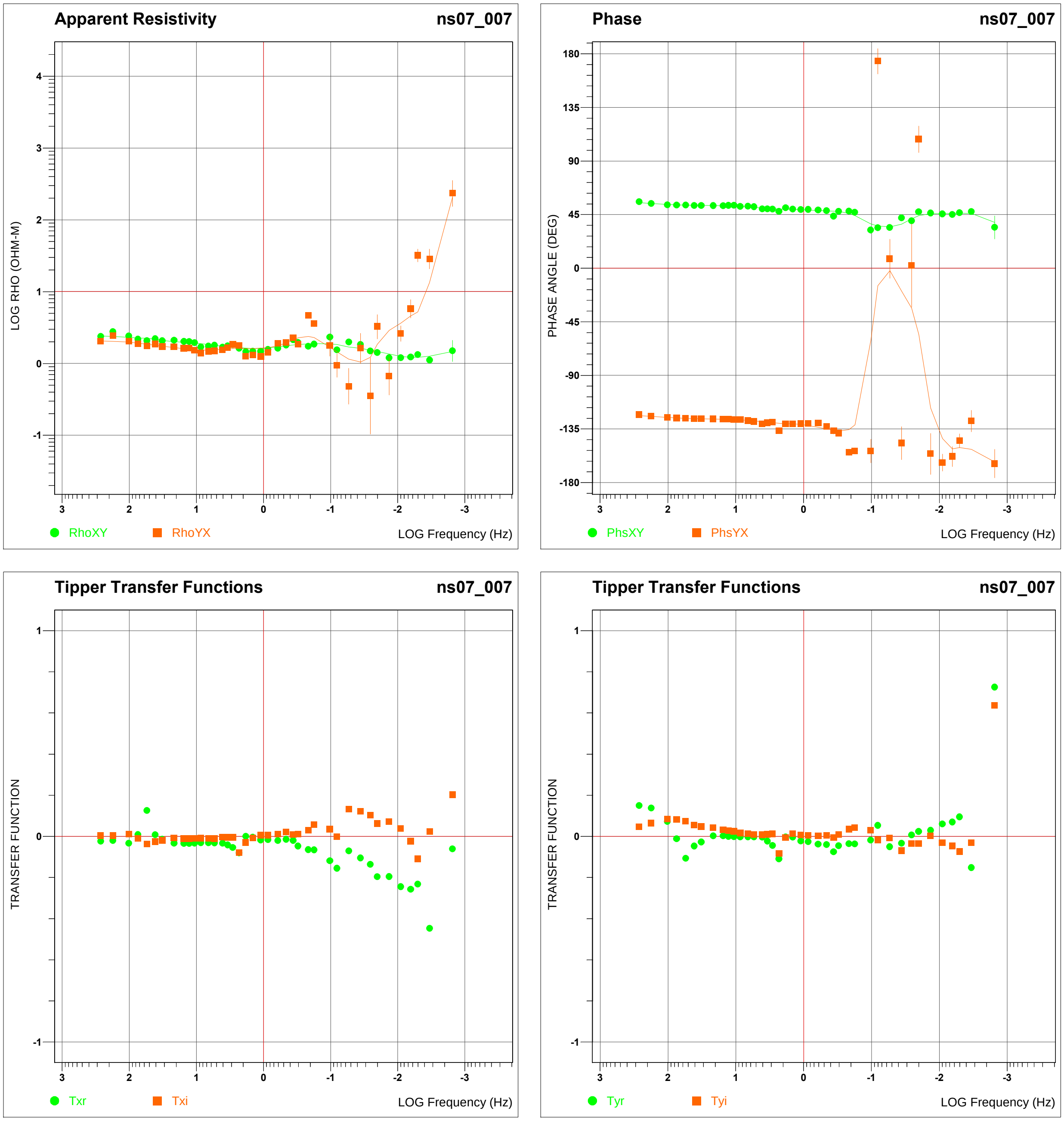
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.119 SITE NS05-005 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



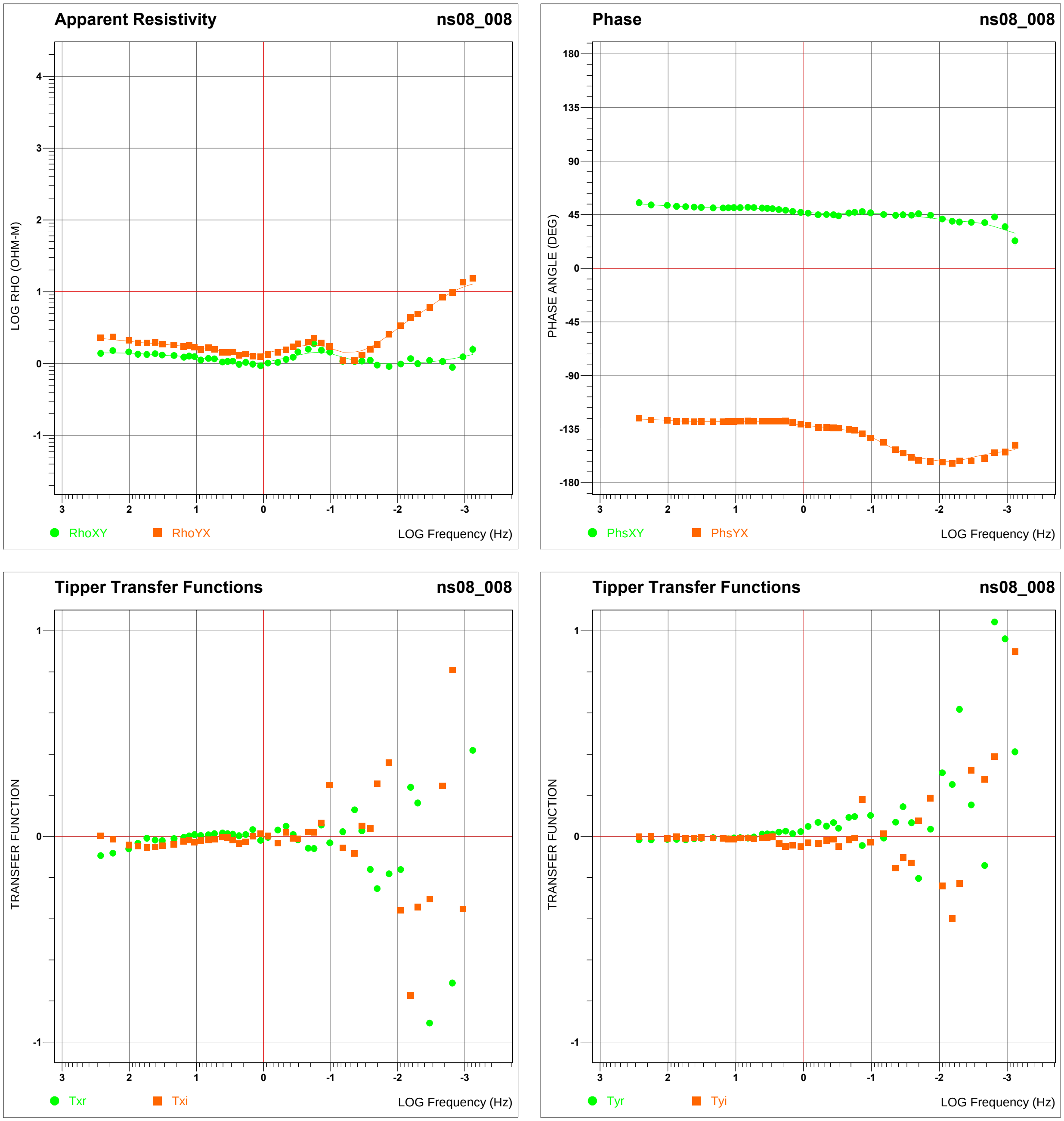
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.120 SITE NS07-007 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



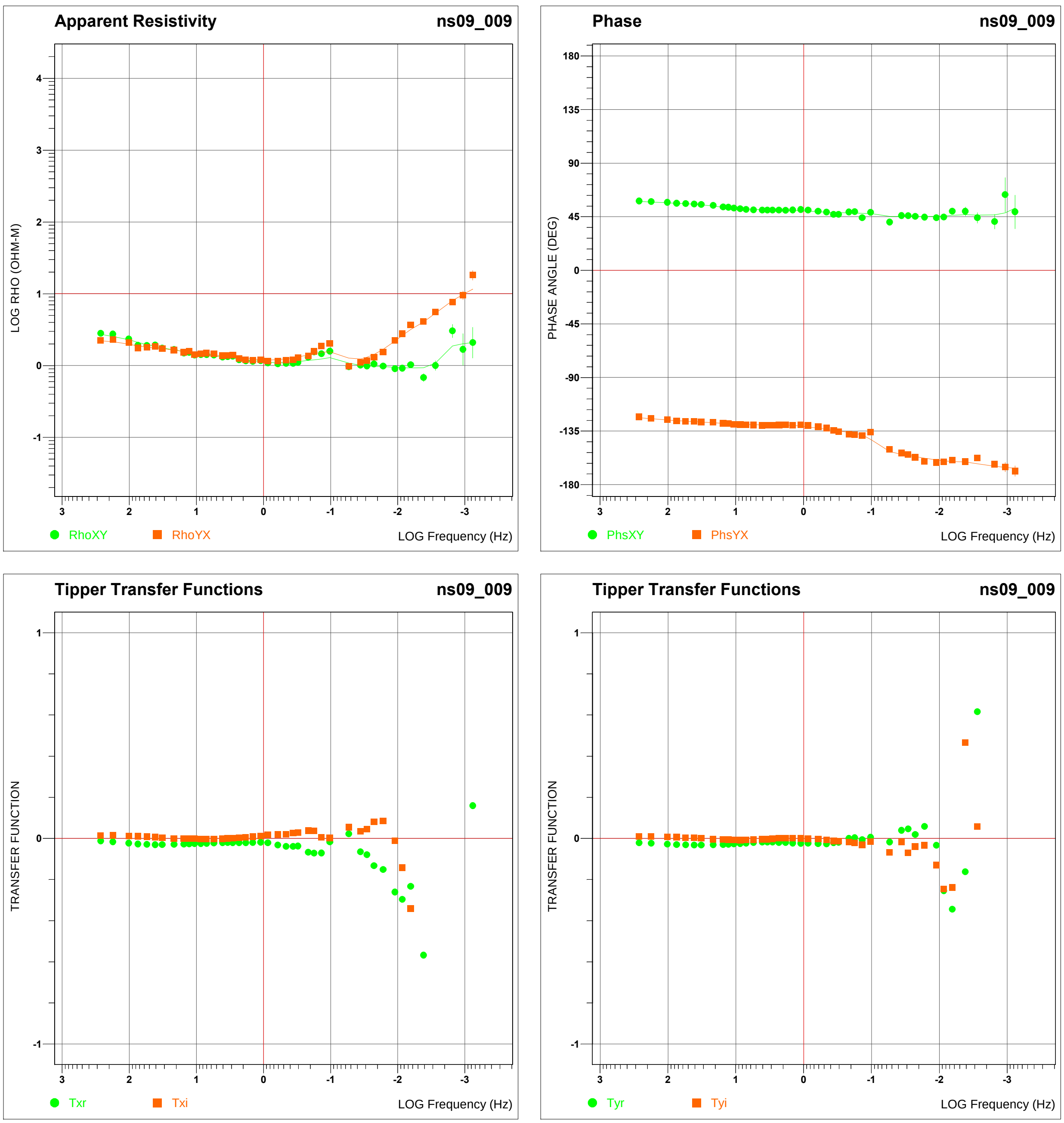
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.121 SITE NS08-008 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



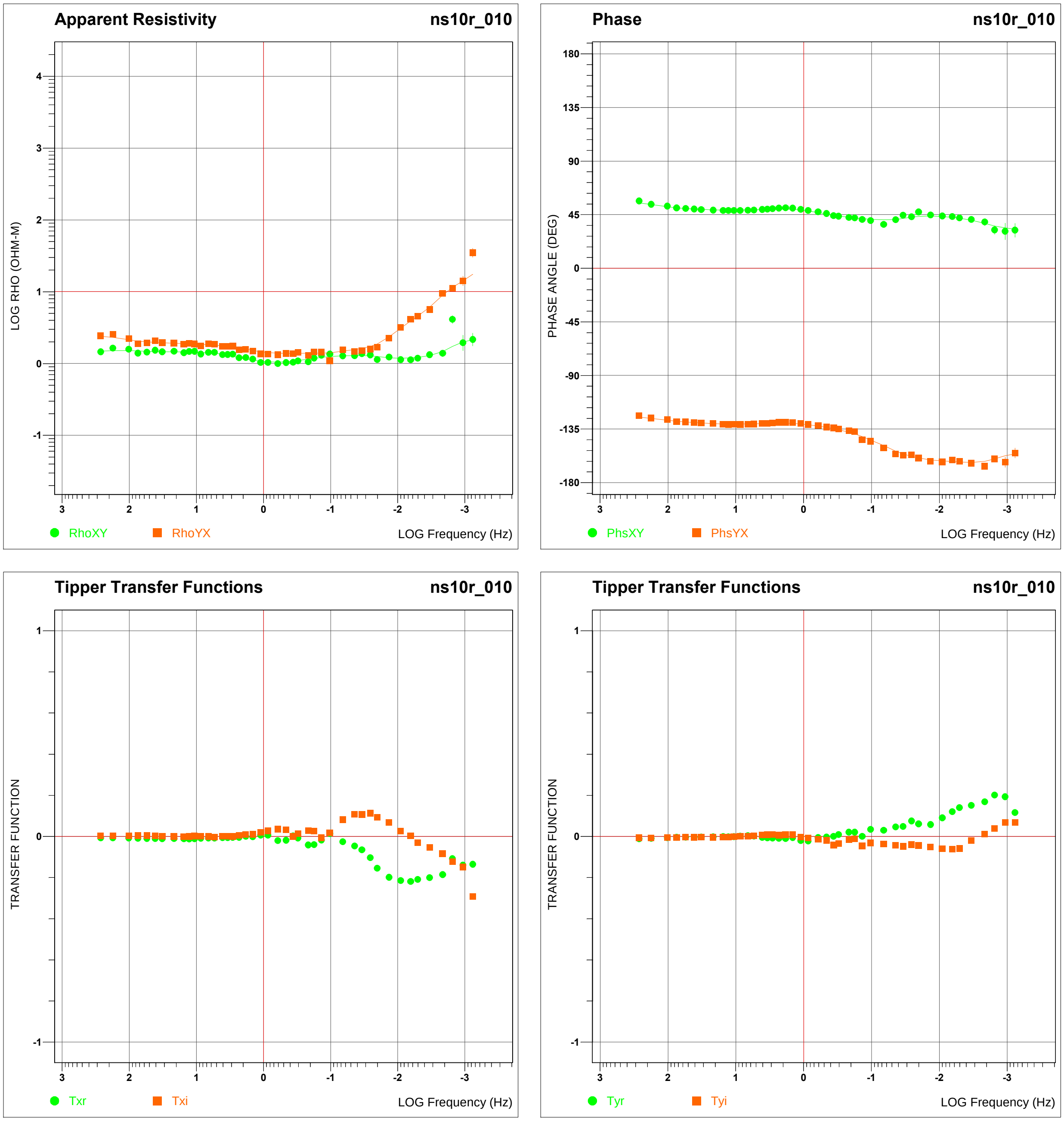
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.122 SITE NS09-009 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



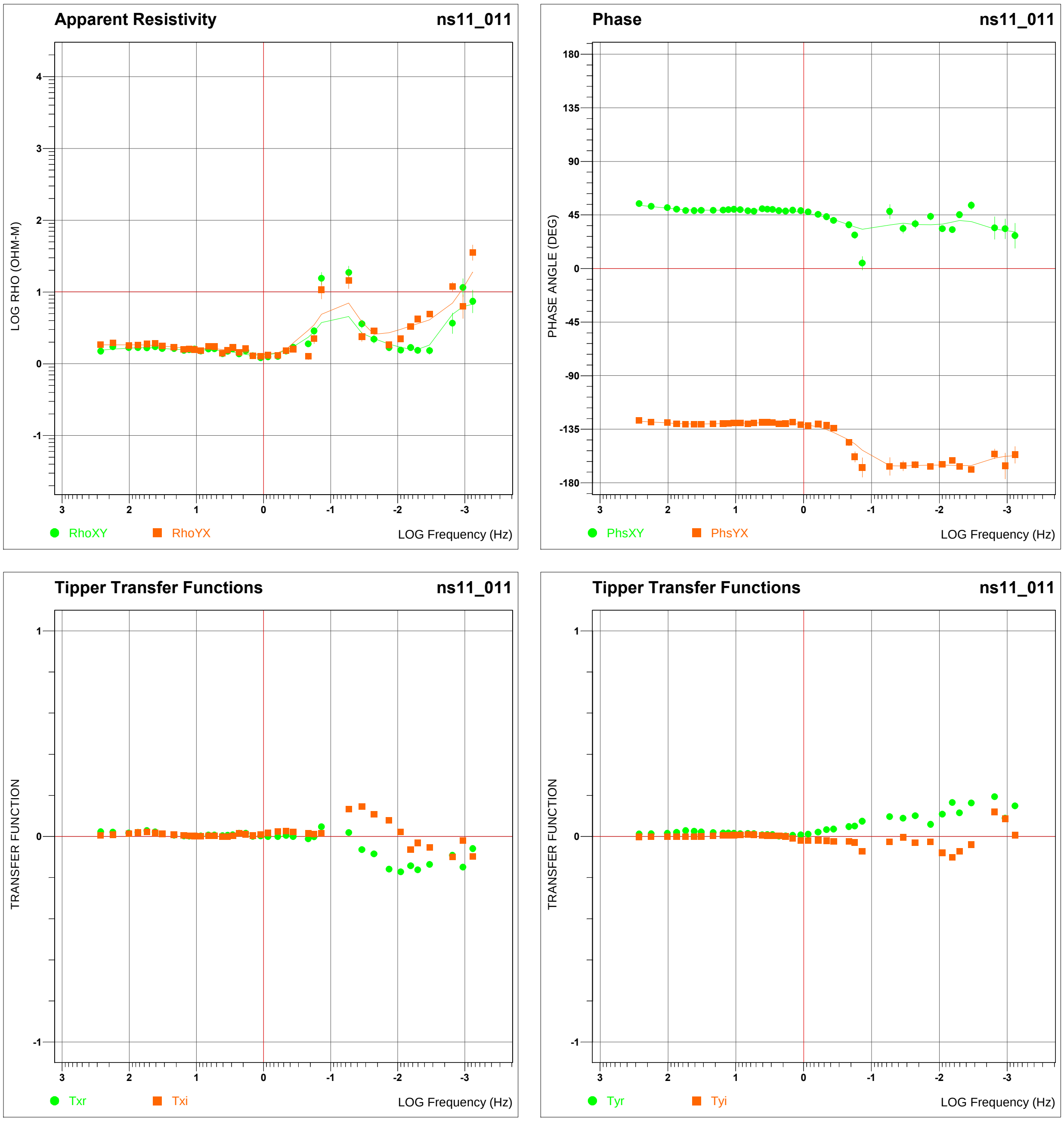
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.123 SITE NS10-010 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.124 SITE NS11-011 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



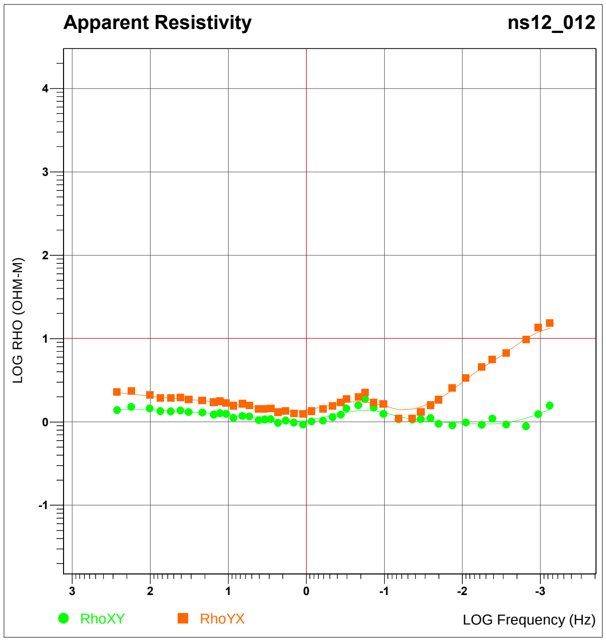
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X

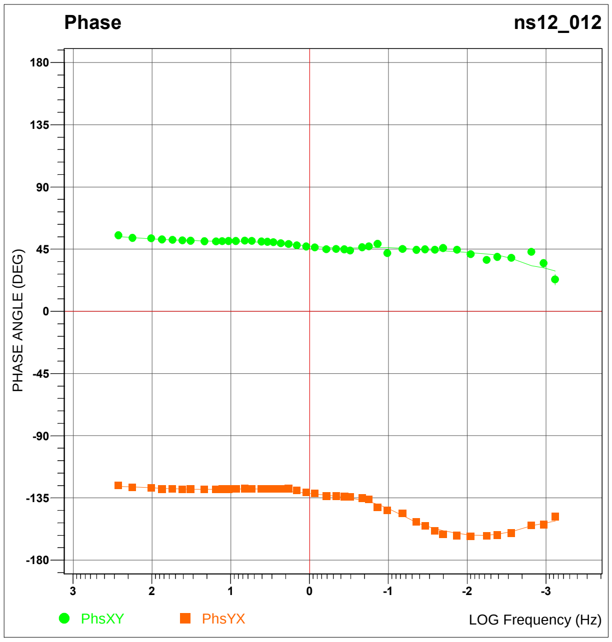
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

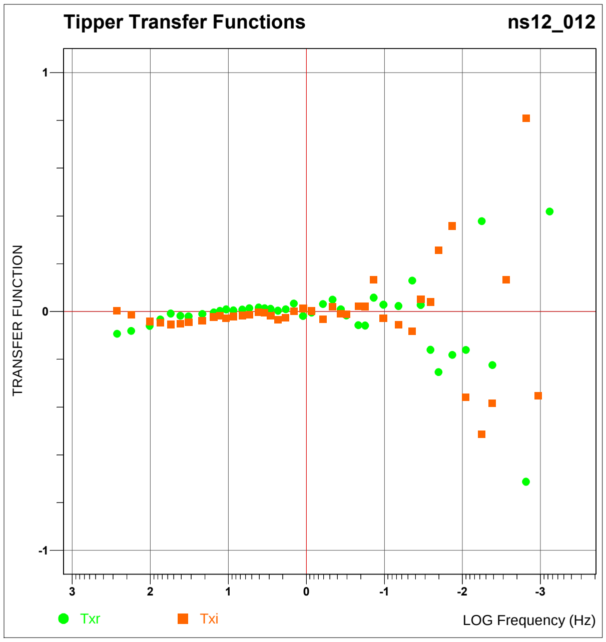
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

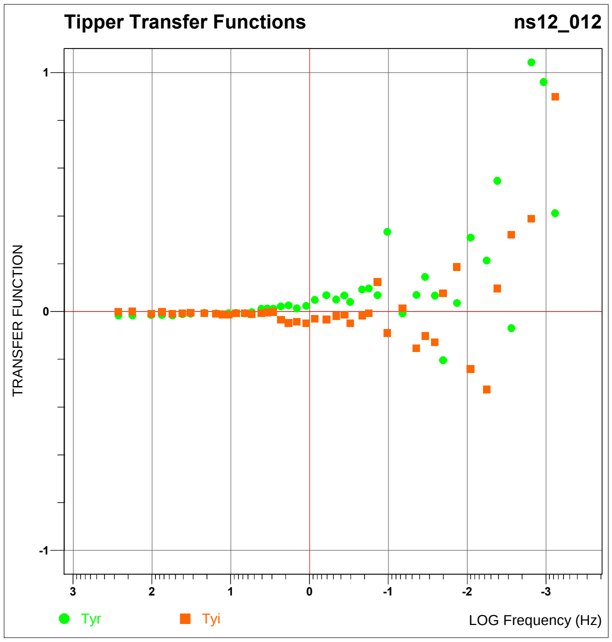
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.125 SITE NS12-012 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



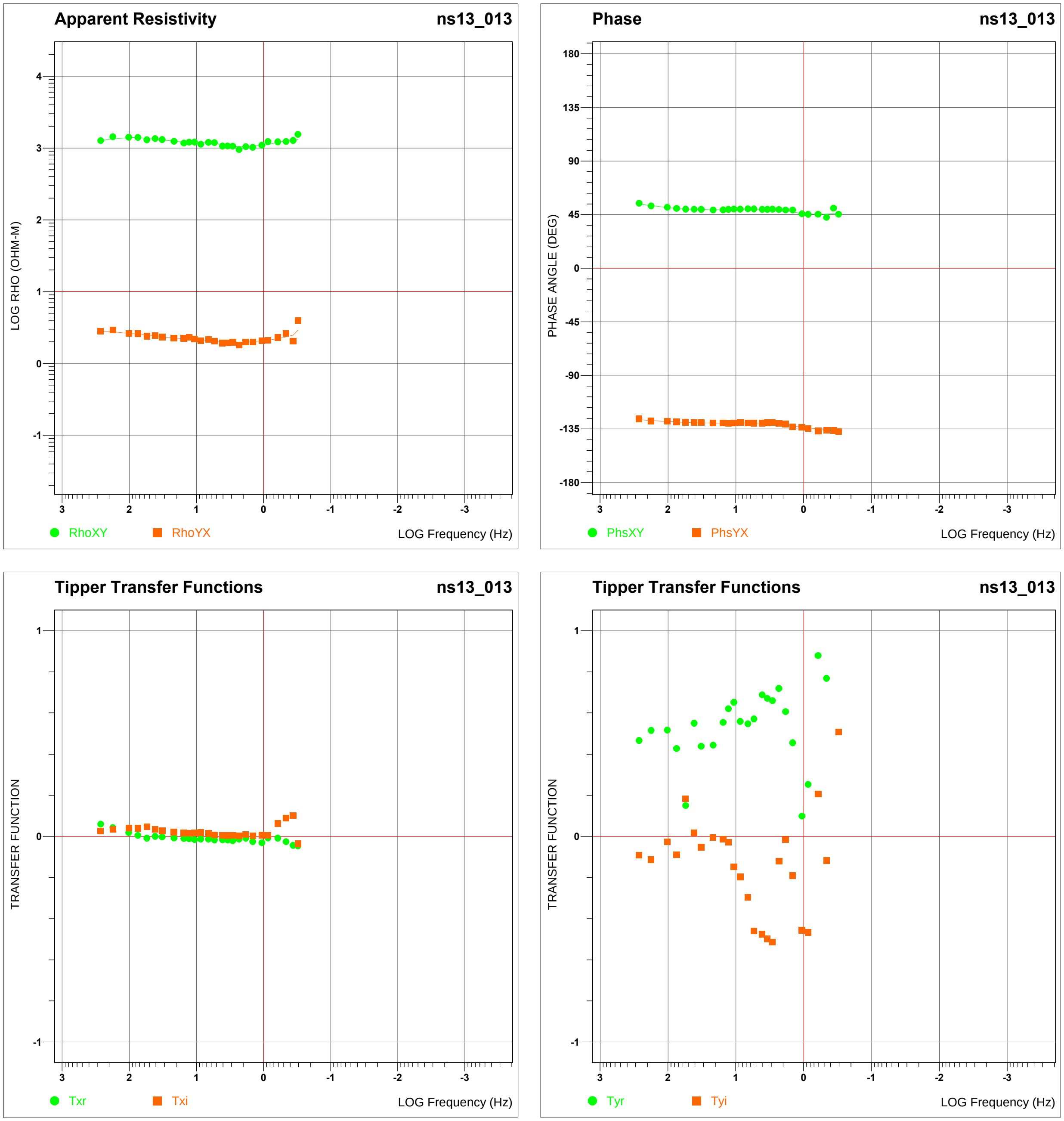






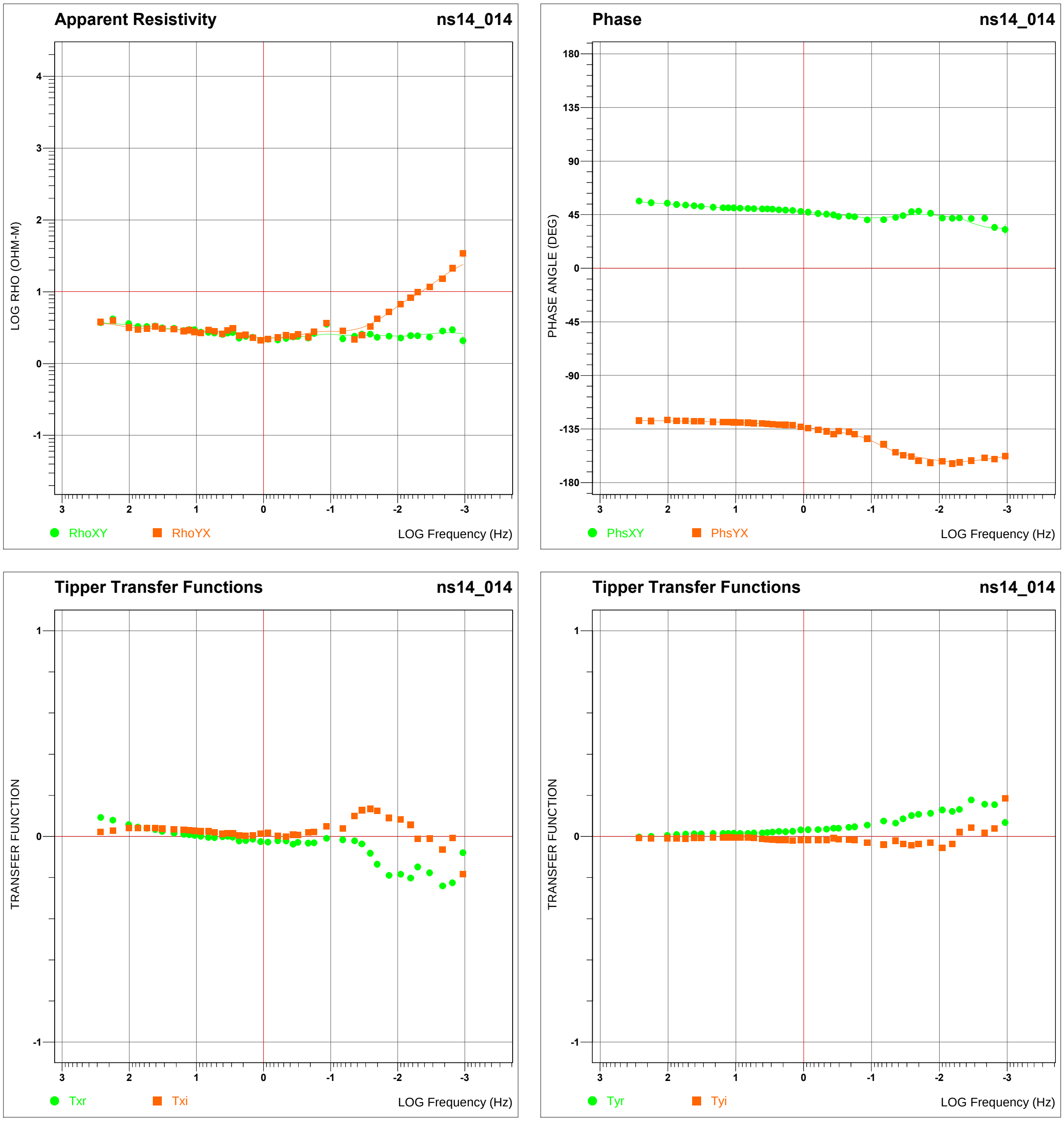
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.126 SITE NS13-013 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.127 SITE NS14-014 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



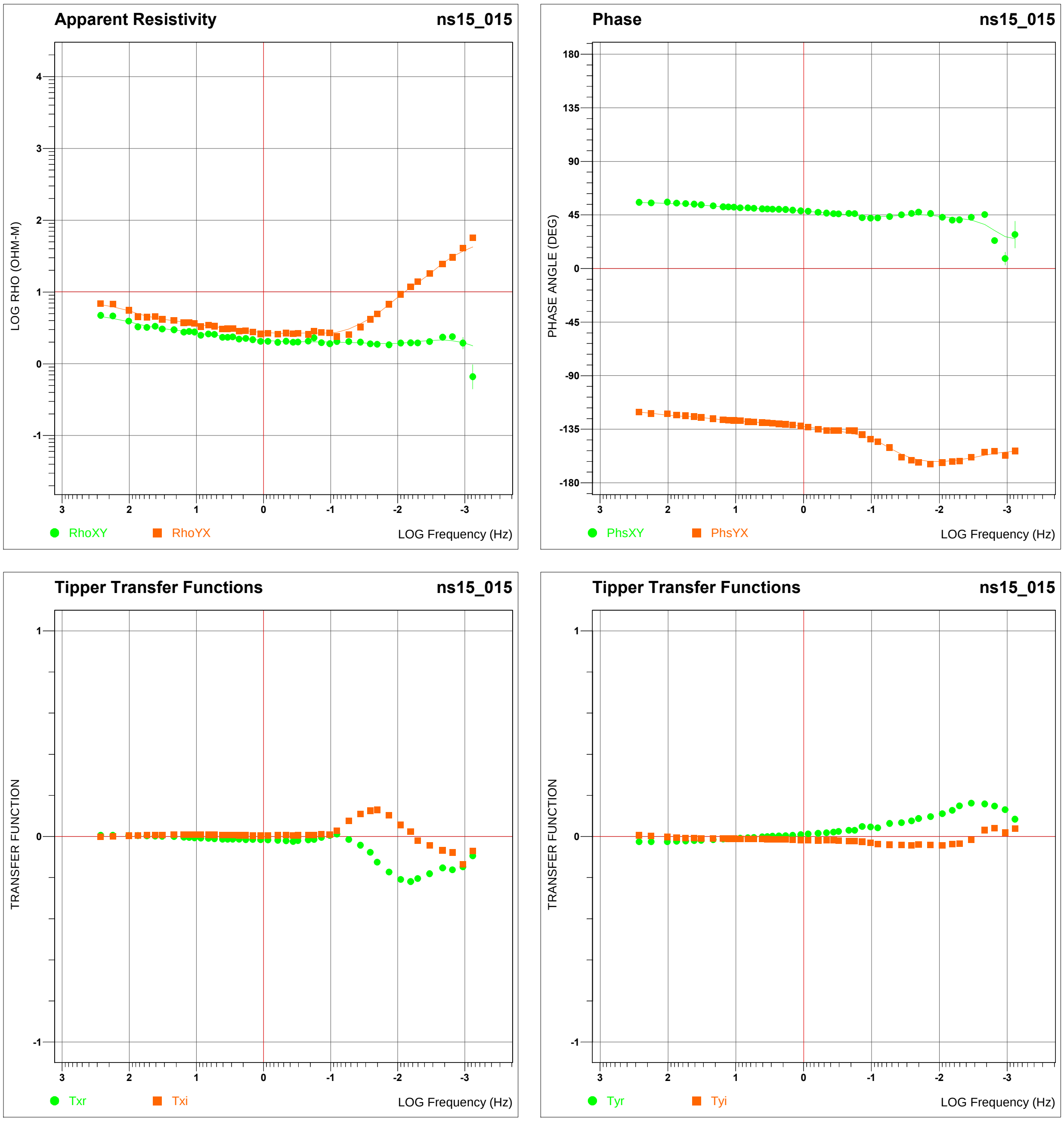
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X

(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

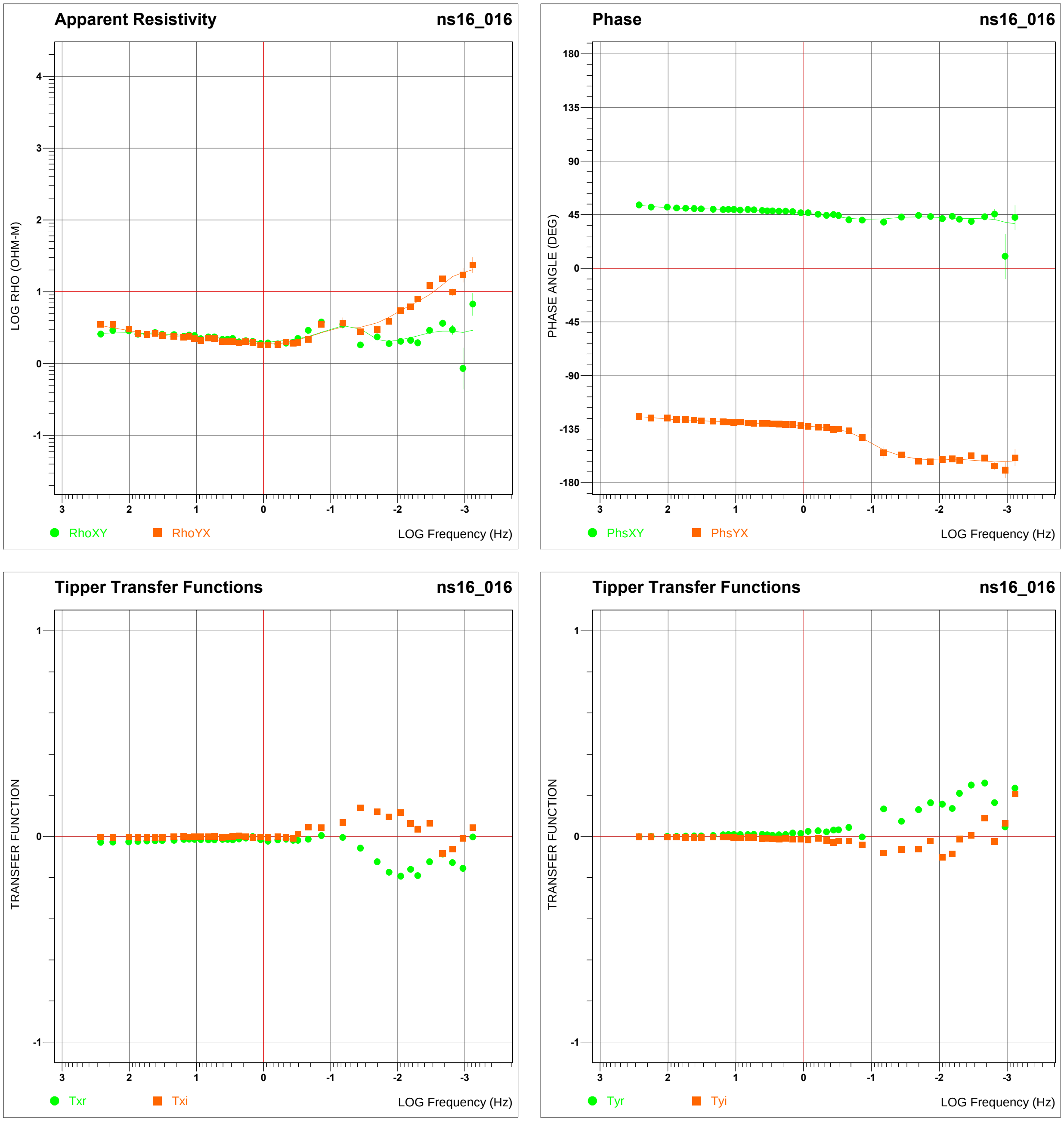
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.128SITE NS15-015 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



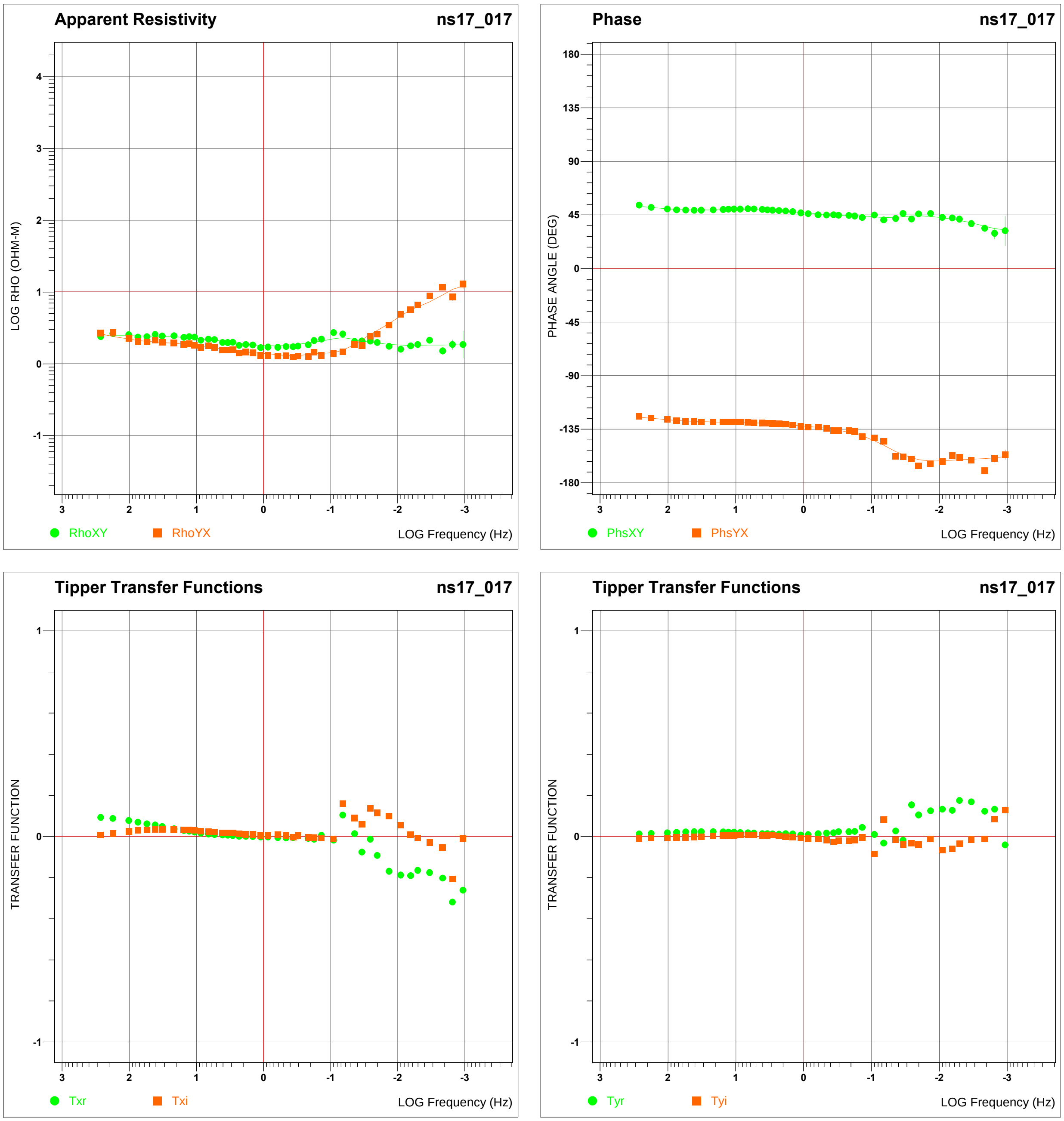
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.129 SITE NS16-016 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



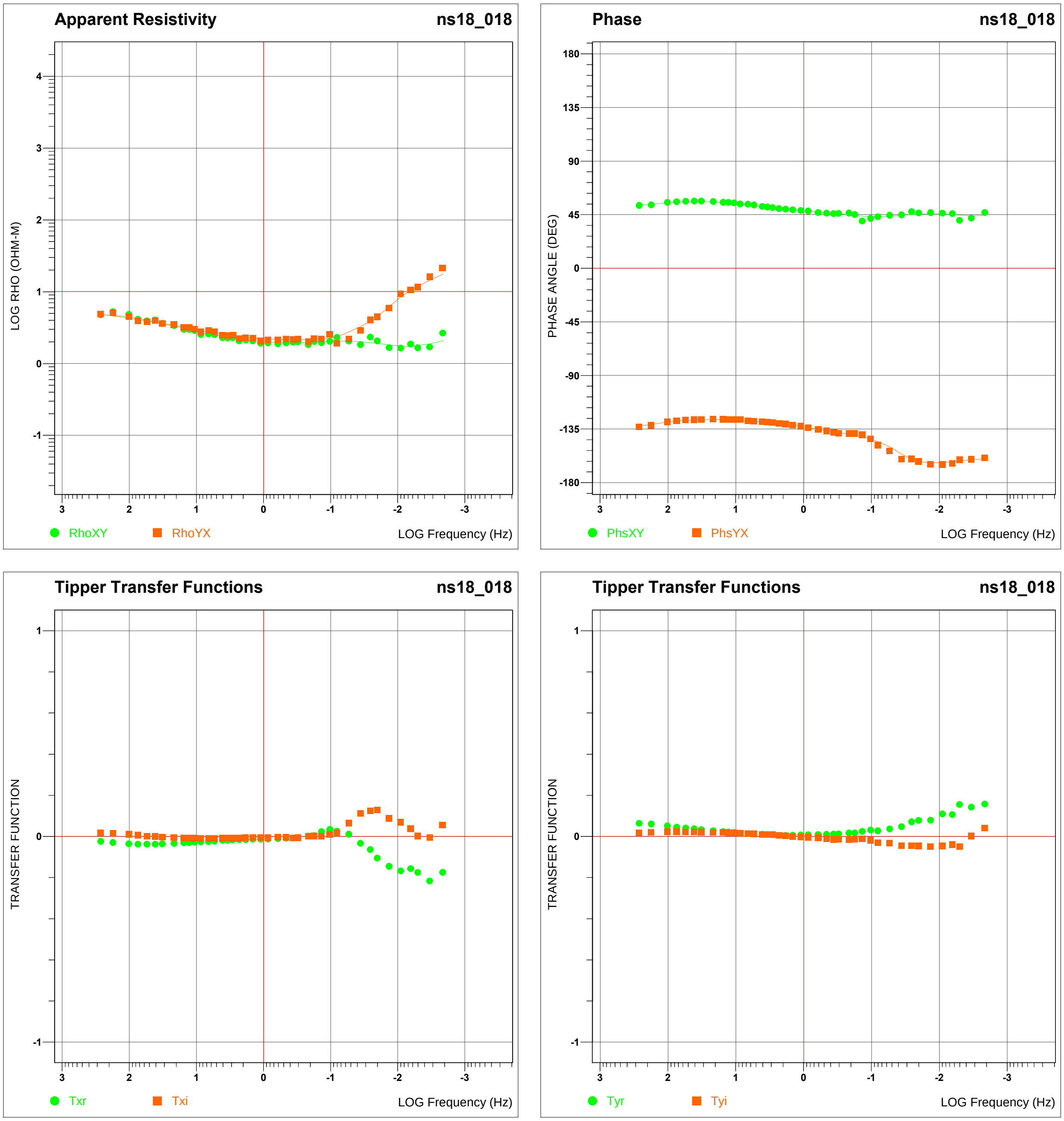
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.130 SITE NS17-017 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



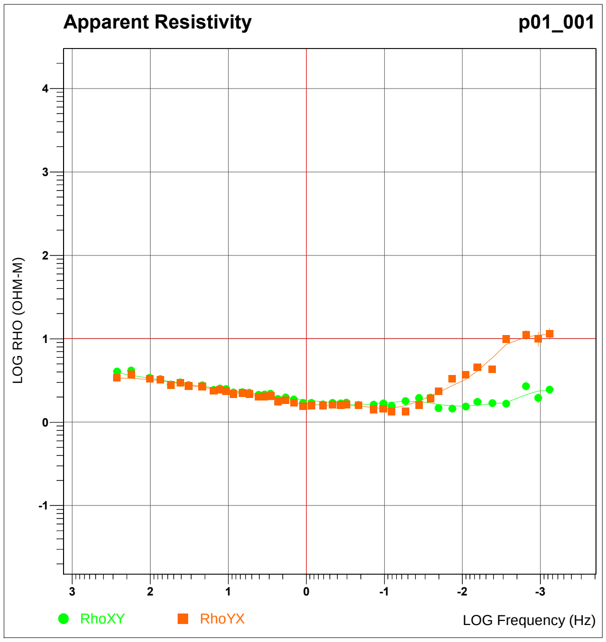
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

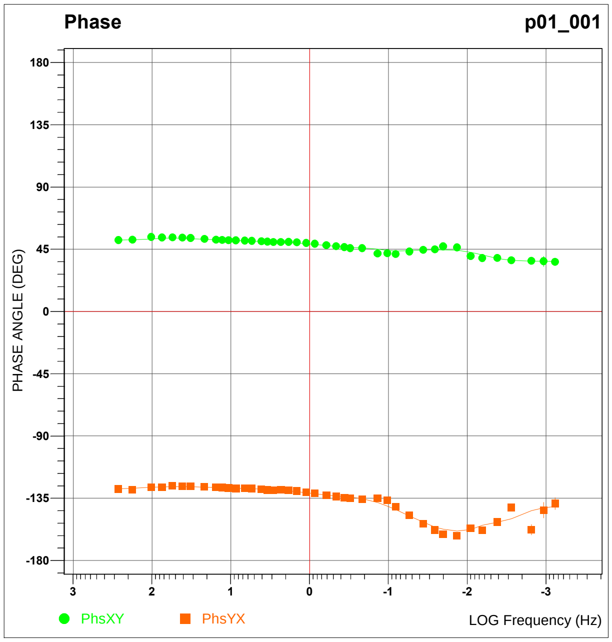
C.1.131 SITE NS18-018 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY

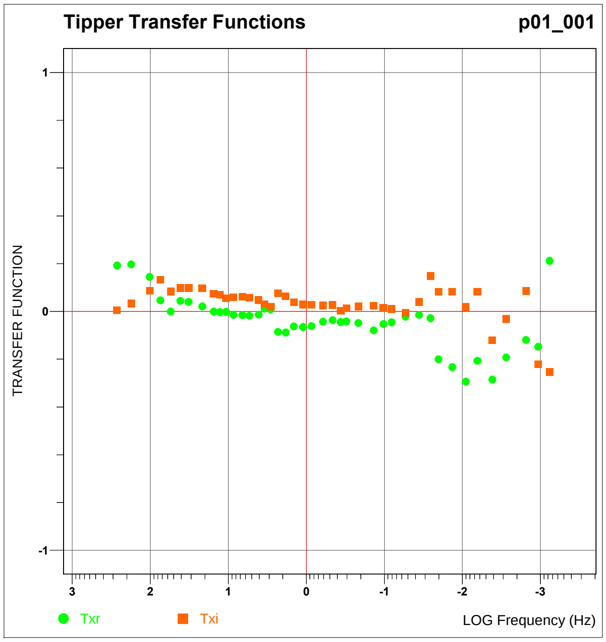


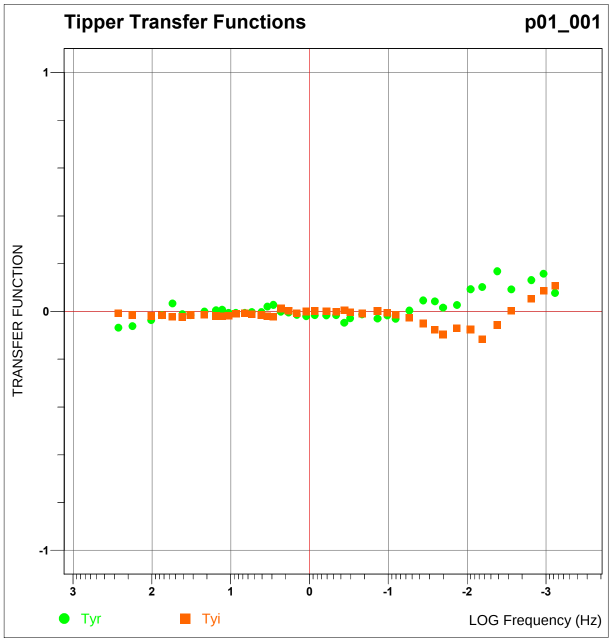
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.132 SITE P01-001 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



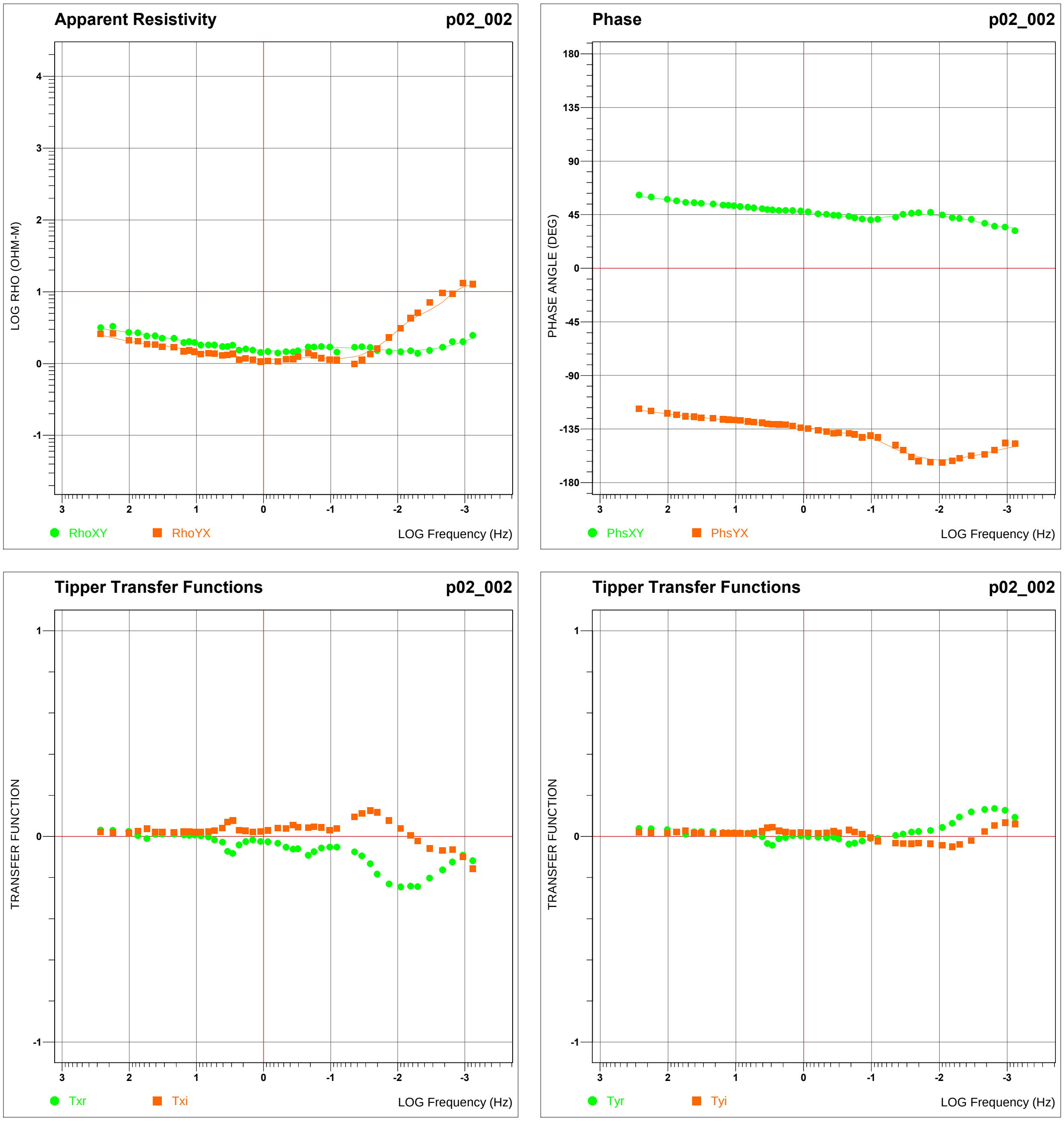






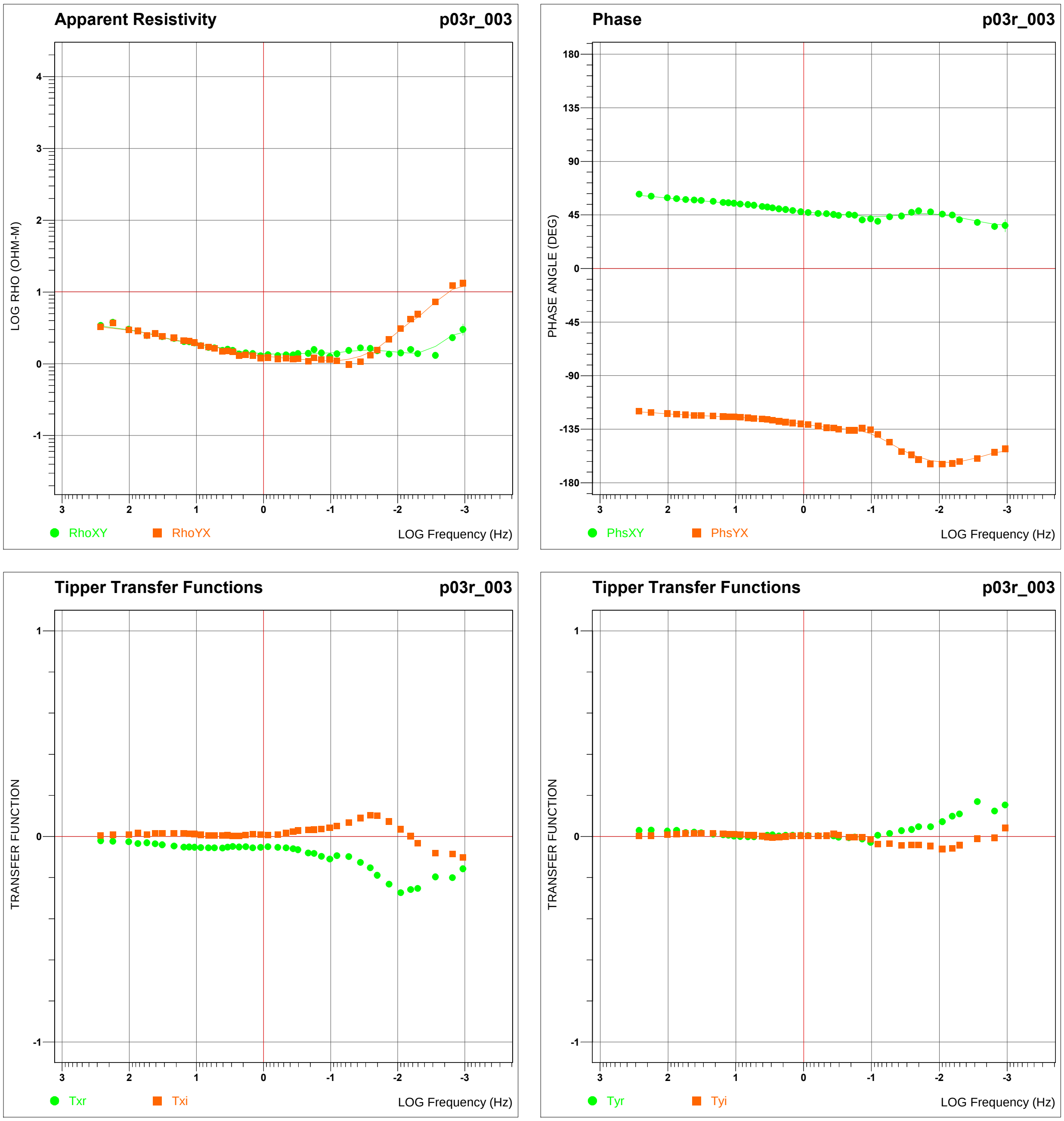
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.133 SITE P02-002 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.134 SITE P03-003 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



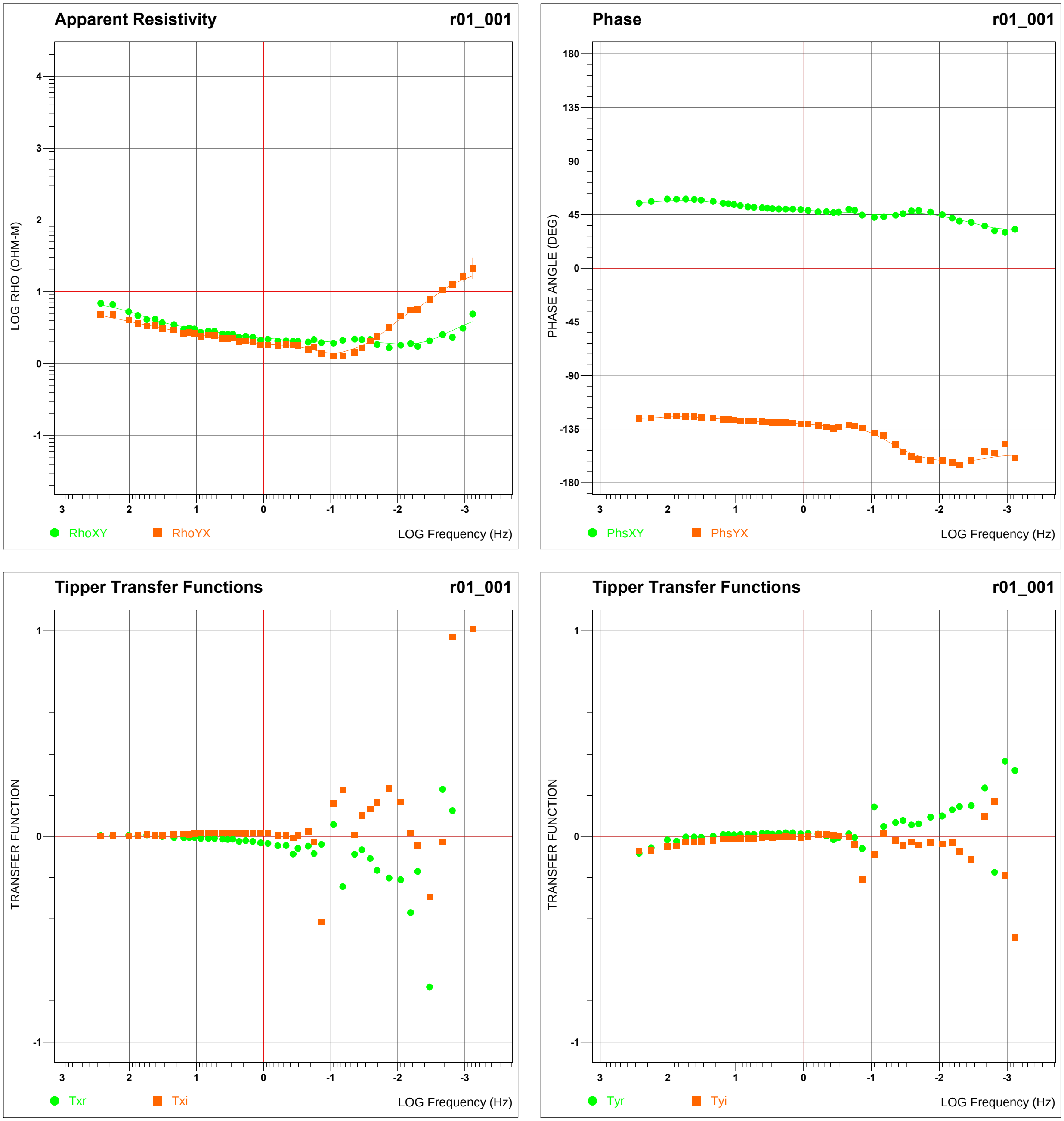
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X

(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.135 SITE R01-001 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



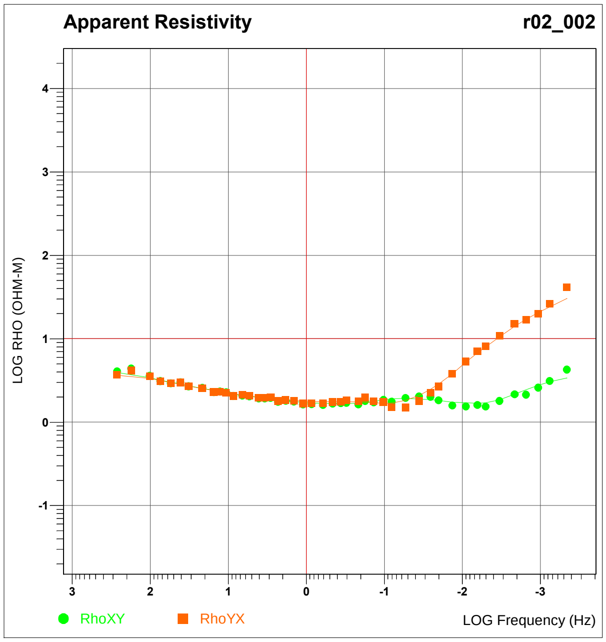
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X

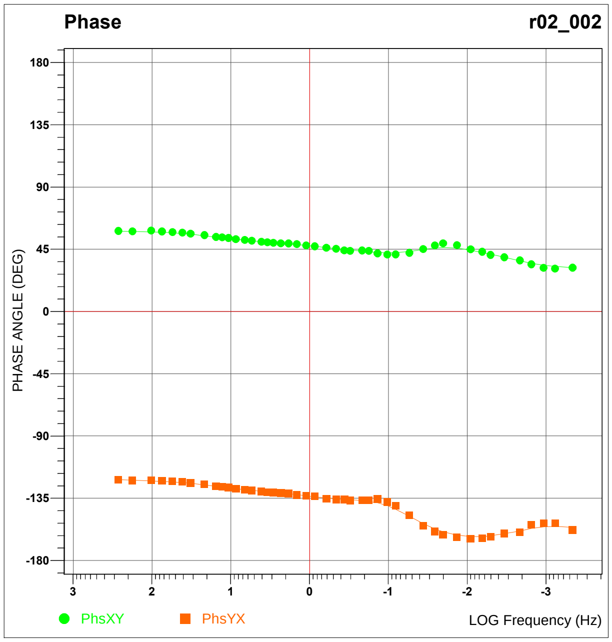
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

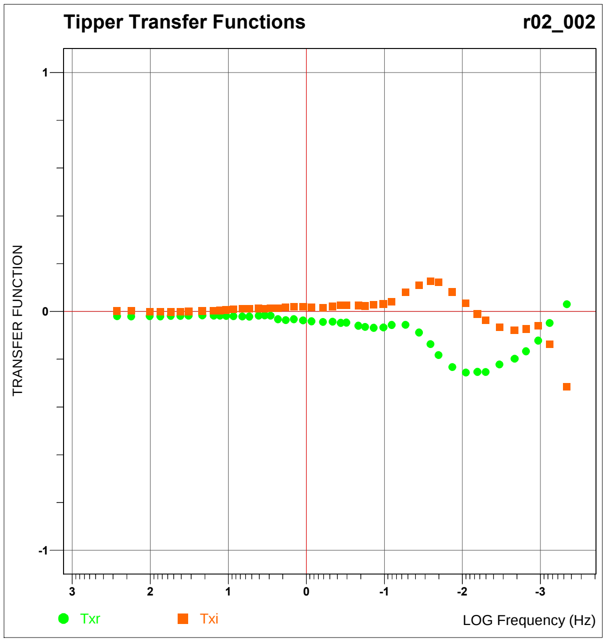
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

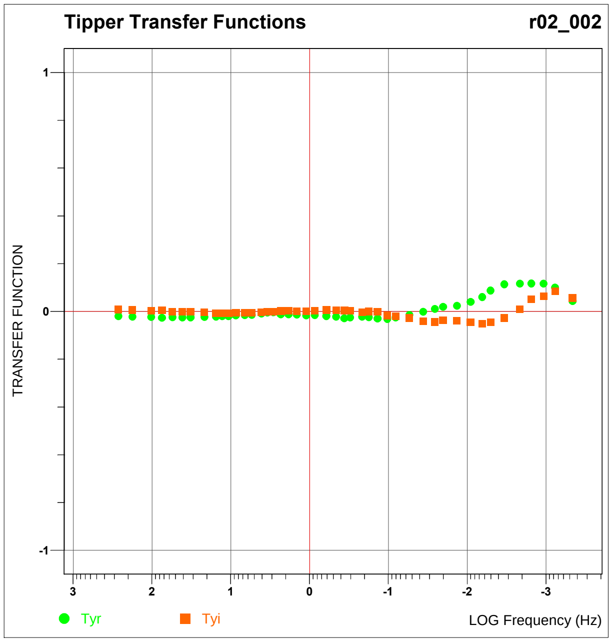
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.136SITE R02-002 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



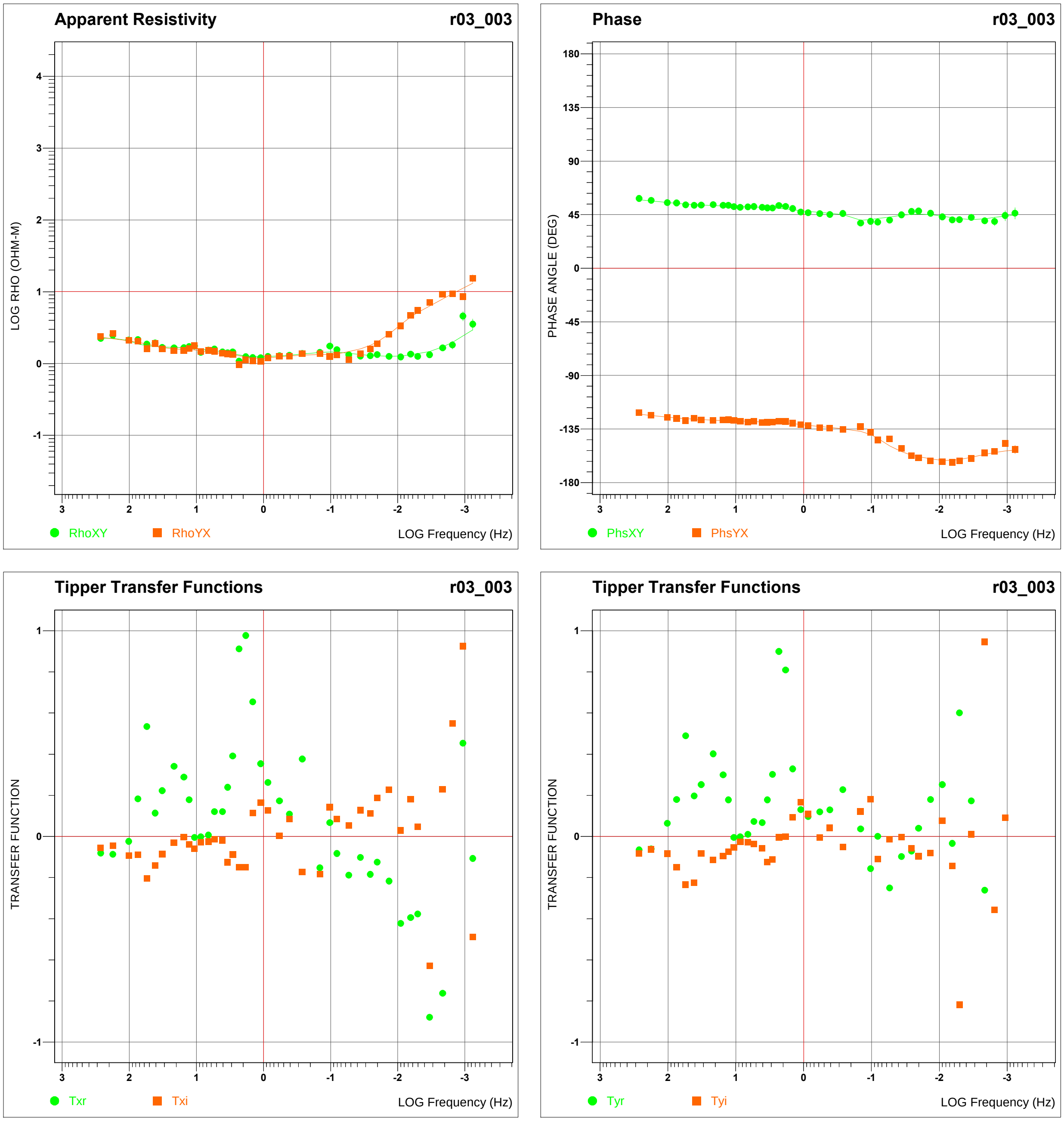






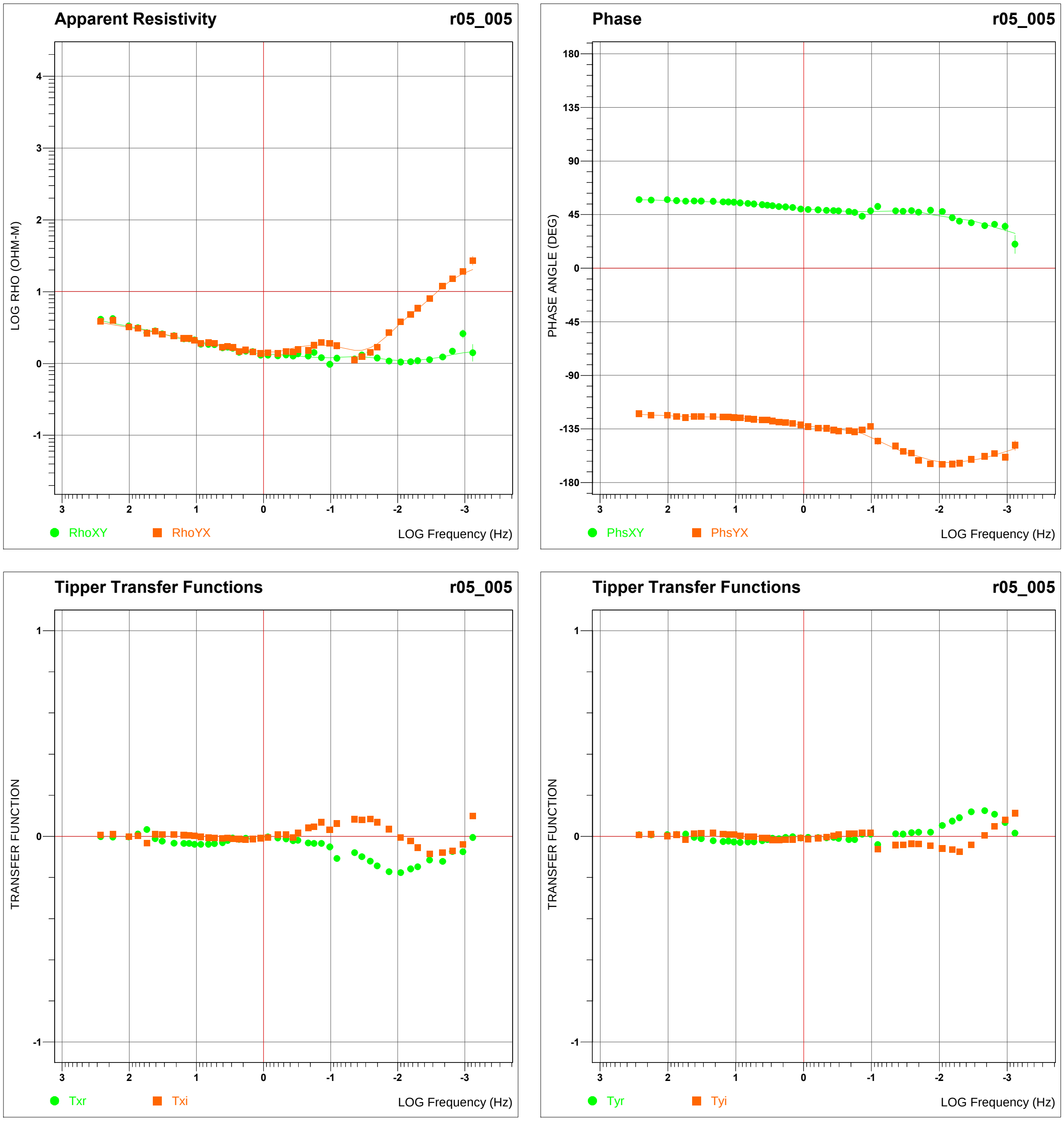
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.137 SITE R03-003 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



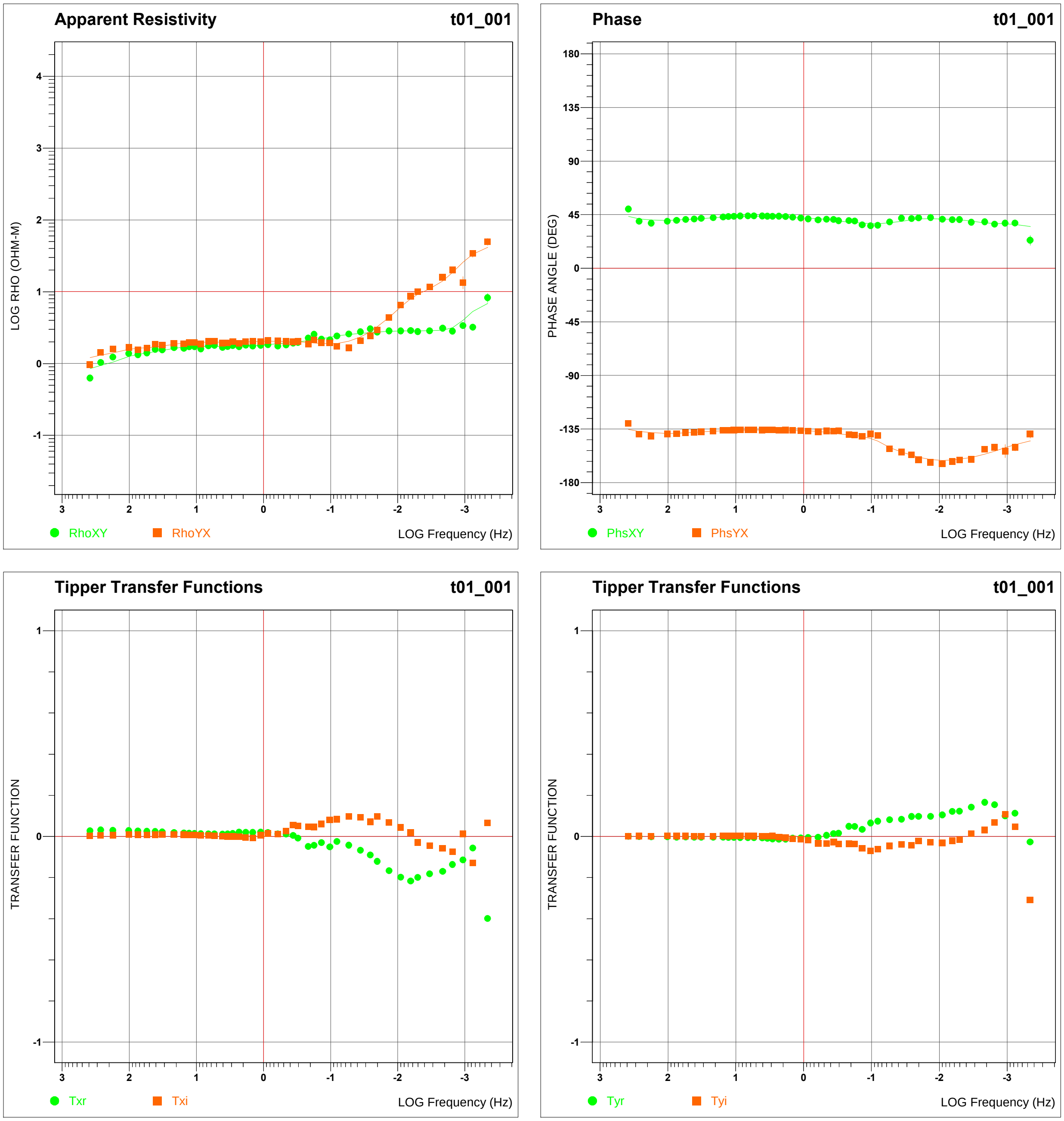
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.138 SITE R05-005 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



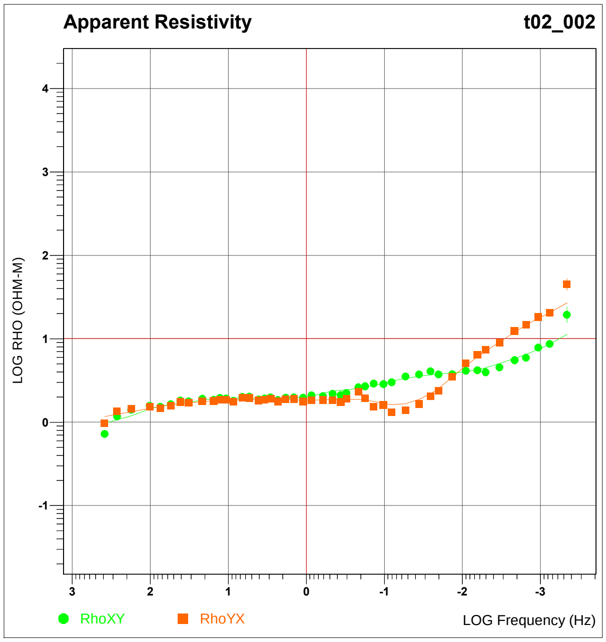
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

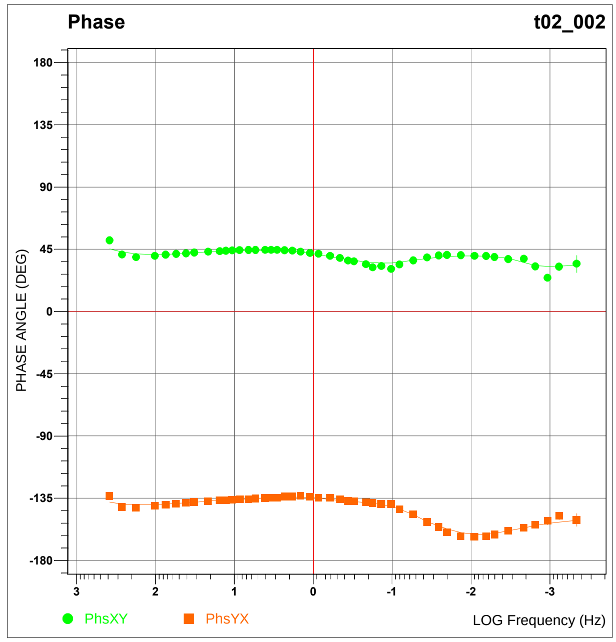
C.1.139 SITE T01-001 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY

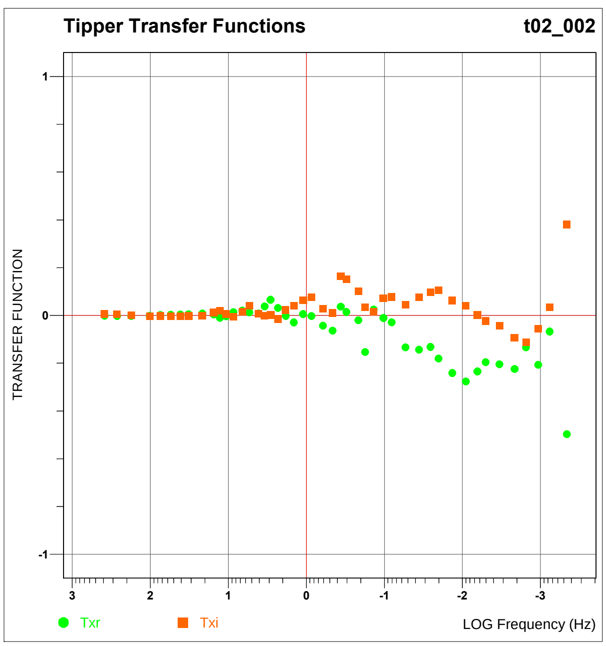


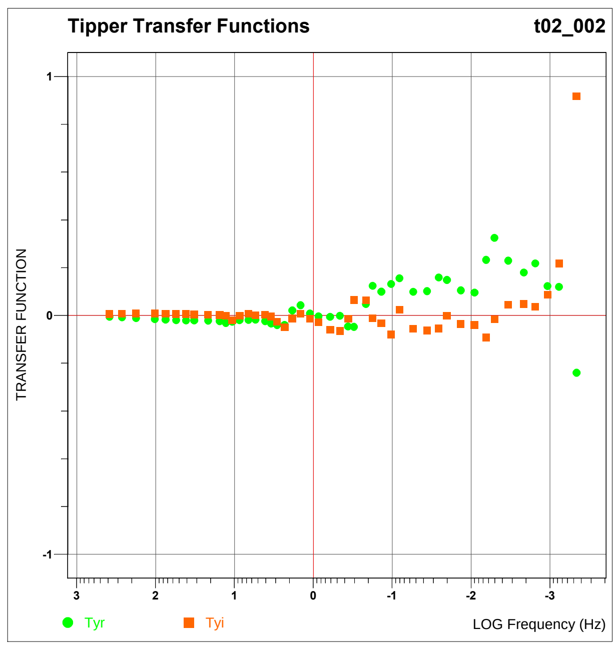
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.140SITE T02-002 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



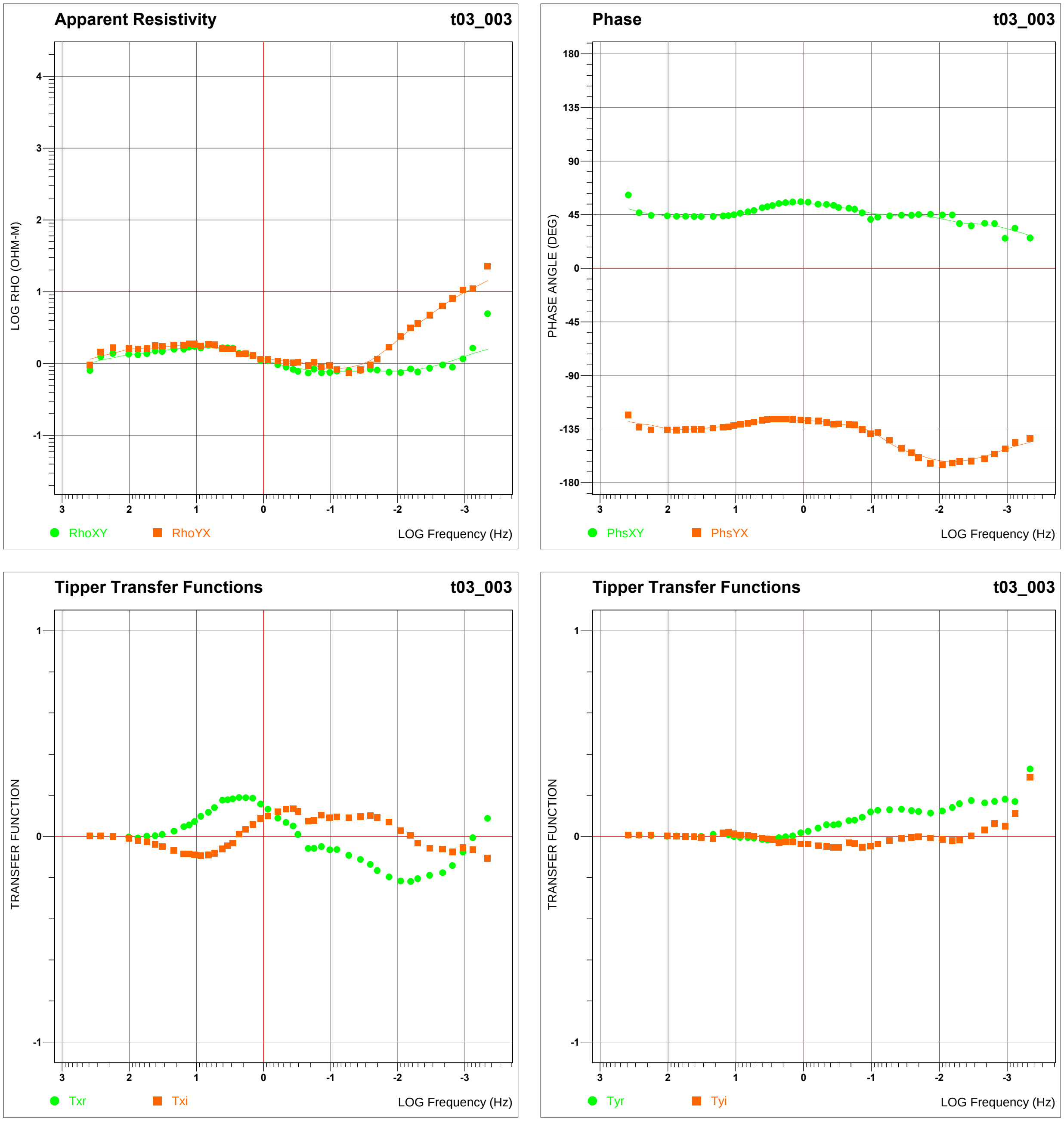






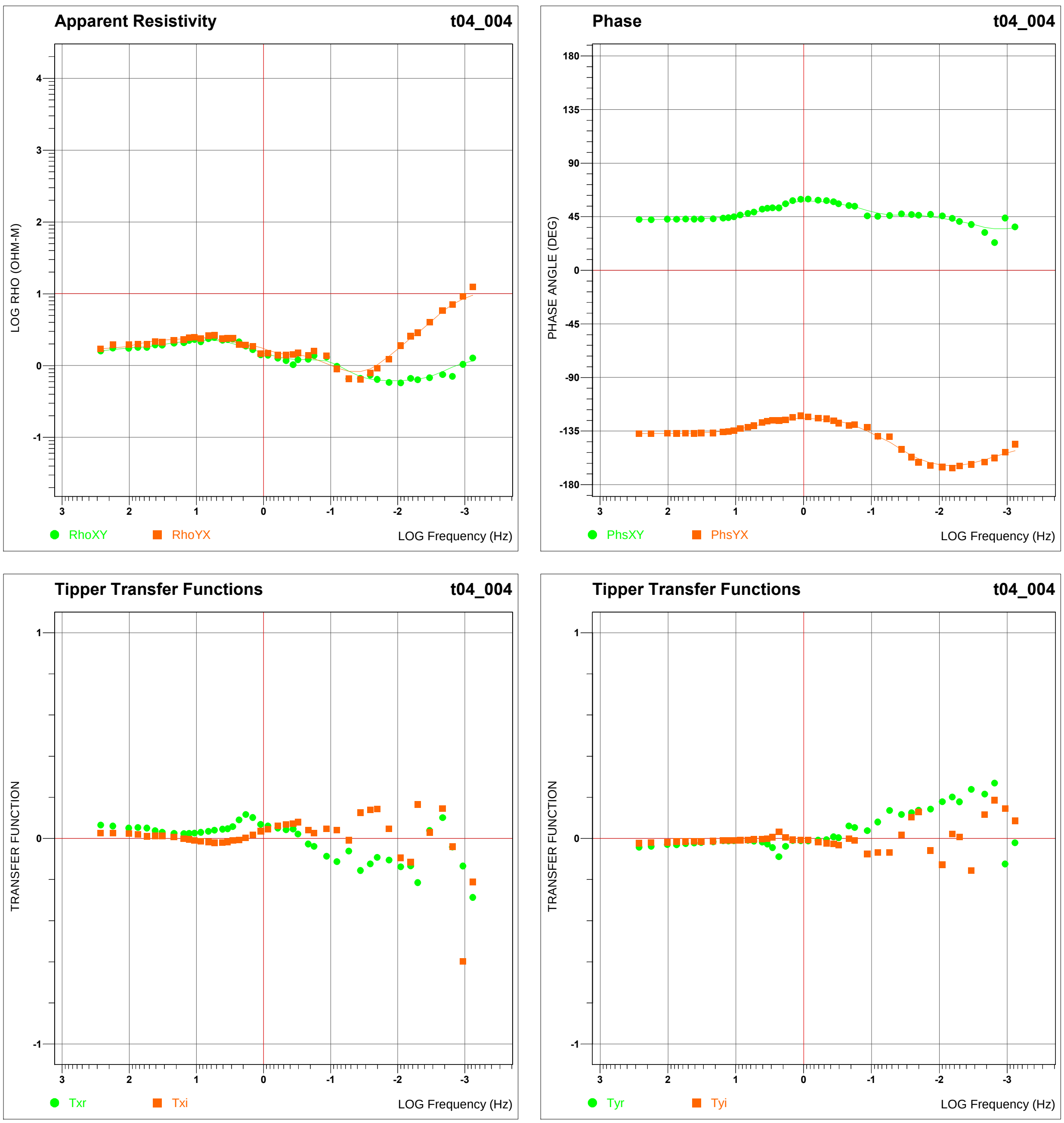
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.141 SITE T03-003 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.142 SITE T04-004 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



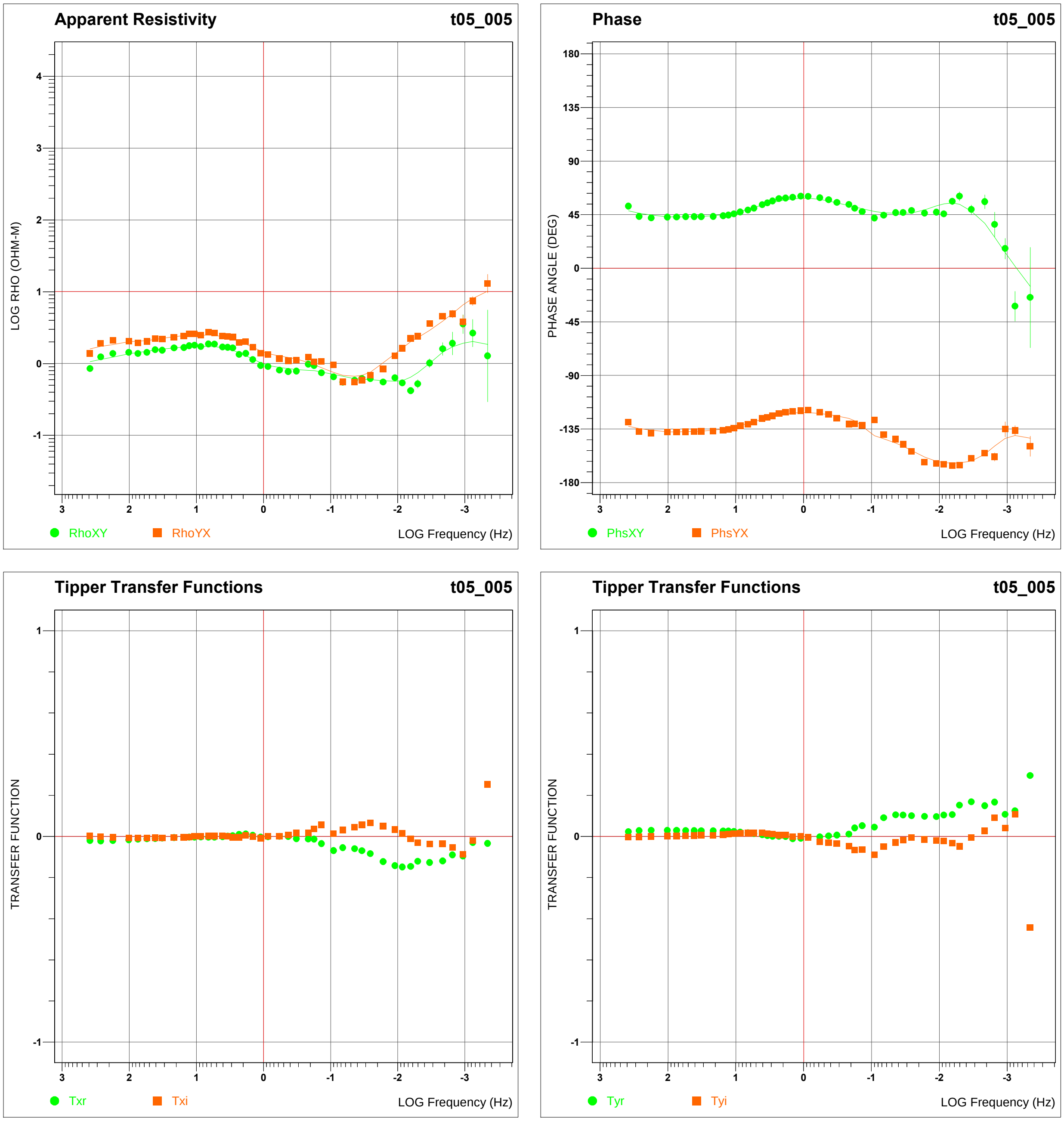
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X

