SeaBed Logging

Data Acquisition Report

Wolseley

Sorell Basin

August 2007

ELECTROMAGNETIC GEOSERVICES AS

emgs AS **Stiklestadvn. 1** **N-7041 Trondheim** **Norway** **Phone: (+47) 73568810** **Fax: (+47) 73568811** **e-mail contact & support:** **es@emgs.com**	SETS **Wolse01** **Wolse02** VESSEL **MV Atlantic Guardian**	LOCATION **Sorell Basin** AREA **Block T/32P** COUNTRY **Australia**
SURVEY PERIOD **8th – 22nd of August 2007**	EMGS FIELD GEOPHYSICIST **Marit Øvstedal**	
CONFIDENTIAL	CLIENT **Santos Ltd**	
Author:	Sign:	Date:
Reviewed:	Sign:	Date:
Approved:	Sign:	Date:

Summary:
The SBL Survey at Sorell Basin was carried out in August 2007. 44 receivers were deployed and around 250 km of transmit lines were run.

Water depths in the Survey area ranged from 1700 to 2500 meters.
The weather conditions during the Survey varied from calm to strong gale.

No HSE incidents or LTI's during the Survey.

Revision History

Version (Date)	*Initials*	*Description*
14-AUG-2007	MO	Initial document
28-AUG-2007	MO	Revised document
12-SEP-2007	THH	Revised document
18-SEP-2007	MB	Final document

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Acronyms and Abbreviations

CM	Central Meridian
CRP	Central Reference Point
CTD	Conductivity, Temperature, Density
DFT	Discrete Fourier Transform
DGPS	Differential Global Positioning System
DQC	Data Quality Control
ED50	European Datum 1950
EM	ElectroMagnetic
EOL	End of Line
ES	Echosounder
FE	First Electrode
GPS	Global Positioning System
HiPAP	High Precision Acoustic Positioning System
HED	Horizontal Electrical Dipole
HSE	Health, Safety and Environment
KP	Kilometre Point
LAT	Lowest Astronomical Tide
LTI/Ds	Lost Time Incident/Diseases
MSL	Mean Sea Level
MT	Magneto Telluric
MVO	Magnitude Versus Offset
PVO	Phase Versus Offset
QA	Quality Assurance
QC	Quality Control
Rx	Receiver
SBL	SeaBed Logging
SOE	Start of Echosounder
SOL	Start of Line
SVP	Sound Velocity Probe/Profile
TE	Tail Electrode
TP	Tail Reference Point
TRP	Towfish Reference Point
Tx	Transmitter
URP	USBL Reference Point
USBL	Ultra Short Base Line
UTC	Universal Time Coordinated
UTM	Universal Transverse Mercator Projection
WGS84	World Geodetic System of 1984

1. HSE and Operating Statistics

1.1. Health, Safety and Environment

HSE summary:	The Survey was conducted without any accidents or lost time incidents (LTI's) Tool box meetings and safety meetings where arranged for both the SBL crew and the marine crew.
HSE statistics:	Vessel Muster Drills: 1 Toolbox meetings: 10 HSE meetings: 1
Obstructions/Installations in the field:	None
Traffic/Shipping lanes:	None
Fishing activity:	None
Interference and Time Share:	None
Environmental obstacles or hazards:	None
Weather observations:	The weather throughout the Survey period was varied, from calm to strong gale
Geomagnetic activity:	Varied

1.2. Production statistics

Table 1: Operating statistics

Operating statistics		
Duration of Survey	350	Hours
Receivers planned	40	Rx
Receivers deployed[1]	44	Rx
Receivers recovered	43	Rx
Data recovery E	39/40	97.5%
Data recovery H	39/40	97.5%
Total Tx-lines planned	88.67	Km
Total Tx-lines made[2]	213.49	Km
Total Tx-lines effective[3]	88.67	Km
Data coverage (E+H)	78/80	97.5%
Total Tx-lines effective/planned	88.67/88.67	100.0%

[1] Incl. test receivers
[2] Incl. re-towed lines
[3] Excl. re-transmitted lines + overlap

2. Survey Plan and Data Acquisition

This chapter lists the relevant data for receivers and transmitter lines. All receiver data covered in this section is as laid, and hence will differ from the initial Survey layout sheet due to receiver drift when sinking to the bottom.

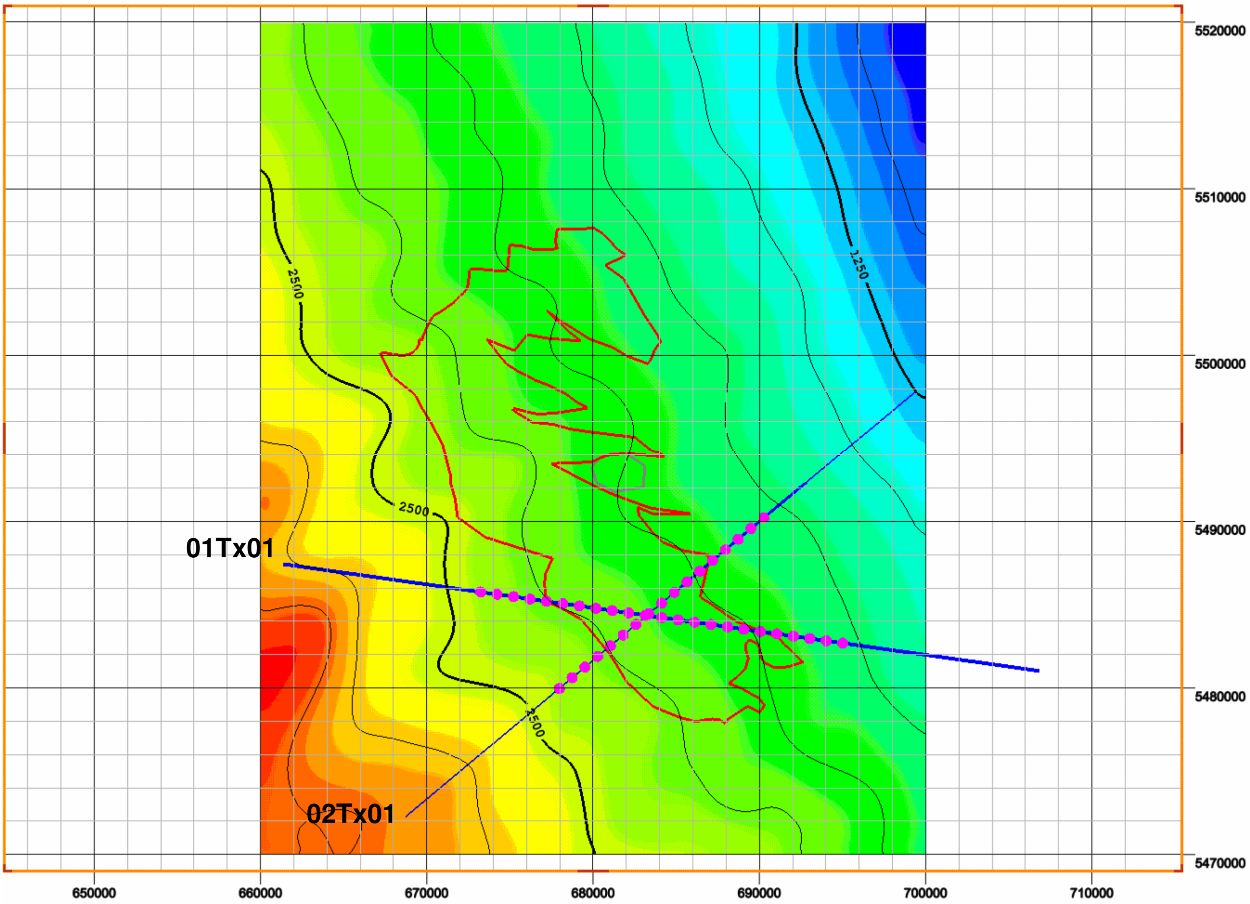

Figure 1: Survey Layout Wolseley. Solid line: Tow lines. Dots: Receiver location

2.1. Receiver Layout

Receiver positions are planned with respect to the geology and general knowledge of potential reservoirs in the area. Positions are planned along theoretical straight lines. Because of the individual drift of the receiver after the deployment from the vessel, the resulting seabed positions may differ from the planned positions. A maximal accepted distance from the planned position is given in the SBL Data Acquisition Standard. The acceptable deviation is greater along the line than in the cross line direction. In cases where a receiver drifts too far away during the descent, the receiver has to be released and re-deployed. Prediction of the drift-behaviour is difficult, especially in deeper water. The currents in each water column may slightly differ on a drop to drop basis, as well as the initial horizontal velocity (ideally zero) and spin of the receivers.

The in-line deviation quoted in table(s) below is the distance between planned and actual (as dropped) position in the direction of the planned towline, whereas the cross-line deviation is the distance between the planned and actual position in the direction orthogonal to the planned towline.

2.1.1. Survey Layout as laid – Wolse01

Table 2: Survey Layout Sheet as laid – Wolse01Tx01

Rx Drop	Receiver ID	Measures: E – Electric H – Magnetic x/y – Axes	Sampling Frequency (Hz)	Positions			Deviation from planned position	
				Mean Easting	Mean Northing	Mean Depth	InLine [m]	CrossLine [m]
01Rx001a	33050015	Exy+Hxy	50	673260.9	5485774	2419.6	2	-14
01Rx002a	25050002	Exy+Hxy	50	674334.6	5485676	2360.6	79	38
01Rx003a	25050004	Exy+Hxy	50	675320.4	5485536	2314.3	75	38
01Rx004a	25050012	Exy+Hxy	50	676136.7	5485360	2291.9	-92	-23
01Rx005a	25050008	Exy+Hxy	50	677207.7	5485224	2263.7	-12	-8
01Rx006a	25050009	Exy+Hxy	50	678182.3	5485125	2227.3	-34	31
01Rx007a	25050010	Exy+Hxy	50	679173.3	5484981	2229.5	-33	26
01Rx008a	25050011	Exy+Hxy	50	680188.8	5484827	2238.7	-5	16
01Rx009a	33050014	Exy+Hxy	50	681181.2	5484694	2221.5	-4	22
01Rx010a	33050016	Exy+Hxy	50	682202.8	5484544	2160.2	29	16
01Rx011a	33050018	Exy+Hxy	50	683190.8	5484384	2198.3	29	-4
01Rx012a	35050069	Exy+Hxy	50	684166.6	5484257	2102.3	13	6
01Rx013a	20060043	Exy+Hxy	50	685151.9	5484133	2057.6	6	21
01Rx014a	33050024	Exy+Hxy	50	686118.6	5483985	2064.5	-16	8
01Rx015a	33050025	Exy+Hxy	50	687130.1	5483838	2074.9	7	5
01Rx016a	25050006	Exy+Hxy	50	688131.1	5483699	2057.0	16	8
01Rx017a	33050029	Exy+Hxy	50	689112.5	5483565	2065.4	7	11
01Rx018a	20060038	Exy+Hxy	50	690093.6	5483363	1974.9	7	-51
01Rx019a	33050031	Exy+Hxy	50	691081.1	5483241	1944.3	2	-35
01Rx020a	33050034	Exy+Hxy	50	692209.5	5483164	1909.2	130	46
01Rx021a	33050035	Exy+Hxy	50	693126.2	5482989	1874.0	62	2
01Rx022a	33050036	Exy+Hxy	50	693988.8	5482918	1815.3	-74	51
01Rx023a	35050063	Exy+Hxy	50	695201.6	5482678	1774.5	160	-16