(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

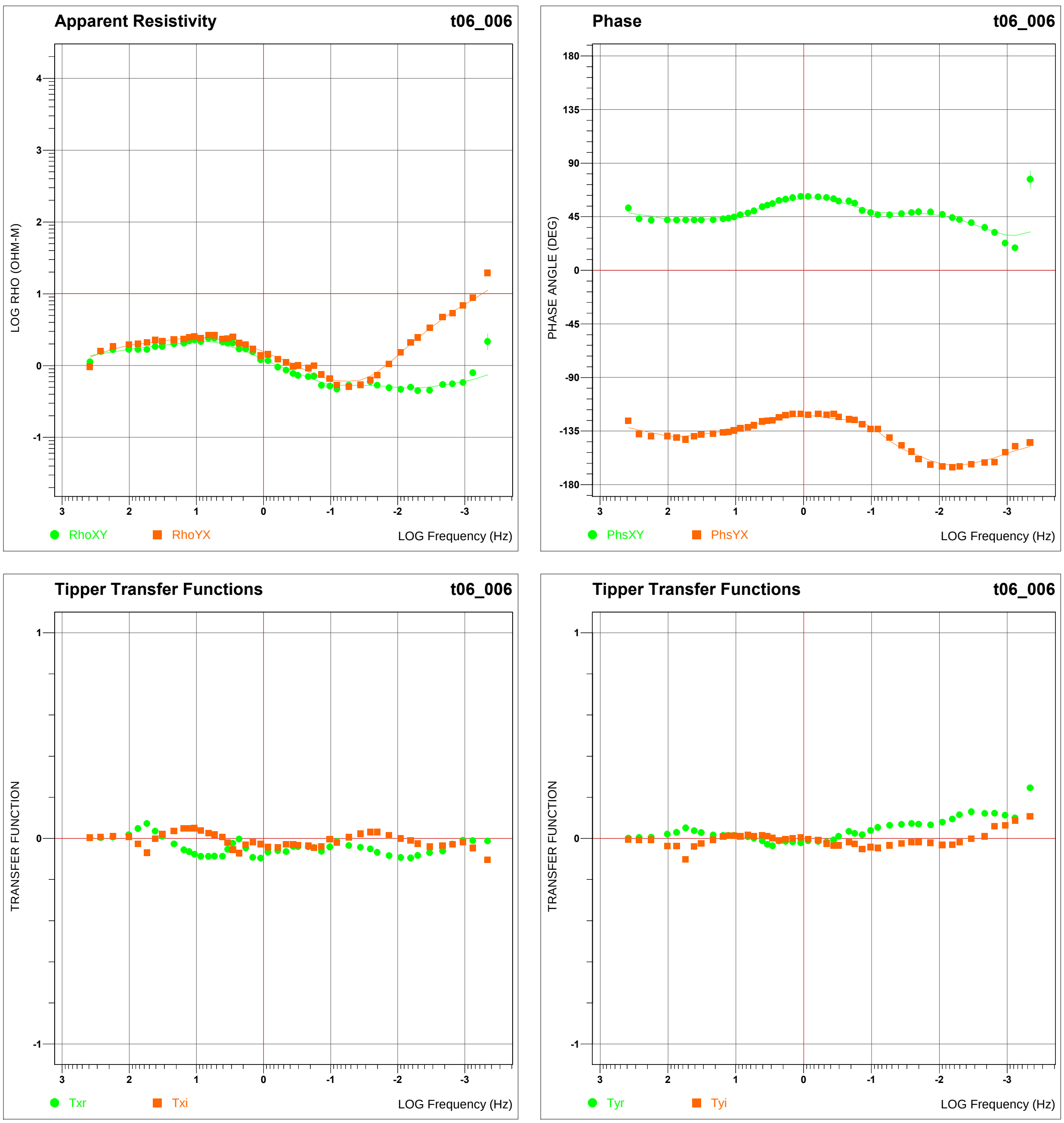
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.143 SITE T05-005 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



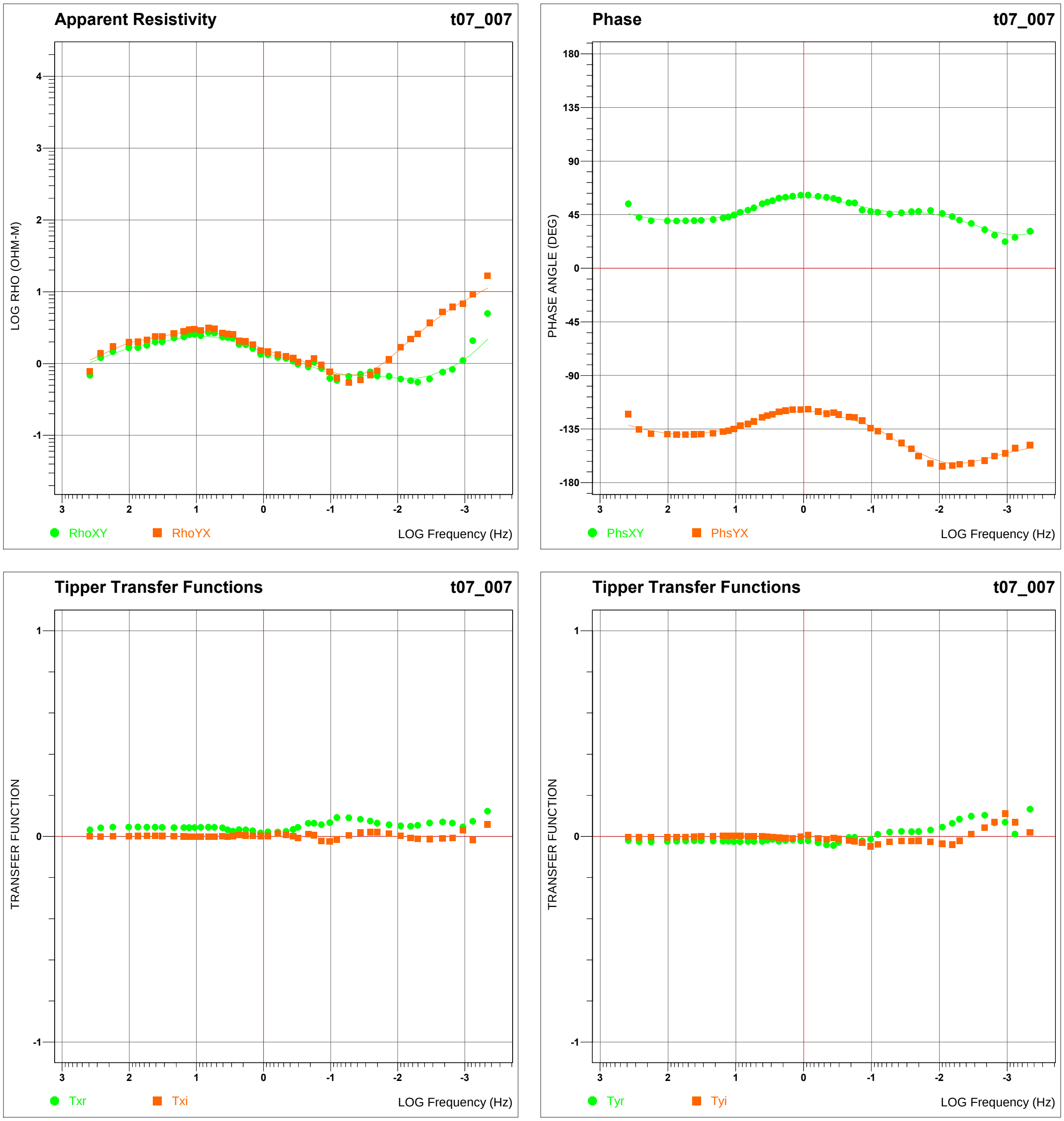
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.144 SITE T06-006 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.145 SITE T07-007 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



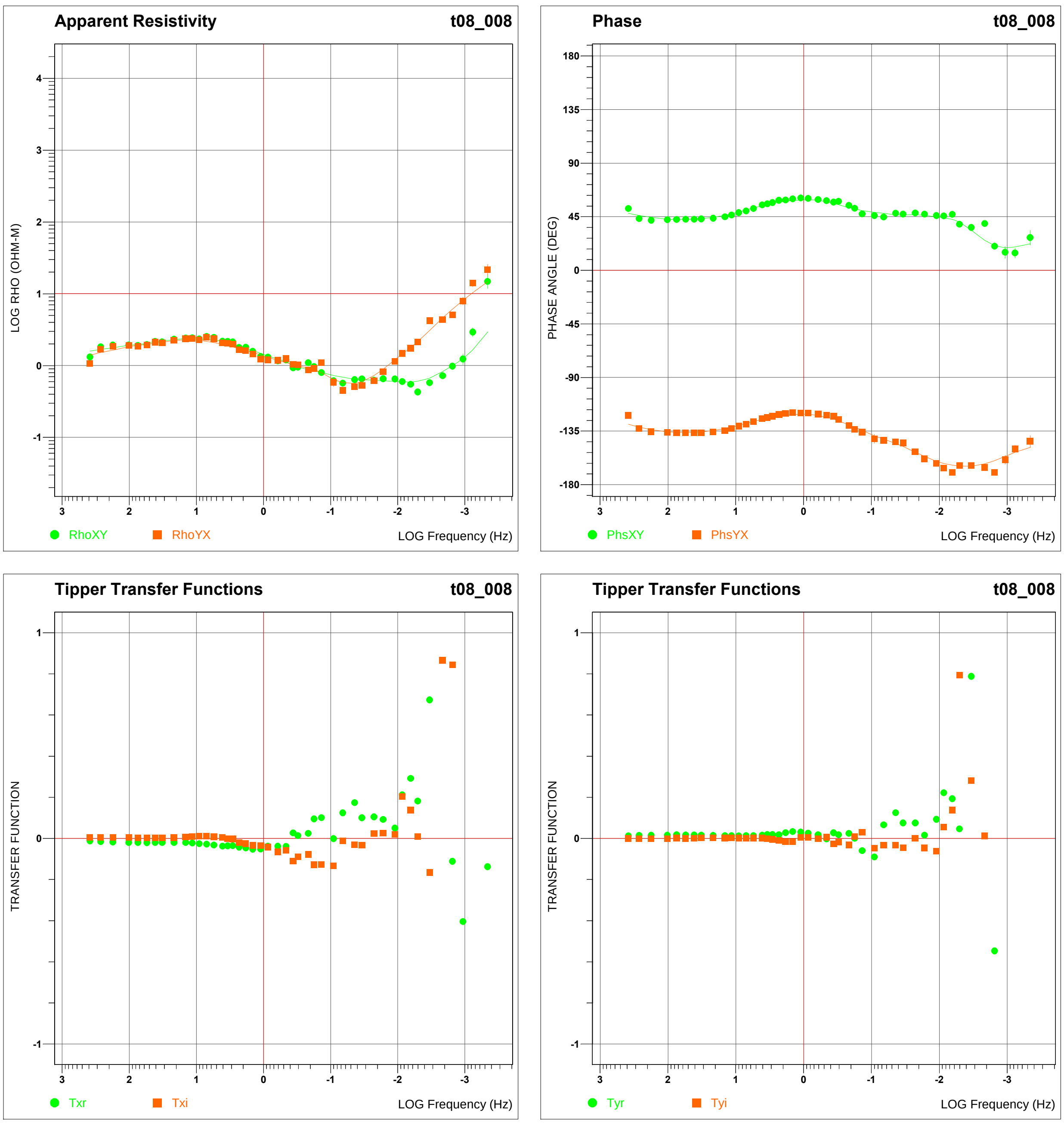
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X

(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

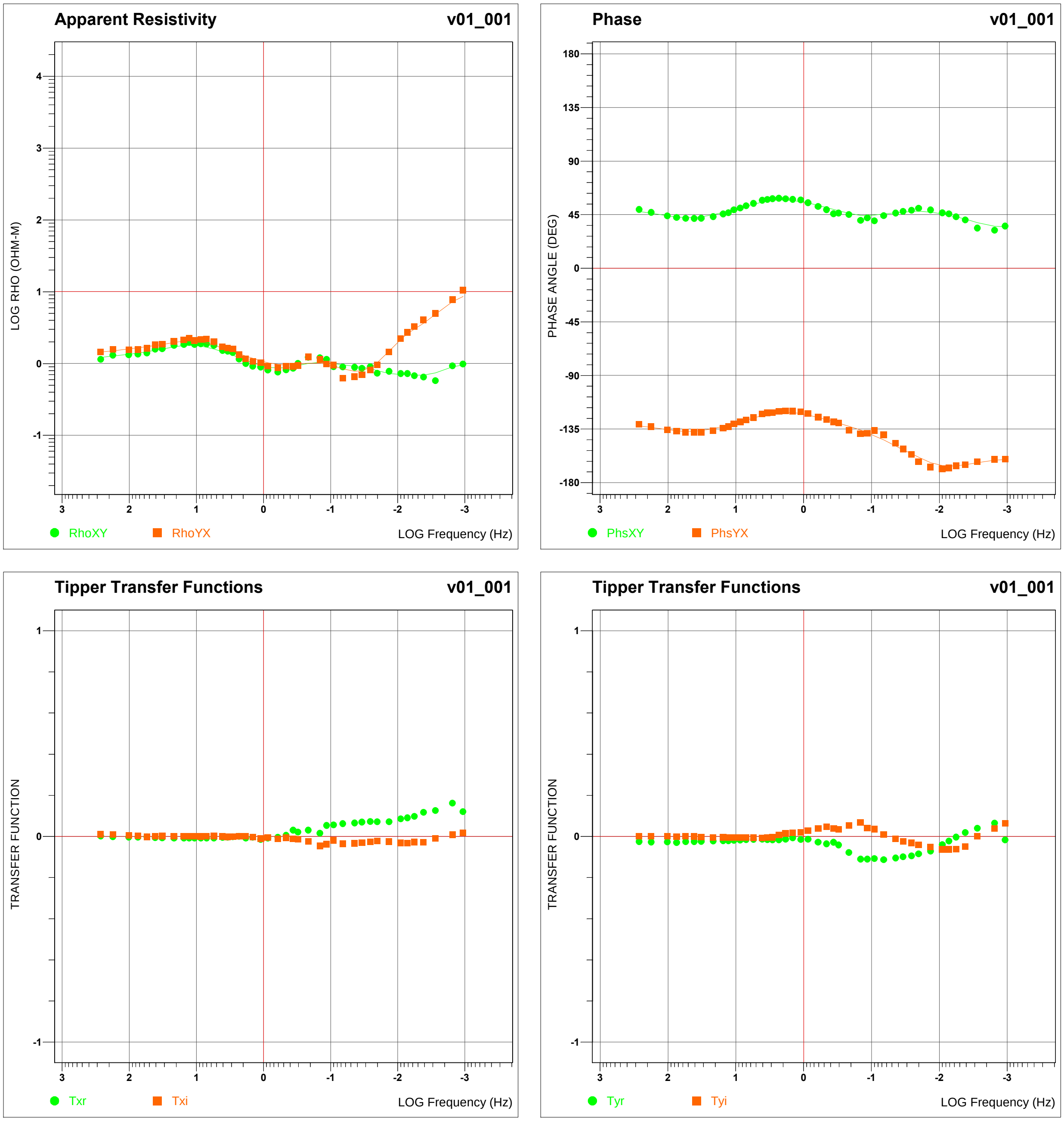
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.146 SITE T08-008 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

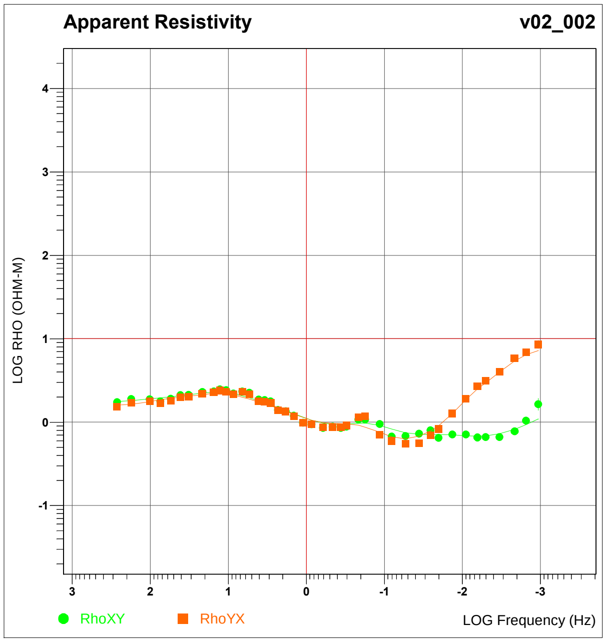
C.1.147 SITE V01-001 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY

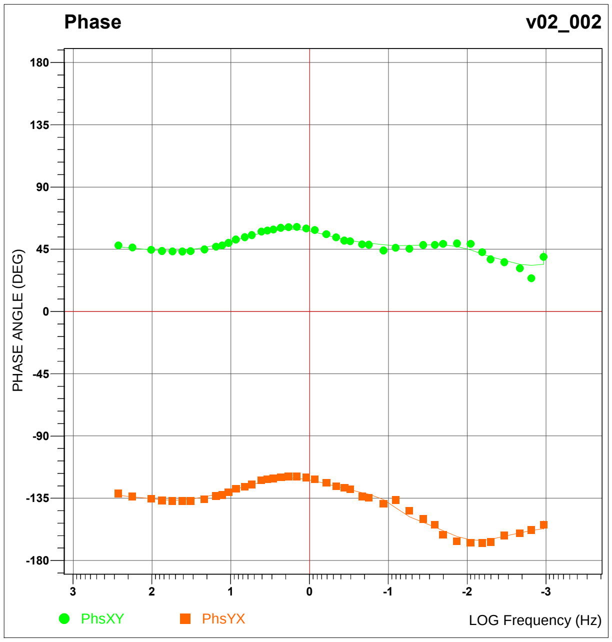


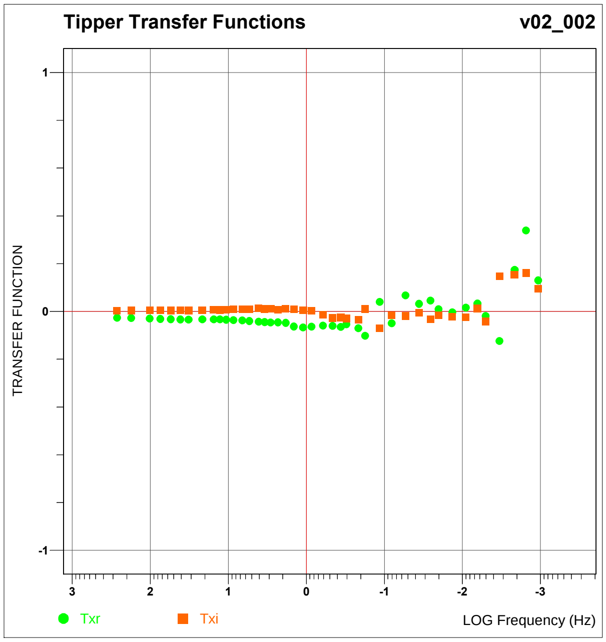
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

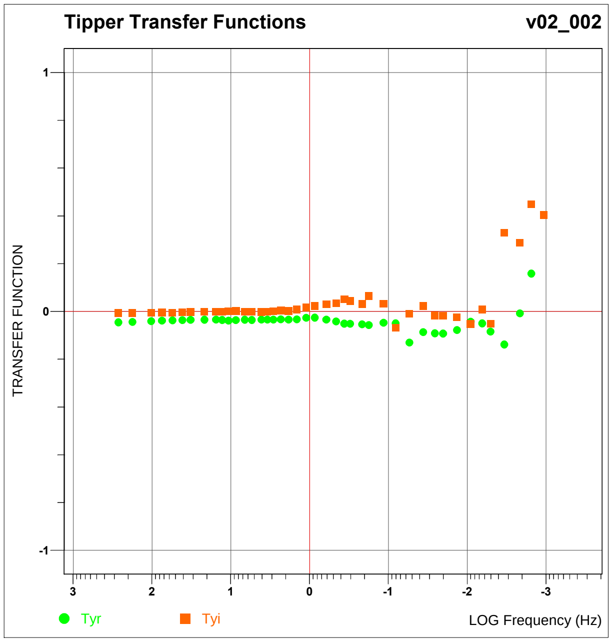
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.148 SITE V02-002 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



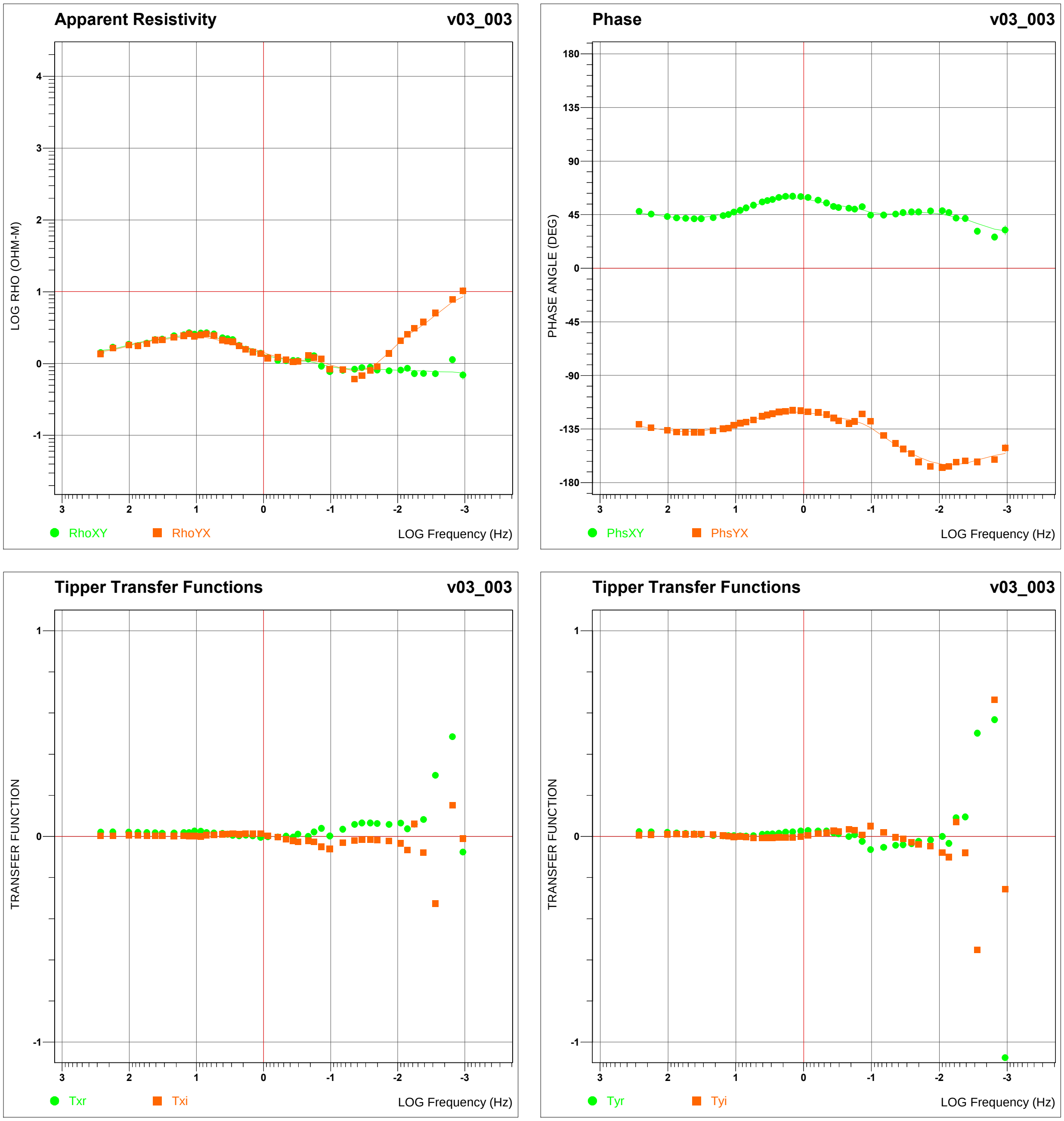






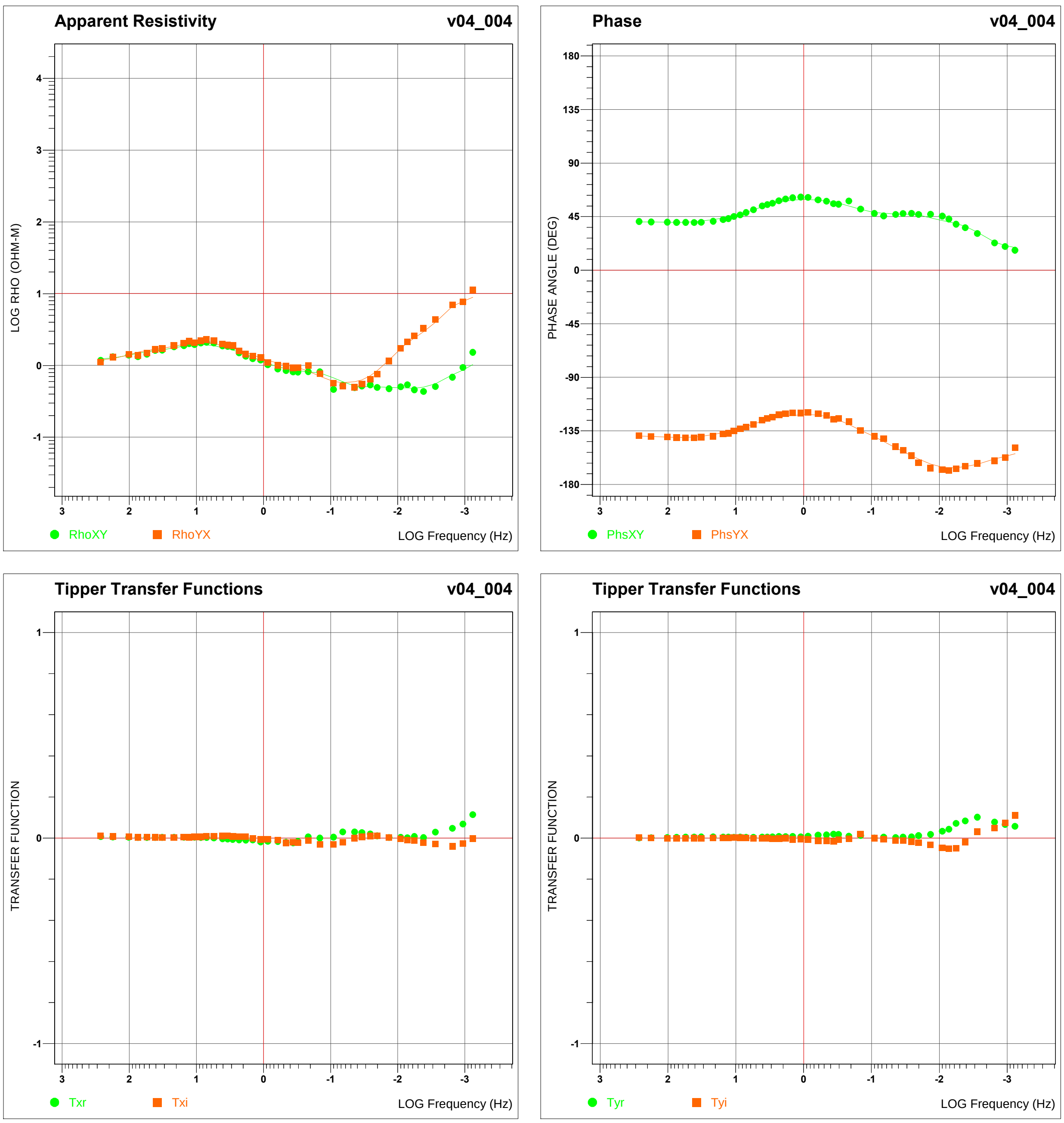
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.149 SITE V03-003 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



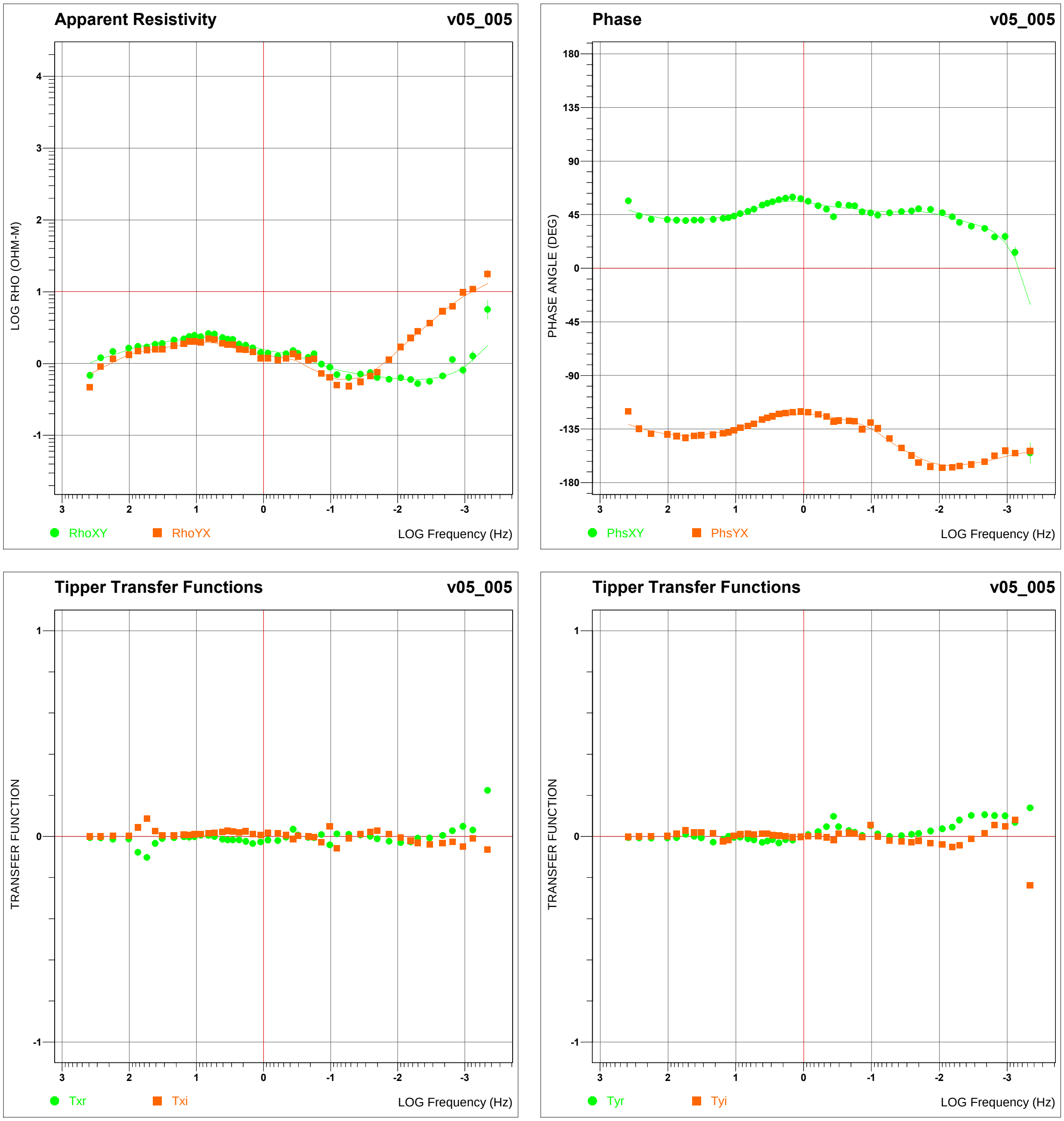
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.150SITE V04-004 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



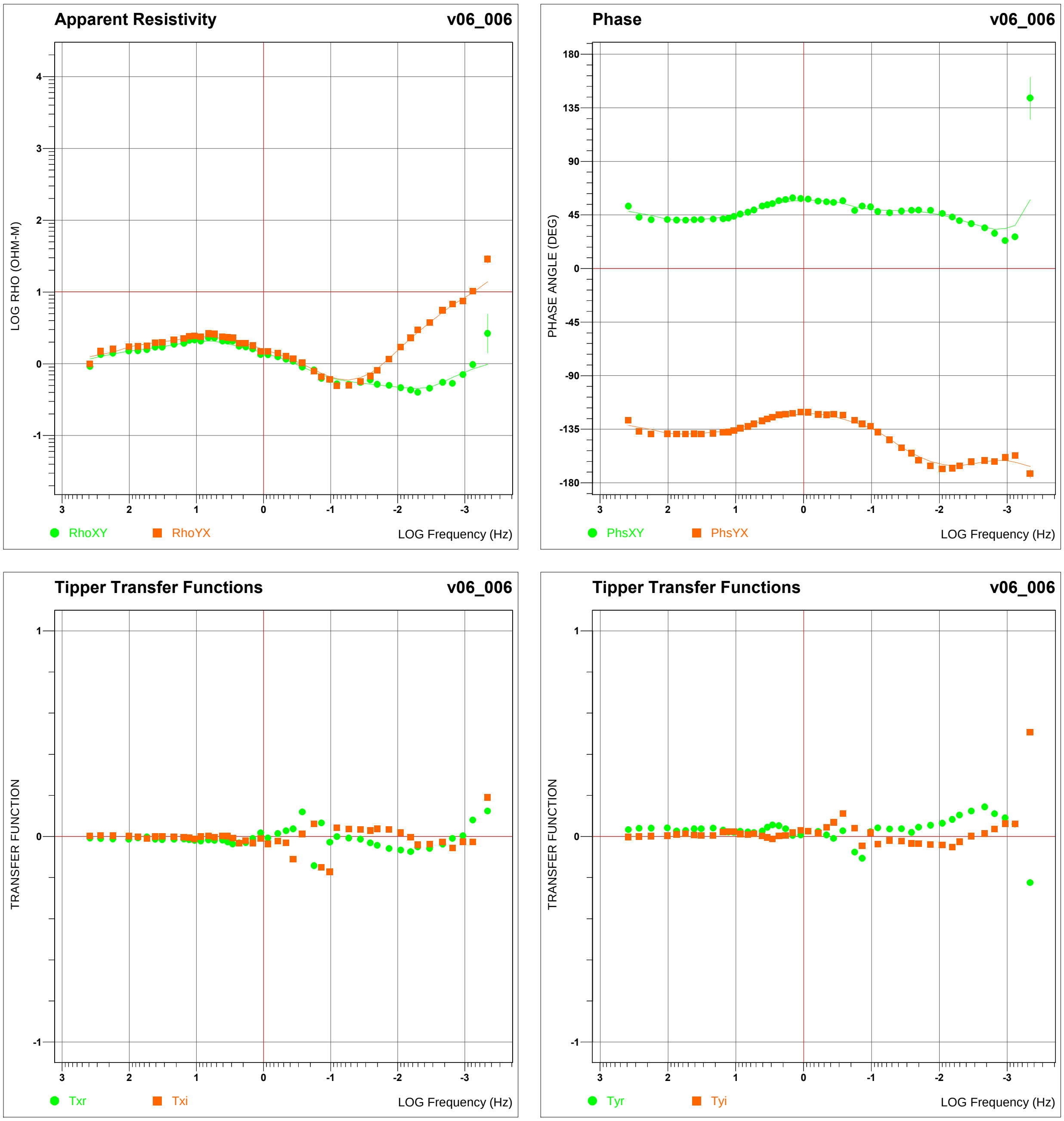
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.151 SITE V05-005 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.152 SITE V06-006 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



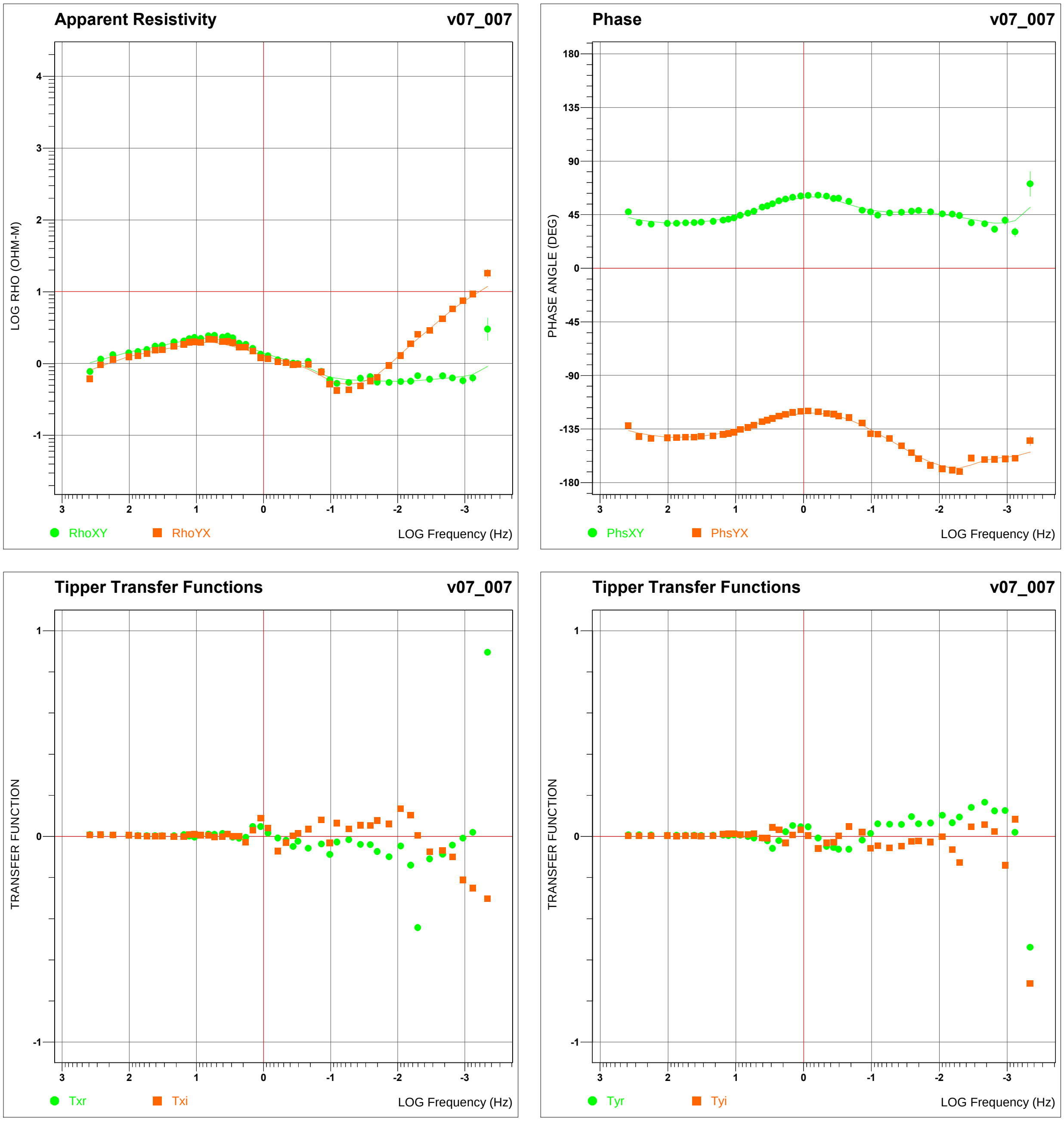
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X

(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.153 SITE V07-007 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



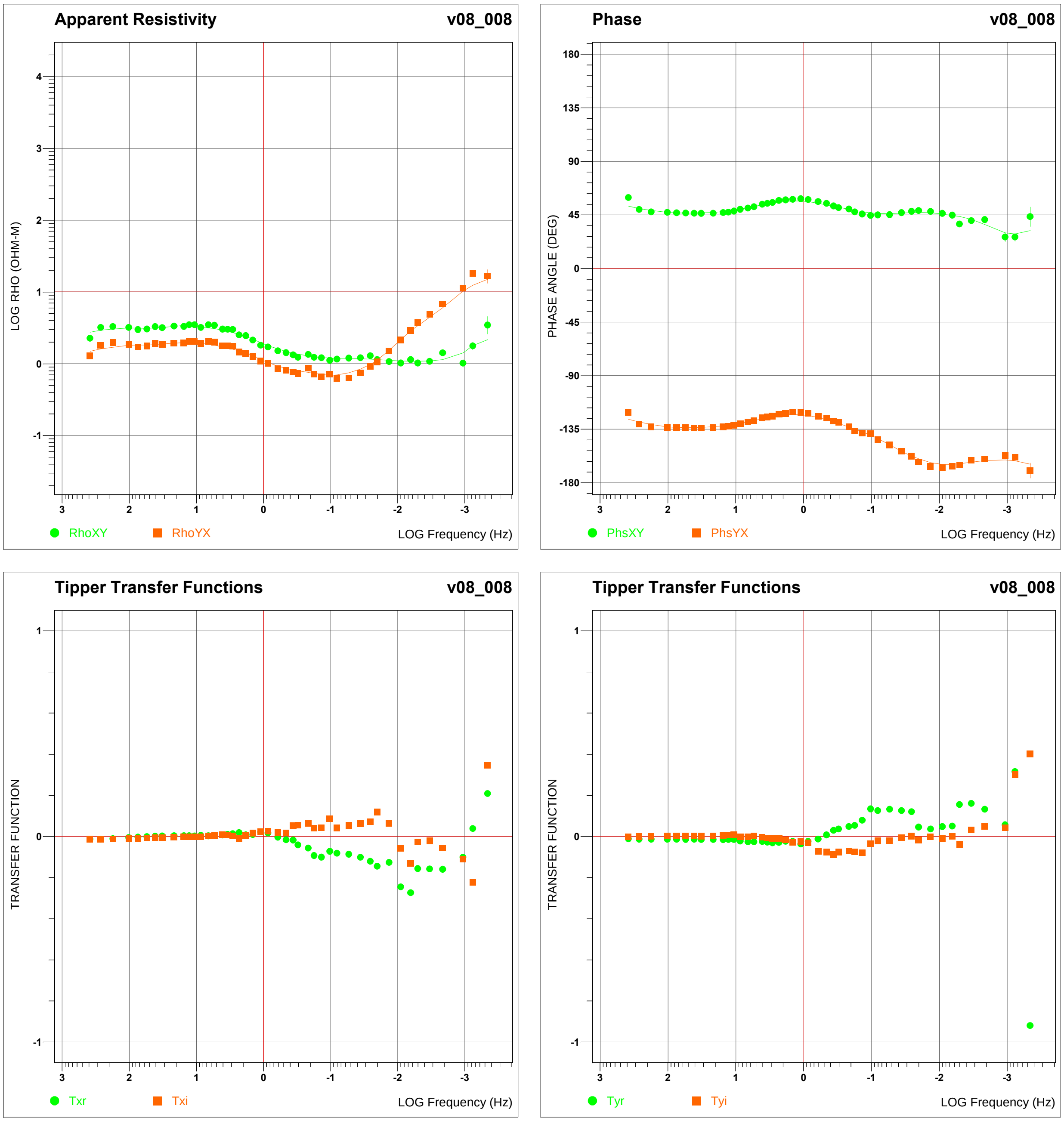
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X

(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

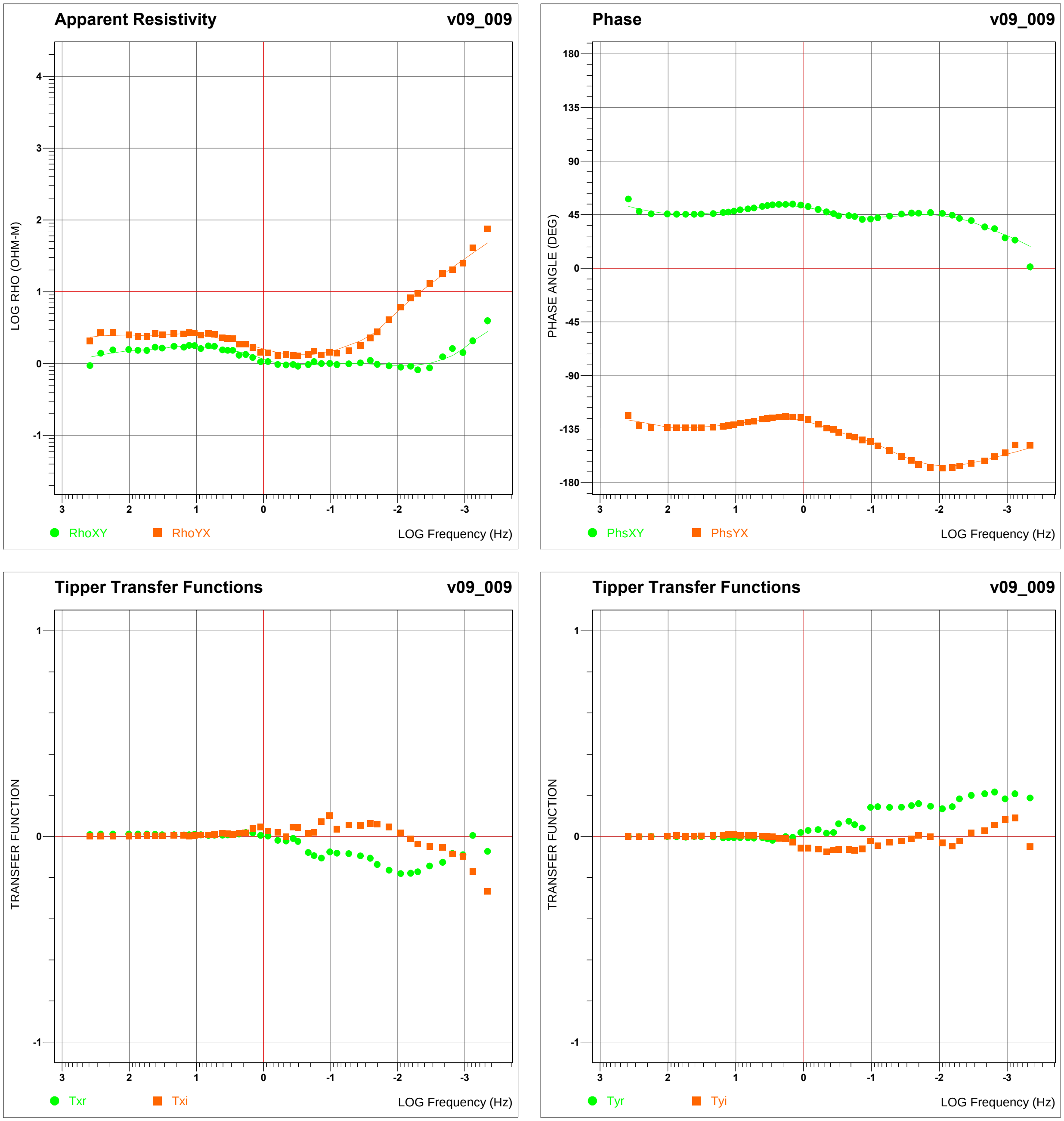
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.154SITE V08-008 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.155 SITE V09-009 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



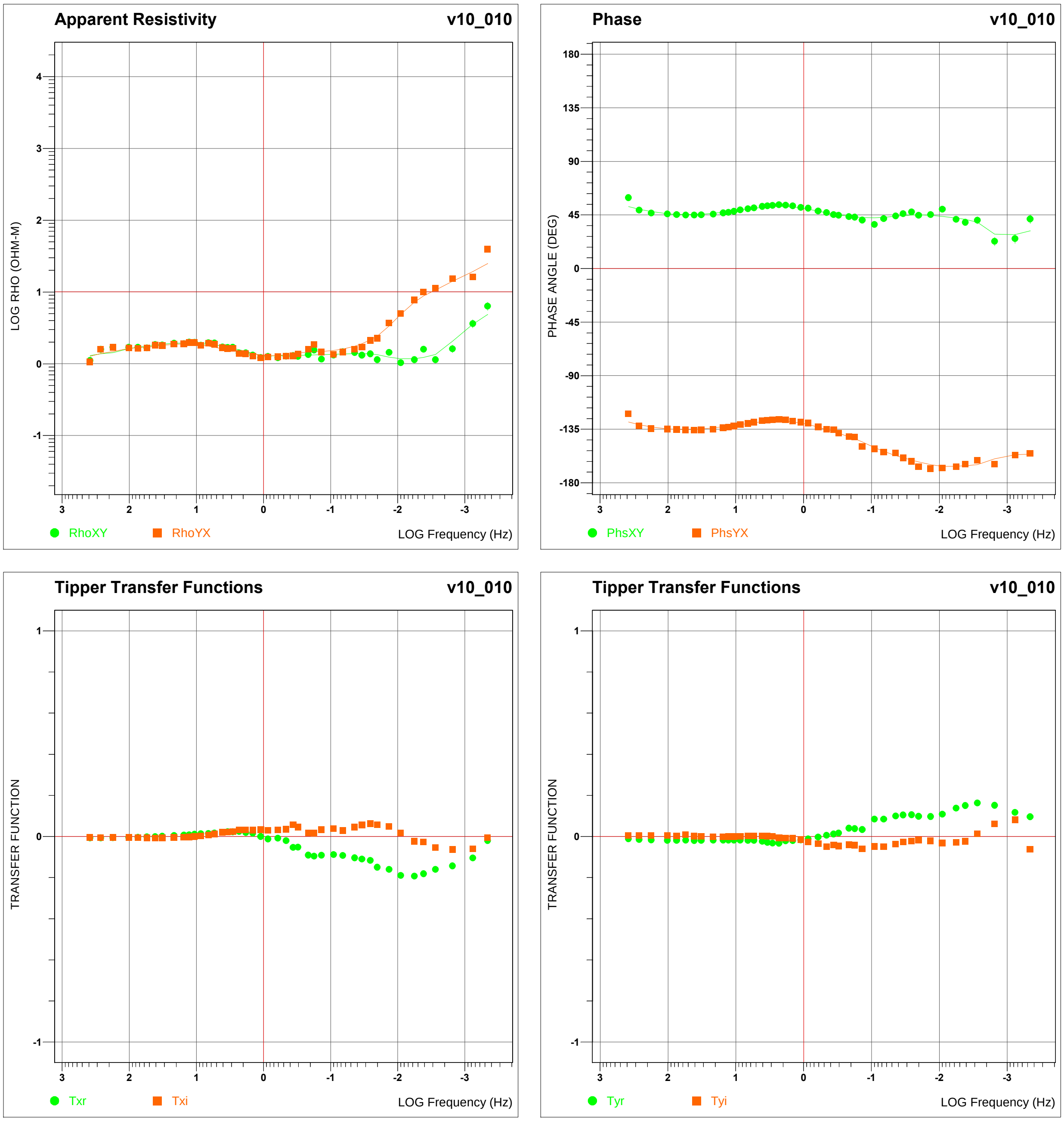
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X

(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.156SITE V10-010 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



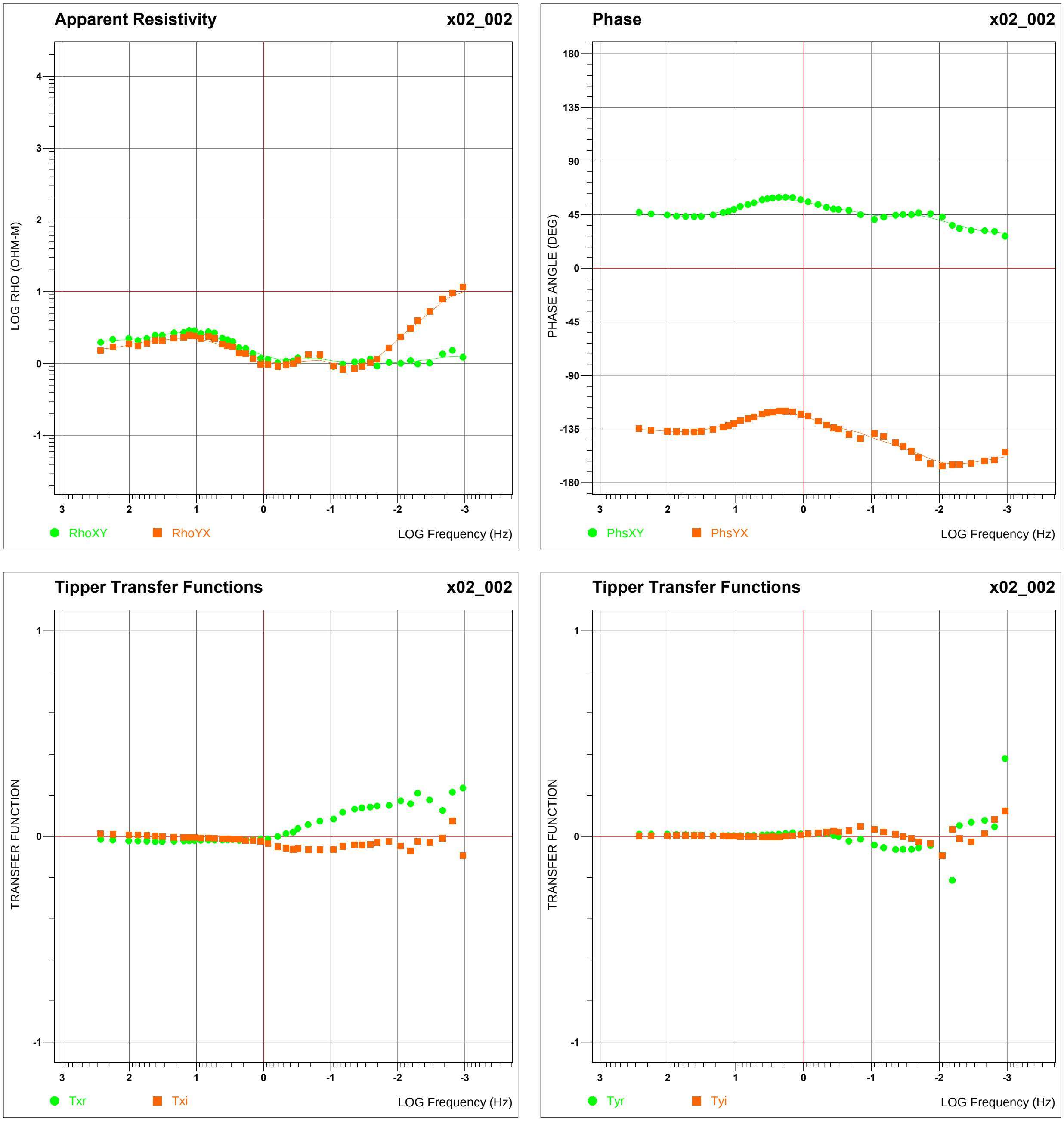
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X

(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

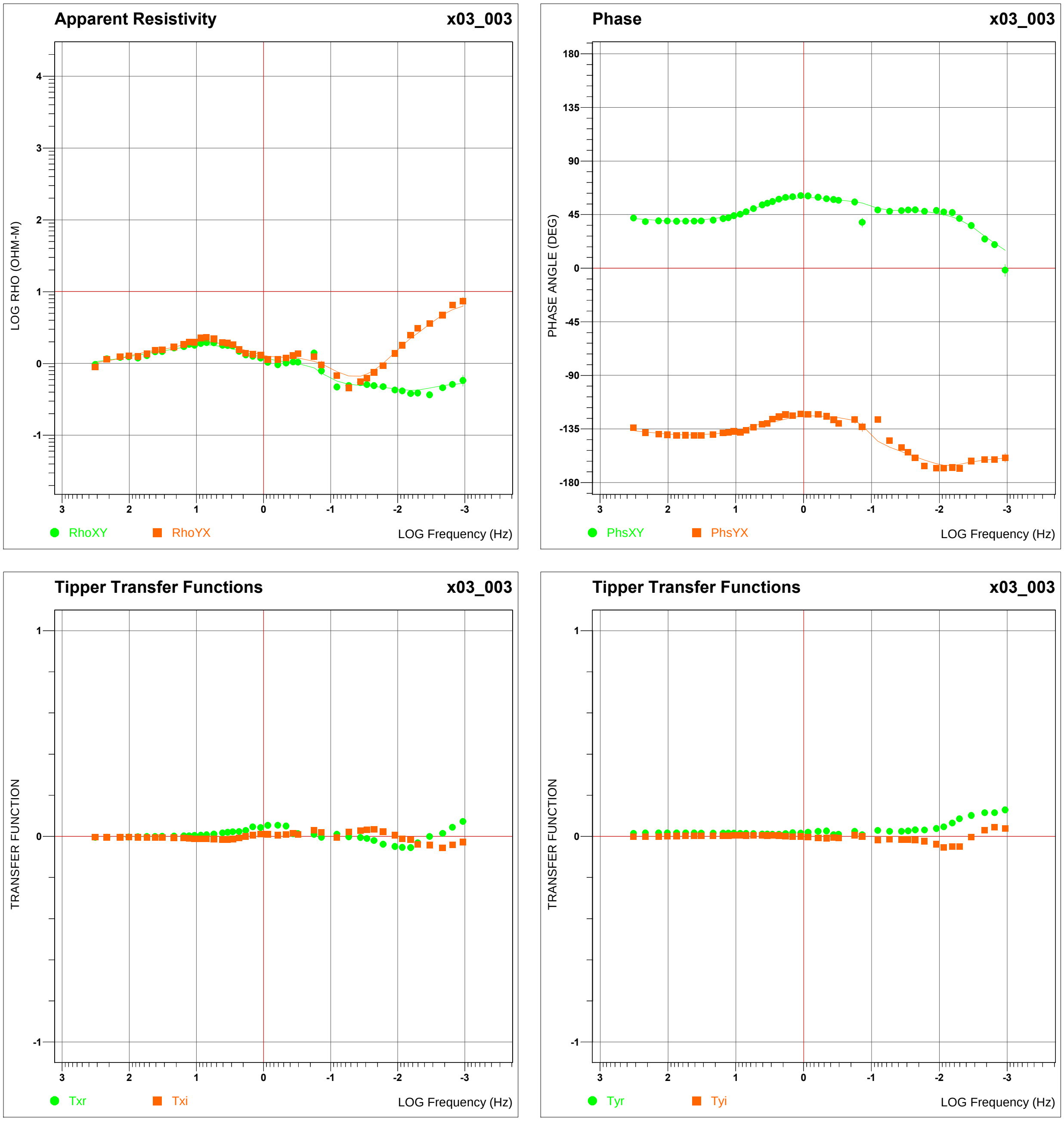
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.157 SITE X02-002 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



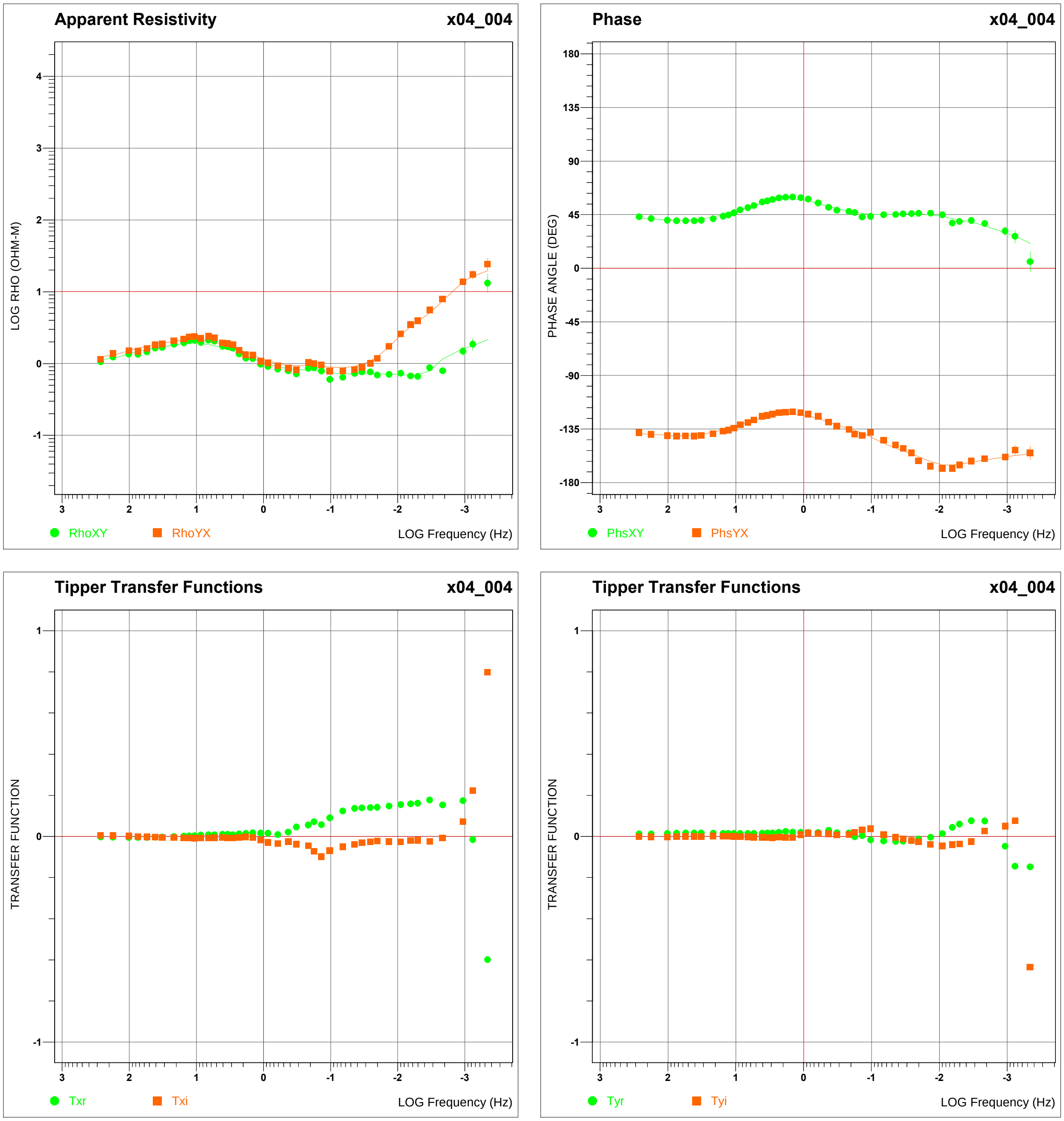
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.158 SITE X03-003 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.159 SITE X04-004 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



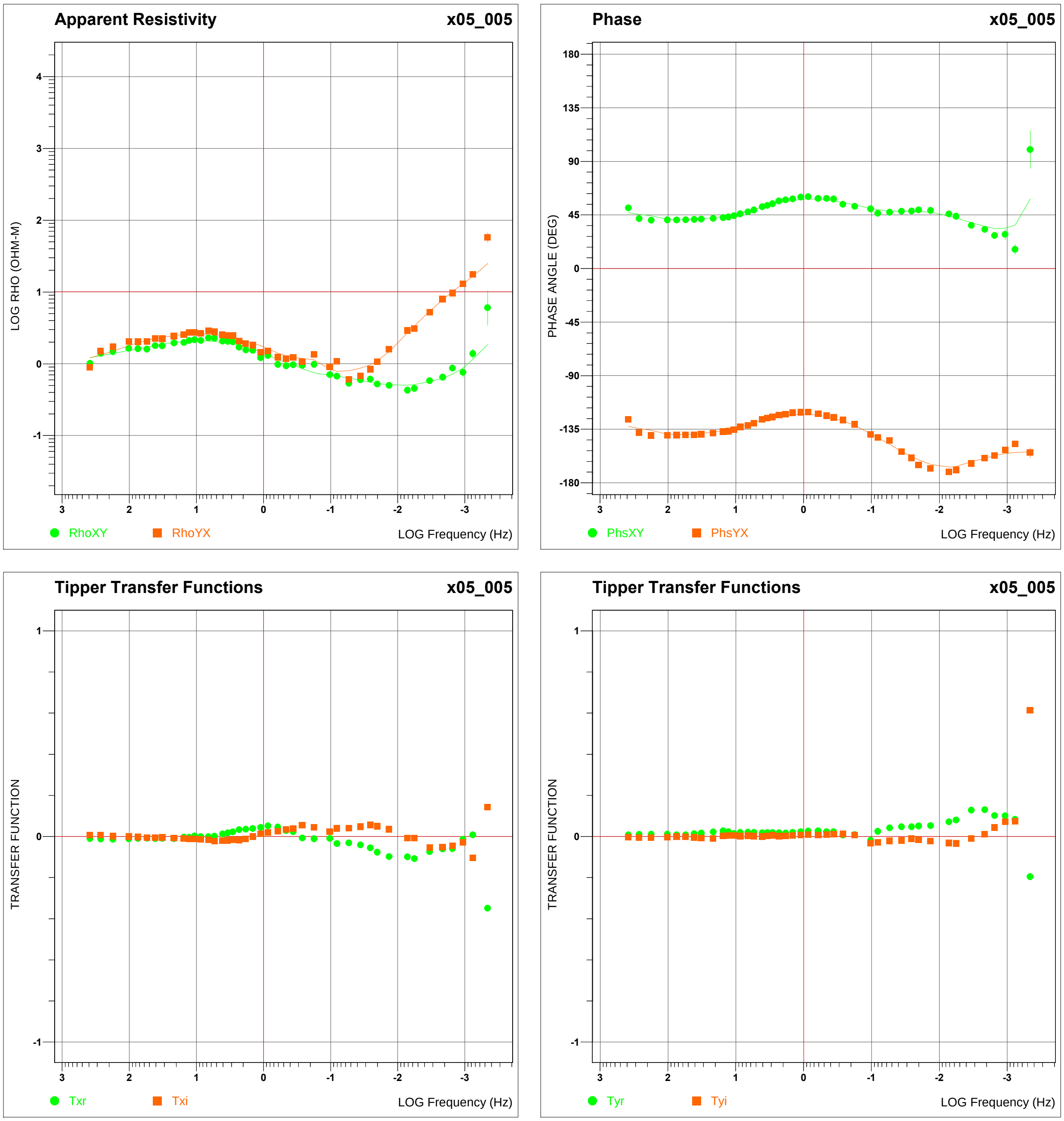
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X

(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.160SITE X05-005 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



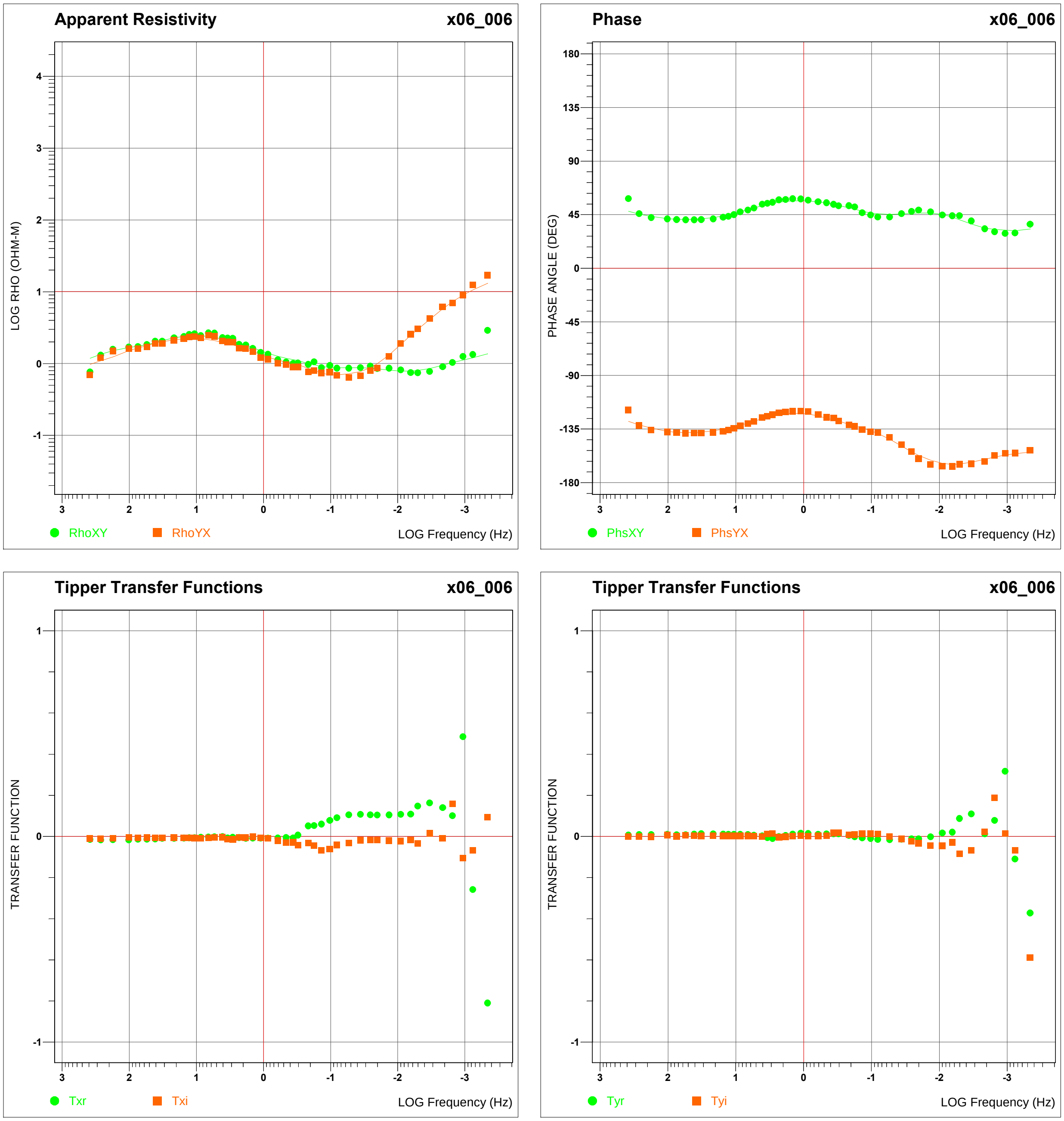
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X

(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

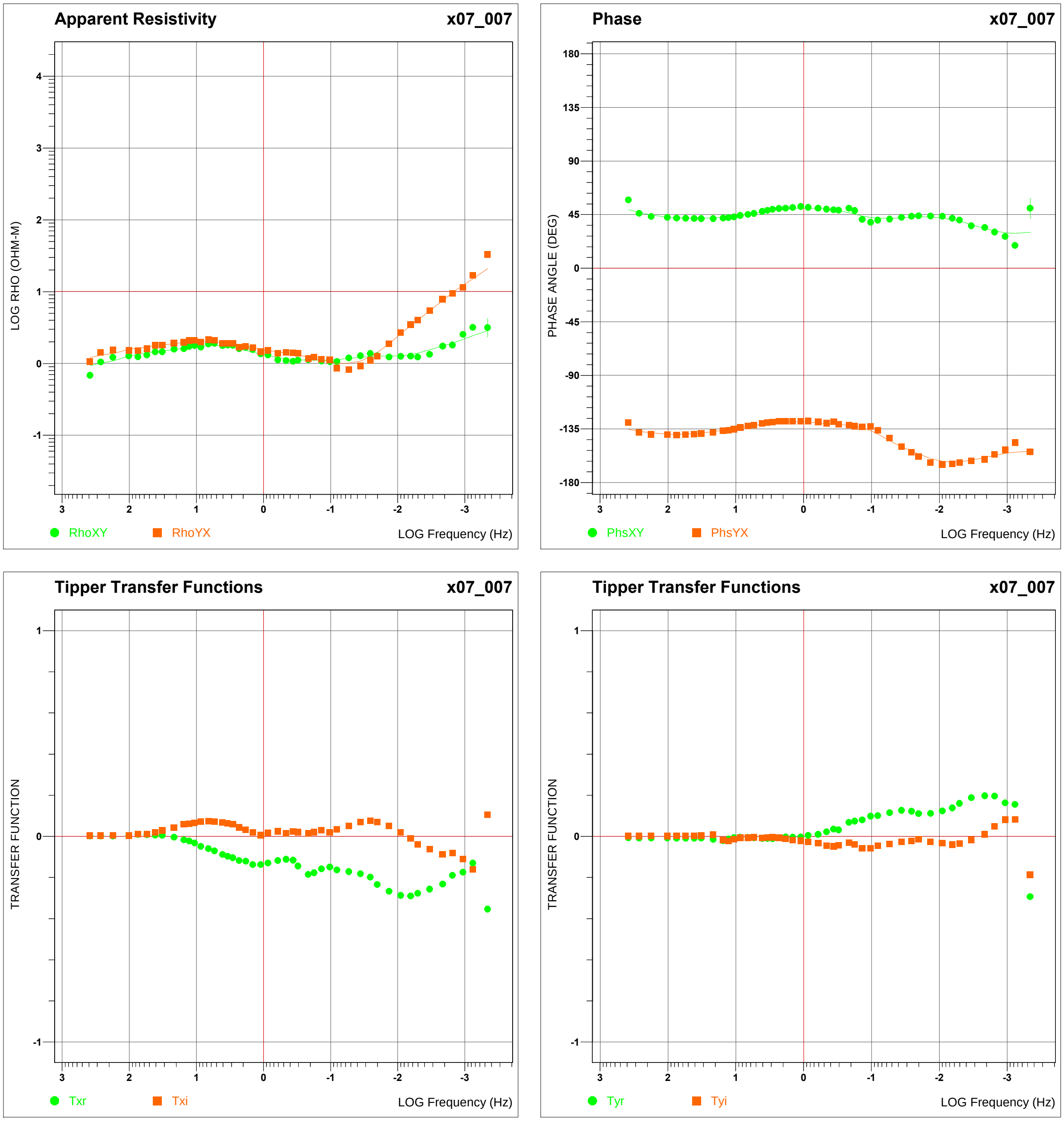
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.161 SITE X06-006 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.162 SITE X07-007 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



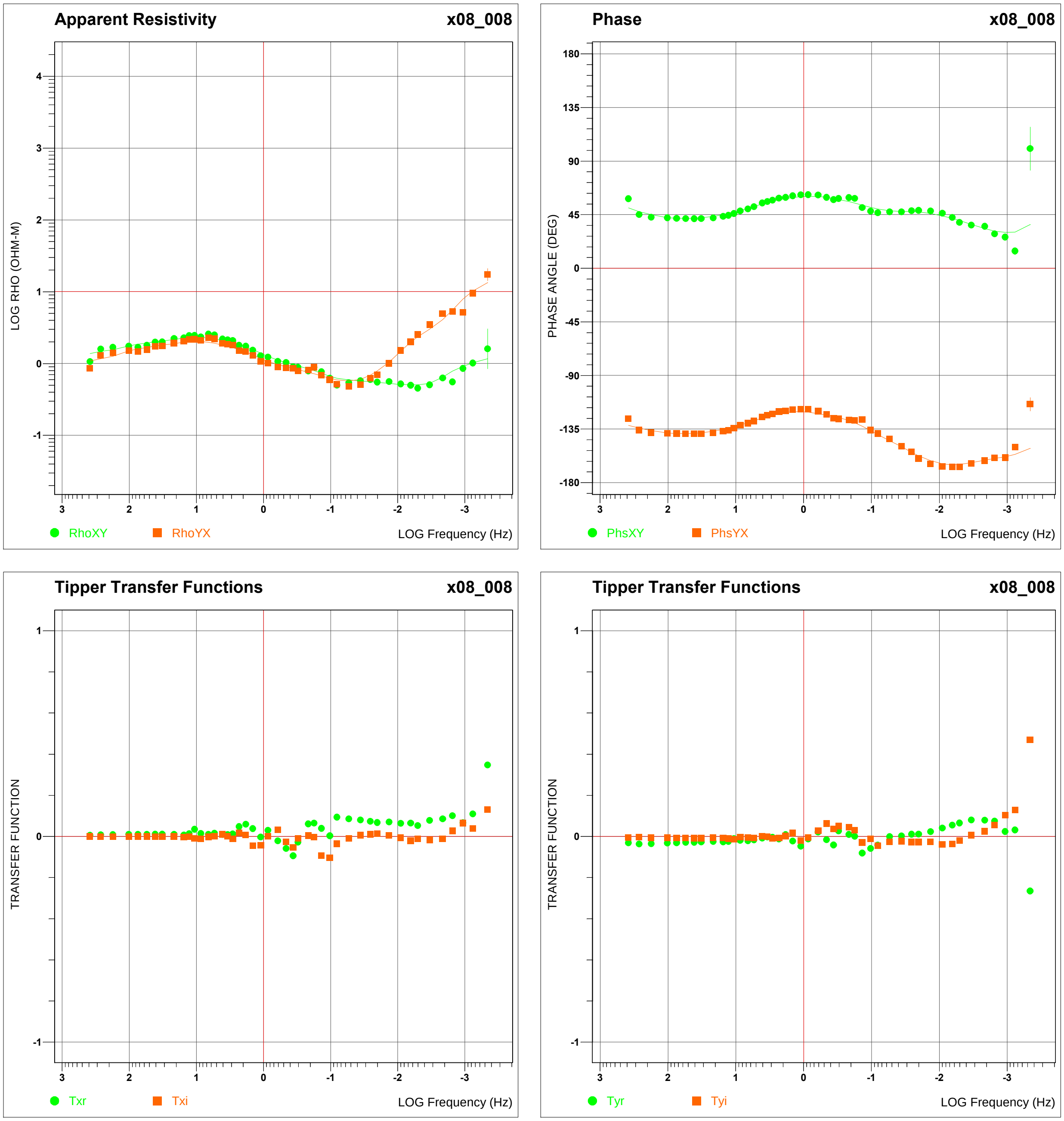
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X

(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

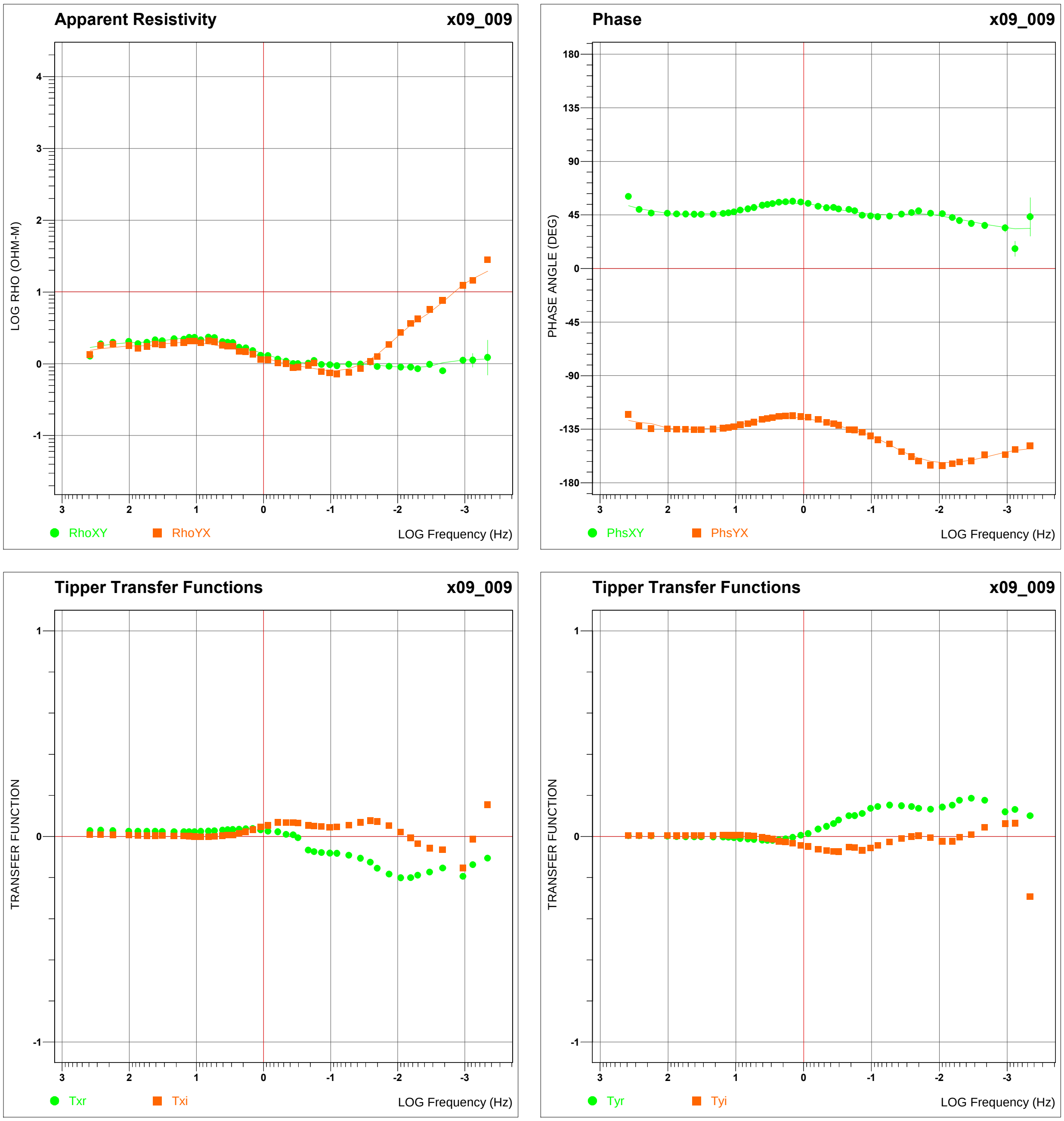
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.163 SITE X08-008 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



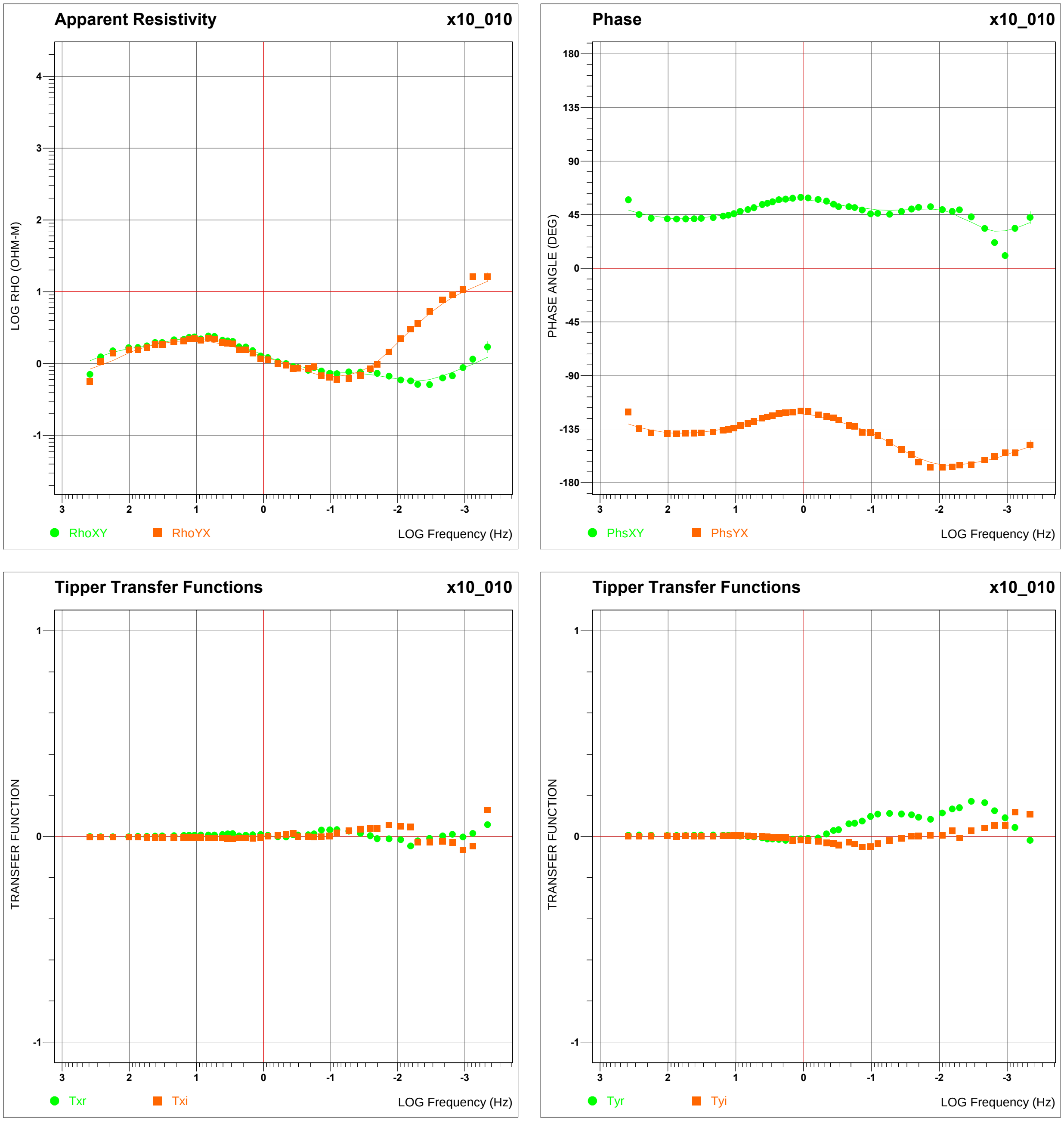
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.164SITE X09-009 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



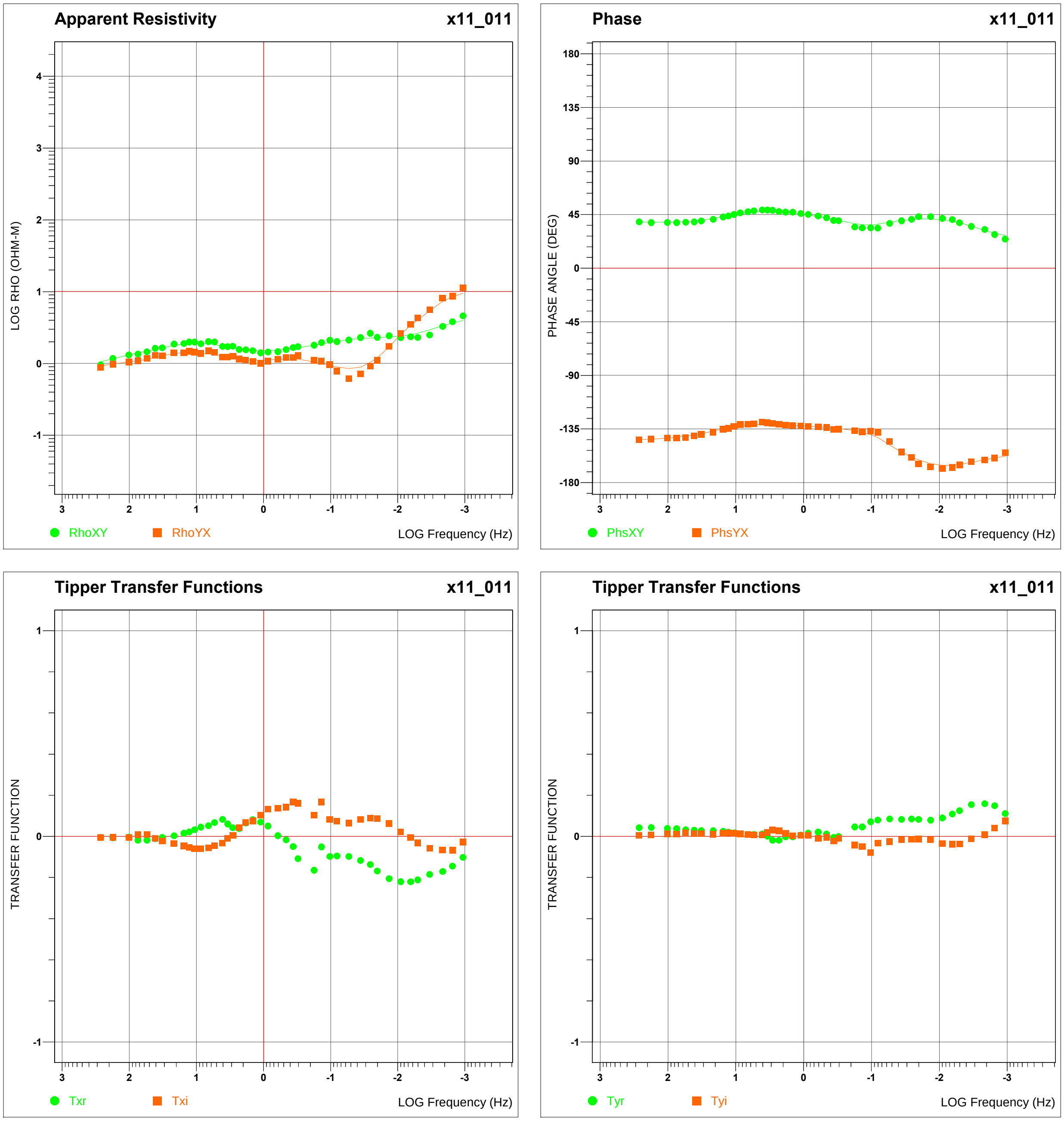
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.165 SITE X10-010 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.166SITE X11-011 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



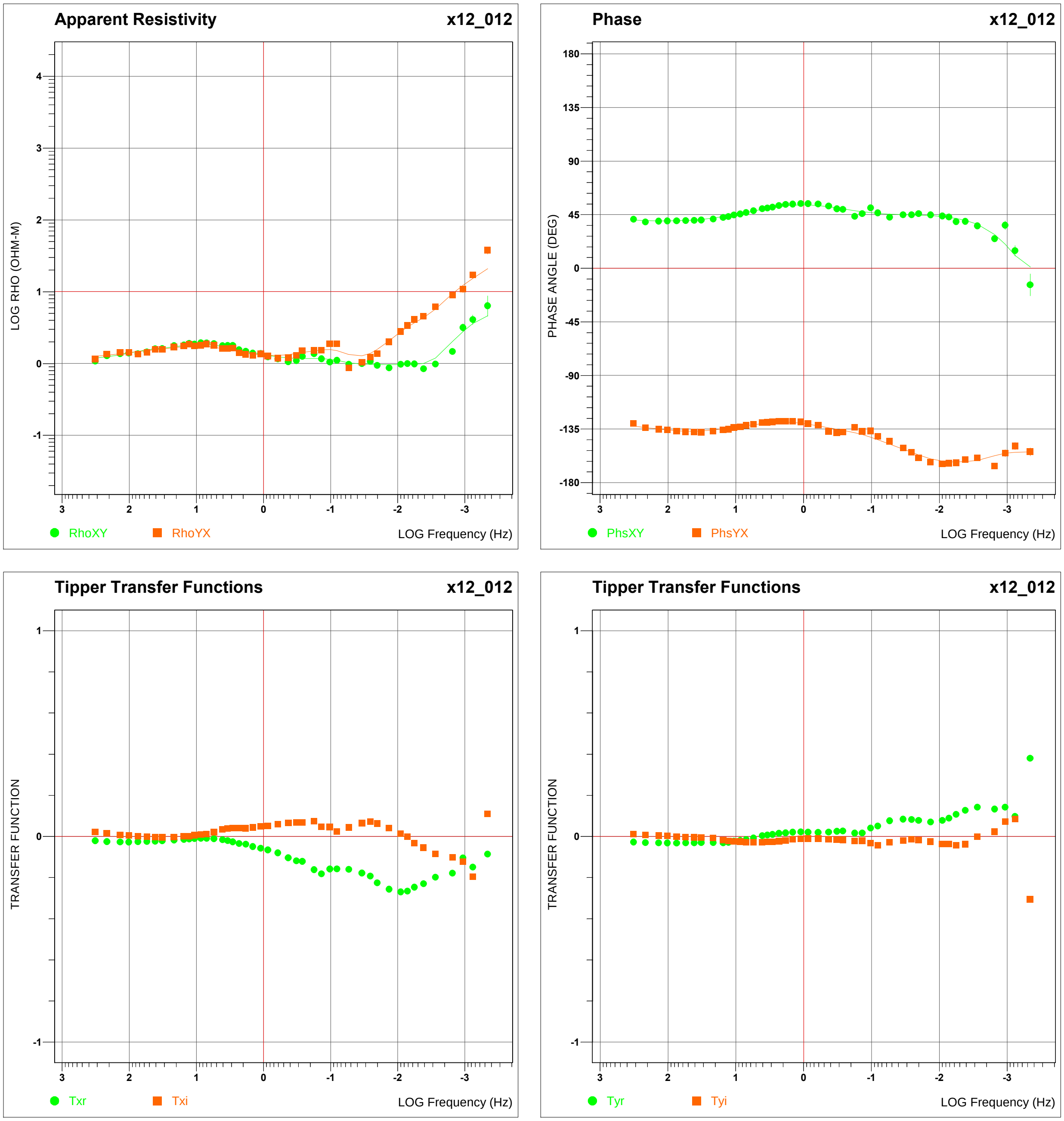
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X

(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

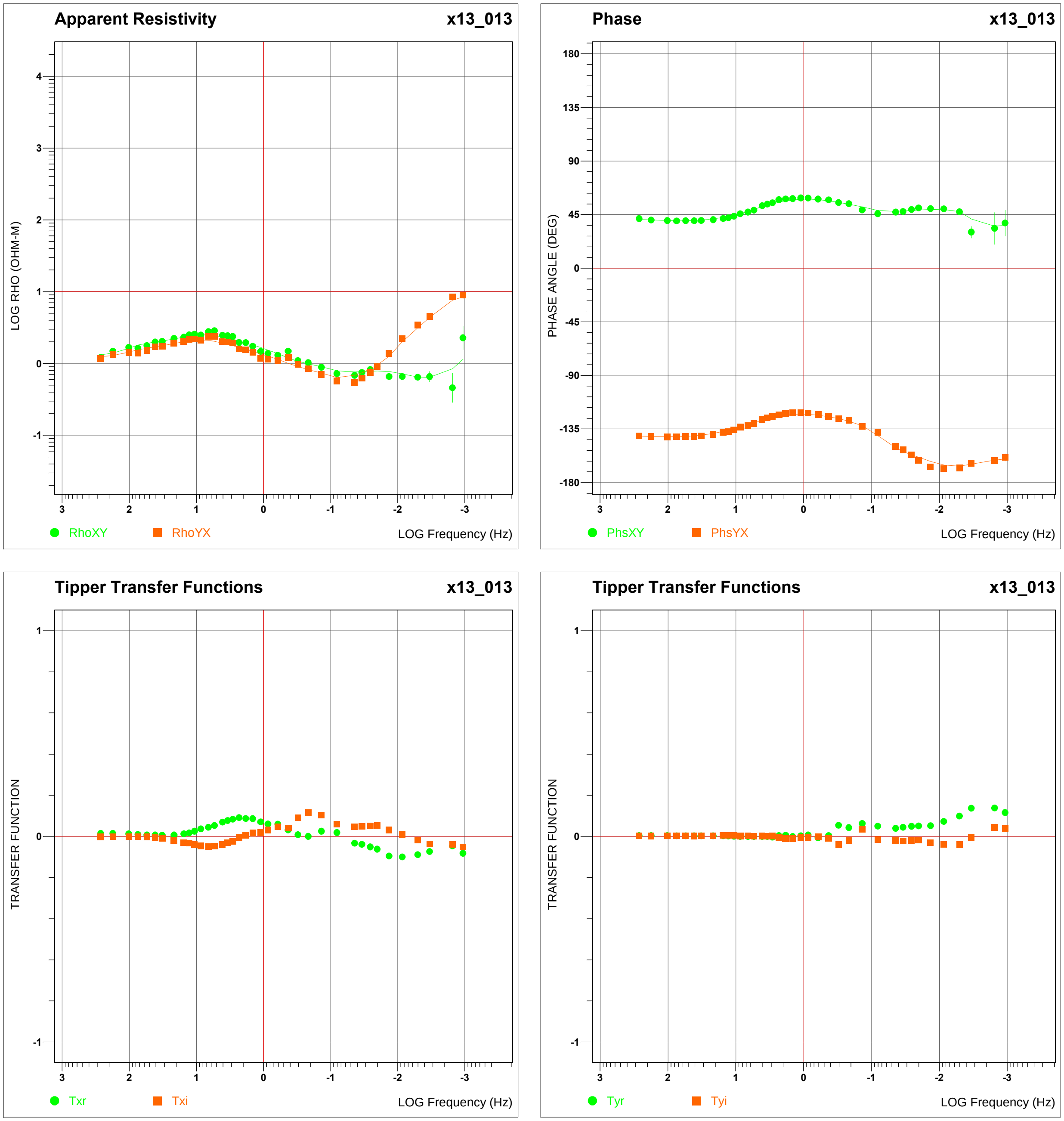
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.167 SITE X12-012 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.168 SITE X13-013 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



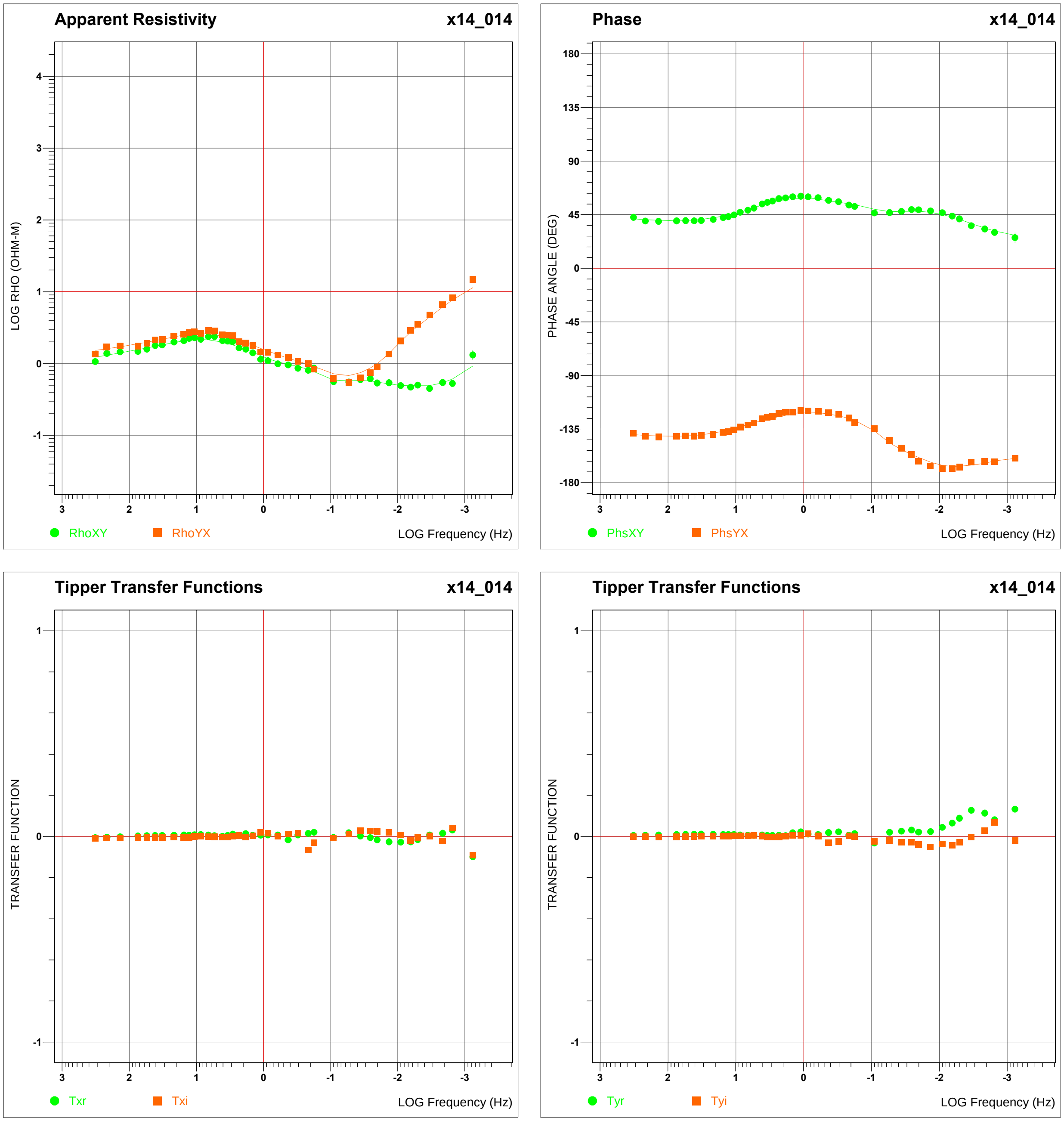
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X

(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

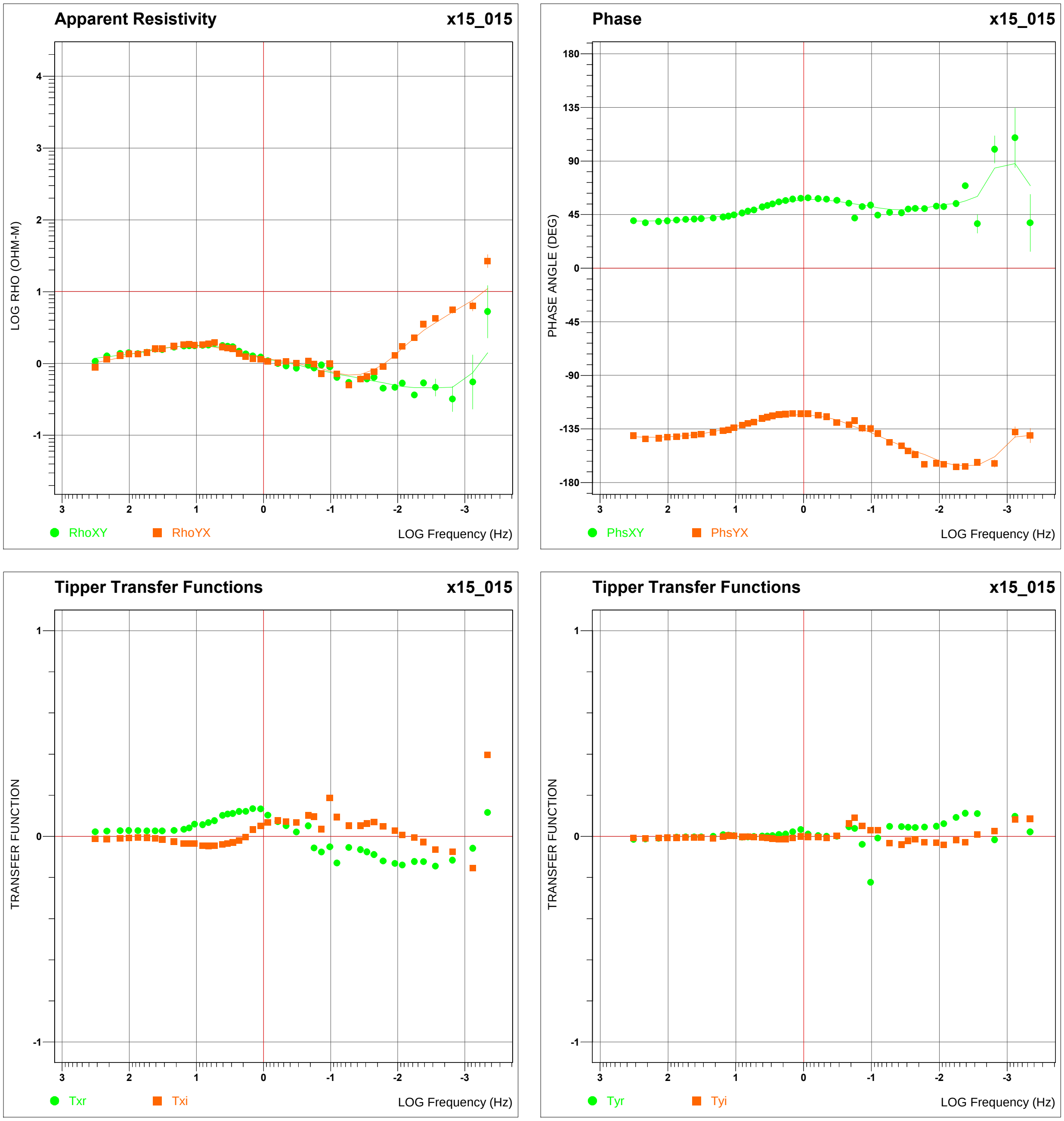
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.169 SITE X14-014 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



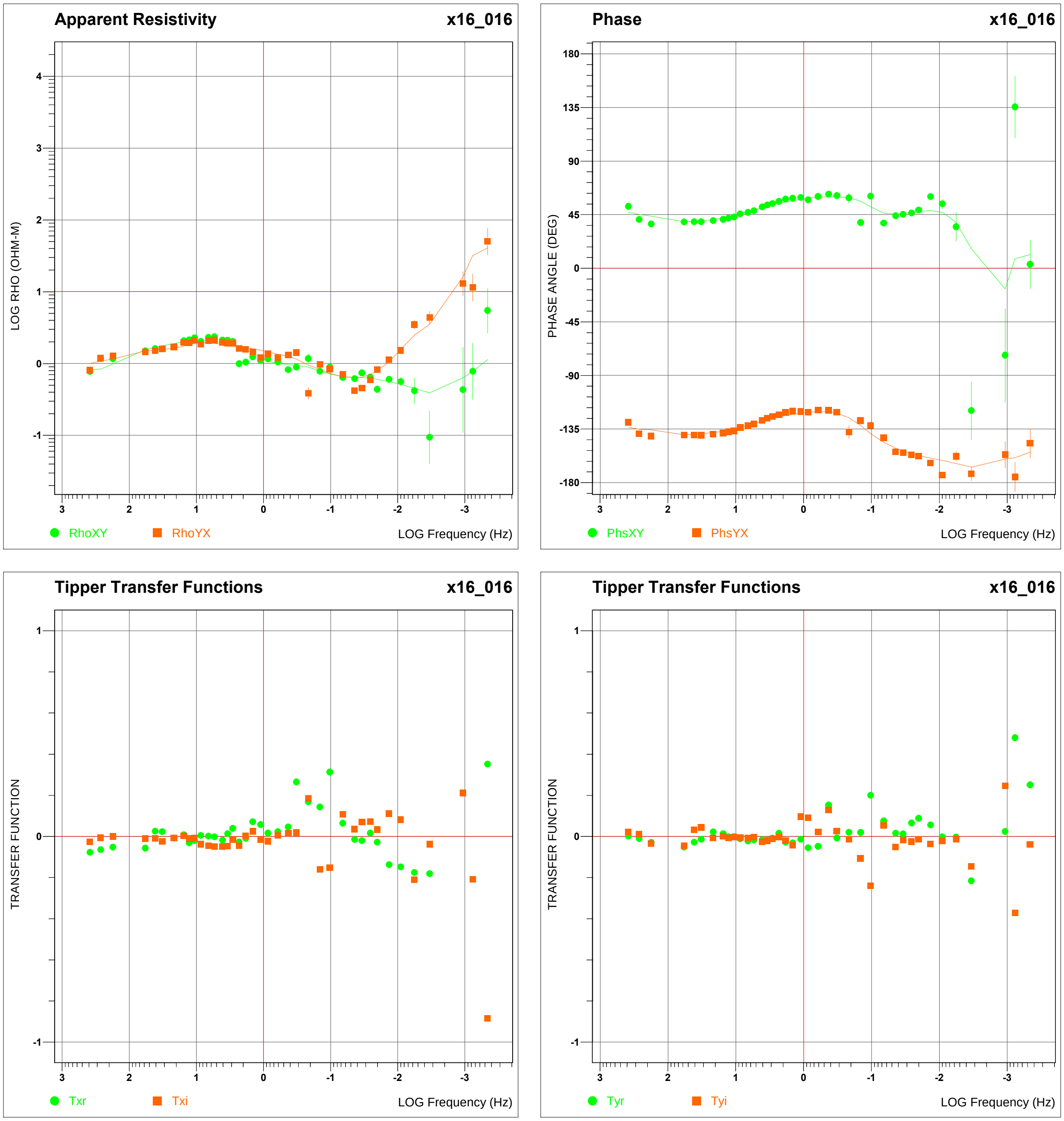
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.170 SITE X15-015 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.171 SITE X16-016 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



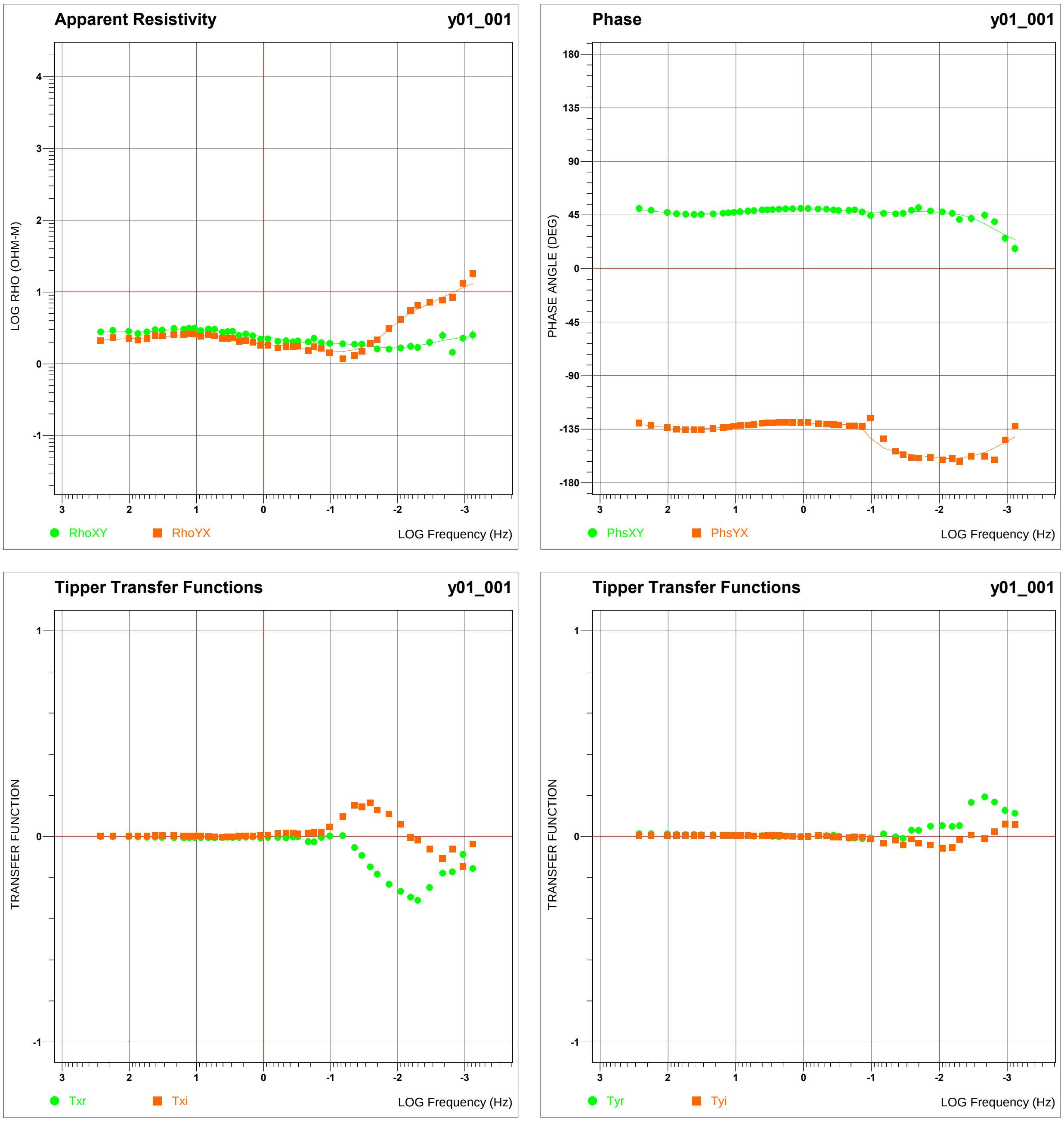
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X

(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.172 SITE Y01-001 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



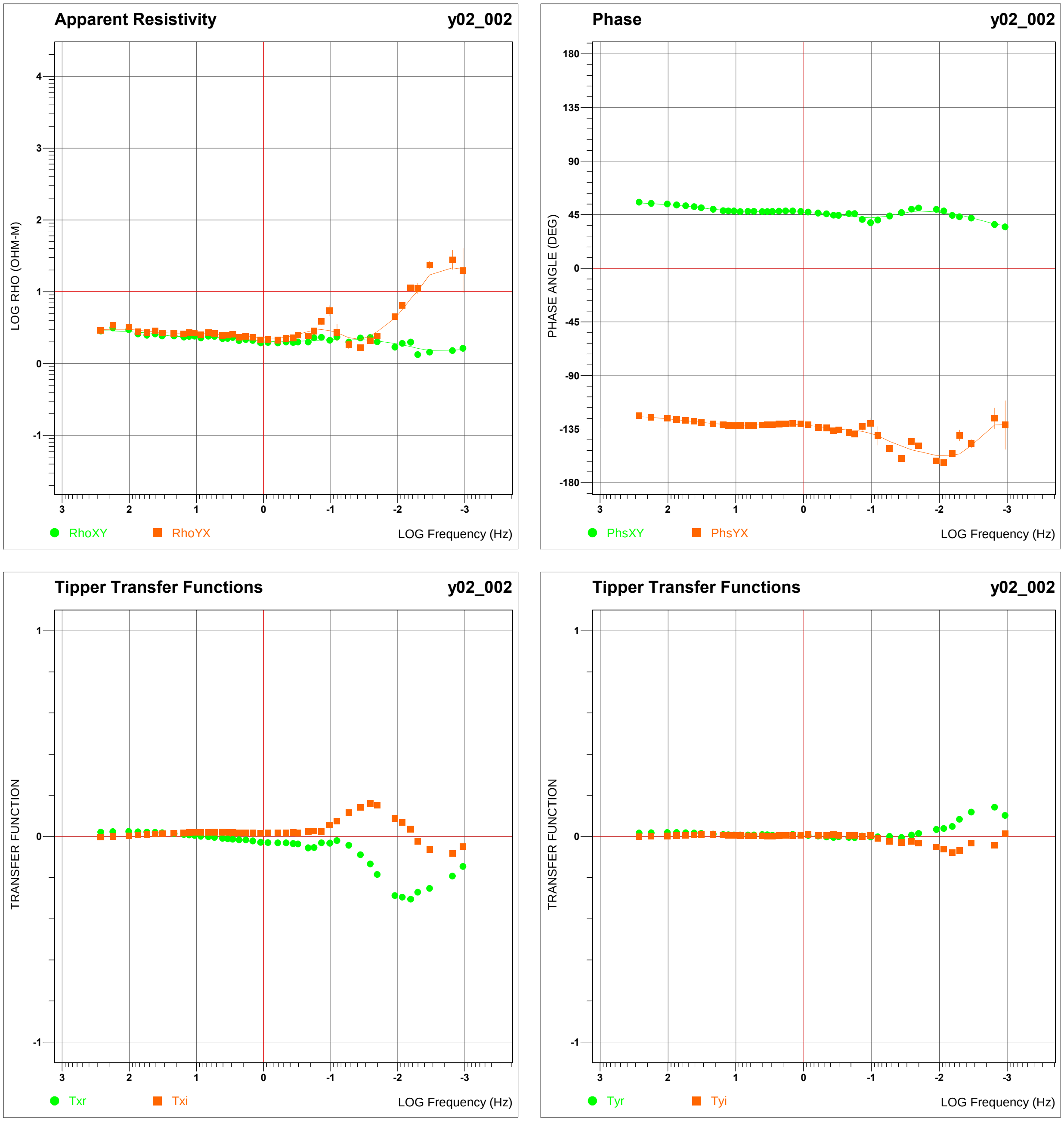
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X

(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

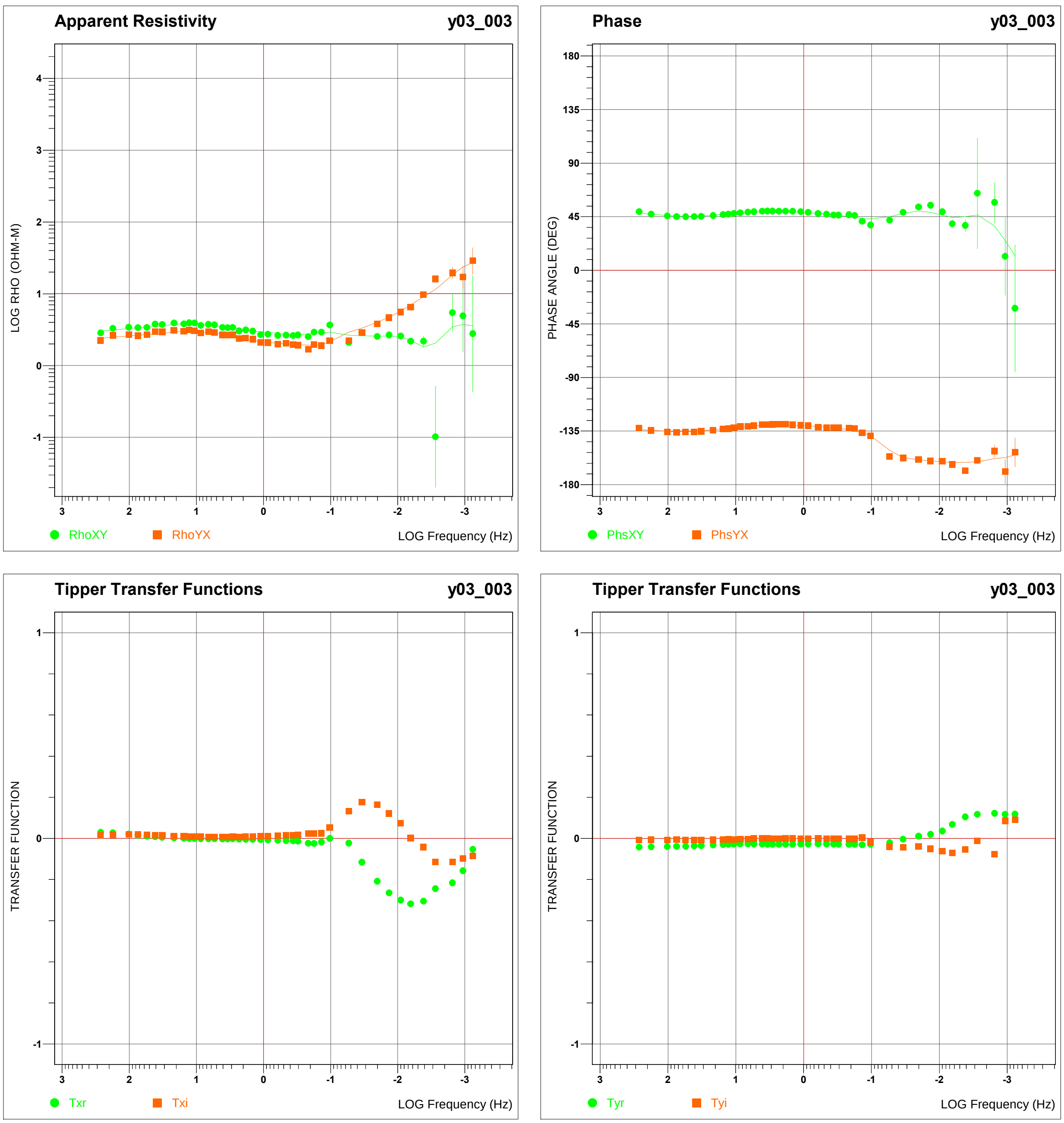
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.173 SITE Y02-002 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.174SITE Y03-003 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



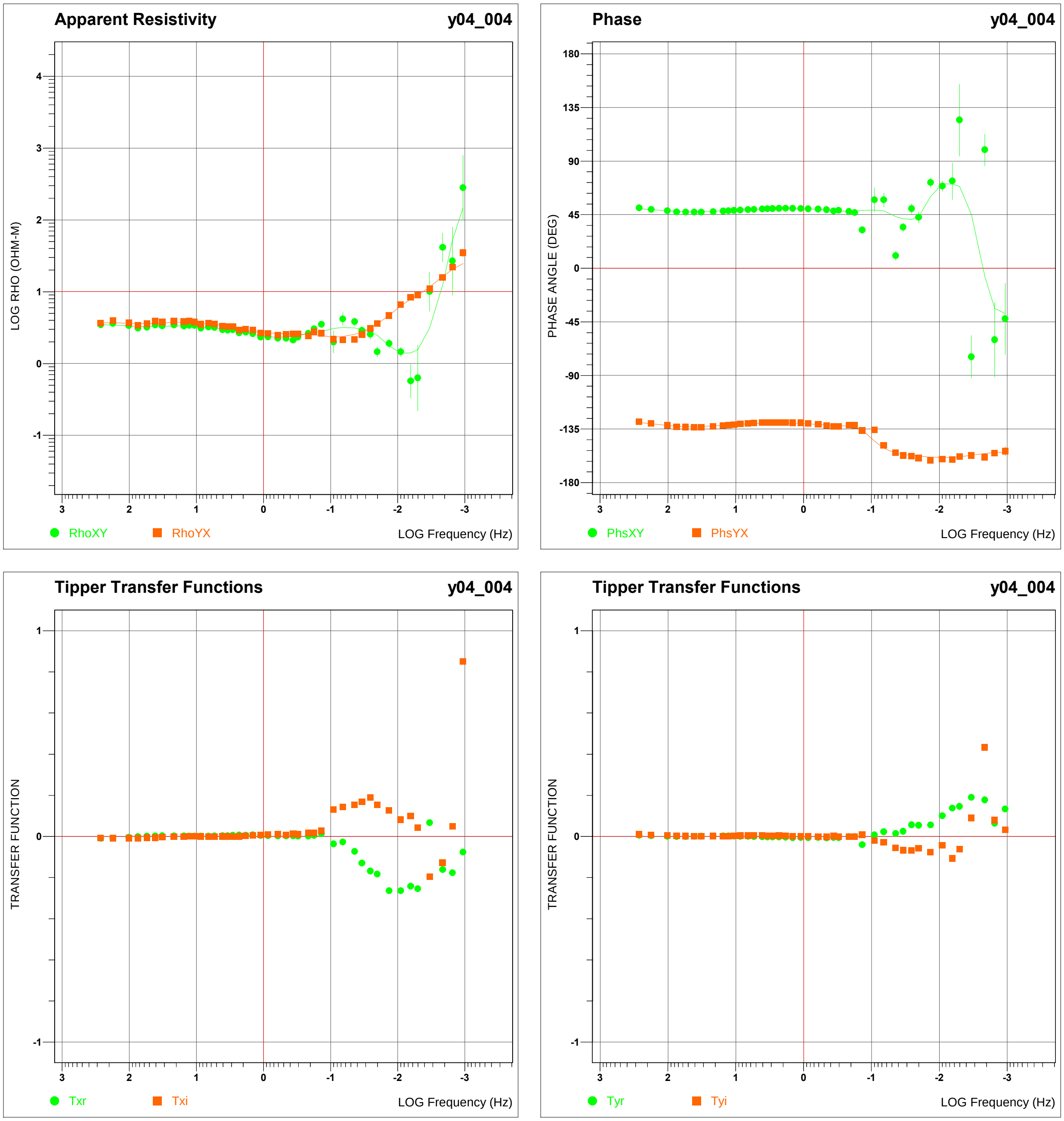
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X

(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

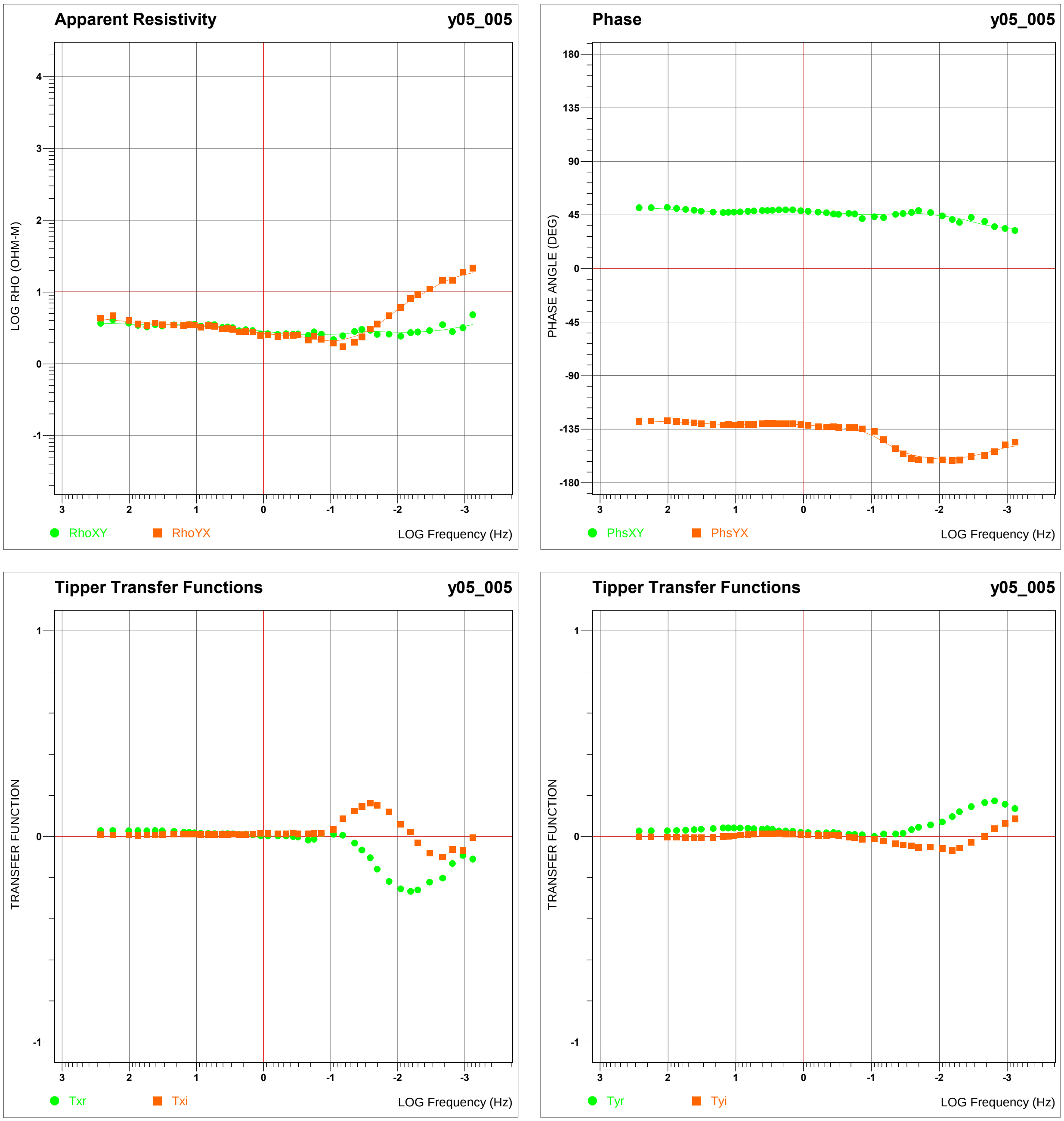
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.175 SITE Y04-004 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



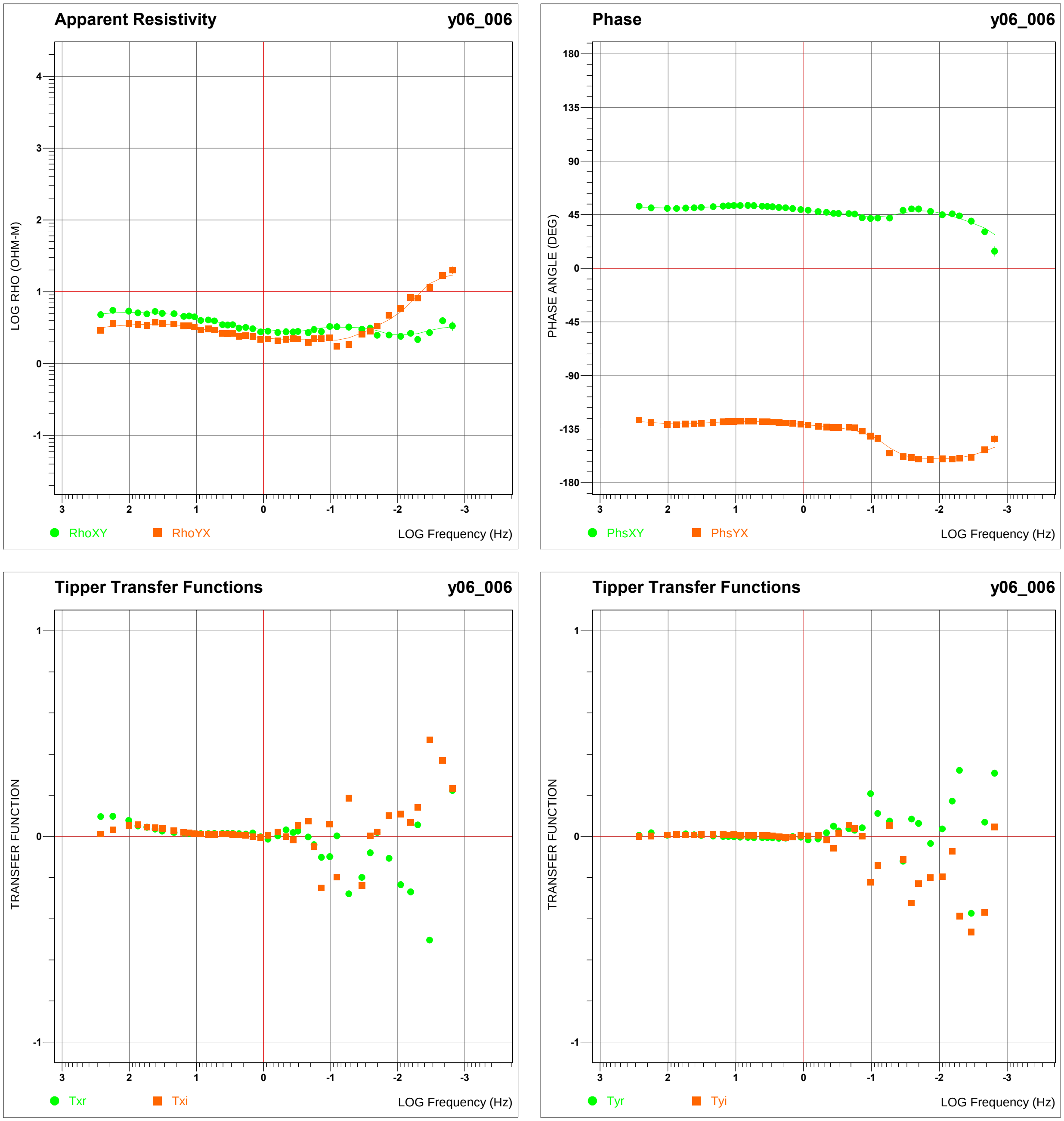
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.176SITE Y05-005 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



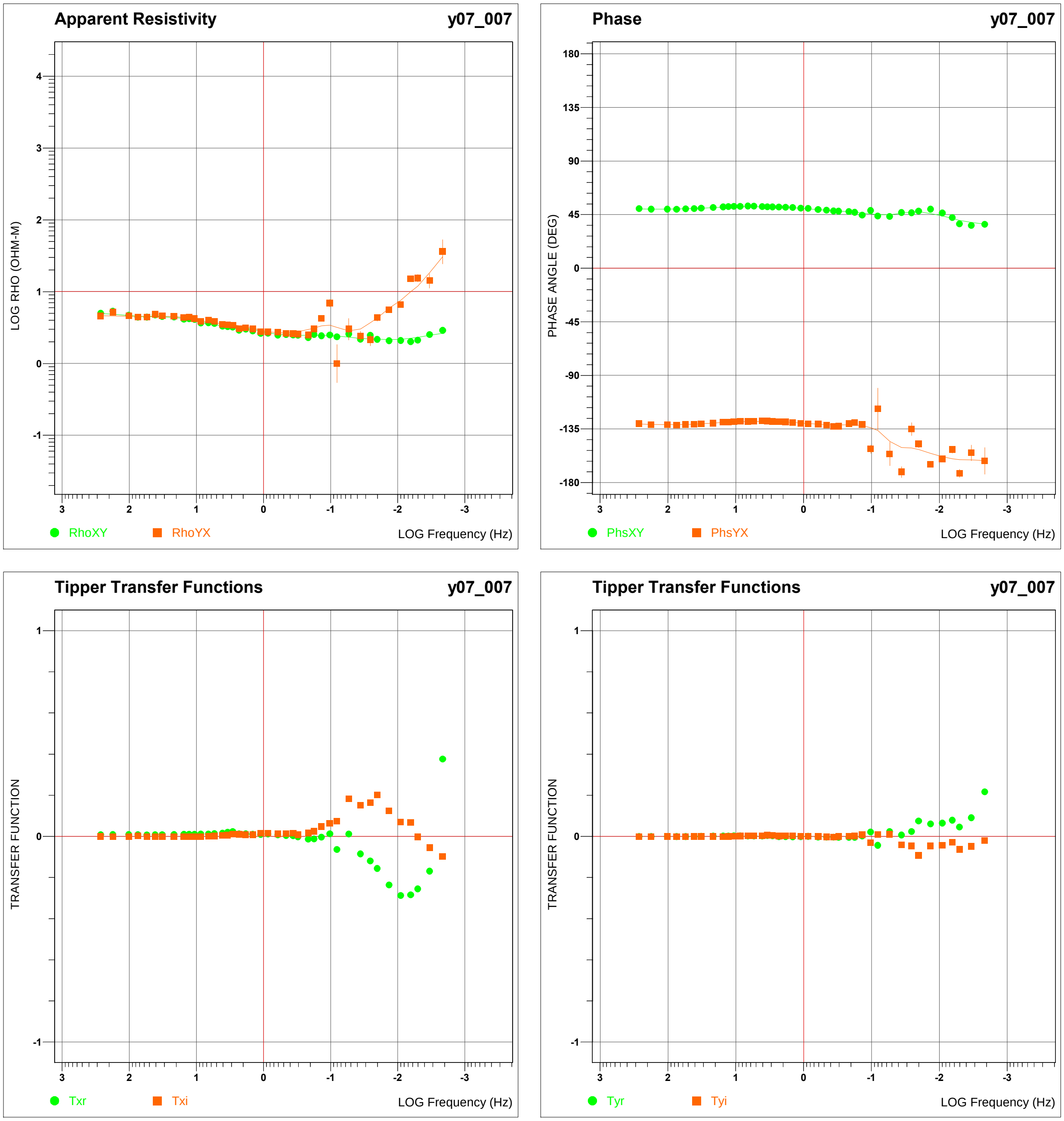
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.177 SITE Y06-006 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.178SITE Y07-007 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



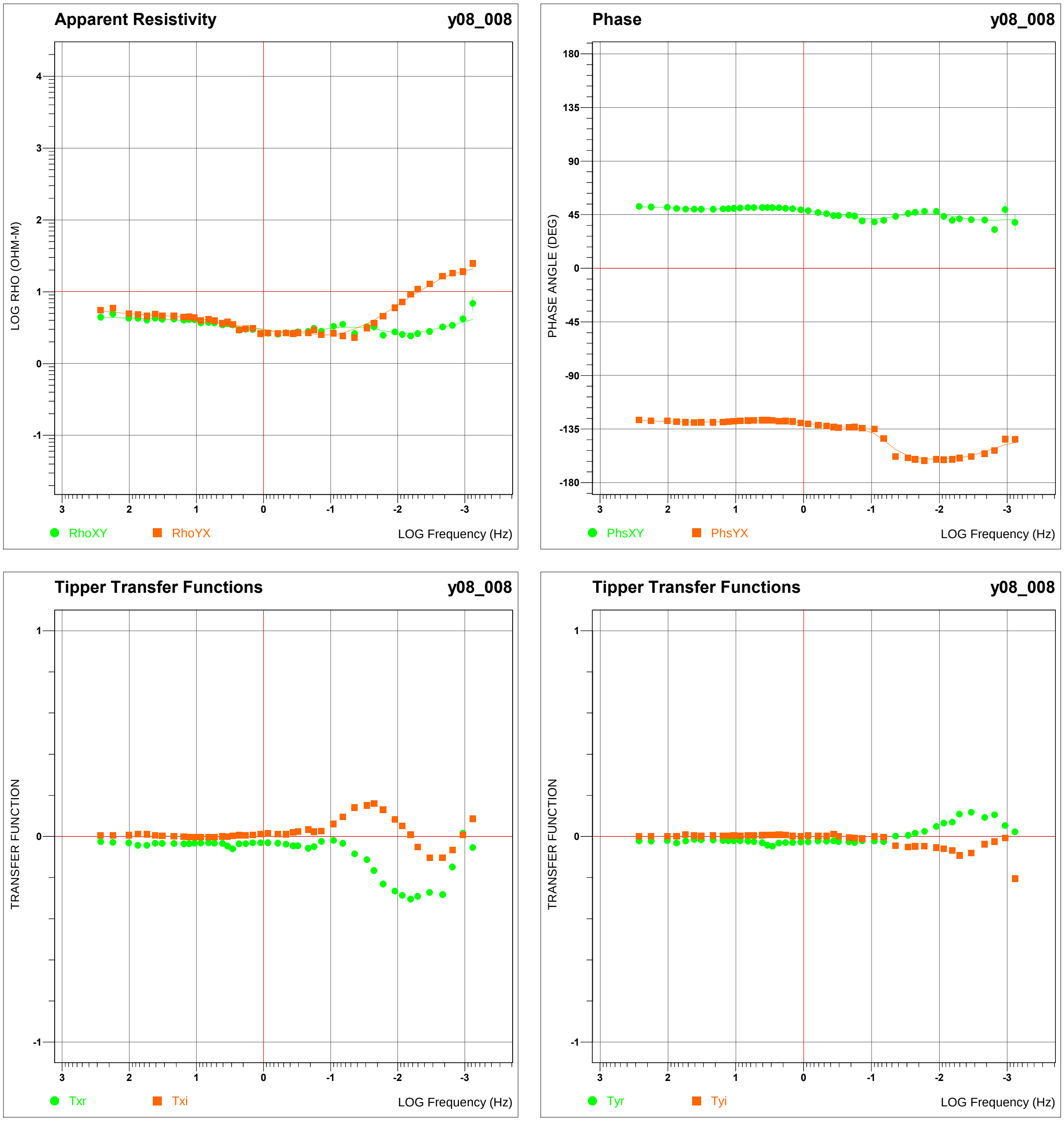
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X

(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.179 SITE Y08-008 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



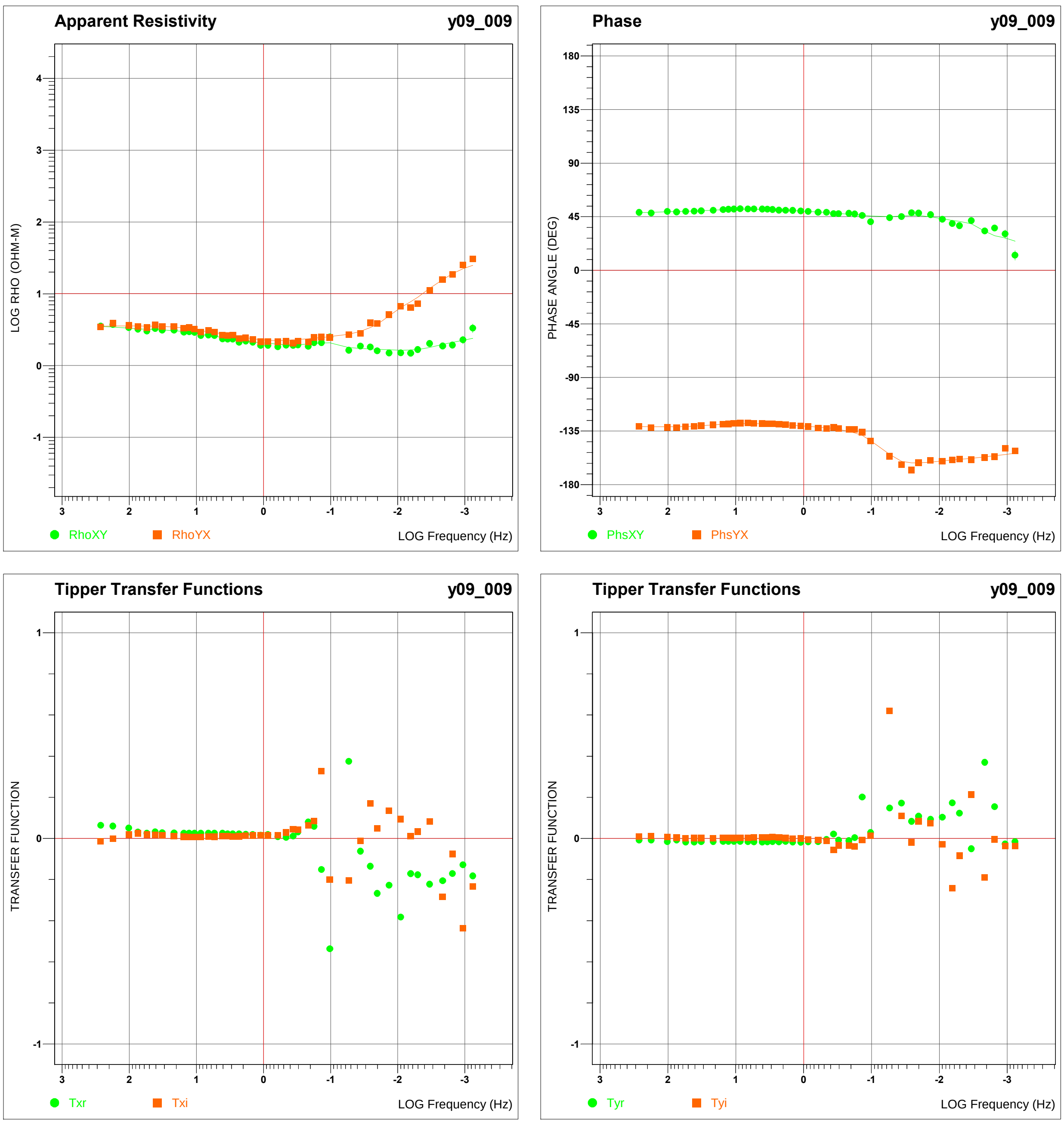
X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X

(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)

MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)

MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

C.1.180 SITE Y09-009 – APPARENT RESISTIVITY, PHASE, & TIPPER SOUNDING CURVES VS FREQUENCY



X IS POINTING TO 90DEG ; Y IS PERPENDICULAR TO X
(RIGHT HAND POSITIVE DOWN COORDINATE SYSTEM)
MODE XY (GREEN) DENOTES ELECTRICAL (**EX**) FIELD AND ORTHOGONAL MAGNETIC (**HY**) FIELD (=EX/HY)
MODE YX (ORANGE) DENOTES ELECTRICAL (**EY**) FIELD AND ORTHOGONAL MAGNETIC (**HX**) FIELD (=EY/HX)

D PARALLEL SENSOR TEST

Project	**US00503S**
Date:	June 26th, 2010
Report by:	Daniel Sponagle
Staff:	Emily Data Roger Sharpe Scott Carlin Jeremy Pierce Shane Montechelle
QuickLay Version	4.00.04
Common folder	V1.46
UTM Coordinates	696298E, 3646093N (WGS 84 / Zone 11N)
Coil Azimuth:	0° T
Declination	12E

Results:

Coil	Coil Type	Serial #	Test Passed	Test Failed	Task For
P50	Phoenix	2121	TEST1-A		Site Hx, Hy
P50	Phoenix	2131	TEST1-A		Site Hx, Hy
P50	Phoenix	2196	TEST1-A		Site Hx, Hy
P50	Phoenix	2203	TEST2-A		Site Hx, Hy
P50	Phoenix	2231	TEST2-A		Site Hx, Hy
P50	Phoenix	2233	TEST2-A		Site Hx, Hy
P50	Phoenix	2239	TEST1-A		Site Hx, Hy
P50	Phoenix	2242	TEST1-A		Site Hx, Hy
P50	Phoenix	2243	TEST1-A		Site Hx, Hy
P50	Phoenix	2248	TEST1-B		Site Hx, Hy
P50	Phoenix	2254	TEST1-B		Site Hx, Hy
P50	Phoenix	2388	TEST1-B		Site Hx, Hy
P50	Phoenix	2393	TEST1-B		Site Hx, Hy
P50	Phoenix	2394	TEST1-B		Remote Hx
P50	Phoenix	2395	TEST1-B		Remote Hy

Coil	Coil Type	Serial #	Test Passed	Test Failed	Task For
P50	Phoenix	2396	TEST1-B		Remote Spare
P50	Phoenix	2444	TEST2-A		Site Hx, Hy
P50	Phoenix	2447	TEST2-A		Site Hx, Hy
P50	Phoenix	2448		TEST2-A	FAIL
P50	Phoenix	2451	TEST4		Spare
P50	Phoenix	2456	TEST4		Spare
P50	Phoenix	2461	TEST4		Spare
BF7	EMI	7001	TEST2-B		Site Hz
BF7	EMI	7005	TEST2-B		Site Hz
BF7	EMI	7008	TEST2-B		Site Hz
BF7	EMI	9107	TEST8		Spare
BF4	EMI	9115	TEST8		Spare
BF4	EMI	9119	TEST8		Spare
BF4	EMI	9122	TEST2-B		Site Hz
BF4	EMI	9622	TEST2-C		Site Hz
BF4	EMI	9623	TEST2-C		Site Hz
BF4	EMI	9624	TEST2-C		Site Hz
BF4	EMI	9639	TEST2-B		Site Hz

Notes:

P50-2448: This coil was flagged as bad and continued to track badly on this PST (see Test2-A). Unit will be returned to office for repairs.

P50-2461: Always shows as completely overscaled despite numerous tests (see Test 3-A). Coil will be retested. The following day, it was determined that the problem lied within the spider. One side has bad z-port.

BF4-9119: Always shows as completely overscaled despite numerous tests (see Test 3-B). Coil will be retested. The following day, it was determined that the problem lied within the spider. One side has bad z-port.

One spider has bad z-port. It has been flagged.

D.1 LOW FREQUENCY COILS ... TEST 1-A

Available Coils:

TS Strip	Manufacture	Serial #	Logger #	Notes
1	Phoenix	P50-2121	9E8D	
2	Phoenix	P50-2131	9E8D	
3	Phoenix	P50-2196	9E8D	
4	Phoenix	P50-2239	9EBD	
5	Phoenix	P50-2242	9EBD	
6	Phoenix	P50-2243	9EBD	

Processing Parameters:

Parameters	Values
PSD Method	Welch
Window	Hanning
Window Length	4096
Segment Overlap	50%

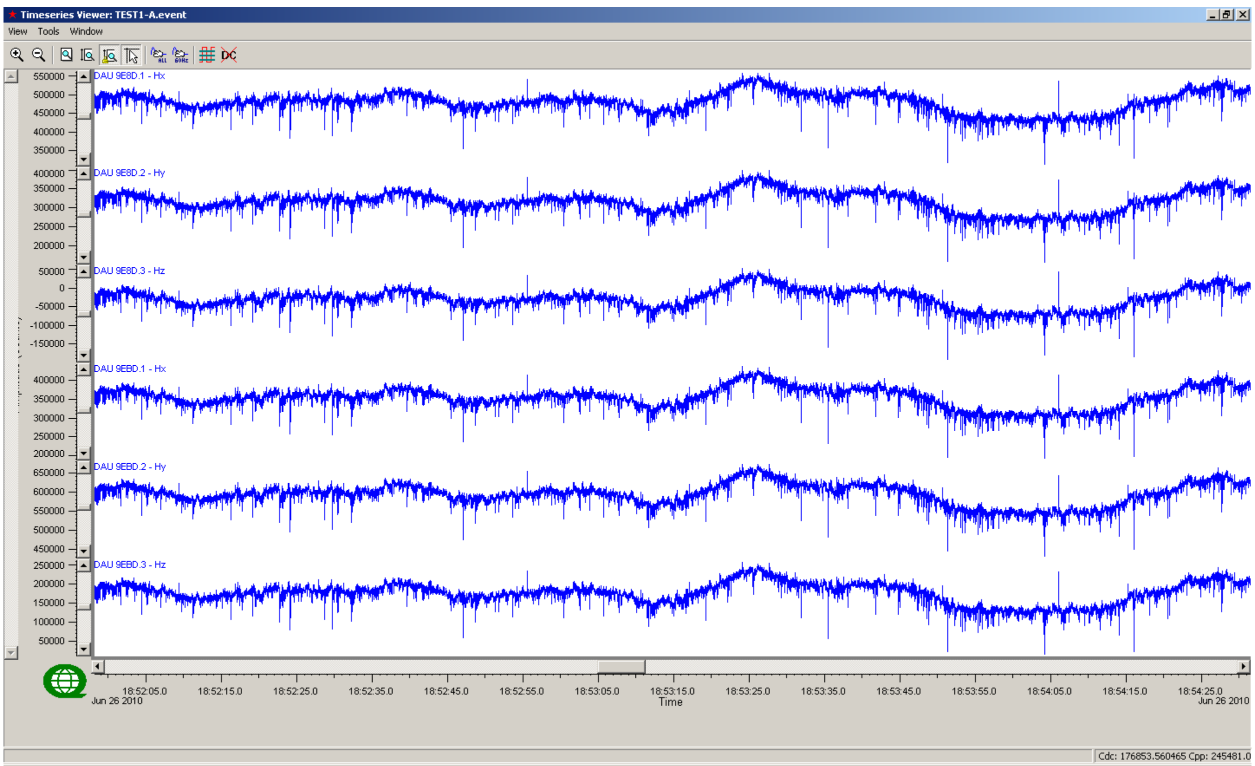
D.1.1 TEST RESULTS: 1000SPS

Event	Test 1-A
Serial Events:	9E8D_20100626.1821_2 9EBD_20100626.1826
Sample Rate:	1000sps
TS Length:	3,120,000 samples (~52min)

Results:

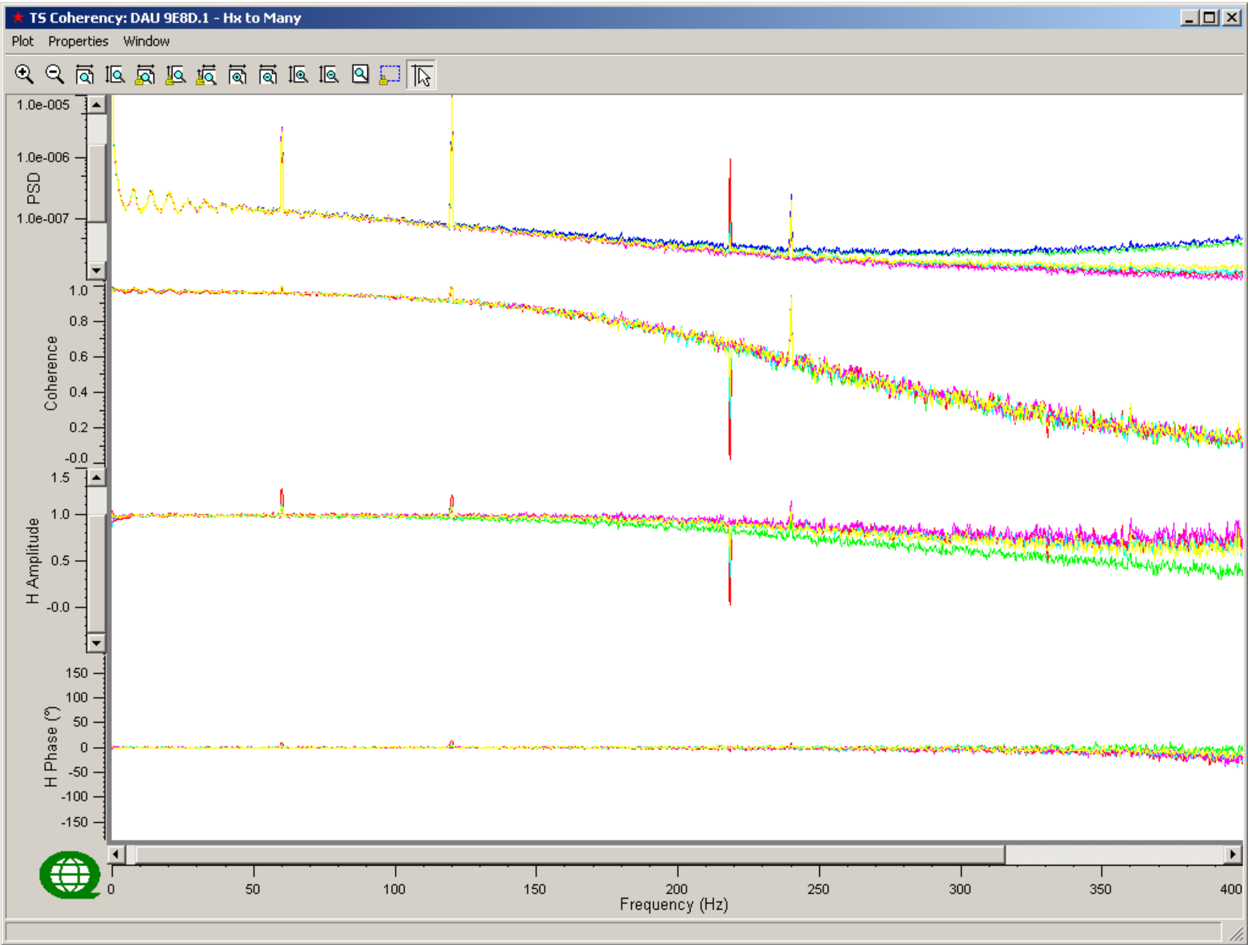
All coils OK

Time Series



Time series @ 1000sps

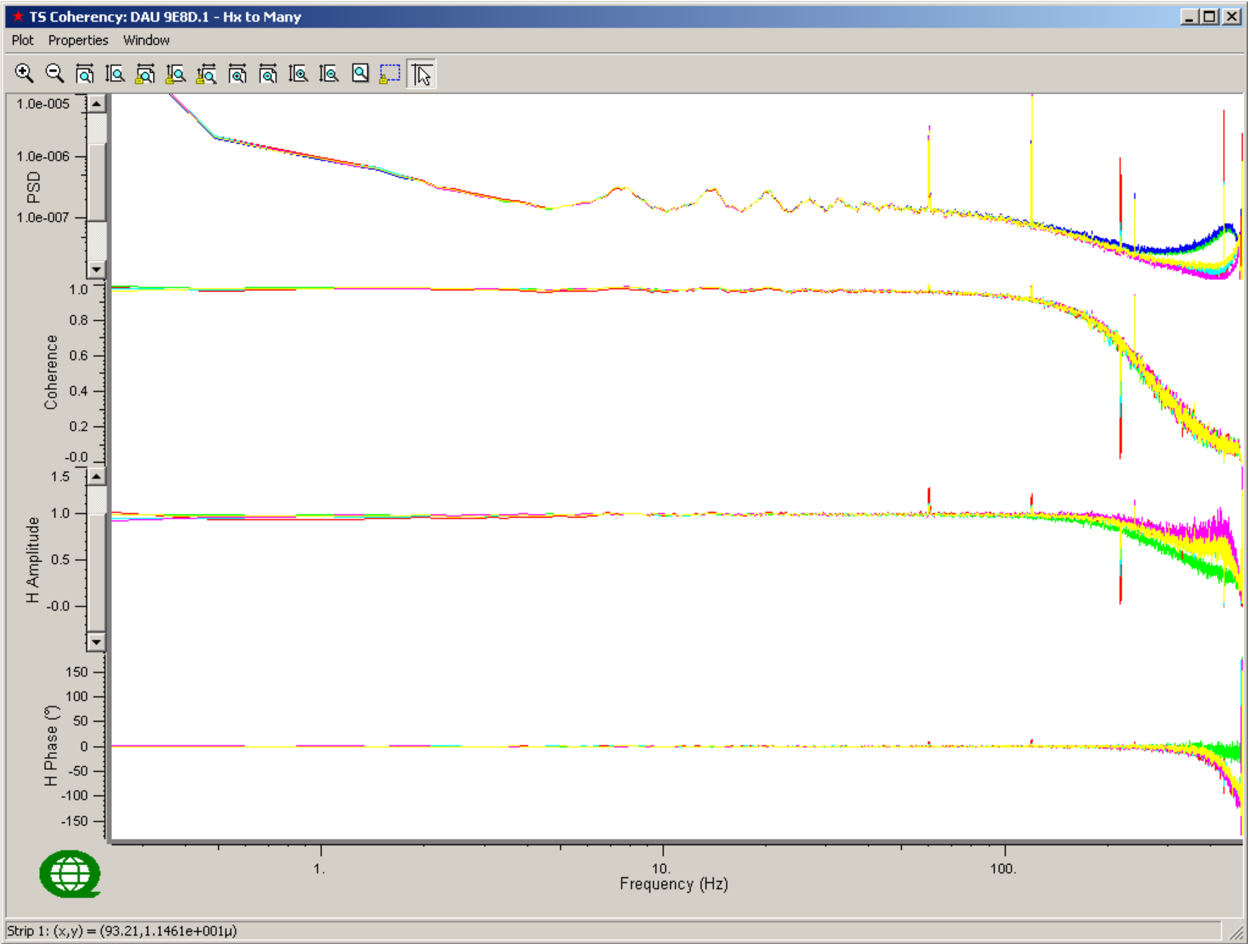
Low Frequency Coil Results **Coherency to P50-2121(Blue)**



From top to bottom: PSD of channels and Coherency and Response Function (Amplitude and Phase) compared to Reference Channel – Linear frequency scale

Colour	Channel	Notes
Blue	P50-2121	
Green	P50-2131	
Red	P50-2196	
Cyan	P50-2239	
Magenta	P50-2242	
Yellow	P50-2243	
Black		

Low Frequency Coil Results (continued) **Coherency to P50-2121 (Blue)**



From top to bottom: PSD of channels and Coherency and Response Function (Amplitude and Phase) compared to Reference Channel – Logarithmic frequency scale

Colour	Channel	Notes
Blue	P50-2121	
Green	P50-2131	
Red	P50-2196	
Cyan	P50-2239	
Magenta	P50-2242	
Yellow	P50-2243	
Black		

D.2 LOW FREQUENCY COILS ... TEST 1-B

Available Coils:

TS Strip	Manufacture	Serial #	Logger #	Notes
1	Phoenix	P50-2248	9EAC	
2	Phoenix	P50-2254	9EAB	
3	Phoenix	P50-2388	9EAB	
4	Phoenix	P50-2393	9EAB	
5	Phoenix	P50-2394	9EBA	
6	Phoenix	P50-2395	9EBA	
7	Phoenix	P50-2296	9EBA	

Processing Parameters:

Parameters	Values
PSD Method	Welch
Window	Hanning
Window Length	4096
Segment Overlap	50%

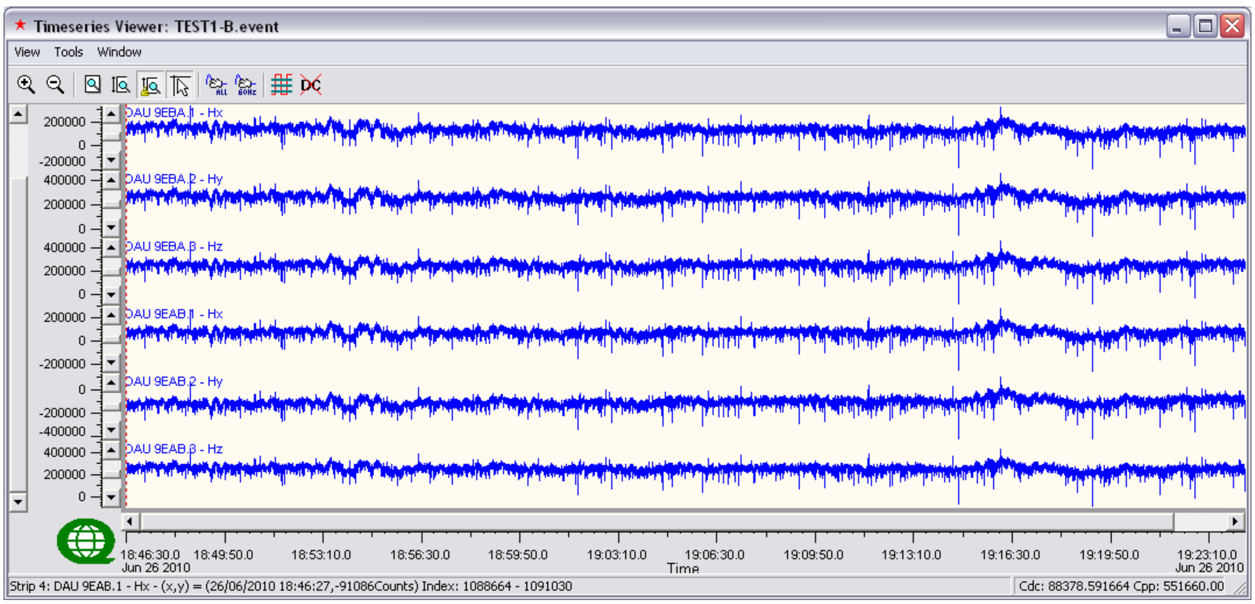
D.2.1 TEST RESULTS: 1000SPS

Event	Test 1-B
Serial Events:	9EAC_20100626.1825 9EBA_20100626.1829 9EAB_20100626.1828
Sample Rate:	1000sps
TS Length:	2,400,000 samples (~40min)

<u>Results:</u>

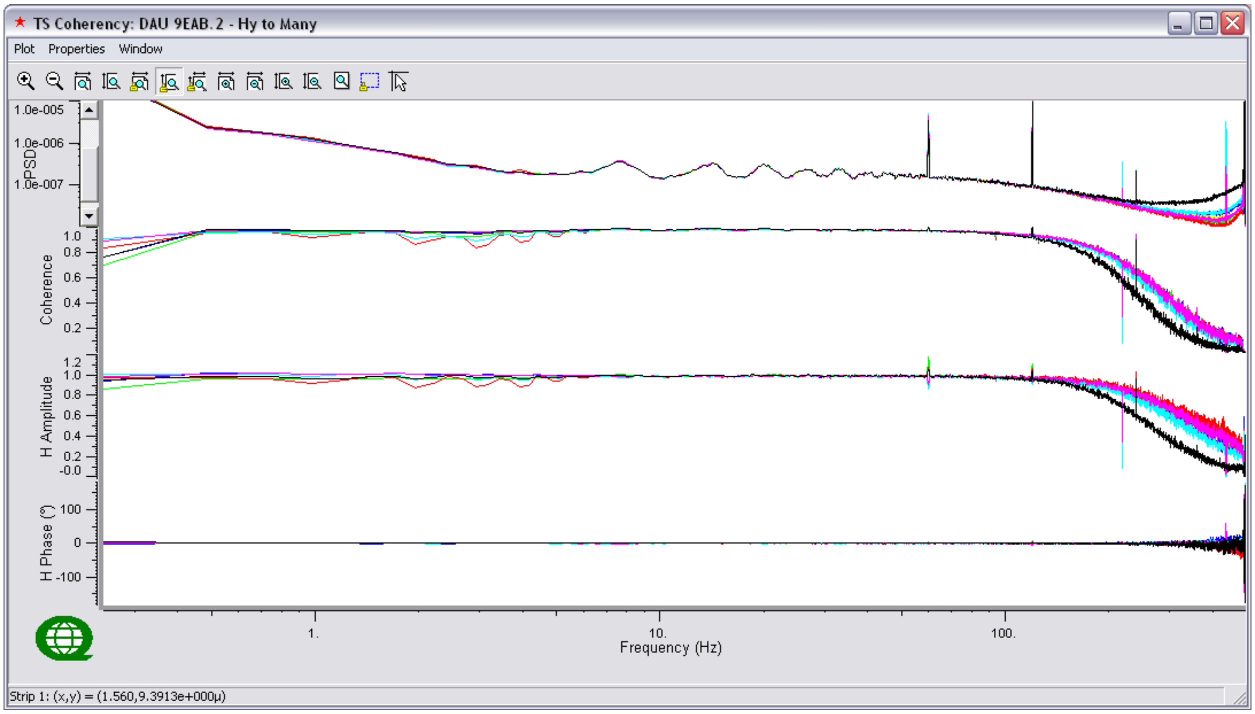
All coils OK

<u>Time Series</u>



<u>Time series @ 1000sps</u>

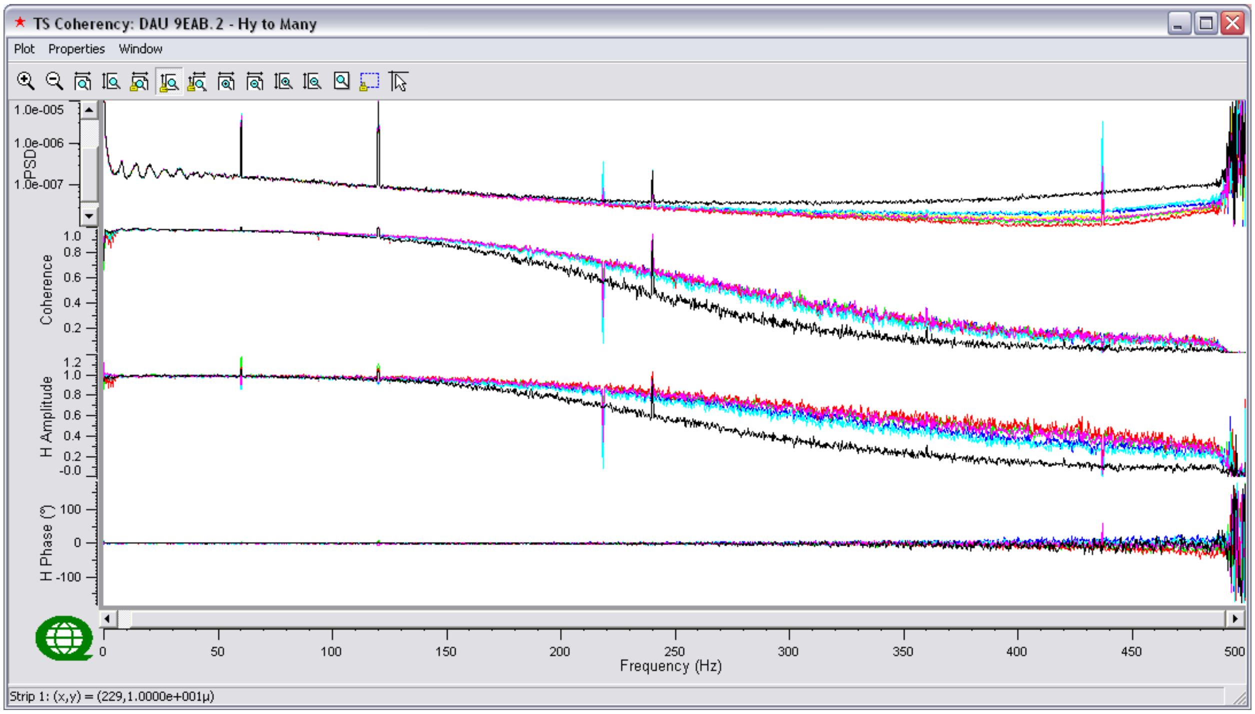
Low Frequency Coil Results **Coherency to P50-2395(Yellow)**



From top to bottom: PSD of channels and Coherency and Response Function (Amplitude and Phase) compared to Reference Channel – Linear frequency scale

Colour	Channel	Notes
Blue	P50-2248	
Green	P50-2254	
Red	P50-2388	
Cyan	P50-2393	
Magenta	P50-2394	
Yellow	P50-2395	
Black	P50-2296	Lower PSD, coherency and amplitude above 150Hz

Low Frequency Coil Results (continued) **Coherency to P50-2395 (Yellow)**



From top to bottom: PSD of channels and Coherency and Response Function (Amplitude and Phase) compared to Reference Channel – Logarithmic frequency scale

Colour	Channel	Notes
Blue	P50-2248	
Green	P50-2254	
Red	P50-2388	
Cyan	P50-2393	
Magenta	P50-2394	
Yellow	P50-2395	
Black	P50-2296	Lower PSD, coherency and amplitude above 150Hz

D.3 LOW FREQUENCY COILS ... TEST 2-A

Available Coils:

TS Strip	Manufacture	Serial #	Logger #	Notes
1	Phoenix	P50-2203	957C	
2	Phoenix	P50-2231	957C	
3	Phoenix	P50-2233	957C	
4	Phoenix	P50-2444	9579	
5	Phoenix	P50-2447	9579	
6	Phoenix	P50-2448	9579	Also failed in previous PSTs. Was already flagged.

Processing Parameters:

Parameters	Values
PSD Method	Welch
Window	Hanning
Window Length	4096
Segment Overlap	50%

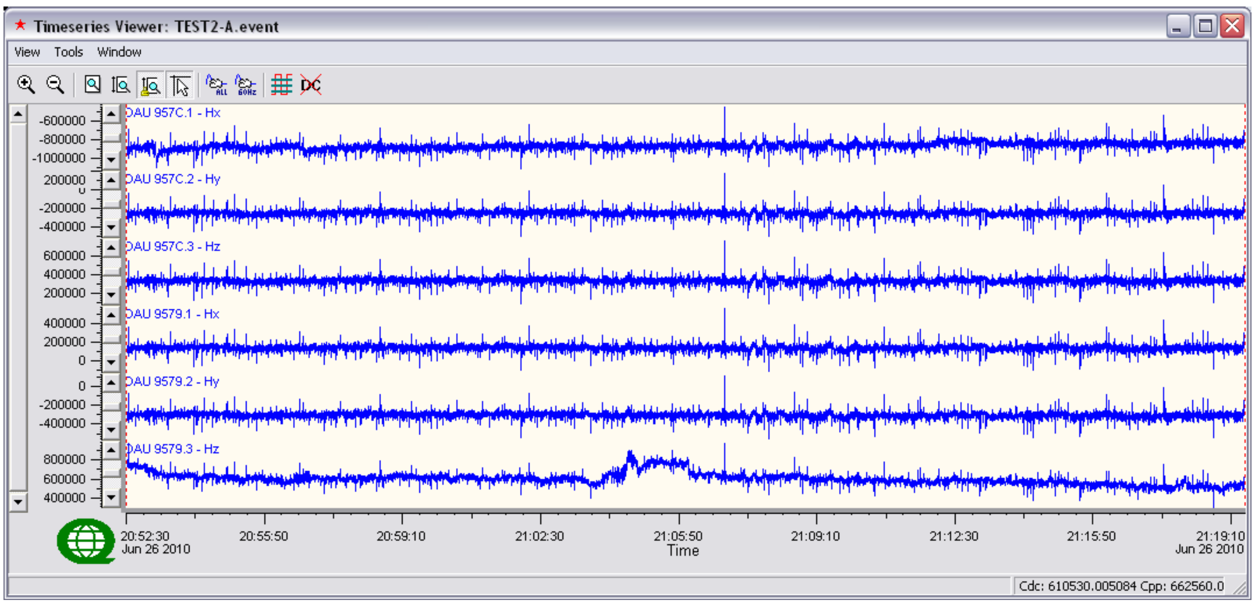
D.3.1 TEST RESULTS: 1000SPS

Event	Test 2-A
Serial Events:	957C-2_20100626.2045 9579_20100626.2047
Sample Rate:	1000sps
TS Length:	1,620,000 samples (~27min)

Results:

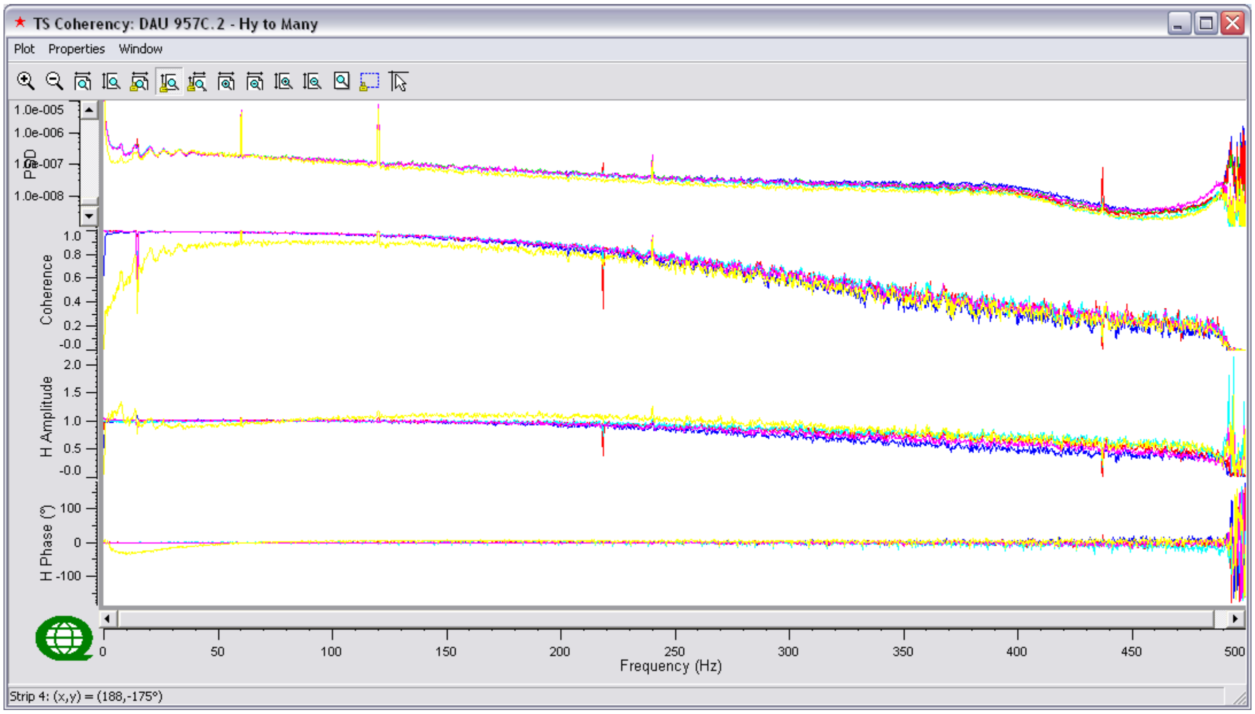
P50-2448 – After failing in Test 1 group, coil cable was swapped for Test 2. Results stayed the same. Coil was flagged and operator mentioned that it failed previous PSTs.

Time Series



Time series @ 1000sps

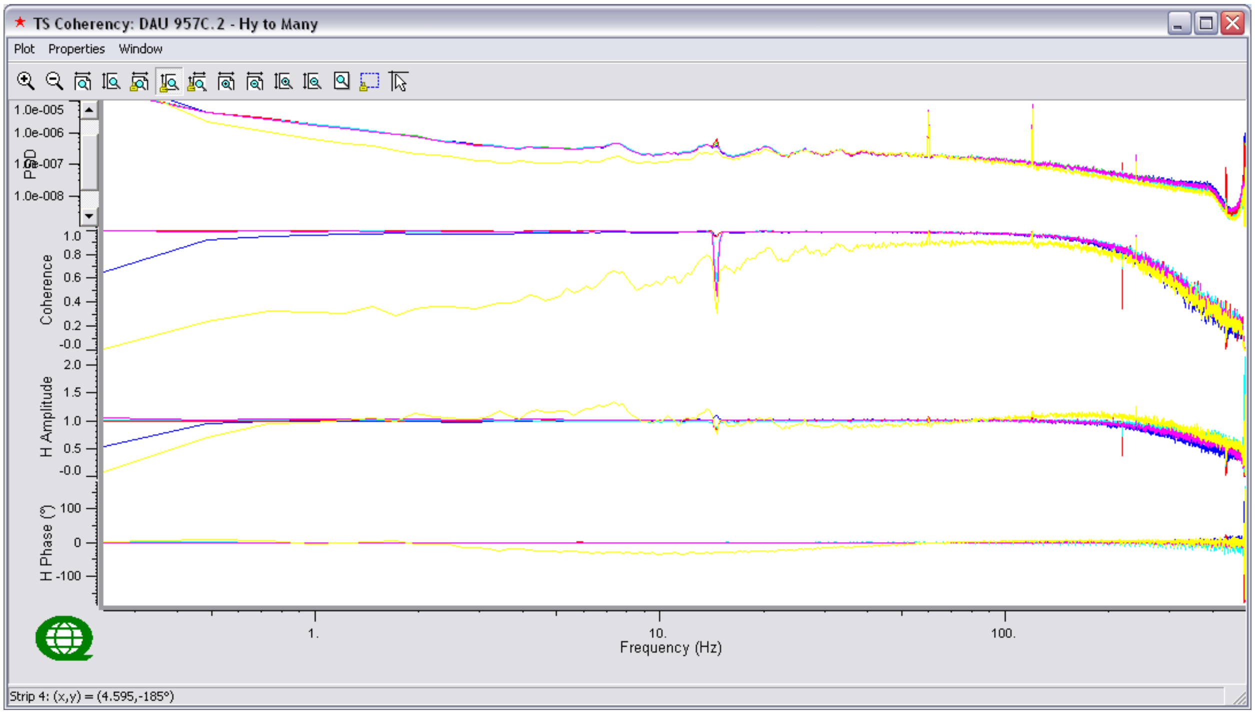
Low Frequency Coil Results **Coherency to P50-2231 (Green)**



From top to bottom: PSD of channels and Coherency and Response Function (Amplitude and Phase) compared to Reference Channel – Linear frequency scale

Colour	Channel	Notes
Blue	P50-2203	
Green	P50-2231	
Red	P50-2233	
Cyan	P50-2444	
Magenta	P50-2447	
Yellow	P50-2448	Fails all parameters
Black		

Low Frequency Coil Results (continued) **Coherency to P50-2121 (Blue)**



From top to bottom: PSD of channels and Coherency and Response Function (Amplitude and Phase) compared to Reference Channel – Logarithmic frequency scale

Colour	Channel	Notes
Blue	P50-2203	
Green	P50-2231	
Red	P50-2233	
Cyan	P50-2444	
Magenta	P50-2447	
Yellow	P50-2448	Fails all parameters
Black		

D.4 LOW FREQUENCY COILS ... TEST 2-B

Available Coils:

TS Strip	Manufacture	Serial #	Logger #	Notes
1	EMI	BF7-7001	9564	
2	EMI	BF7-7005	9564	
3	EMI	BF7-7008	9564	
4	EMI	BF4-9122	9E8D	
5	EMI	BF4-9836	9E8D	
6				

Processing Parameters:

Parameters	Values
PSD Method	Welch
Window	Hanning
Window Length	4096
Segment Overlap	50%

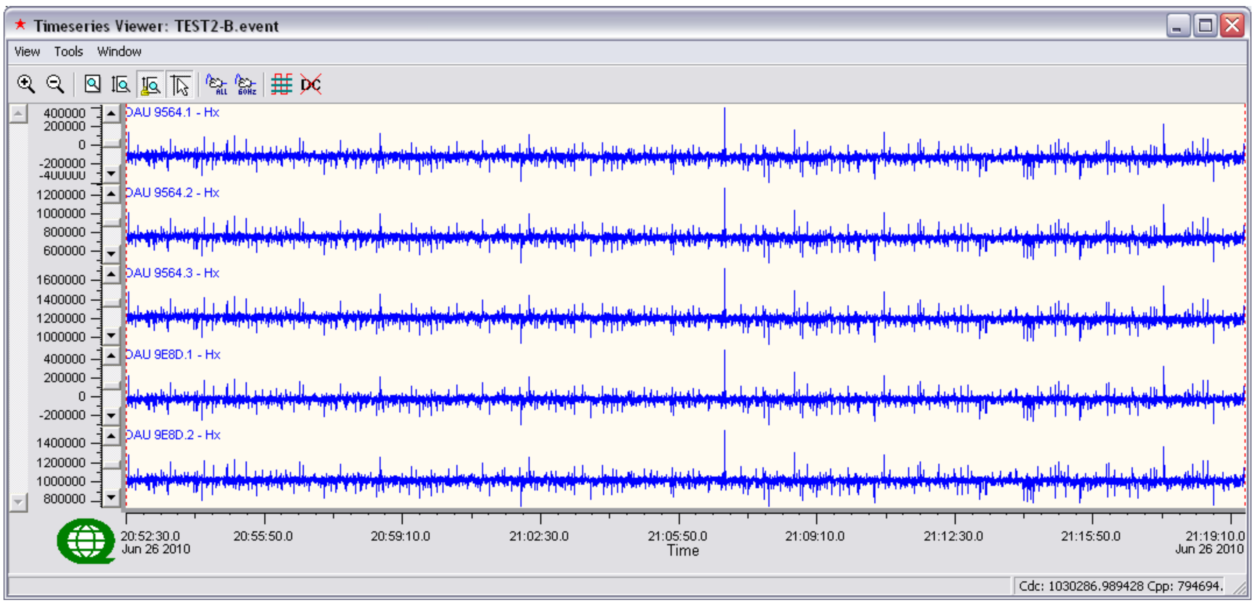
D.4.1 TEST RESULTS: 1000SPS

Event	Test 2-B
Serial Events:	9564_20100626.2049 9E8D-2_20100626.2044
Sample Rate:	1000sps
TS Length:	1,620,000 samples (~27min)

Results:

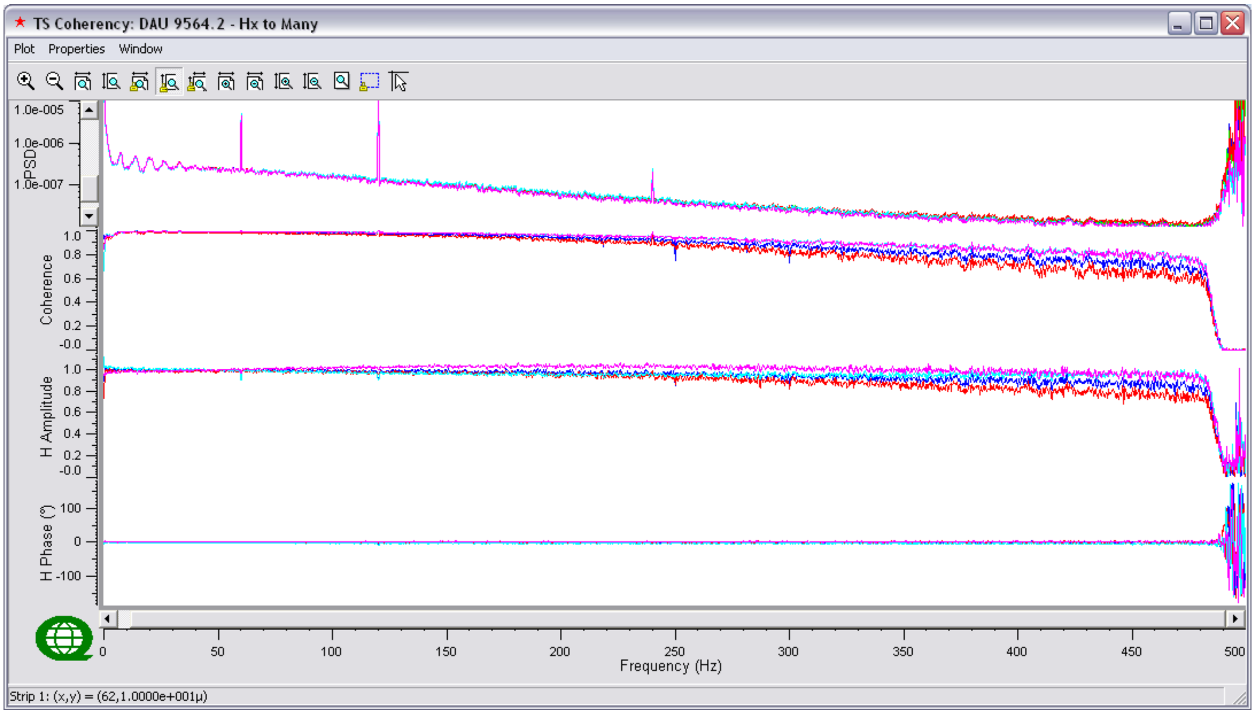
Coherencies diverge above 250Hz for all coils. Likely all coils are okay.

Time Series



Time series @ 1000sps

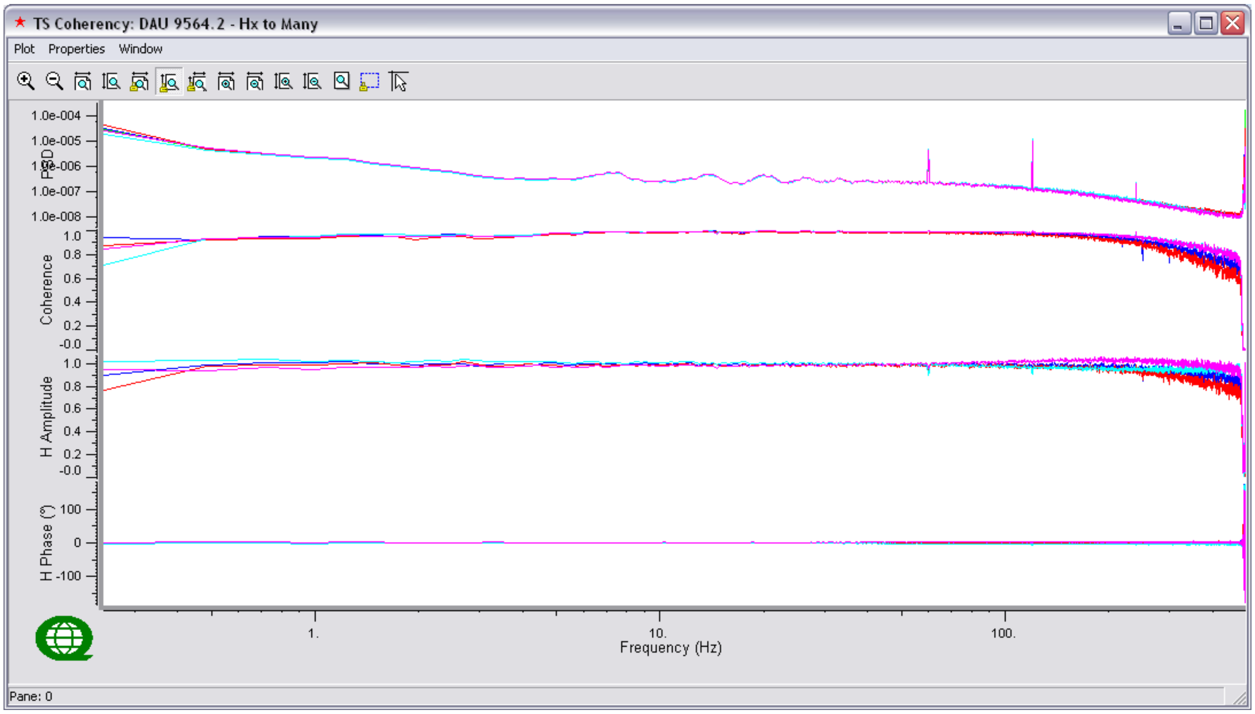
Low Frequency Coil Results **Coherency to BF7-7005(Green)**



From top to bottom: PSD of channels and Coherency and Response Function (Amplitude and Phase) compared to Reference Channel – Linear frequency scale

Colour	Channel	Notes
Blue	BF7-7001	
Green	BF7-7005	
Red	BF7-7008	
Cyan	BF4-9122	
Magenta	BF4-9836	
Yellow		
Black		

Low Frequency Coil Results (continued) **Coherency to BF7-7005 (Green)**



From top to bottom: PSD of channels and Coherency and Response Function (Amplitude and Phase) compared to Reference Channel – Logarithmic frequency scale

Colour	Channel	Notes
Blue	BF7-7001	
Green	BF7-7005	
Red	BF7-7008	
Cyan	BF4-9122	
Magenta	BF4-9836	
Yellow		
Black		

D.5 LOW FREQUENCY COILS ... TEST 2-C

Available Coils:

TS Strip	Manufacture	Serial #	Logger #	Notes
1	EMI	BF4-9122	9E8D	
2	EMI	BF4-9836	9E8D	
3	EMI	BF4-9622	9EBA	
4	EMI	BF4-9623	9EBA	
5	EMI	BF4-9624	9EBA	
6				

Processing Parameters:

Parameters	Values
PSD Method	Welch
Window	Hanning
Window Length	4096
Segment Overlap	50%

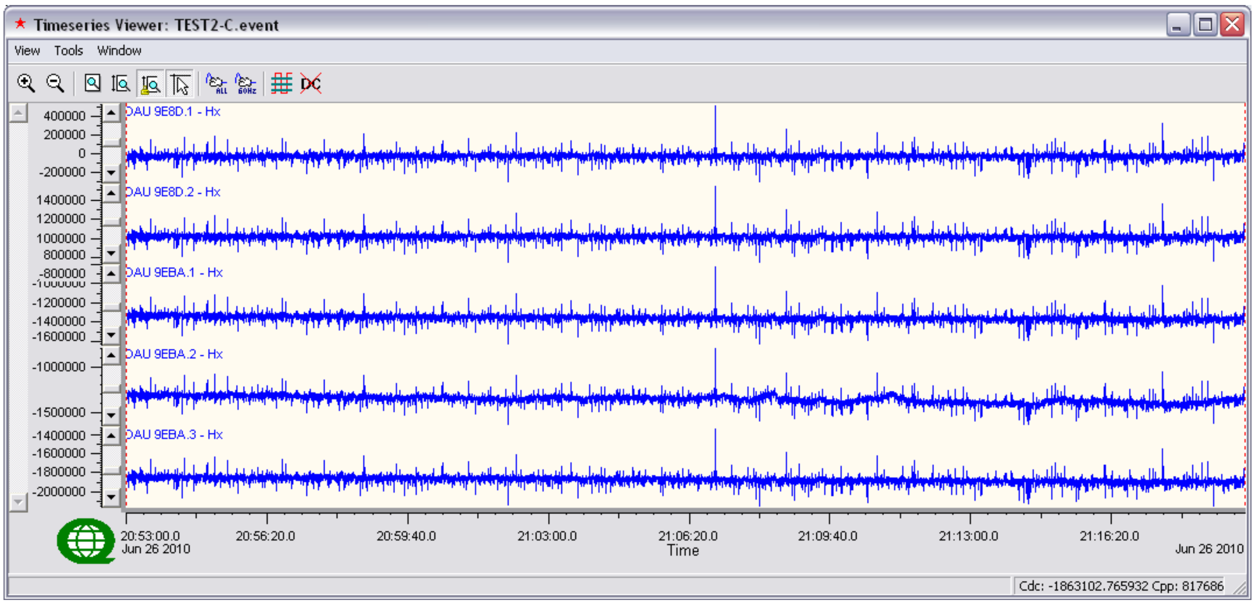
D.5.1 TEST RESULTS: 1000SPS

Event	Test 2-C
Serial Events:	9E8D-2_20100626.2044 9EBA-2_20100626.2048
Sample Rate:	1000sps
TS Length:	1,560,000 samples (~26min)

<u>Results:</u>

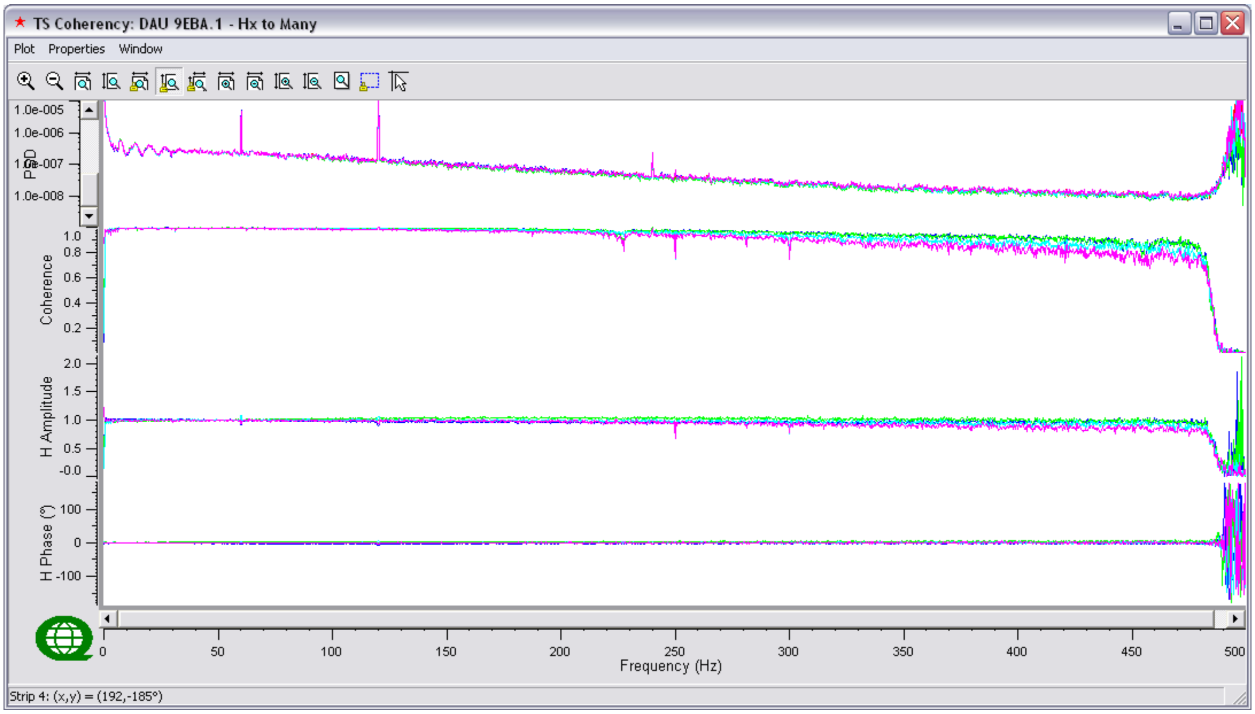
All coils OK

<u>Time Series</u>



<u>Time series @ 1000sps</u>

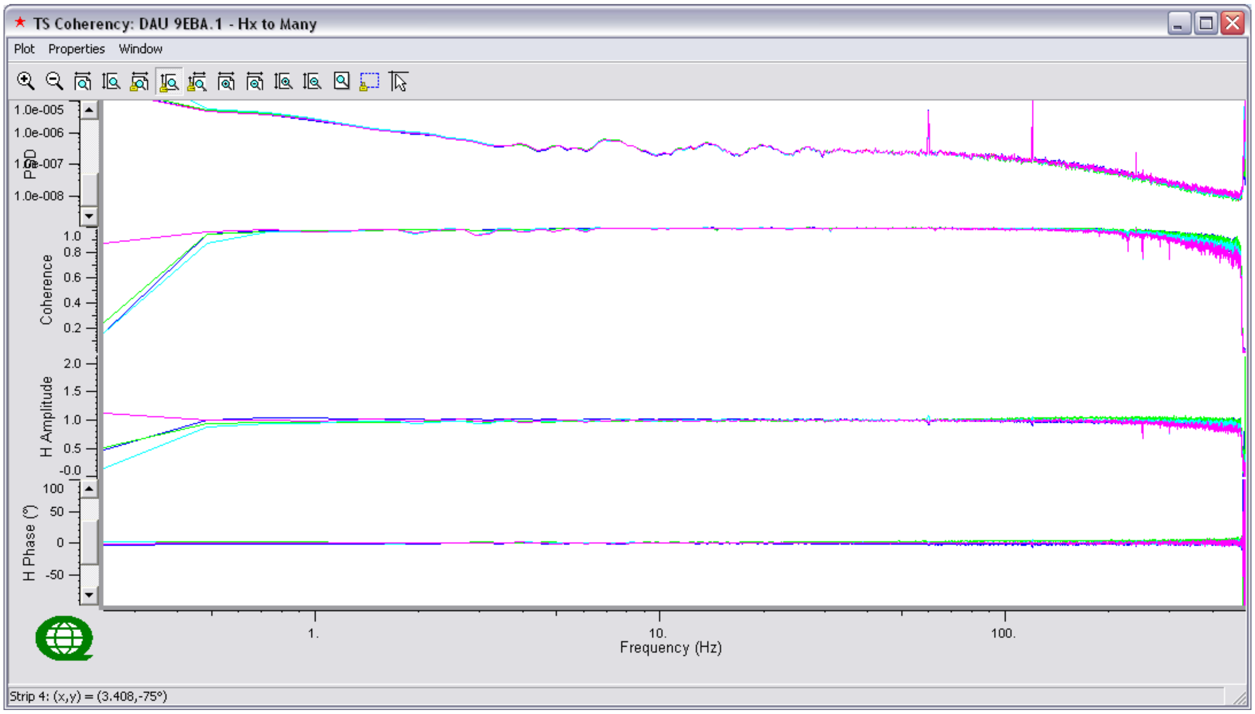
Low Frequency Coil Results **Coherency to BF4-9622(Red)**



From top to bottom: PSD of channels and Coherency and Response Function (Amplitude and Phase) compared to Reference Channel – Linear frequency scale

Colour	Channel	Notes
Blue	BF4-9122	
Green	BF4-9836	
Red	BF4-9622	
Cyan	BF4-9623	
Magenta	BF4-9624	Slightly lower coherencies above 250Hz
Yellow		
Black		

Low Frequency Coil Results (continued) **Coherency to BF4-9622(Red)**



From top to bottom: PSD of channels and Coherency and Response Function (Amplitude and Phase) compared to Reference Channel – Logarithmic frequency scale

Colour	Channel	Notes
Blue	BF4-9122	
Green	BF4-9836	
Red	BF4-9622	
Cyan	BF4-9623	
Magenta	BF4-9624	
Yellow		
Black		

D.6 LOW FREQUENCY COILS ... TEST 3-A

Available Coils:

TS Strip	Manufacture	Serial #	Logger #	Notes
1	Phoenix	P50-2451	9571	
2	Phoenix	P50-2456	9571	
3	Phoenix	P50-2461	9571	Fails all parameters
4				
5				
6				

Processing Parameters:

Parameters	Values
PSD Method	Welch
Window	Hanning
Window Length	4096
Segment Overlap	50%

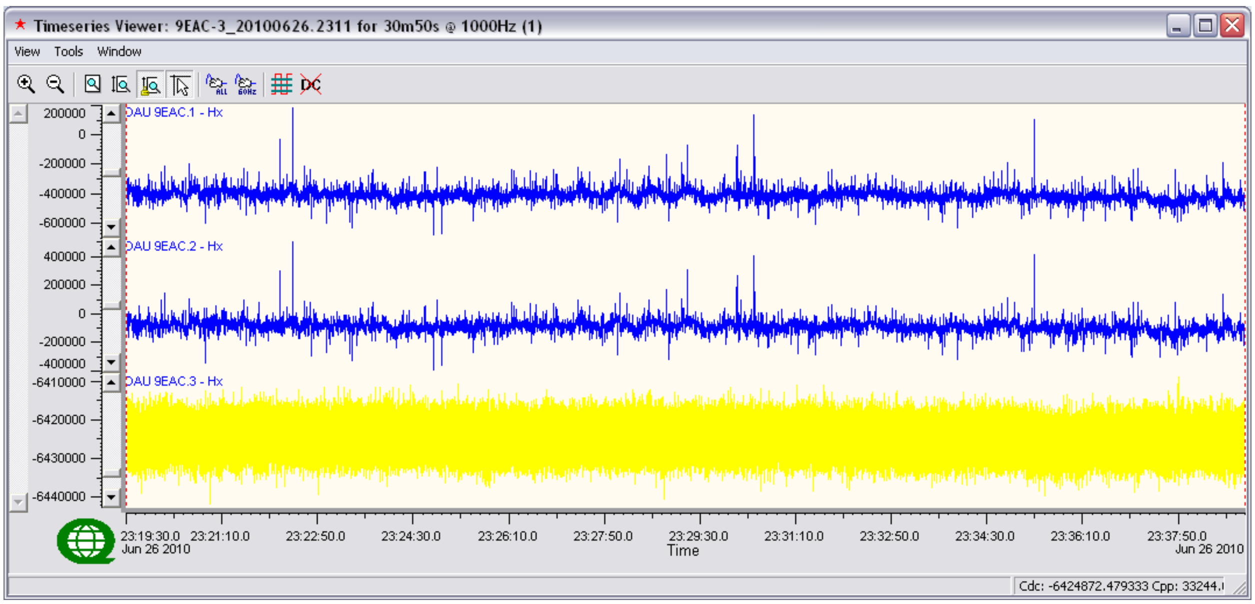
D.6.1 TEST RESULTS: 1000SPS

Event	Test 3-A
Serial Events:	9571-3_20100626.2319
Sample Rate:	1000sps
TS Length:	1,440,000 samples (~24min)

Results:

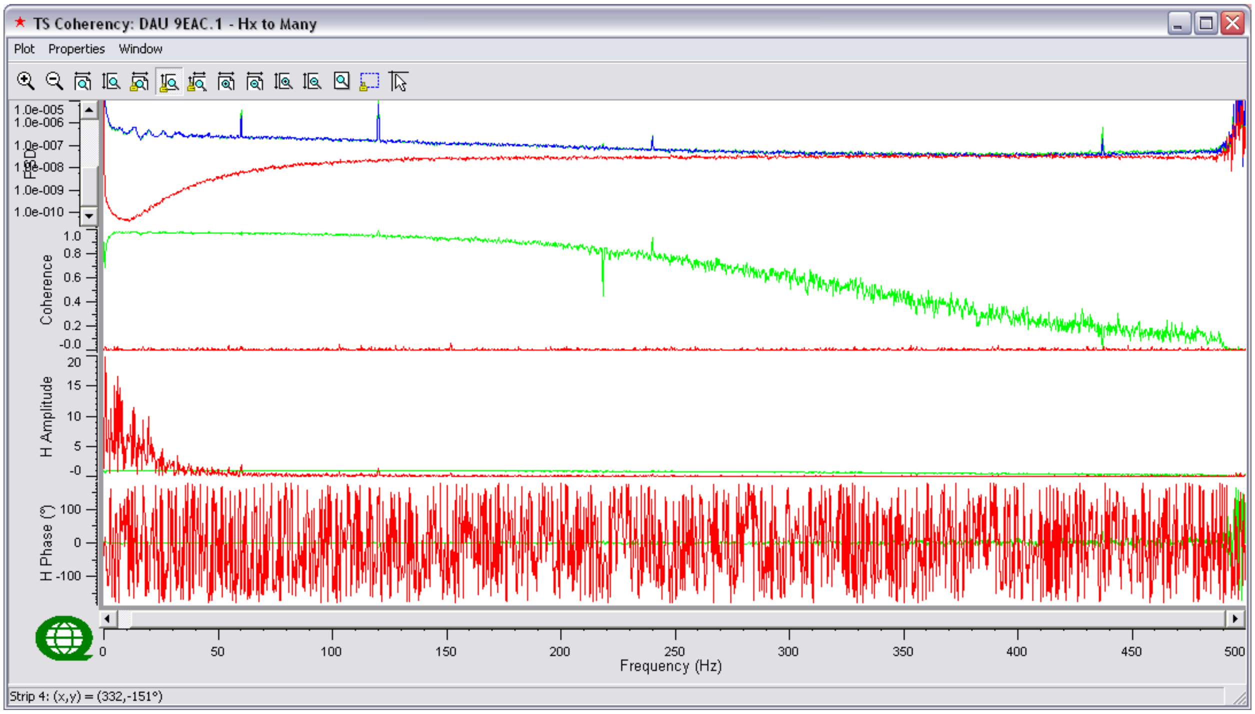
Coils tested 3 times. Logger switched from 9F07 to 9571 (with Test 2 group). Coil cable switched for this test. Results are consistent.