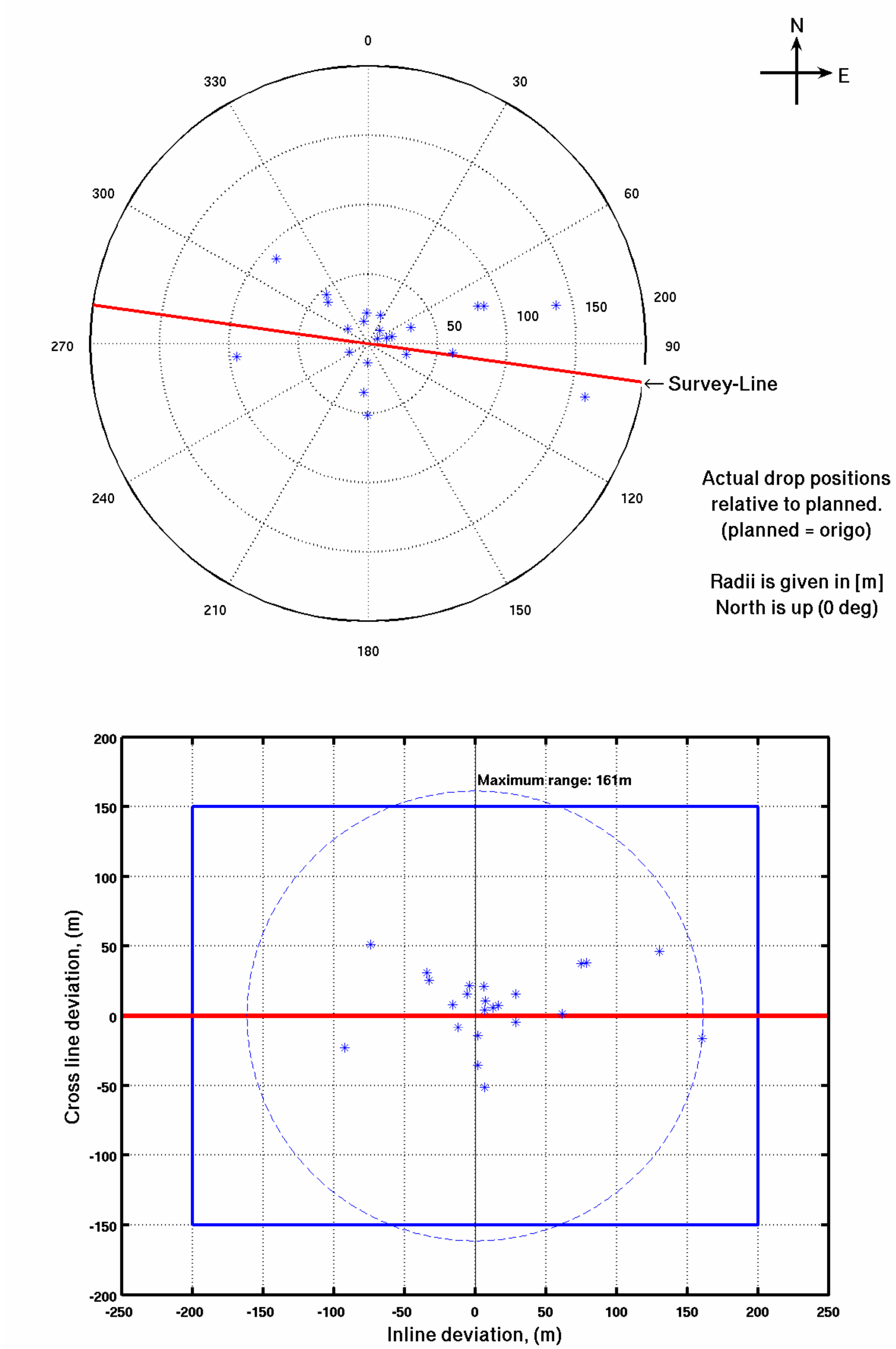

Figure 2: Drop position accuracy Wolse01Tx01 – deviation from planned position

2.1.2. Survey Layout as laid – Wolse02

Table 3: Survey Layout Sheet as laid – Wolse02Tx01

Rx drop	Receiver ID	Measures: E – Electric H – Magnetic x/y – Axes	Sampling Frequency (Hz)	Positions			Deviation from planned position	
				Mean Easting	Mean Northing	Mean Depth	InLine [m]	CrossLine [m]
01Rx024a	33050023	Exy+Hxy	50	678080.7	5480016.9	2465.5	73	-39
01Rx025a	20060040	Exy+Hxy	50	678818.0	5480625.3	2429.3	29	-43
01Rx026a	33050038	Exy+Hxy	50	679571.0	5481270.7	2401.5	21	-30
01Rx027a	33050043	Exy+Hxy	50	680325.5	5481936.6	2345.9	26	-1
01Rx028a	33050044	Exy+Hxy	50	681091.3	5482559.5	2313.2	13	-13
01Rx029a	33050046	Exy+Hxy	50	681882.8	5483198.5	2263.2	31	-29
01Rx030a	35050047	Exy+Hxy	50	682625.4	5483840.3	2222.5	12	-11
01Rx031a	35050050	Exy+Hxy	50	683409.4	5484481.5	2186.3	24	-20
01Rx032a	35050053	Exy+Hxy	50	684172.7	5485129.7	2141.1	26	-10
01Rx033a	35050054	Exy+Hxy	50	684908.6	5485768.4	2113.6	0	8
01Rx034a	35050056	Exy+Hxy	50	685674.8	5486421.7	2062.7	7	20
01Rx035a	35050058	Exy+Hxy	50	686424.4	5487094.5	2029.3	14	57
02Rx001a	35050059	Exy+Hxy	50	687183.5	5487695.5	1992.2	-19	33
02Rx002b	35050061	Exy+Hxy	50	688060.0	5488384.1	1917.0	96	1
02Rx003b	33050022	Exy+Hxy	50	688820.3	5489011.5	1870.4	81	-5
02Rx004b	25050003	Exy+Hxy	50	689554.7	5489633.4	1834.7	44	3
02Rx005b	35050064	Exy+Hxy	50	690329.3	5490274.2	1771.8	49	0

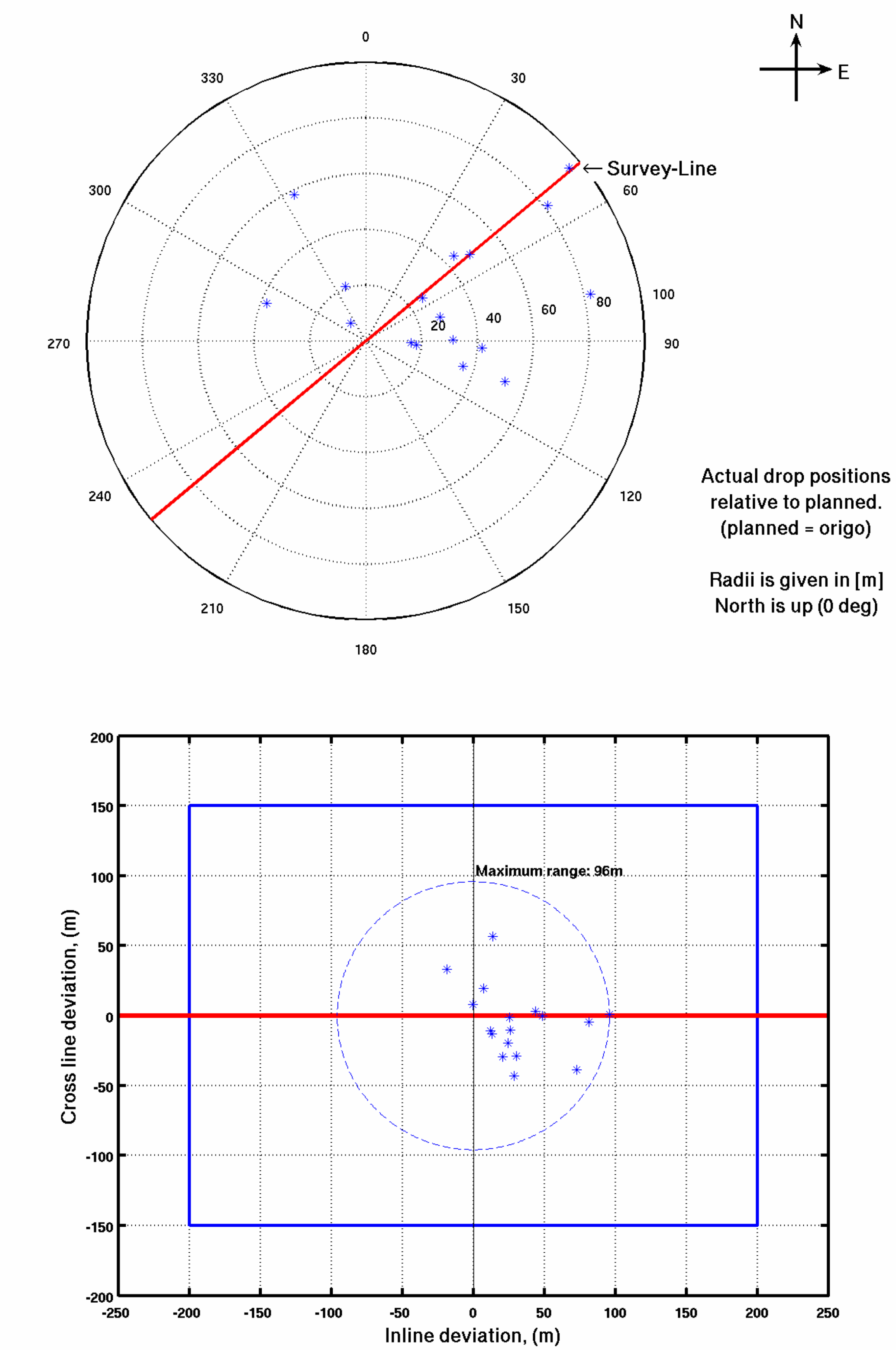

Figure 3: Drop position accuracy Wolse02Tx01 – deviation from planned position

2.2. Transmitter Layout

The source is set up with a specified frequency and energy output. A combination of frequencies is also possible. The system is capable of delivering up to 1250A. The transmitter lines are characterized by the start-of-line (SOL) and end-of-line (EOL) positions, the direction of towing, vessel speed and depth of source. Ideally, the source should be as close to the seafloor as possible. However, operational factors, such as weather and antenna balance (generally best for up-hill towing), may influence the towing. Decisions about this must be taken on board. The same applies for the speed of the vessel.