Time Series



Time series @ 1000sps

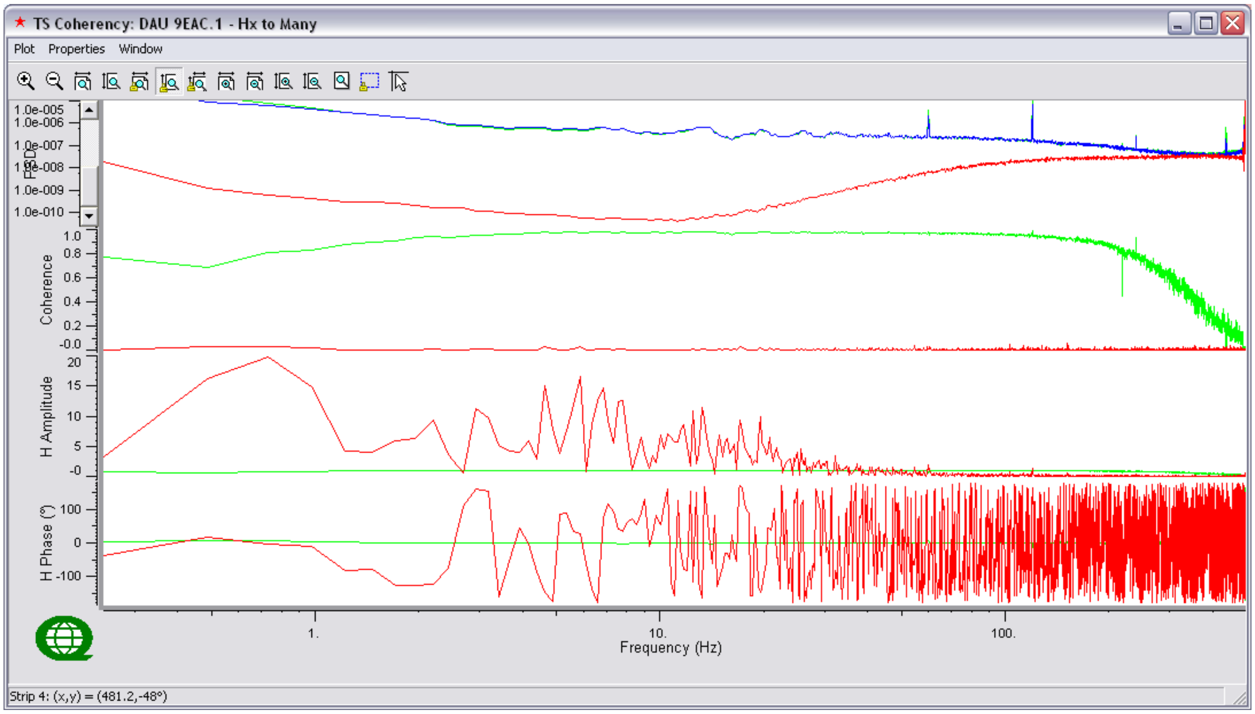
Low Frequency Coil Results **Coherency to P50-2451(Blue)**



From top to bottom: PSD of channels and Coherency and Response Function (Amplitude and Phase) compared to Reference Channel – Linear frequency scale

Colour	Channel	Notes
Blue	P50-2451	
Green	P50-2456	Slightly lower coherencies below 1Hz
Red	P50-2461	Fails all parameters
Cyan		
Magenta		
Yellow		
Black		

Low Frequency Coil Results (continued) **Coherency to P50-2451(Blue)**



From top to bottom: PSD of channels and Coherency and Response Function (Amplitude and Phase) compared to Reference Channel – Logarithmic frequency scale

Colour	Channel	Notes
Blue	P50-2451	
Green	P50-2456	Slightly lower coherencies below 1Hz
Red	P50-2461	Fails all parameters
Cyan		
Magenta		
Yellow		
Black		

D.7 LOW FREQUENCY COILS ... TEST3-B

Available Coils:

TS Strip	Manufacture	Serial #	Logger #	Notes
1	EMI	BF4-9107	9571	
2	EMI	BF4-9115	9571	
3	EMI	BF4-9119	9571	Fails all parameters
4				
5				
6				

Processing Parameters:

Parameters	Values
PSD Method	Welch
Window	Hanning
Window Length	4096
Segment Overlap	50%

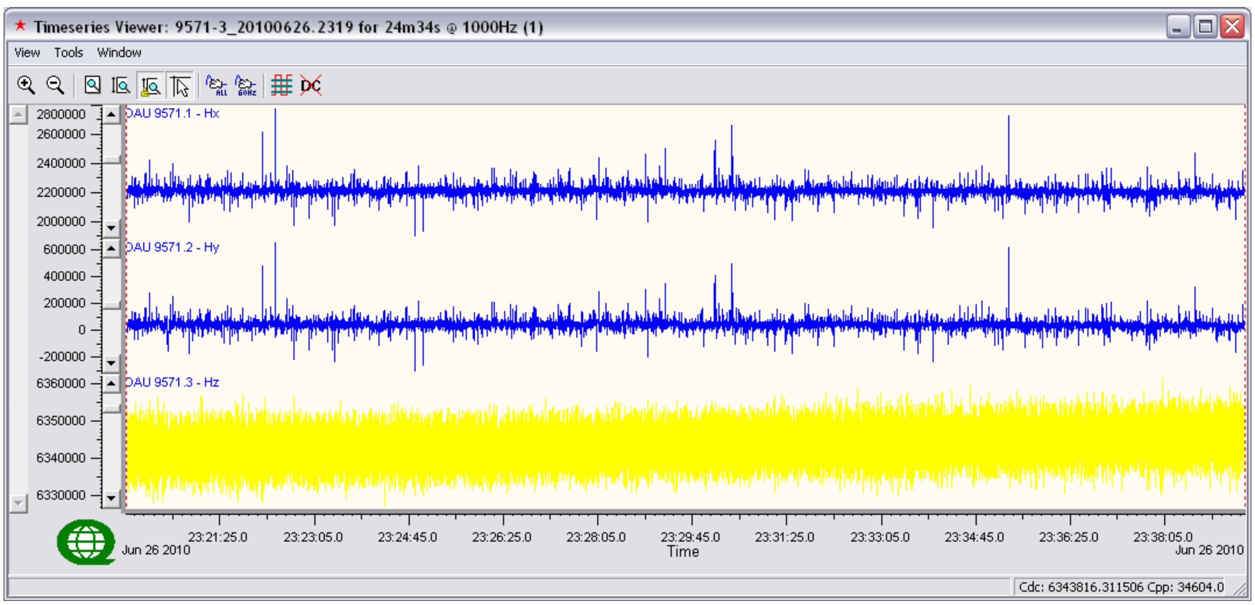
D.7.1 TEST RESULTS: 1000SPS

Event	Test 3-B
Serial Events:	9571-3_20100626.2319
Sample Rate:	1000sps
TS Length:	1,440,000 samples (~24min)

Results:

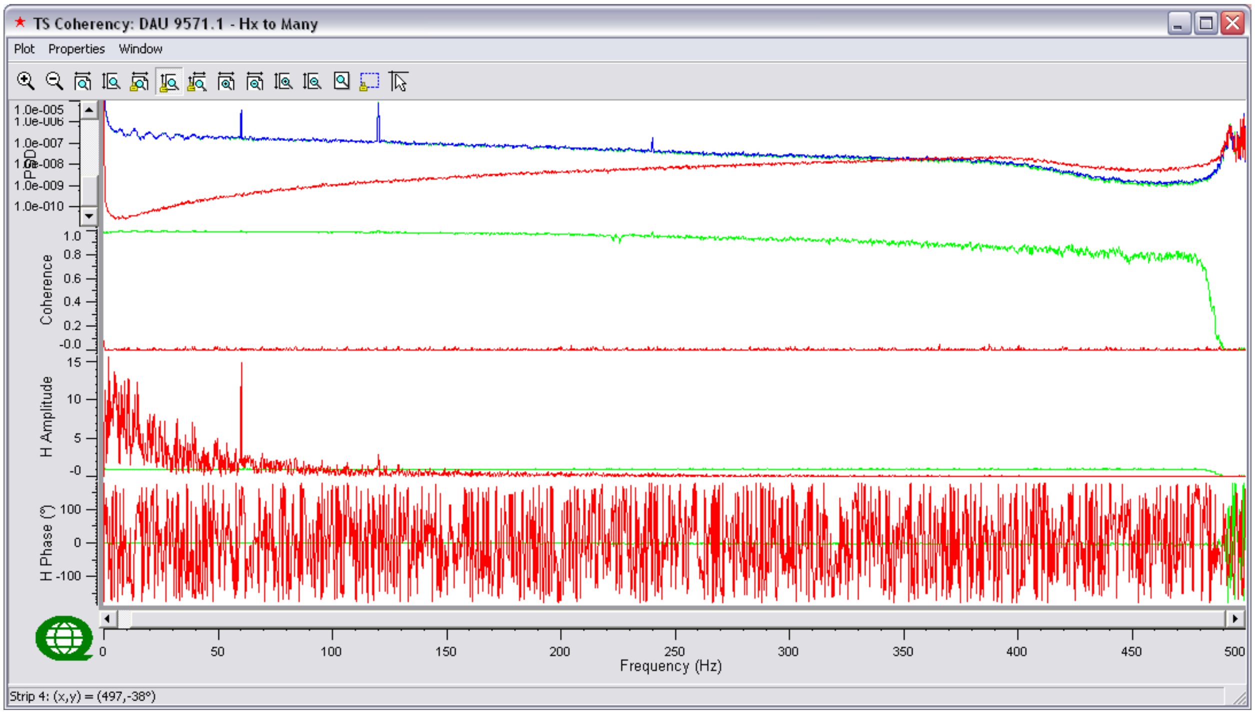
Coil 9119 was tested 3 times: Coil cable was checked and tightened (with Test 1 group). Coil cable was swapped (with Test 2 group).

Time Series



Time series @ 1000sps

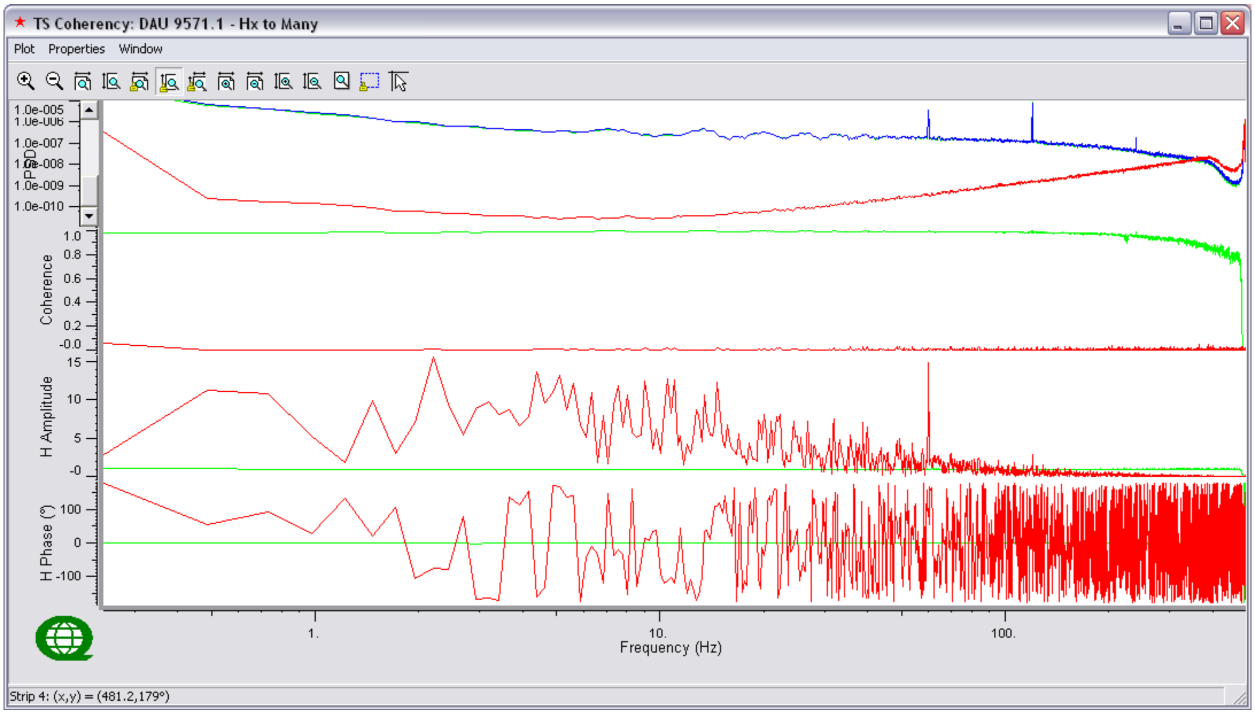
Low Frequency Coil Results **Coherency to BF4-9107(Blue)**



From top to bottom: PSD of channels and Coherency and Response Function (Amplitude and Phase) compared to Reference Channel – Linear frequency scale

Colour	Channel	Notes
Blue	BF4-9107	
Green	BF4-9115	
Red	BF4-9119	Fails all parameters
Cyan		
Magenta		
Yellow		
Black		

Low Frequency Coil Results (continued) **Coherency to BF4-9107(Blue)**



From top to bottom: PSD of channels and Coherency and Response Function (Amplitude and Phase) compared to Reference Channel – Logarithmic frequency scale

Colour	Channel	Notes
Blue	BF4-9107	
Green	BF4-9115	
Red	BF4-9119	Fails all parameters
Cyan		
Magenta		
Yellow		
Black		

D.8 LOW FREQUENCY COILS ... TEST4 (DAY2)

Available Coils:

TS Strip	Manufacture	Serial #	Logger #	Notes
1	Phoenix	P50-2451	9571	
2	Phoenix	P50-2456	9571	
3	Phoenix	P50-2461	9571	
4				
5				
6				

Processing Parameters:

Parameters	Values
PSD Method	Welch
Window	Hanning
Window Length	4096
Segment Overlap	50%

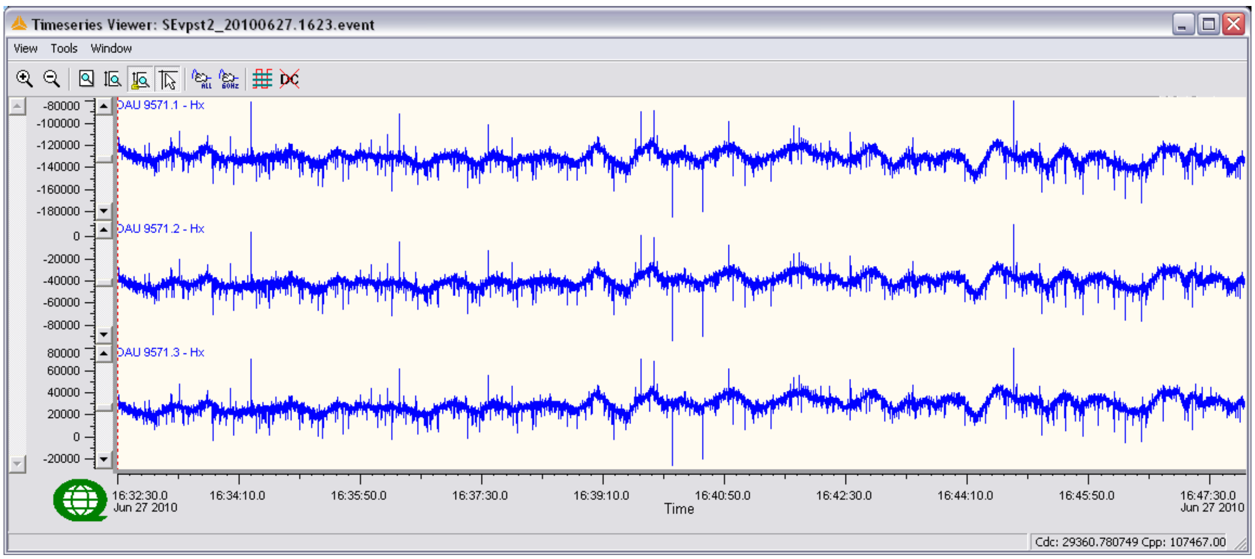
D.8.1 TEST RESULTS: 1000SPS

Event	Test4
Serial Events:	pst2_20100627.1623
Sample Rate:	1000sps
TS Length:	1,560,000 samples (~26min)

<u>Results:</u>

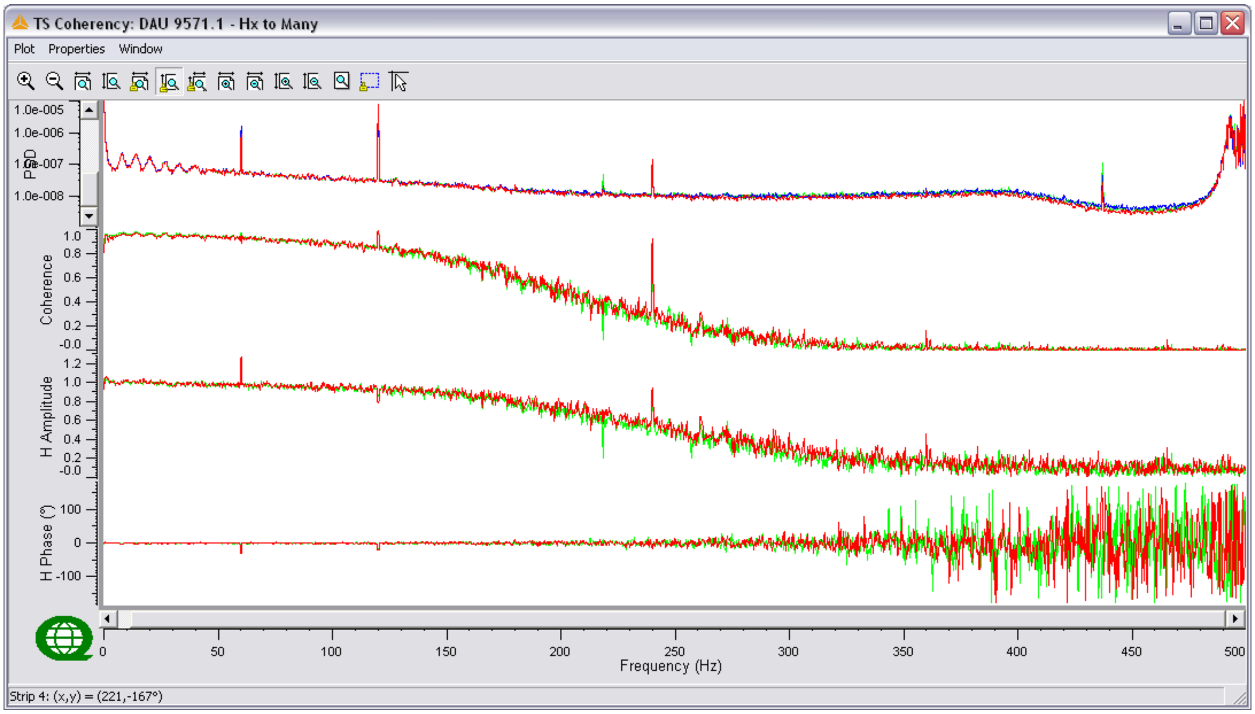
All coils OK

<u>Time Series</u>



<u>Time series @ 1000sps</u>

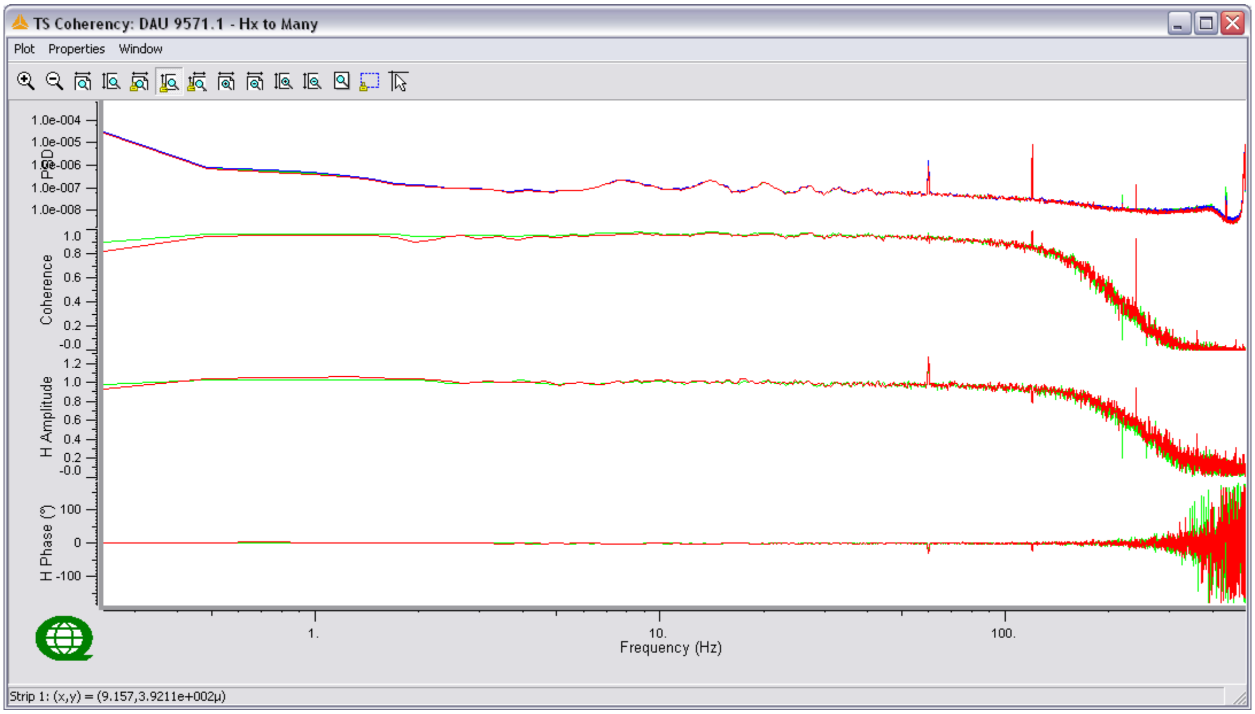
Low Frequency Coil Results **Coherency to P50-2451(Blue)**



From top to bottom: PSD of channels and Coherency and Response Function (Amplitude and Phase) compared to Reference Channel – Linear frequency scale

Colour	Channel	Notes
Blue	P50-2451	
Green	P50-2456	
Red	P50-2461	
Cyan		
Magenta		
Yellow		
Black		

Low Frequency Coil Results (continued) **Coherency to P50-2451(Blue)**



From top to bottom: PSD of channels and Coherency and Response Function (Amplitude and Phase) compared to Reference Channel – Logarithmic frequency scale

Colour	Channel	Notes
Blue	P50-2451	
Green	P50-2456	
Red	P50-2461	
Cyan		
Magenta		
Yellow		
Black		

D.9 LOW FREQUENCY COILS ... TEST5

Available Coils:

TS Strip	Manufacture	Serial #	Logger #	Notes
1	Phoenix	P50-2451	9571	
2	Phoenix	P50-2456	9571	
3	Phoenix	P50-2461	9571	
4				
5				
6				

D.9.1 TEST RESULTS: 1000SPS

Event Test5

Serial Events: 9571-5_20100627.1706

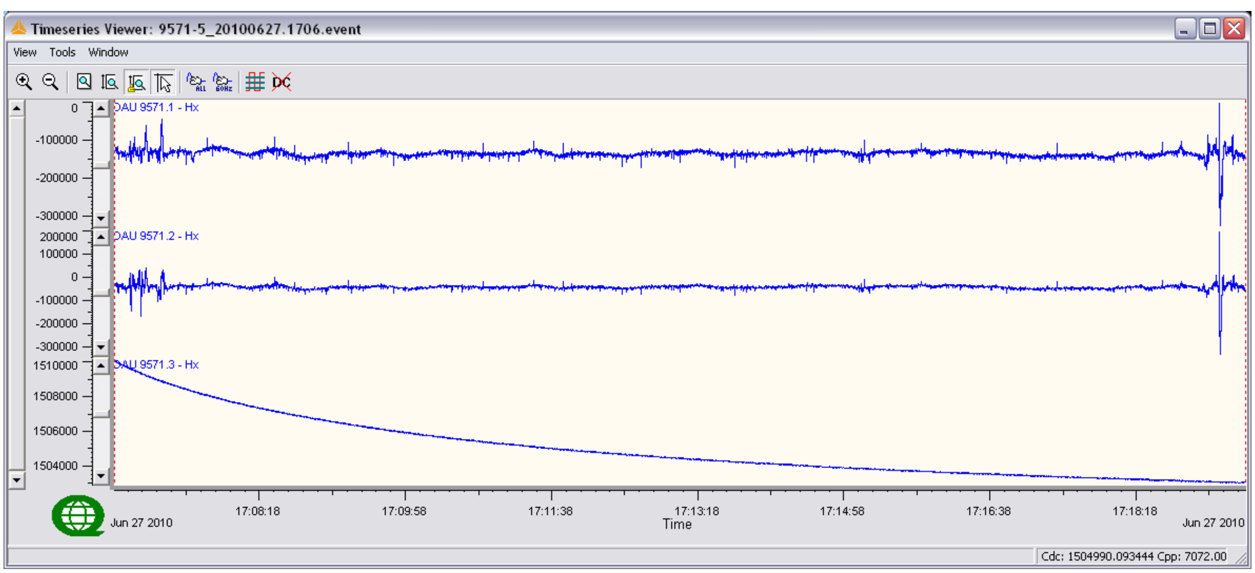
Sample Rate: 1000sps

TS Length: 780,000 samples (~13min)

Results:

Coils had previously passed test (Test4), after switching coils to opposite side of spider the z-coil did not track

Time Series



Time series @ 1000sps

D.10 Low Frequency Coils … Test6

Available Coils:

TS Strip	Manufacture	Serial #	Logger #	Notes
1	Phoenix	P50-2461	9571	
2	Phoenix	P50-2456	9571	
3	Phoenix	P50-2451	9571	
4				
5				
6				

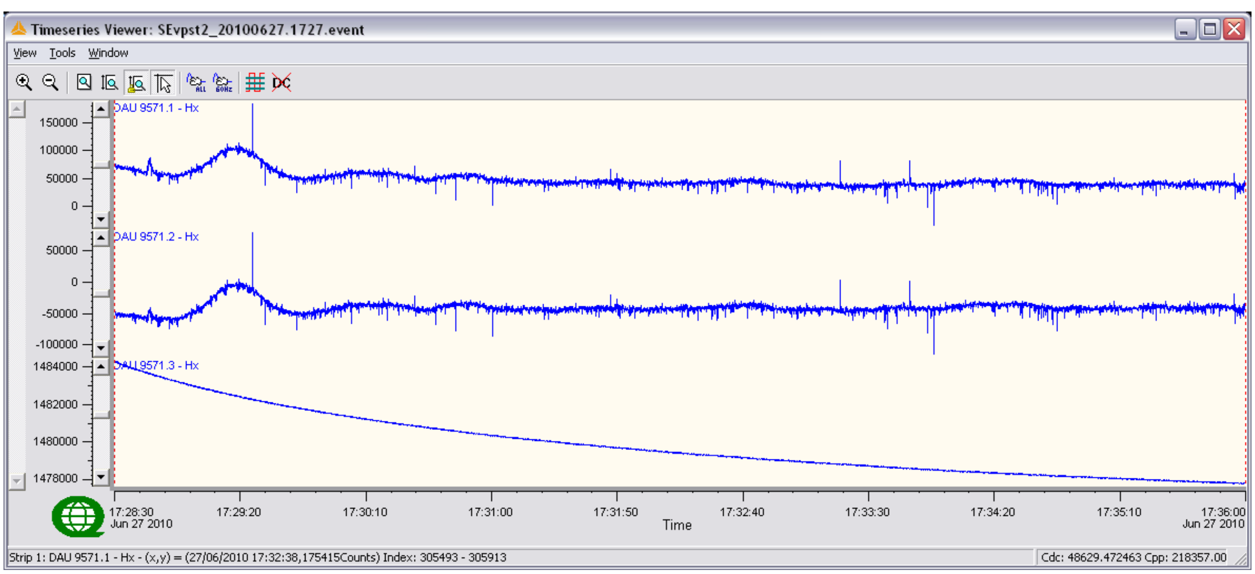
D.10.1 Test Results: 1000sps

Event	Test6
Serial Events:	SEvpst2_20100627.1727
Sample Rate:	1000sps
TS Length:	600,000 samples (~10min)

Results:

After z-input failure in Test5 coils in x and z inputs were switched, z inputs continued to fail all parameters. Spider flagged as bad.

Time Series



Time series @ 1000sps

D.11 LOW FREQUENCY COILS ... TEST7

Available Coils:

TS Strip	Manufacture	Serial #	Logger #	Notes
1	Phoenix	P50-2451	9F07	
2	Phoenix	P50-2456	9F07	
3	Phoenix	P50-2461	9F07	
4				
5				
6				

Processing Parameters:

Parameters	Values
PSD Method	Welch
Window	Hanning
Window Length	4096
Segment Overlap	50%

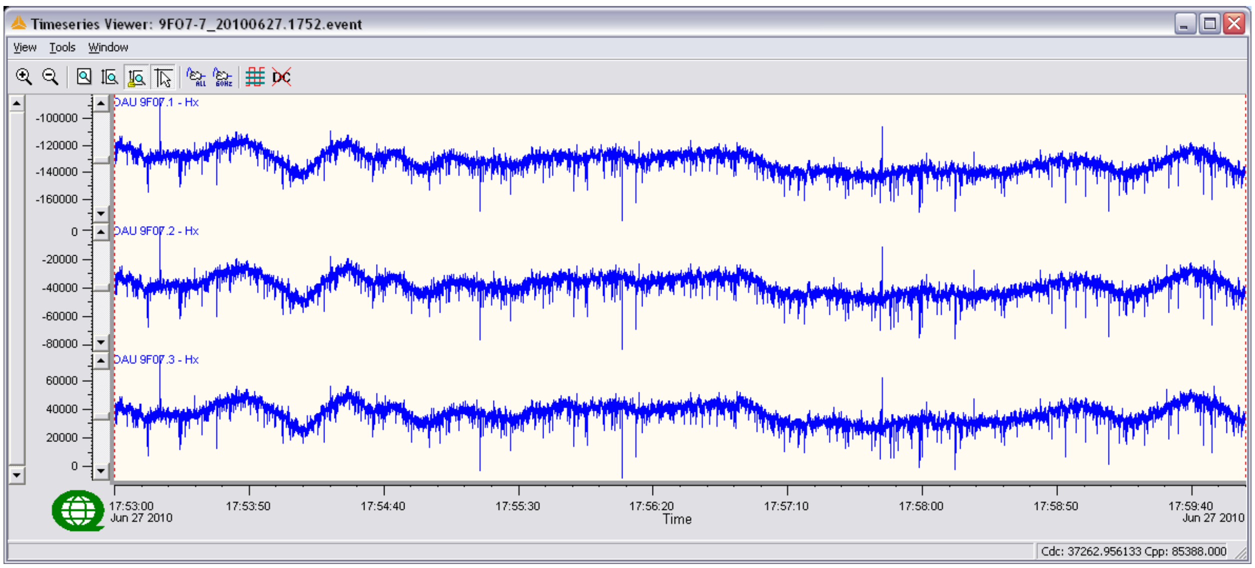
D.11.1 TEST RESULTS: 1000SPS

Event	Test7
Serial Events:	9FO7-7_20100627.1752
Sample Rate:	1000sps
TS Length:	480,000 samples (~8min)

Results:

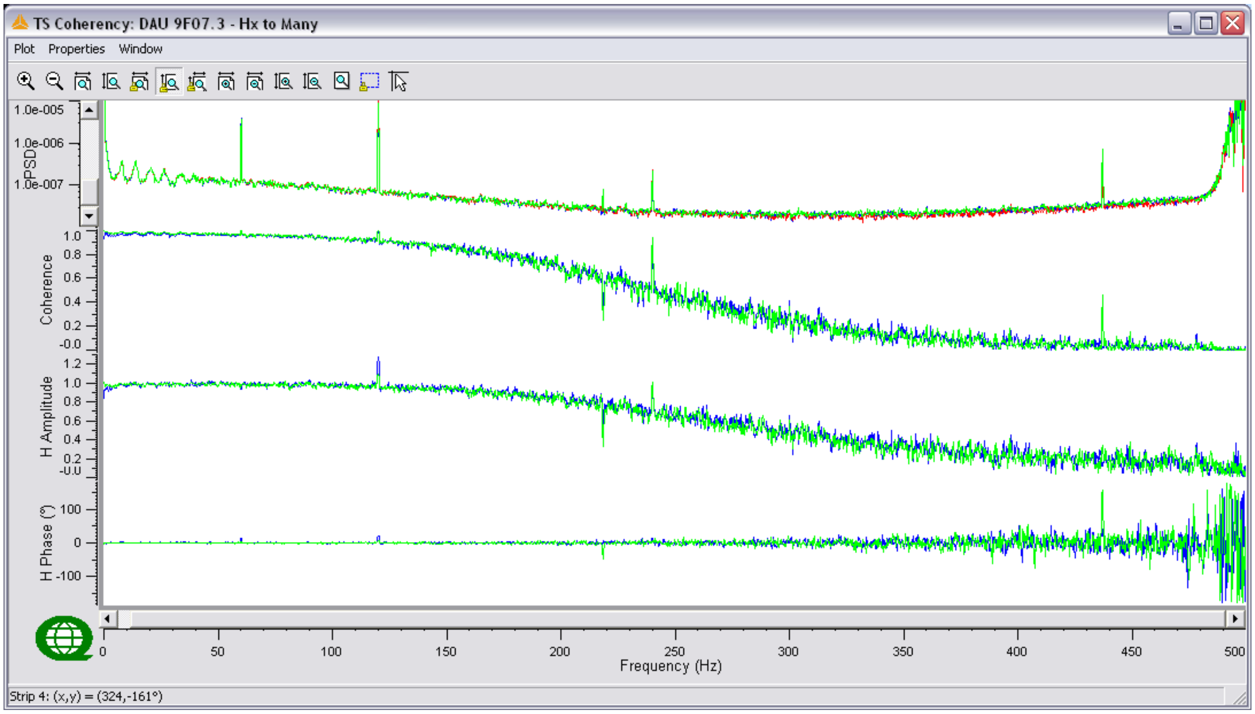
After failing day 1 tests, 9F07 was retested using different spider, everything was OK.

Time Series



Time series @ 1000sps

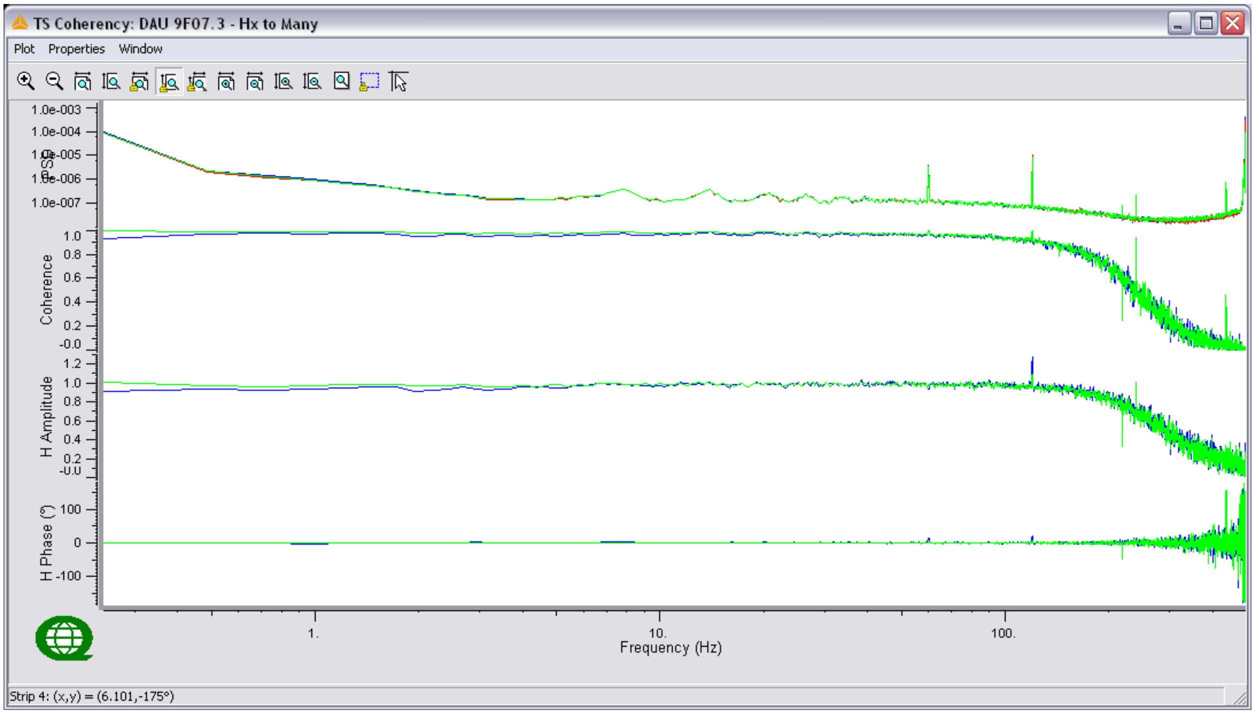
Low Frequency Coil Results **Coherency to P50-2461(Red)**



From top to bottom: PSD of channels and Coherency and Response Function (Amplitude and Phase) compared to Reference Channel – Linear frequency scale

Colour	Channel	Notes
Blue	P50-2451	
Green	P50-2456	
Red	P50-2461	
Cyan		
Magenta		
Yellow		
Black		

Low Frequency Coil Results (continued) **Coherency to P50-2461(Red)**



<u>From top to bottom: PSD of channels and Coherency and Response Function (Amplitude and Phase) compared to Reference Channel – Logarithmic frequency scale</u>

Colour	Channel	Notes
Blue	P50-2451	
Green	P50-2456	
Red	P50-2461	
Cyan		
Magenta		
Yellow		
Black		

D.12 LOW FREQUENCY COILS … TEST8

Available Coils:

TS Strip	Manufacture	Serial #	Logger #	Notes
1	EMI	BF4-9107	9F07	
2	EMI	BF4-9115	9F07	
3	EMI	BF4-9119	9F07	
4				
5				
6				

Processing Parameters:

Parameters	Values
PSD Method	Welch
Window	Hanning
Window Length	4096
Segment Overlap	50%

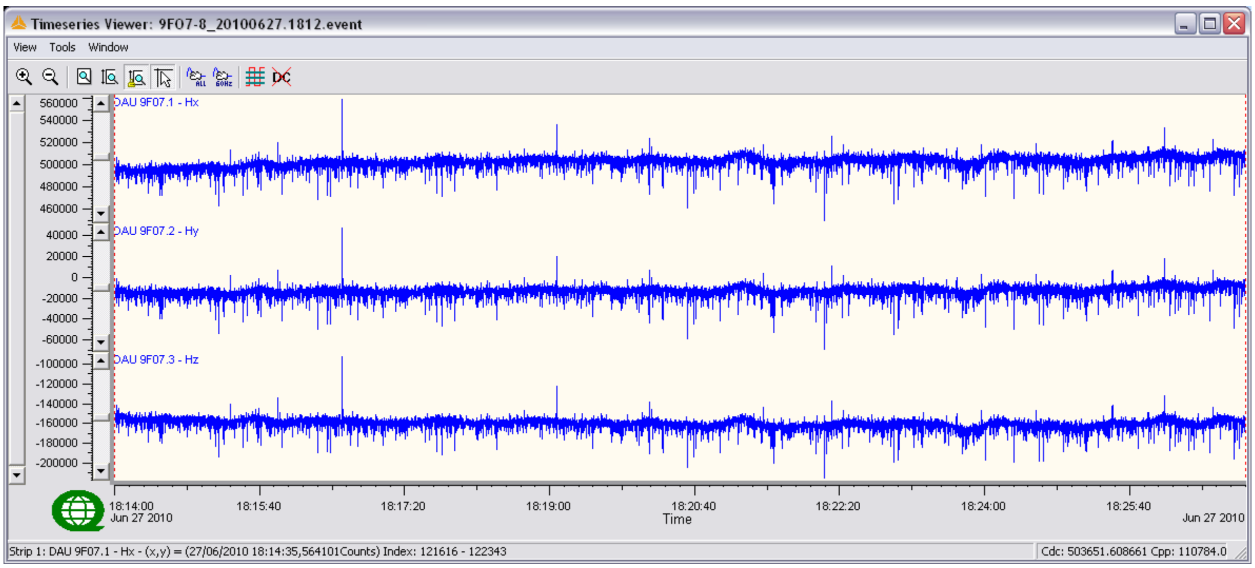
D.12.1 *TEST RESULTS: 1000SPS*

Event	Test8
Serial Events:	9FO7-8_20100627.1812
Sample Rate:	1000sps
TS Length:	960,000 samples (~16min)

Results:

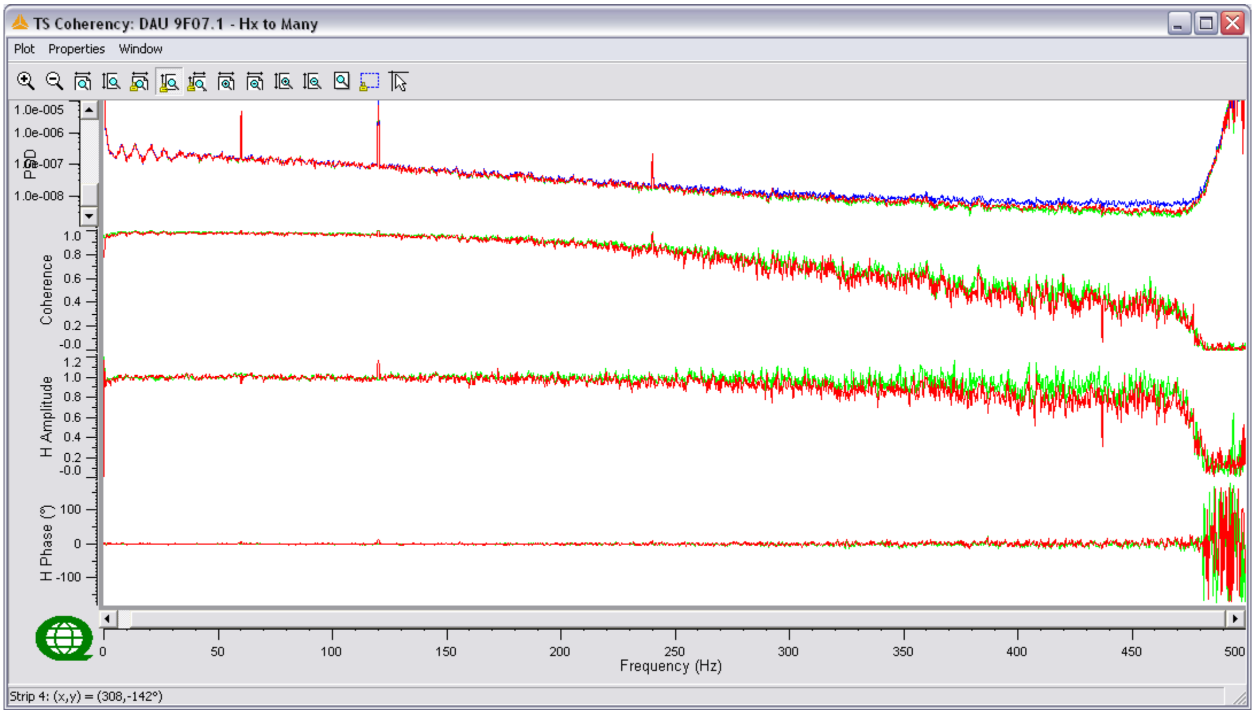
All coils OK

Time Series



Time series @ 1000sps

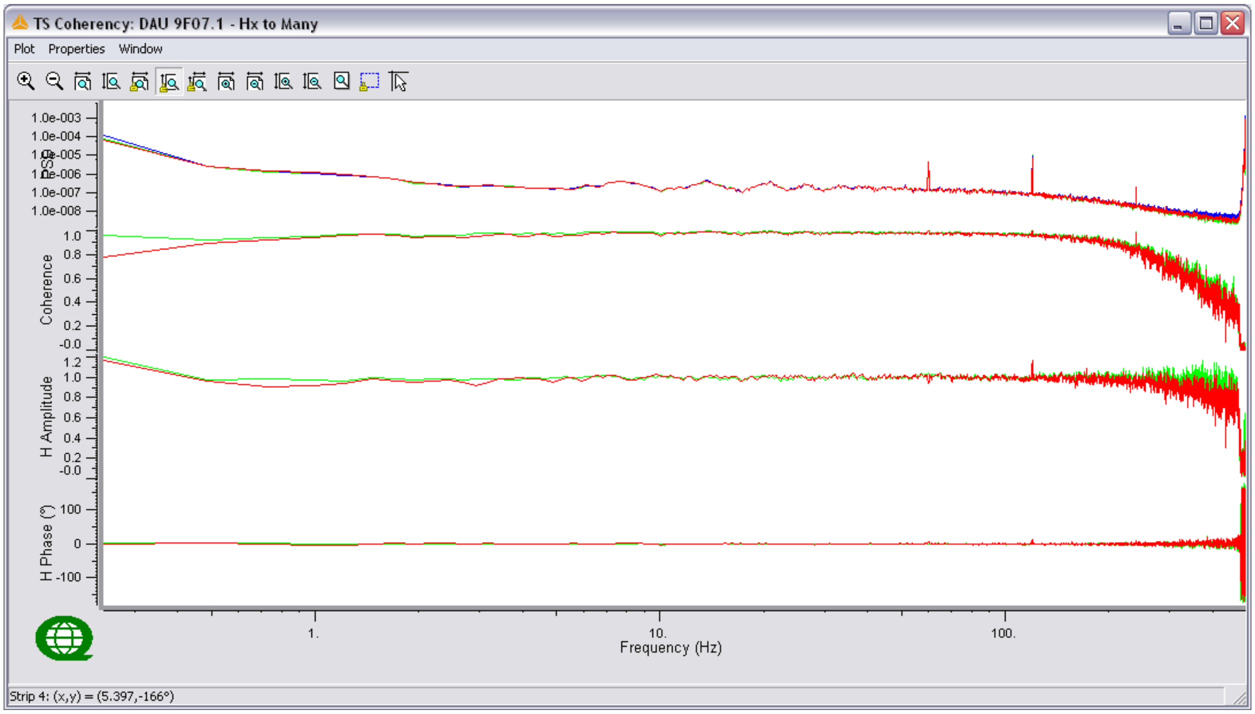
Low Frequency Coil Results **Coherency to BF4-9107(Blue)**



From top to bottom: PSD of channels and Coherency and Response Function (Amplitude and Phase) compared to Reference Channel – Linear frequency scale

Colour	Channel	Notes
Blue	BF4-9107	
Green	BF4-9115	
Red	BF4-9119	
Cyan		
Magenta		
Yellow		
Black		

Low Frequency Coil Results (continued) **Coherency to BF4-9107(Blue)**



From top to bottom: PSD of channels and Coherency and Response Function (Amplitude and Phase) compared to Reference Channel – Logarithmic frequency scale

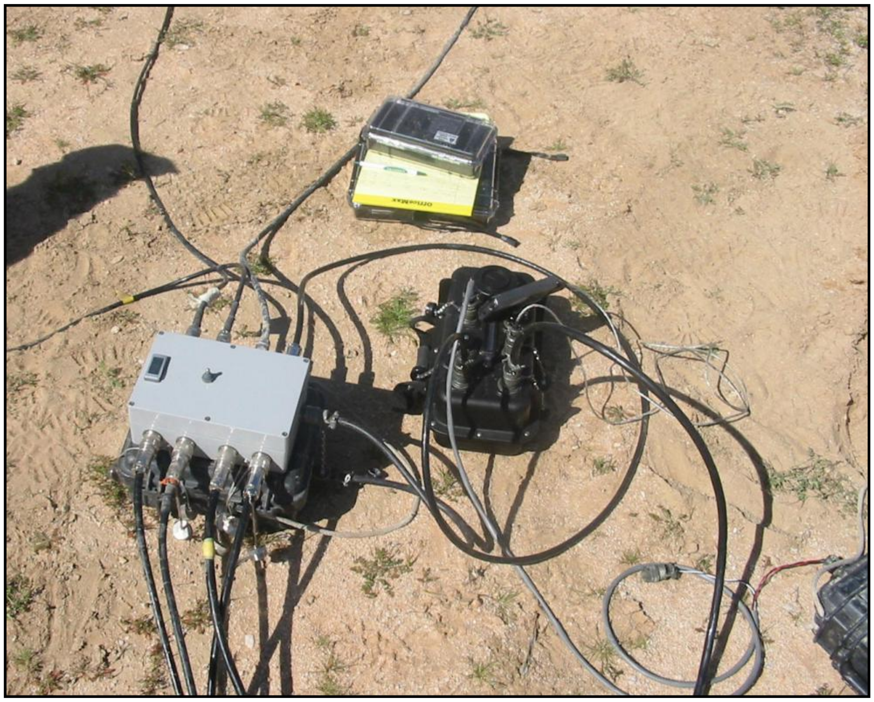
Colour	Channel	Notes
Blue	BF4-9107	
Green	BF4-9115	
Red	BF4-9119	
Cyan		
Magenta		
Yellow		
Black		

E INSTRUMENTS SPECIFICATIONS

E.1 REF TEK – 130 QUANTECREV2 DATA ACQUISITION SYSTEM

Refraction Technology Inc. – Plano, Texas

Specifications:



Specification	Description
Mechanical – DAS	
Size:	5.3" (135mm) high x 7.3" (185mm) wide x 13.5" (343mm) long
Weight:	4.5 lbs (2 kg)
Watertight Integrity:	IP 67
Shock:	Survives a 1 meter drop on any axis
Operating Temperature:	-20°C to +60°C
Connectors	
Channel Input:	PTO7A14-19S (2 each for 6-Channel DAS)
Power:	PTO7A12-4S
NET:	PTO7A14-19P
Serial:	PTO7A12-10P
GPS Antenna:	PTO7A12-8S
Power	

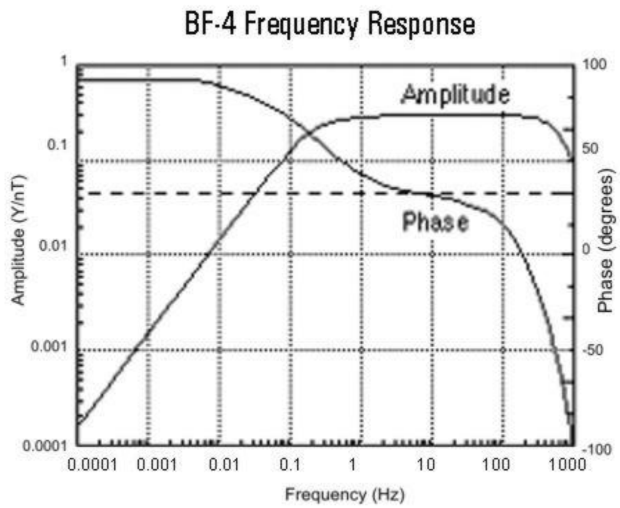
<table>
<tr><th>Specification</th><th colspan="5">Description</th></tr>
<tr><td>Input Voltage:</td><td colspan="5">10 to 16 VDC</td></tr>
<tr><td>Average Power:</td><td colspan="5">~3 W (3 ch., no communications)</td></tr>
<tr><td></td><td colspan="5">~3.4 W (3 ch., with communications)</td></tr>
<tr><td></td><td colspan="5">~4 W (6 ch., no communications)</td></tr>
<tr><td></td><td colspan="5">~4.4 W (6 ch., with communications)</td></tr>
<tr><td colspan="6">Communications</td></tr>
<tr><td>NET Connector:</td><td colspan="5"></td></tr>
<tr><td>Ethernet:</td><td colspan="5">10-BaseT, TCP/IP, UDP/IP, FTP, RTP</td></tr>
<tr><td>Serial:</td><td colspan="5">Asynchronous, RS-232 , PPP, TCP/IP, UDP/IP, FTP, RTP</td></tr>
<tr><td>Serial Connector:</td><td colspan="5"></td></tr>
<tr><td>Terminal:</td><td colspan="5">Asynchronous, RS-232 , 130 Command</td></tr>
<tr><td colspan="6">A/D Converter</td></tr>
<tr><td>Type:</td><td colspan="5">$\Delta-\Sigma$ modulation, 256 KHz base rate, 24-bit output resolution</td></tr>
<tr><td>Channels:</td><td colspan="5">6</td></tr>
<tr><td rowspan="5">Input Impedance:</td><td>Filter</td><td colspan="4"></td></tr>
<tr><td>A</td><td colspan="4">100 Mohms, 0.002 μFd, differential</td></tr>
<tr><td>B</td><td colspan="4">100 Mohms, 0.002 μFd, differential</td></tr>
<tr><td>C</td><td colspan="4">100 Mohms, 0.002 μFd, differential</td></tr>
<tr><td>D</td><td colspan="4">100 Mohms, 0.002 μFd, differential</td></tr>
<tr><td>Common Mode Rejection:</td><td colspan="5">Greater than 70 dB within +/-2.5VDC</td></tr>
<tr><td rowspan="7">Sensor Input Signal Range:</td><td rowspan="2">Gain</td><td rowspan="2">Input Full Scale (volts)</td><td colspan="2">Bit Weight</td><td rowspan="7"></td></tr>
<tr><td>Actual</td><td>Reported</td></tr>
<tr><td>1</td><td>+/- 10 V</td><td>1.907μV</td><td>62.50mV</td></tr>
<tr><td>4</td><td>+/- 2.5 V</td><td>476.8nV</td><td>15.63mV</td></tr>
<tr><td>16</td><td>+/- 625 mV</td><td>119.2nV</td><td>3.906mV</td></tr>
<tr><td>64</td><td>+/- 156 mV</td><td>29.80nV</td><td>976.6μV</td></tr>
<tr><td>256</td><td>+/- 39 mV</td><td>7.45nV</td><td>244.1μV</td></tr>
<tr><td>Noise Level:</td><td colspan="5">~1 count RMS at 50 sps @x1</td></tr>
<tr><td>Sample Rates:</td><td colspan="5">1000, 500, 250, 200, 125, 100, 50, 40, 25, 20, 10, 5, 1 sps</td></tr>
<tr><td colspan="6">Time Base</td></tr>
<tr><td>Type:</td><td colspan="5">GPS Receiver/Clock plus a disciplined oscillator</td></tr>
<tr><td>Accuracy with GPS:</td><td colspan="5">+/- 100 μsec after validated 3-D fix and locked</td></tr>
<tr><td>Free-Running Accuracy:</td><td colspan="5">0.1 ppm over the temperature range of 0^{o}C to 40^{o}C, and 0.2 ppm from -20^{o}C to 0^{o}C</td></tr>
<tr><td colspan="6">Recording Modes</td></tr>
<tr><td>Continuous:</td><td colspan="5">Record length</td></tr>
</table>

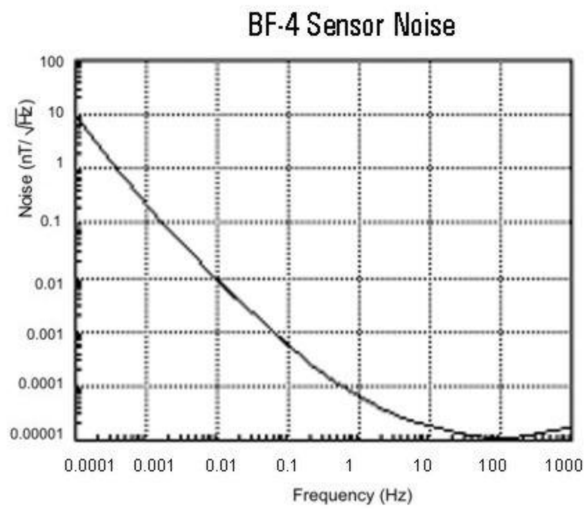
Specification	Description
Recording Capacity	
Battery Backed SRAM:	5 Mbytes
Removable Storage:	up to 8 GB with two CF type II cards
Recording Format	
Format:	PASSCAL Recording Format
Compliance	CE

E.2 BF-4 MAGNETIC FIELD INDUCTION SENSOR

Schlumberger –EMI (Electromagnetic Instruments Inc.)Technology Center

The BF-4 sensor utilizes a magnetic feedback design to provide a stable flat response over several decades of frequency. The sensors respond as a B field detector over the flat band regions. Both the amplitude and phase responses are highly stable with variations of less than 0.1dB in amplitude and +/- one degree in phase between sensors. For the frequencies below the flat response region, the sensor response is proportional to signal frequency so that the sensor acts as a dB/dt detector. The coil is potted with epoxy and housed inside a rugged impact-resistant Nema G-10 fiberglass tube. A matched low noise preamplifier is connected to the coil in a waterproof case and powered by an external +/- 12V power supply.





Features

High sensitivity
Very low noise
Magnetic feedback design
Chopper stabilized amplifier for best low frequency performance
Ruggedized and waterproof
Light weight and compact
Low power consumption
Stable phase response

Applications

Magnetotellurics
Audiomagnetotellurics
Controlled-source electromagnetics
Magnetometric resistivity

Performance

Frequency Range: 0.0001 to 1000 Hz
3 dB frequency corners: 0.2 Hz, 500 kHz
Sensitivity (flat region): 0.3 V/nT (standard)
Power consumption: 12mA at +/-12V

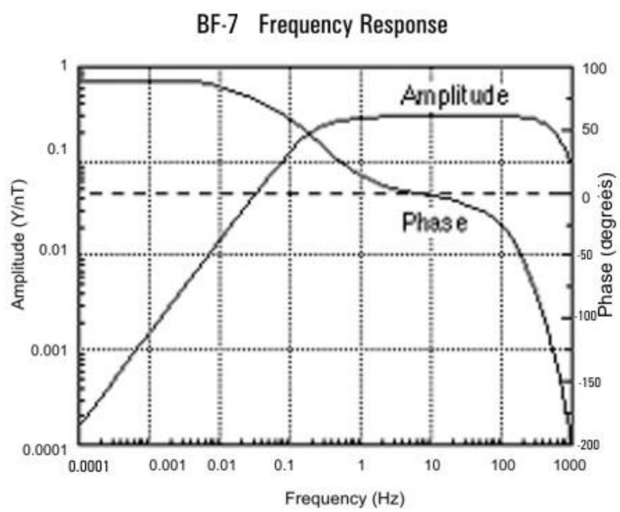
Physical

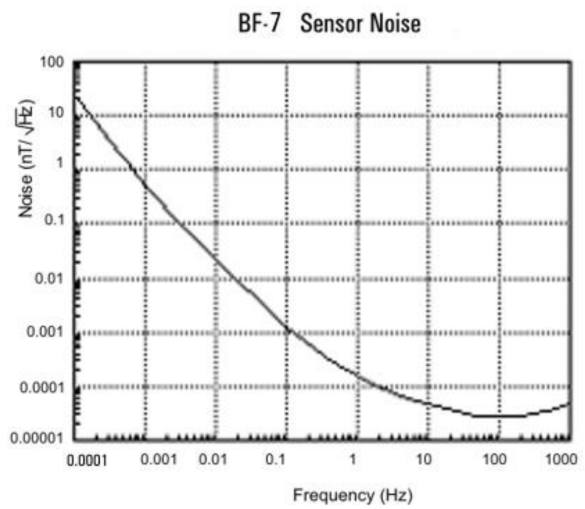
Housing: Nema G-10 straight tube
Length: 142 cm (56 inches)
Diameter: 6 cm (2.4 inches)
Weight: 7 kg (15 lbs)
Connector: 8-pin Tajimi

E.3 BF-7 MAGNETIC FIELD INDUCTION SENSOR

Schlumberger –EMI (Electromagnetic Instruments Inc.)Technology Center

The BF-7 sensor utilizes a magnetic feedback design to provide a stable flat response over several decades of frequency. The sensors respond as a B field detector over the flat band regions. Both the amplitude and phase responses are highly stable with variations of less than 0.1dB in amplitude and +/- one degree in phase between sensors. For the frequencies below the flat response region, the sensor response is proportional to signal frequency so that the sensor acts as a dB/dt detector. The coil is potted with epoxy and housed inside a rugged impact-resistant Nema G-10 fiberglass tube. A matched low noise preamplifier is connected to the coil in a waterproof case and powered by an external +/- 12V power supply. The BF-7 sensor is designed for monitoring vertical field applications.





Features

High sensitivity
Very low noise
Magnetic feedback design
Chopper stabilized amplifier for best low frequency performance
Ruggedized and waterproof
Light weight and compact
Low power consumption (290 mW)
Stable phase response

Applications

Magnetotellurics
Audiomagnetotellurics
Controlled-source electromagnetics
Magnetometric resistivity

Performance

Frequency Range: 0.0001 to 1000Hz
3 dB frequency corners: 0.2 Hz, 500kHz
Sensitivity (flat region): 0.3 V/nT (standard)
Power consumption: 12mA at +/-12V

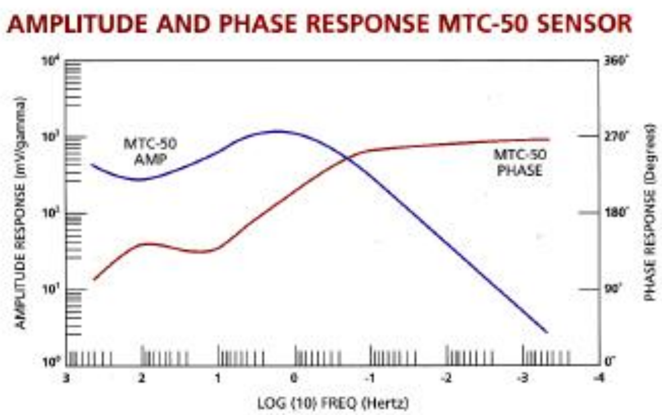
Physical

Housing: Nema G-10
Length: 104 cm (41 inches)
Diameter: 6 cm (2.4 inches)
Weight: 7 kg (15 lbs)
Connector: 8-pin Tajimi

E.4 MTC 50 (P50) SERIES MAGNETIC SENSORS

Phoenix Geophysics Ltd

MTC-50 magnetic sensor coils weigh just over 10 kg, and measure only 141 cm. They provide magnetotelluric data at frequencies between 400 Hz to 0.0002 Hz.

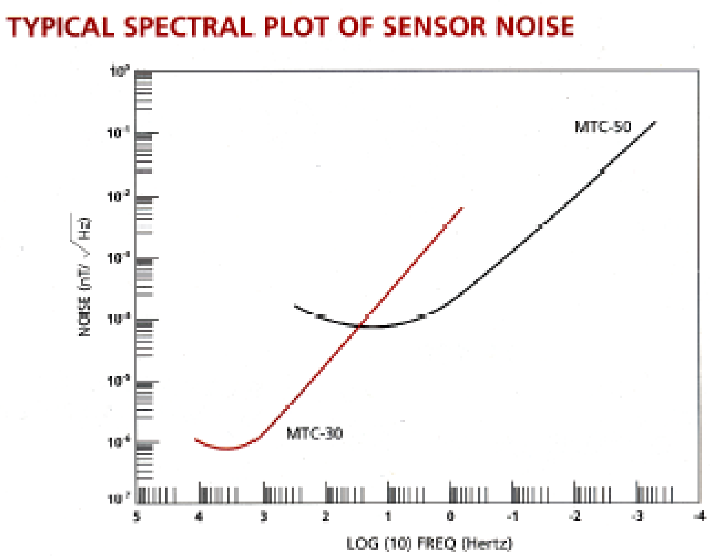


Coil model MTC-50

Overall Length	141 cm
Outside Diameter	6.0 cm
Weight	10.5 kg
Frequency Range (for MT)	400 Hz to 0.00002 Hz

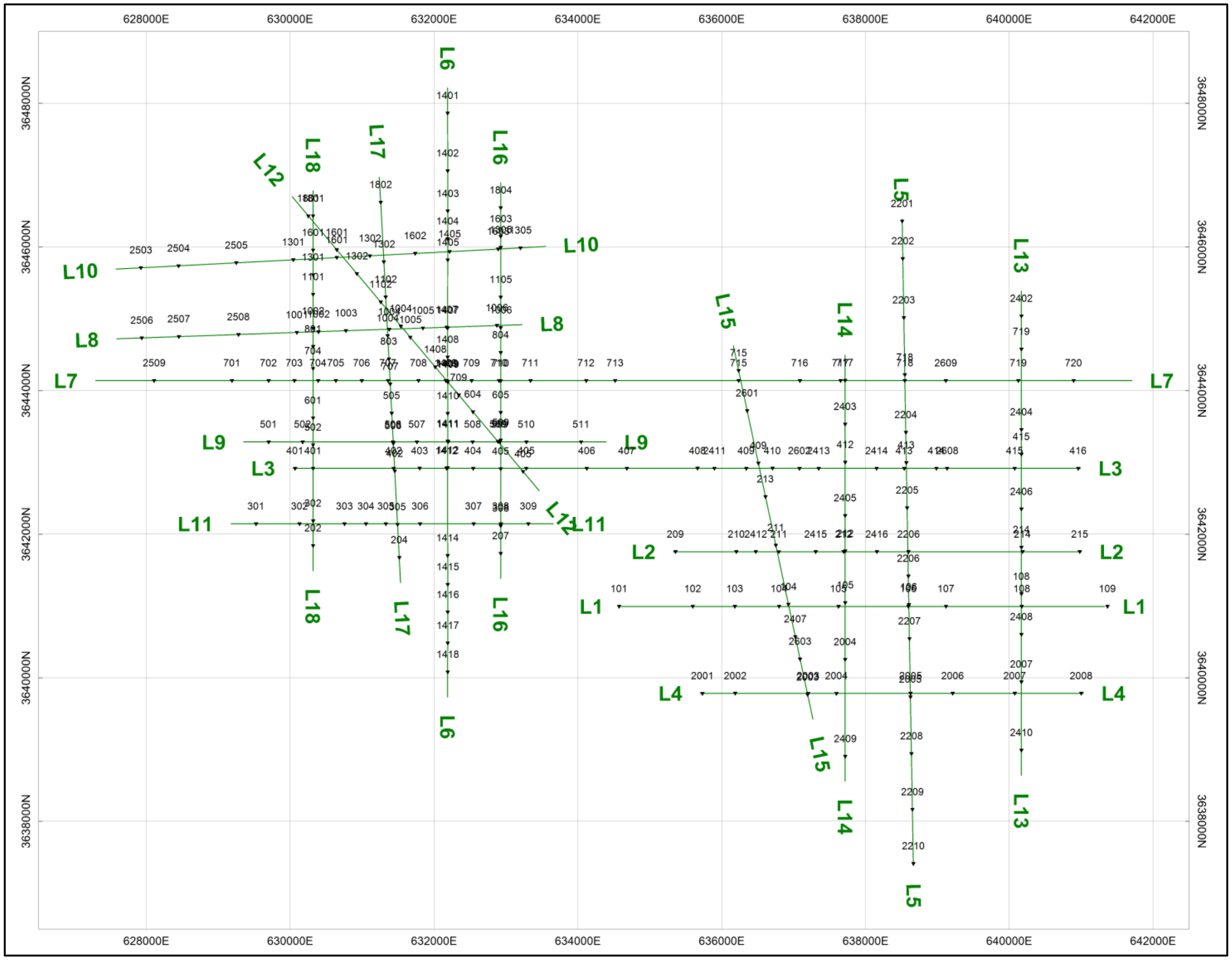
Technical Specifications

Overall Length : 141 cm
Outside Diameter : 6.0 cm
Weight : 10.5 kg
Frequency Range (for MT) :
400 Hz to 0.00002 Hz



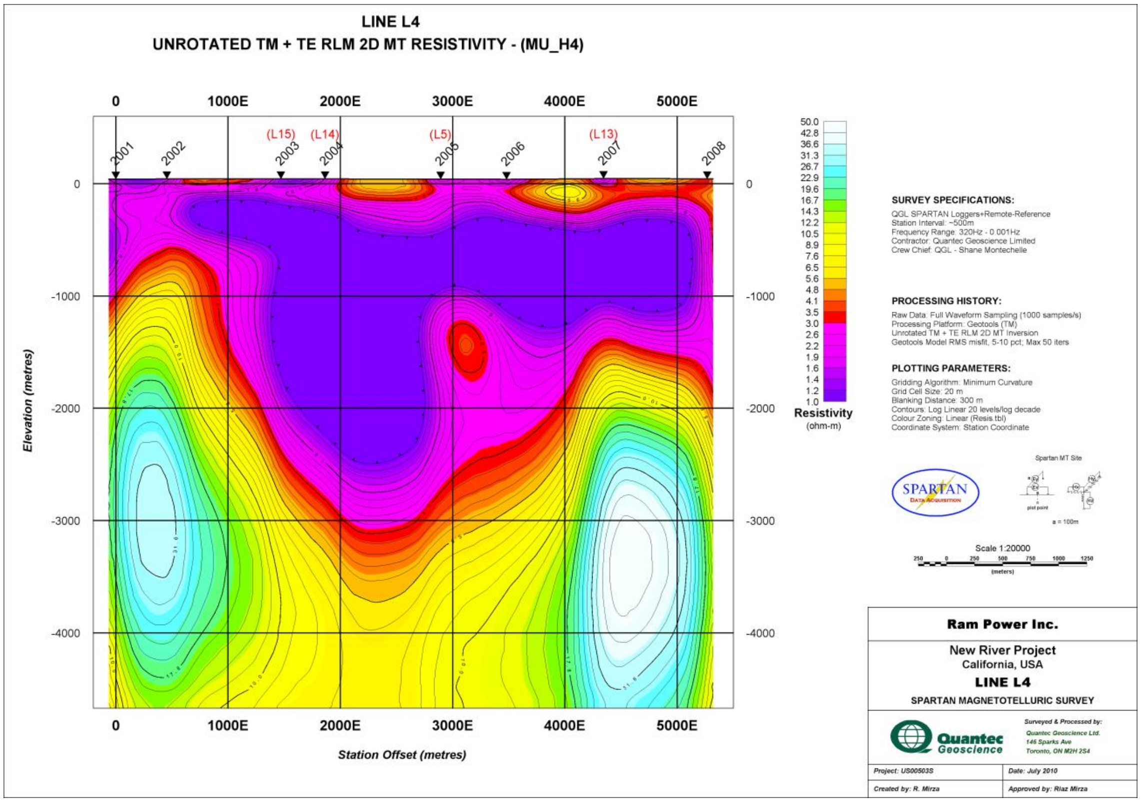
F SECTIONS OF THE 2D MODELS

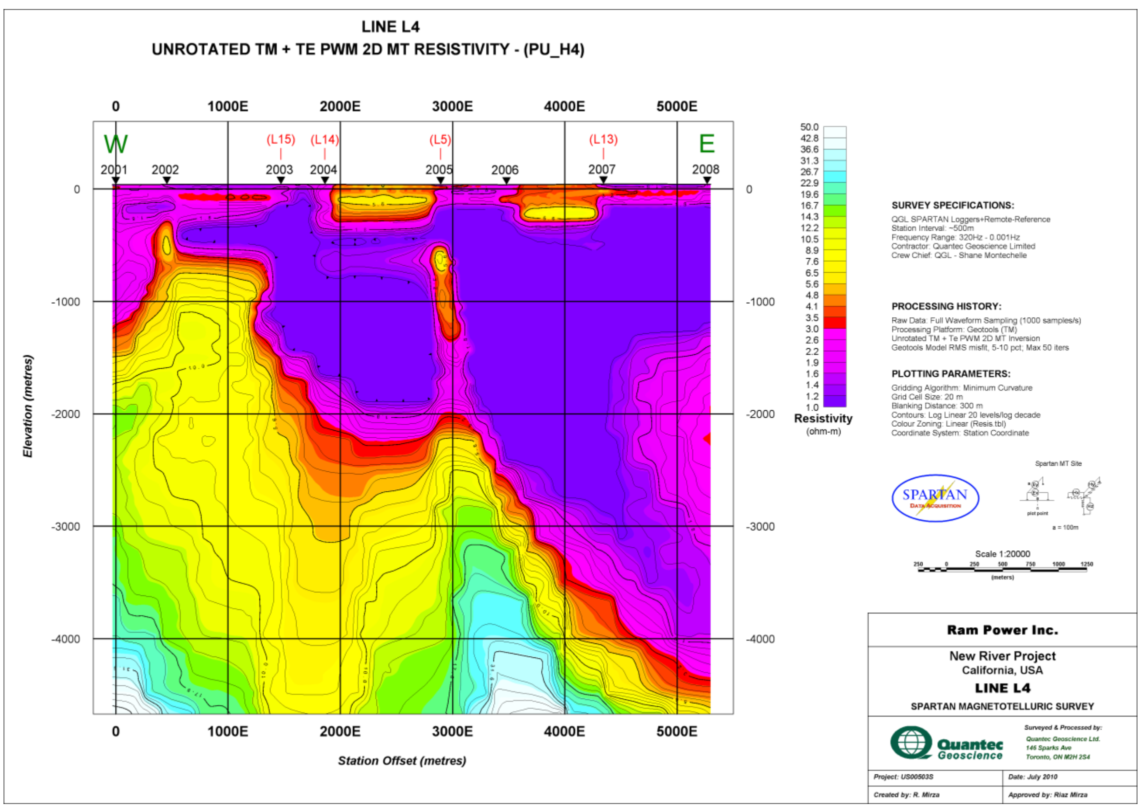
F.1 2D LINES LOCATION MAP



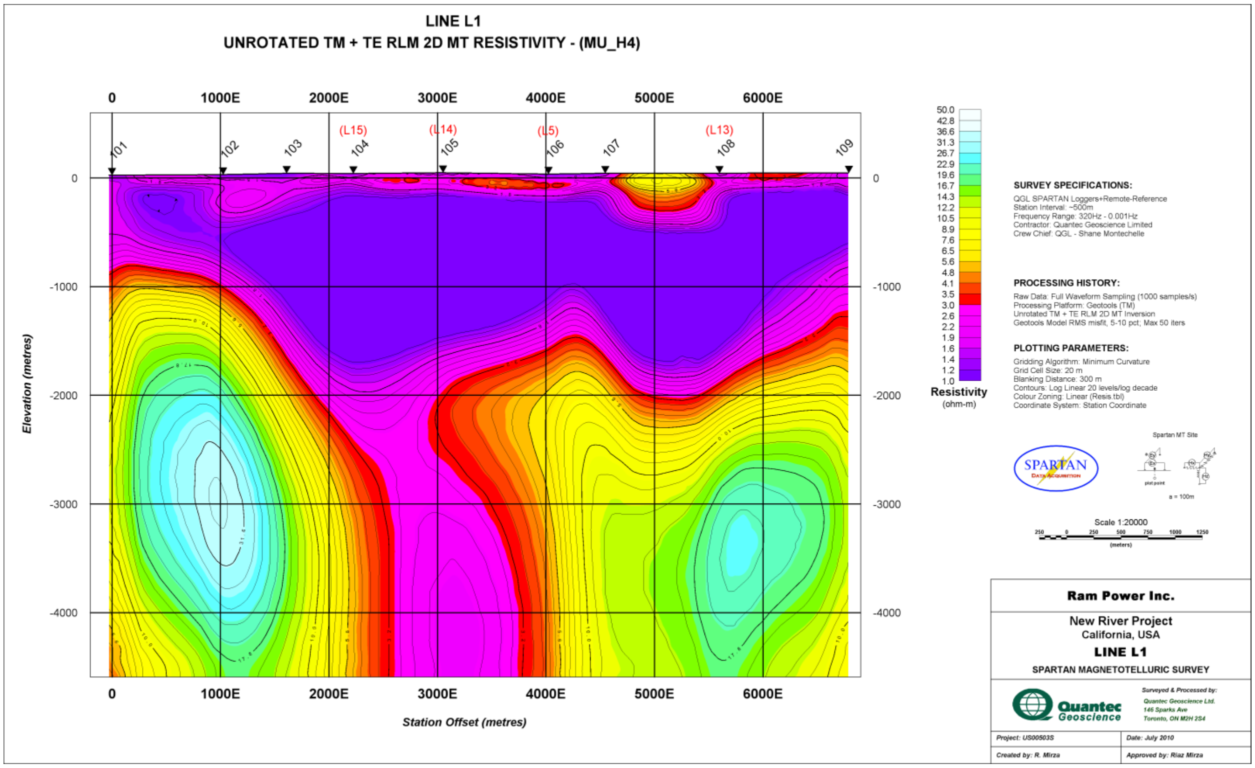
2D MT Line Location Map for Resistivity Models - RLM & PWM

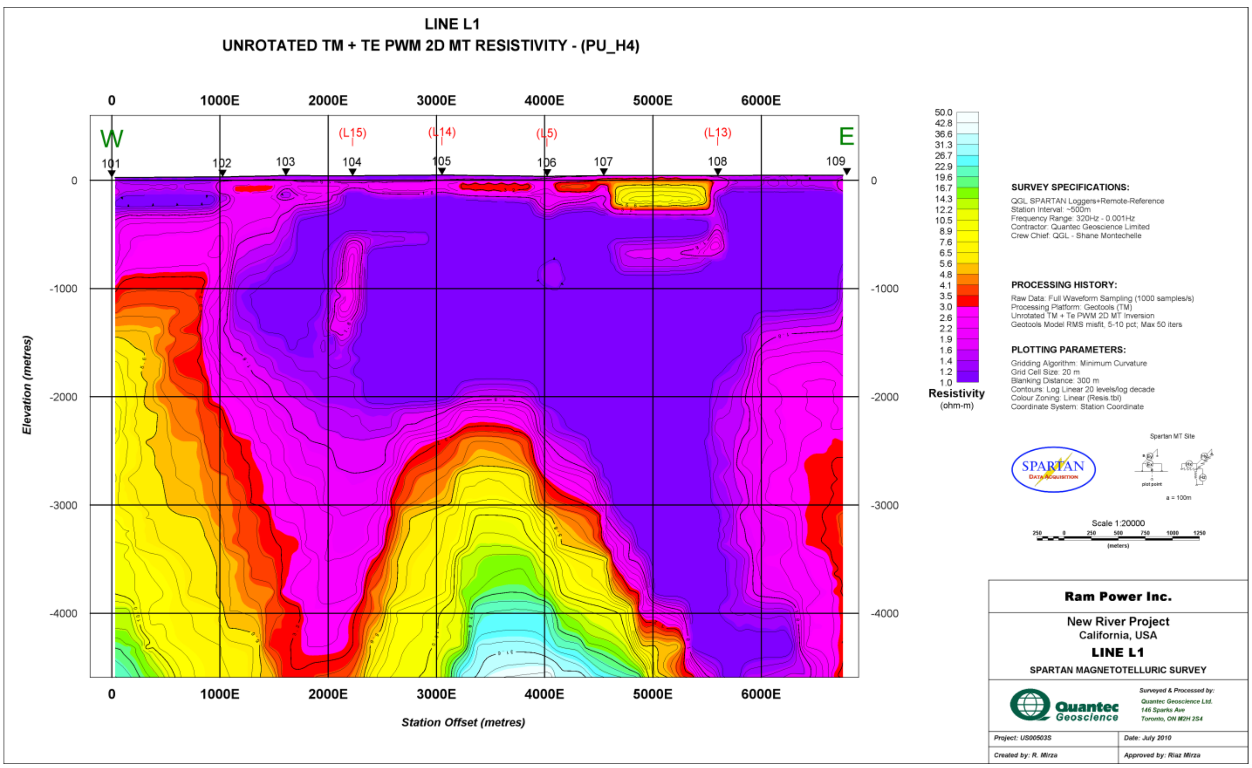
F.2 2D MT RESISTIVITY RLM & PWM SECTION MAPS (E-W LINES)



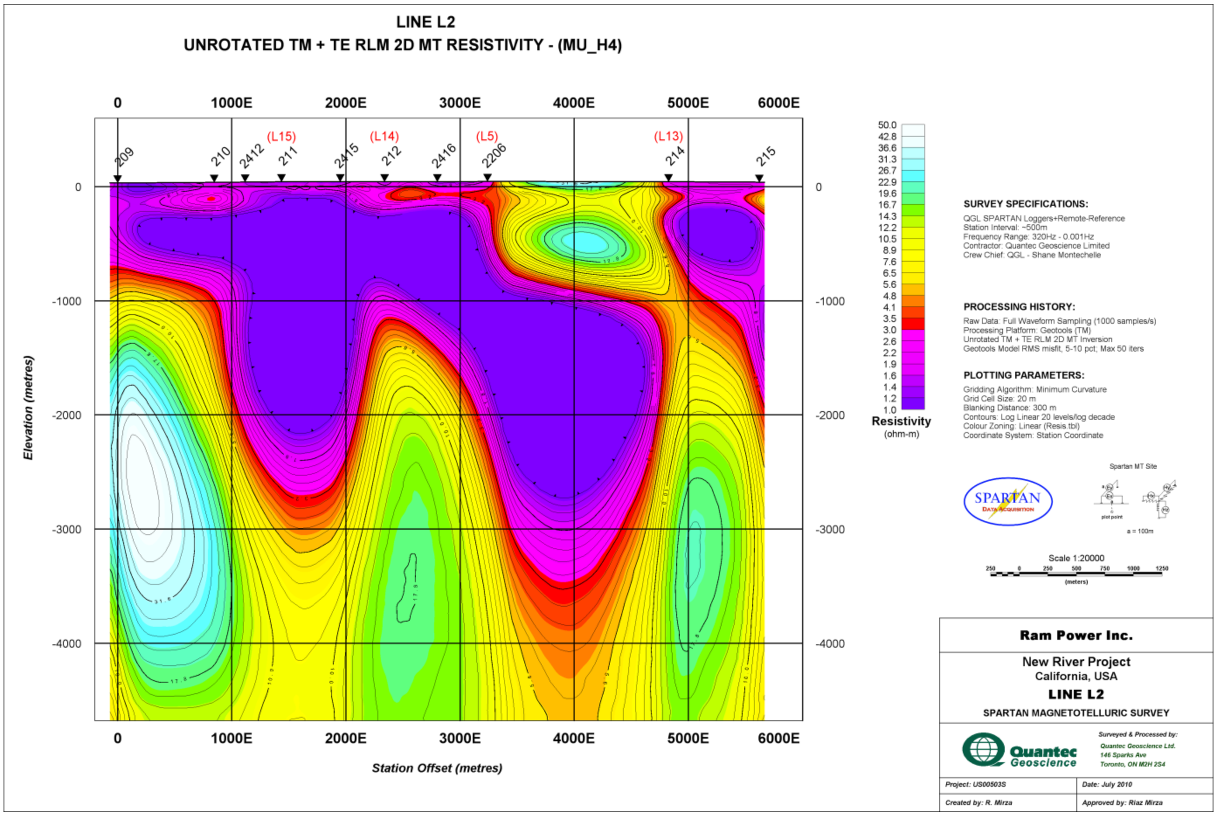


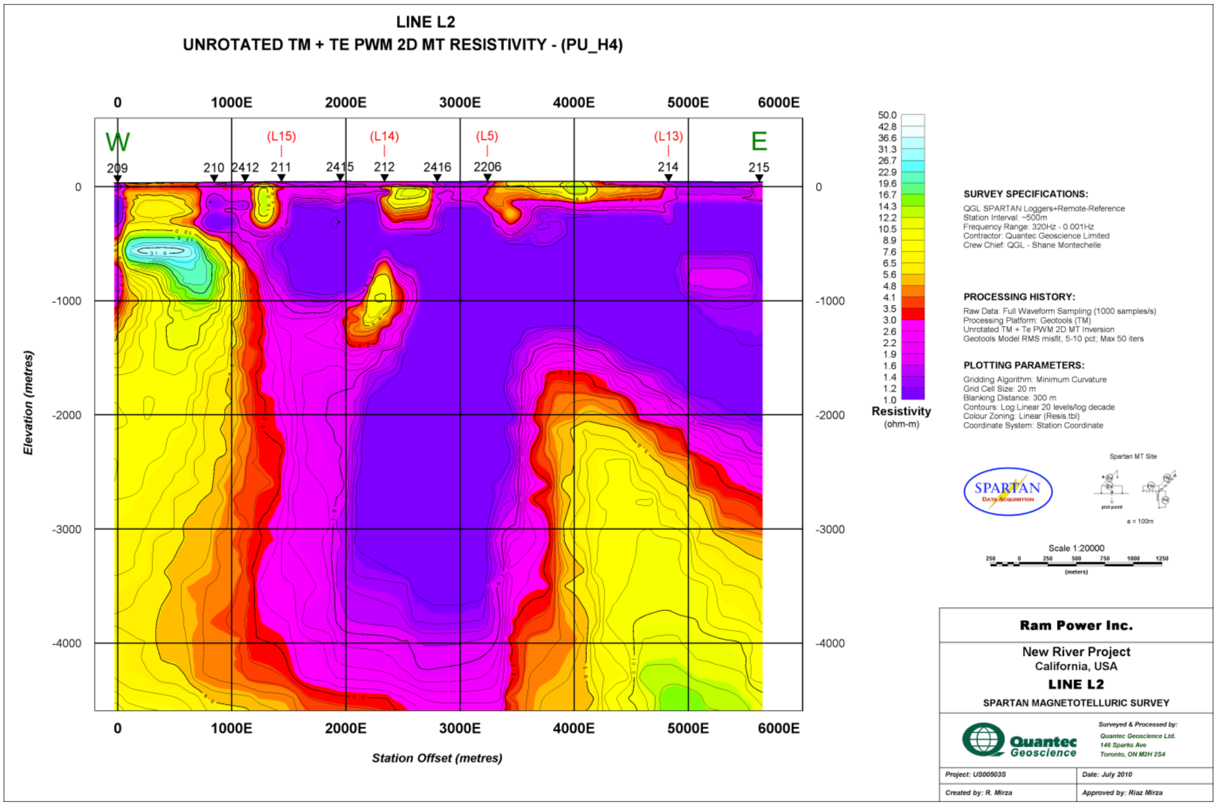
Line 4 – 2D MT Resistivity Models - RLM (top) & PWM (bottom)