Table 4: Towline summary

Line	Date started	TX [km]	Line Hdg. [deg]	Comments
Wolse01Tx01a	2007-08-13	N/A	96.78	Line aborted due to software problems
Wolse01Tx01b	2007-08-13	N/A	96.78	. Not used for processing due to bad positioning
Wolse01Tx01c	2007-08-16	10.0	96.78	Complete line together with Wolse01Tx01a and Wolse01Tx01b. Not used for processing.
Wolse01Tx01d	2007-08-18	29.3	276.78	Aborted due to source power fault
Wolse01Tx01e	2007-08-19	32.8	276.78	Complete line together with Wolse01Tx01d.
Wolse02Tx01a	2007-08-14	N/A	48.89	Line aborted due to loss of positioning
Wolse02Tx01b	2007-08-15	40.9	48.89	Complete line. Not used for processing due to bad positioning from source.
Wolse02Tx01c	2007-08-17	41.6	228.89	Complete line

Table 5: Line Definition as towed – Wolse01Tx01d

Position SOL		Position EOL	
Easting	Northing	Easting	Northing
707711.2	5480851.0	678715.8	5485017.5
Time SOL		Time EOL	
2007-08-18,20:42:29		2007-08-19,04:38:49	

Table 6: Line Definition as towed – Wolse01Tx01e

Position SOL		Position EOL	
Easting	Northing	Easting	Northing
693536.4	5482948.8	661101.2	5487578.1
Time SOL		Time EOL	
2007-08-19,13:43:18		2007-08-19,22:43:58	

Table 7: Line Definition as towed – Wolse02Tx01c

Position SOL		Position EOL	
Easting	**Northing**	**Easting**	**Northing**
700547.4	5498829.2	668607.2	5472218.3
Time SOL		**Time EOL**	
2007-08-17,07:42:21		2007-08-17,18:59:01	

3. Data Quality Control (DQC)

This chapter describes the data quality and lists Survey dependent factors that have, or may have, influence on data quality. The discussion will be kept on a qualitative level.

3.1. DQC – Source Signal

The source outputs a predetermined signal waveform and is monitored real time from the Survey vessel. The source output signal is written to file (.ant) as described under the heading Source Data in the appendices.

3.1.1. Source QC – Wolse01Tx01

Table 8: Source QC – Wolse01Tx01d

Source parameters		Value	
Dipole length		271.8m	
Signal shape		Santos Composite Square	
Signal frequency		0.25	
Start of line		**End of line**	
Current	1000A	Current	1000A
Voltage	88V	Voltage	88
Current filename	20070818195140084_200Hz.ant	Current filename	20070818195140084_200Hz.ant

QC event during line				
Date	**Time**	**KP**	**Fix**	**Comment**
2007-08-18	20:42	46.0	97	SOL
2007-08-19	04:30	16.7	2942	Line aborted due to source power fault

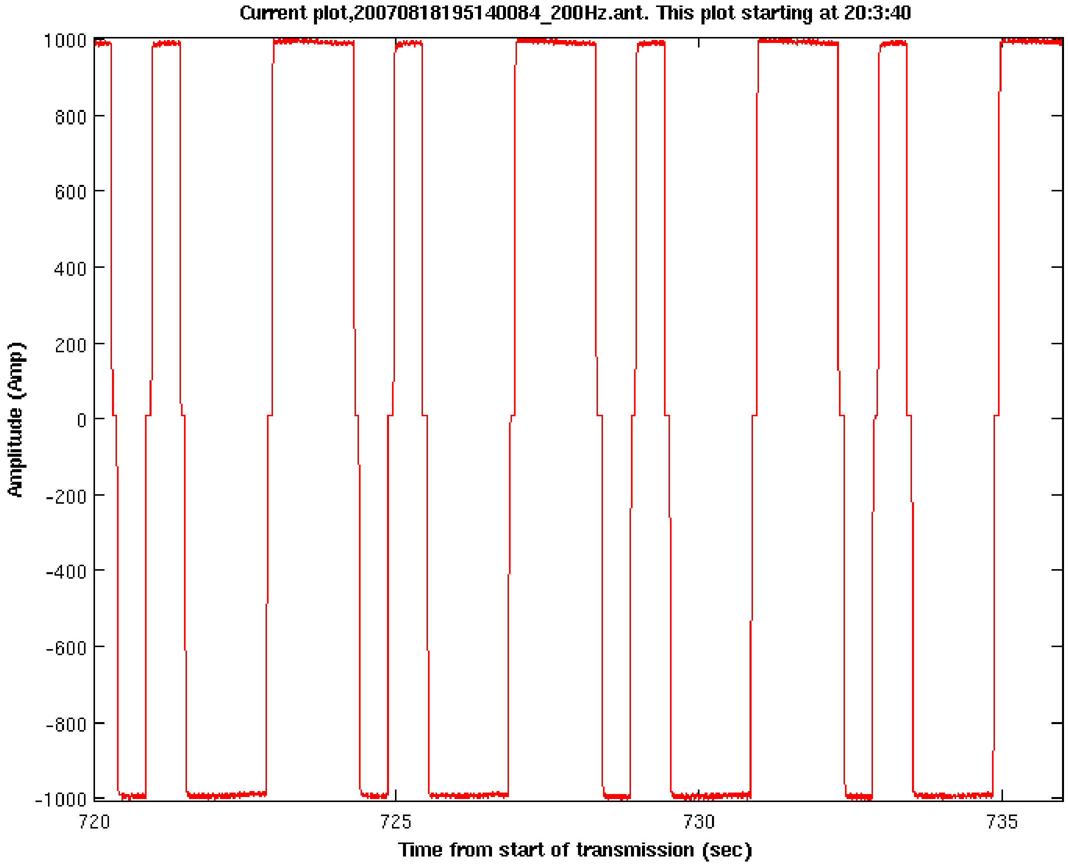

Figure 4: Source signal shape Wolse01Tx01d

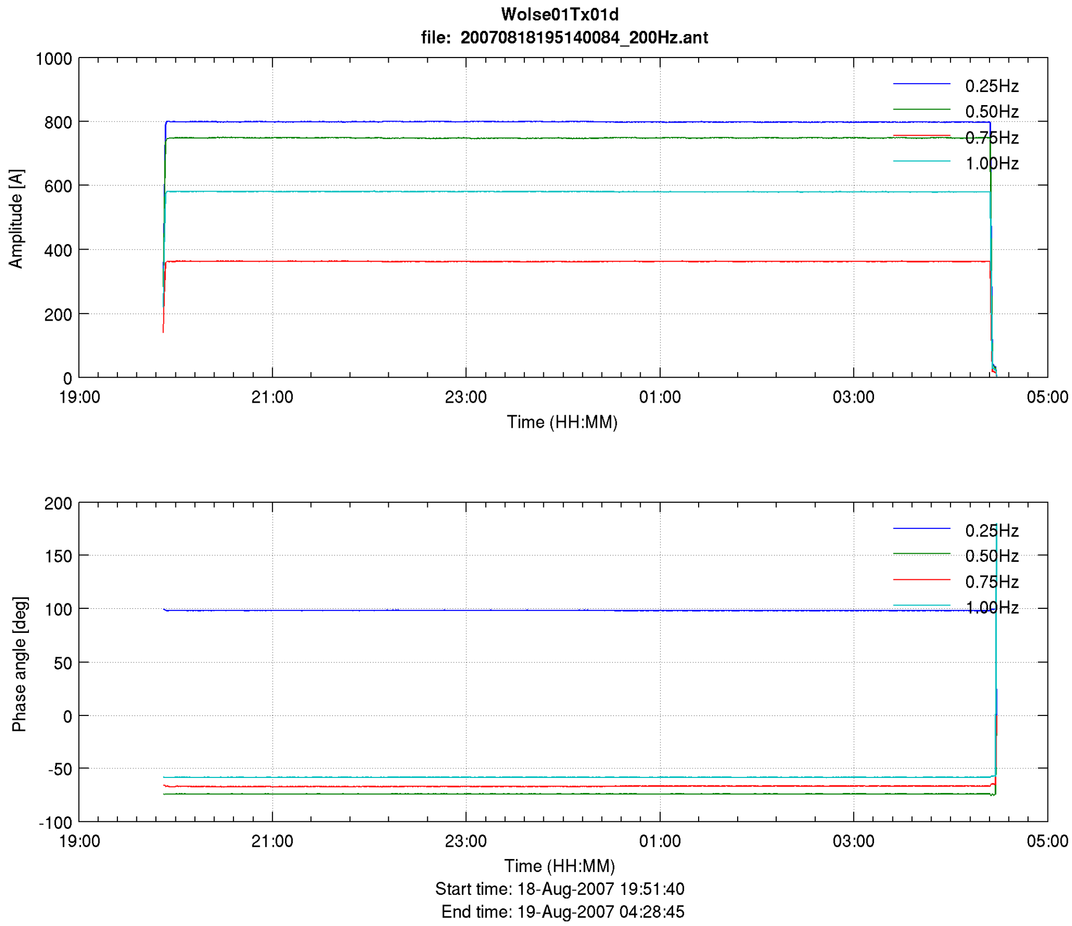

Figure 5: Demodulated source trend plot Wolse01Tx01d

Table 9: Source QC – Wolse01Tx01e

Source parameters		Value	
Dipole length		271.8m	
Signal shape		Santos Composite Square	
Signal frequency		0.25	
Start of line		**End of line**	
Current	1000A	Current	1000A
Voltage	88V	Voltage	89V
Current filename	20070819133849074_200Hz.ant	Current filename	20070819133849074_200Hz.ant