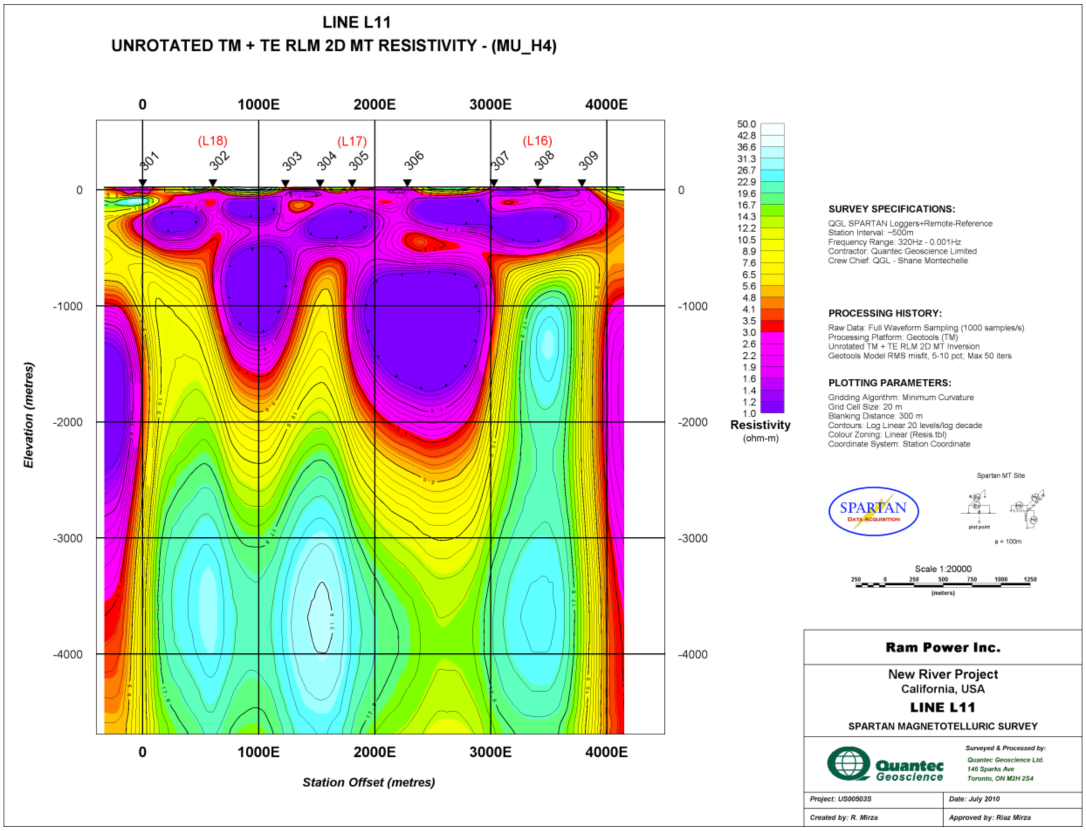


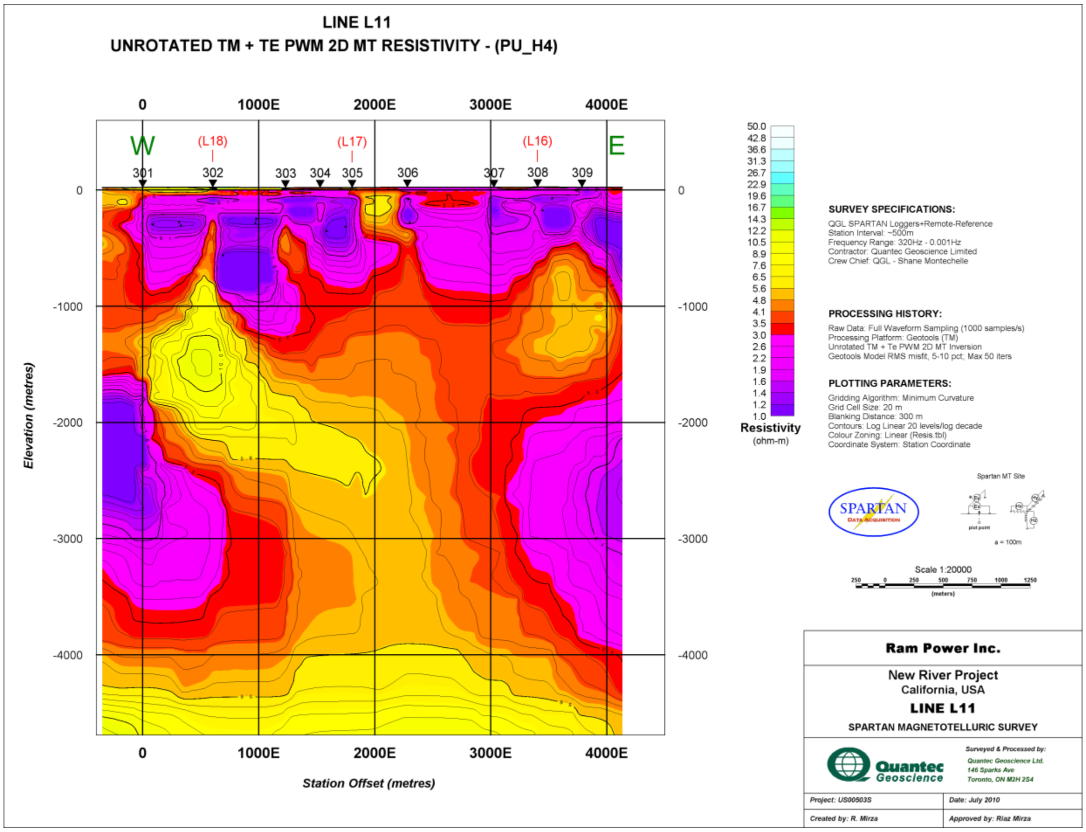
Line 1 – 2D MT Resistivity Models - RLM (top) & PWM (bottom)



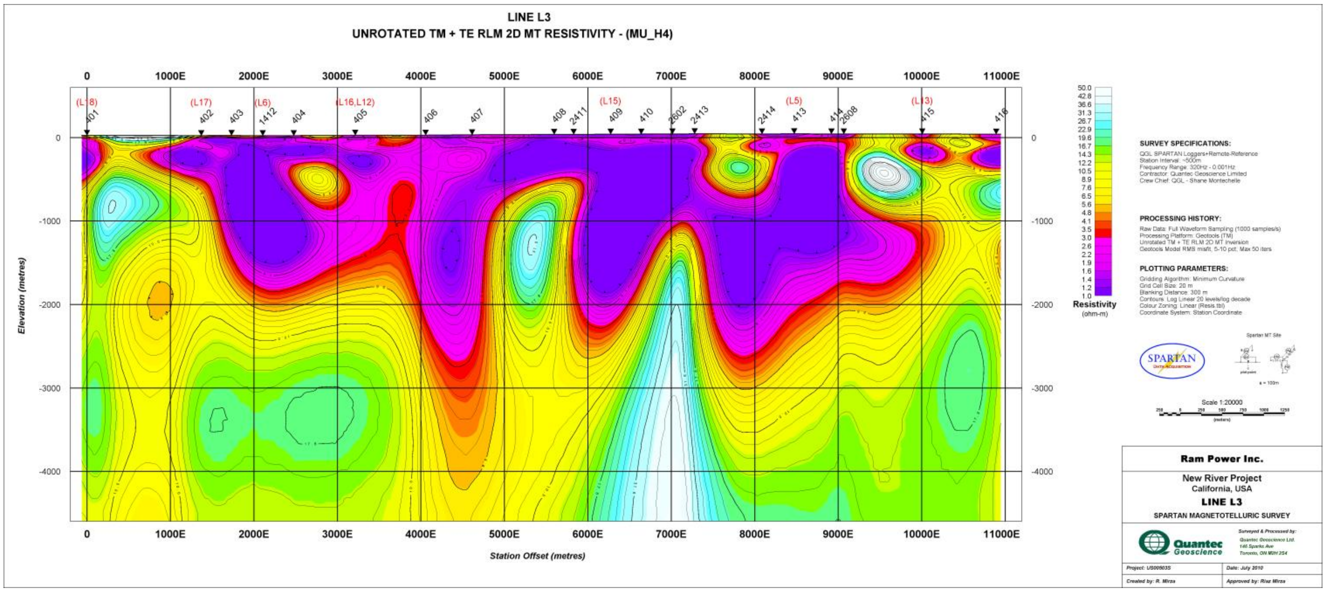


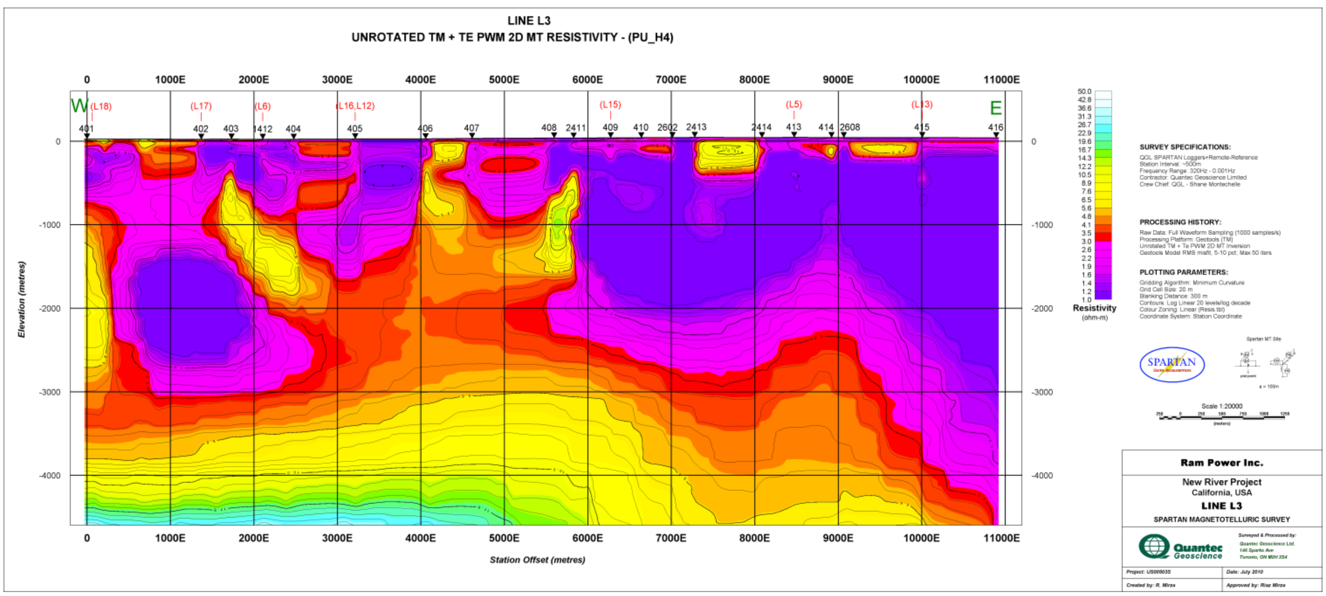
<u>Line 2 – 2D MT Resistivity Models - RLM (top) & PWM (bottom)</u>



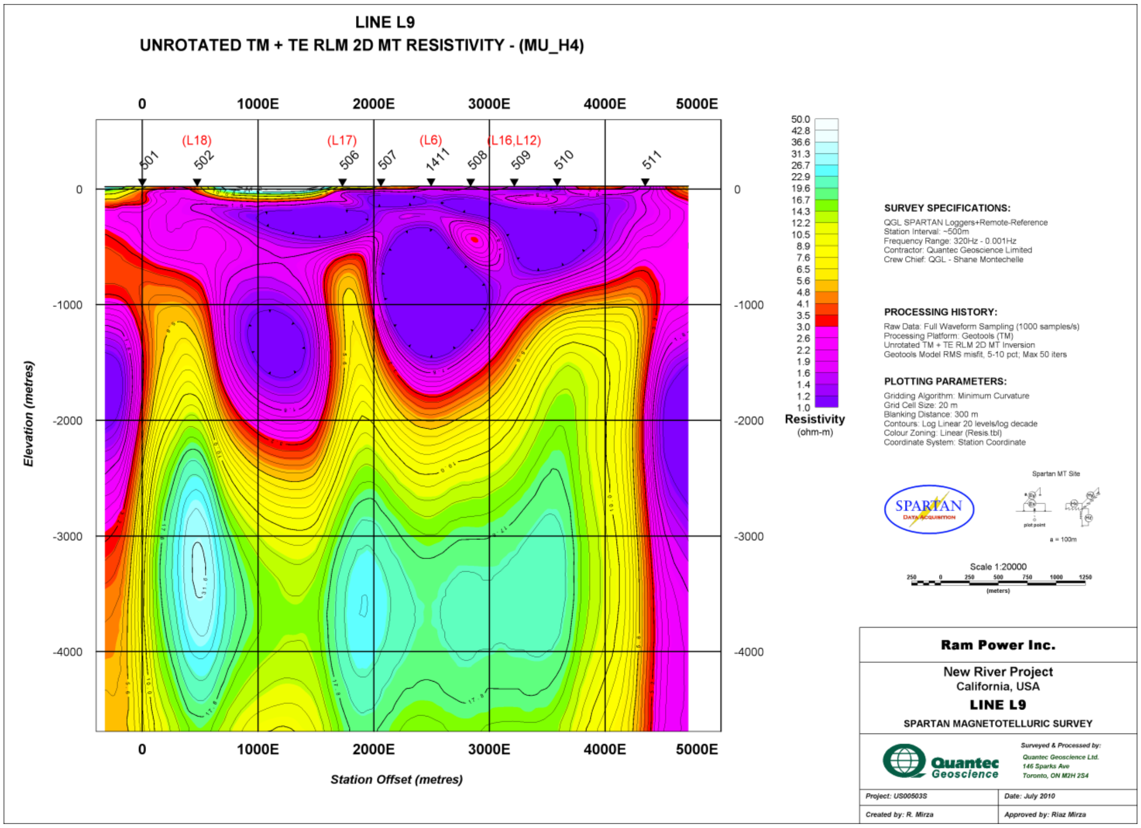


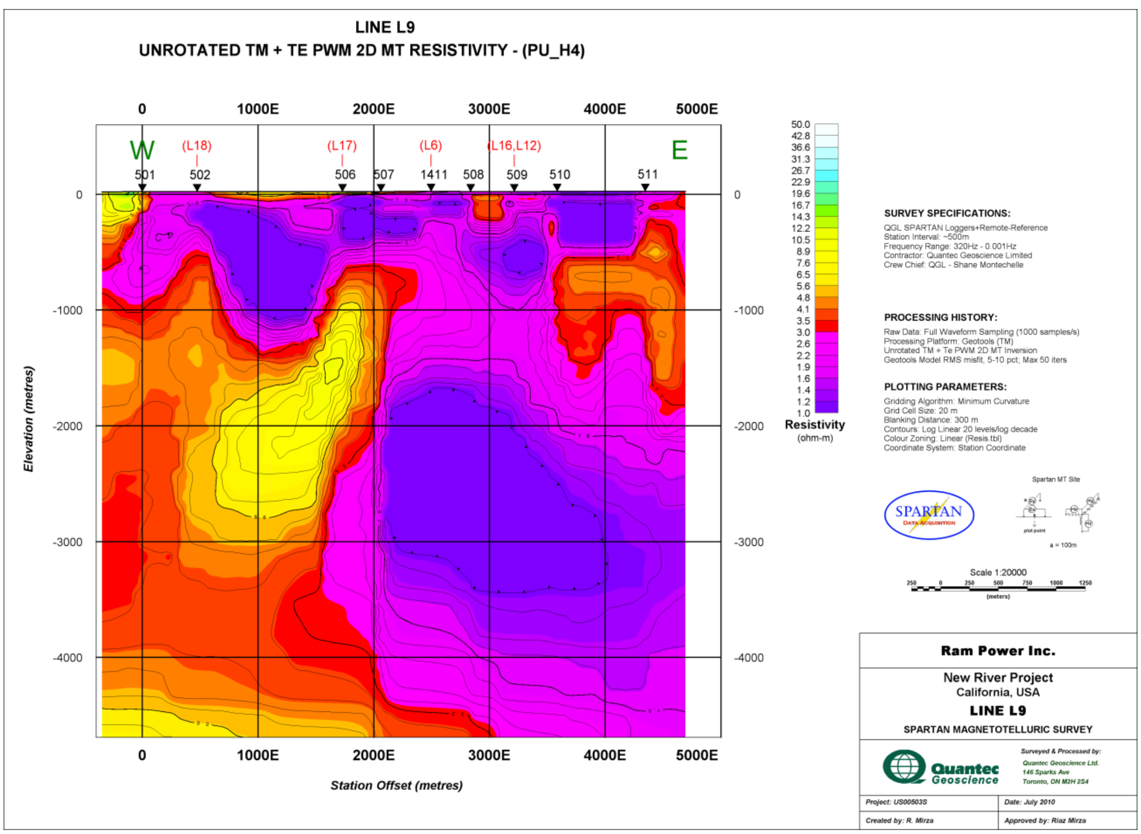
Line 11 – 2D MT Resistivity Models - RLM (top) & PWM (bottom)



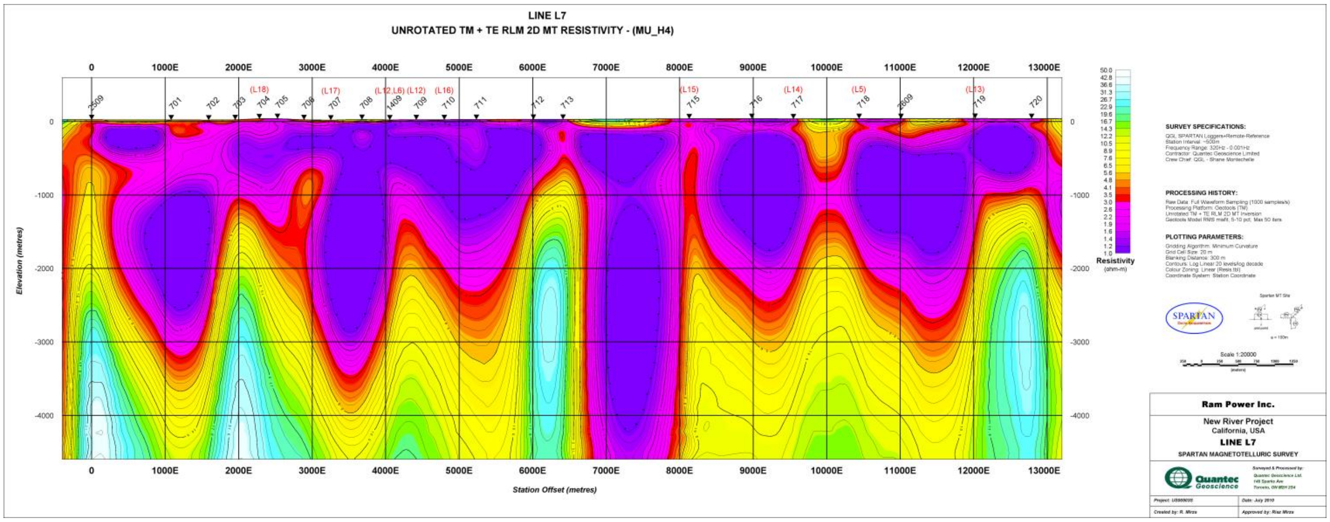


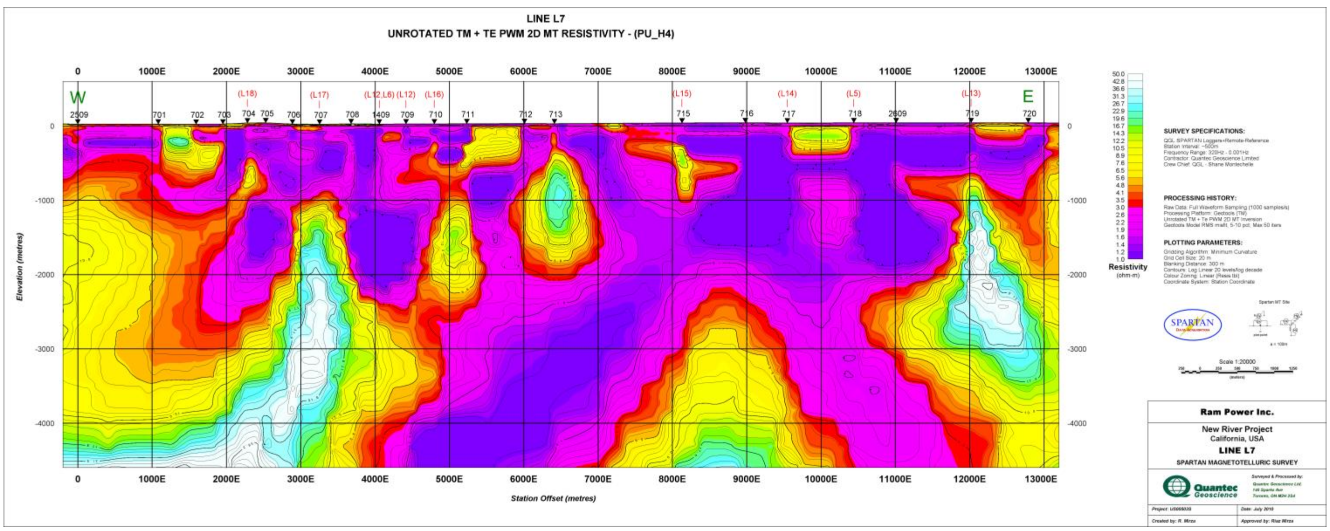
<u>Line 3 – 2D MT Resistivity Models - RLM (top) & PWM (bottom)</u>



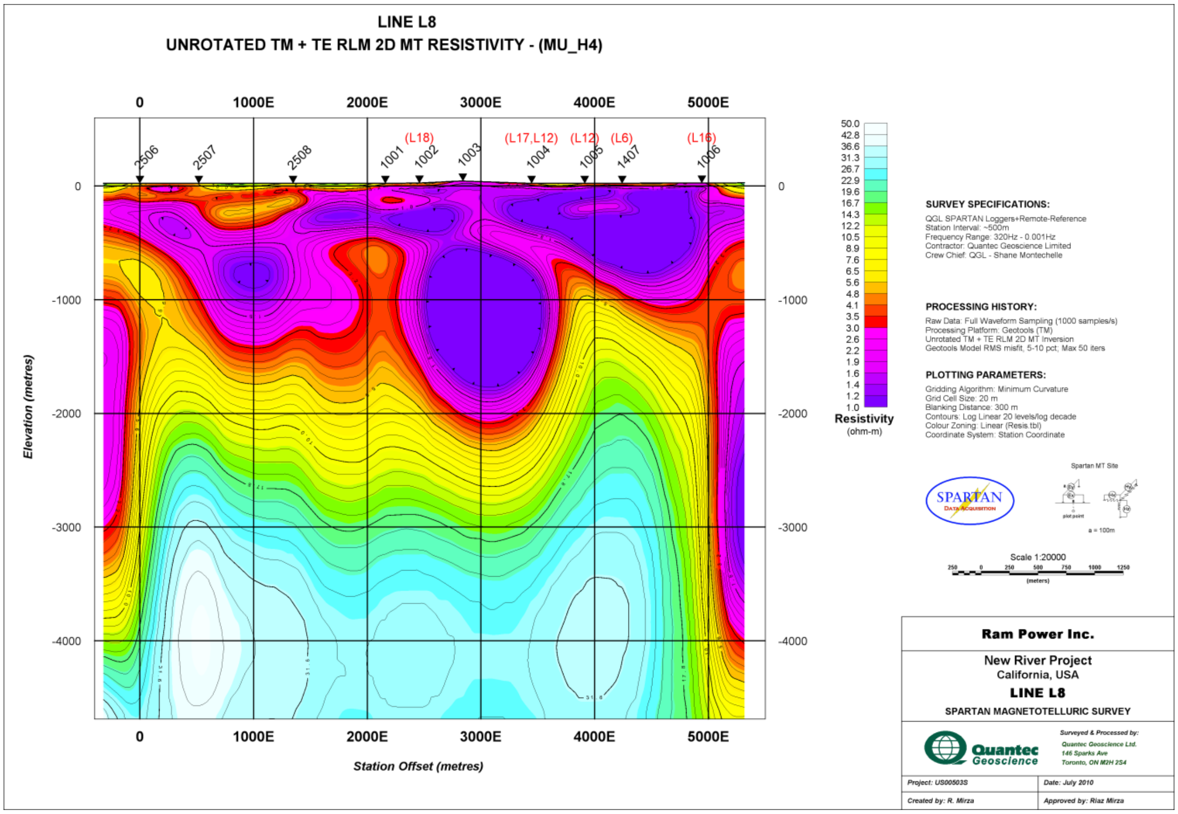


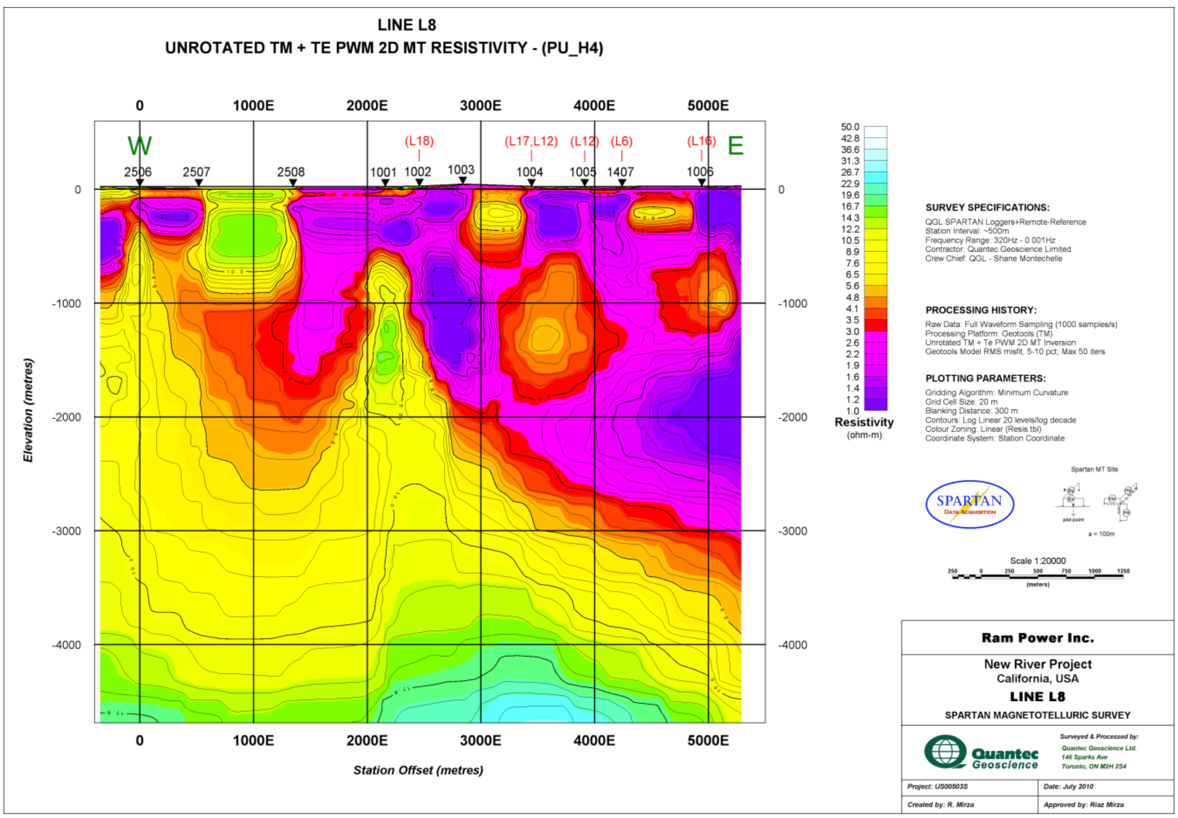
<u>Line 9 – 2D MT Resistivity Models - RLM (top) & PWM (bottom)</u>



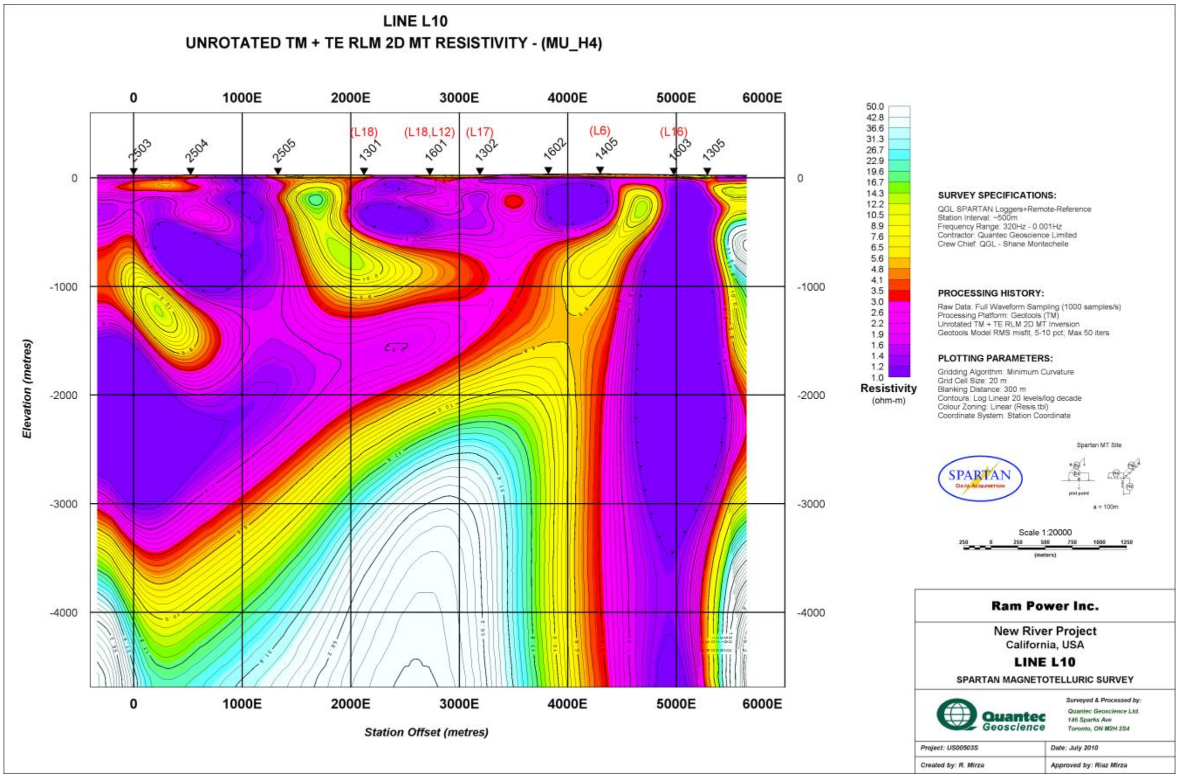


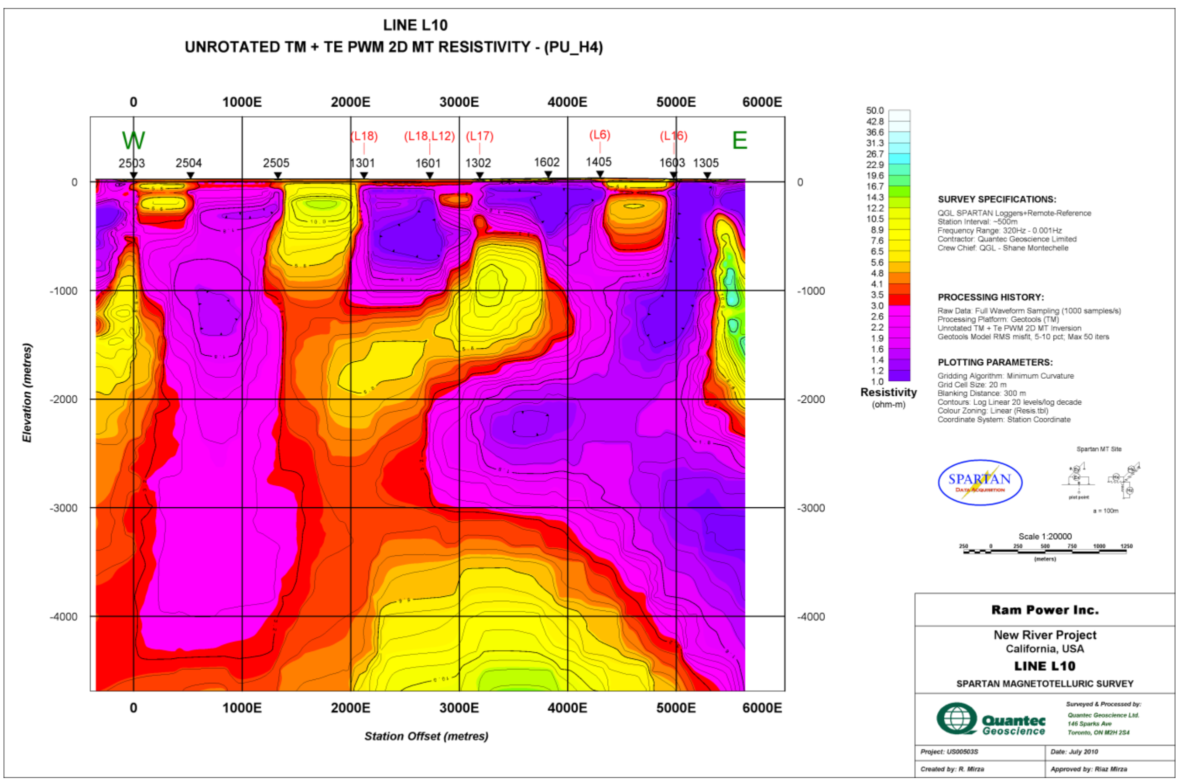
<u>Line 7 – 2D MT Resistivity Models - RLM (top) & PWM (bottom)</u>





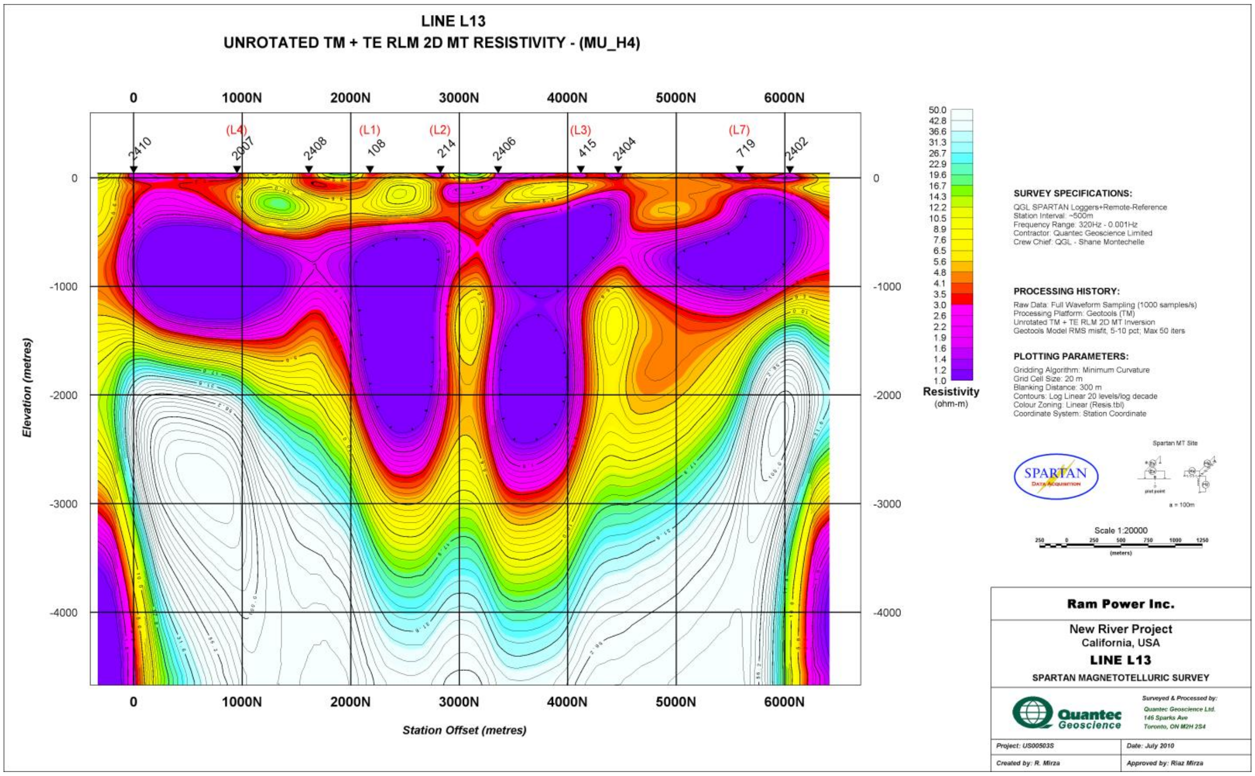
Line 8 – 2D MT Resistivity Models - RLM (top) & PWM (bottom)

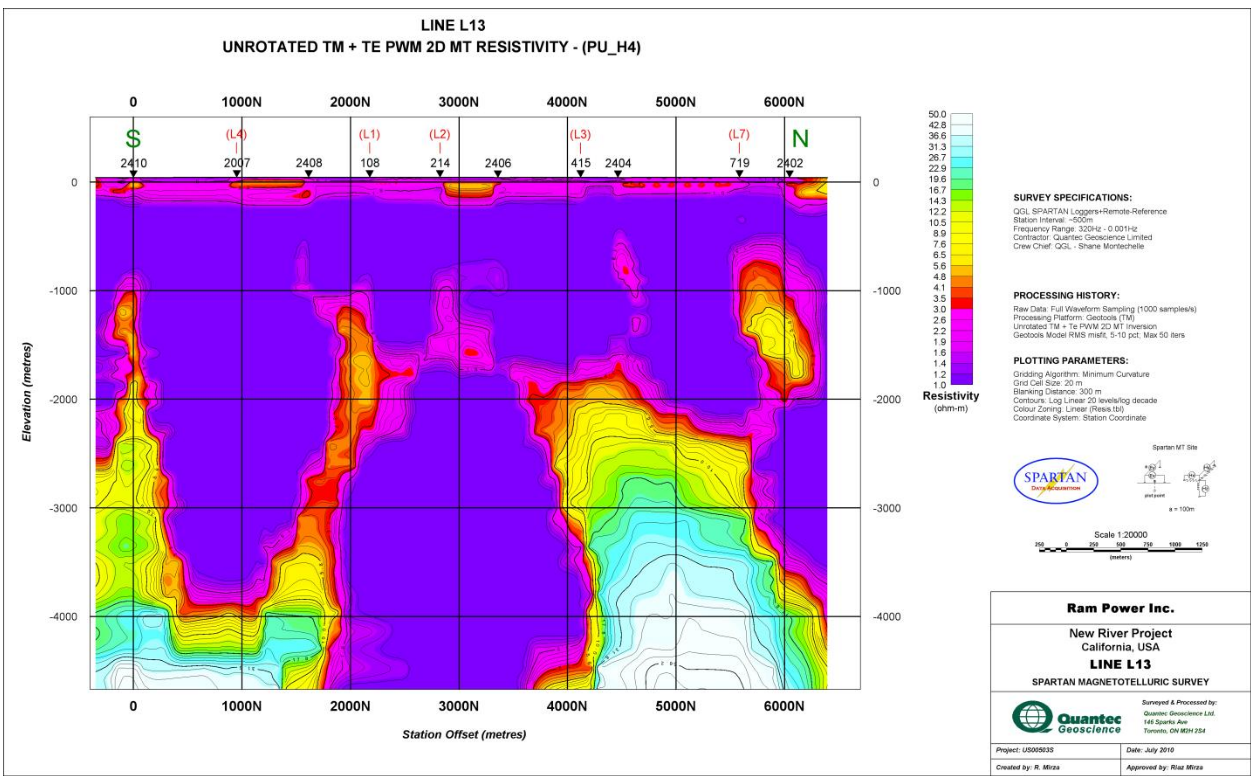




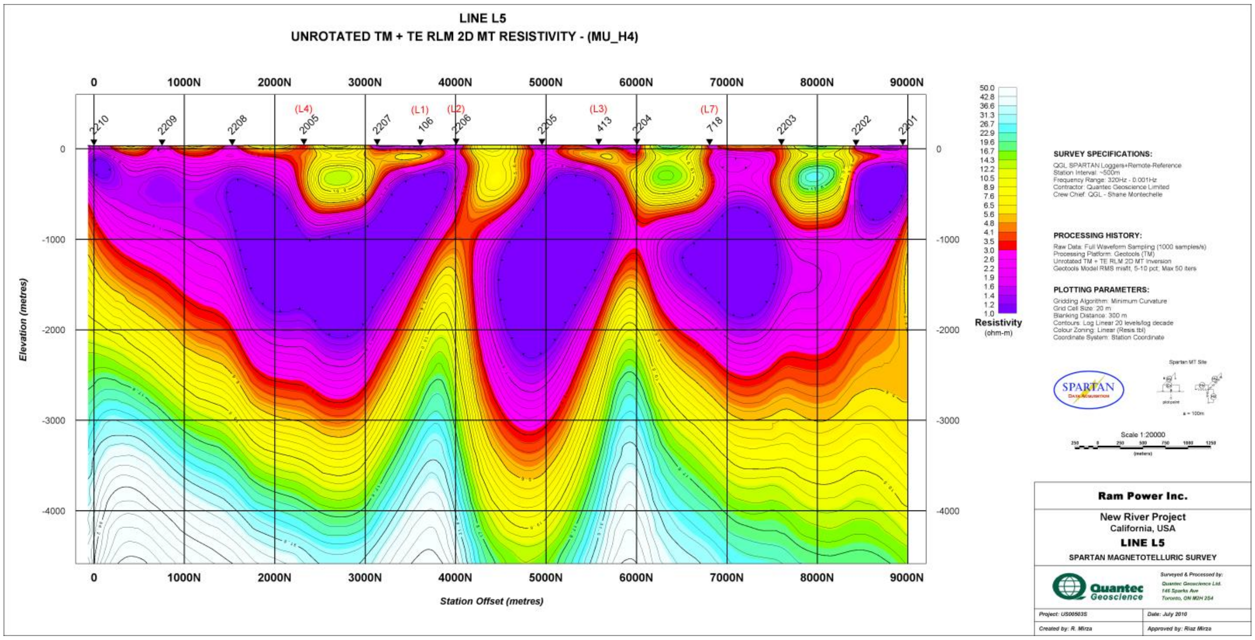
Line 10 – 2D MT Resistivity Models - RLM (top) & PWM (bottom)

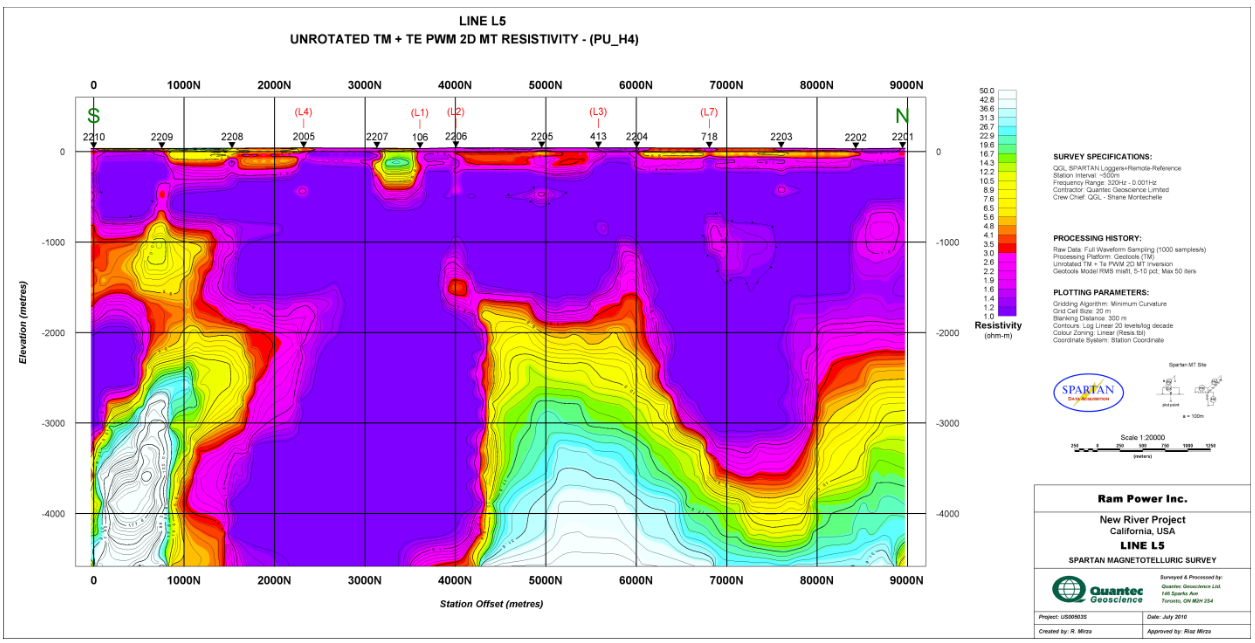
F.3 2D MT RESISTIVITY RLM & PWM SECTION MAPS (N - S LINES)



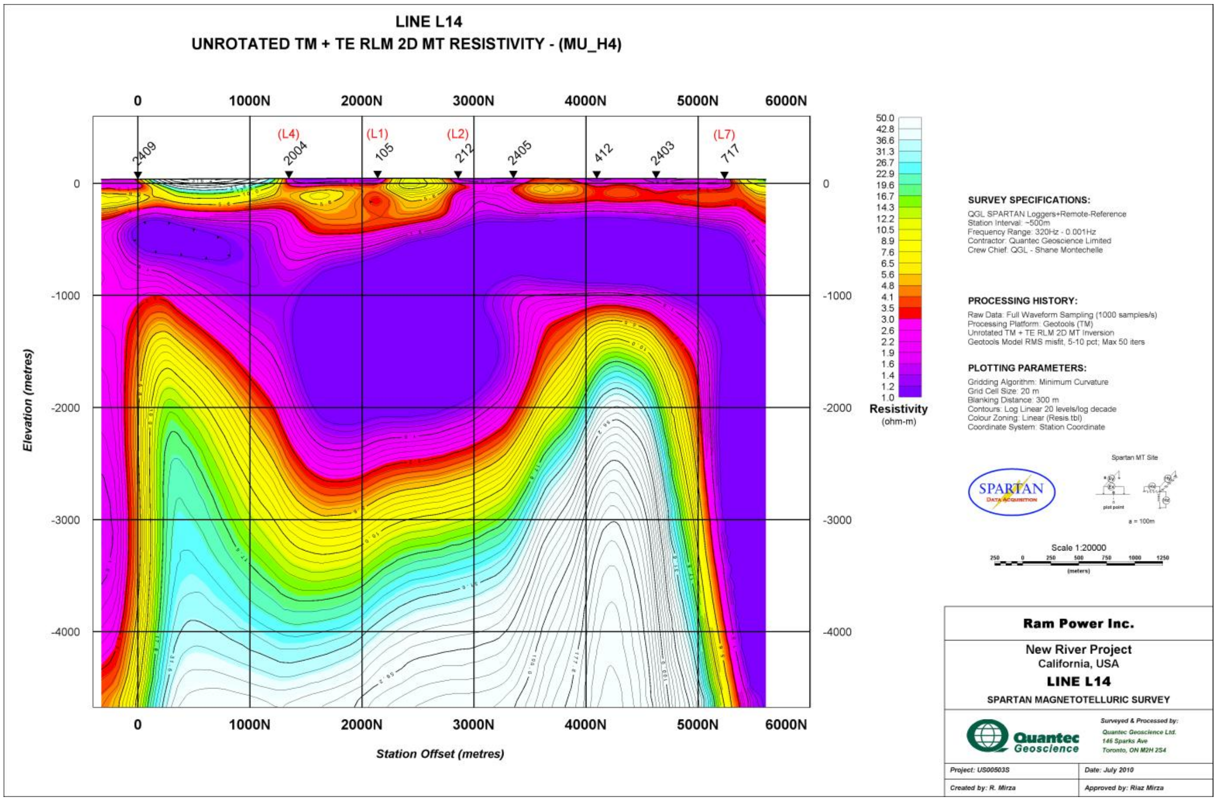


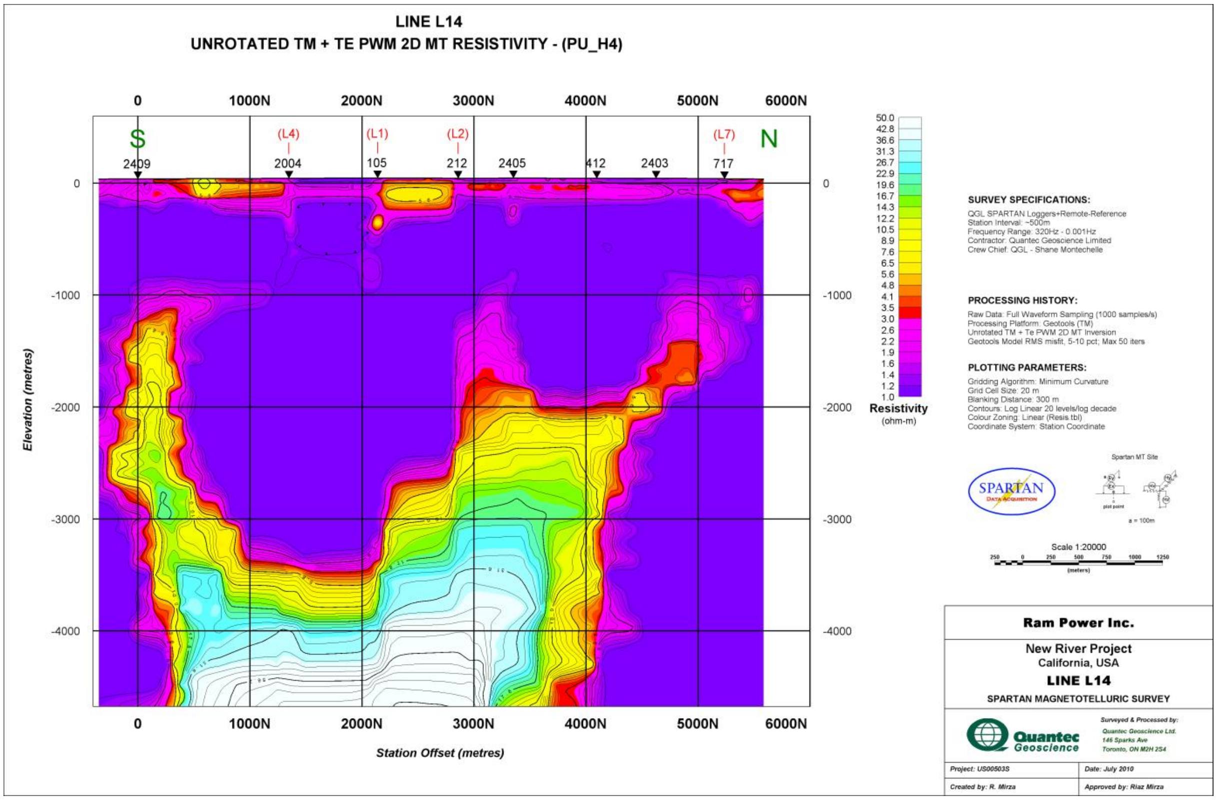
Line 13 – 2D MT Resistivity Models - RLM (top) & PWM (bottom)



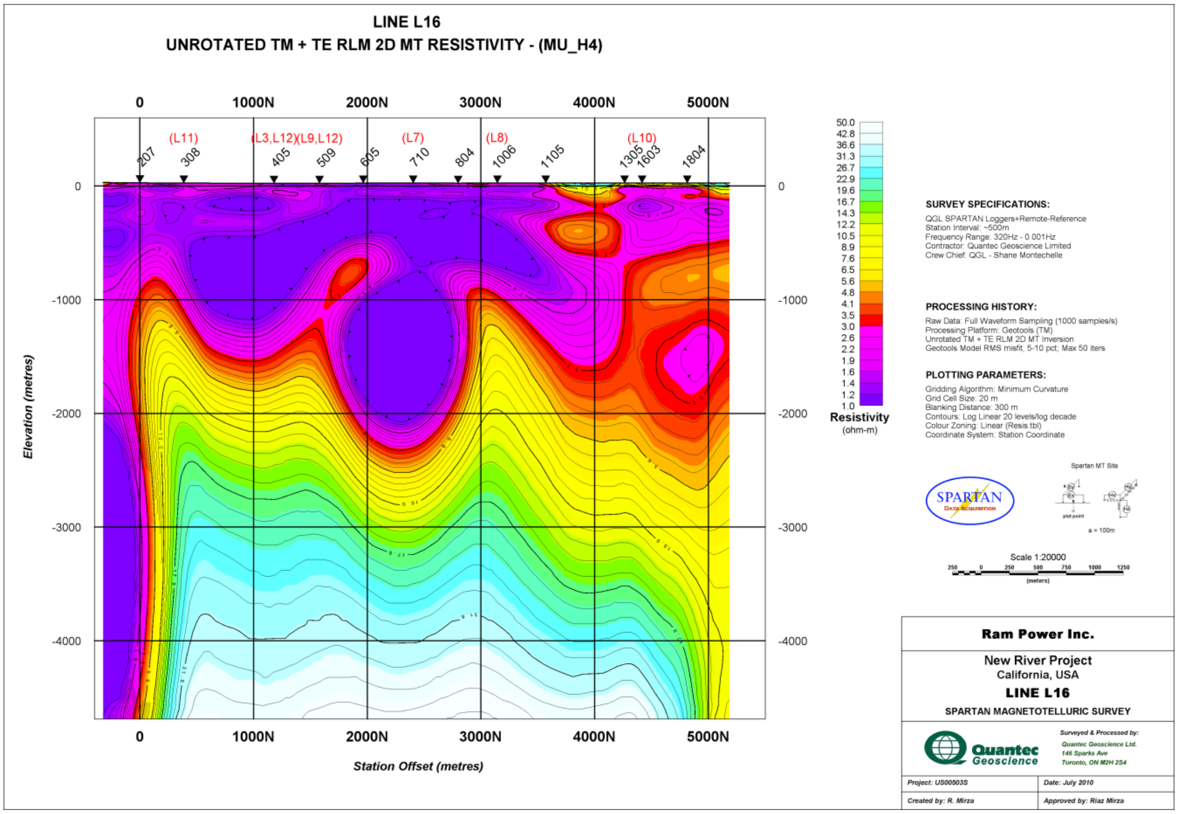


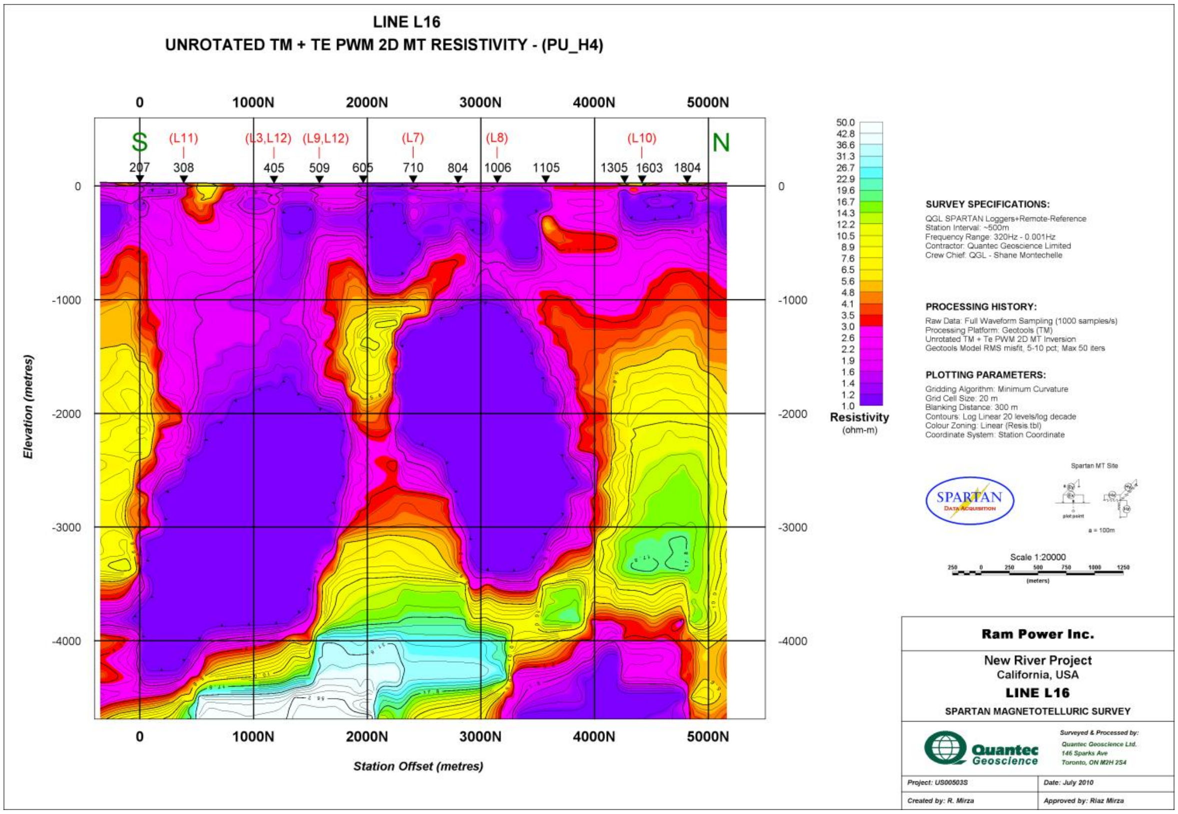
<u>Line 5 – 2D MT Resistivity Models - RLM (top) & PWM (bottom)</u>



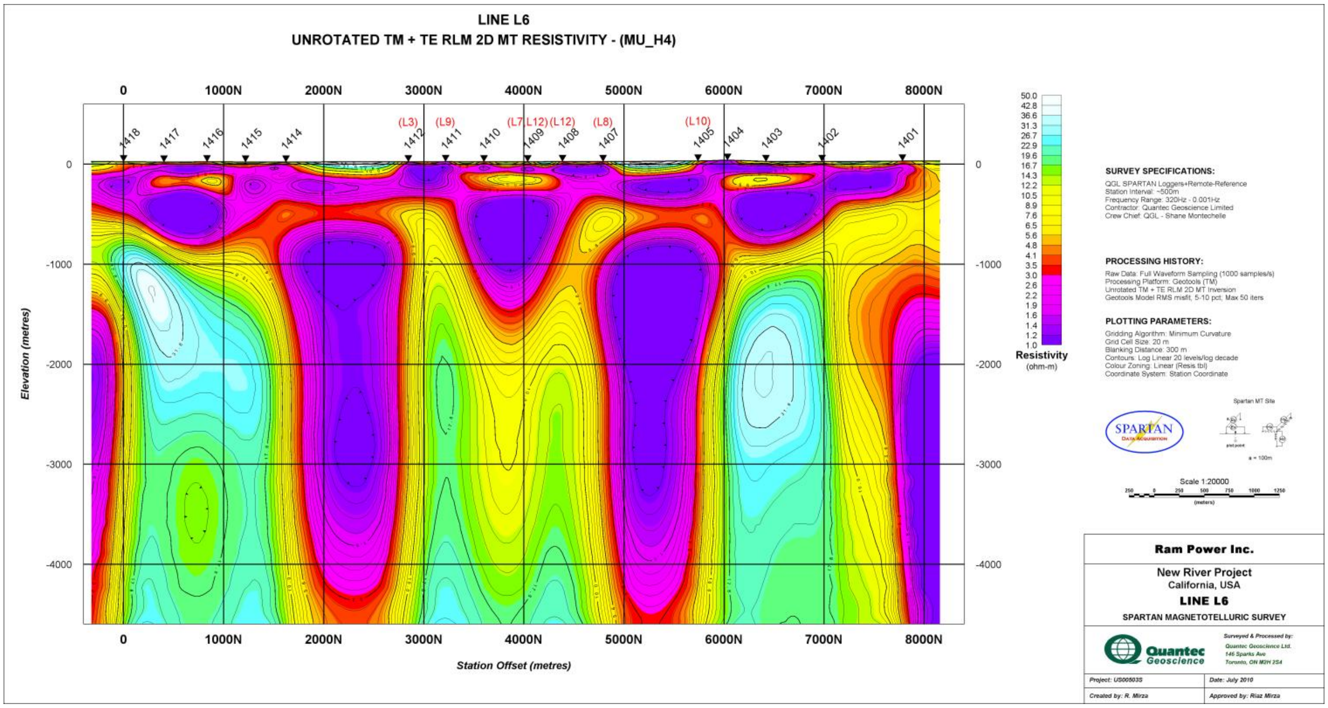


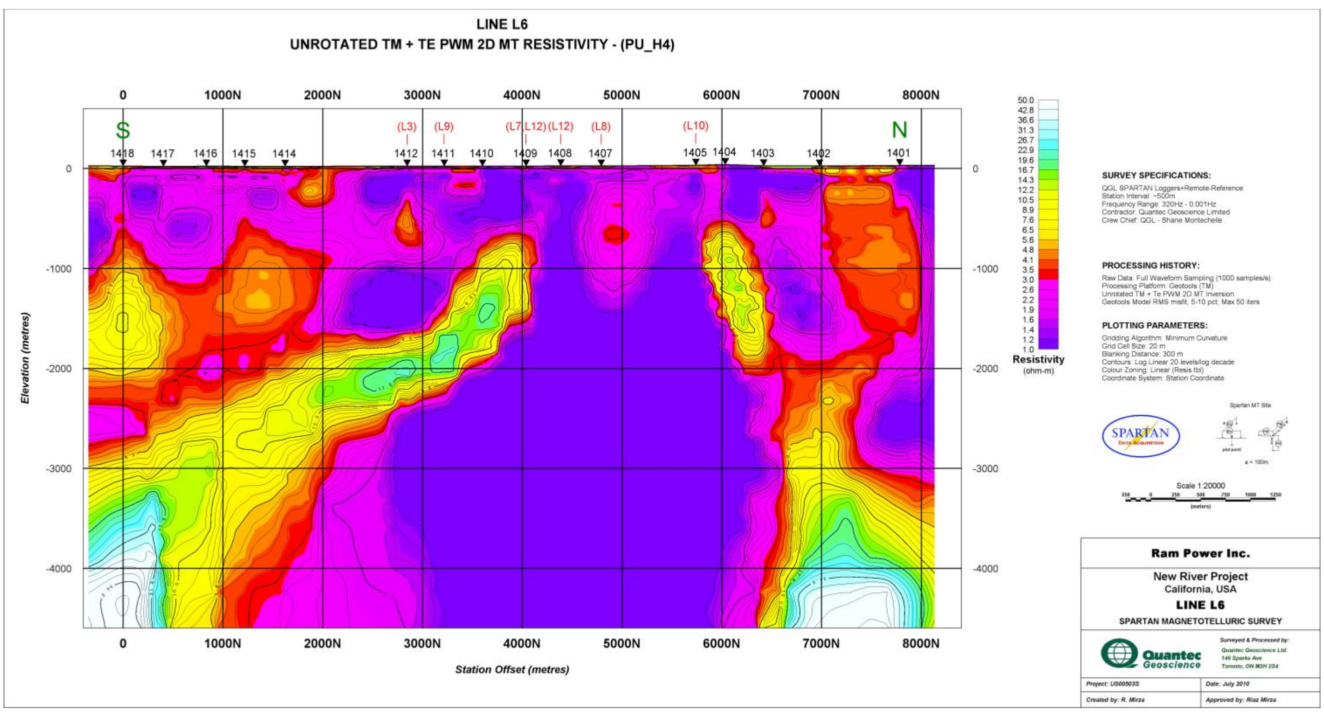
Line 14 – 2D MT Resistivity Models - RLM (top) & PWM (bottom)



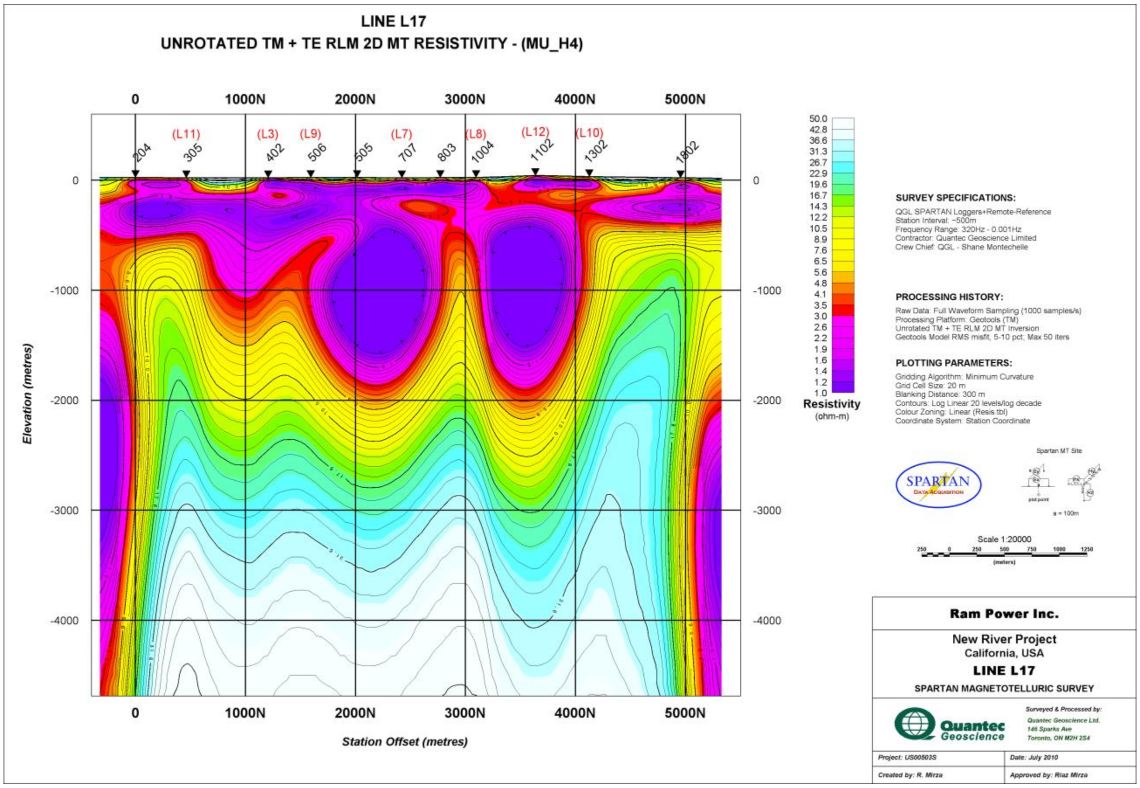


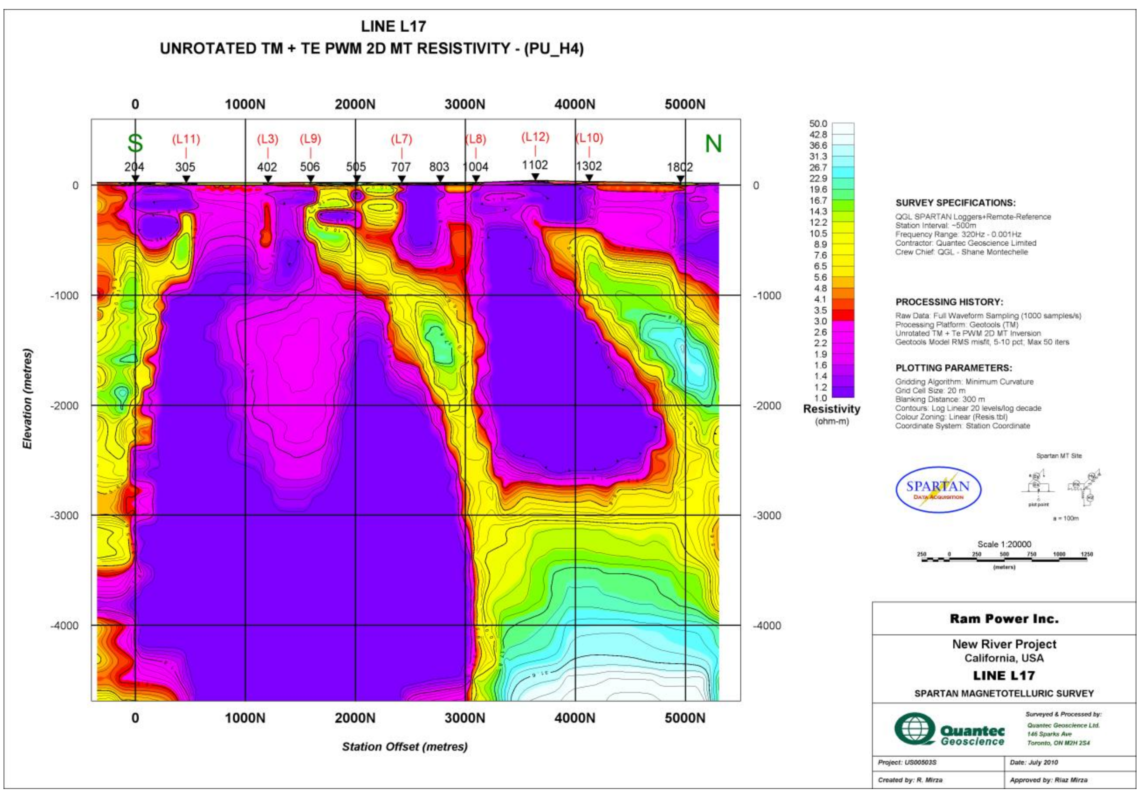
Line 16 – 2D MT Resistivity Models - RLM (top) & PWM (bottom)



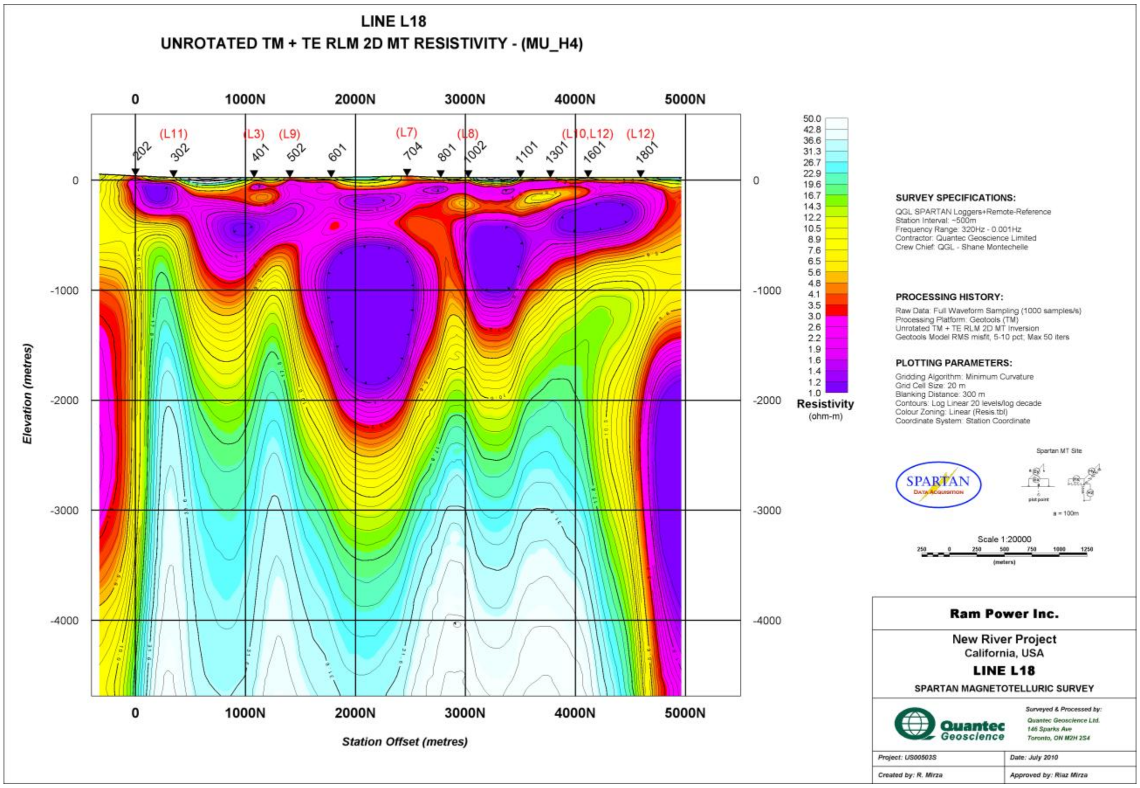


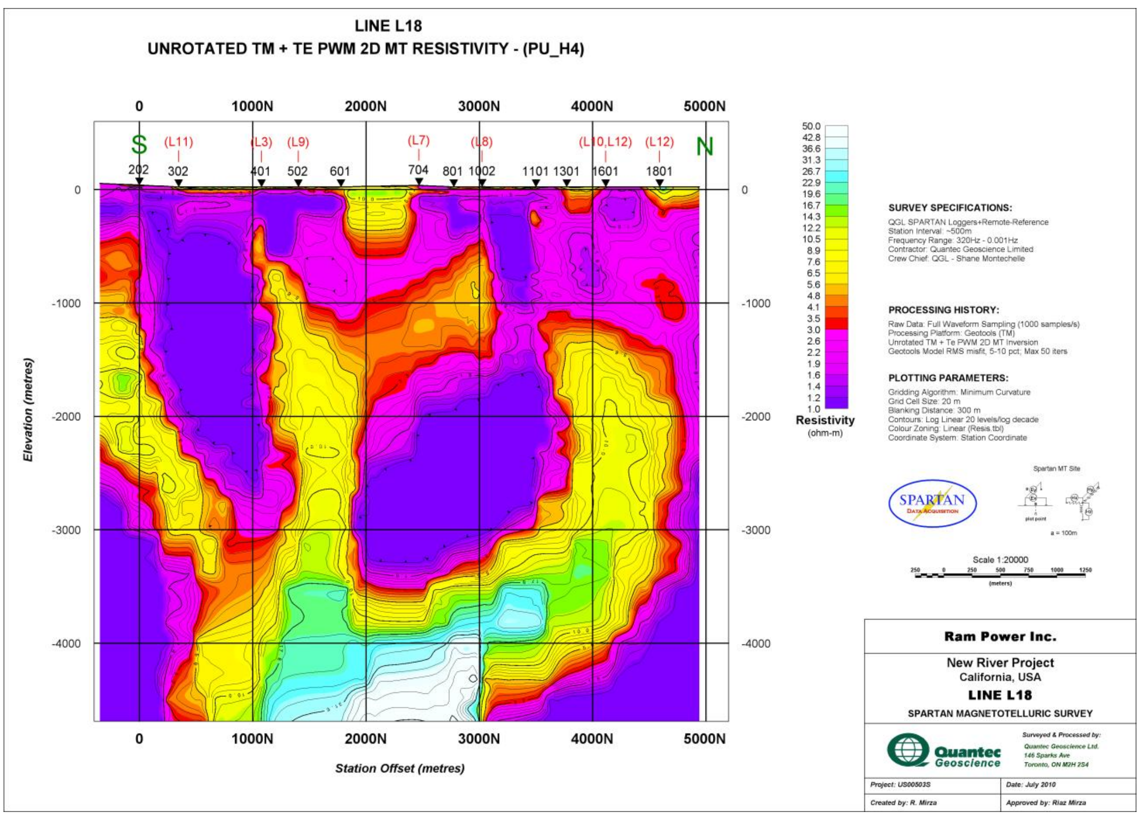
<u>Line 6 – 2D MT Resistivity Models - RLM (top) & PWM (bottom)</u>





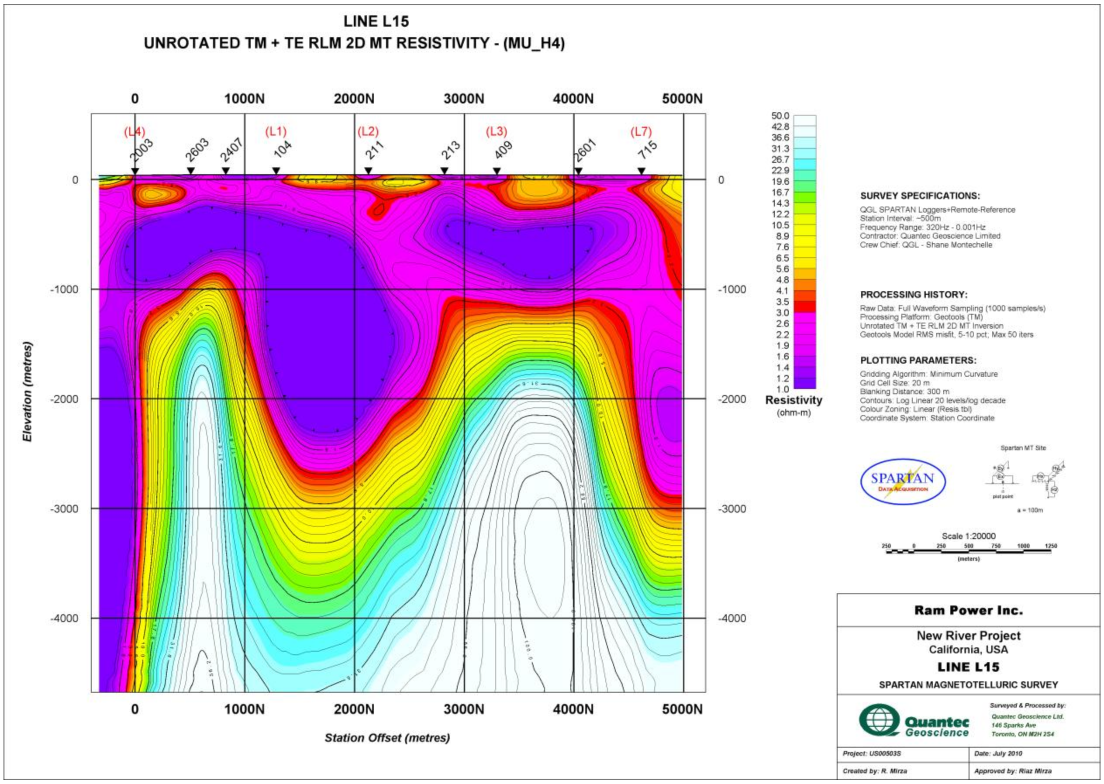
Line 17 – 2D MT Resistivity Models - RLM (top) & PWM (bottom)

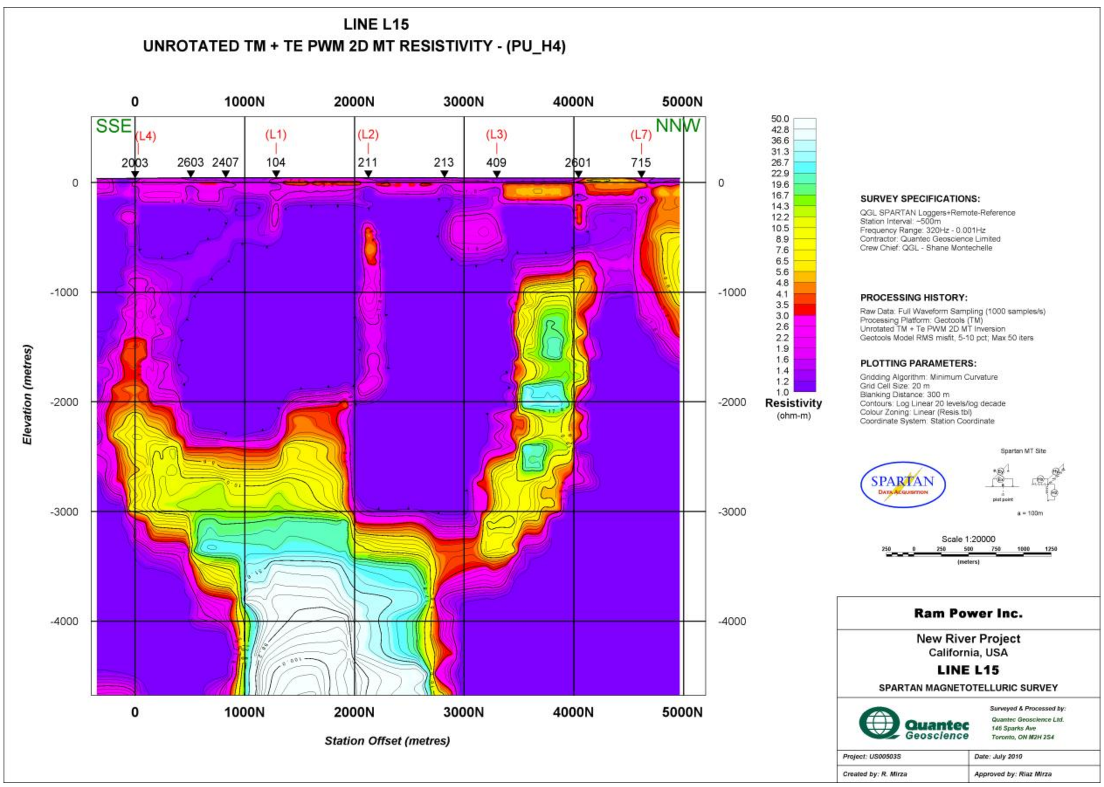




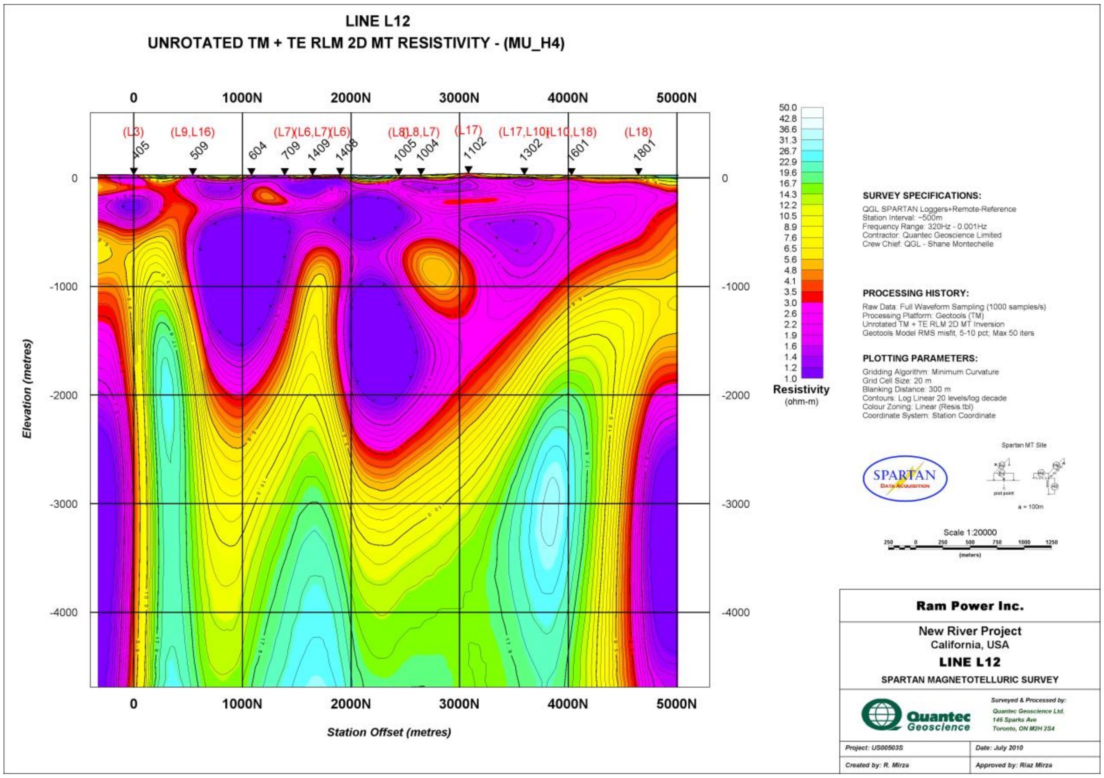
Line 18 – 2D MT Resistivity Models - RLM (top) & PWM (bottom)

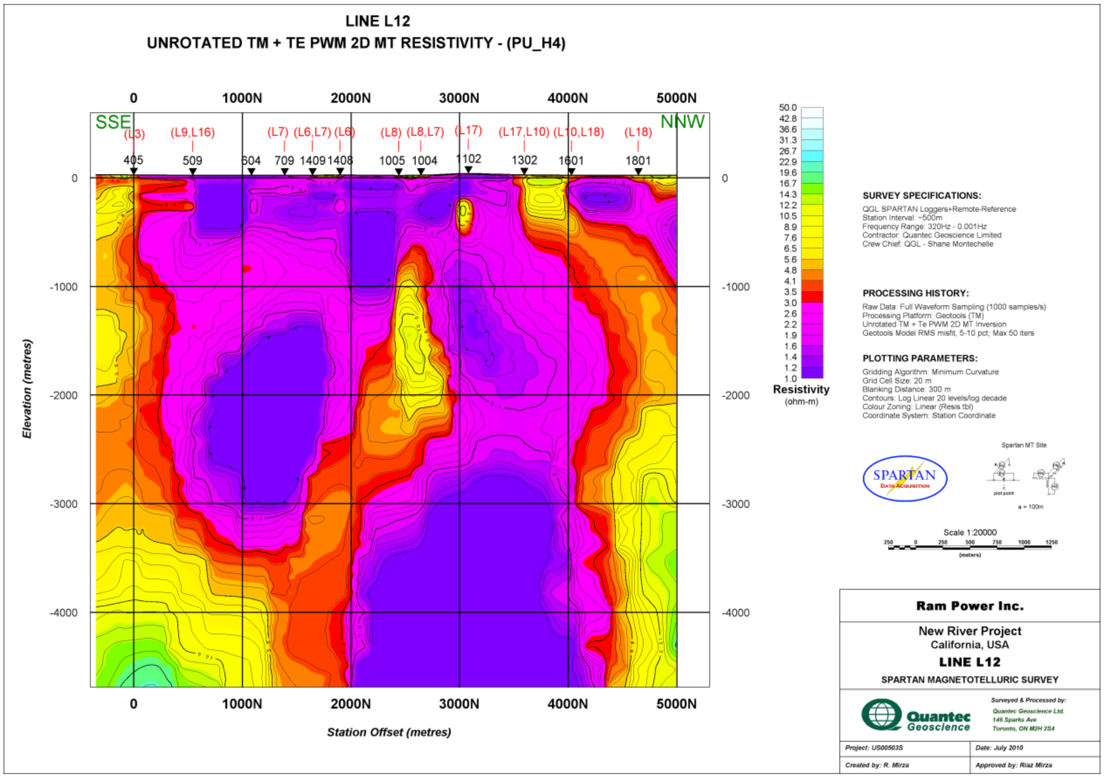
F.4 2D MT RESISTIVITY RLM & PWM SECTION MAPS (NW-SE LINES)





Line 15 – 2D MT Resistivity Models - RLM (top) & PWM (bottom)

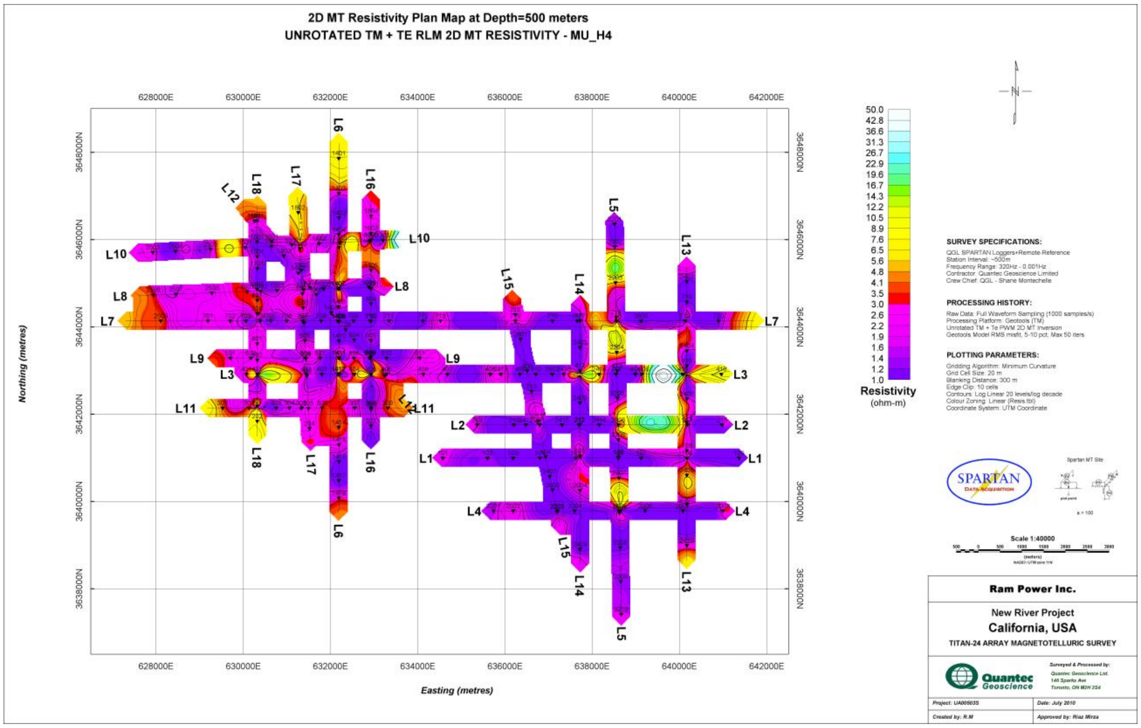


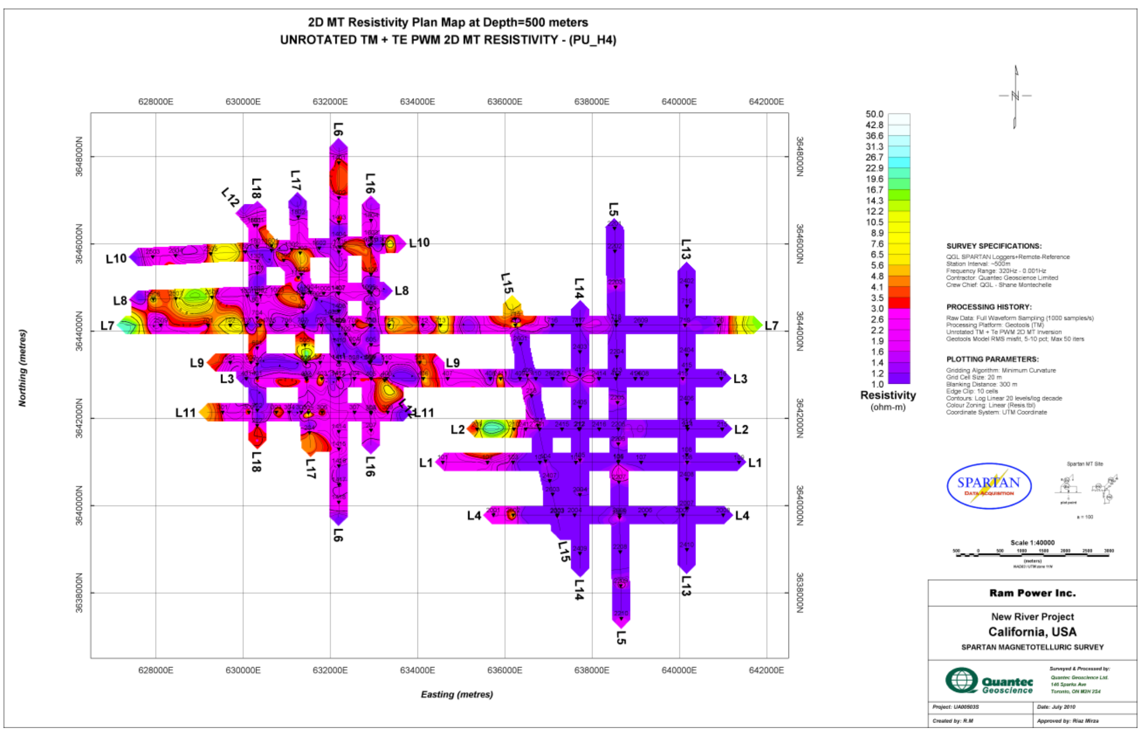


Line 12 – 2D MT Resistivity Models - RLM (top) & PWM (bottom)

G PLAN MAPS OF THE 2D & 3D MODELS

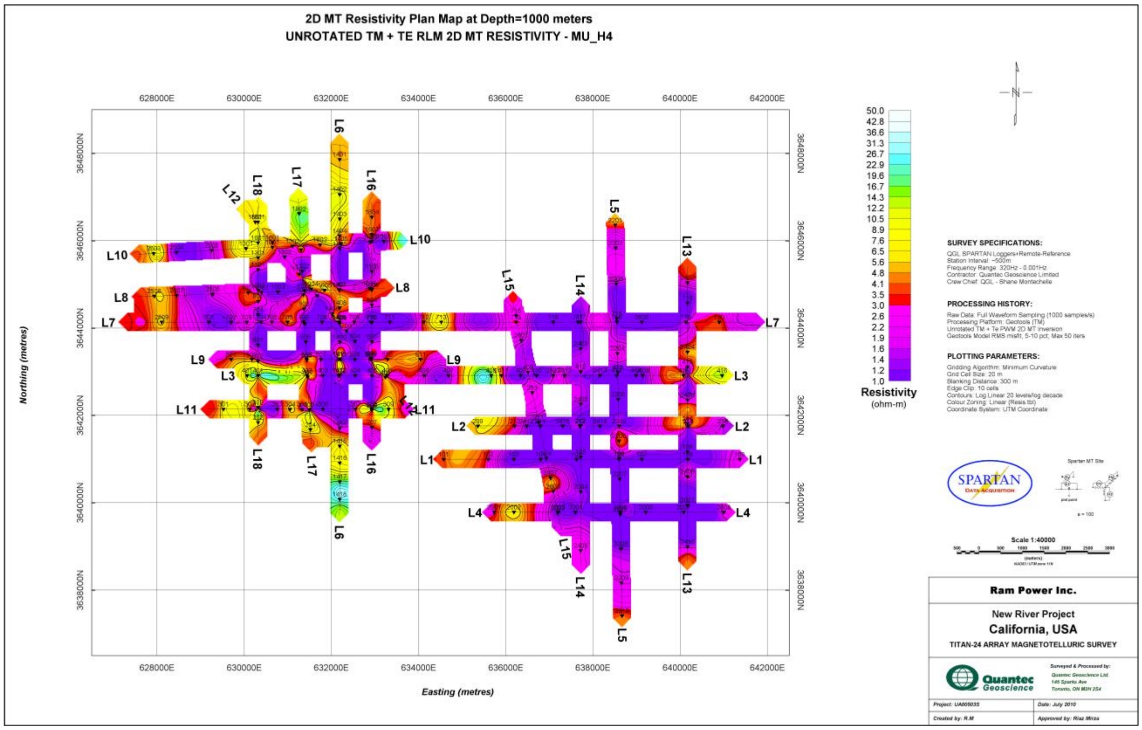
G.1 2D RLM AND PWM PLAN MAPS AT 500M DEPTH

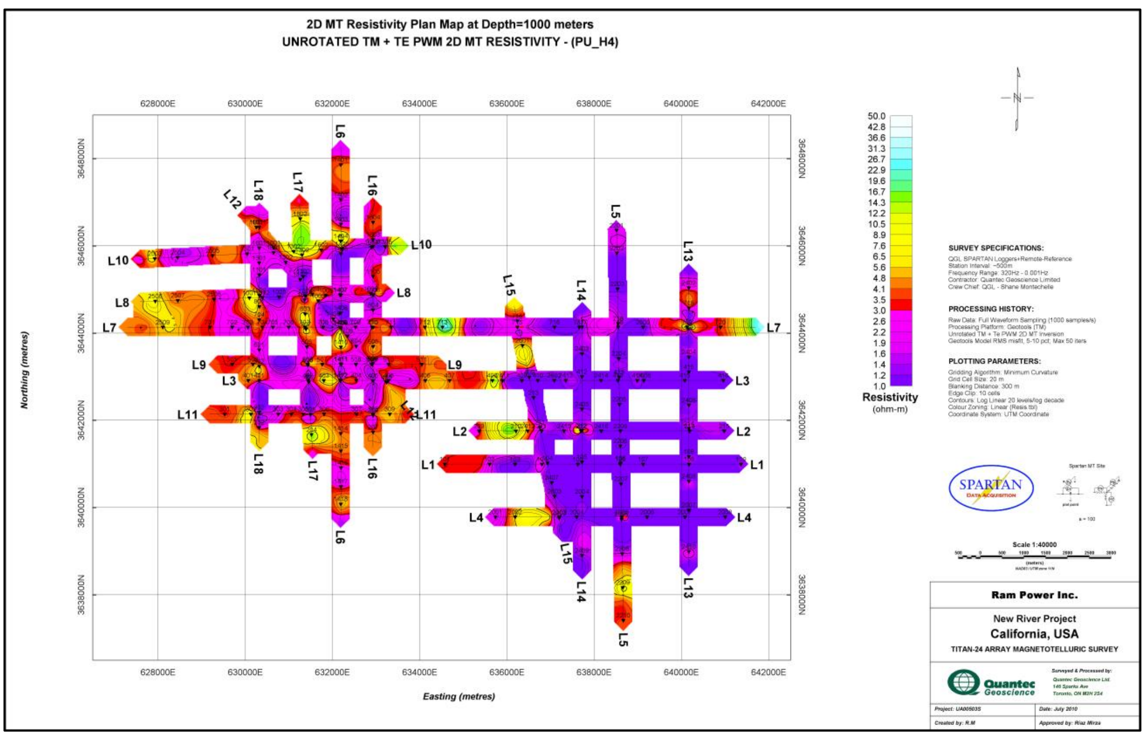




Plan Maps of RLM (top) and PWM (bottom) Resistivity at 500m Depth

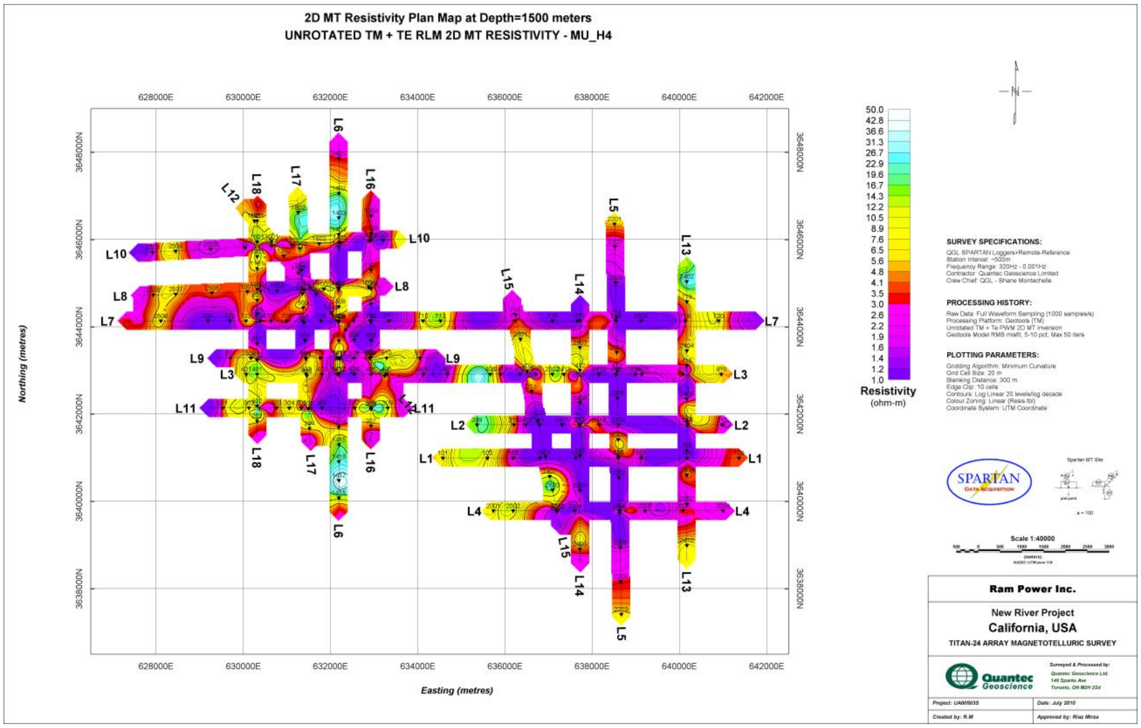
G.2 2D RLM AND PWM PLAN MAPS AT 1000M DEPTH