QC event during line

Date	Time	KP	Fix	Comment
2007-08-19	14:35	32.8	340	SOL
	22:45	0	3268	EOL

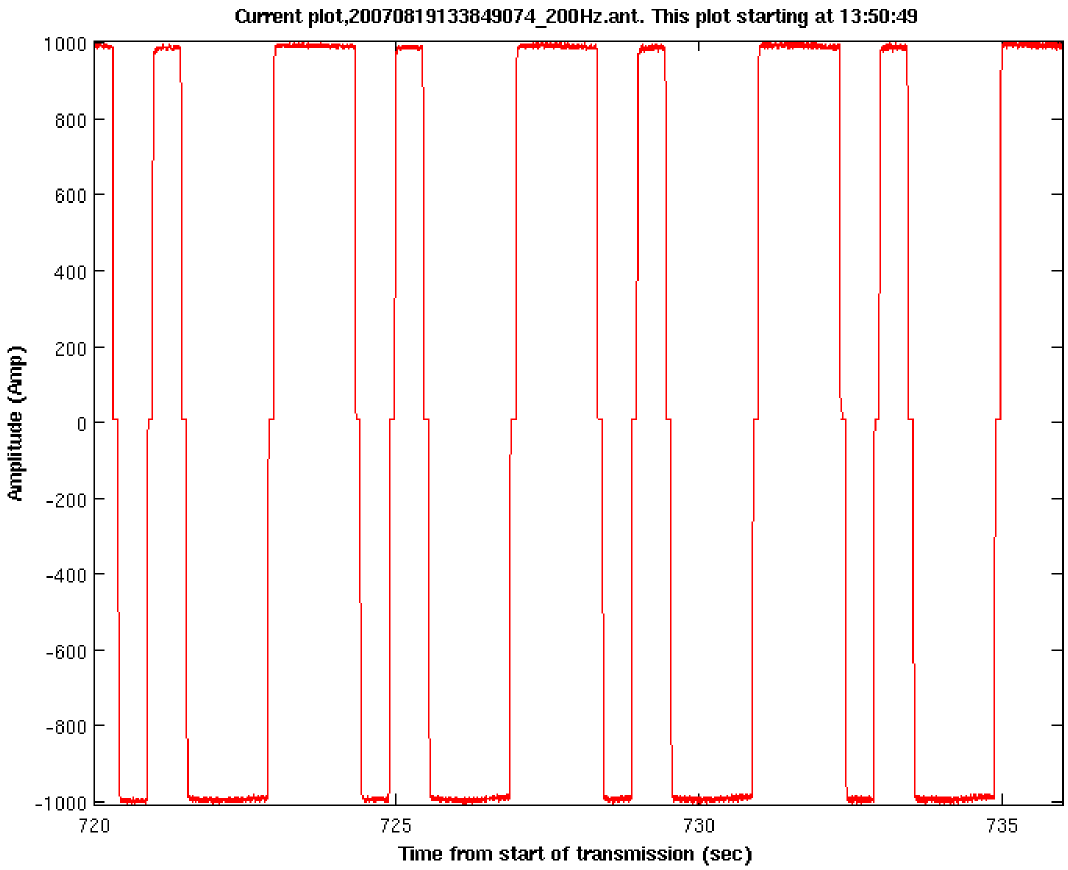

Figure 6: Source signal shape Wolse01Tx01e

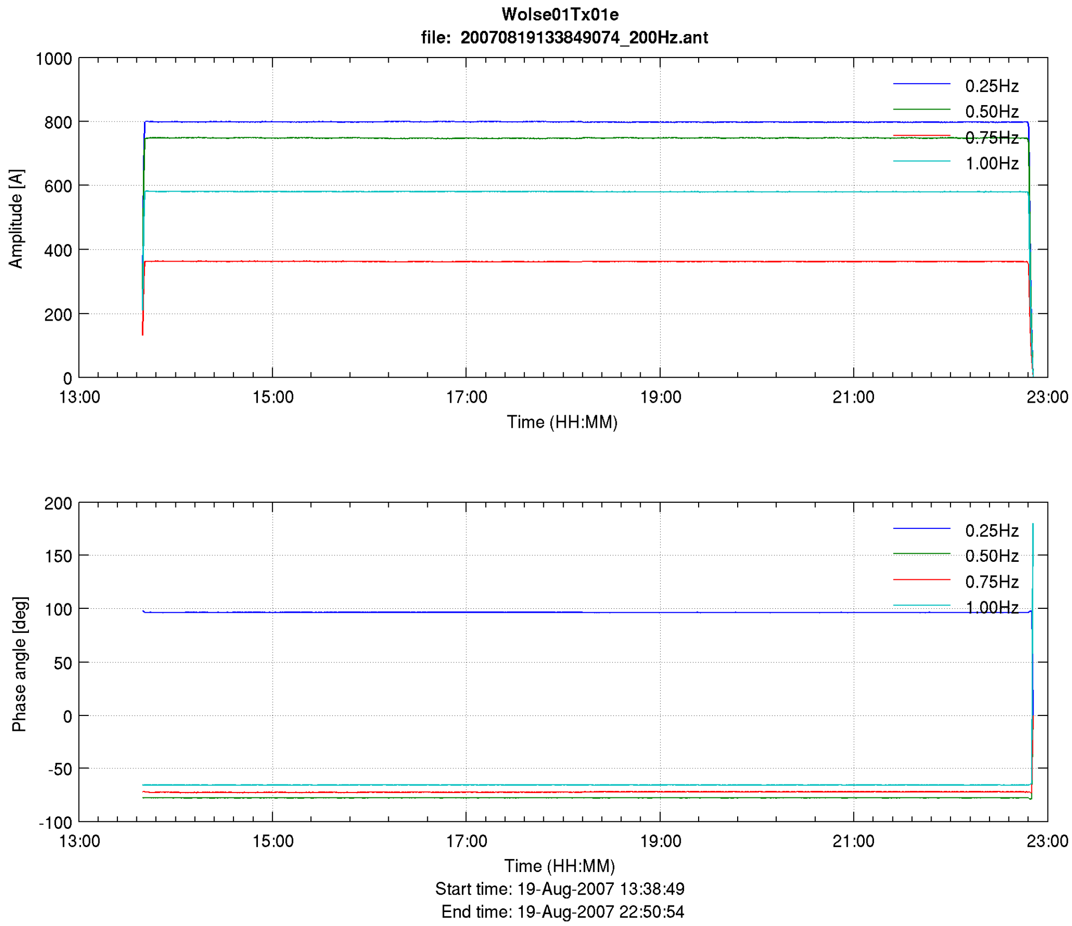

Figure 7: Demodulated source trend plot Wolse01Tx01e

3.1.2. Source QC – Wolse02Tx01

Table 10: Source QC – Wolse02Tx01c

<table>
<tr><th colspan="3">Source parameters</th><th colspan="3">Value</th></tr>
<tr><td colspan="3">Dipole length</td><td colspan="3">271.8m</td></tr>
<tr><td colspan="3">Signal shape</td><td colspan="3">Santos Composite Square</td></tr>
<tr><td colspan="3">Signal frequency</td><td colspan="3">0.25</td></tr>
<tr><th colspan="3">Start of line</th><th colspan="3">End of line</th></tr>
<tr><td>Current</td><td colspan="2">1250A</td><td>Current</td><td colspan="2">1250A</td></tr>
<tr><td>Voltage</td><td colspan="2">75V</td><td>Voltage</td><td colspan="2">75V</td></tr>
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<tr><th colspan="6">QC event during line</th></tr>
<tr><th>Date</th><th>Time</th><th>KP</th><th>Fix</th><th colspan="2">Comment</th></tr>
<tr><td>2007-08-16</td><td>07:41</td><td>40.17</td><td>139</td><td colspan="2">SOL</td></tr>
<tr><td></td><td>19:00</td><td>0</td><td>4215</td><td colspan="2">EOL</td></tr>
</table>

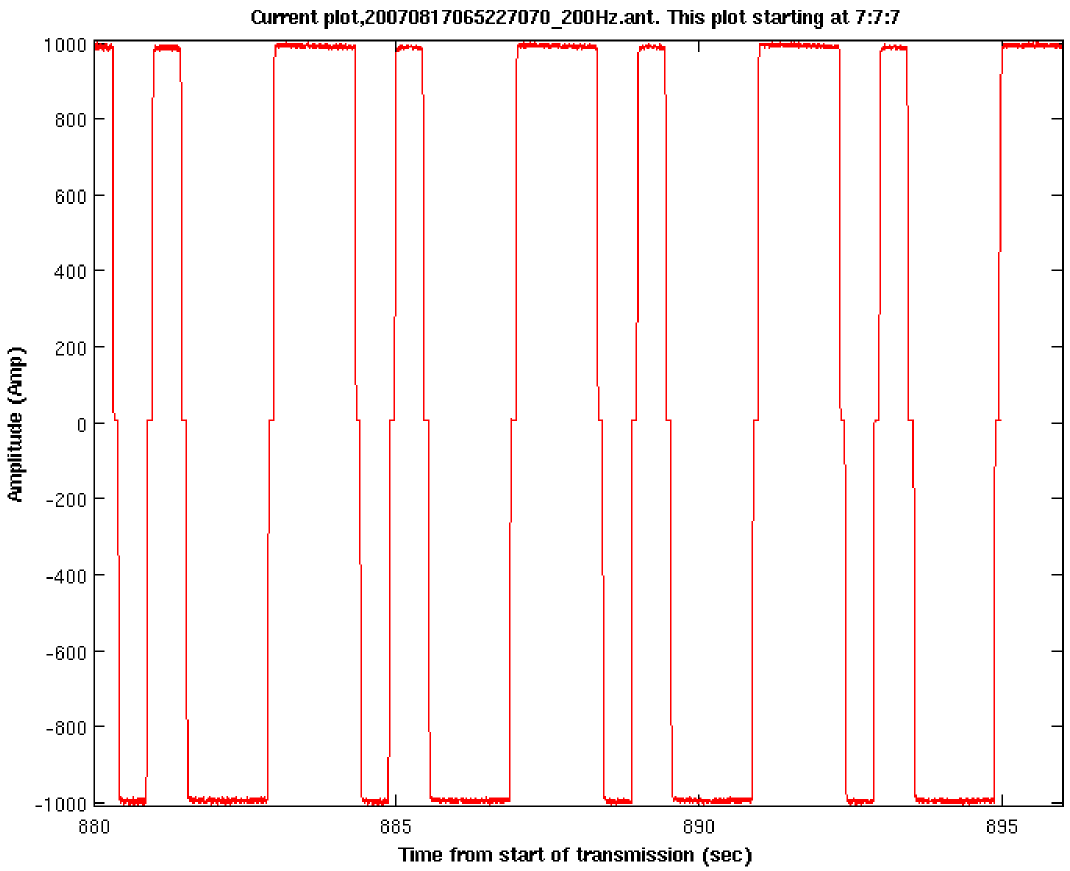


Figure 8: Source signal shape Wolse02Tx01c

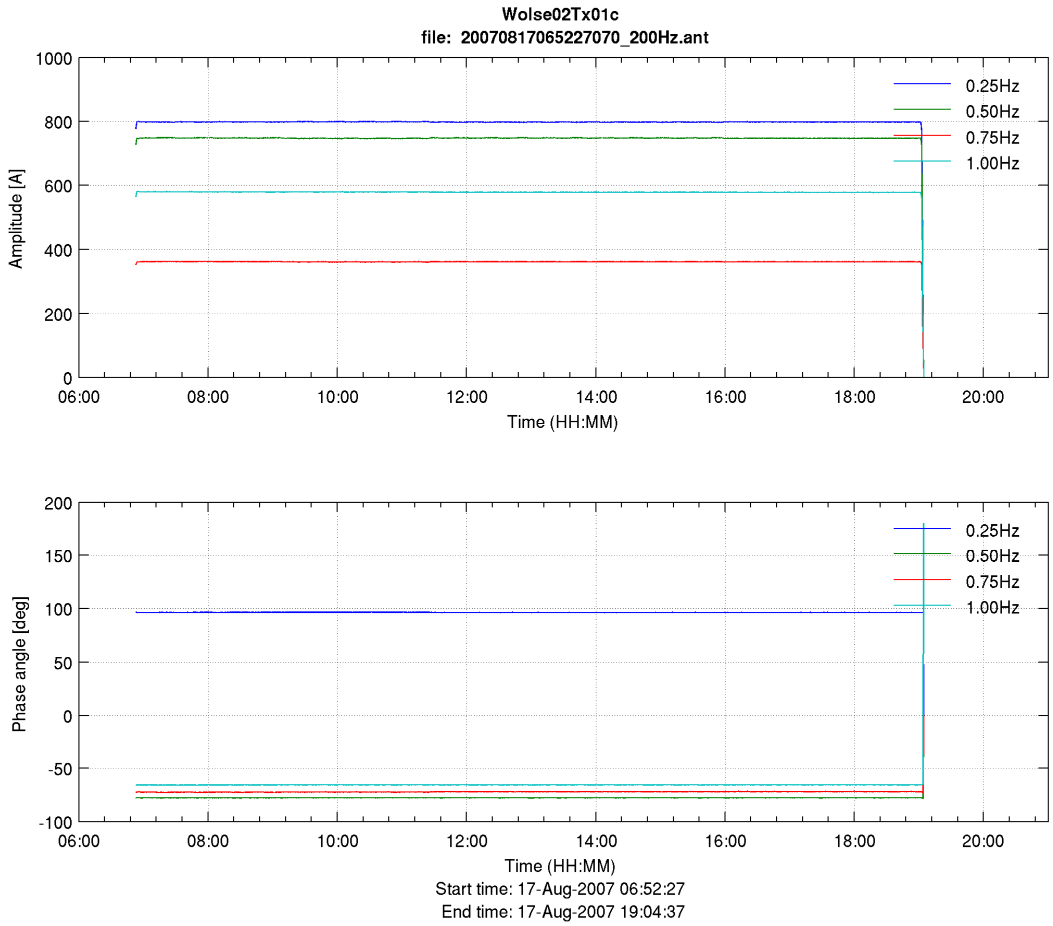


Figure 9: Demodulated source trend plot Wolse02Tx01c

3.2. DQC – Receivers

In the tables below a brief quality description of the data is given. We have emphasized on isolating data of poor and bad quality, hence the data of good quality is not commented (as in fields with "No comments"). The channel numbering (Ex1, Hy1 etc.) refers to the RxII channel identifier. The column labelled "Drift" refers to the drift of the internal logger clock in relation to GPS time, and is given in parts per billion.