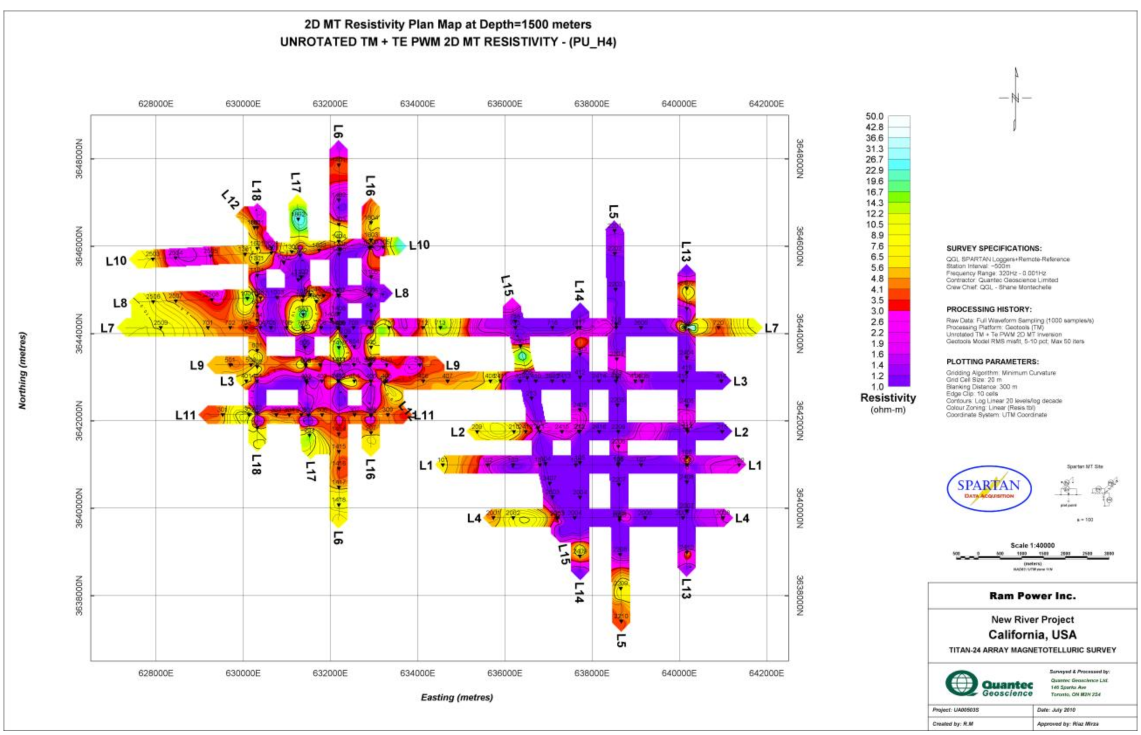




Plan Maps of RLM (top) and PWM (bottom) Resistivity at 1000m Depth

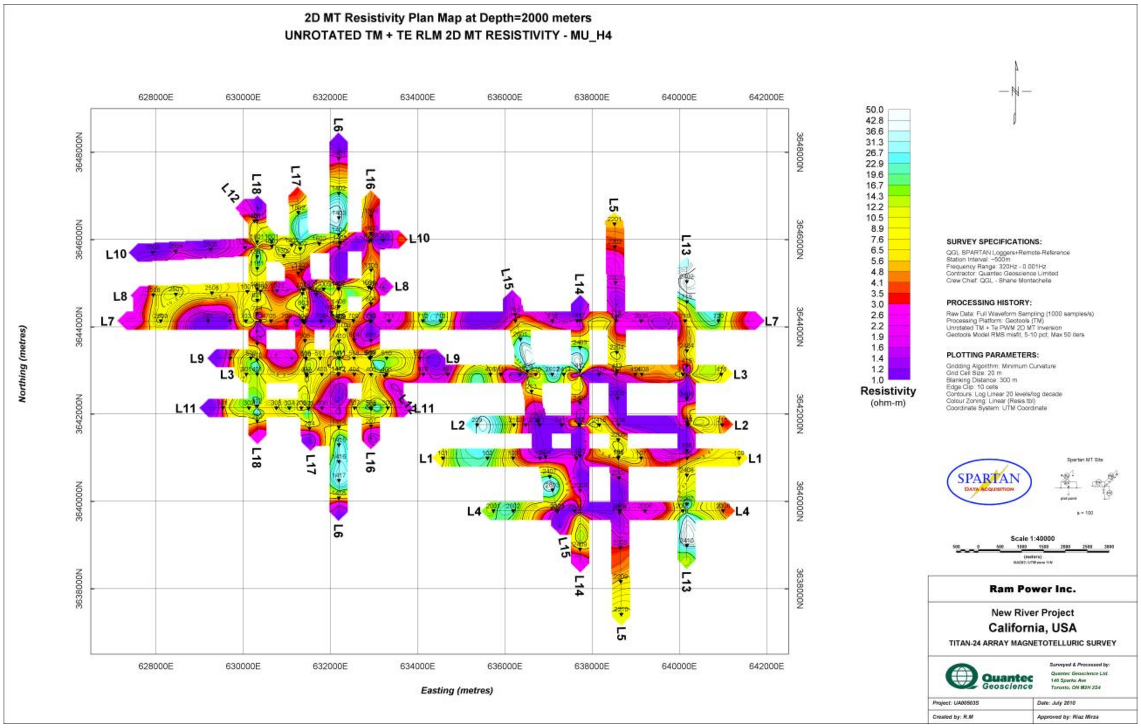
G.3 2D RLM AND PWM PLAN MAPS AT 1500M DEPTH

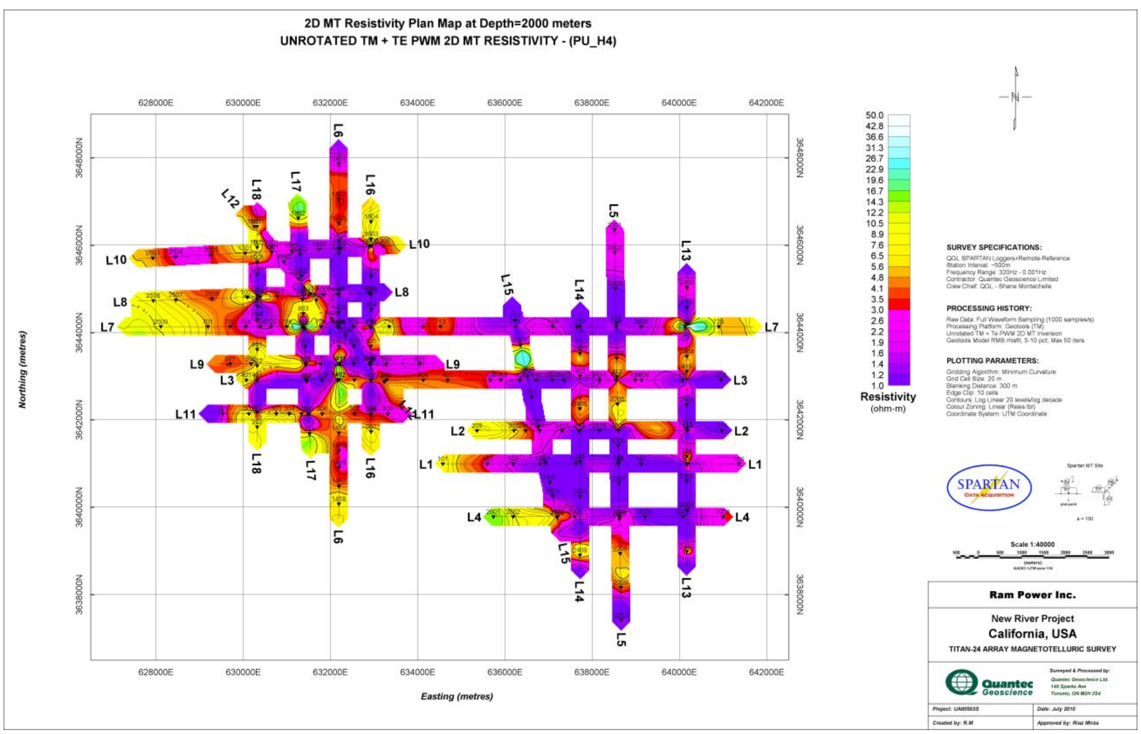




<u>Plan Maps of RLM (top) and PWM (bottom) Resistivity at 1500m Depth</u>

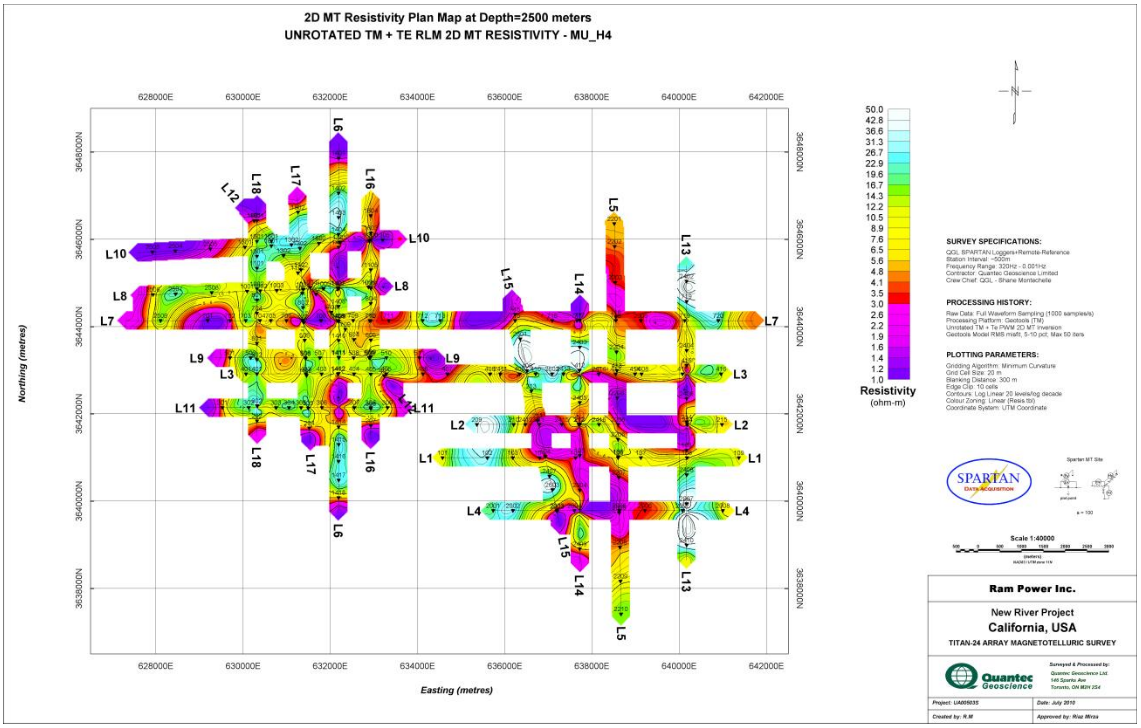
G.4 2D RLM AND PWM PLAN MAPS AT 2000M DEPTH

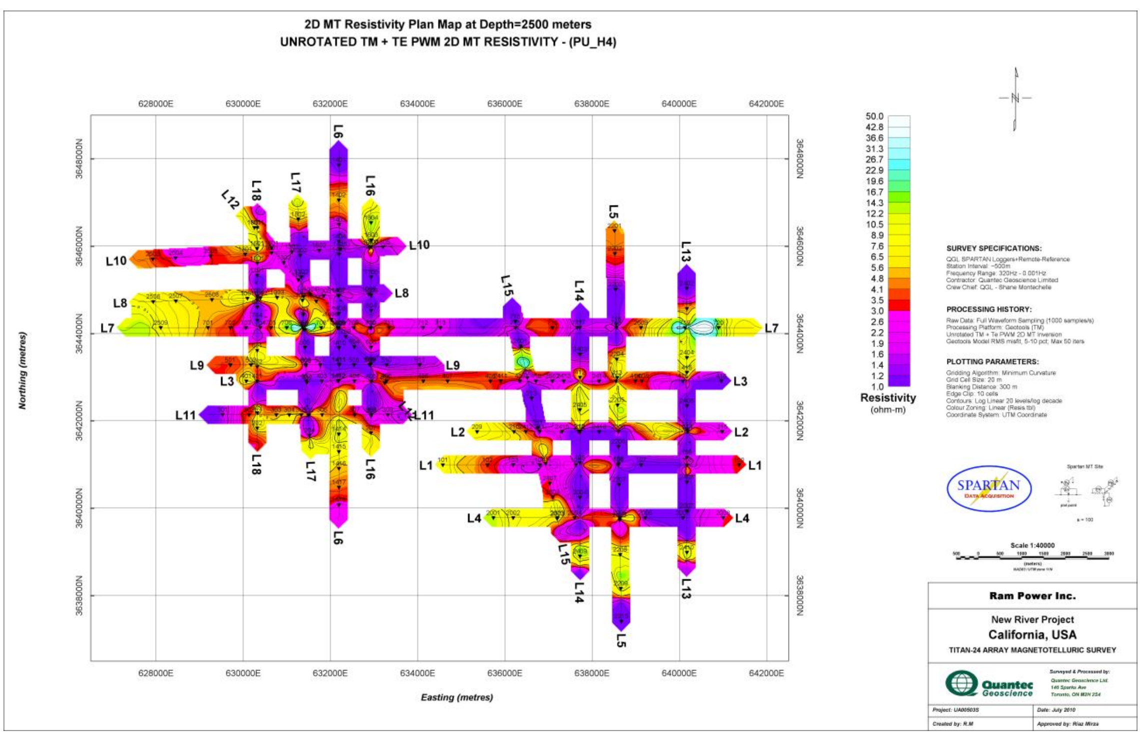




Plan Maps of RLM (top) and PWM (bottom) Resistivity at 2000m Depth

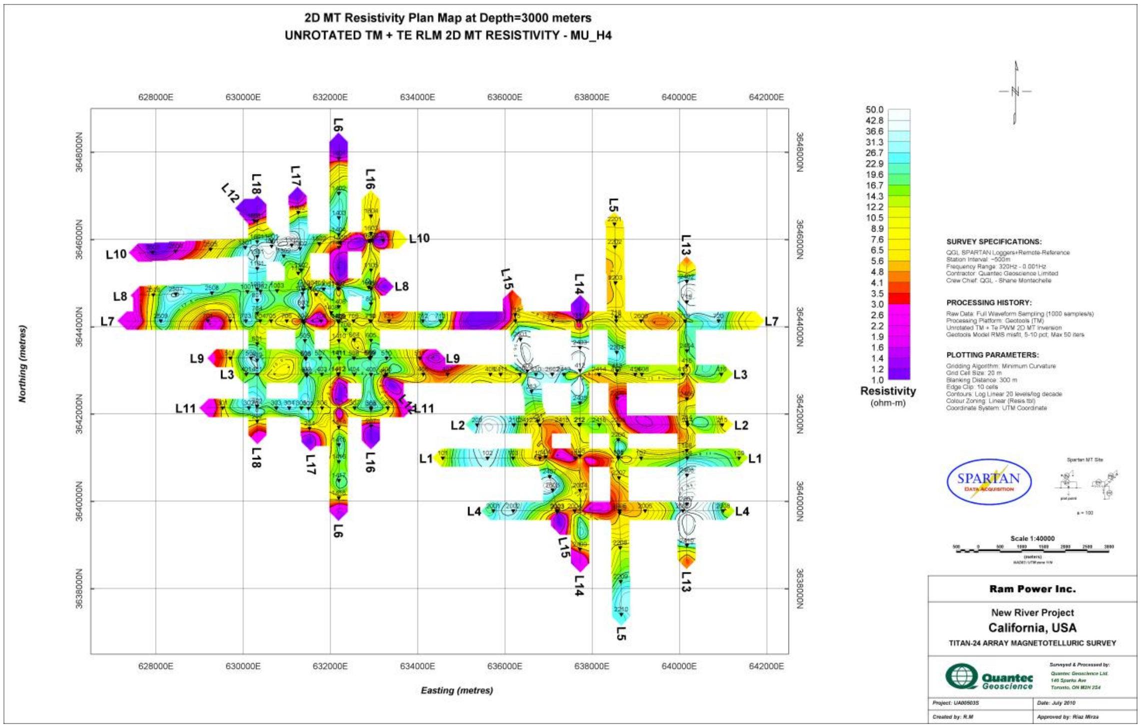
G.5 2D RLM AND PWM PLAN MAPS AT 2500M DEPTH

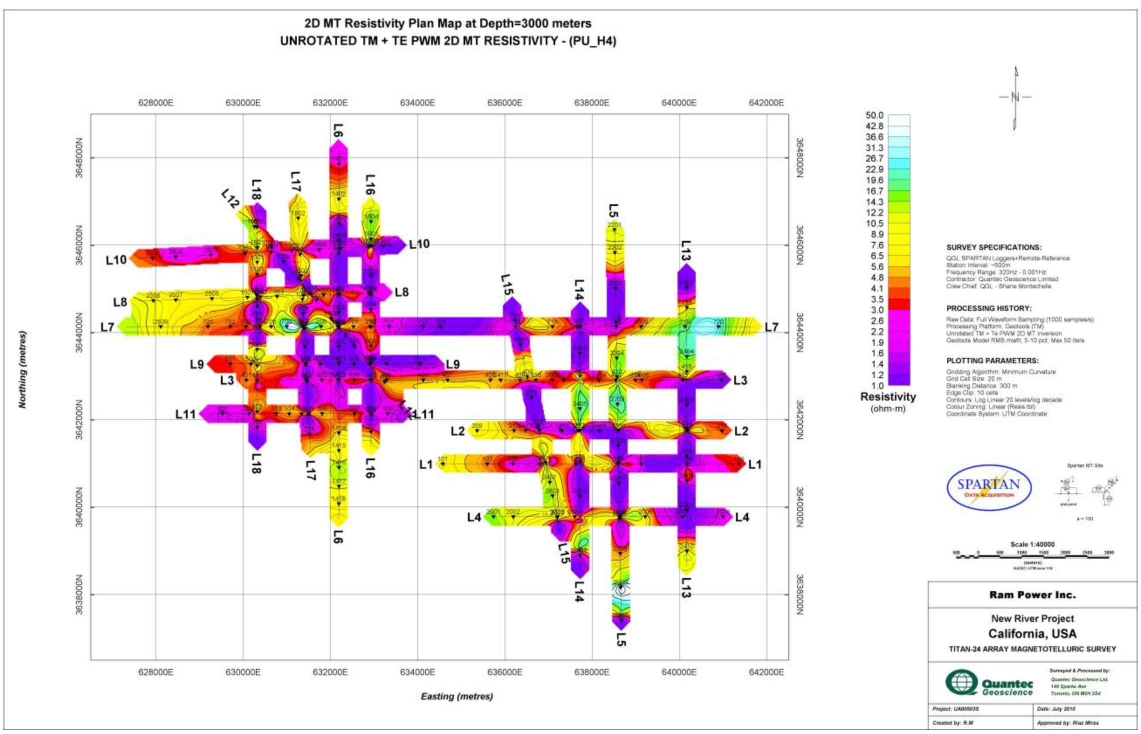




Plan Maps of RLM (top) and PWM (bottom) Resistivity at 2500m Depth

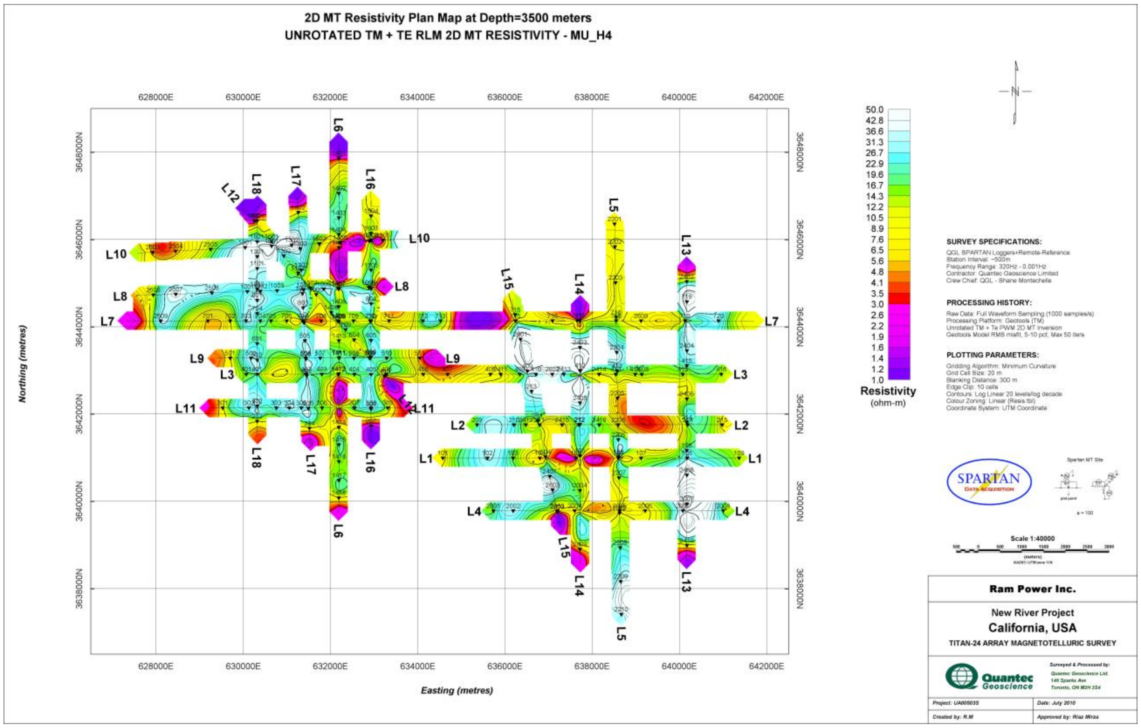
G.6 2D RLM AND PWM PLAN MAPS AT 3000M DEPTH

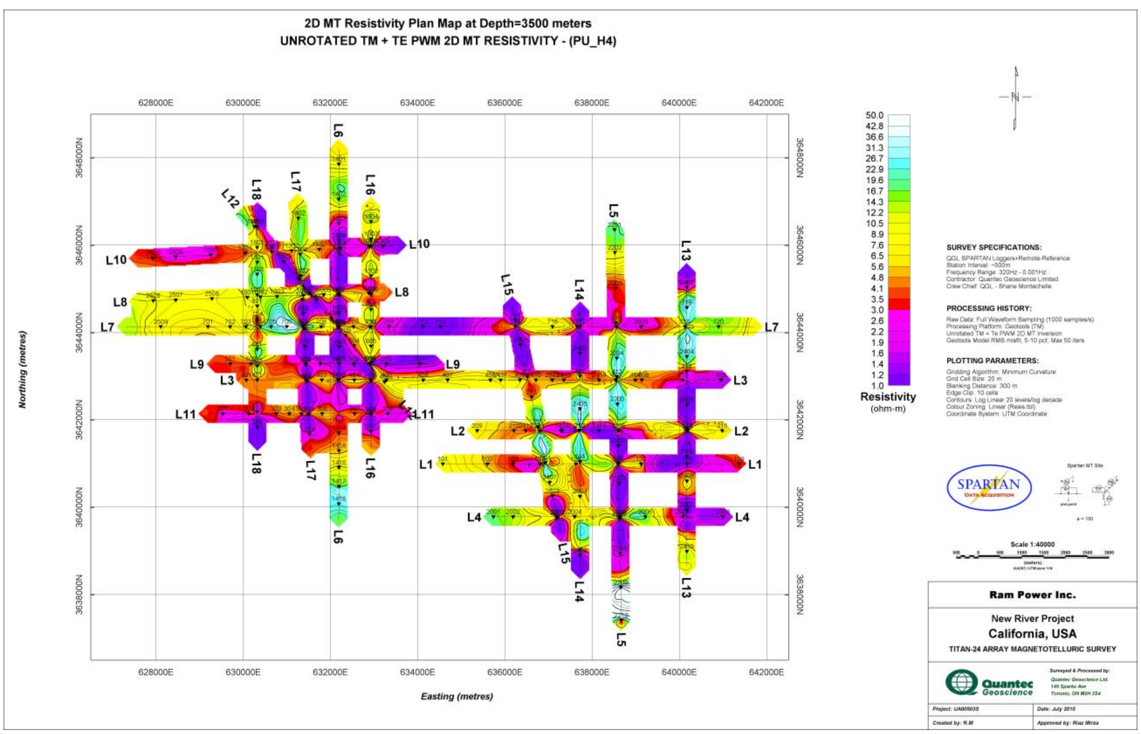




Plan Maps of RLM (top) and PWM (bottom) Resistivity at 3000m Depth

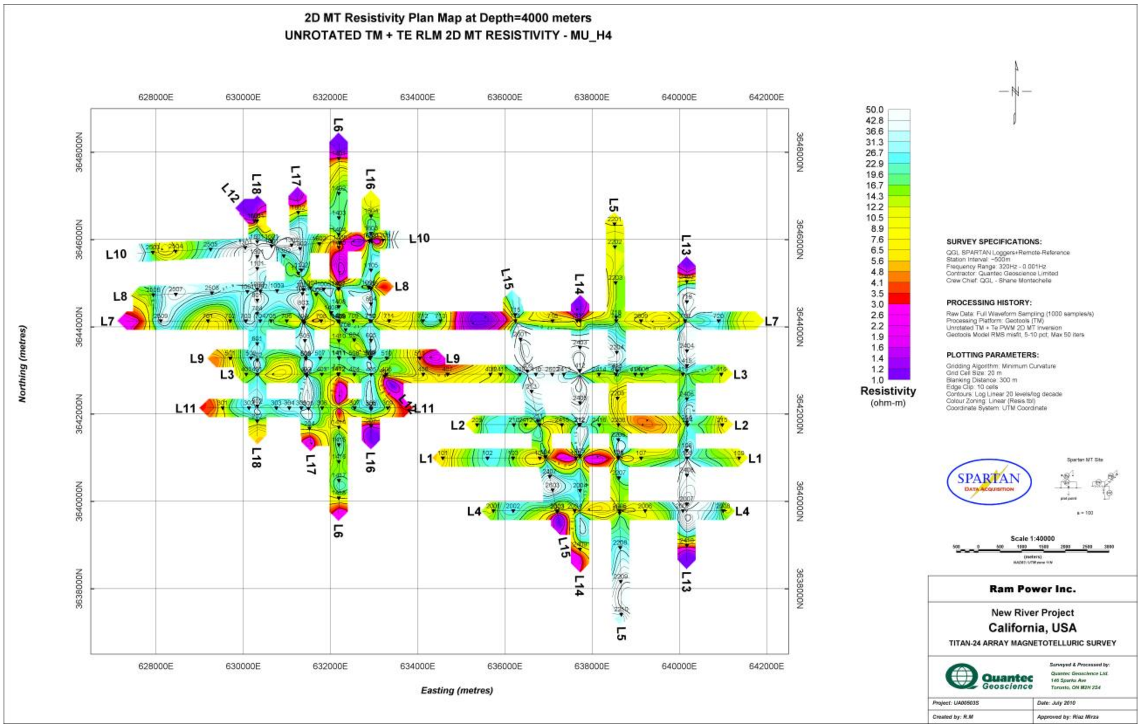
G.7 2D RLM AND PWM PLAN MAPS AT 3500M DEPTH

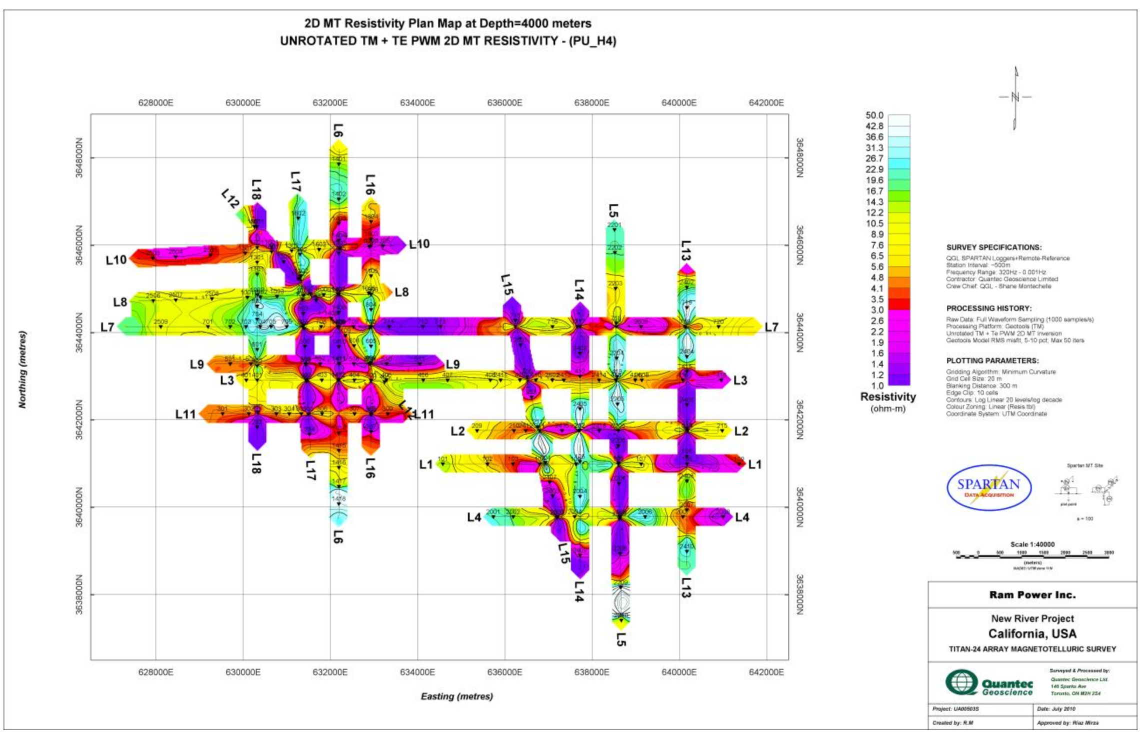




Plan Maps of RLM (top) and PWM (bottom) Resistivity at 3500m Depth

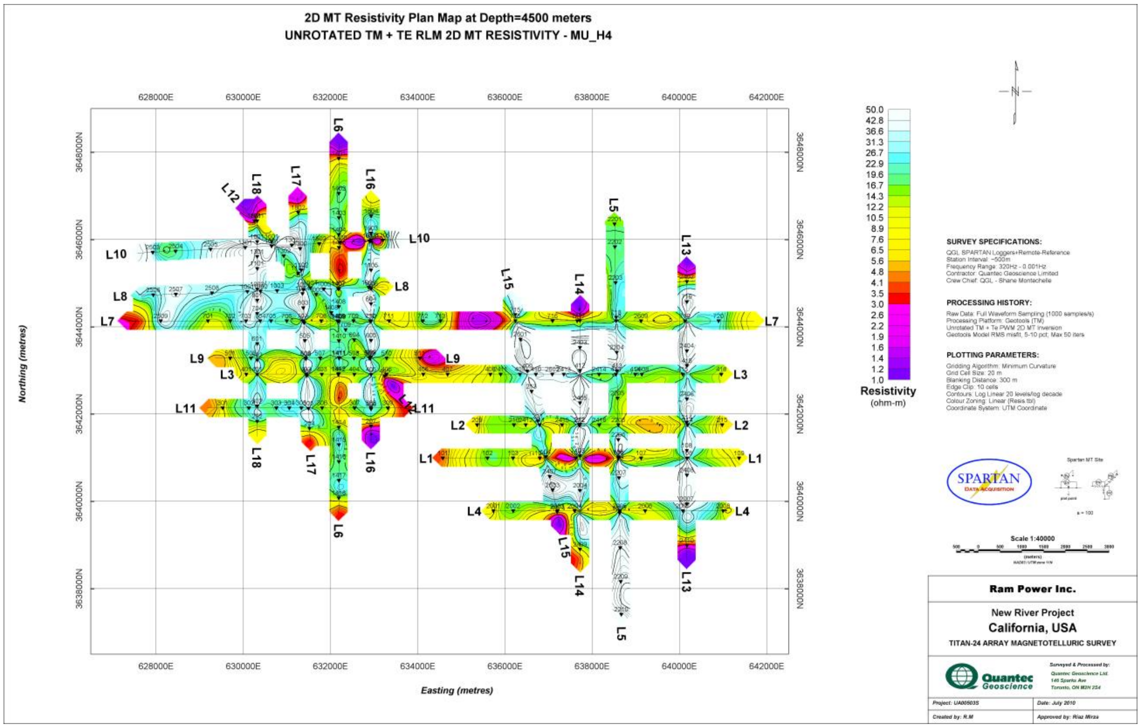
G.8 2D RLM AND PWM PLAN MAPS AT 4000M DEPTH

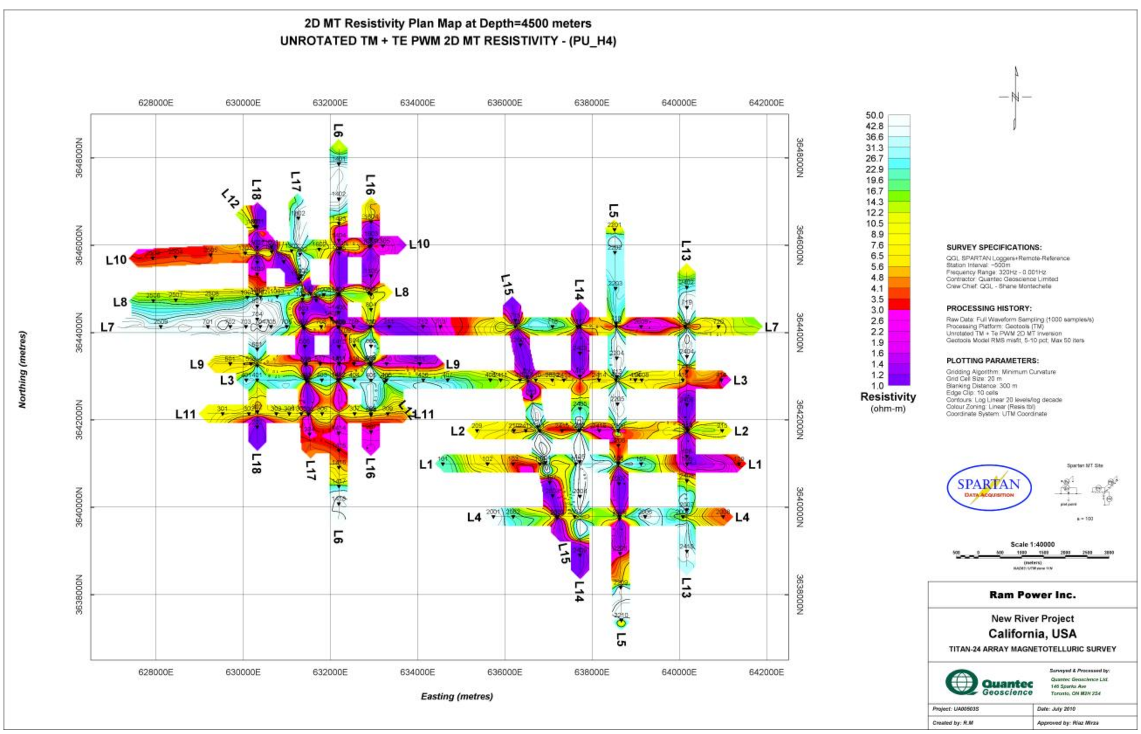




Plan Maps of RLM (top) and PWM (bottom) Resistivity at 4000m Depth

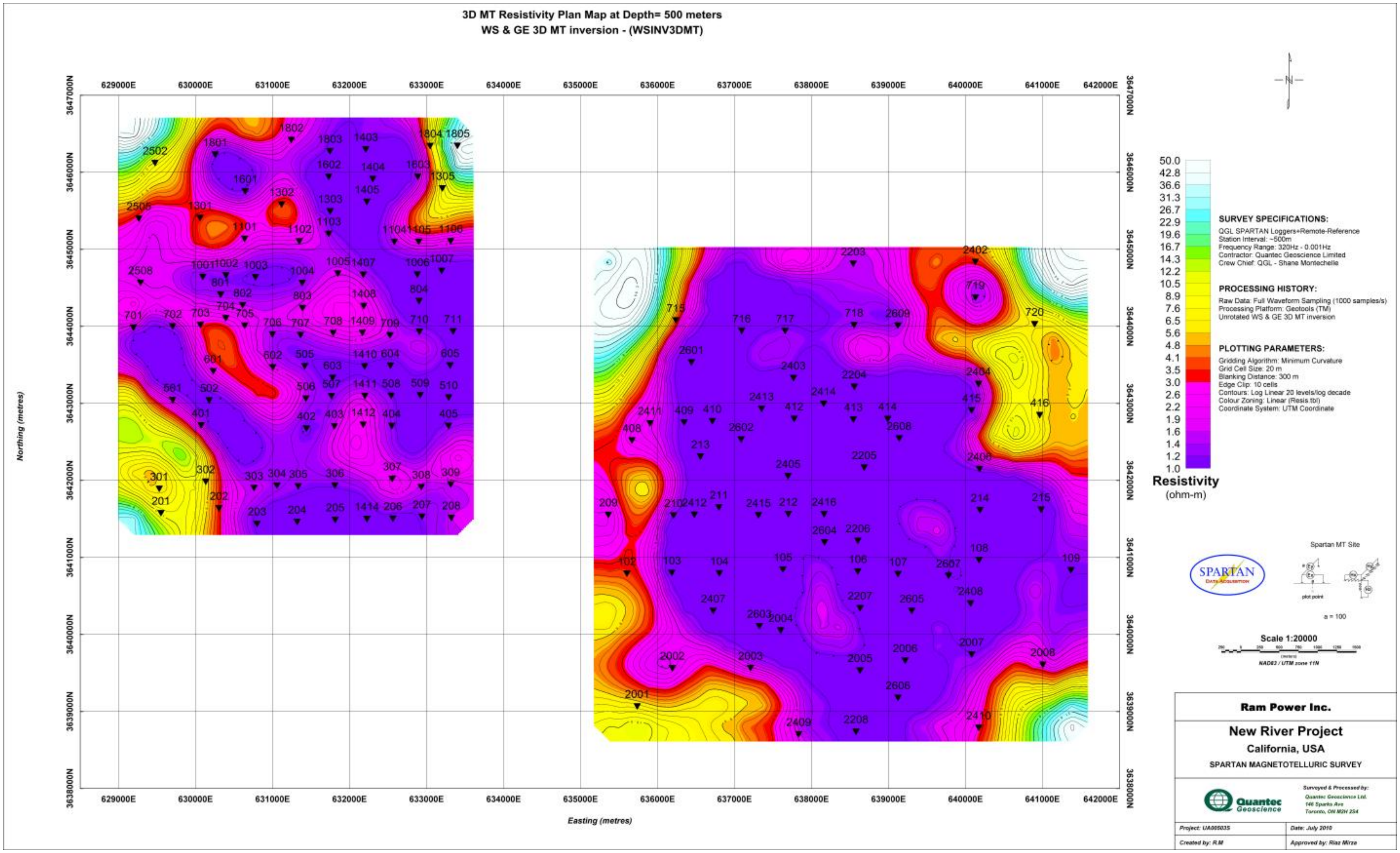
G.9 2D RLM AND PWM PLAN MAPS AT 4500M DEPTH





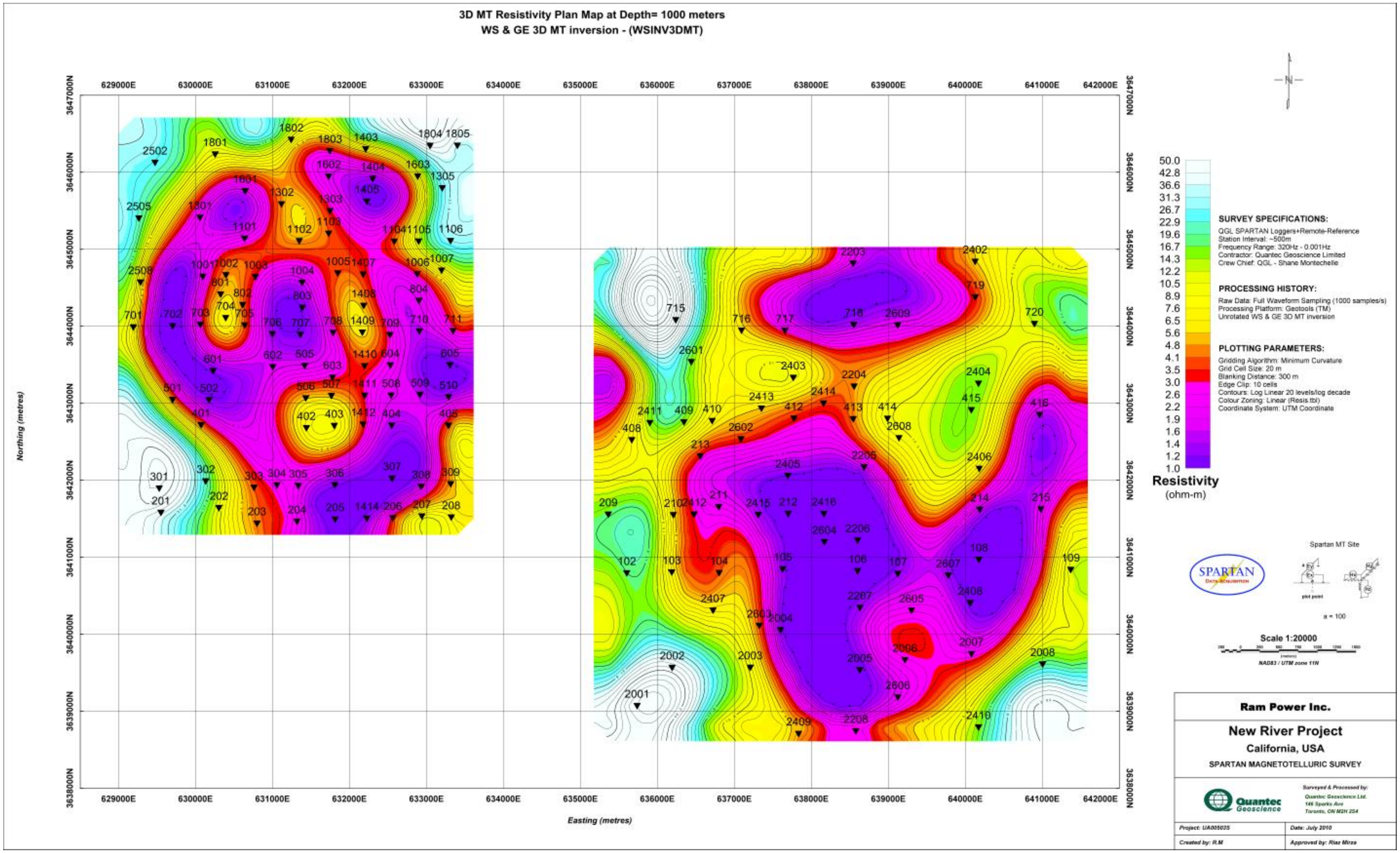
Plan Maps of RLM (top) and PWM (bottom) Resistivity at 4500m Depth

G.10 3D MT RESISTIVITY PLAN MAPS AT 500M DEPTH



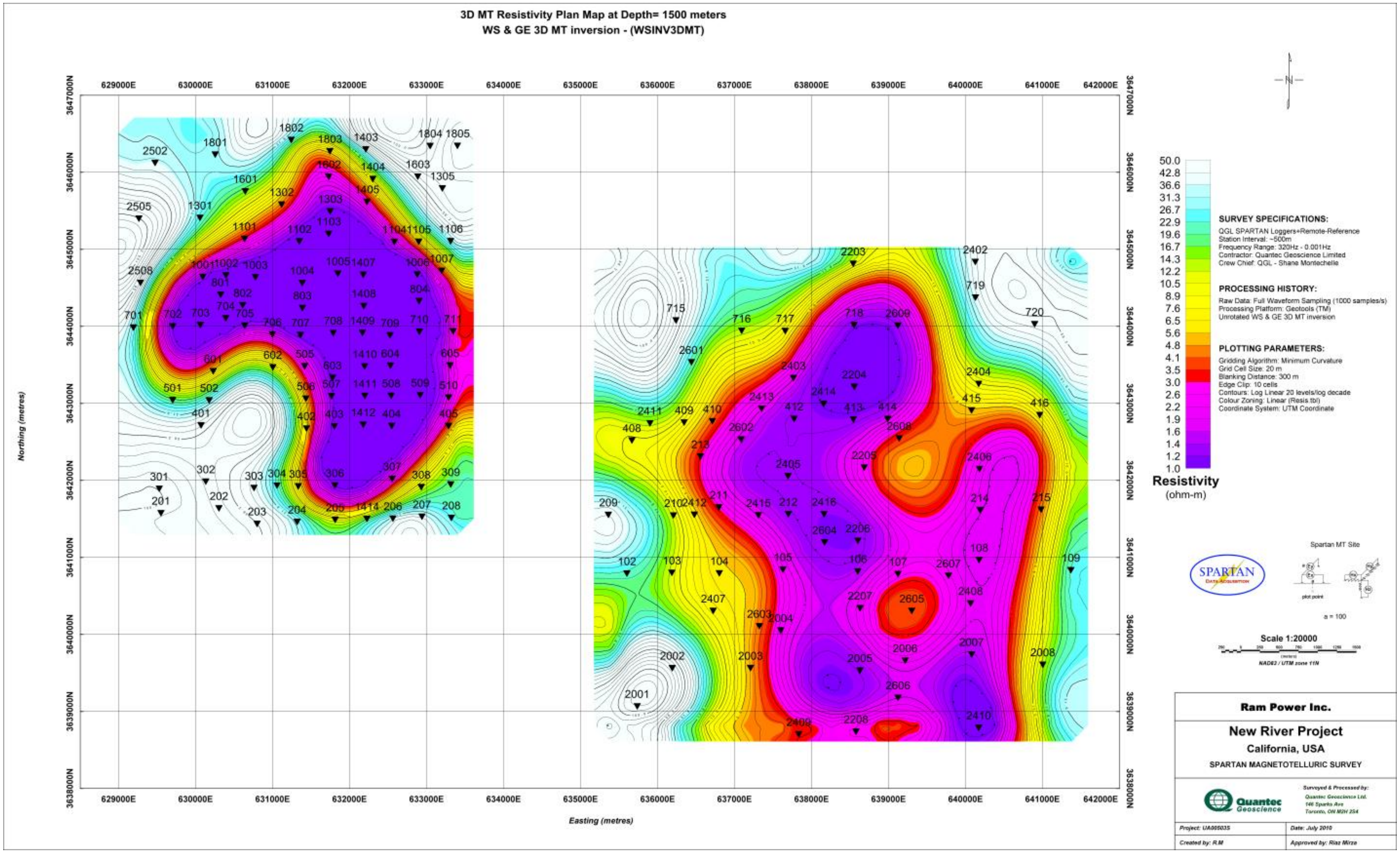
Plan Map at 500m Depth of 3D MT Resistivity

G.11 3D MT RESISTIVITY PLAN MAPS AT 1000M DEPTH



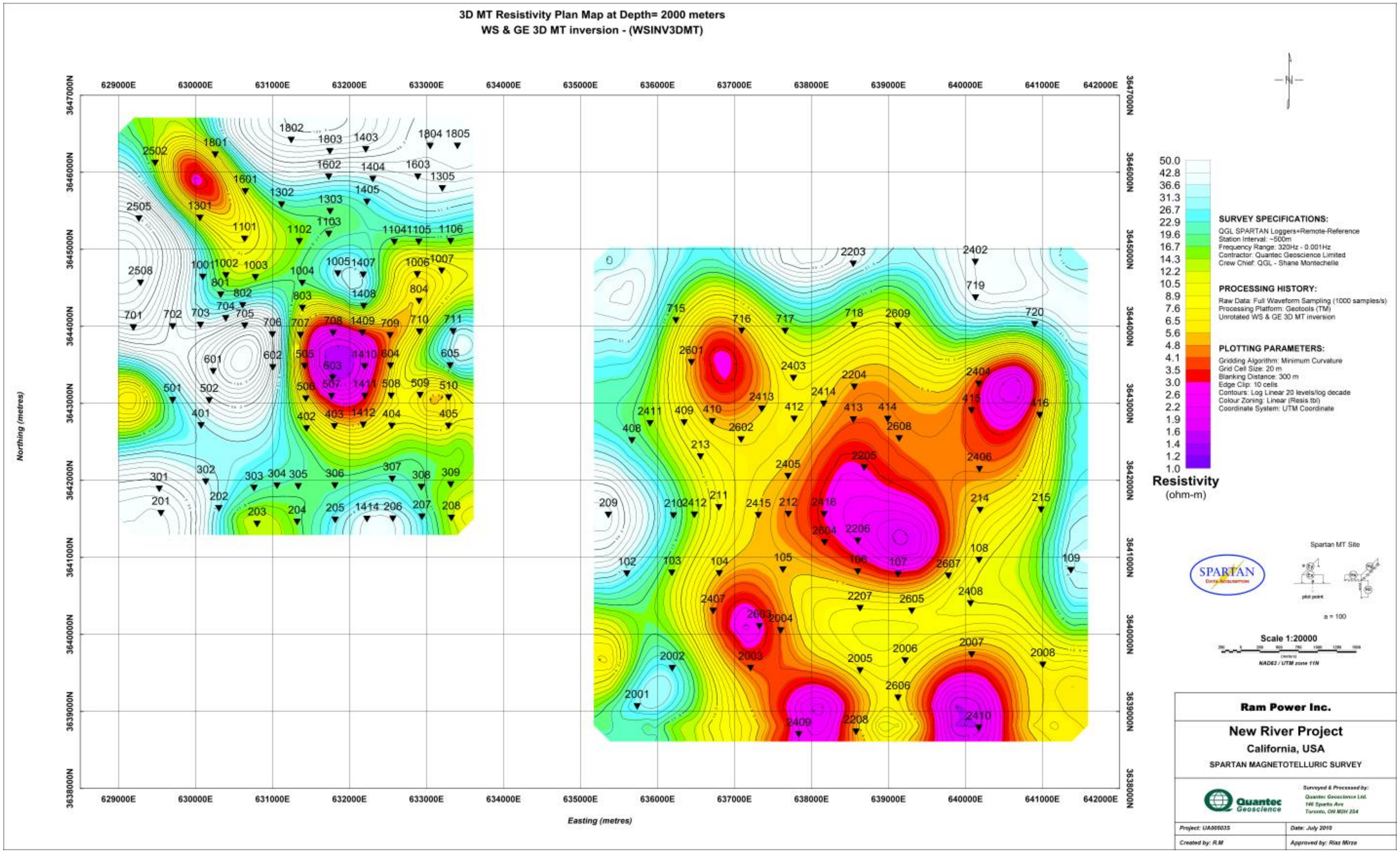
Plan Map at 1000m Depth of 3D MT Resistivity

G.12 3D MT RESISTIVITY PLAN MAPS AT 1500M DEPTH



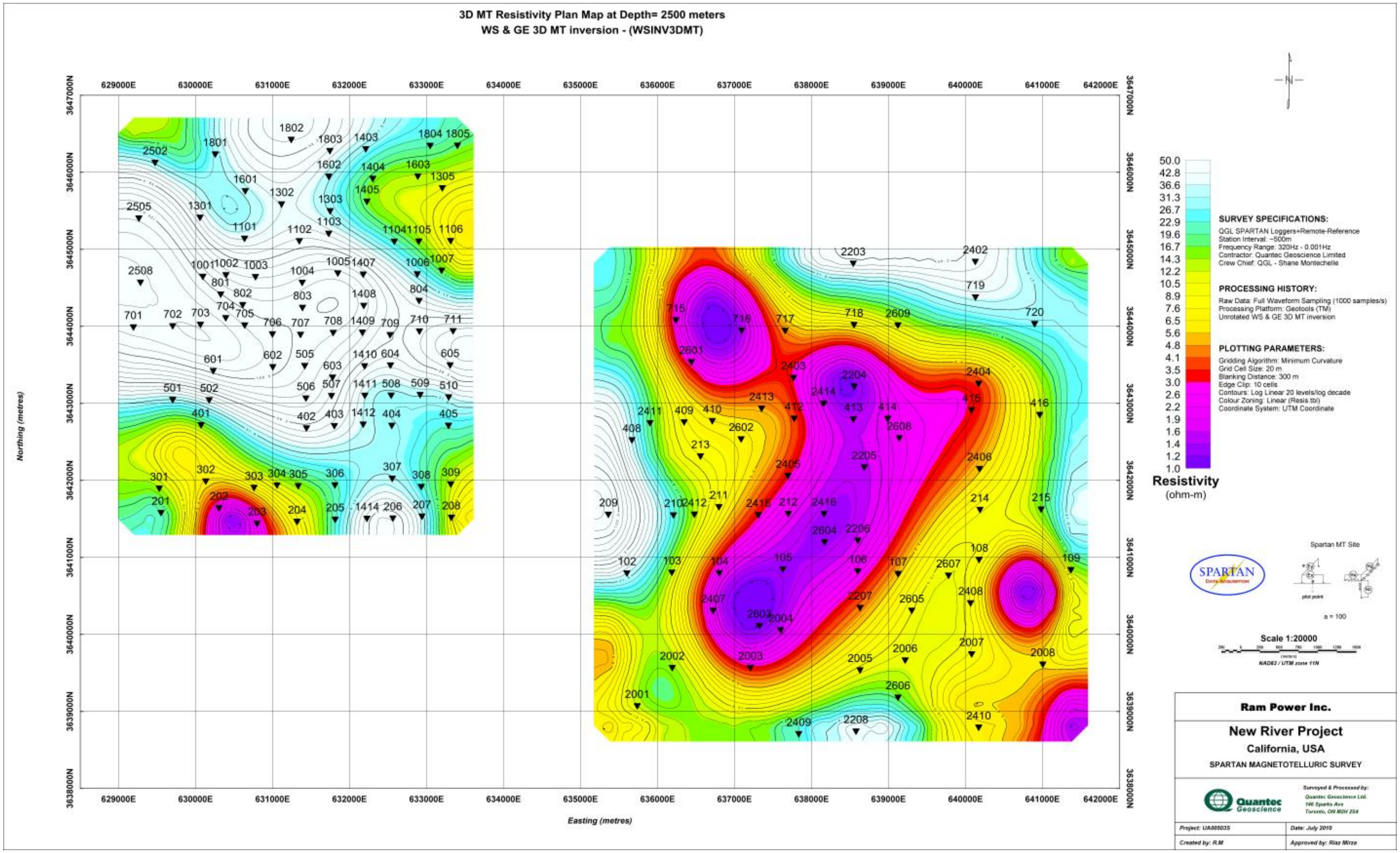
Plan Map at 1500m Depth of 3D MT Resistivity

G.13 3D MT RESISTIVITY PLAN MAPS AT 2000M DEPTH



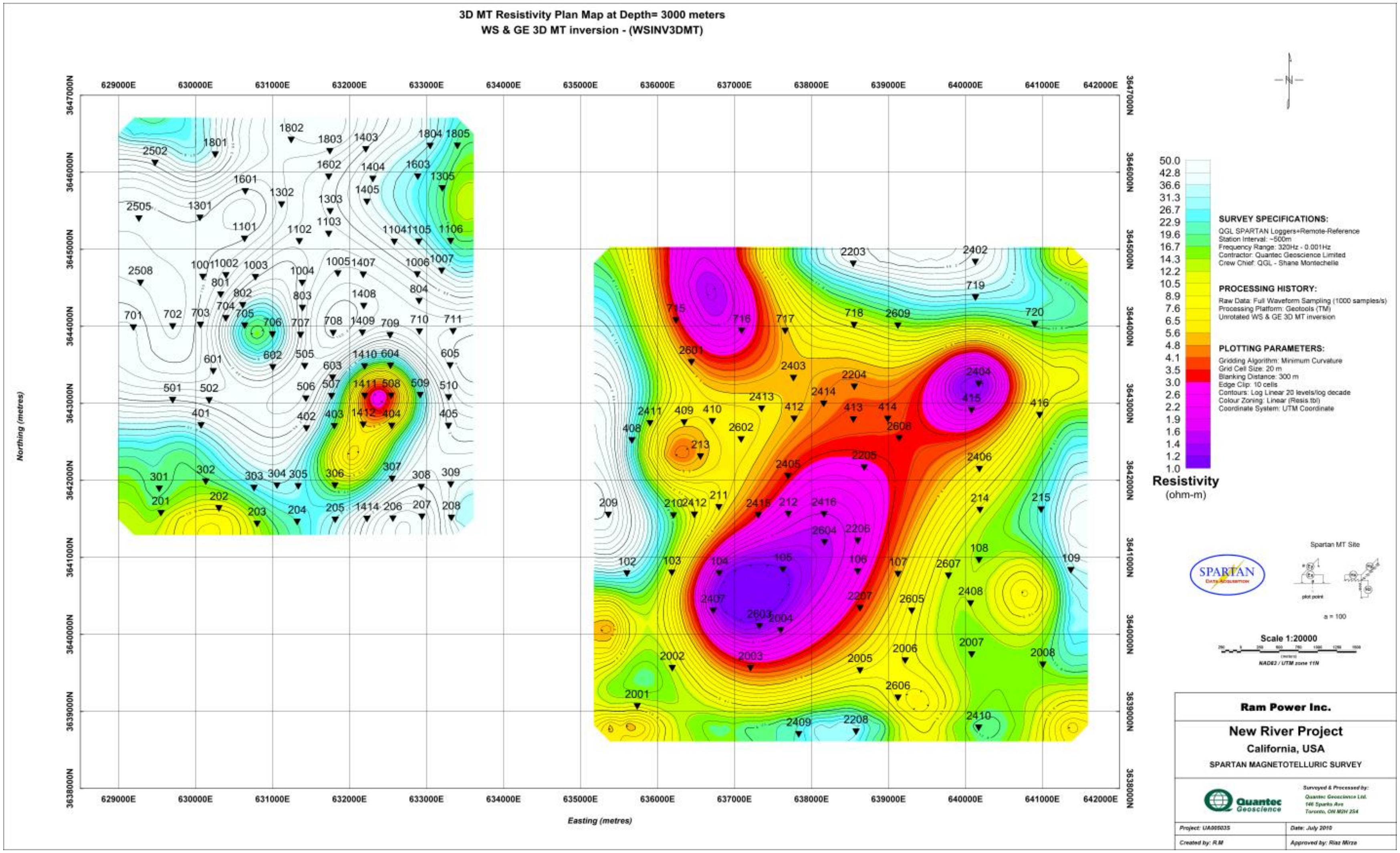
Plan Map at 2000m Depth of 3D MT Resistivity

G.14 3D MT RESISTIVITY PLAN MAPS AT 2500M DEPTH



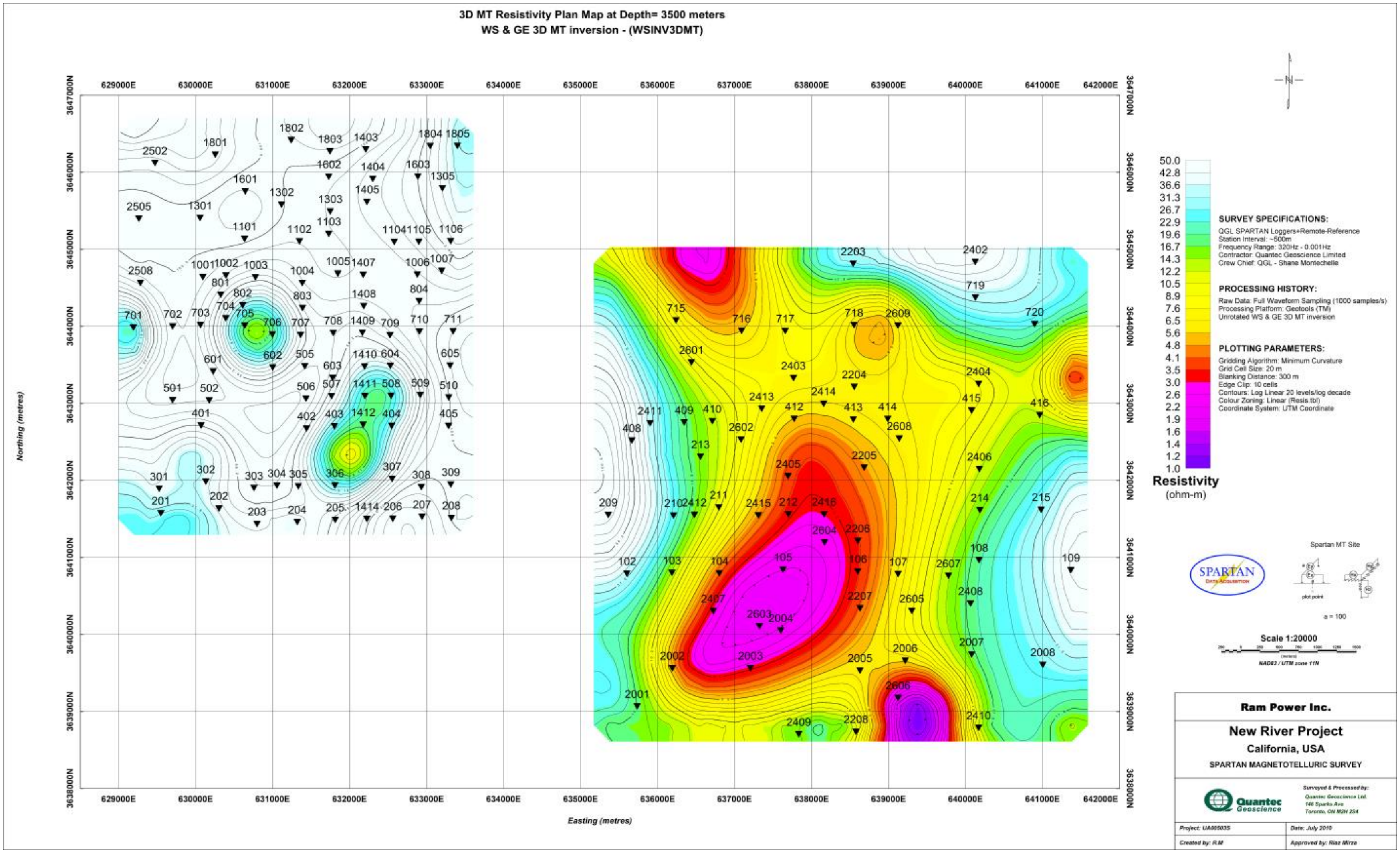
Plan Map at 2500m Depth of 3D MT Resistivity

G.15 3D MT RESISTIVITY PLAN MAPS AT 3000M DEPTH



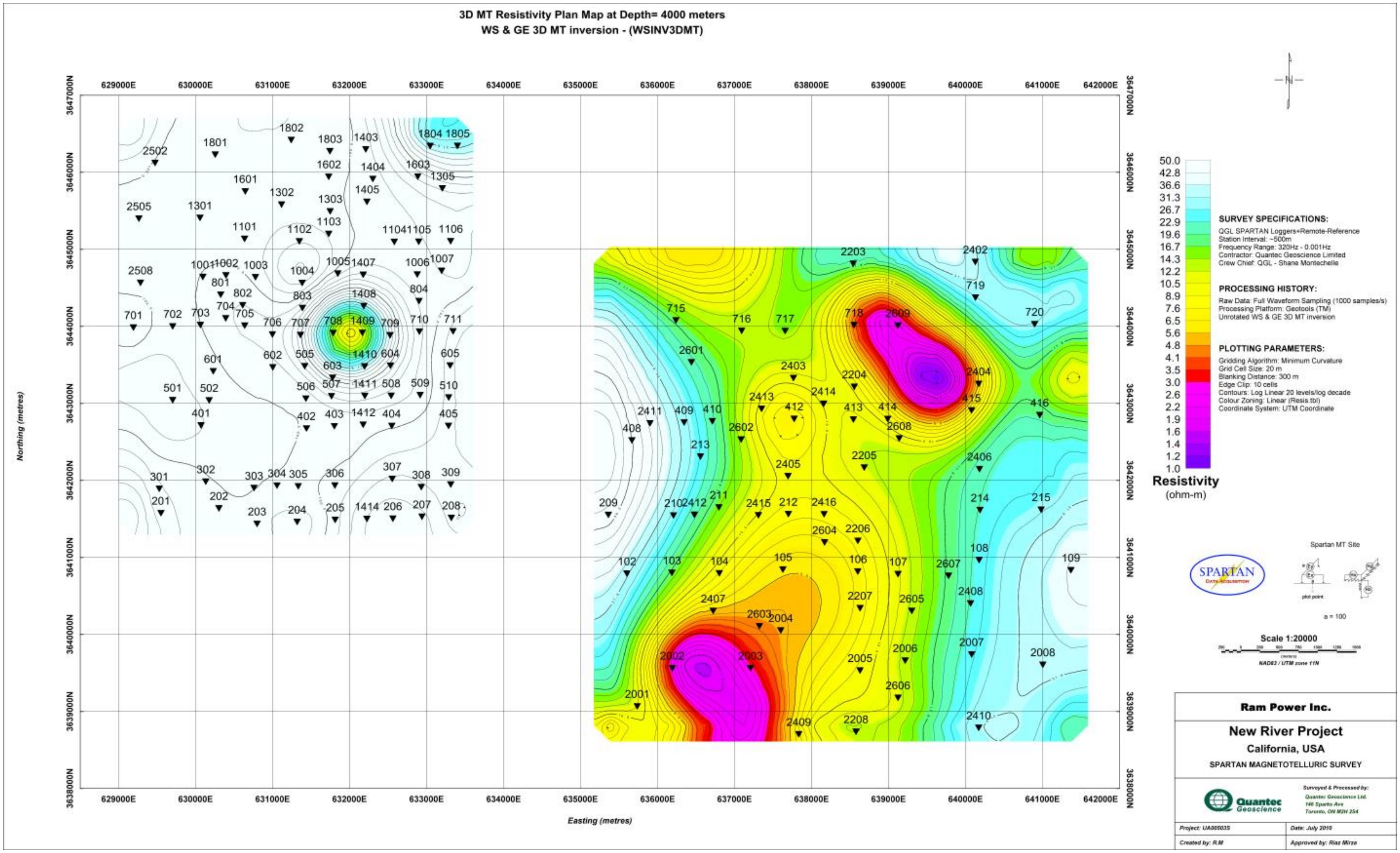
Plan Map at 3000m Depth of 3D MT Resistivity

G.16 3D MT RESISTIVITY PLAN MAPS AT 3500M DEPTH



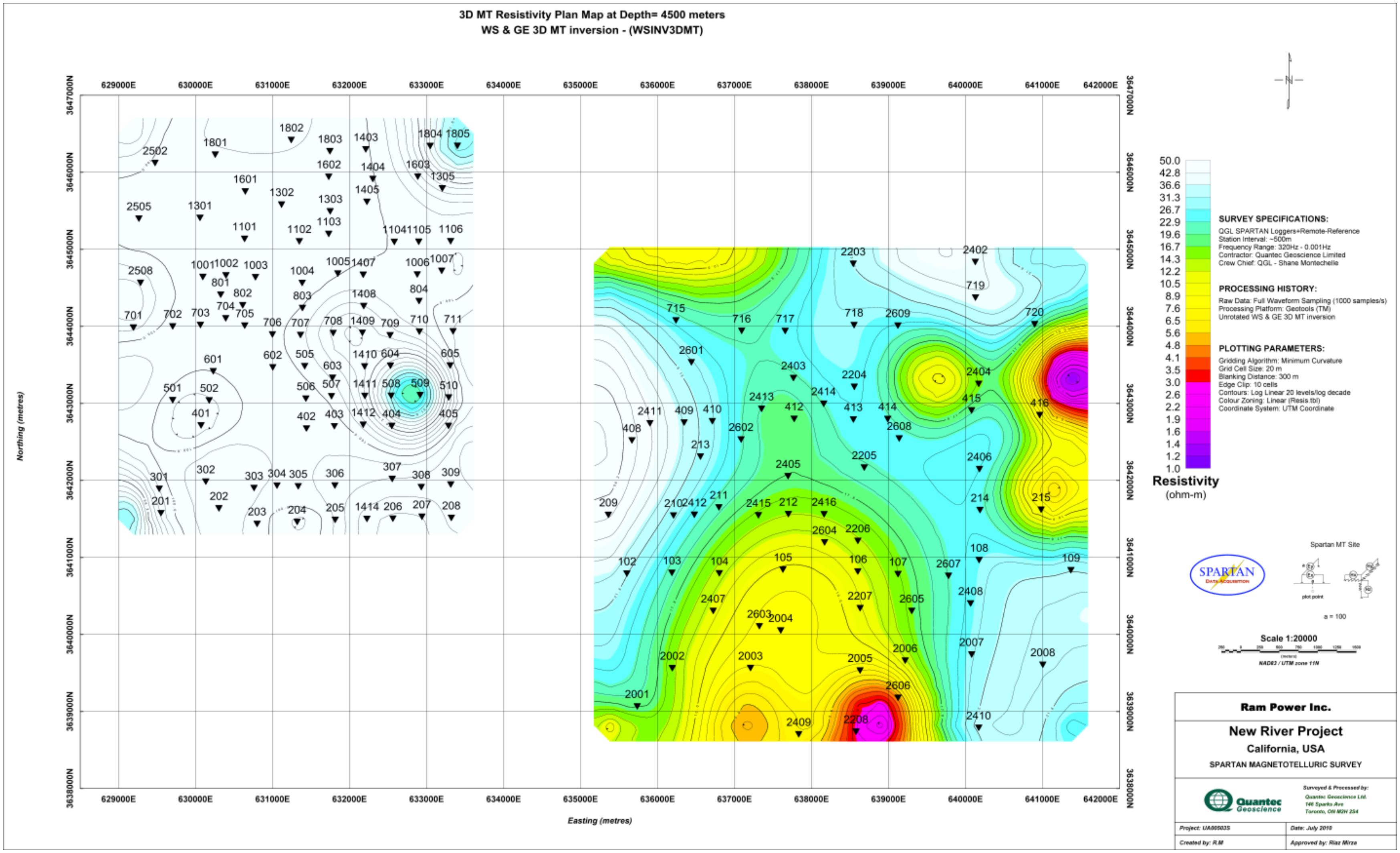
__Plan Map at 3500m Depth of 3D MT Resistivity__

G.17 3D MT RESISTIVITY PLAN MAPS AT 4000M DEPTH



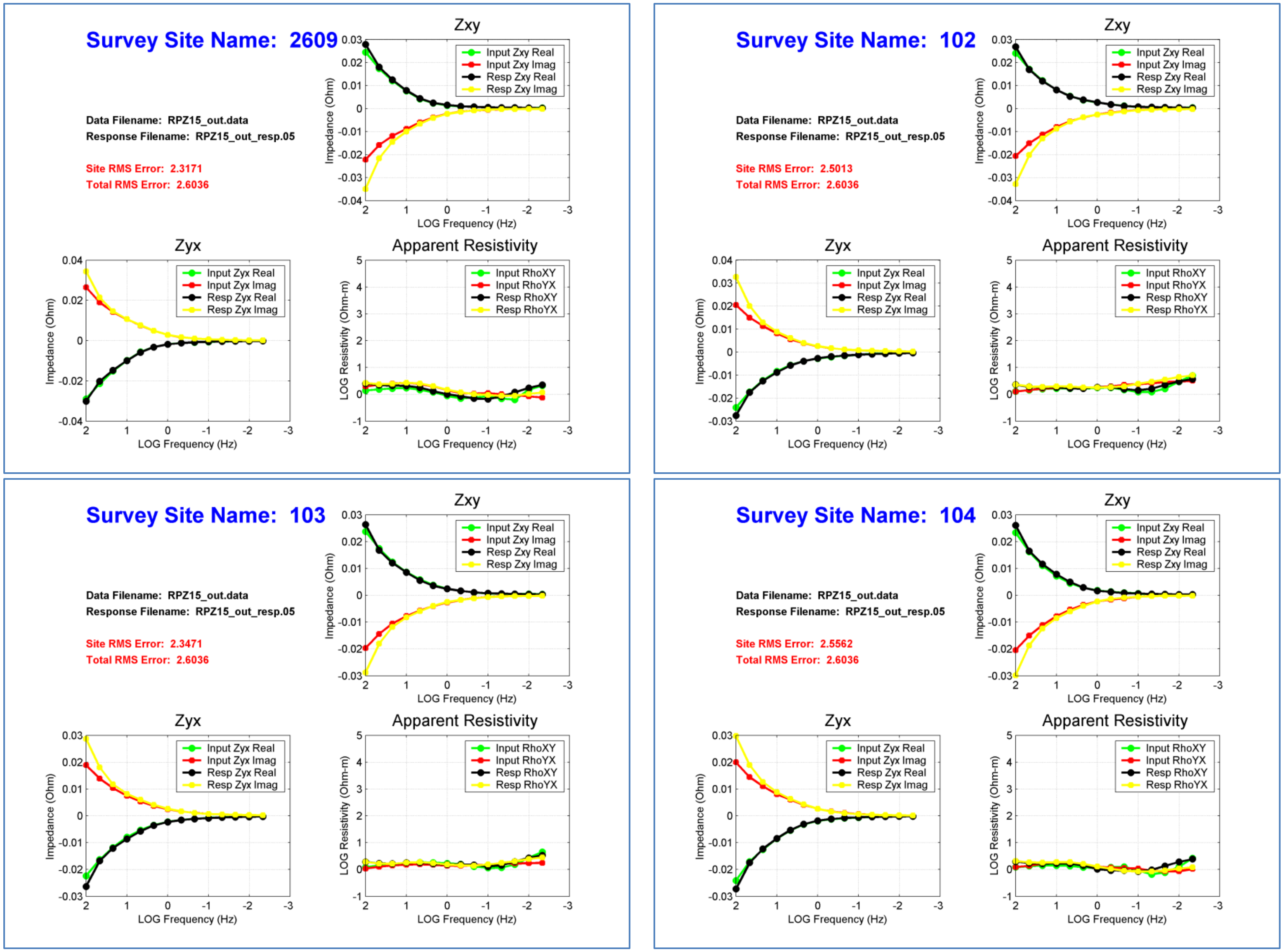
Plan Map at 4000m Depth of 3D MT Resistivity

G.18 3D MT RESISTIVITY PLAN MAPS AT 4500M DEPTH

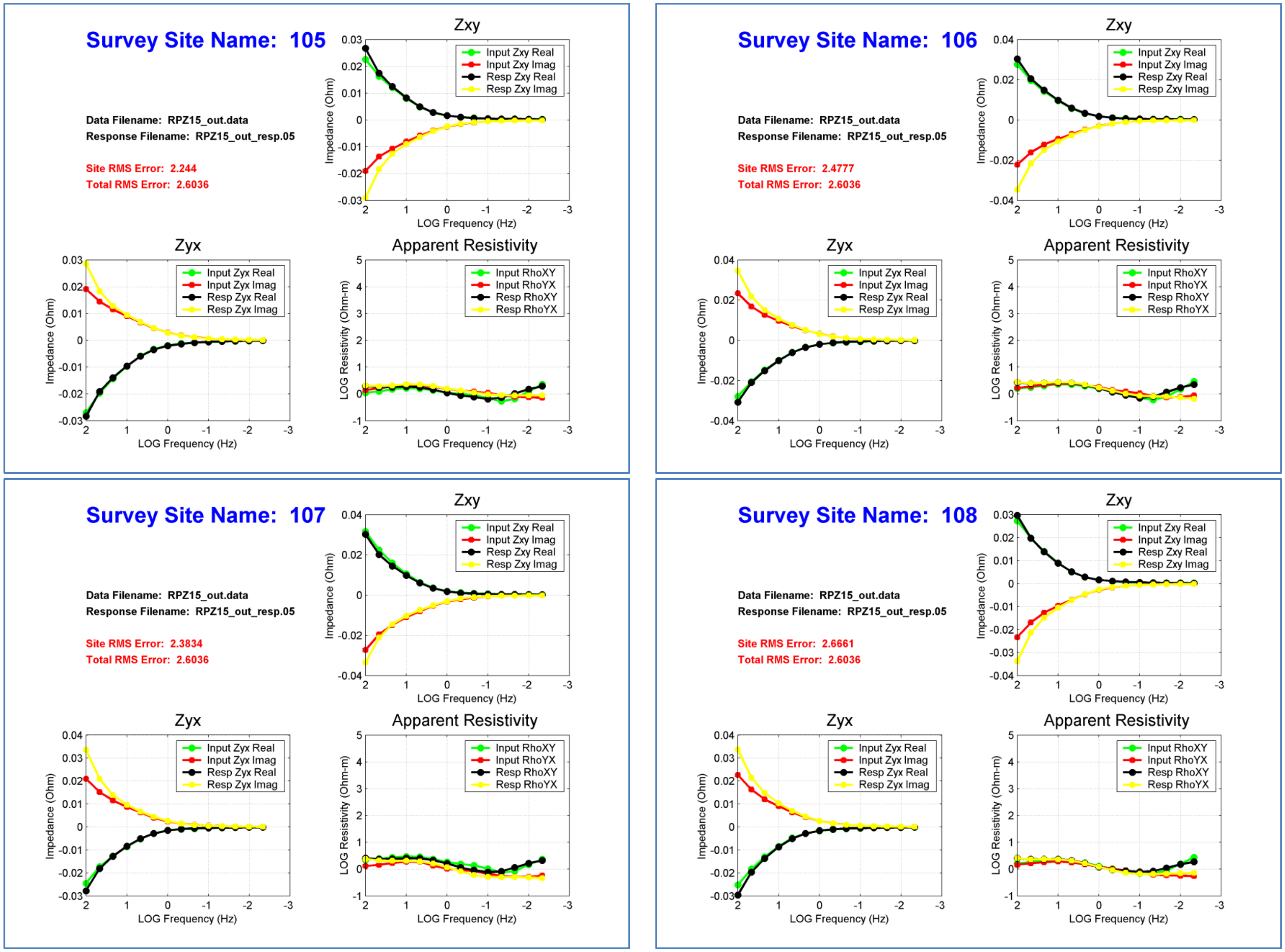


<u>Plan Map at 4500m Depth of 3D MT Resistivity</u>

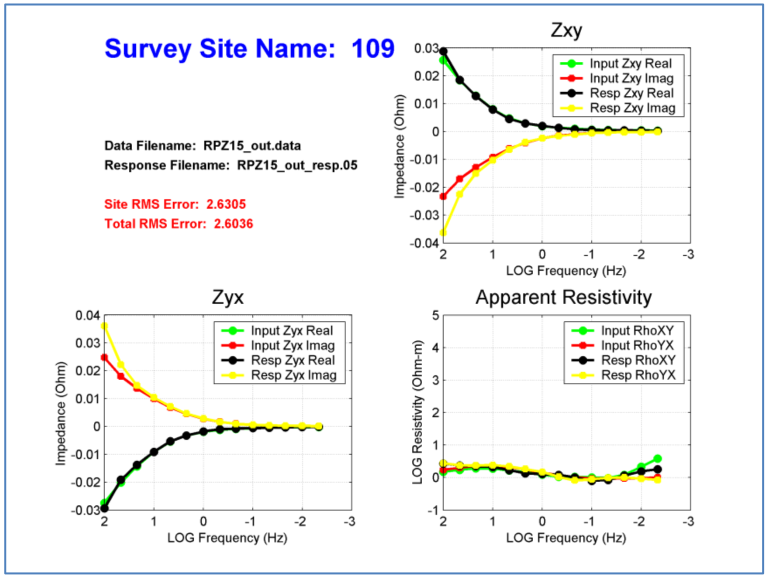
H MT 3D RESISTIVITY RESPONSES (MESQUITE GRID)

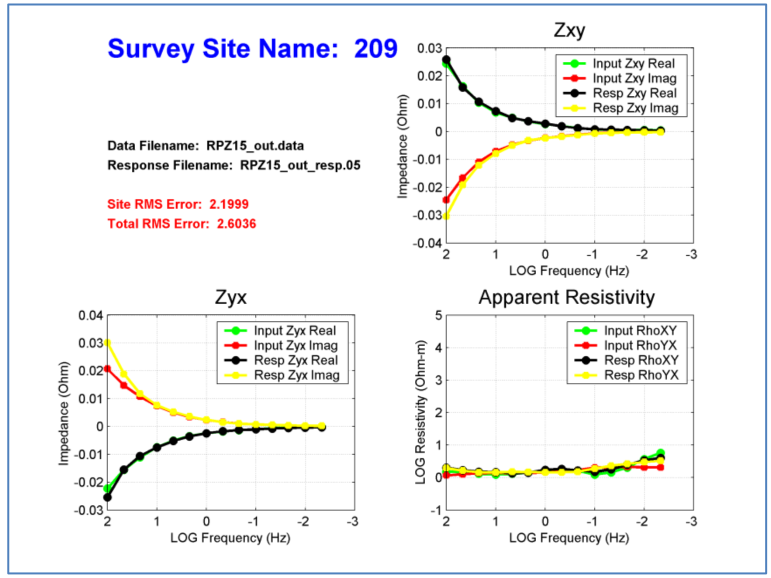


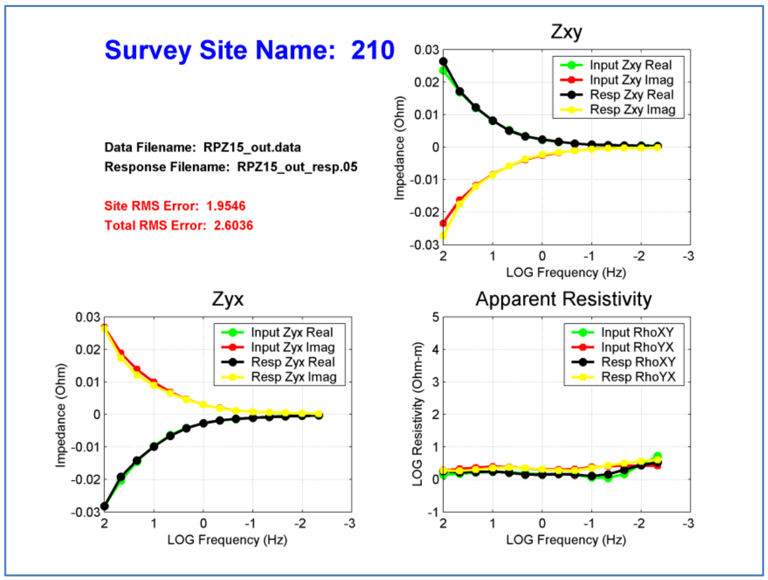
MT 3D Resistivity Responses (Mesquite Grid)

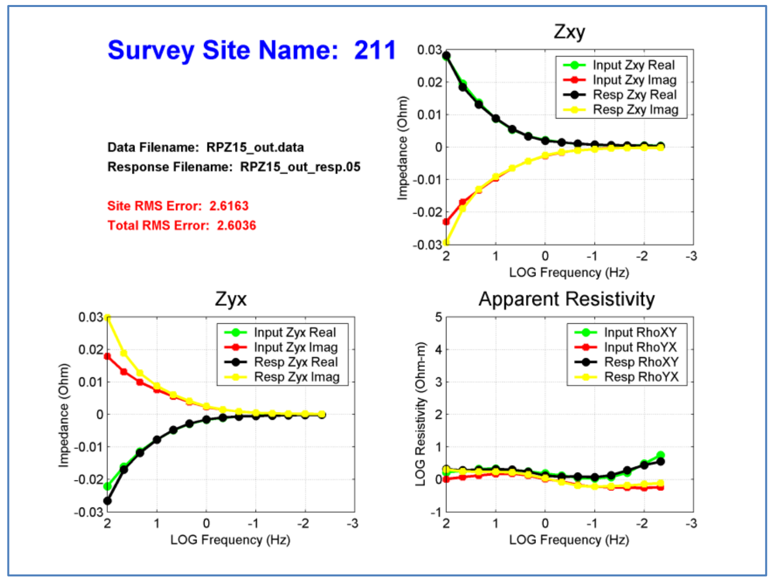


MT 3D Resistivity Responses (Mesquite Grid)

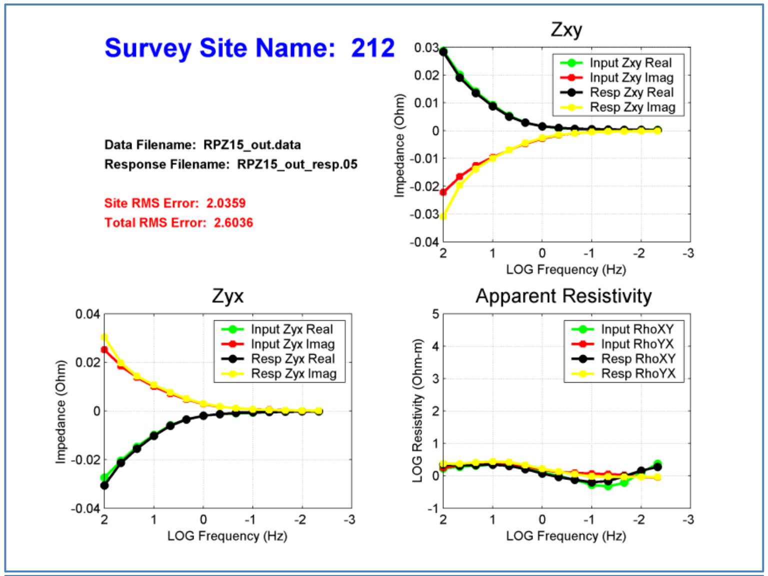


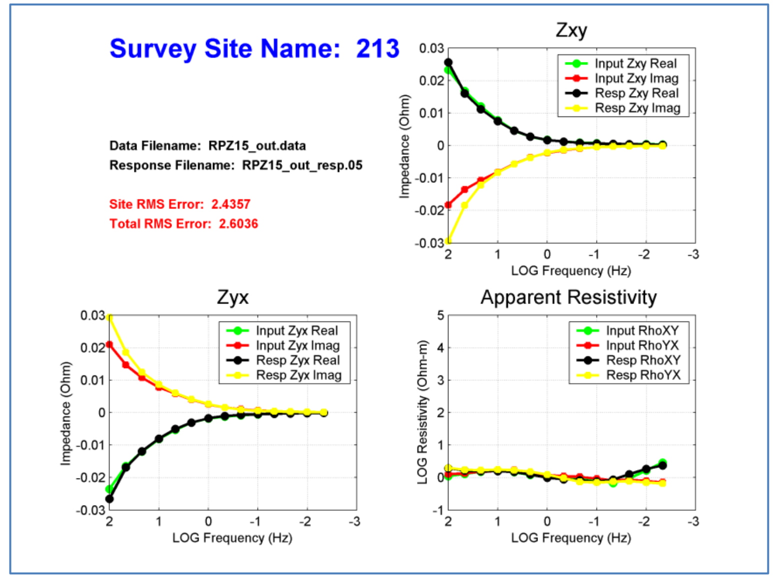


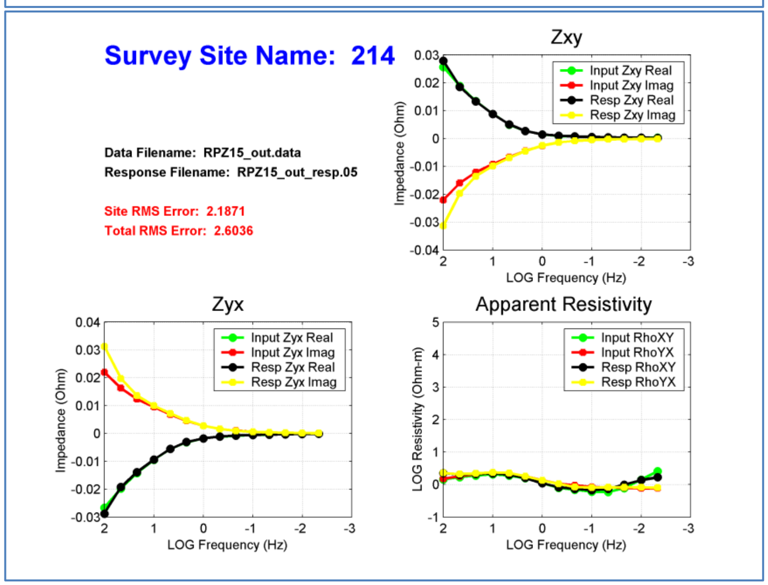


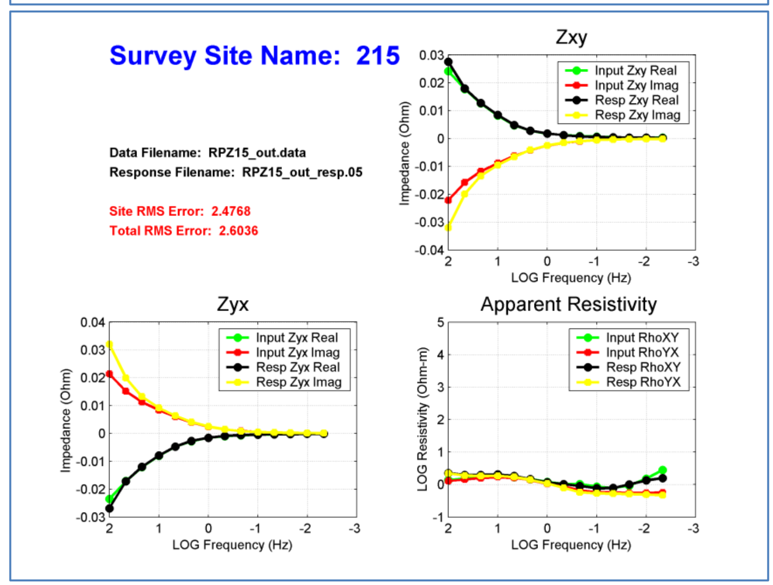


MT 3D Resistivity Responses (Mesquite Grid)

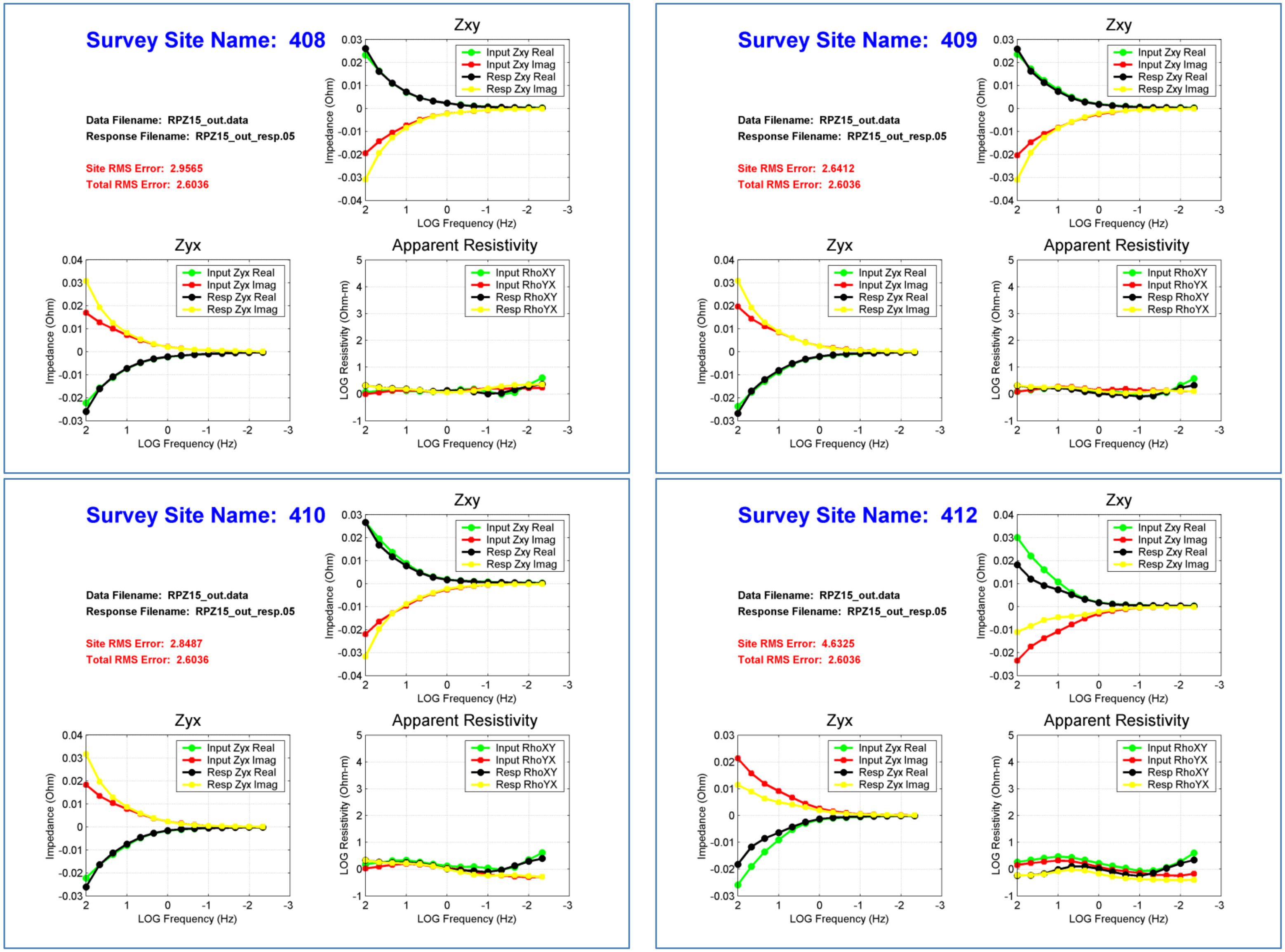




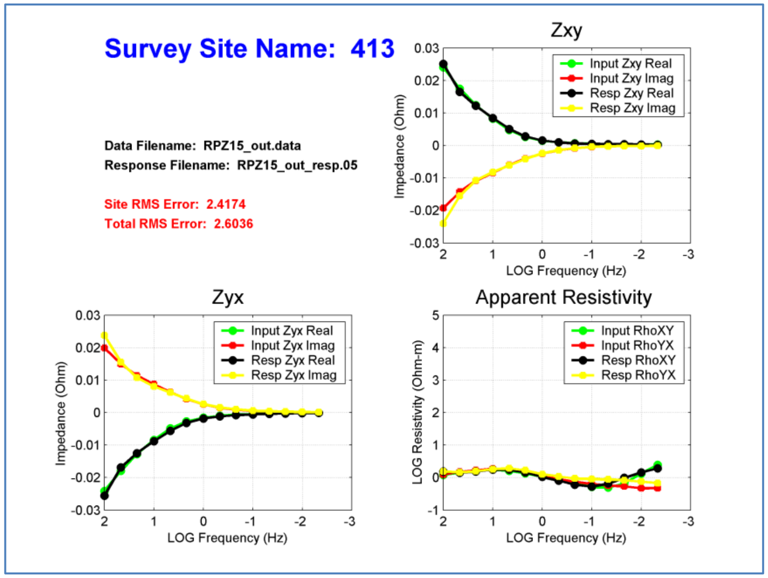


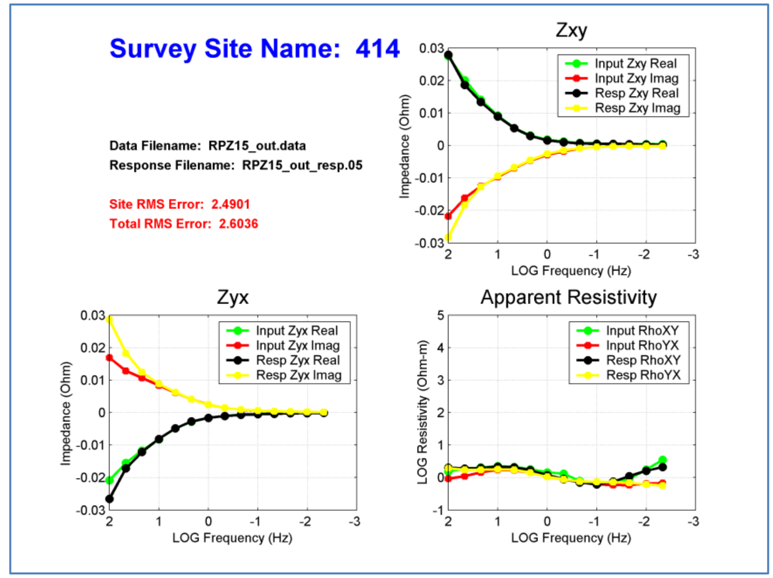


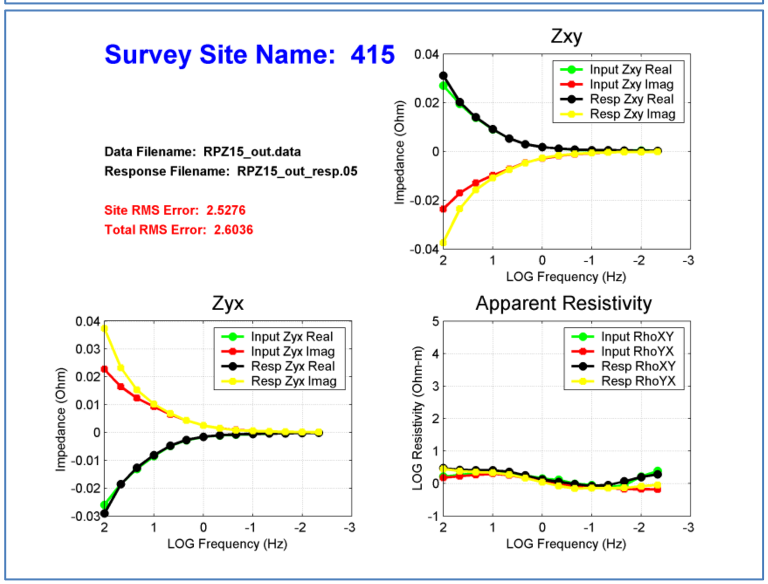
MT 3D Resistivity Responses (Mesquite Grid)