Table 11: Noise Categories

Color codes					
N/A (Non-existent channel)	**OK** (Nothing to comment)	**Light** (Light Noise)	**Medium** (Medium Noise)	**Heavy** (Heavy Noise)	**Dead** (No Data)

3.2.1. Receiver DQC – Wolse01

Table 12: Equipment performance – 01Tx01de[4]

Rx drop	Receiver ID	Ex1	Ex2	Ey1	Ey2	Hx1	Hy1	Drift (ppb)
01Rx001a	33050015	OK	Noise	OK	OK	Light	Light	0.05
01Rx002a	25050002	Light	OK	Light	Light	Light	OK	8.80
01Rx003a	25050004	Light	OK	OK	Noise	OK	OK	3.79
01Rx004a	25050012	OK	OK	Light	Light	OK	OK	-1.81
01Rx005a	25050008	Light	Light	OK	OK	OK	Noise	-8.58
01Rx006a	25050009	Light	OK	Light	OK	OK	OK	-19.84
01Rx007a	25050010	OK	Light	OK	Light	OK	OK	-17.43
01Rx008a	25050011	OK	OK	Light	OK	OK	OK	-14.04
01Rx009a	33050014	Light	Light	Light	OK	OK	OK	10.78
01Rx010a	33050016	OK	Light	Light	Light	OK	OK	-14.55
01Rx011a	33050018	OK	OK	OK	OK	OK	OK	5.82
01Rx012a	35050069	Noise	Noise	OK	Light	Light	OK	-5.20
01Rx013a	20060043	Light	Light	OK	OK	OK	OK	-4.00
01Rx014a	33050024	OK	OK	OK	OK	Light	OK	-15.65
01Rx015a	33050025	OK	OK	OK	OK	Light	OK	2.96
01Rx016a	25050006	Light	Light	Noise	Light	Noise	Light	0.04
01Rx017a	33050029	OK	OK	OK	OK	OK	Light	-21.89
01Rx018a	20060038	OK	OK	OK	OK	OK	OK	-3.38
01Rx019a	33050031	Light	Light	OK	OK	OK	OK	12.04
01Rx020a	33050034	Noise	OK	OK	OK	OK	OK	-5.90
01Rx021a	33050035	OK	OK	OK	OK	OK	OK	-4.06
01Rx022a	33050036	OK	OK	OK	OK	Light	OK	-14.47
01Rx023a	35050063	OK	OK	Noise	OK	OK	OK	-3.69
01Rx024a	33050023	Noise	Noise	Noise	Noise	HEAVY	HEAVY	14.11
01Rx025a	20060040	HEAVY	HEAVY	HEAVY	HEAVY	Noise	Noise	-307.30
01Rx026a[5]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
01Rx027a	33050043	OK	OK	OK	Noise	OK	OK	3.32
01Rx028a	33050044	OK	OK	OK	OK	Light	OK	4.01
01Rx029a	33050046	OK	Light	OK	Noise	OK	OK	6.10
01Rx030a	35050047	Noise	OK	OK	Light	OK	OK	-11.55
01Rx031a	35050050	OK	OK	OK	Light	Light	OK	40.72
01Rx032a	35050053	Noise	Noise	Light	Light	Light	OK	-7.75
01Rx033a	35050054	OK	Noise	Noise	Light	OK	OK	4.86
01Rx034a	35050056	OK	Light	OK	Light	OK	OK	-13.84
01Rx035a	35050058	OK	OK	OK	Light	OK	Light	-20.66

[4] Azimuth receivers are marked grey.
[5] Receiver 01Rx026a was lost during operation.

3.2.2. Receiver DQC – Wolse02

Table 13: Equipment performance – 02Tx01c[6]

Rx drop	Receiver ID	Ex1	Ex2	Ey1	Ey2	Hx1	Hy1	Drift (ppb)
01Rx001a	33050015	OK	Noise	Light	Light	Light	OK	0.05
01Rx002a	25050002	OK	OK	OK	Light	Light	OK	8.80
01Rx003a	25050004	Light	Light	HEAVY	HEAVY	OK	OK	3.79
01Rx004a	25050012	Light	Light	OK	OK	Light	OK	-1.81
01Rx005a	25050008	OK	OK	Light	Light	Light	HEAVY	-8.58
01Rx006a	25050009	Light	Light	Light	Light	Light	Light	-19.84
01Rx007a	25050010	Light	Light	Noise	HEAVY	OK	OK	-17.43
01Rx008a	25050011	OK	OK	Light	OK	OK	OK	-14.04
01Rx009a	33050014	Noise	Noise	Noise	Light	OK	OK	10.78
01Rx010a	33050016	Light	Light	Light	Light	OK	OK	-14.55
01Rx011a	33050018	Light	Light	Light	Light	OK	OK	5.82
01Rx012a	35050069	Light	Light	Light	Light	Light	OK	-5.20
01Rx013a	20060043	Light	Light	Light	Light	OK	OK	-4.00
01Rx014a	33050024	Light	Light	Light	Light	OK	Light	-15.65
01Rx015a	33050025	OK	OK	Light	Light	OK	OK	2.96
01Rx016a	25050006	Light	OK	Noise	Light	Light	OK	0.04
01Rx017a	33050029	Light	OK	OK	Ok	OK	Noise	-21.89
01Rx018a	20060038	Light	Light	Light	Light	Light	Light	-3.38
01Rx024a	33050023	Noise	Noise	Noise	Noise	HEAVY	HEAVY	14.11
01Rx025a	20060040	Noise	Noise	Light	Light	OK	Light	-307.30
01Rx026a[7]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
01Rx027a	33050043	Light	Light	Light	Noise	OK	OK	3.32
01Rx028a	33050044	Light	Light	Light	Light	Light	OK	4.01
01Rx029a	33050046	Light	Noise	Light	Noise	OK	OK	6.10
01Rx030a	35050047	Light	Light	Light	Light	OK	OK	-11.55
01Rx031a	35050050	OK	OK	Light	Light	OK	OK	40.72
01Rx032a	35050053	Light	Light	Light	Light	Light	OK	-7.75
01Rx033a	35050054	OK	OK	Noise	Light	OK	OK	4.86
01Rx034a	35050056	OK	Light	Light	Light	OK	OK	-13.84
01Rx035a	35050058	OK	OK	Light	Noise	Light	OK	-20.66
02Rx001a	35050059	OK	Light	Light	Light	Light	OK	-4.17
02Rx002b	35050061	Light	Light	Light	Light	HEAVY	Noise	10.85
02Rx003b	33050022	Light	Light	OK	OK	Light	OK	1.10
02Rx004b	25050003	OK	OK	OK	Light	OK	OK	-7.77
02Rx005b	35050064	Light	Light	Noise	Light	OK	OK	18.64

[6] Azimuth receivers are marked grey.
[7] Receiver 01Rx026a was lost during operation.

4. DQC – Navigation

In this chapter a brief quality description of the transmitter files is given. Events of significance for the data are highlighted with times, fix numbers and kilometre points (KP). The data are processed to avoid false spikes and jumps in positions and values.

Table 14: Navigation File QC - General Comments and Missing Fields

Field number	Field data description	Comments
12	Roll Antenna	Undefined for single dipole
13	Surface elevation wrt vert datum	N/A
24	Doppler pressure (fish)	N/A
28	Roll (fish)	N/A
29	Pitch (fish)	N/A
37	Winch Length	N/A
38	Winch Tension	N/A
40	Pressure (Tail)	N/A
51	STD Roll antenna	Undefined for single dipole

4.1.1. Navigation File QC – Wolse01Tx01d

Table 15: Navigation File QC – Wolse01Tx01d

Line parameters			Value	
Fish target height			30 m	
Fix interval			10 s	
Start of line			**End of line**	
Line heading	276.78		Line heading	276.78
Tow speed	2.0		Tow speed	2.0
QC event during line				
Date	**Time**	**KP**	**Fix**	**Comment**
2007-08-18	20:42	46.0	97	SOL
2007-08-19	04:30	16.7	2942	Line aborted due to source fault