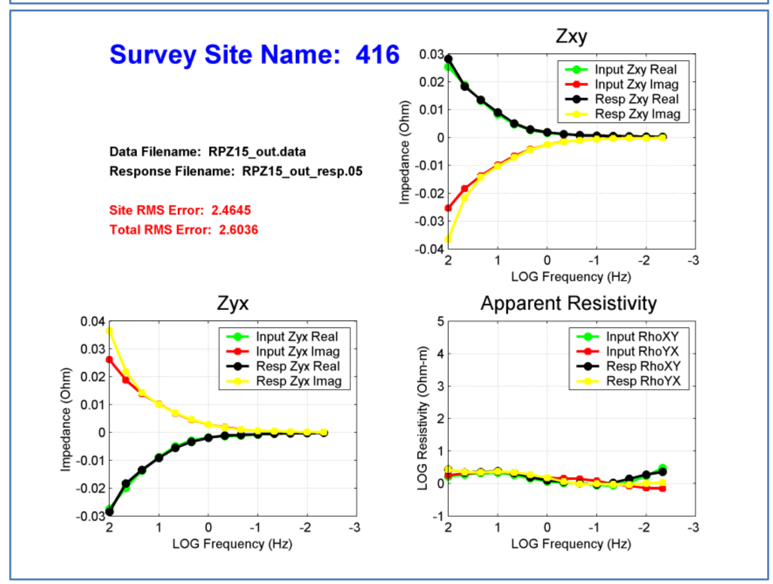


MT 3D Resistivity Responses (Mesquite Grid)

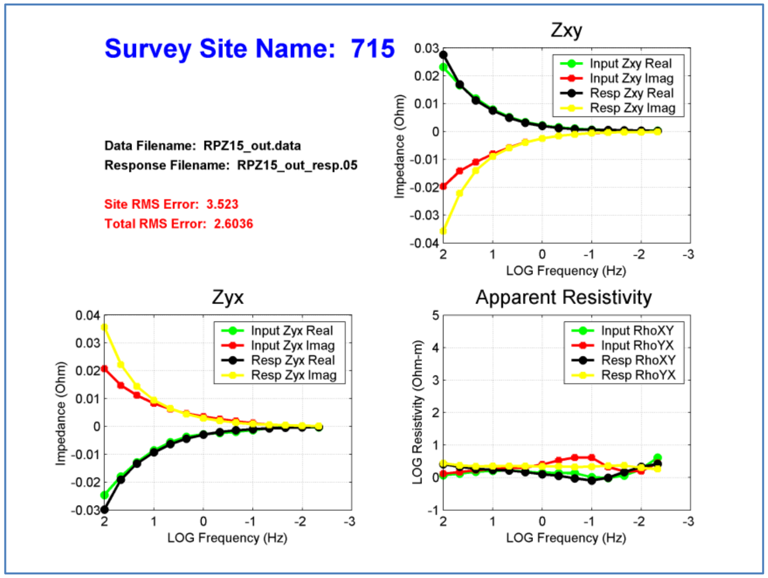


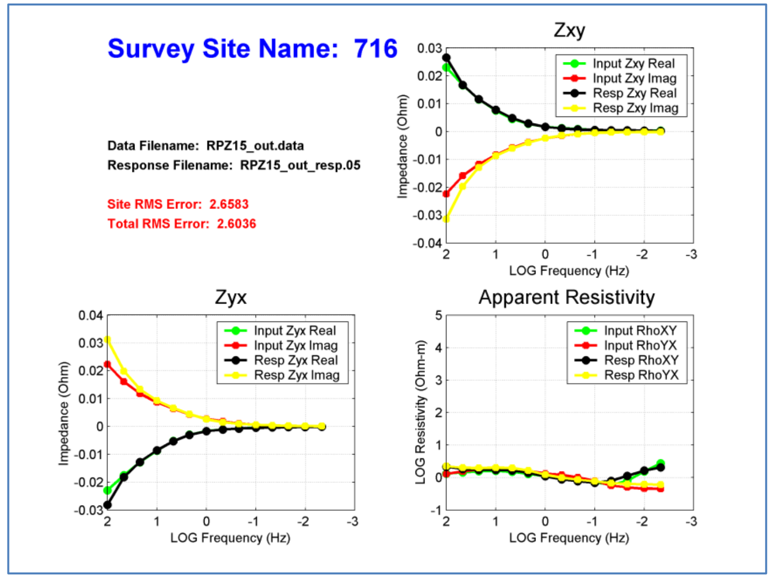


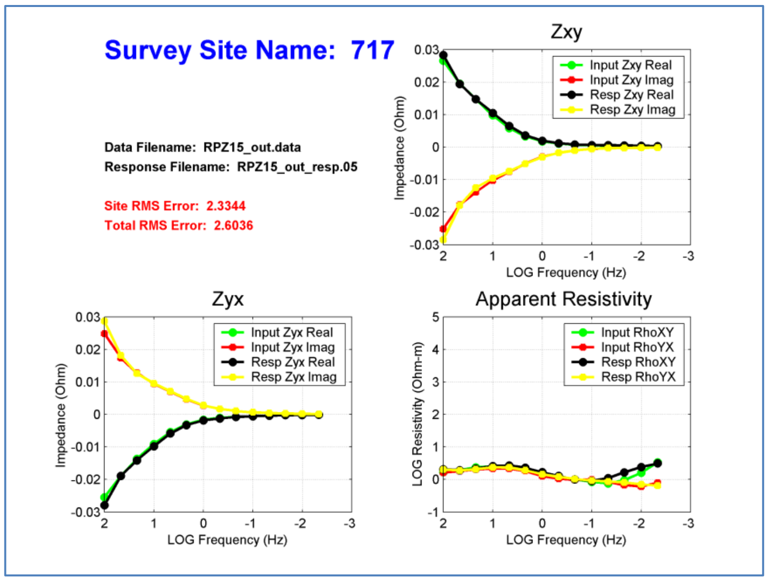


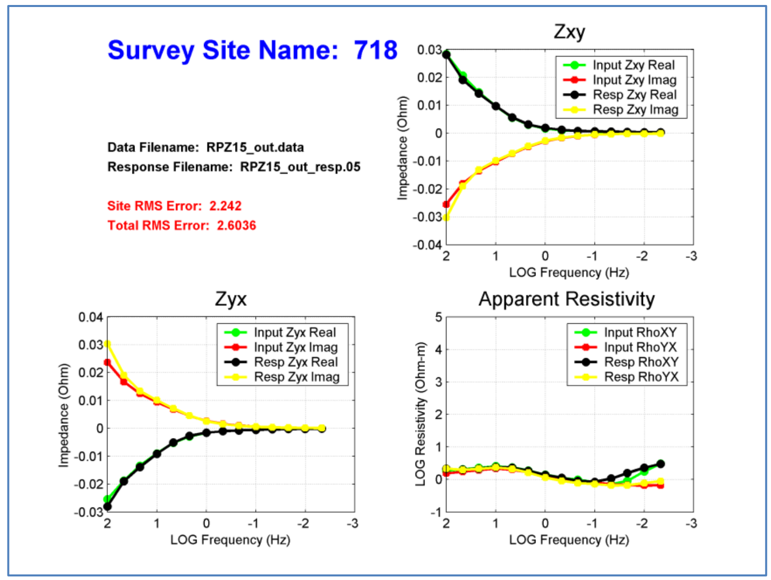


MT 3D Resistivity Responses (Mesquite Grid)

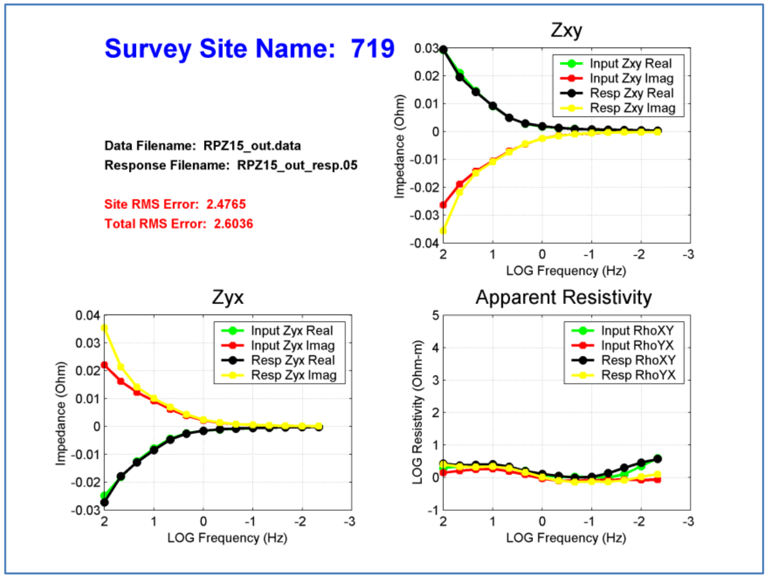


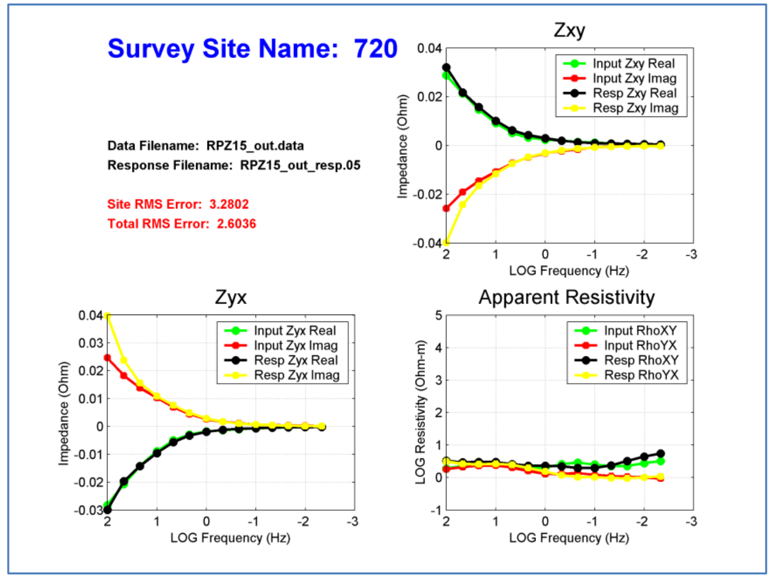


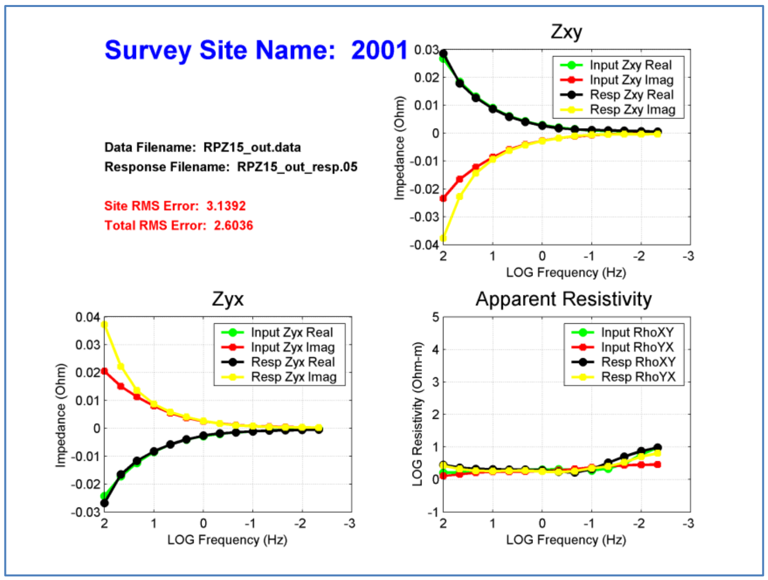


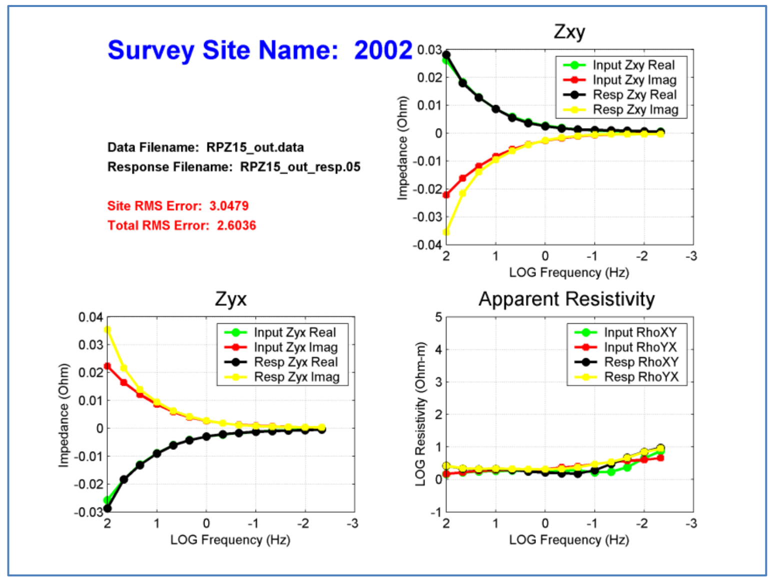


MT 3D Resistivity Responses (Mesquite Grid)

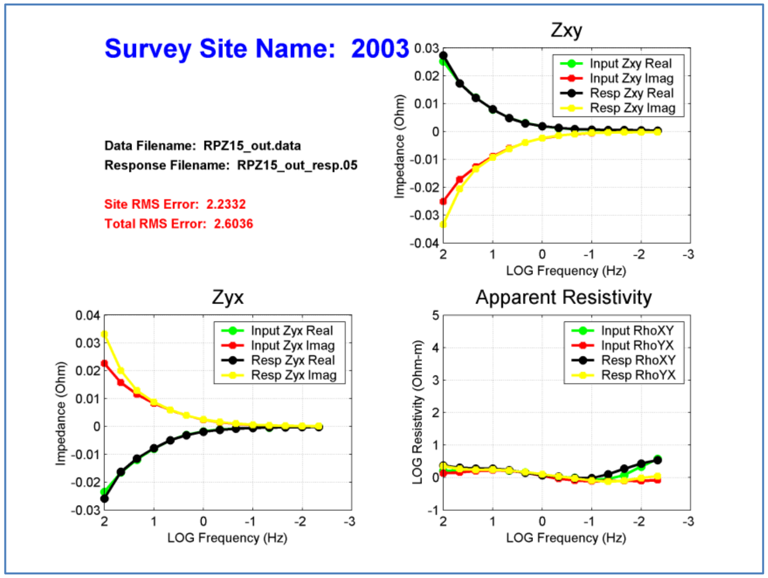


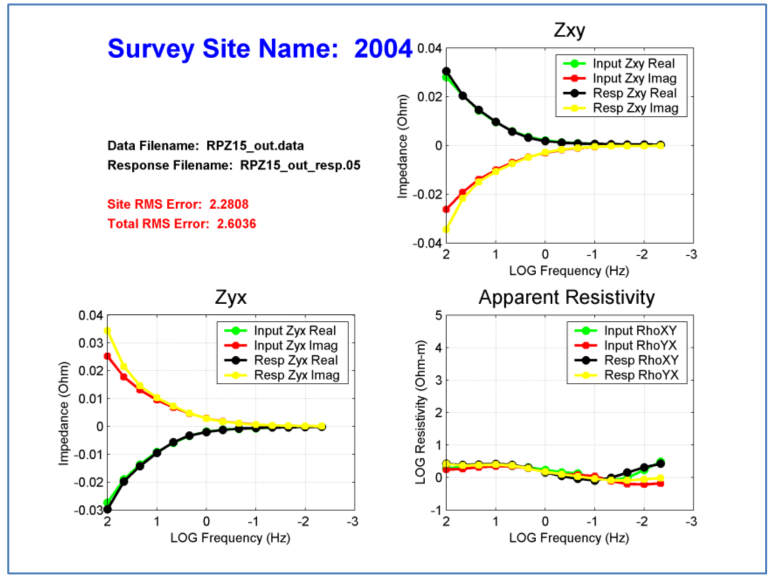


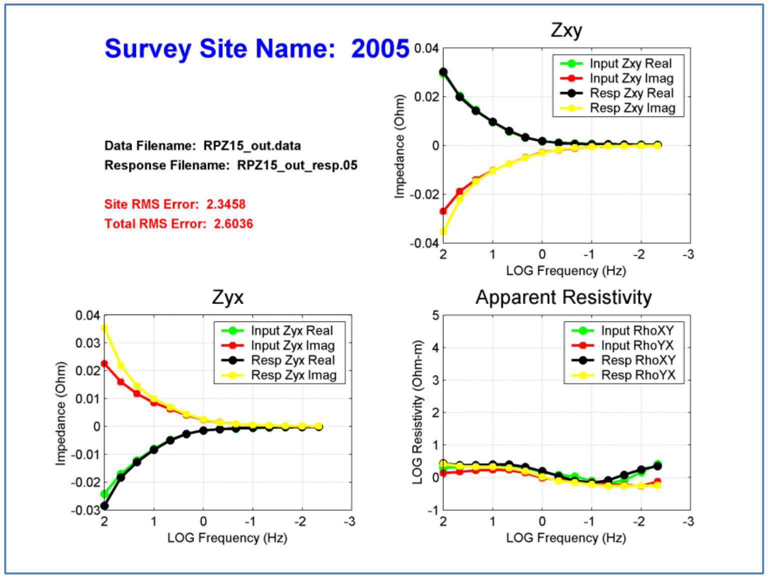


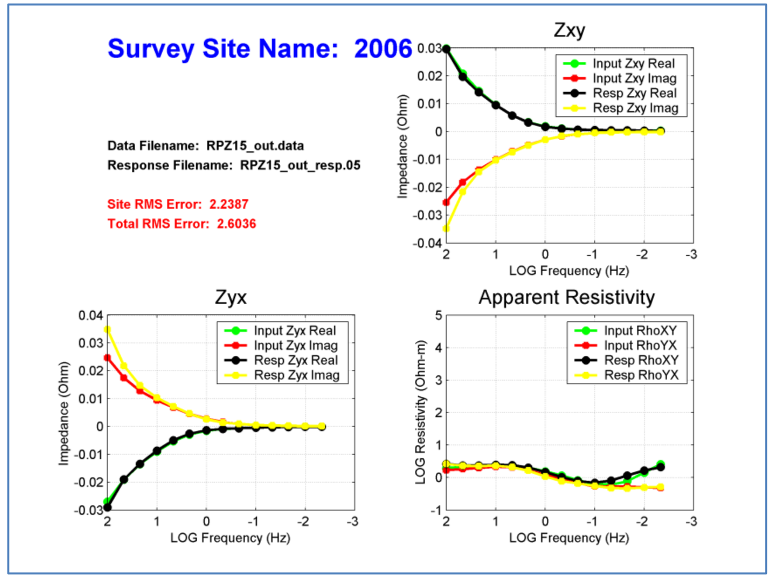


MT 3D Resistivity Responses (Mesquite Grid)

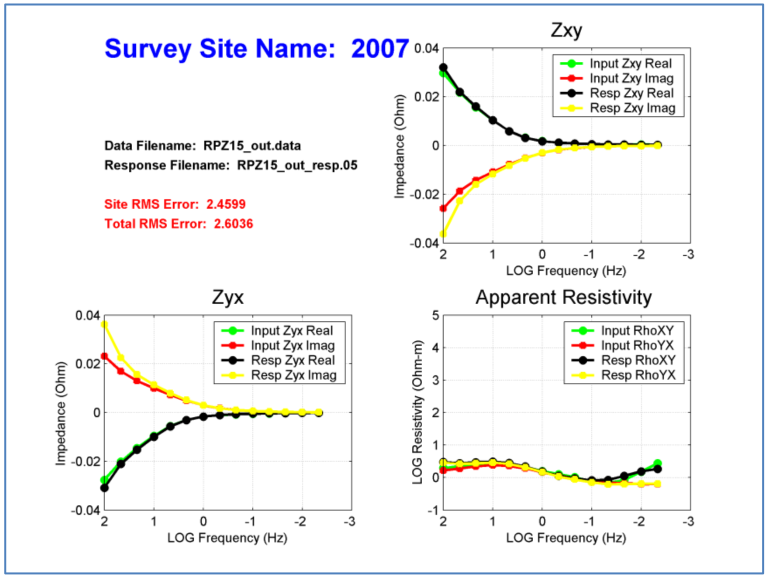


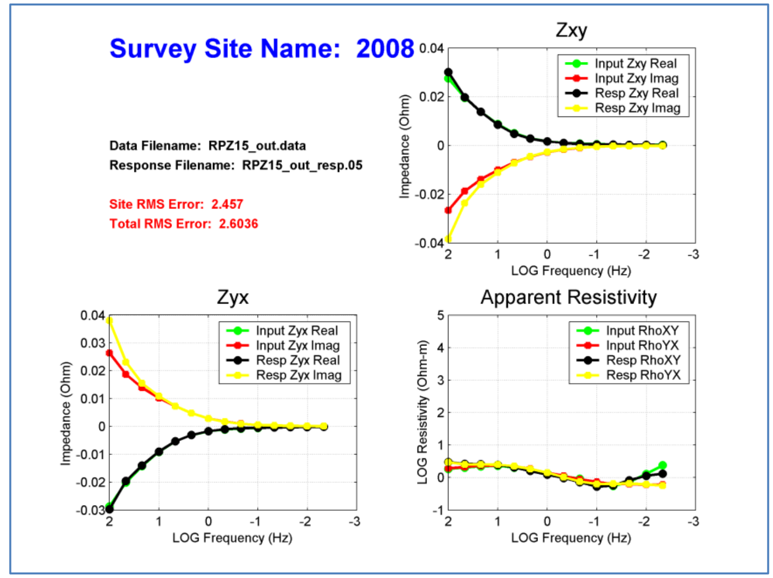


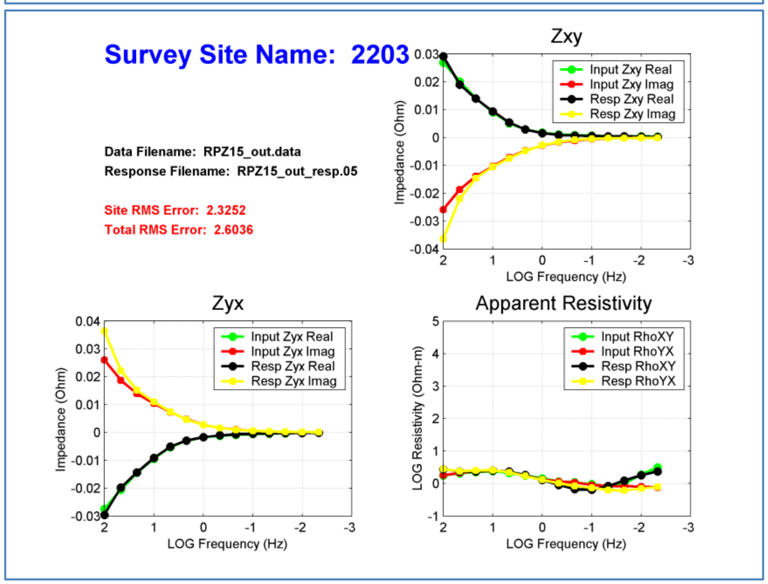


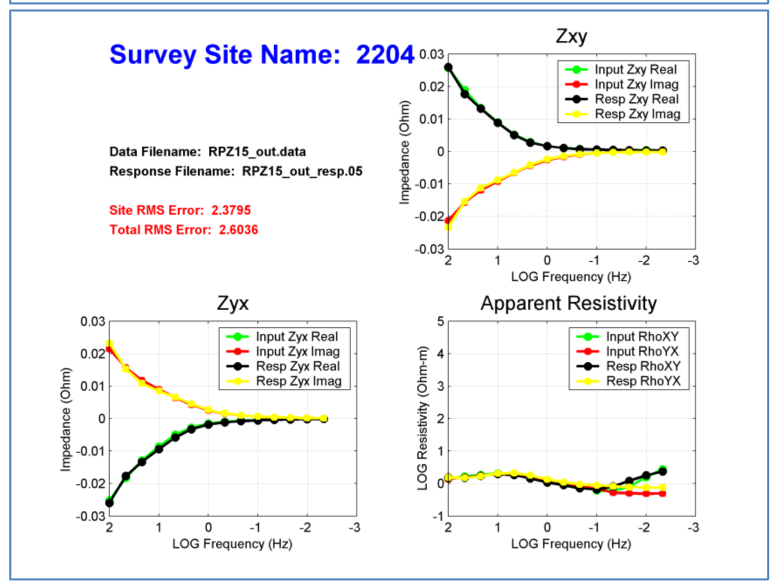


MT 3D Resistivity Responses (Mesquite Grid)

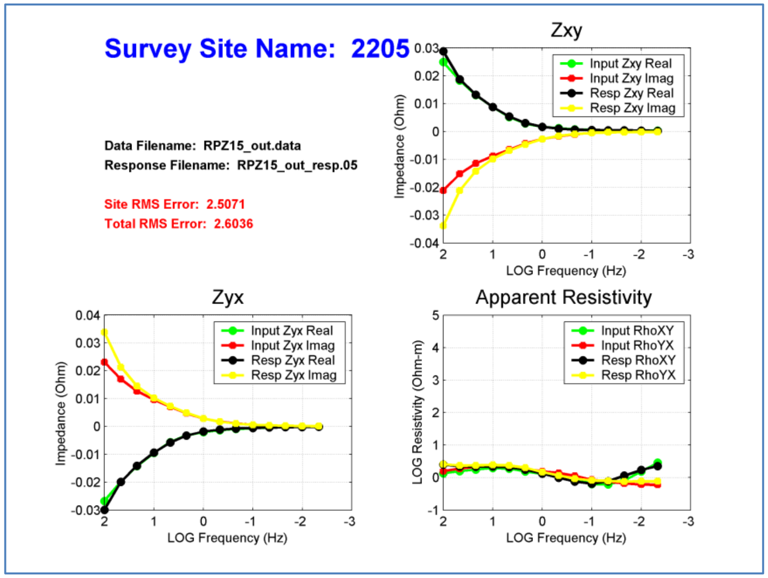


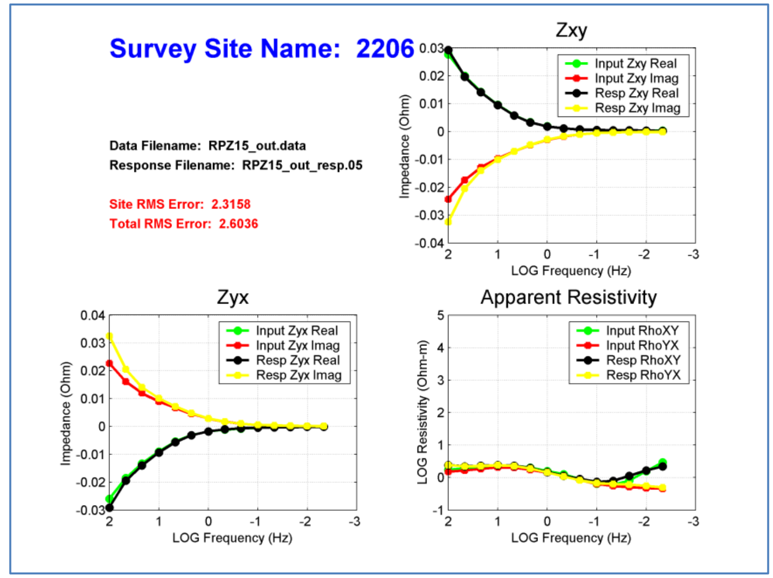


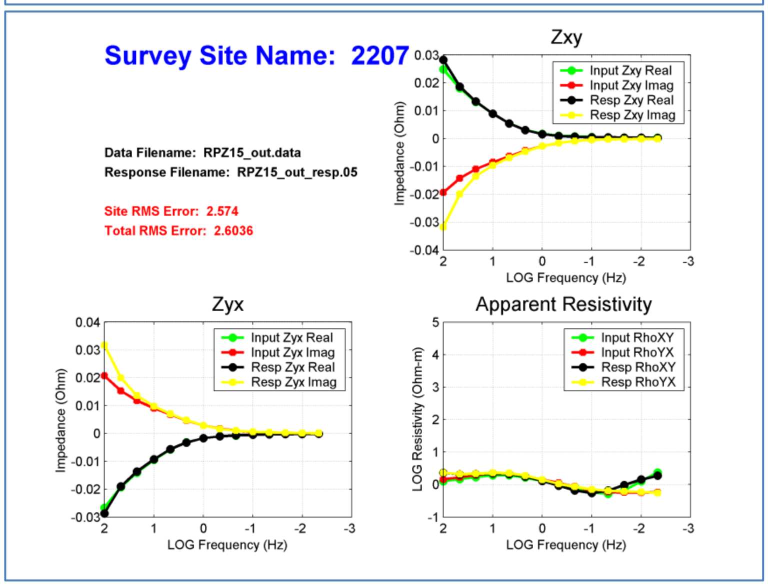


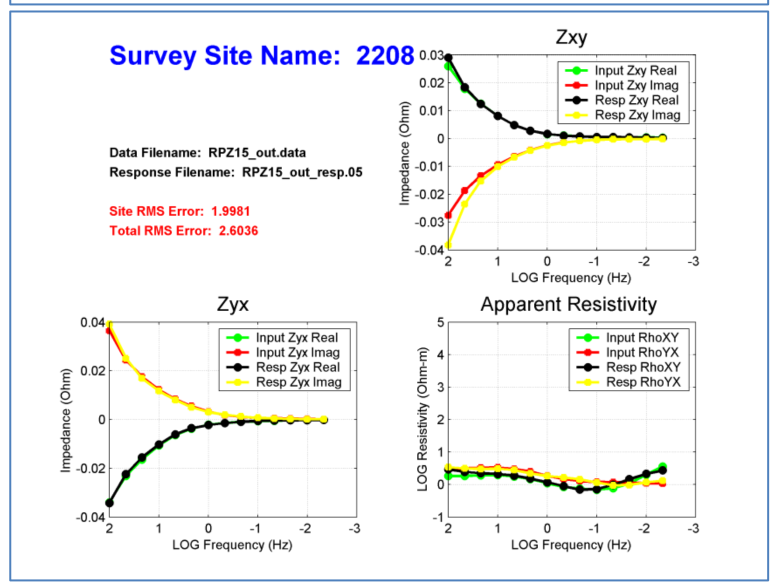


MT 3D Resistivity Responses (Mesquite Grid)

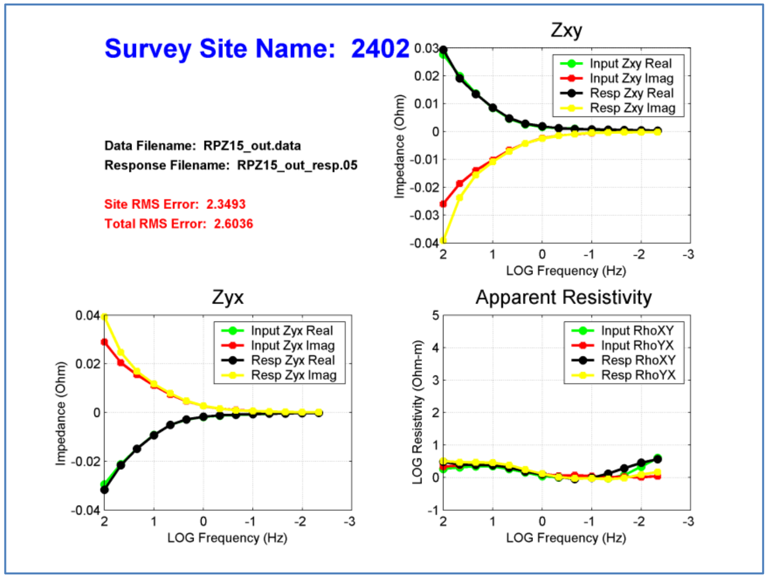


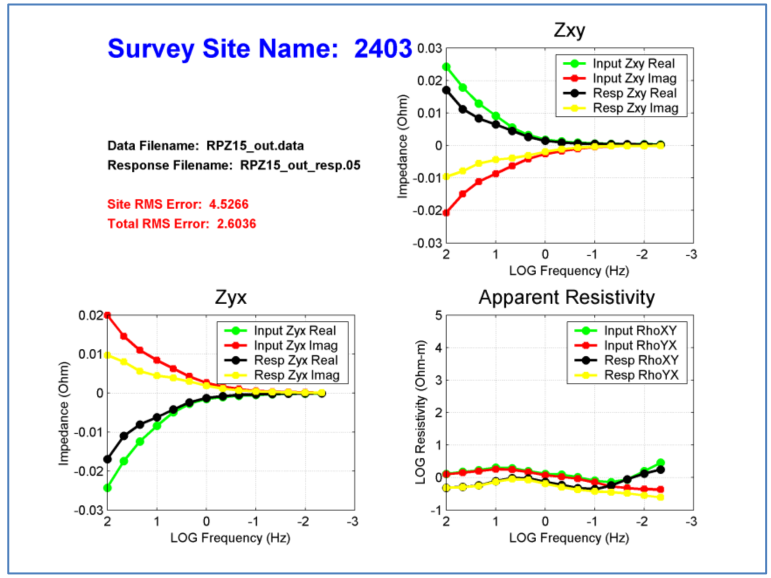


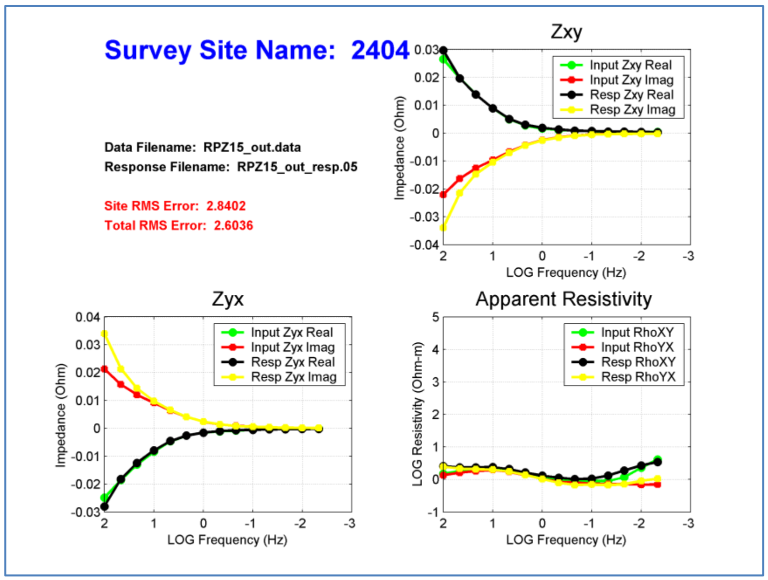


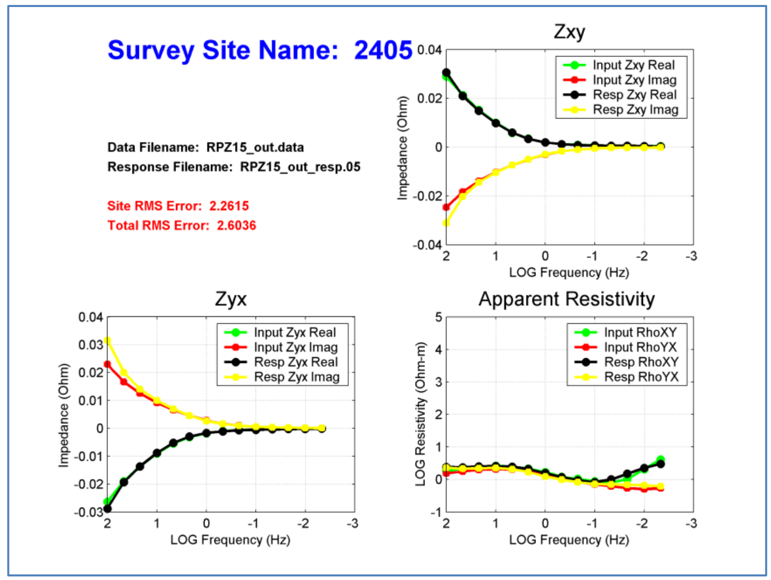


MT 3D Resistivity Responses (Mesquite Grid)

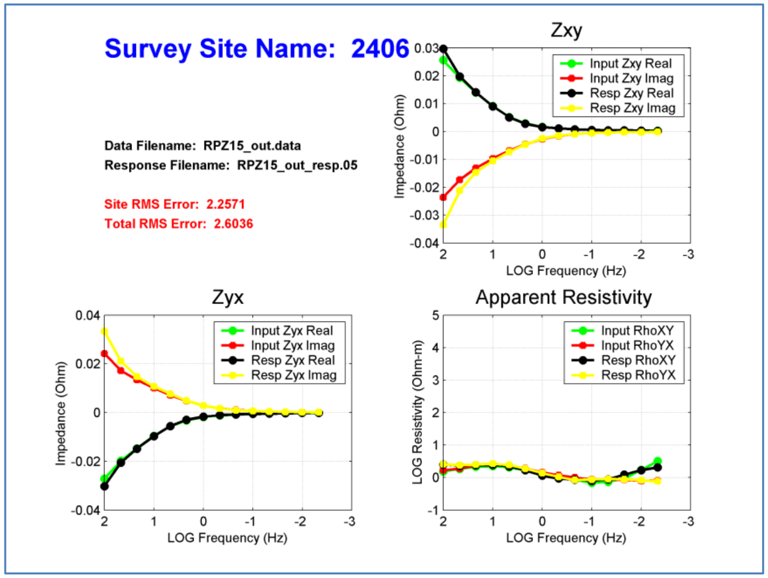


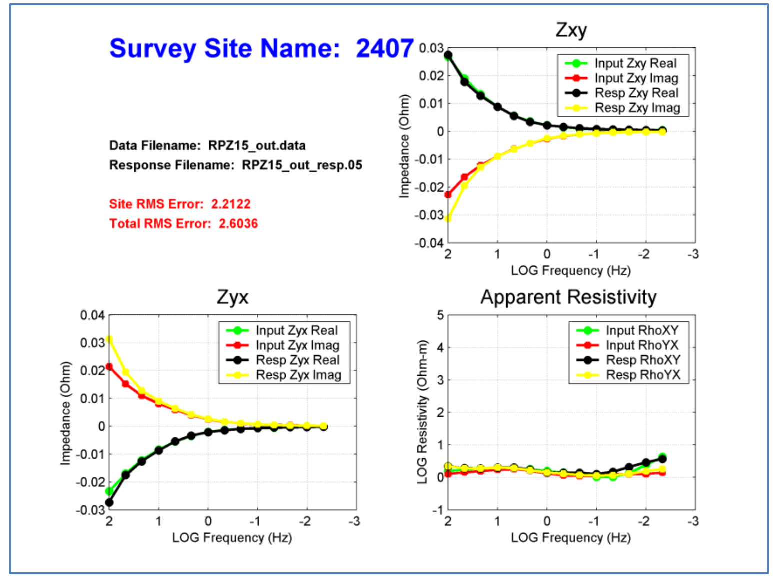


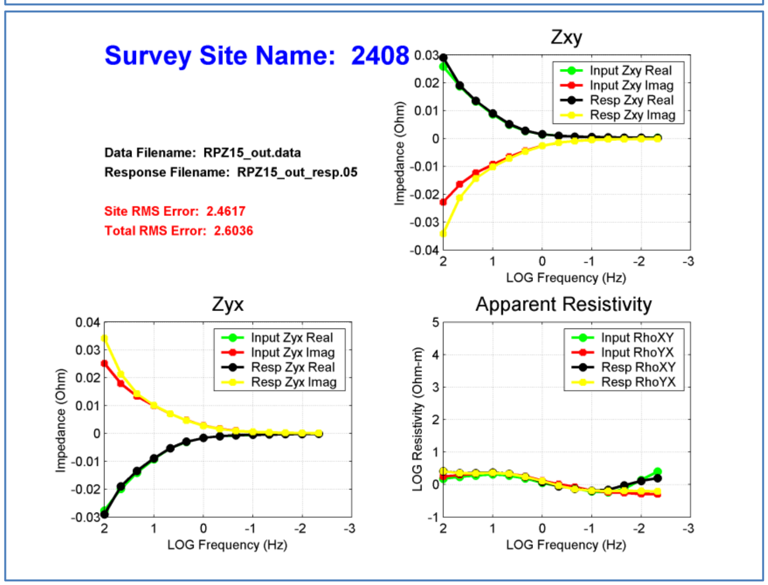


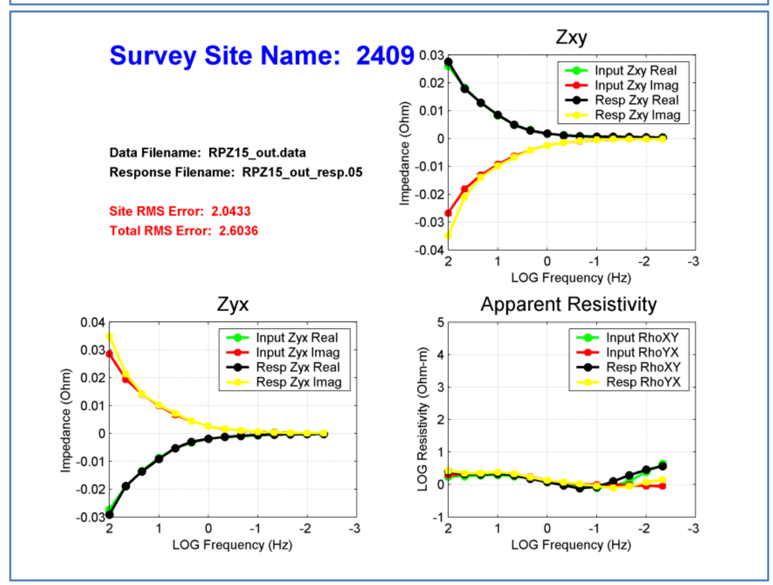


MT 3D Resistivity Responses (Mesquite Grid)

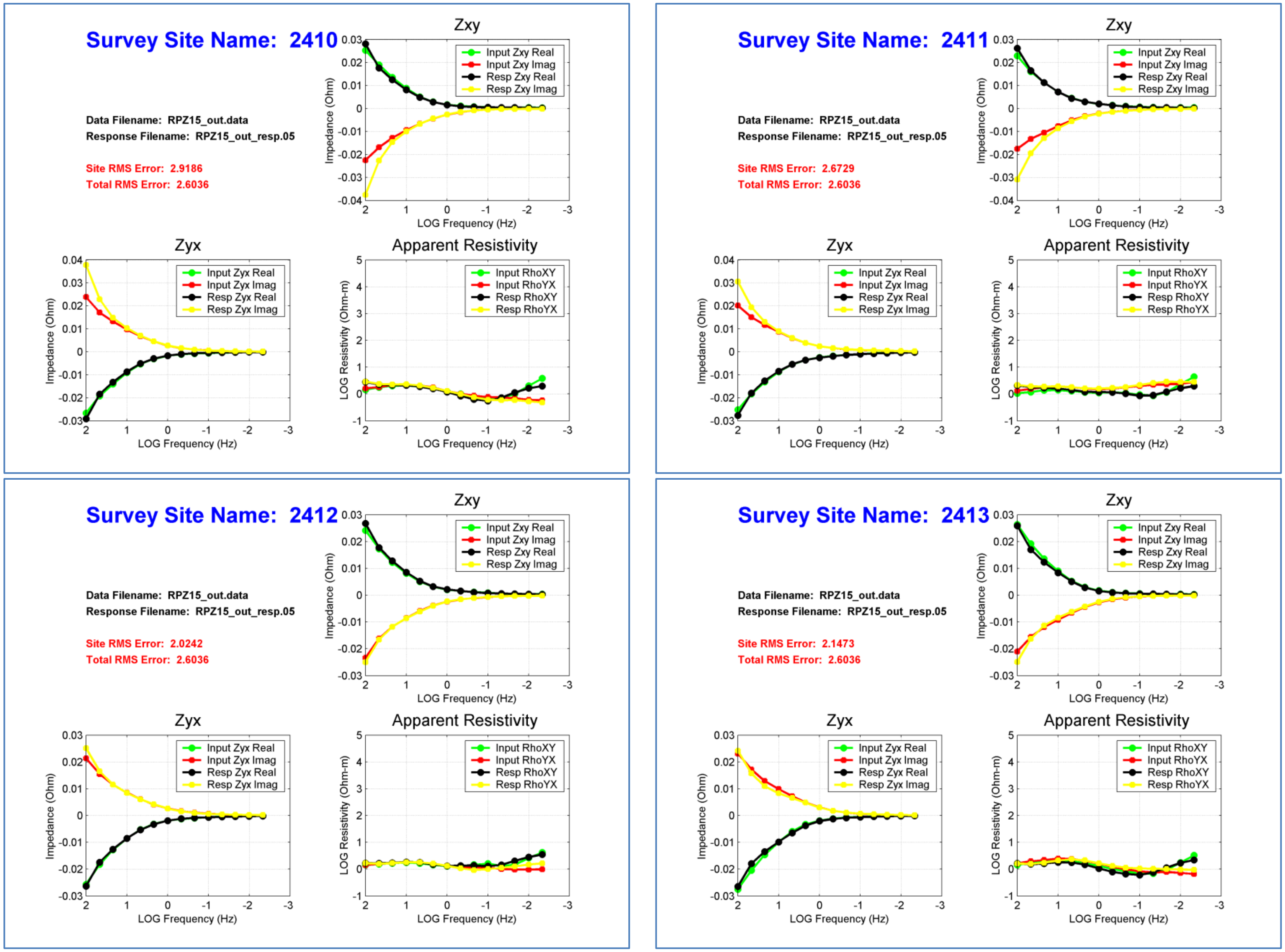




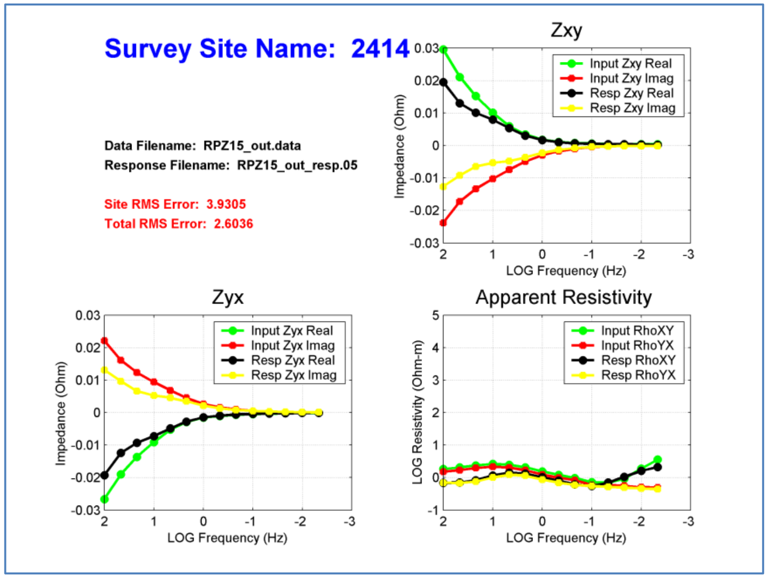


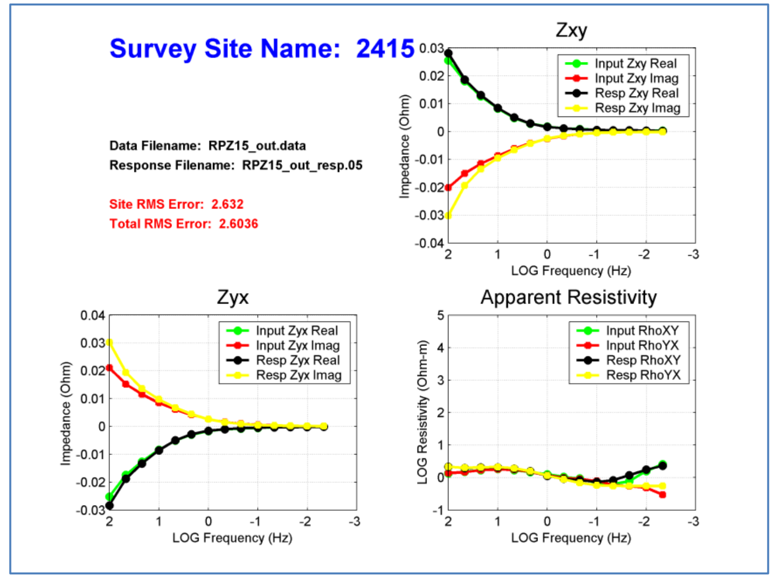


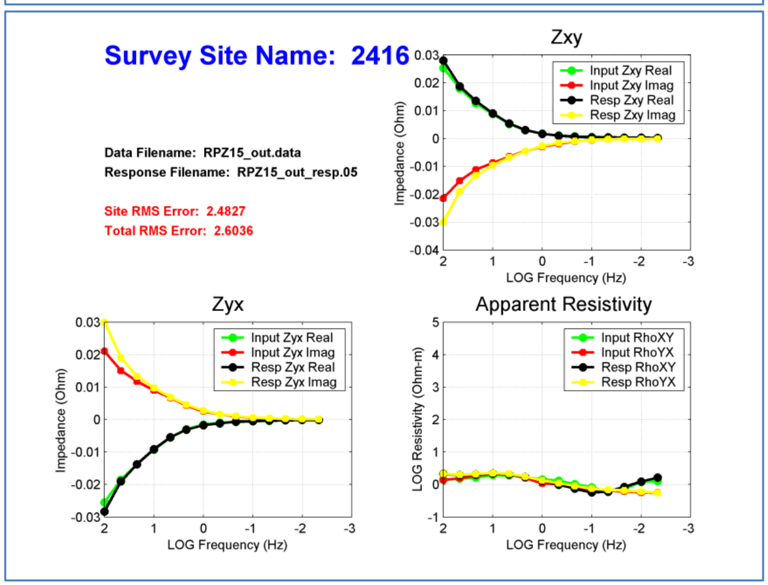
MT 3D Resistivity Responses (Mesquite Grid)

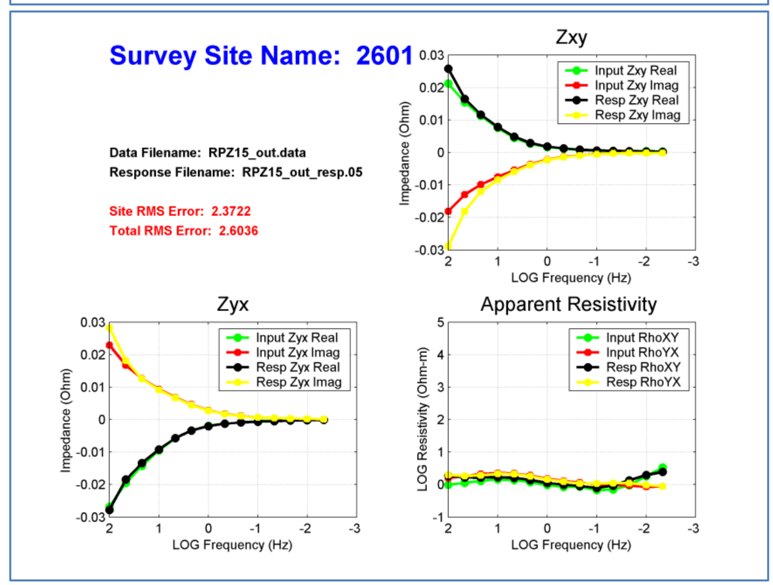


MT 3D Resistivity Responses (Mesquite Grid)

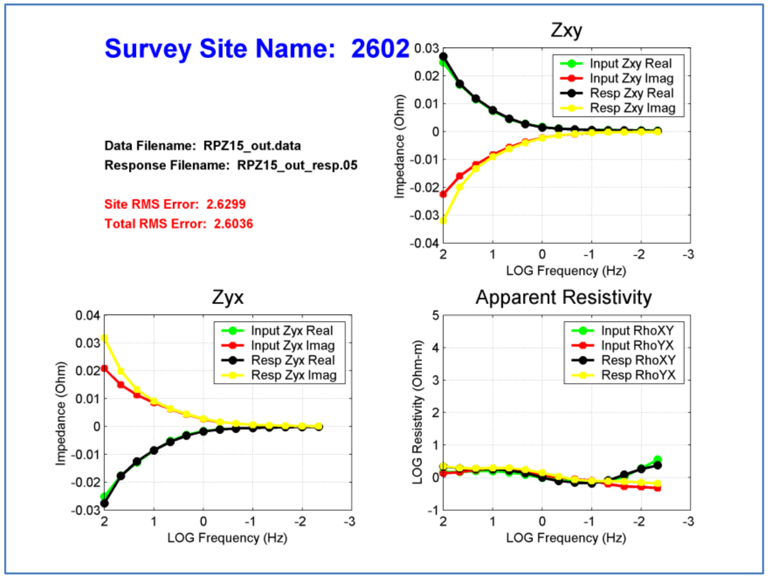


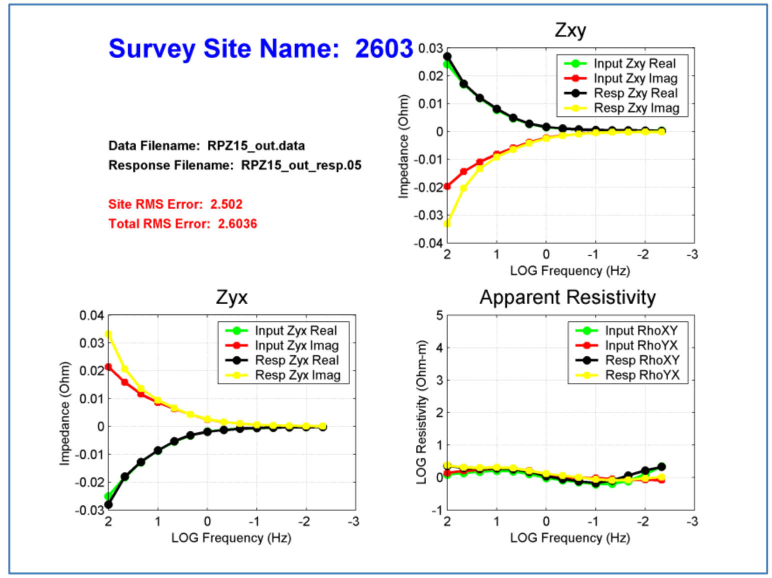


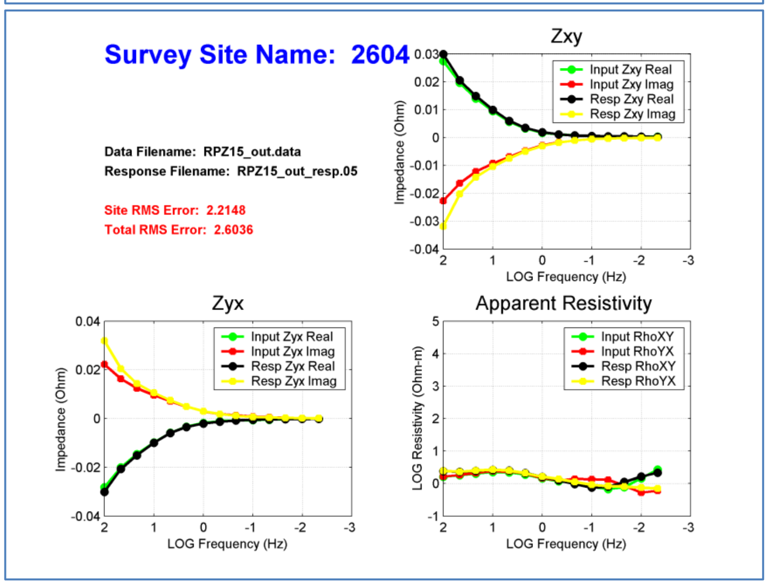


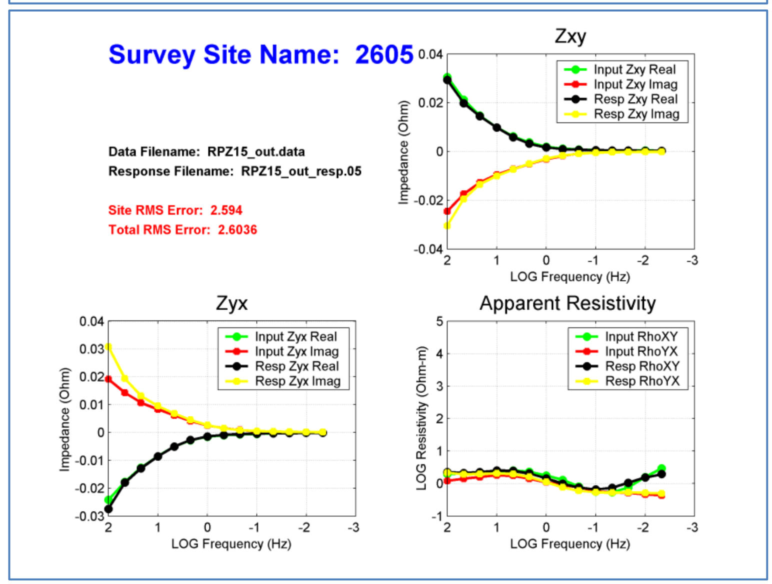


MT 3D Resistivity Responses (Mesquite Grid)

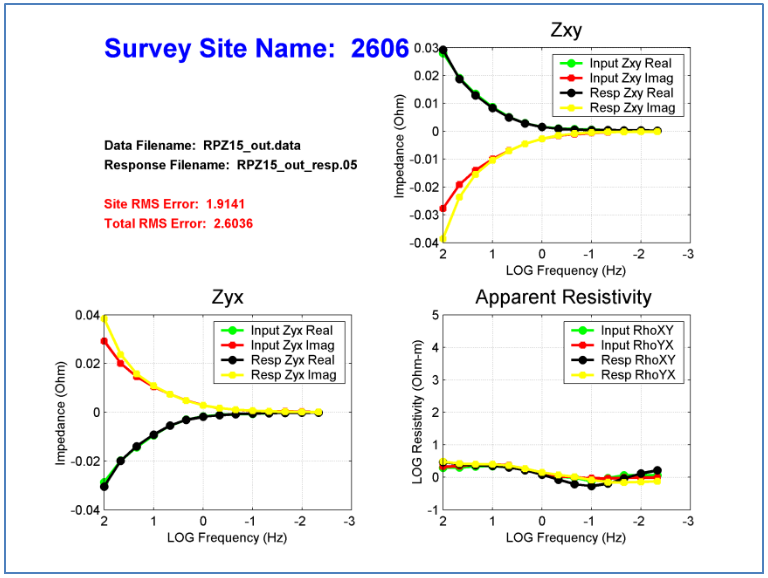


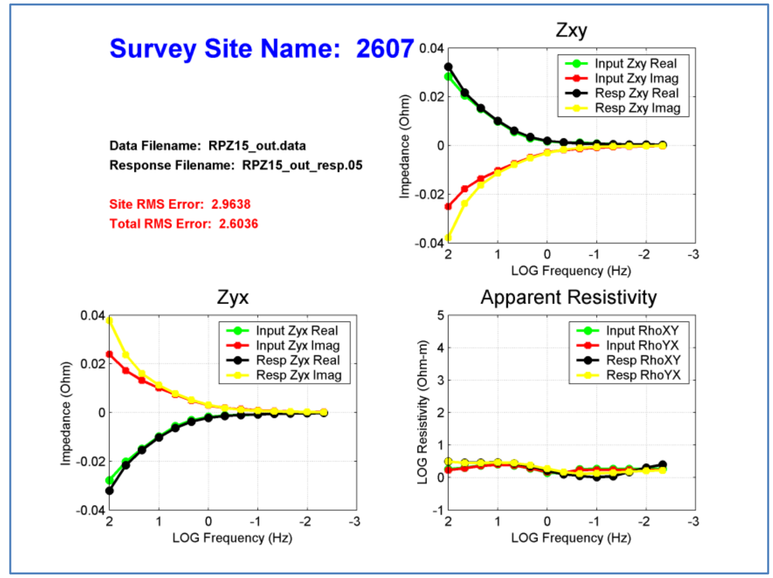


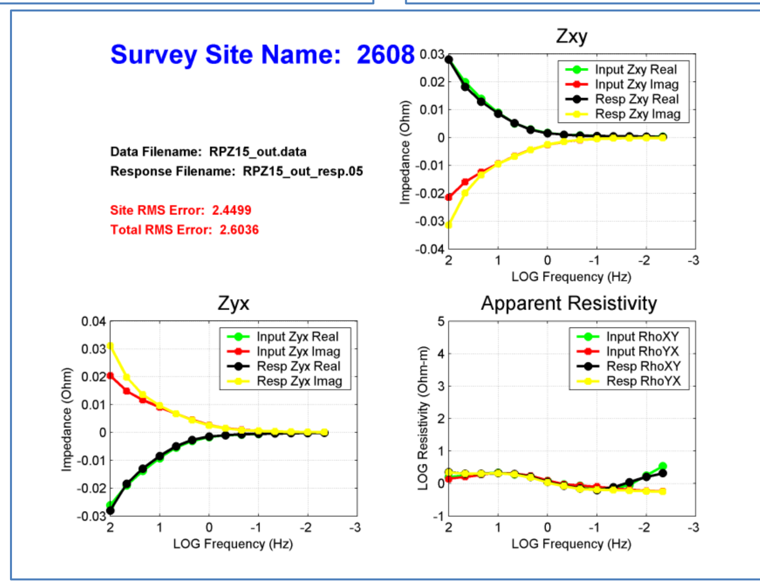




MT 3D Resistivity Responses (Mesquite Grid)

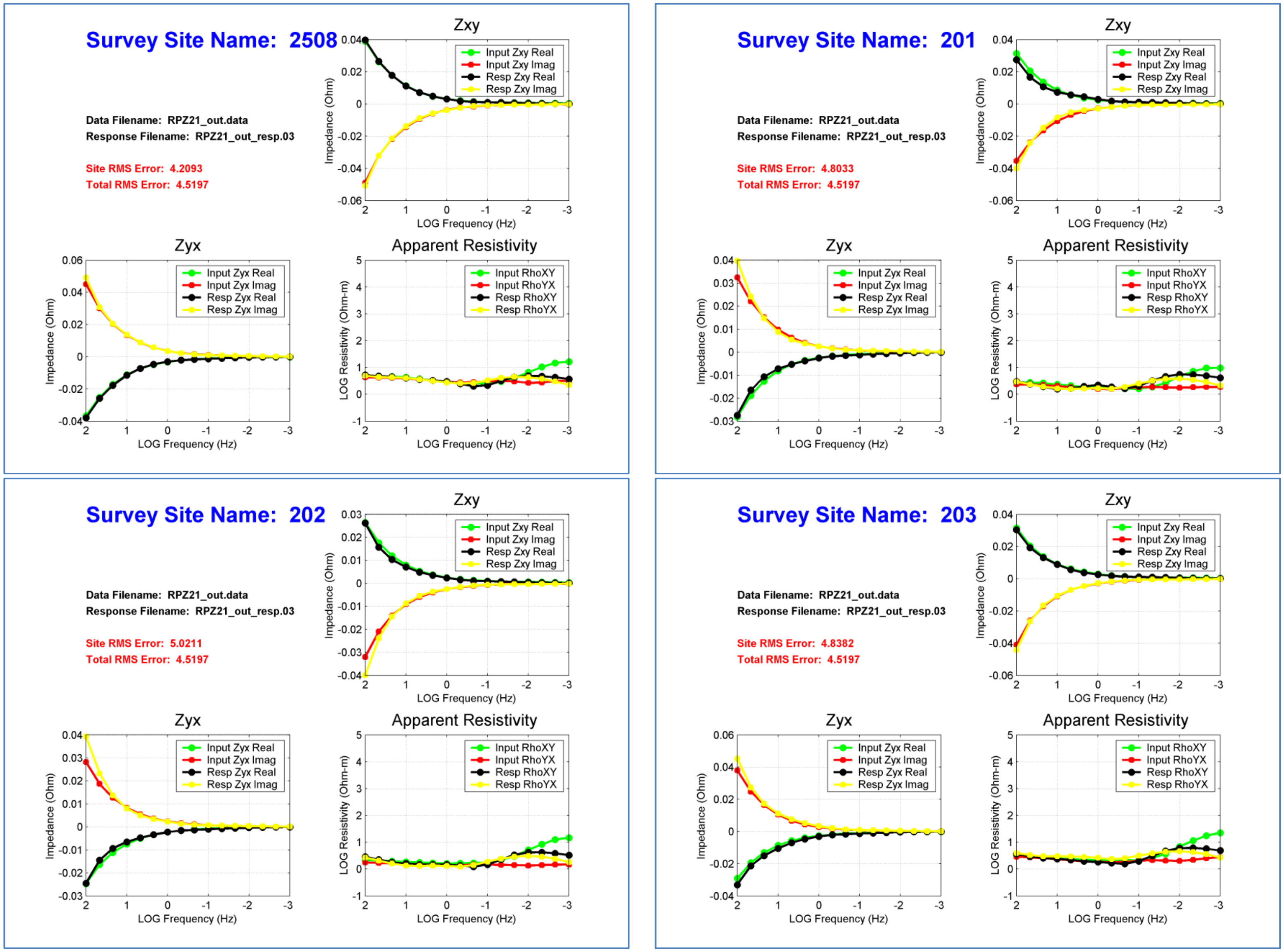




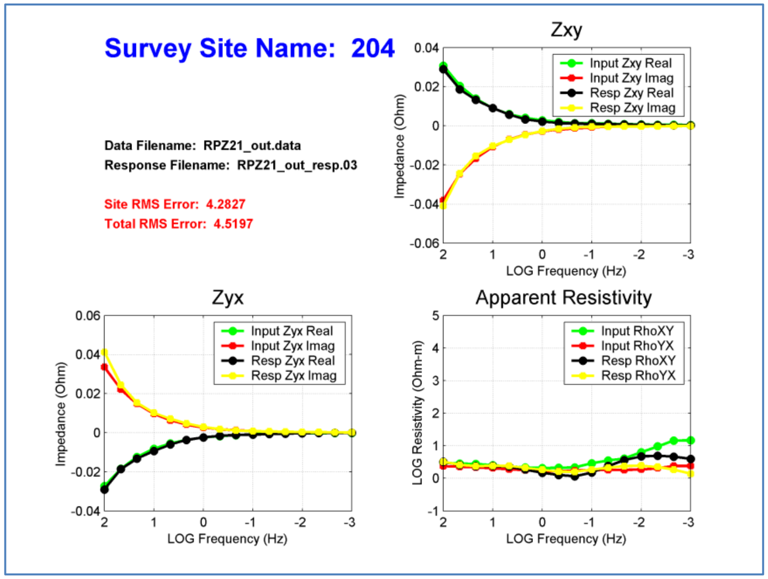


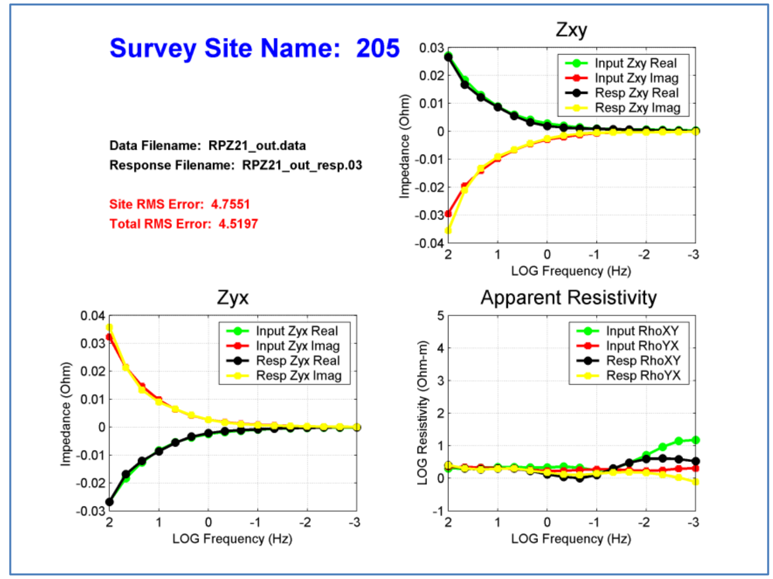
MT 3D Resistivity Responses (Mesquite Grid)

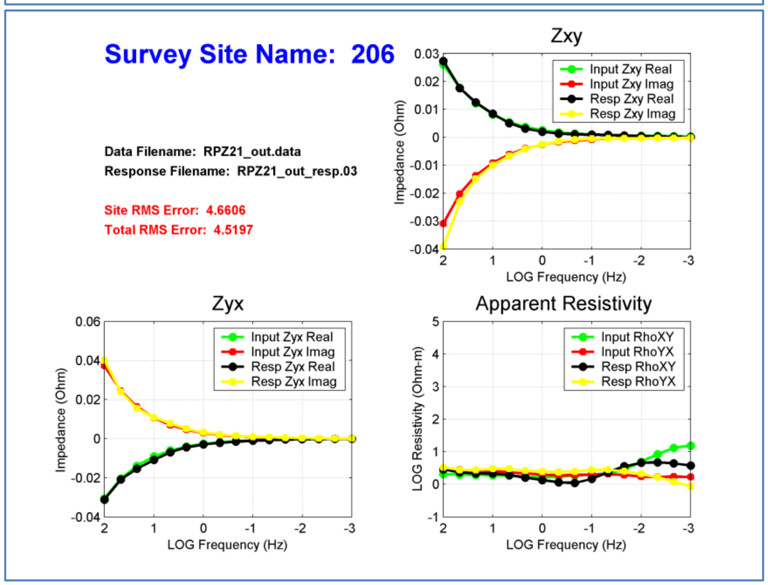
I MT 3D RESISTIVITY RESPONSES (NEW RIVER GRID)

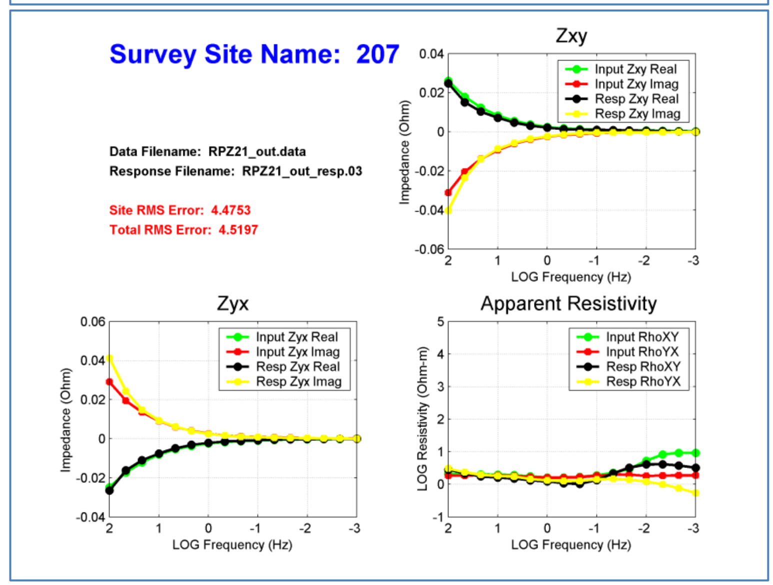


MT 3D Resistivity Responses (New River Grid)

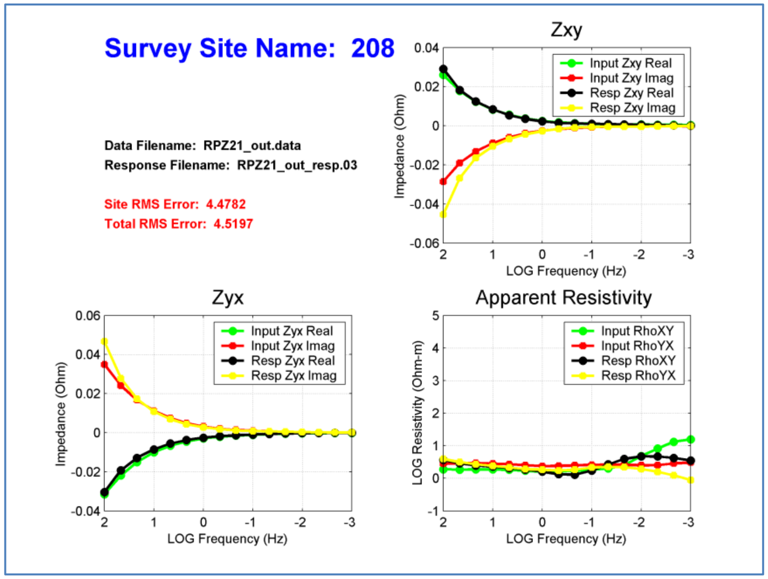


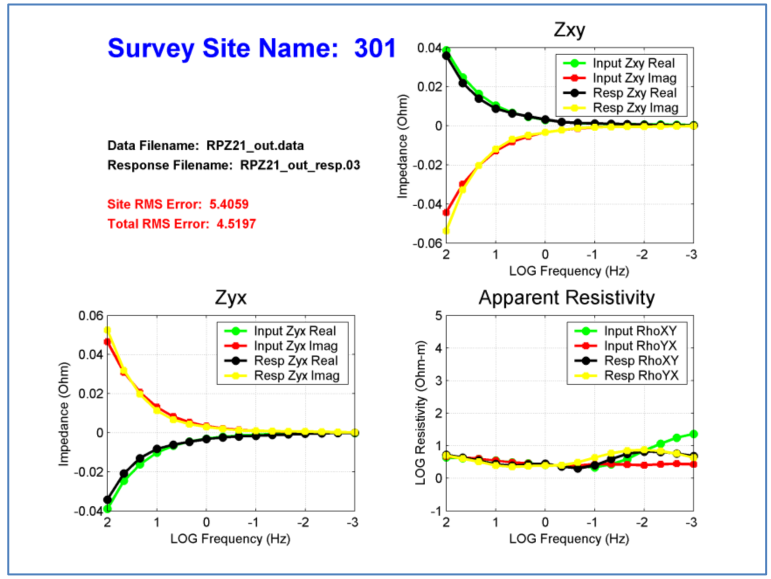


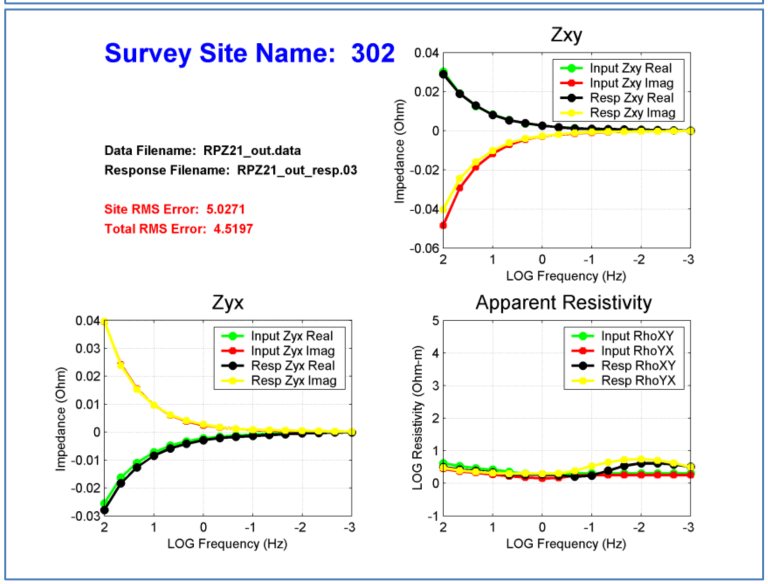


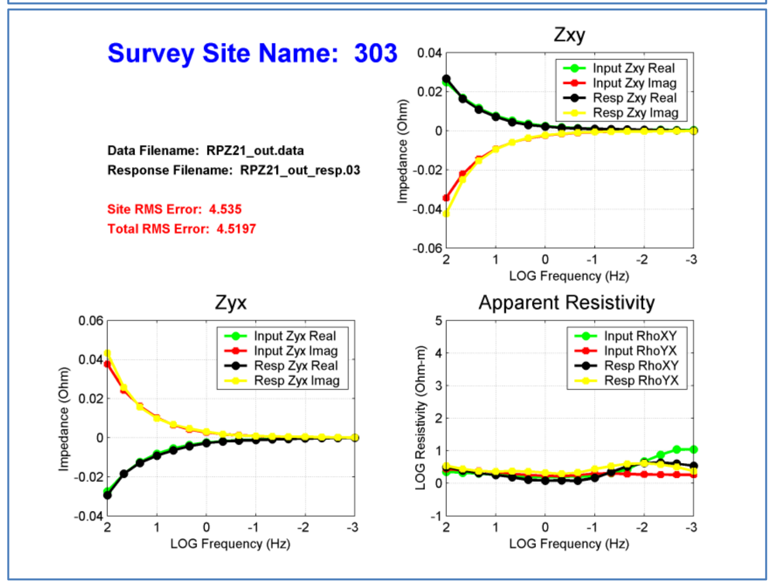


MT 3D Resistivity Responses (New River Grid)

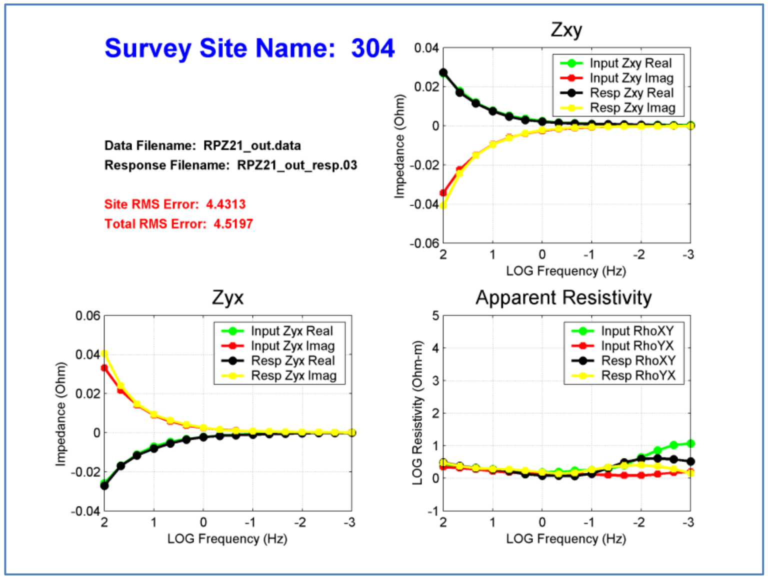


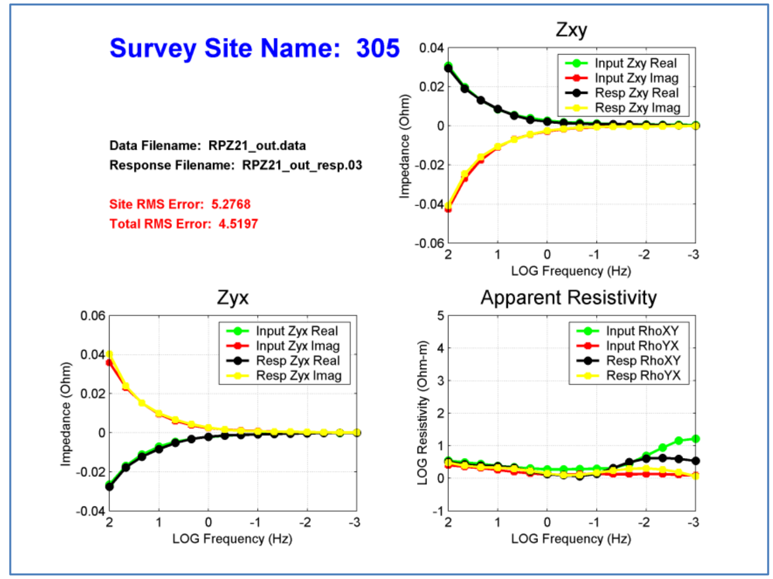


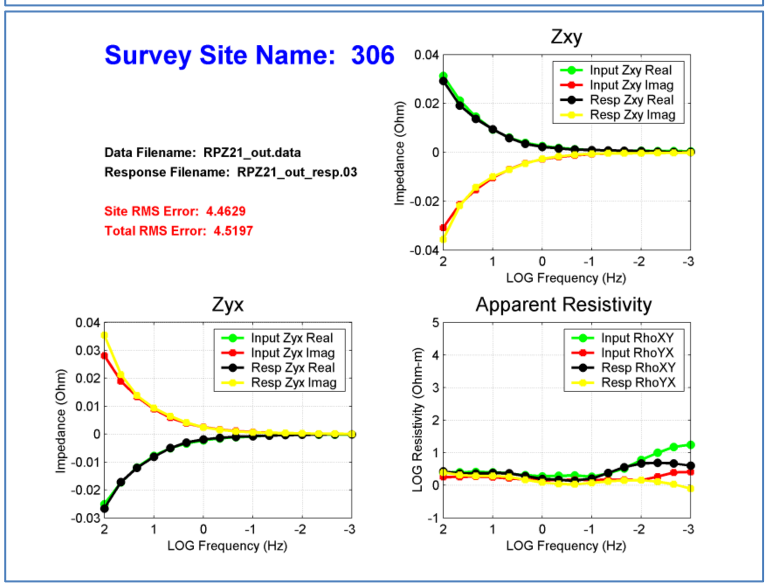


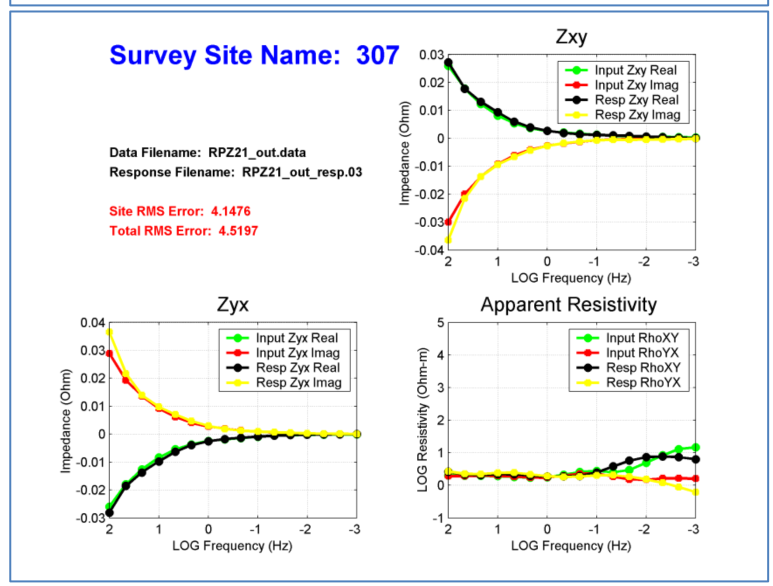


MT 3D Resistivity Responses (New River Grid)









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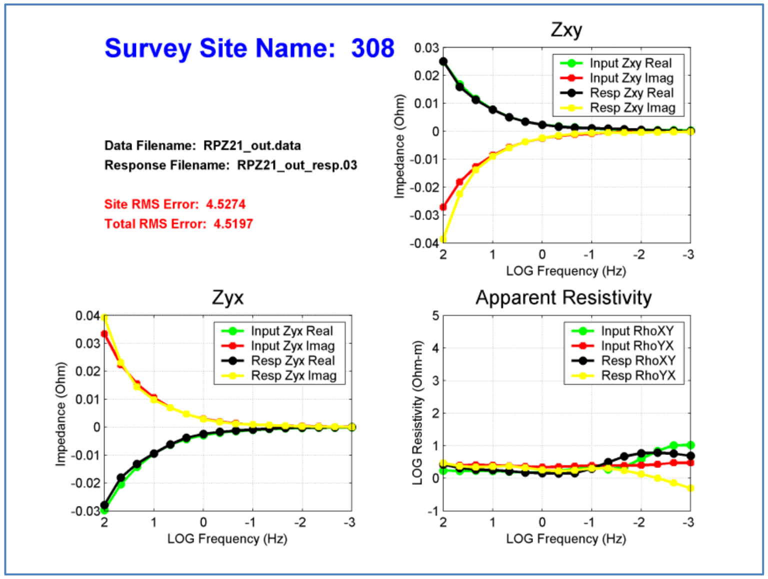

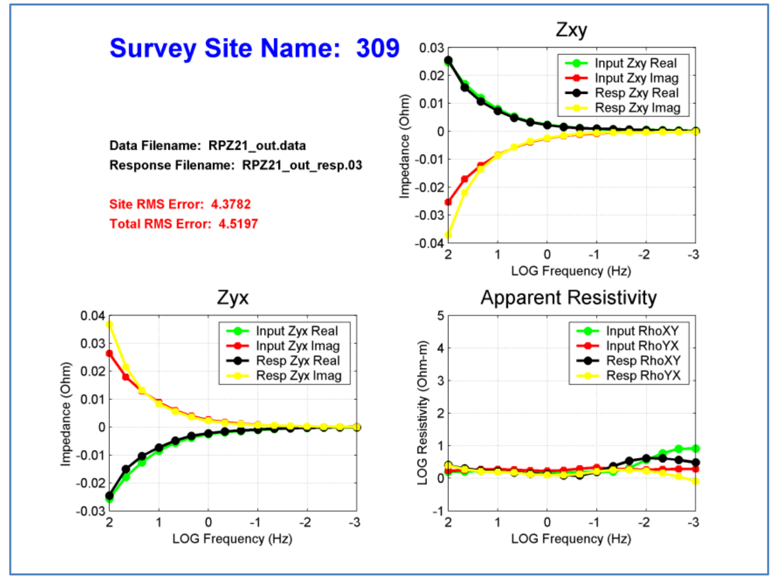

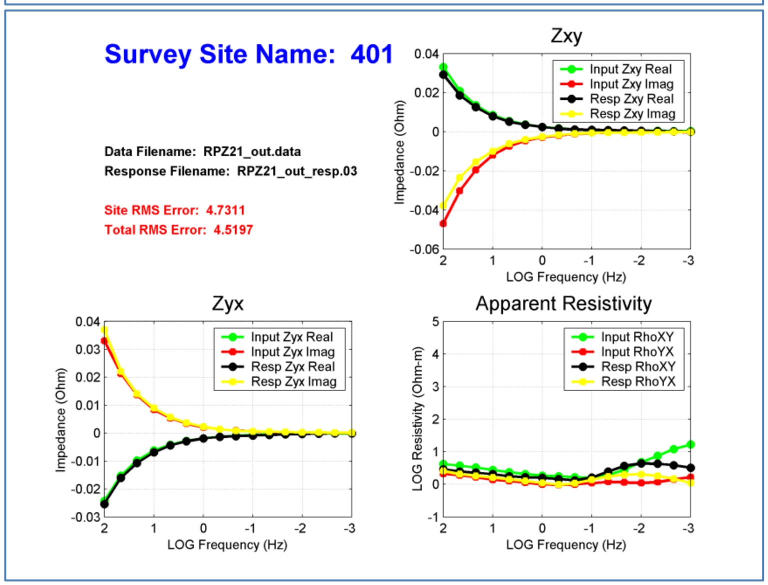

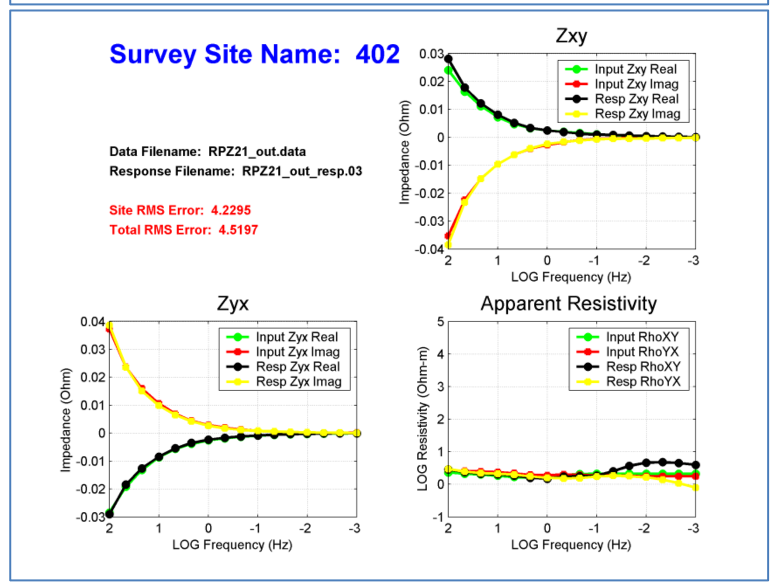

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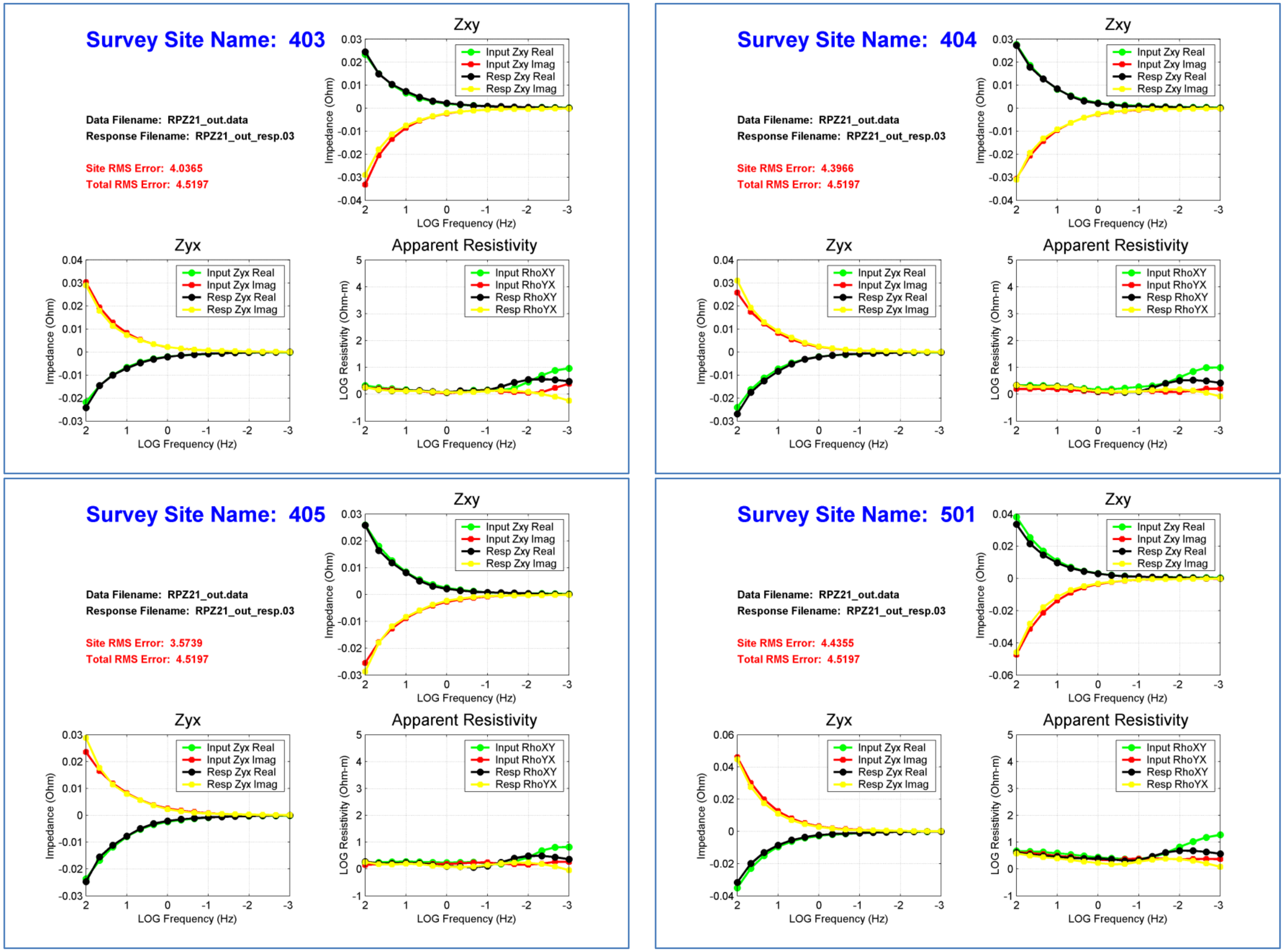

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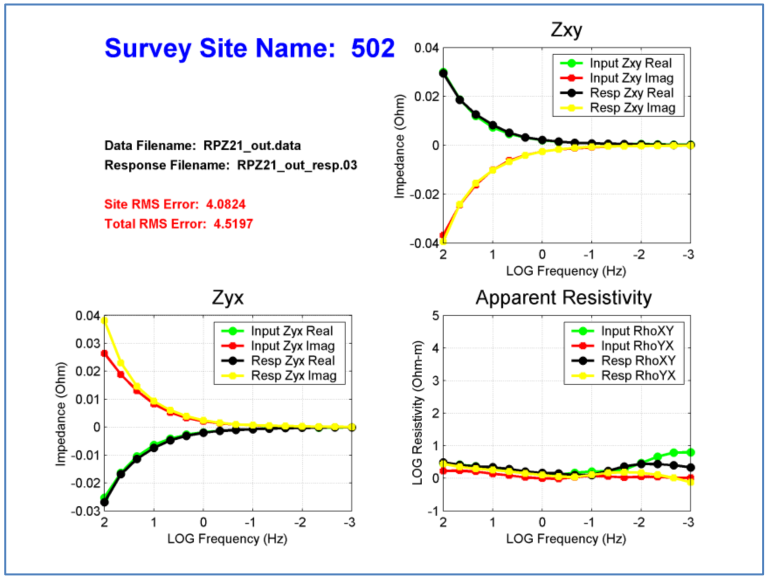