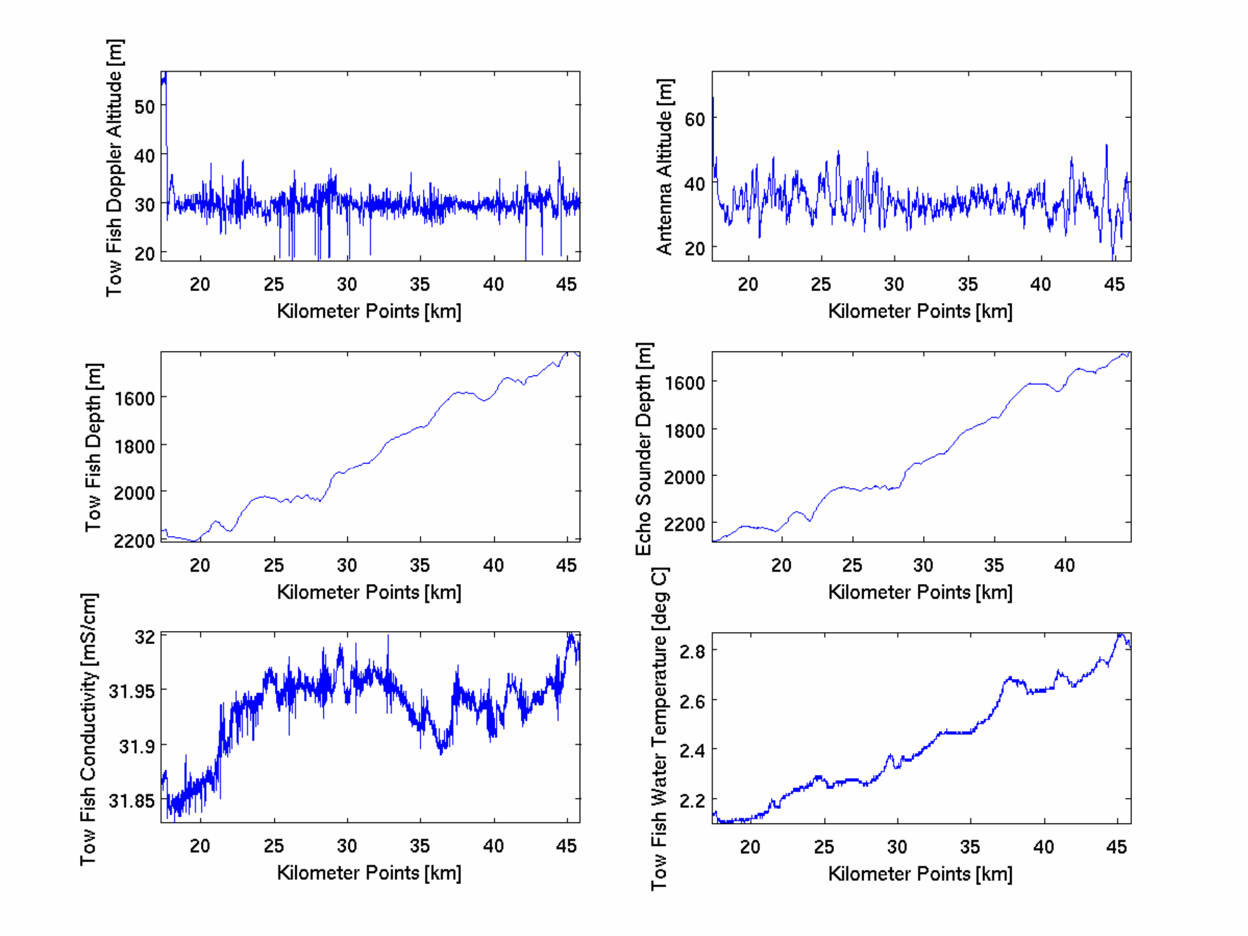


Figure 10: Key navigation parameters plotted for Wolse01Tx01d

4.1.2. Navigation File QC – Wolse01Tx01e

Table 16: Navigation File QC – Wolse01Tx01e

Line parameters		Value	
Fish target height		30 m	
Fix interval		10 s	
Start of line		**End of line**	
Line heading	276.78	Line heading	276.78
Tow speed	2.0	Tow speed	2.0
QC event during line			

Date	Time	KP	Fix	Comment
2007-08-19	14:35	32.8	340	SOL
	22:45	0	3268	EOL

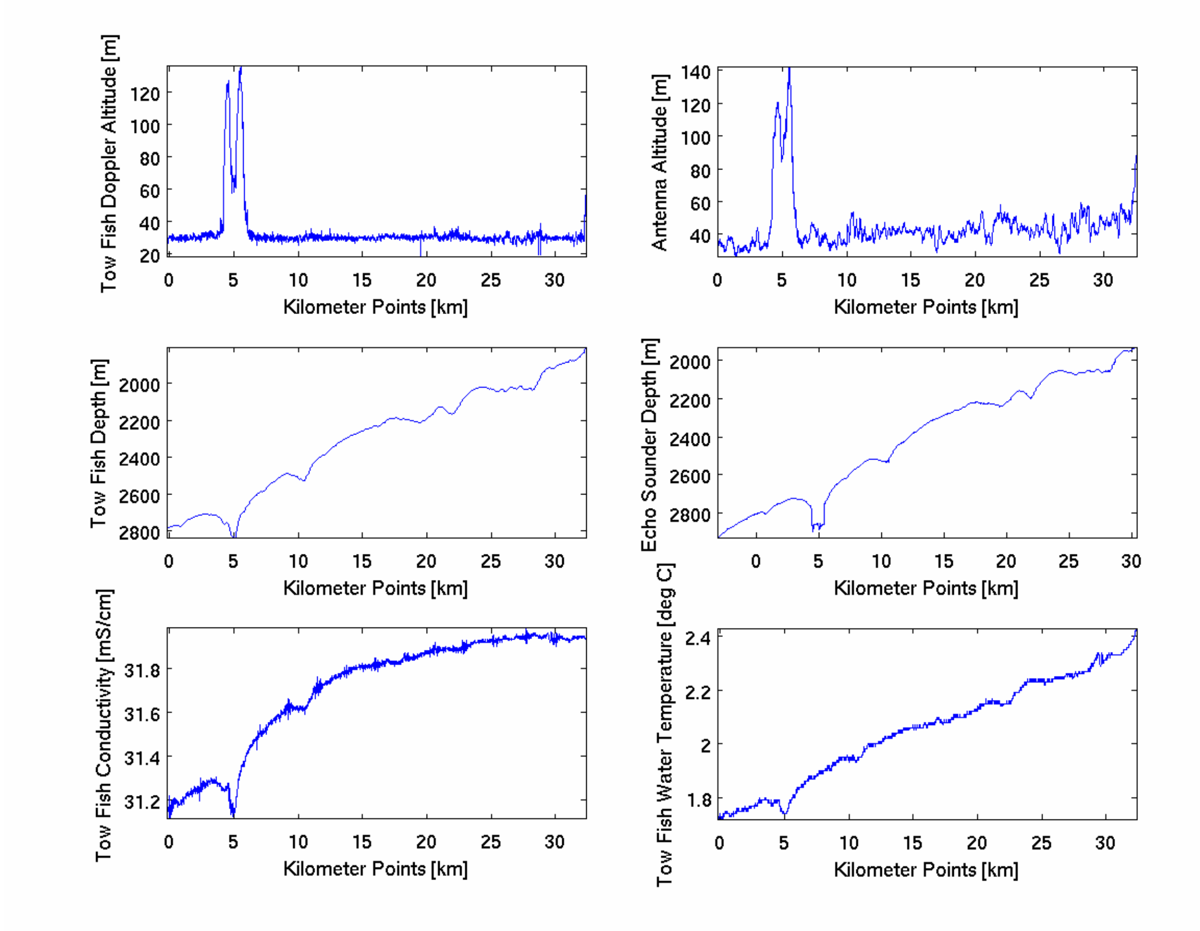


Figure 11: Key navigation parameters plotted for Wolse01Tx01e

4.1.3. Navigation File QC – Wolse02Tx01c

Table 17: Navigation File QC – Wolse02Tx01c

Line parameters		Value		
Fish target height		30 m		
Fix interval		10 s		
Start of line		**End of line**		
Line heading	228.89	Line heading	228.89	
Tow speed	2.0	Tow speed	2.0	
QC event during line				
Date	**Time**	**KP**	**Fix**	**Comment**
2007-08-16	07:41	40.17	139	SOL
	19:00	0	4215	EOL

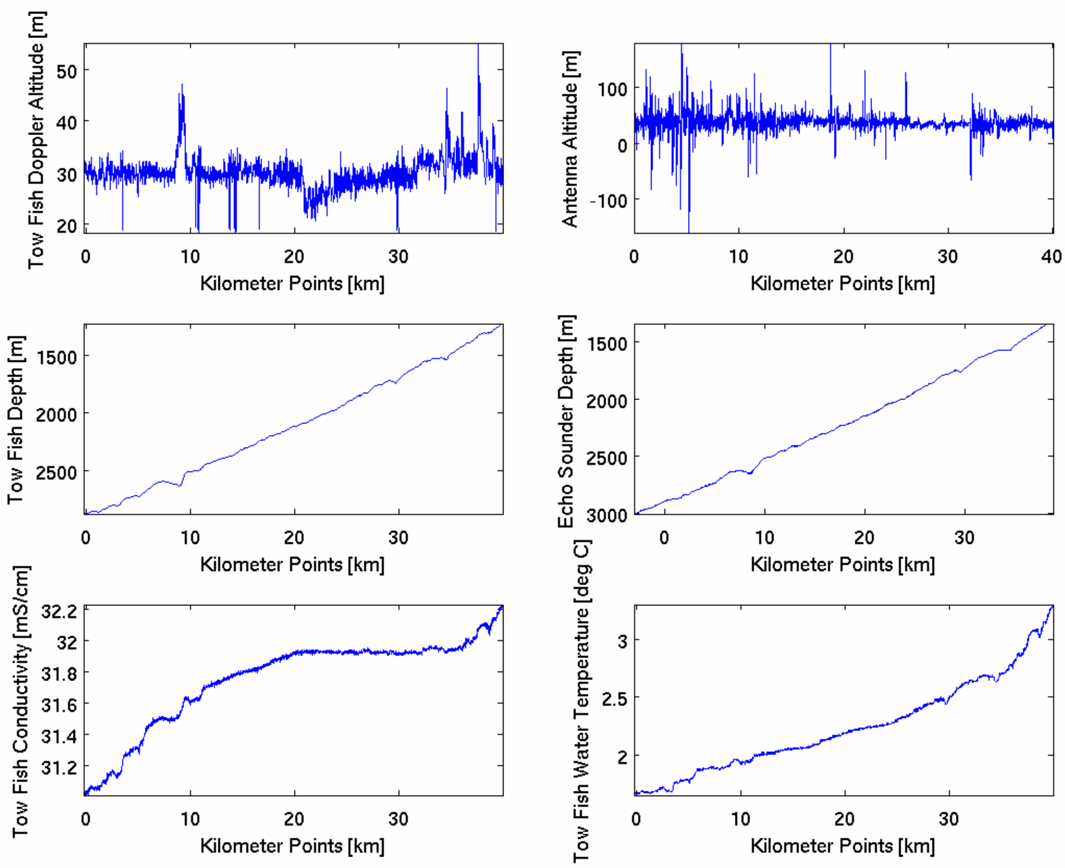


Figure 12: Key navigation parameters plotted for Wolse02Tx01c

Appendices

Appendix I - Sequence of events

08-AUG-2007 Time (UTC)	Event
05:35 12:10	Transit to survey area Standby due to weather
Weather observations during the day: Sea [m]: W 1.5-2 Wind [knots]: N 10-15	

09-AUG-2007 Time (UTC)	Event
	Standby due to weather
Weather observations during the day: Sea [m]: 0.5-1.25 Wind [knots]: W 28-33	

10-AUG-2007 Time (UTC)	Event
00:00 18:53	Standby due to weather Transit to survey area
Weather observations during the day: Sea [m]: W 1-2 Wind [knots]: NW 35-40	

11-AUG-2007 Time (UTC)	Event
05:28 11:45 14:05 16:30	Start deploying receivers - Wolse01Tx01 Spin test on 01Rx023a Start echo sounder line - Wolse01Tx01 Continue deploying receivers - Wolse01Tx01
Weather observations during the day: Sea [m]: 4-6 Wind [knots]: W 11-16	

12-AUG-2007 Time (UTC)	Event
14:20 14:25 15:02 22:00 22:05 22:55	Last receiver positioned on seabed - Wolse01Tx01 End echo sounder line - Wolse01Tx01 Start echo sounder line - Wolse02Tx01, and Start deploying receivers - Wolse02Tx01 Last receiver positioned on seabed - Wolse02Tx01 End echo sounder line - Wolse02Tx01 Start echo sounder line - Wolse01Tx01
Weather observations during the day: Sea [m]: 4-6 Wind [knots]: SW 11-16	

13-AUG-2007 Time (UTC)	Event
01:20	End echo sounder line - Wolse01Tx01
04:13	Start SVP - Wolse01Tx01
07:32	Wolse01Tx01a aborted before SOL
14:00	SOL Wolse01Tx01b
Weather observations during the day: Sea [m]: W 3-4 Wind [knots]: S 15	

14-AUG-2007 Time (UTC)	Event
02:48	EOL Wolse01Tx01b
06:37	Start echo sounder line - Wolse02Tx01
07:29	Start deploying receivers - Wolse02
11:27	Last receiver positioned on seabed - Wolse02
16:40	End echo sounder line - Wolse02Tx01
18:27	Start SVP - Wolse02Tx01, Wolse02Tx01a aborted before SOL
Weather observations during the day: Sea [m]: NE 2-3 Wind [knots]: NE 25 -30	

15-AUG-2007 Time (UTC)	Event
12:05	SOL Wolse02Tx01b
23:10	EOL Wolse02Tx01b
Weather observations during the day: Sea [m]: 4-6 Wind [knots]: NNE 17-21	

16-AUG-2007 Time (UTC)	Event
08:53	Start SVP – Wolse01Tx01c
11:50	SOL Wolse01Tx01c
14:43	EOL Wolse01Tx01c
17:56	Start recovering receivers - Wolse02
23:20	Start redeploying receivers - Wolse02
Weather observations during the day: Sea [m]: SW 2-3 Wind [knots]: NE 25	

17-AUG-2007 Time (UTC)	Event
03:14	Last receiver positioned on seabed - Wolse02
05:40	Start SVP - Wolse02Tx01c
07:41	SOL Wolse02Tx01c
19:00	EOL Wolse02Tx01c
23:08	Vessel deviates to Tasmania for off signing crew member
Weather observations during the day: Sea [m]: 2.5-4 Wind [knots]: S 17-21	

18-AUG-2007 Time (UTC)	Event
18:19 20:42	Start SVP - Wolse01Tx01d SOL Wolse01Tx01d
Weather observations during the day: Sea [m]: SW 2 Wind [knots]: W 10	

19-AUG-2007 Time (UTC)	Event
04:30 13:05 14:35 22:45	EOL Wolse01Tx01d Start SVP - Wolse01Tx01e SOL Wolse01Tx01e EOL Wolse01Tx01e
Weather observations during the day: Sea [m]: 1.25-2.5 Wind [knots]: W 11-16	

20-AUG-2007 Time (UTC)	Event
05:05 11:00 11:40	Start recovering receivers - Wolse02 Last receiver on deck - Wolse02 Start recovering receivers - Wolse01Tx01
Weather observations during the day: Sea [m]: SW 3 Wind [knots]: NW 17	

21-AUG-2007 Time (UTC)	Event
07:15 08:05	Last receiver on deck - Wolse01Tx01 Start recovering receivers - Wolse02Tx01
Weather observations during the day: Sea [m]: 4-6 Wind [knots]: S 11-16	

22-AUG-2007 Time (UTC)	Event
17:53 17:58 19:00	End recovering receivers - Wolse02Tx01 Search for missing receiver - 01Rx026a End of job
Weather observations during the day: Sea [m]: SW 1 Wind [knots]: E 8	

Appendix II - Navigation Setup

Table 18 and Table 19 list the navigational setup used for the Survey. The Survey was executed in the following work datum.

Table 18: Geographical coordinate system and projection

Geodetic parameters	
Satellite / Work Datum	WGS84
Spheroid:	WGS84 - Semi-Major Axis: 6378137 - Inverse flattening: 298.257223563
Projection:	UTM - Zone: 54S - Longitude of Origin: 141° E - Latitude of Origin: 0° S - False Easting (m): 500000 - False Northing (m): 6,000,000 - Scale Factor at CM: 0.99960

Table 19: Vertical datum, tide and water depth corrections

Vertical parameters	
Vertical Datum Name:	MSL
Tide Correction Source:	None
Water Depth Corrections:	Sound Velocity - SVP into Sonardyne Ranger All depths corrected for vessel draft

Comparison of coordinate transformations / projection

Table 20: Test coordinates at the planning-board

Test Coordinates	
Transformation from Datum	WGS84 Lat/long
Transformation to Datum	WGS84
Latitude in GNSS/Satellite Datum	40 45 38.261S
Longitude in GNSS/Satellite Datum	143 03 09.602E
Latitude in Work/Local Datum	40 45 38.261S
Longitude in Work/Local Datum	143 03 09.602E
Northing in Local Projection (m)	5485788.126 N
Easting in Local Projection (m)	673261.038 E

Sound Velocity Profile(s)