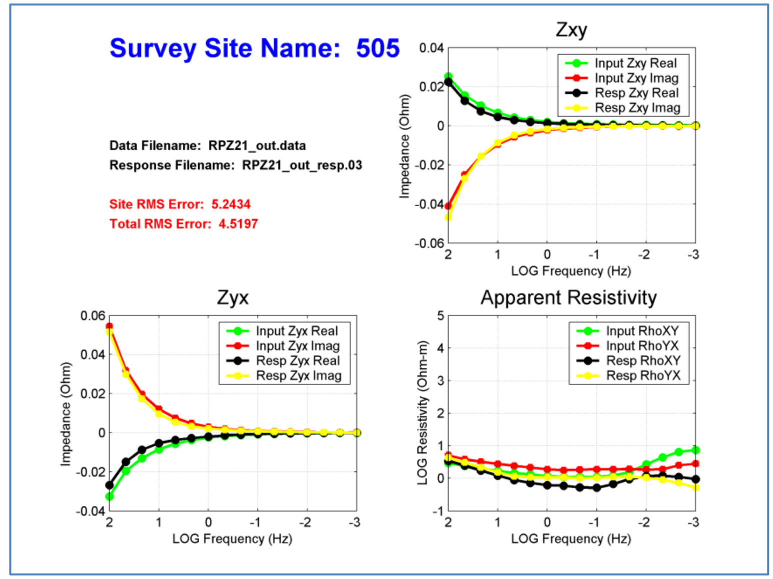

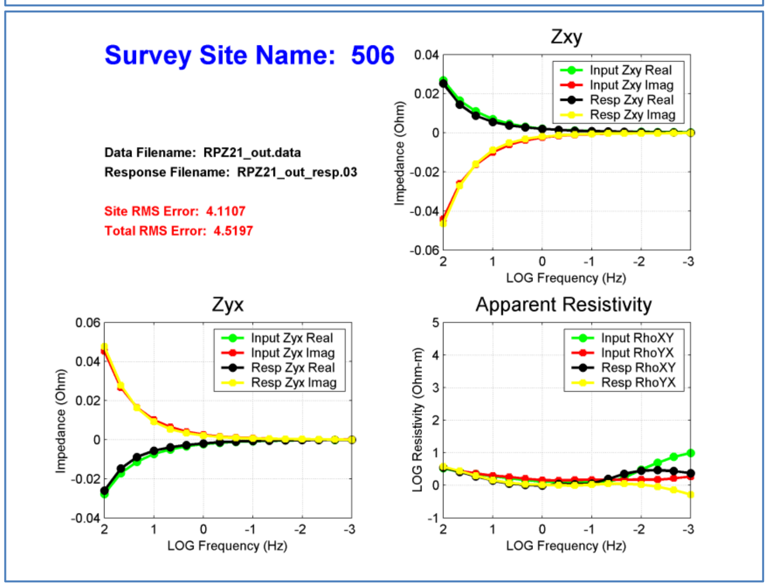

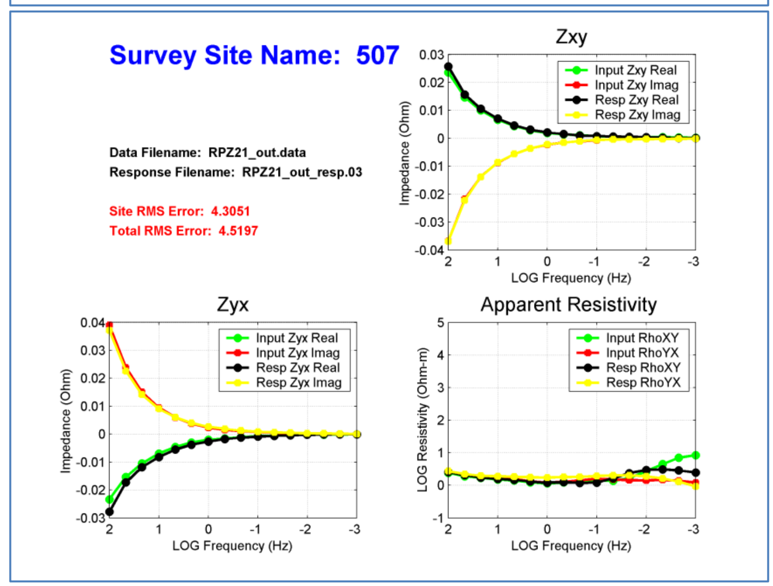

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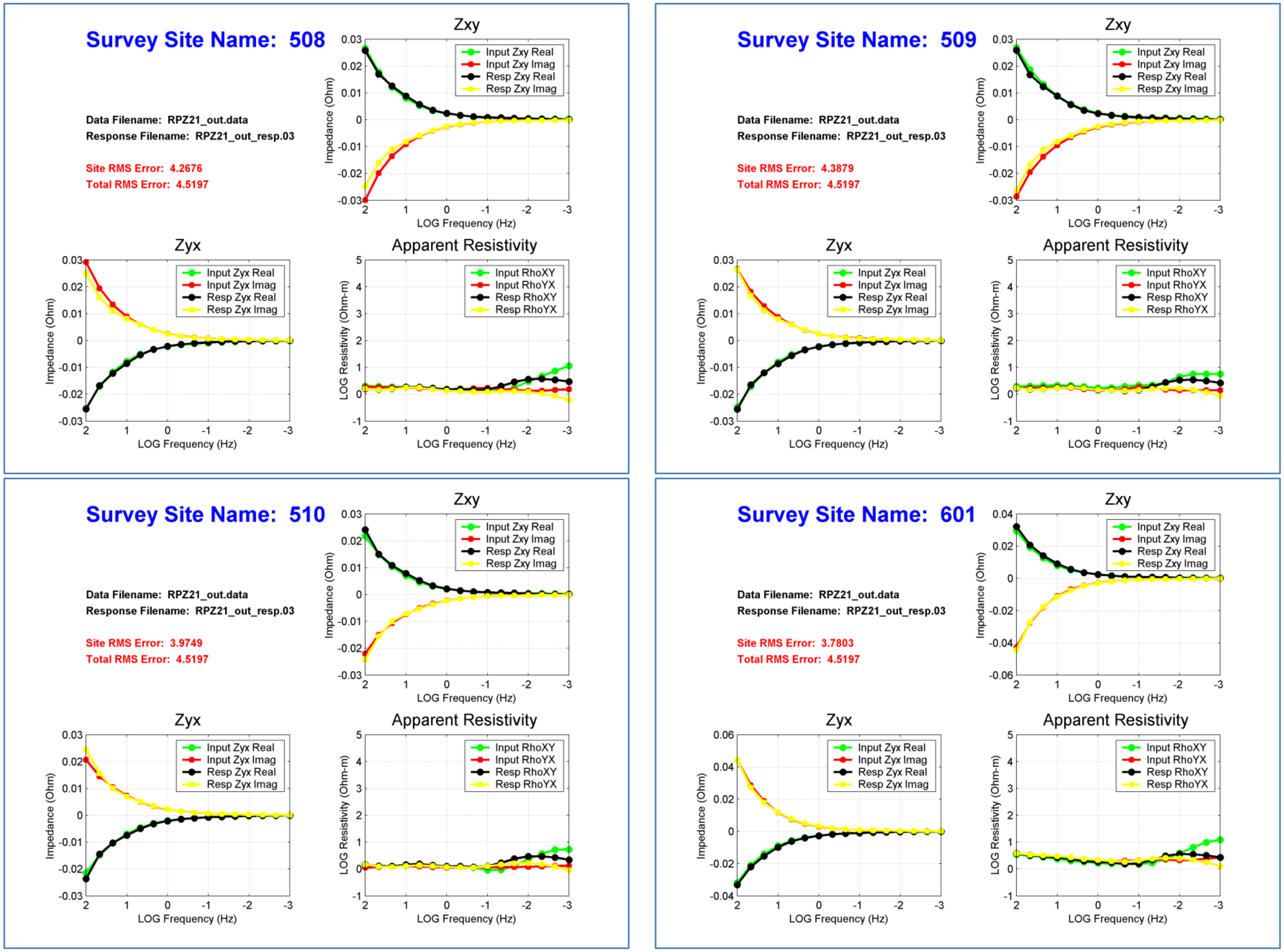

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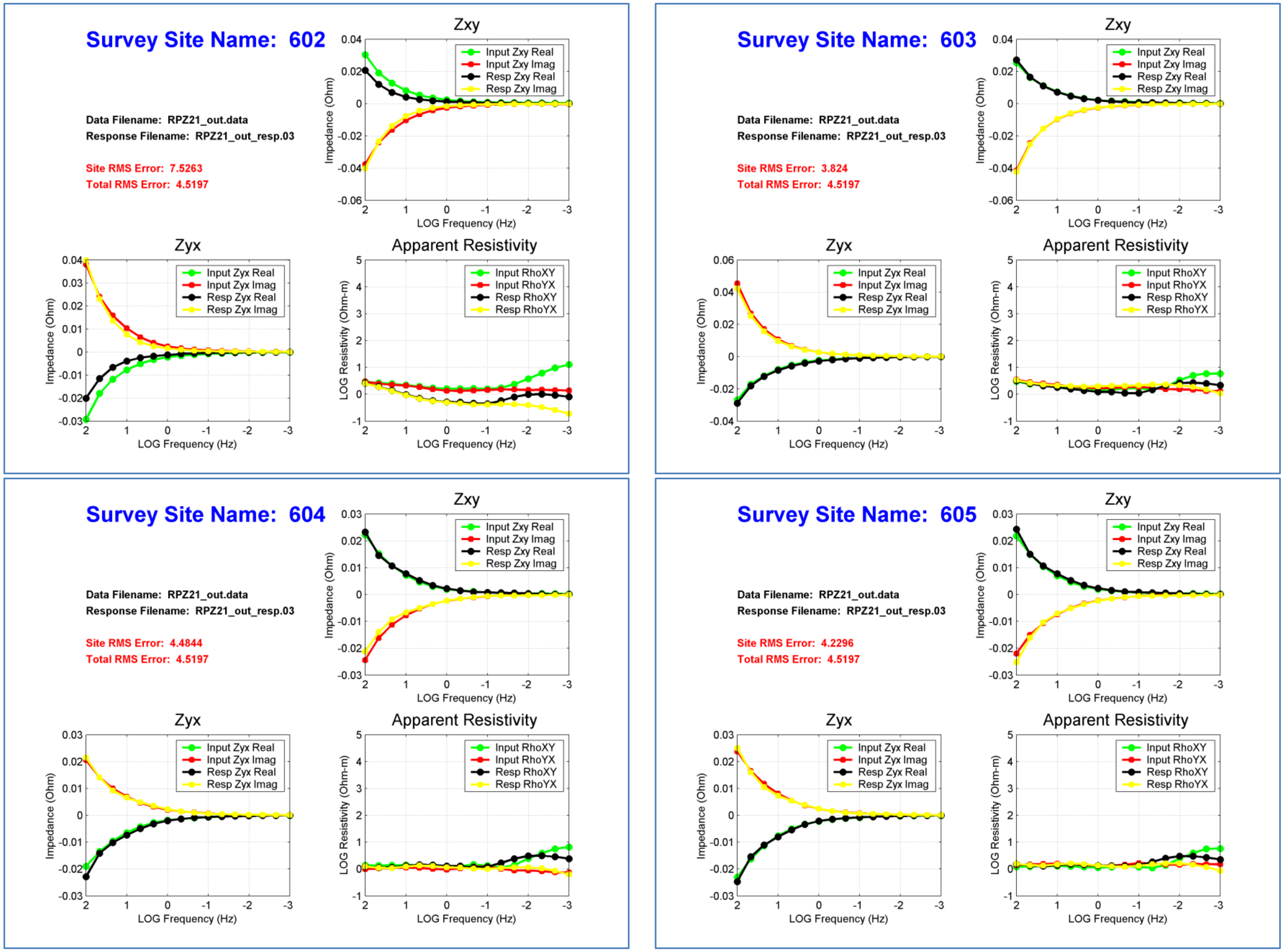

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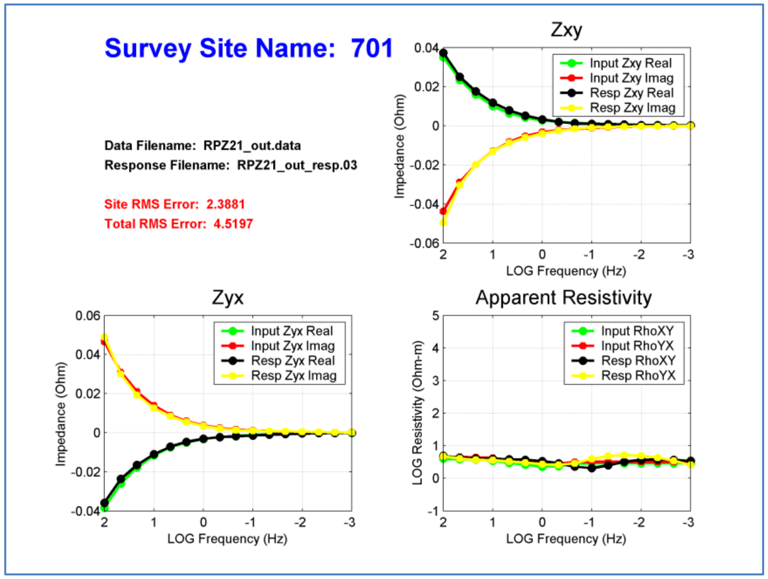

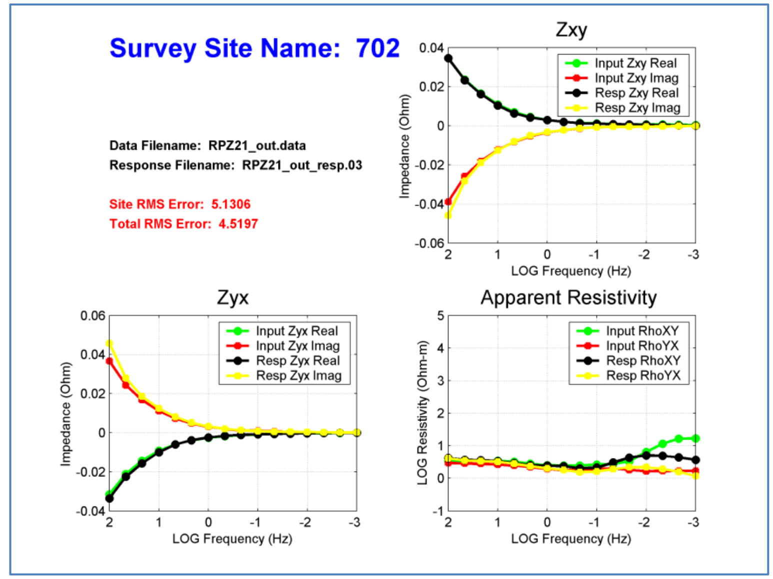

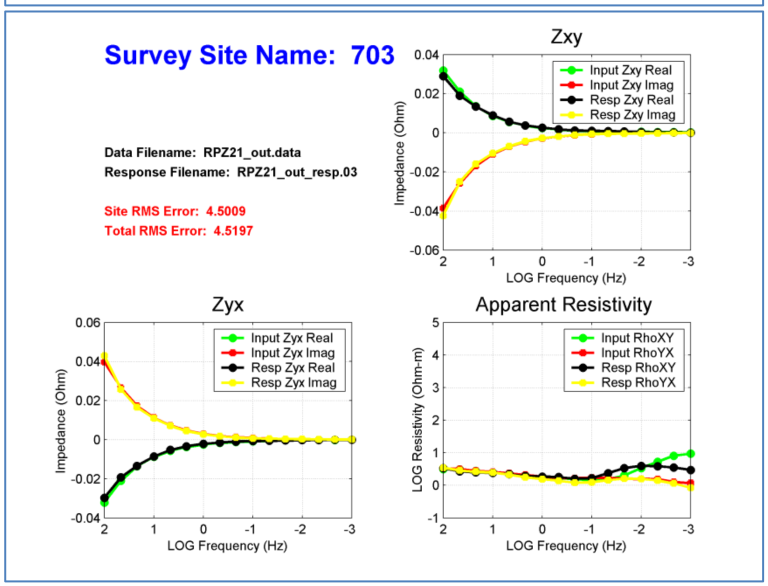

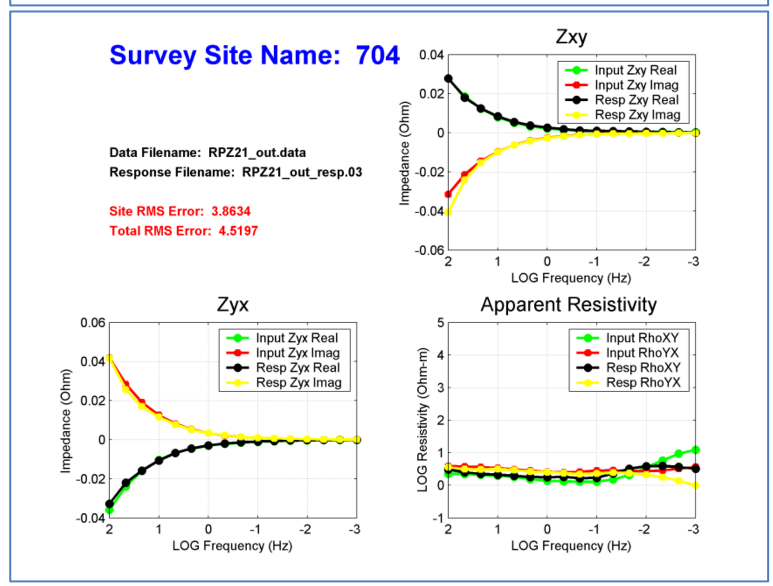

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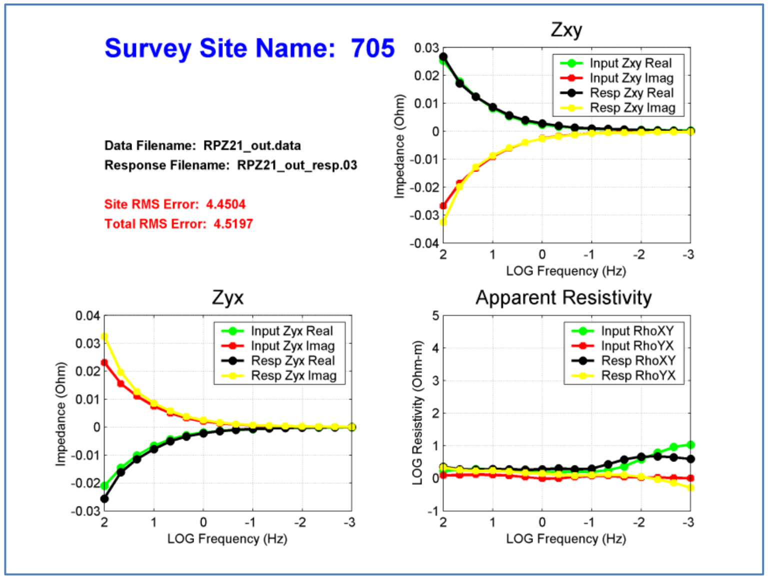

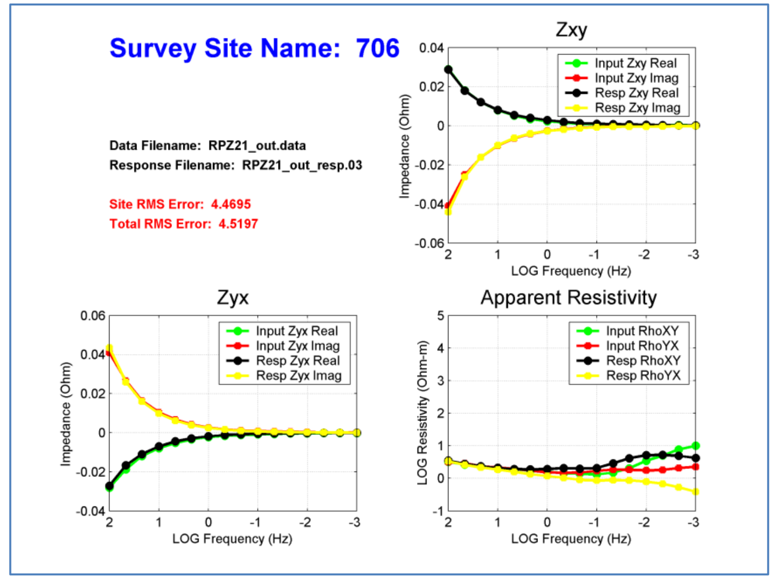

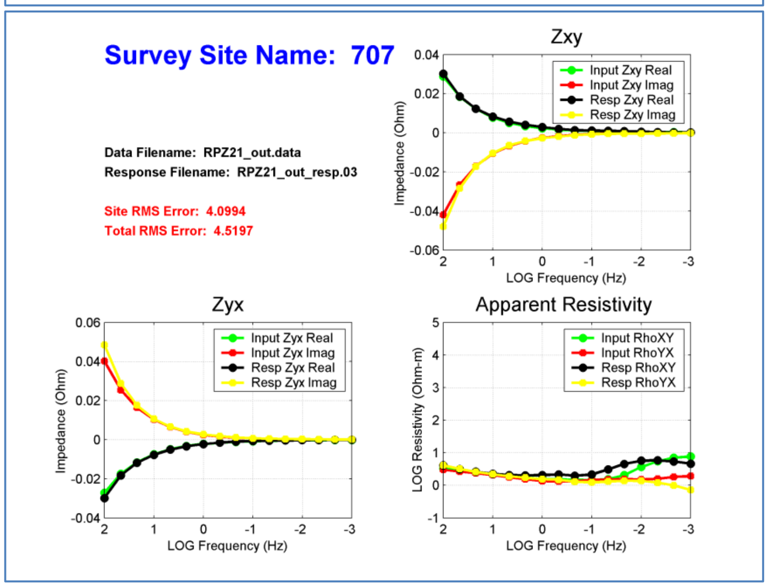

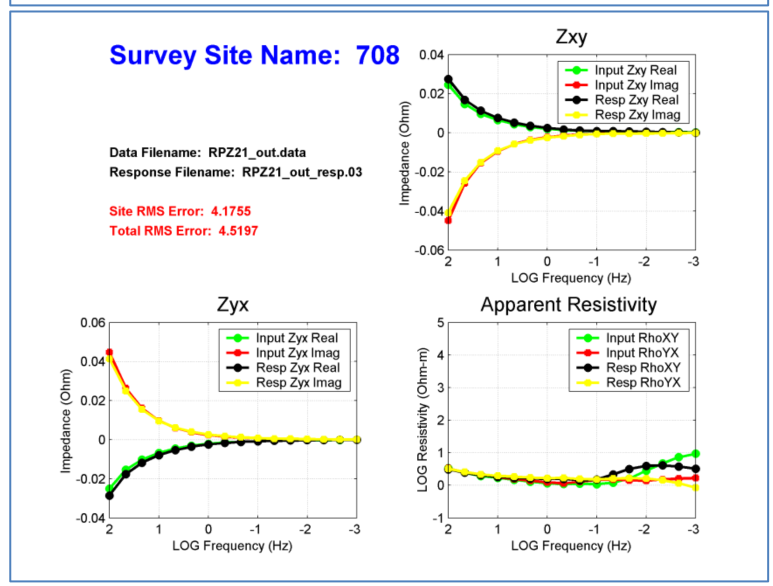

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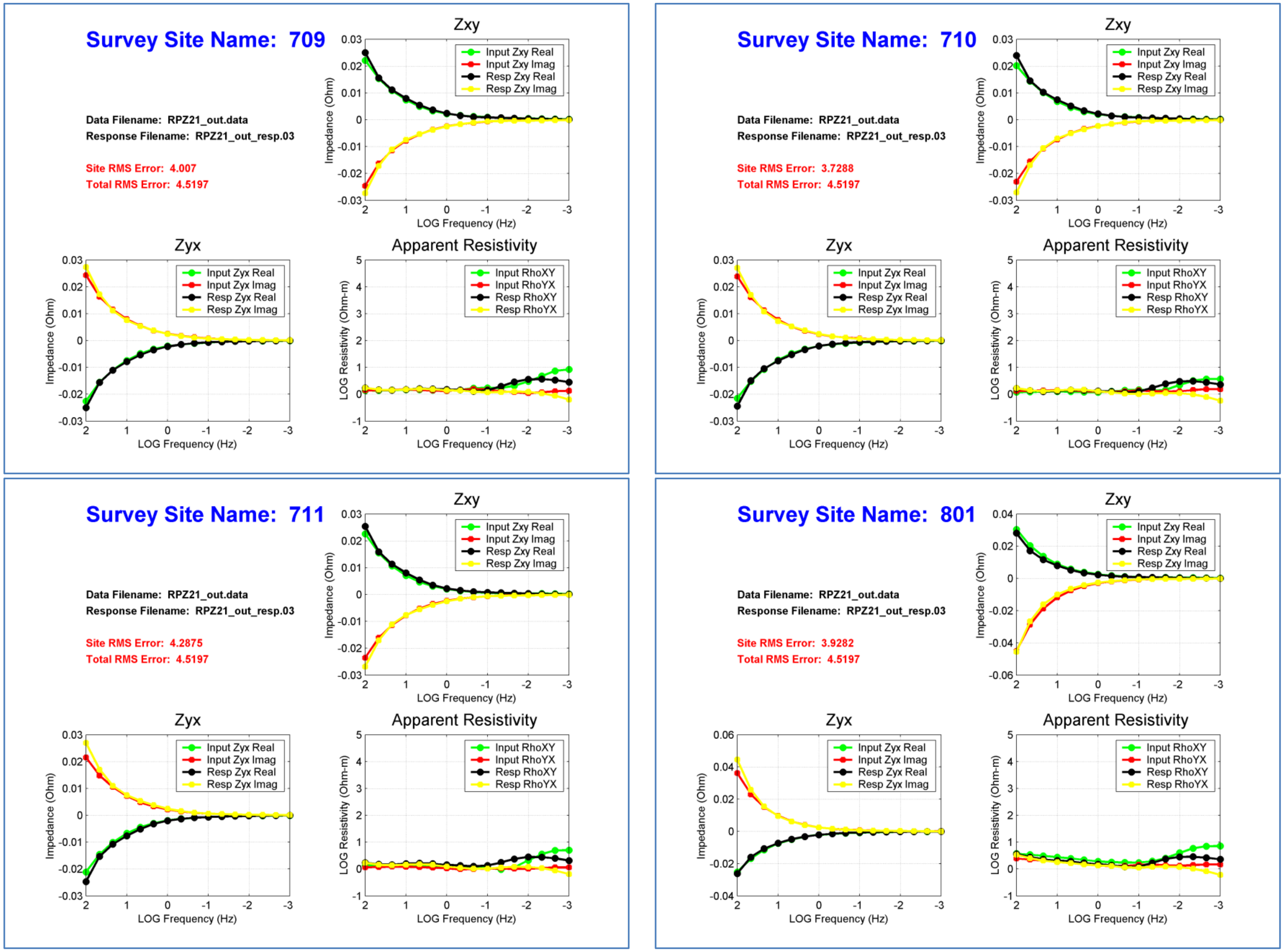

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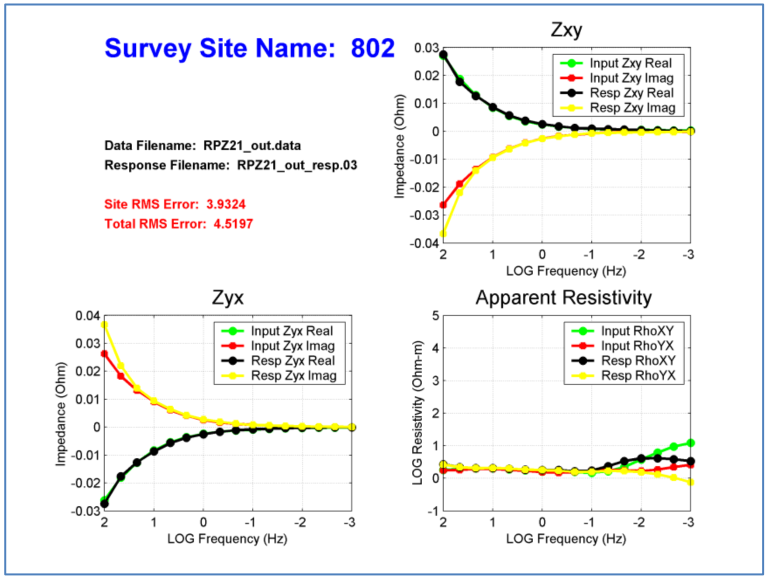

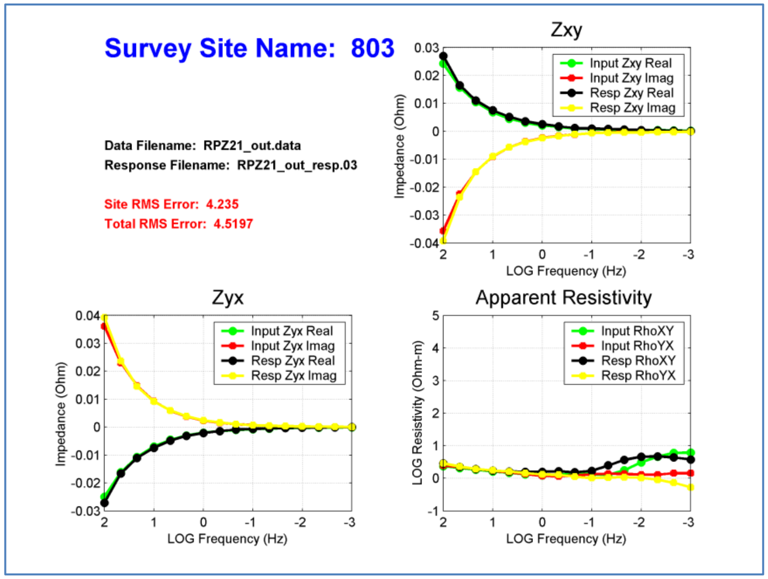

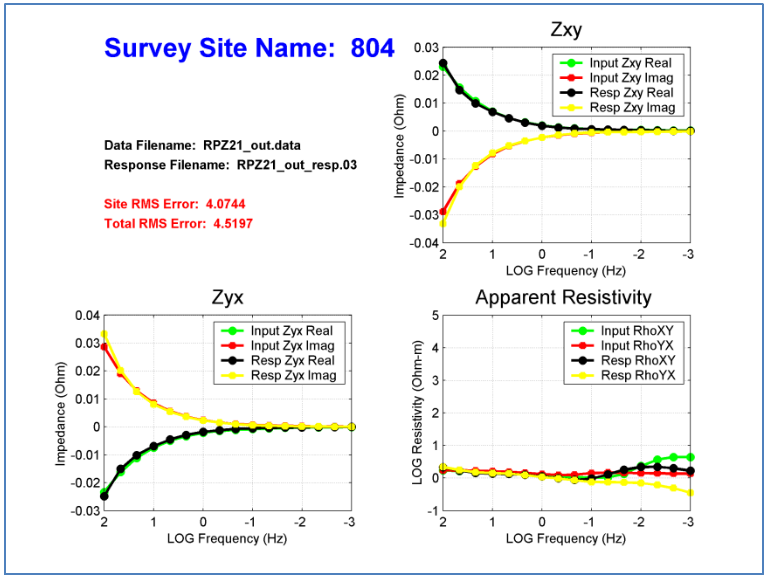

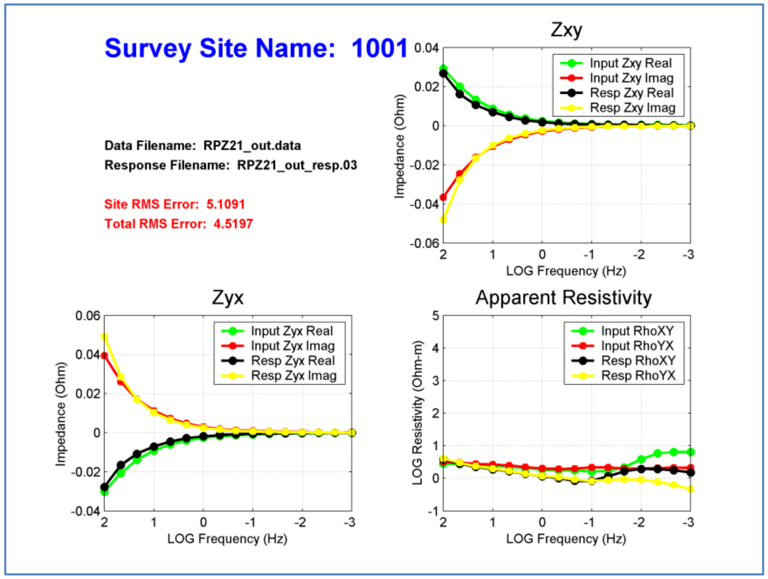

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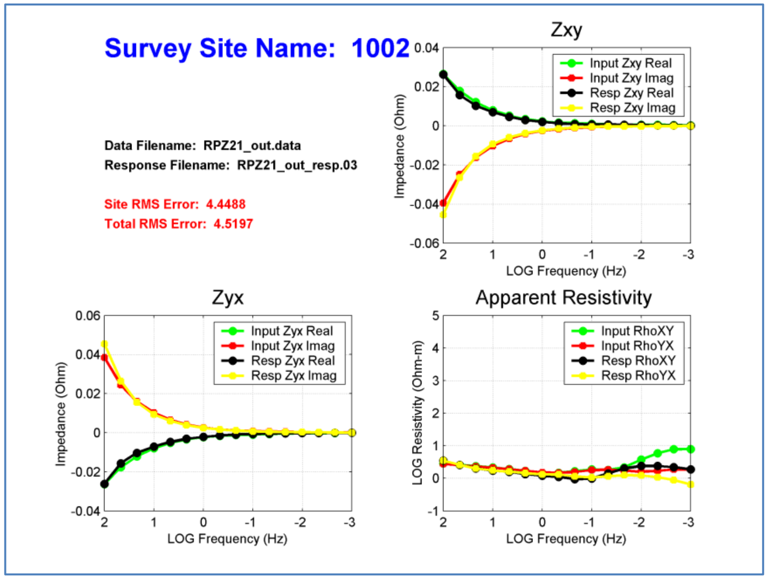

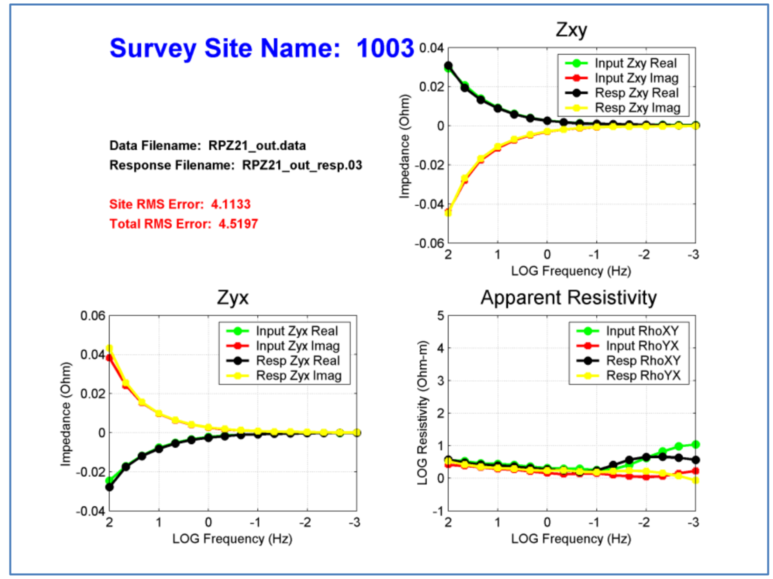

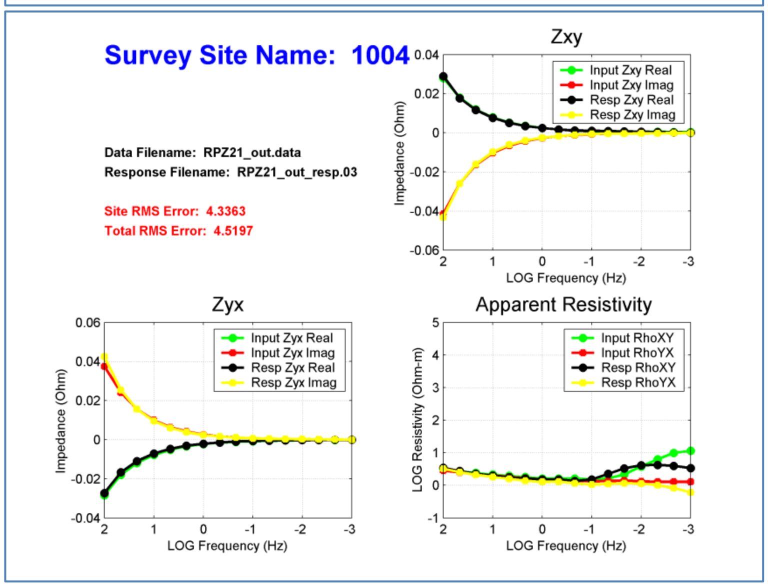

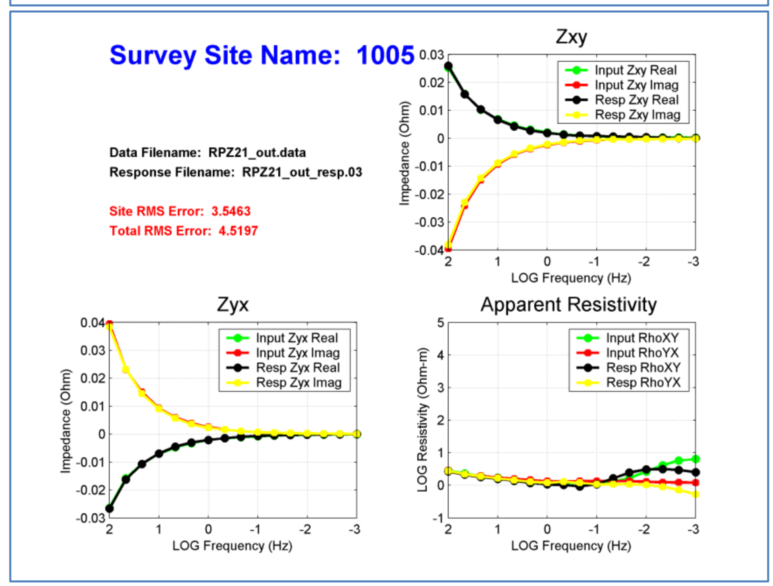

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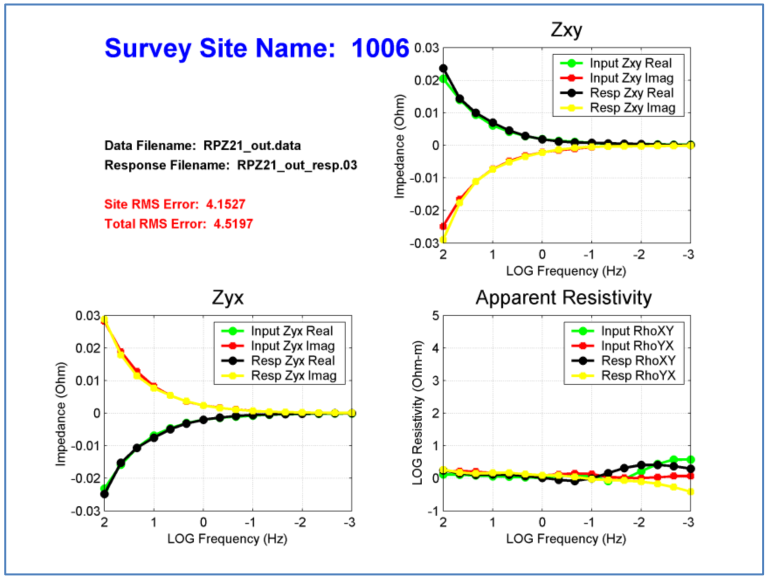

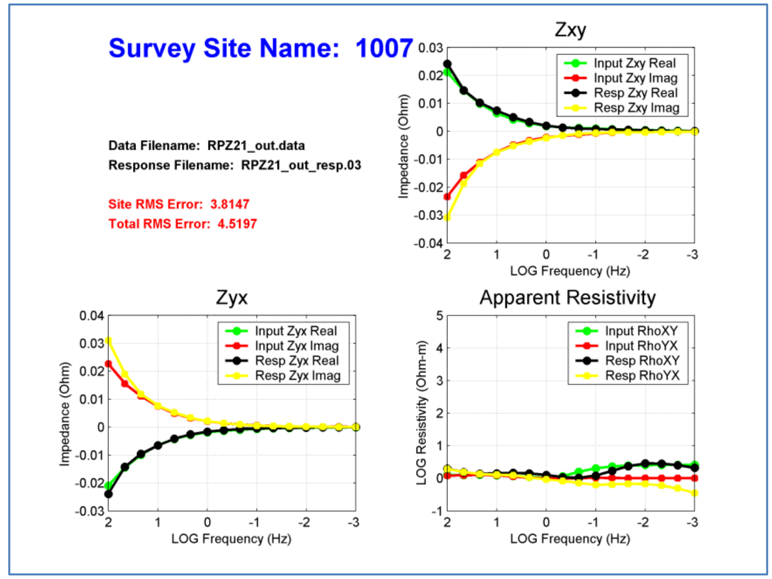

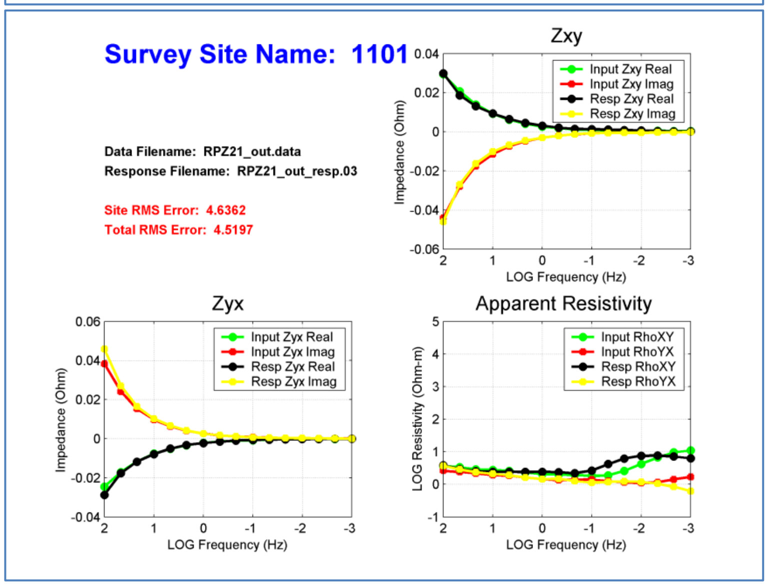

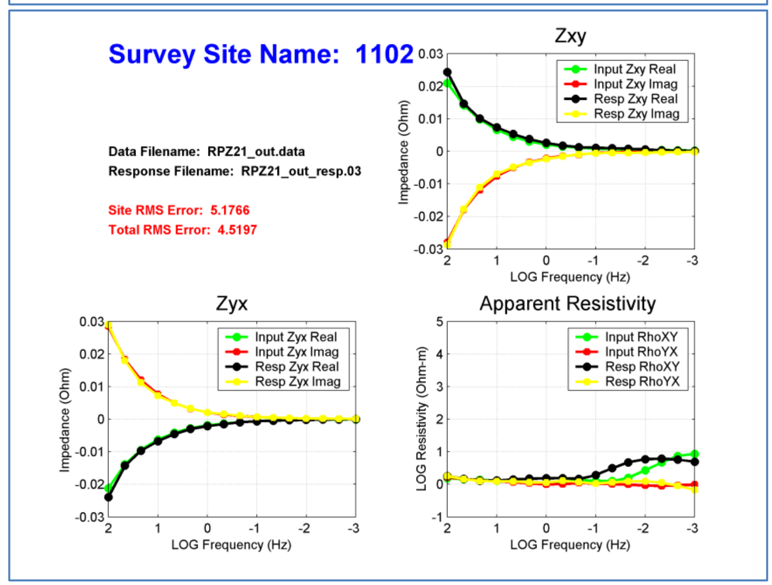

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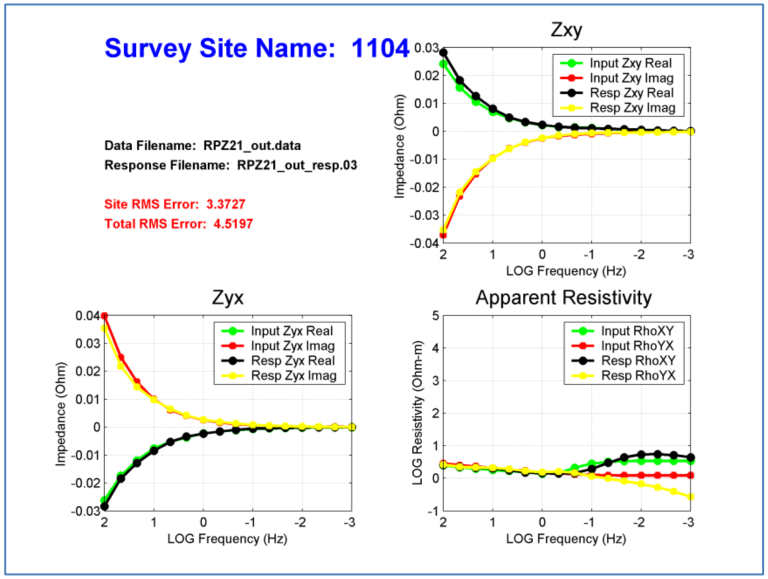

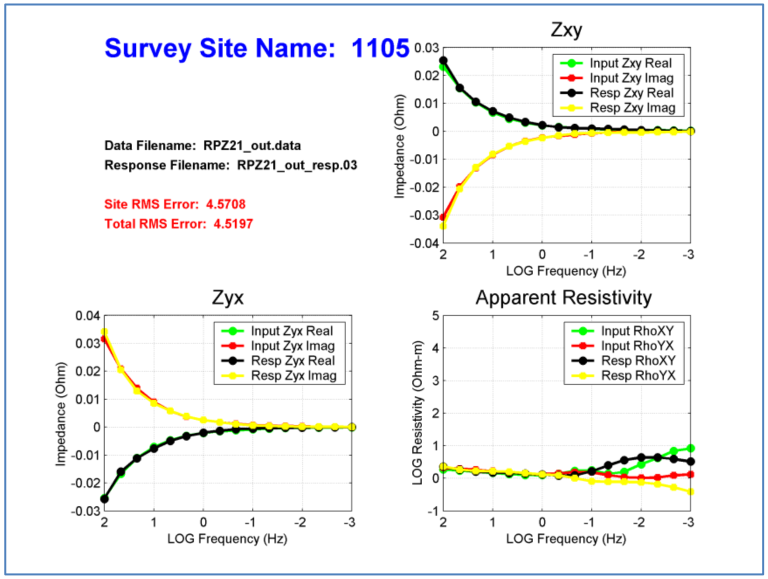

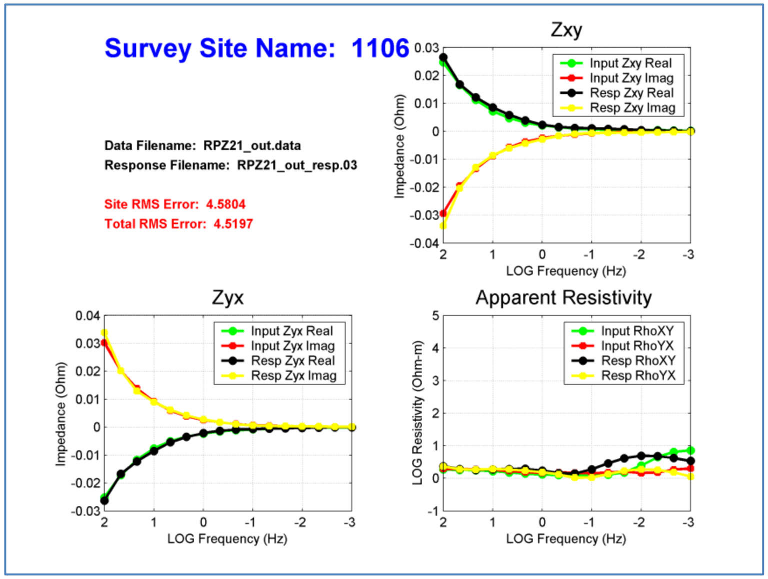

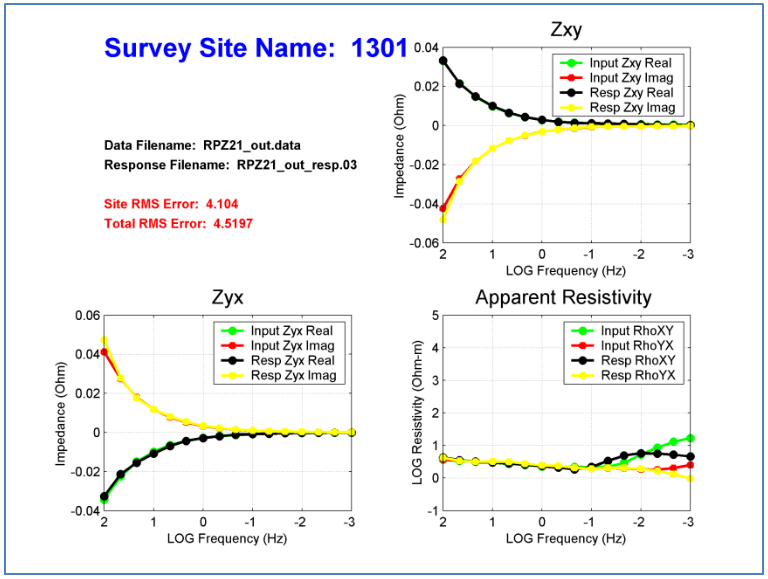

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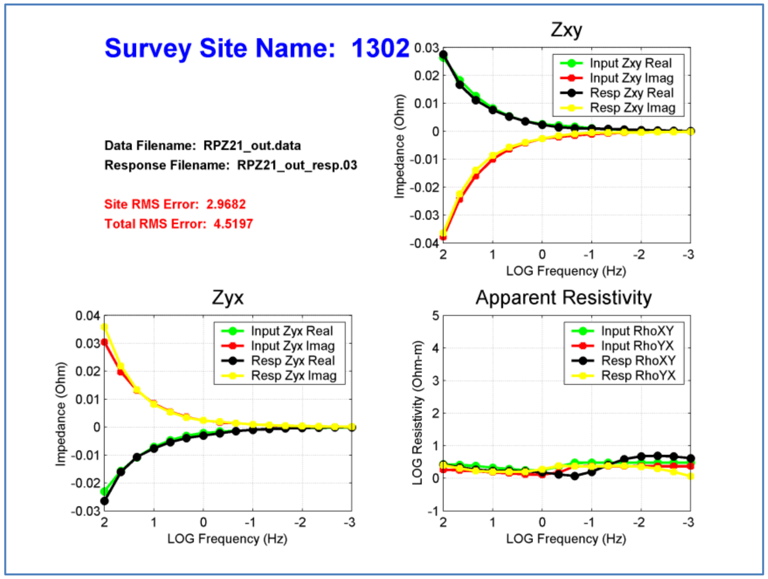

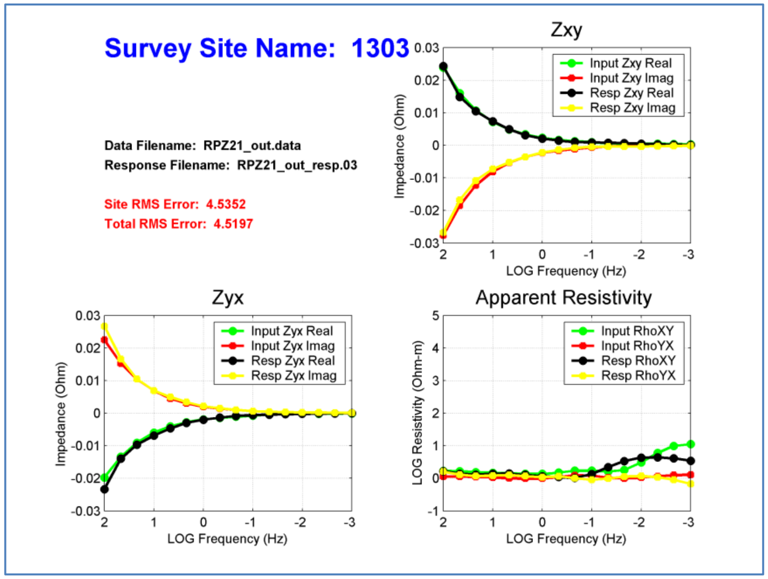

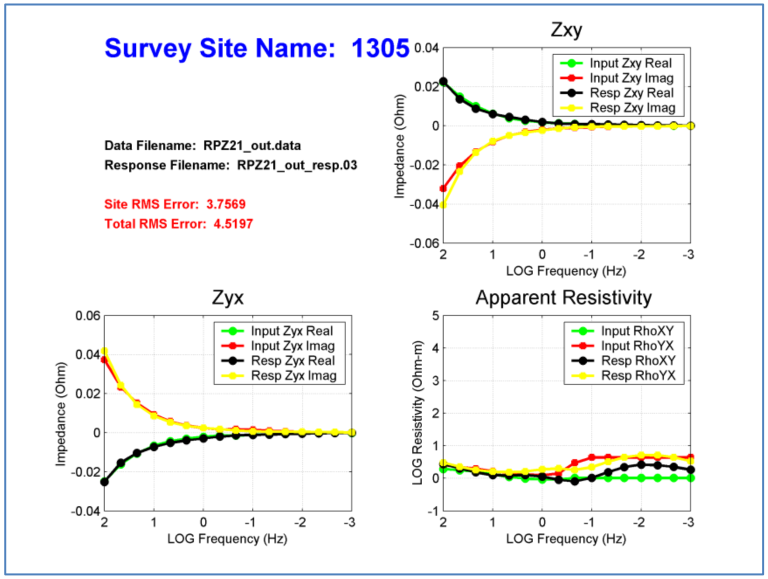

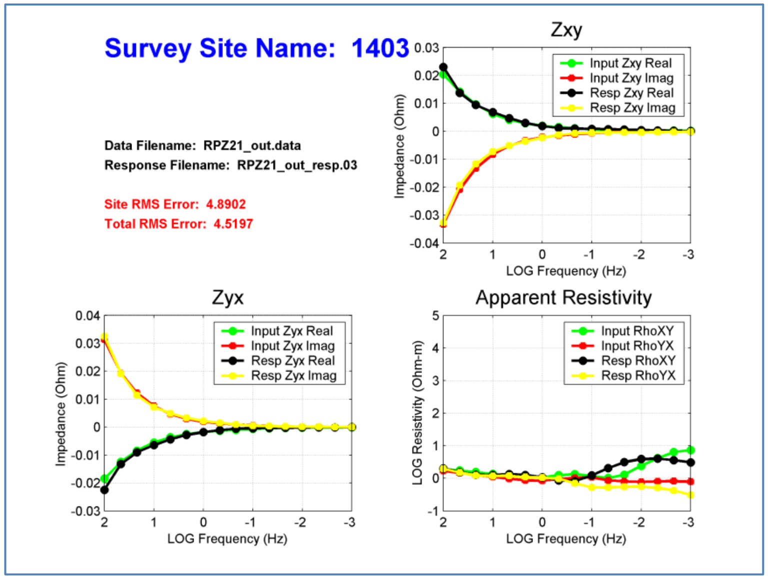

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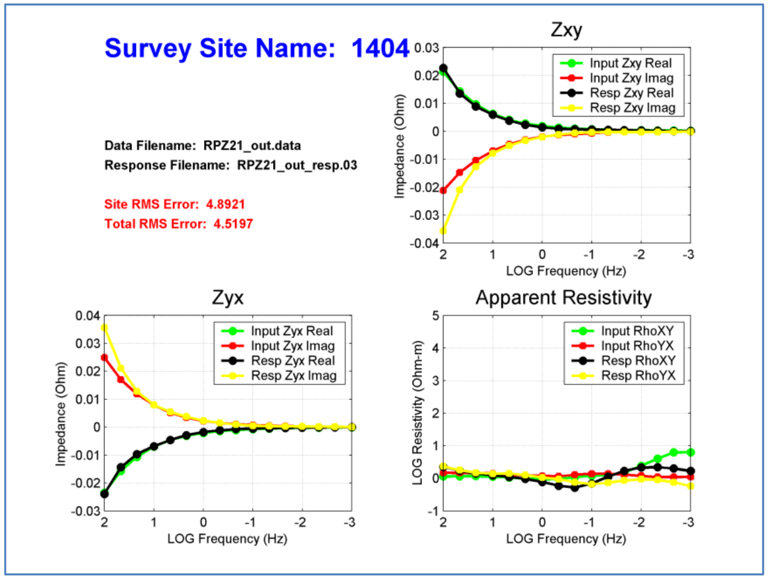

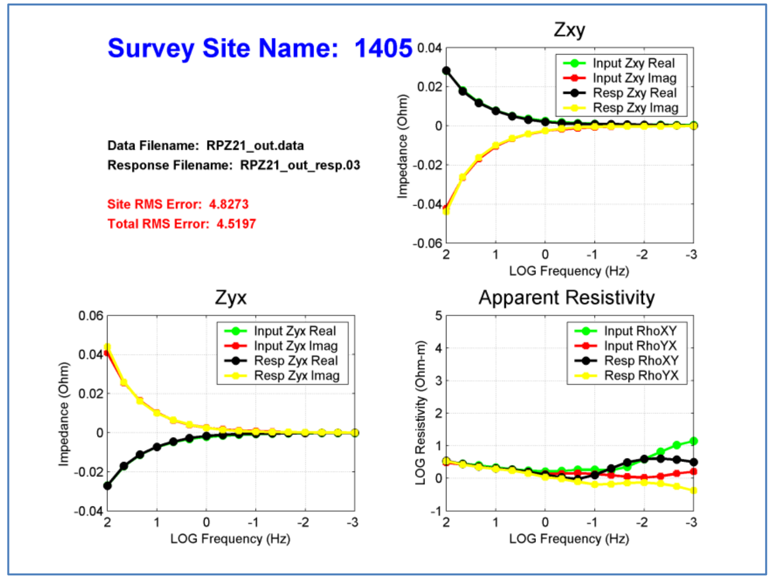

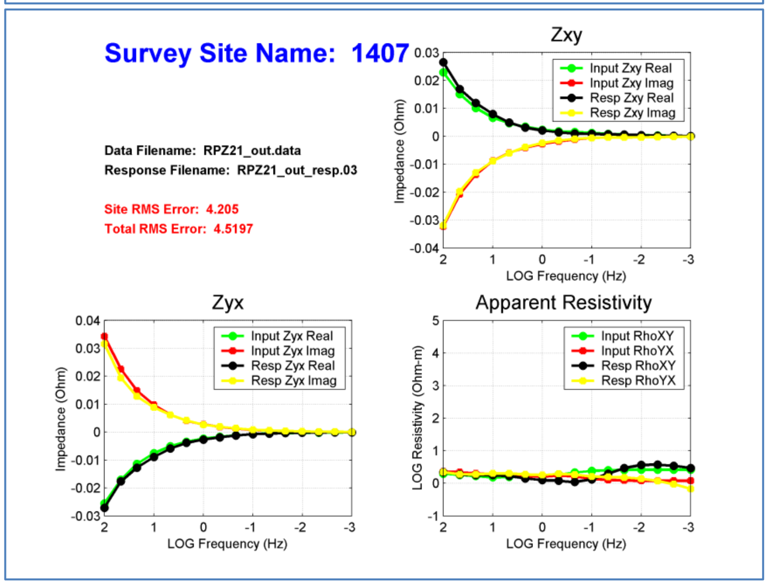

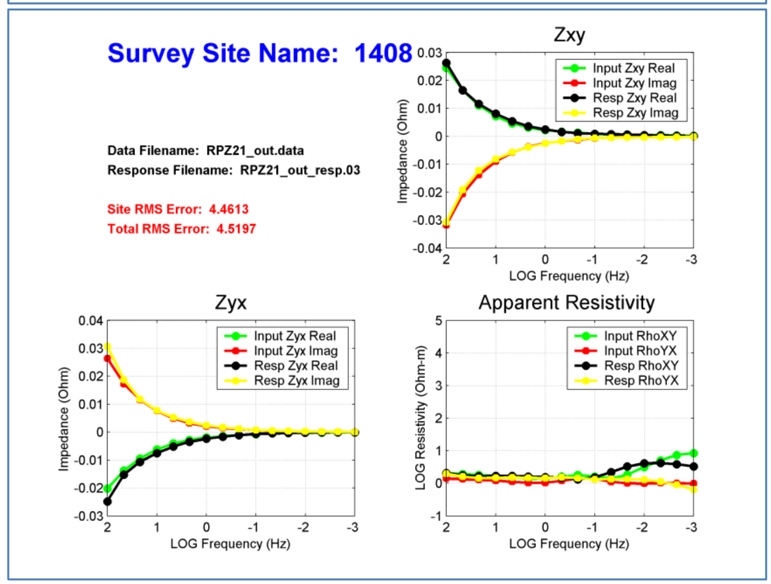

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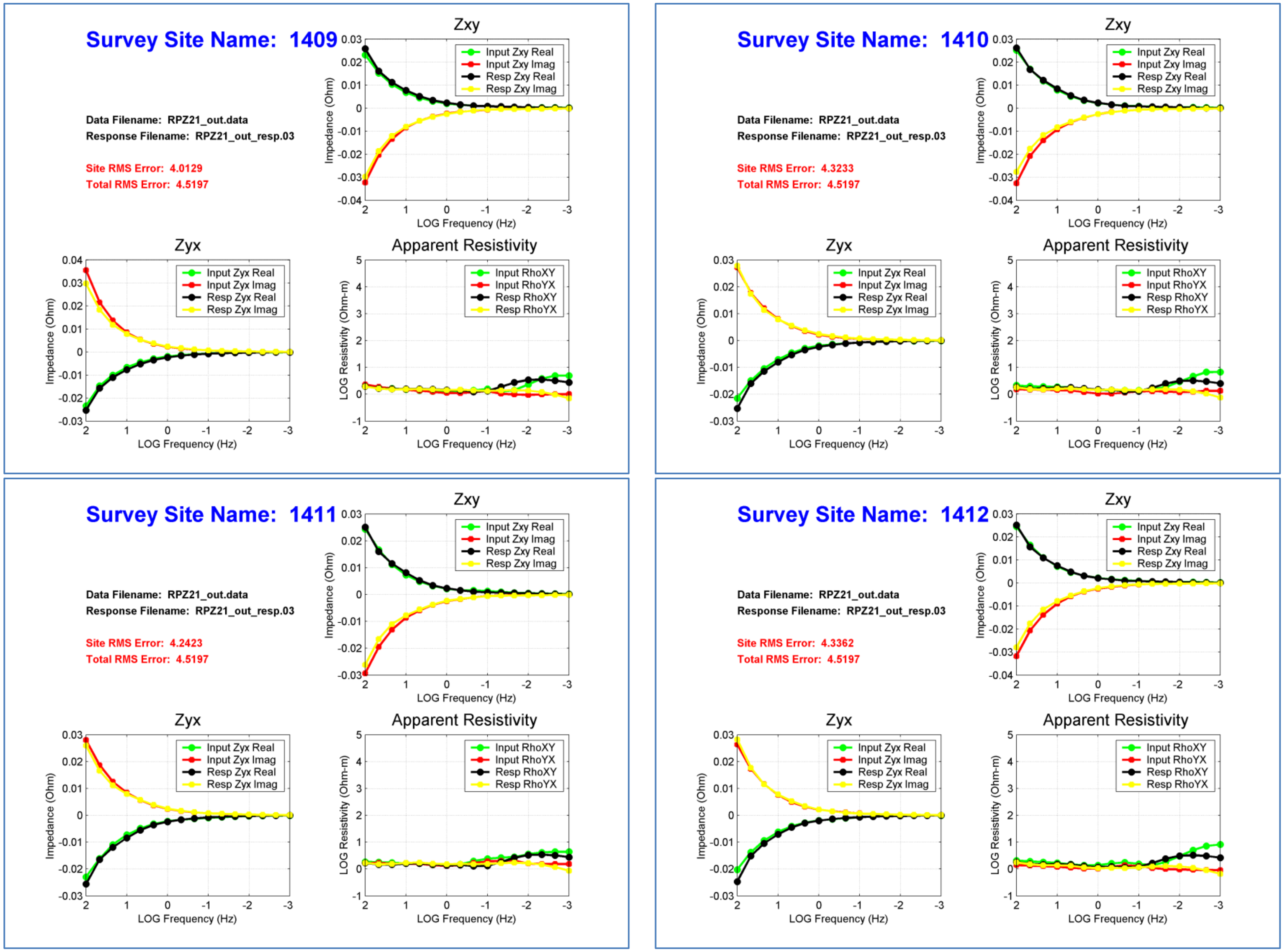

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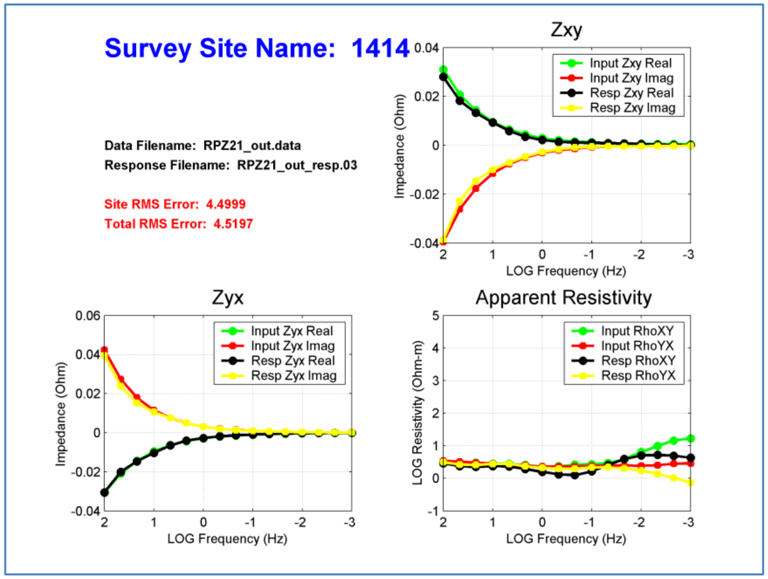

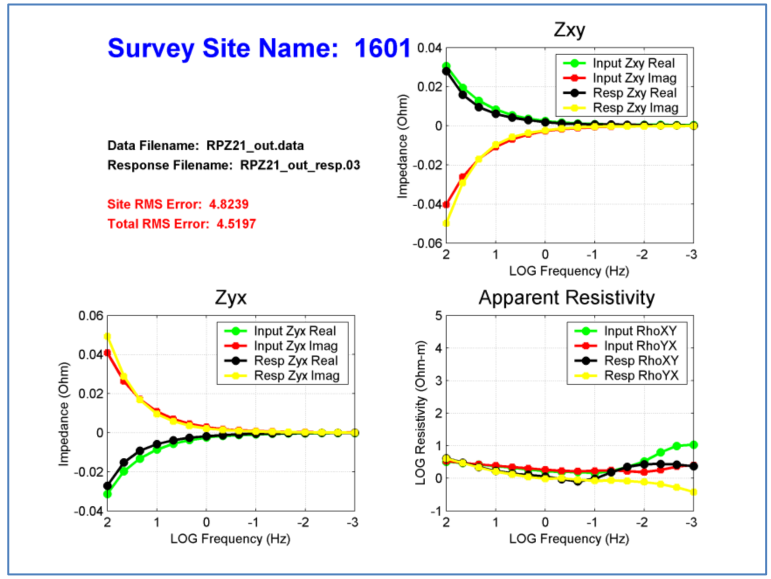

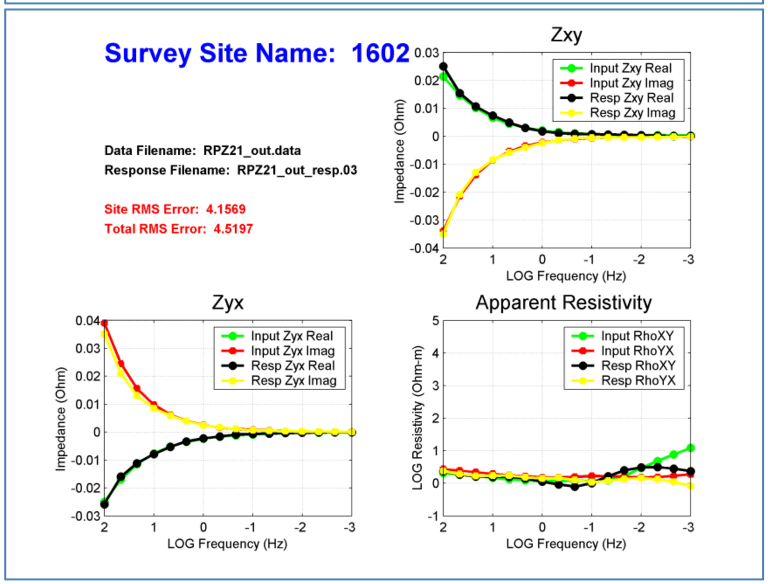

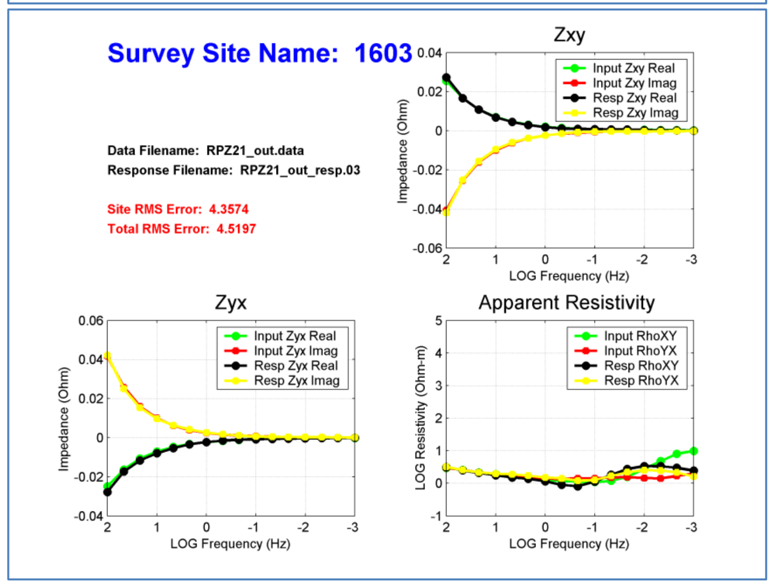

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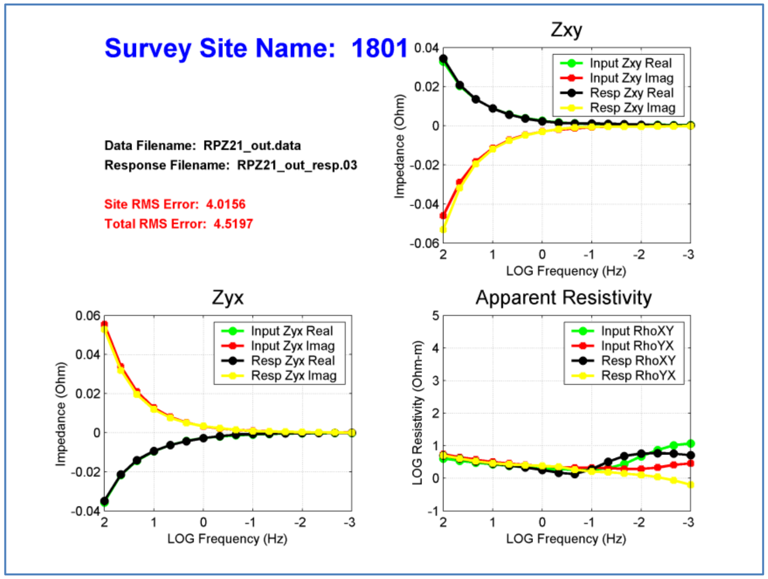

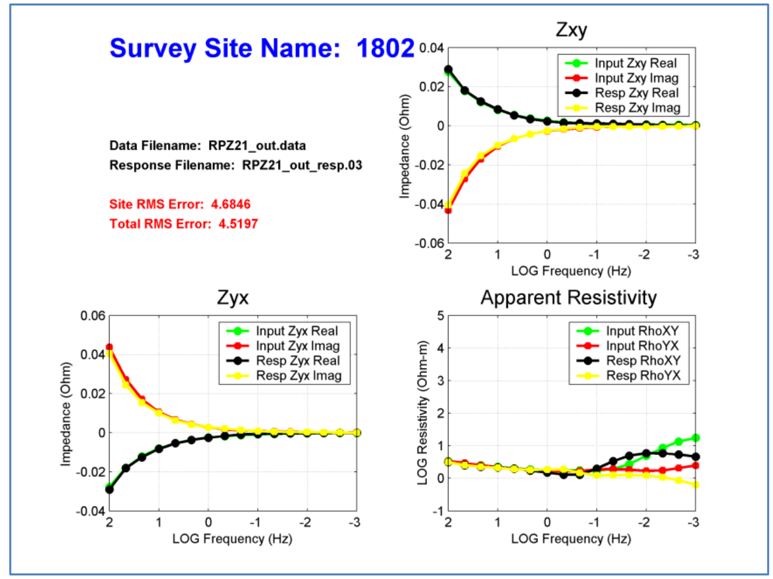

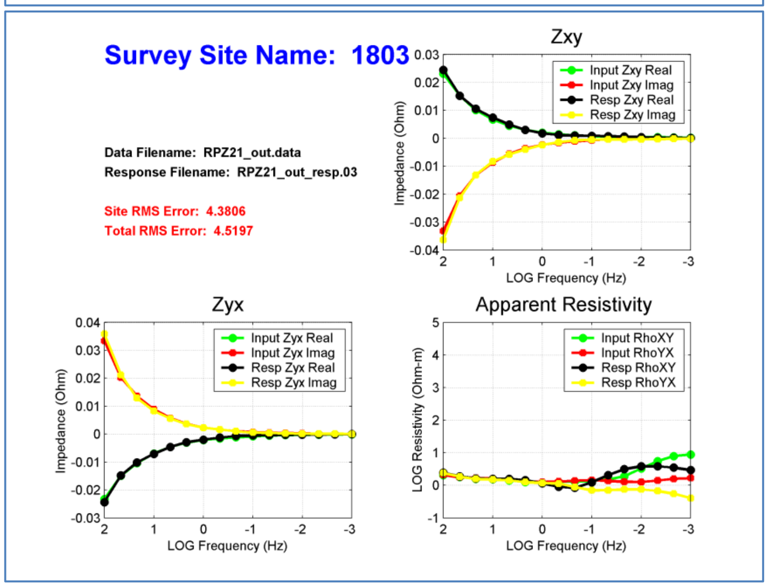

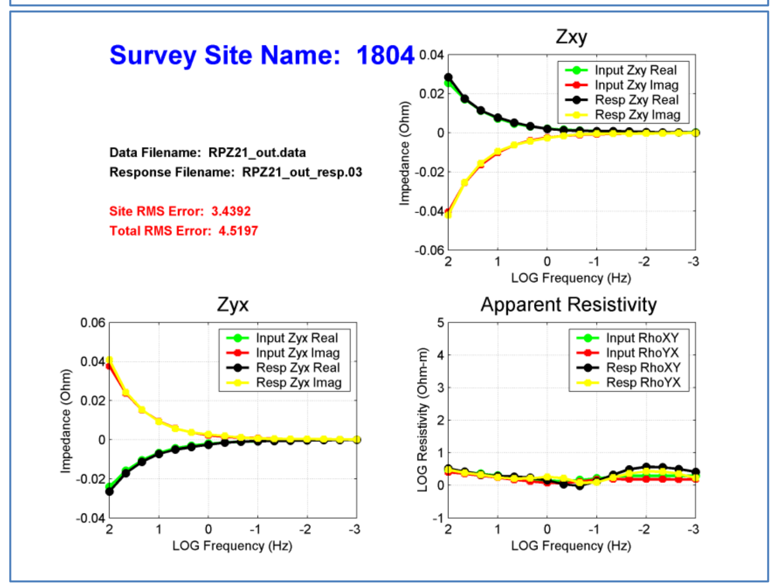

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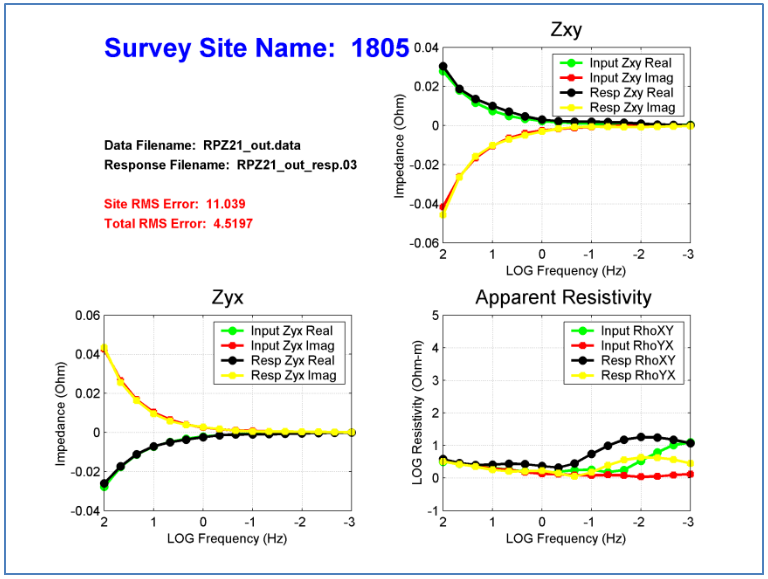
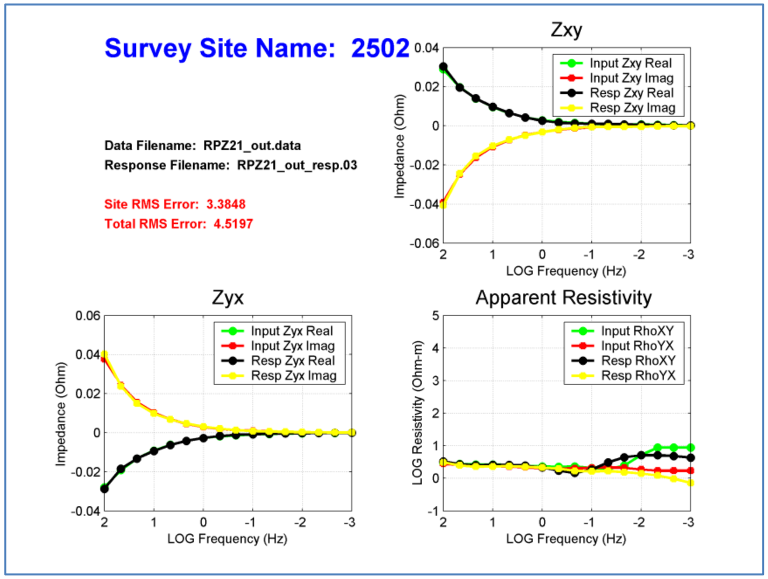
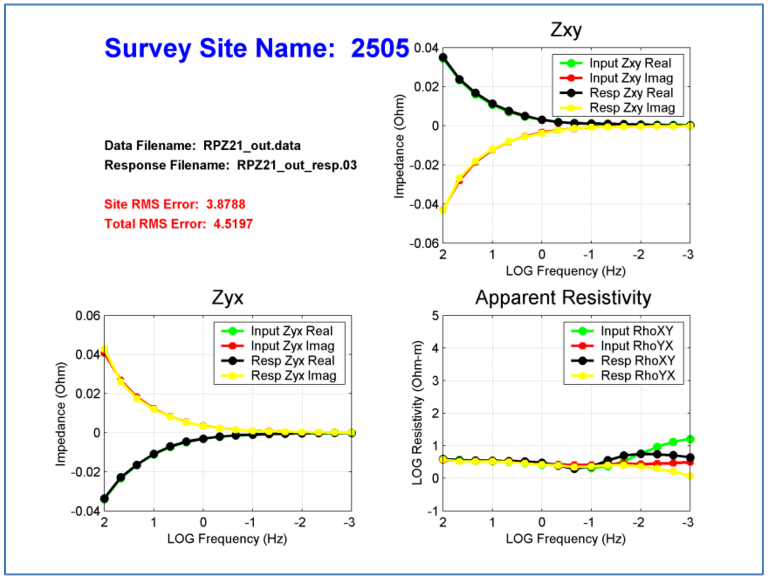






MT 3D Resistivity Responses (New River Grid)

J INTRODUCTION TO THE MAGNETOTELLURIC METHOD

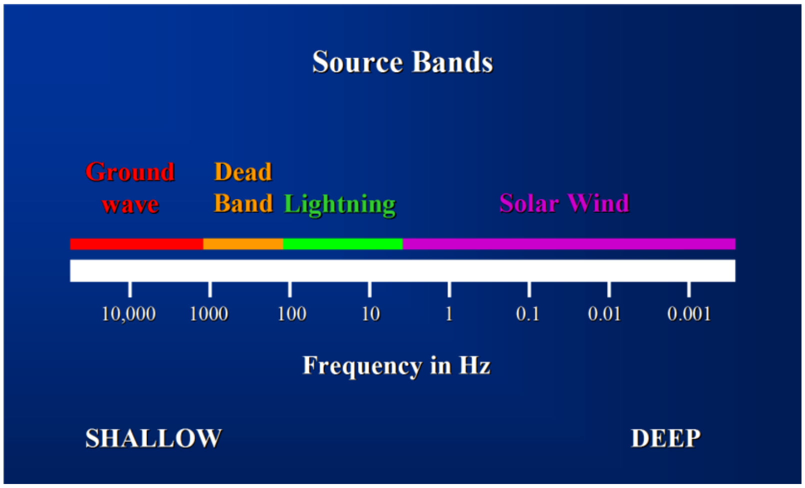
J.1 INTRODUCTION

The magnetotelluric (MT) method utilizes time-variations in the Earth's natural electric (E) and magnetic (H) fields to image the resistivity of the subsurface structure. The natural electromagnetic (EM) signals are assumed to be of plane-wave source over the frequency range with which the MT surveys are usually carried out. The plane-wave source is simpler to model compared with the complex transmitter geometries and signals used in the other EM methods. It makes the MT responses easier to understand and interpret with respect to the subsurface resistivity variations.

The E and H fields are measured over a broad range of frequencies. Typically, the frequencies can range from above 10 kHz to below 0.001Hz. Considering the conductivity of the Earth's materials and the frequency range over which the MT data are measured, the EM fields propagate in a diffusive regime. High frequency signals are attenuated more rapidly in the subsurface. Therefore, high frequency data are indicative of shallow resistivity structure while low frequency data are indicative of deep resistivity structure.

At frequencies below 1Hz the EM signal source is due to oscillations of the Earth's ionosphere as it interacts with the solar wind. At frequencies above 1Hz the signal source is due to worldwide lightning activities. There is a lack of natural signal around 1Hz, often referred to as the "hole". Modern 24-bit recording hardware and signal processing techniques, however, have largely eliminated the data quality degradations that have been traditionally seen around the 1Hz signal hole.

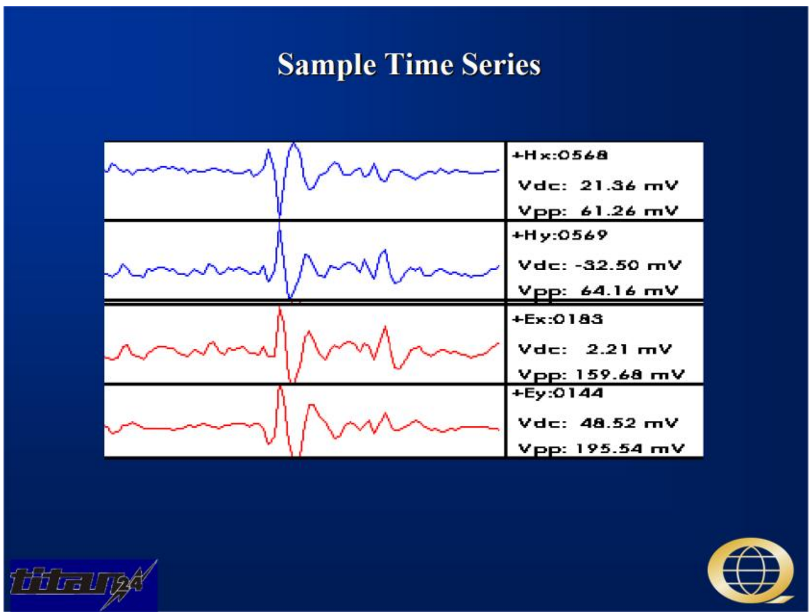
Between about 8Hz and 300Hz the signal from worldwide lightning activity propagates in a "resonant" cavity (the resistive atmosphere) between the conductive ionosphere and the conductive Earth's surface. Above 3 kHz the signal propagates as a ground wave. Between 300Hz and 3 kHz there is a "dead-band" where the signal does not propagate well. Despite hardware and signal processing improvements this dead-band remains problematic. When signal (atmospheric activity) is present within several hundreds of miles of the survey area the data quality improves. When no signal is being generated in the vicinity of the survey area the data quality is poor.



J.2 MEASUREMENTS

Both the electric and magnetic fields are measured at each site. The measured field strengths depend on the ionosphere and lightning activities and are essentially of random nature. While the E and H field strengths are random the ratio of these two fields depends on the frequency and the subsurface resistivity structure. For a homogeneous and a 1D earth resistivity structures, the magnetic field is perpendicular to the electric field. However, it is possible for a complex subsurface resistivity structure to rotate the fields. Therefore, full tensor data, including two perpendicular electric and two perpendicular magnetic fields, are usually measured.

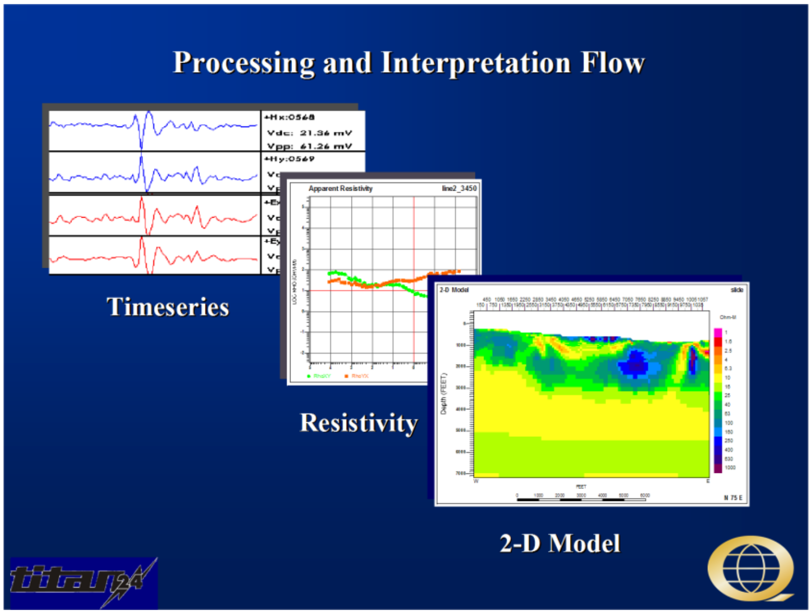
In the field surveys, the electric and magnetic fields are measured as a function of time. The electric field is measured using two orthogonal grounded dipoles. The magnetic field is also measured using induction coils parallel to the electric dipoles.



J.3 DATA PROCESSING

Extracting the subsurface resistivity structure from the measured magnetic and electric fields is a multi-step process. First, time series are transformed into frequency domain and sophisticated processing techniques are used to estimate the MT impedance tensor from the electric and magnetic fields. The impedance tensor is then used to calculate the apparent resistivity and phase data. In interpretation stage, inversion techniques are used to invert the apparent resistivity and phase data in to the subsurface true resistivity image. Finally, the resistivity image must be interpreted in terms of geologic units.

In time series processing, the measured magnetic and electric fields are Fourier transformed into the frequency domain. Calibration curves are applied to the measured fields to remove the acquisition system response. The Fourier coefficients represent the amplitude and phase of the electric and magnetic fields as a function of frequency.



A variety of complex signal processing techniques are used to minimize noise and bias in the estimation of geophysical parameters from the measured fields. The approaches include:

- Spatial isolation of noise. A remote reference magnetic station is used to separate signal from local noise in the magnetic field data;
- Coherency sieves to find coherent signal. First the local and remote magnetic field measurements are compared and coherent signal are kept. Then the local magnetic and electric fields are compared for coherency;
- Frequency isolation of noise. Long Fourier transforms are used to provide extremely sharp isolation of noise in frequency;
- Time isolation of noise. Short Fourier transforms are used to remove noise that is isolated in time (noise spikes, or noise that is randomly turning off and on);
- Robust statistics that minimize biasing effects of a few isolated measurements.

The geophysical parameters are estimated after the processing is completed. In frequency domain, the ratio between the two measured components (E and H) is called electrical impedance (Z) and is defined as $|Z| = |E/H|$. The primary geophysical parameters are usually represented as plots of the apparent resistivity versus frequency and the phase versus frequency. The impedance values are used to calculate apparent resistivity and phase data as follows:

$$\rho_a(\Omega m) = \frac{1}{\mu\omega}|Z|^2 \quad \text{and} \quad \varphi = \arg(Z)$$

The apparent resistivity is a function of the frequency. The apparent resistivity can be considered as a volumetric weighted average of the resistivity and thickness of the rocks being sampled. Consequently, it is a smoothly varying function of the frequency. It can be shown theoretically that on a log-log plot of the apparent resistivity vs. frequency the curve cannot exceed a slope of +/- 45 degrees for a layered earth model. For a homogenous half-space or a one-dimensional (1D) earth the phase is related to the apparent resistivity through the Hilbert transform. This association does not exist for the 2D and the 3D earth models.

J.4 INTERPRETATION

Plots of apparent resistivity and phase data versus frequency in a log-log scale are a conventional way of looking at the data before interpretation. If the survey involves several MT sites located along a line pseudo-sections of the apparent resistivities and phases in both components provides a first impression of the resistivity variation of the subsurface along the survey line.

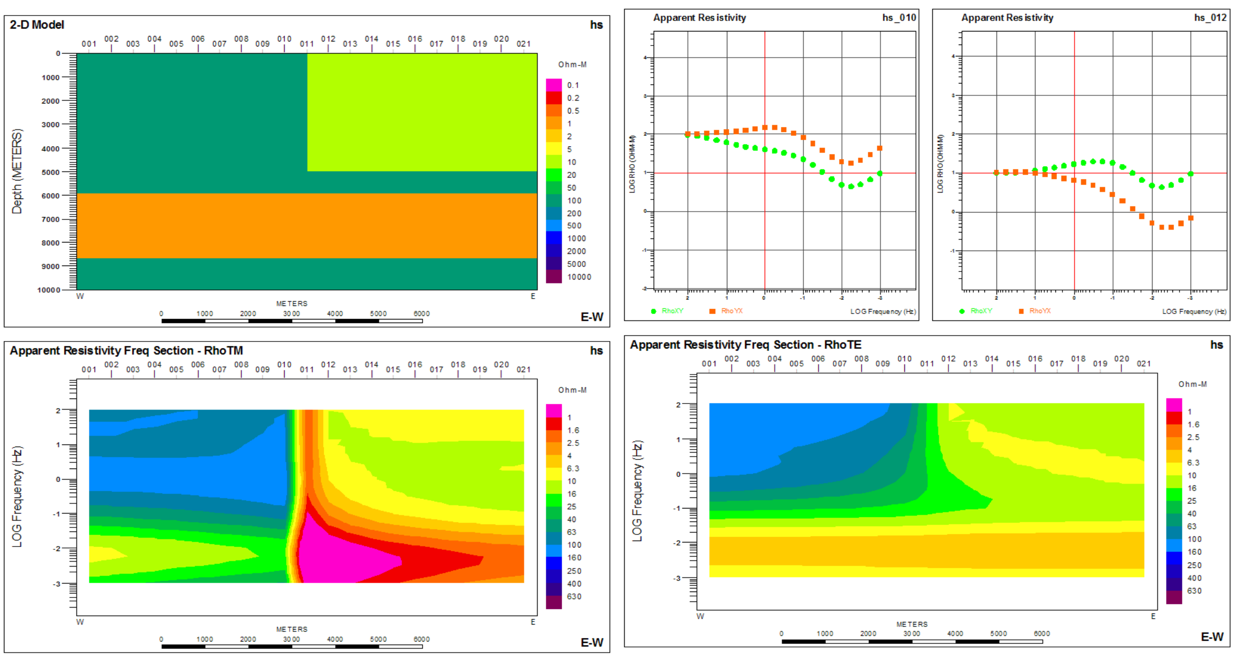
The depth of penetration of the EM signal depends on the frequency of the data and the resistivity of the subsurface. The depth at which the signal amplitude attenuates to 37% (1/e) of its initial value is called the electromagnetic skin depth (δ) and is defined as:

$$\delta(m) = \sqrt{\frac{2}{\mu\omega\sigma}} = 503\left(\sqrt{\frac{\rho}{f}}\right)$$

where δ (m) is the skin depth, μ the magnetic permeability, σ (S/m) the conductivity (1/resistivity), ω the angular frequency (=$2\pi f$), f (Hz) the frequency, and ρ (Ωm) the resistivity (1/conductivity)

The skin depth concept provides an estimation of the maximum depth of investigation of the MT data.

The following plots illustrate example of the apparent resistivity curves for two MT sites as well as the apparent resistivity cross-sections along a MT line over a simple geological model.



Interpretation of the MT data is performed using the maps of true resistivity of the subsurface. Inversion algorithms in one-dimension (1D), two-dimension (2D), and three-dimension (3D) are used to invert the apparent resistivity and phase data in to the maps of true resistivity of the subsurface. A simple layered subsurface structure generally can adequately be reproduced using the 1D inversion. In the case of more complex 2D or 3D structures, the MT response will be affected by lateral variations in resistivity. Consequently, a 2D or 3D inversion algorithm is required to allow the lateral resistivity variations.

In 1D earth assumption, off-diagonal elements of the impedance tensor are equal and of opposite signs and the diagonal elements are zero. The 1D inversion of the MT data produces a resistivity-depth profile for each MT site. The results represent a first order approximation of the resistivity variations with depth using a layered-earth model.

If there are lateral variations in the resistivity of the subsurface along one direction only (perpendicular to the strike) then a 2D inversion and interpretation is required. In this case, for a data rotated to the strike direction, off-diagonal elements of the impedance tensor are of opposite signs but not equal and the diagonal elements are zero. Because the electrical conductivity is constant along the strike direction (for example x-direction) all derivatives with respect to x will be zero. Therefore, Maxwell's equations are simplified and can be separated into two distinct modes so-called Transverse Electric (TE) and Transverse Magnetic (TM). The TE-mode represents the condition where the electric field is parallel to the strike direction while the TM-mode represents the condition where the magnetic field is parallel to the strike direction.

A cross-section of the true resistivity variations perpendicular to the assumed strike direction is created in the 2D inversion and is used in interpretation. For more complex geological structures a 3D inversion is essential to adequately describe the resistivity variation of the subsurface. In this case, none of the elements in the impedance tensor are equal or zero.

One of the factors that can affect the multi-dimensional MT data and interpretation is "static shift". The apparent resistivity curves can be biased (shifted up or down) by lateral resistivity contrasts with dimensions smaller than the minimum wavelength of the EM fields. These small features cannot be resolved by the MT data and they introduce a DC shift on the log-log apparent resistivity plots. This effect can be recognized by examining the sounding resistivity curves from the neighbouring MT sites and most be treated before the interpretation. Note that there are no static shift effects in the phase data.

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PROJECT	
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Project Grid Location	California, USA
Survey Type	Spartan MT
Survey Period (YY/MM/DD to YY/MM/DD)	2010/06/26 to 2010/07/24
Quantec Project Number	US00503S
Responsible Geophysicist	Riaz Mirza
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REPORT	
Report Date	07/12/2010
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