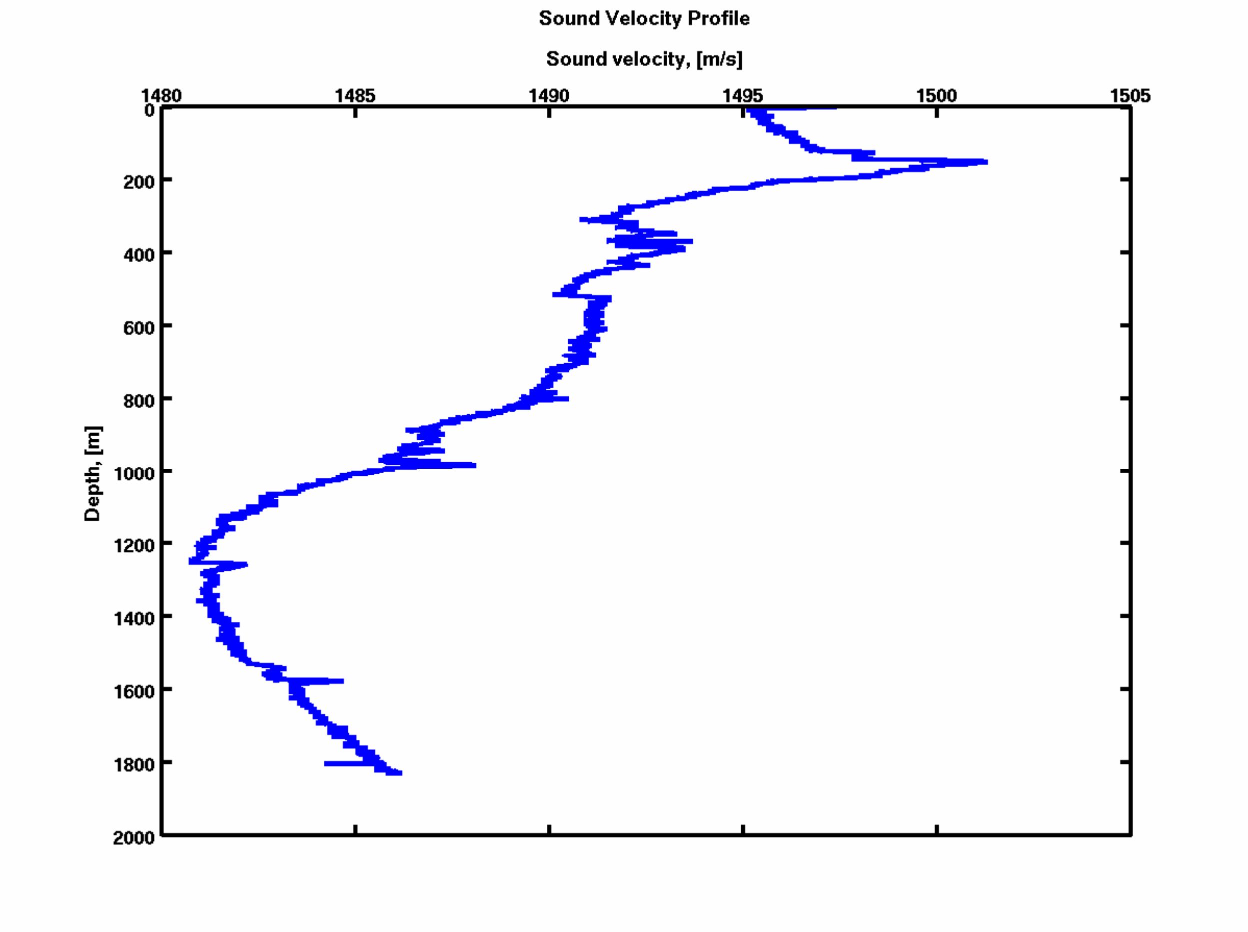


Figure 13: Sound Velocity Profile from Wolse01Tx01d

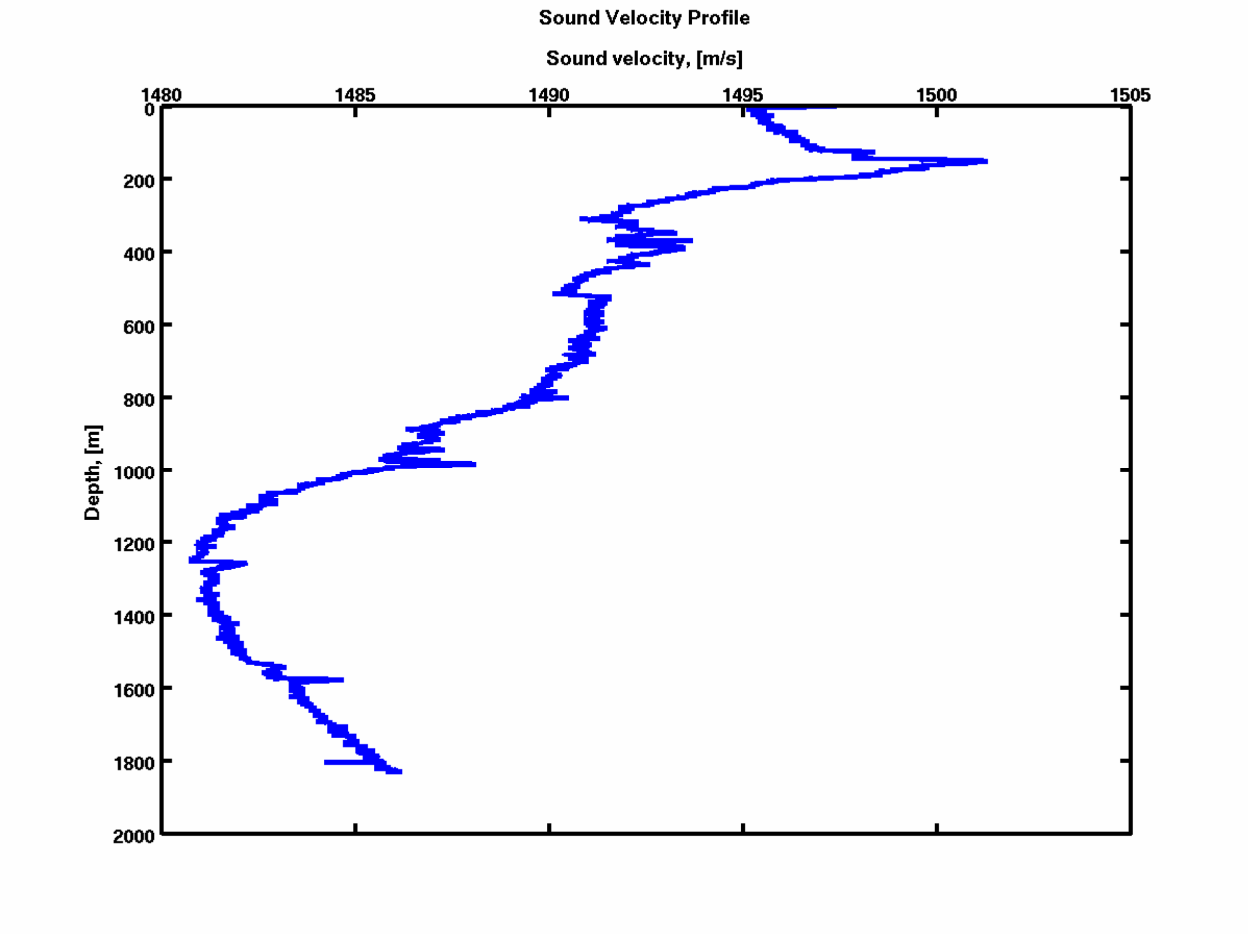


Figure 14: Sound Velocity Profile from Wolse01Tx01e

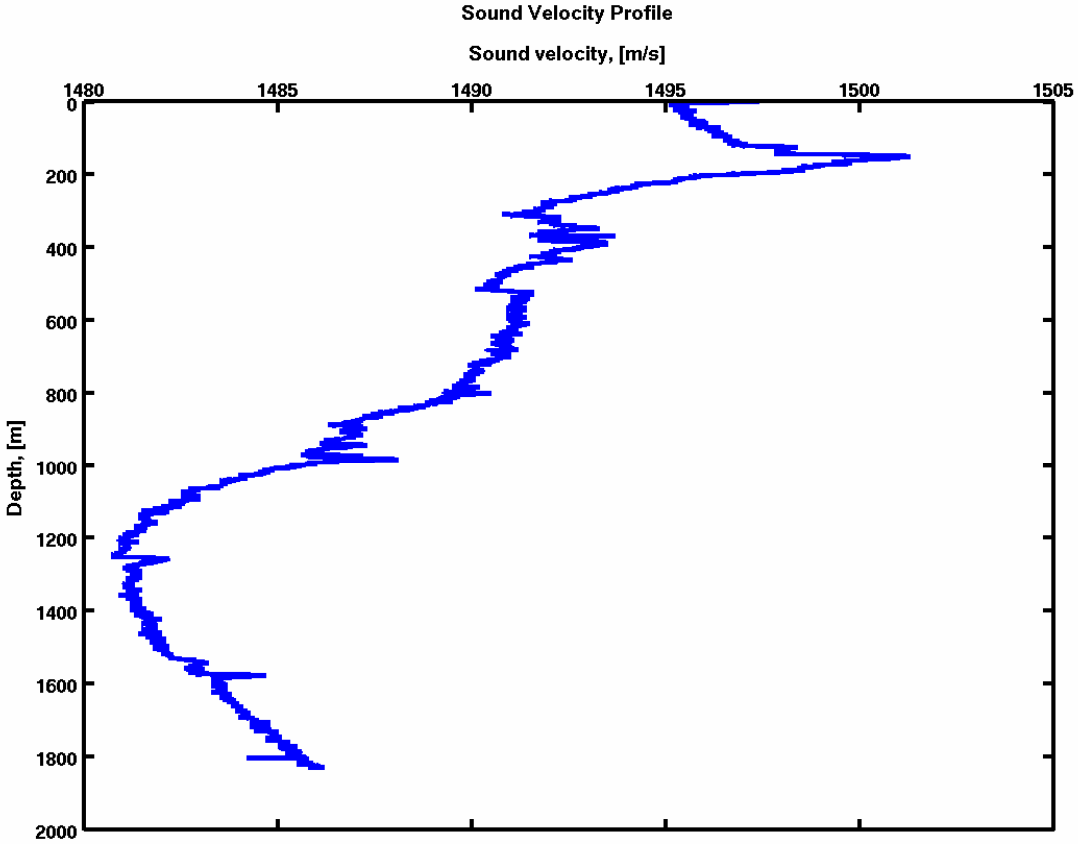


Figure 15: Sound Velocity Profile from Wolse02Tx01c

Appendix III - DQC processing

This appendix gives an overview of the Quality Control process itself and how the data are being processed for Quality Control purposes. The processing tools are Matlab routines and Elmap.

Flow chart

- View Receiver raw data to determine data quality.
- View Navigation data to determine quality.
- View Source files to determine source performance.
- Filter time series to display source signal.
- Output amplitude and phase as a function of source-receiver offset.
- Assess overall data quality for all parts of the system (Receiver, Navigation and Source).

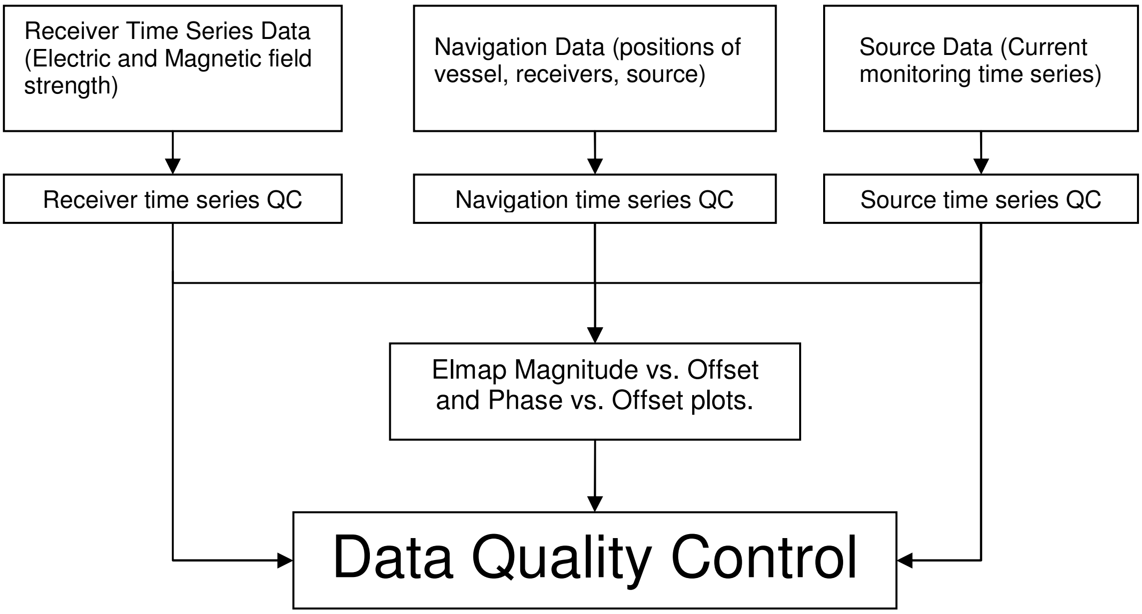


Figure 16: Data processing flow chart

Table 21: Software used for Data Quality Control

QC	Software/Manufacturer	Version
Time Series	Matlab (EMGS-routines)	Ver. 7.0 Rel. 14
Elmap	Elmap / EMGS	R-1.4
Navigation Data	Matlab (EMGS-routines)	Ver. 7.0 Rel. 14
Source Data	Matlab (EMGS-routines)	Ver. 7.0 Rel. 14

Elmap processing package

elmap is a processing package made by EMGS. It is an expanding toolbox of software that can be tailored to perform any necessary steps in SBL data processing. For QC purposes it is mainly used to plot the amplitude and phase of a recorded signal as a function of the distance to the source (MVO and PVO). This is done by applying a Fourier transform to the time series at regular offset intervals, using a number of periods centred at the desired offset output.

elmap processing flow

In this section the processing flow during QC is briefly described.

Rawdata

Upon download, the 24-bit time-series data from each SBL data-logger is calibrated and converted into 32-bit raw-data of the .rx2 format.

The calibration accounts for the following:

i) Analog to digital (AD) conversion factor
ii) Gain
iii) Frequency dependent AD-conversion/sensor response filters
iv) Dipole receiver antenna length (for electric channels)

The result is the time series of the calibrated SBL signal in the rx2 format.

Conversion

The rx2 raw-data file is converted into netCDF[8]-format. Data recorded at times where the source was not transmitting are usually omitted (at the operator's option). The resulting file includes navigation and source data as well.

Windowing

SBL receivers have two sets of channels for electric X and Y components (Ex, Ey channels), and an option of one set of magnetic X and Y components (Hx, Hy channels). An offset limit is set to extract only the data of interest.

Demodulation

Interpretation and visualization of electromagnetic data is done by looking at the amplitude and phase for a given frequency at various offsets. To obtain this, a Fourier transform is applied to the time series. The time series is windowed with a Hann window. The Fourier transform is done for regular offset intervals using a number of periods centred at the desired offset output. To increase S/N ratio at far offsets, the number of periods (*np*) used for the Fourier transform may be increased. At near offsets - less than 3km, $np_{\min}$ periods are used with a linear increase to $np_{\max}$ periods at maximum source-receiver offsets.

$$np_{\min} = \frac{LS \cdot f}{v} \qquad np_{\max} = \frac{2 \cdot LS \cdot f}{v}$$ - both values rounded up to the nearest integer

LS is the dipole length
f is the source frequency
v is the average towing speed

[8] For more information on netCDF see: http://my.unidata.ucar.edu/content/software/netcdf/index.html

Scaling

A variation in the source current magnitude (in time domain), the source signal shape, and/or the source antenna length, will result in a different source signature recorded by the receiver.

The source signal can be quantified by the current momentum. This quantity is defined as the product of the current amplitude (in the frequency domain) at the frequency of interest and the source antenna (HED) length. Note that the current momentum is a complex entity.

To facilitate the comparison of SBL responses recorded during a changing source signature, it is useful to consider the current momentum normalized SBL responses. This is achieved by taking the frequency filtered complex receiver responses and divide (Scale) them by the complex current moments for the same frequency.

Channel drop/summation

Due to redundancy of electric data, one have the possibility to either discard one set of the electric channels or sum the two channels together to increase the signal-to-noise ratio. Decisions are based on QC in frequency domain. If two channels have very different noise level the noisy channel will be excluded. If they have the same noise level overall, the two channels will be summed. See Appendix VI - Channel Parameters for channel drop/sum parameters used in this Survey.

Rotation

When deployed from the vessel, receivers sink freely to the seafloor. The X and Y channel orientation will therefore be arbitrary. To interpret the data, it is necessary to rotate the data so that one axis is aligned in the (nominal) towline direction. The rotation angle is calculated using the real data measurements at a given offsets. The methodology used gives consistent rotation angles for all offsets and also consistency from independent calculations based on electric and magnetic data.

elmap plots produced

The following plots are produced through the elmap processing flow:

- MVO for all available channels (Ex1, Ex2, Ey1, Ey2,Hx1, Hy1)
- PVO for all available channels (Ex1, Ex2, Ey1, Ey2, Hx1, Hy1)
- MVO & PVO inline and crossline rotated data for the E and H-channels.
- MVO & PVO inline rotated plots for inc. in this report, E and H-channels.

elmap channel naming convention

elmap uses a channel naming convention that are ordered by type, and then by number. If for instance the two Ex-channels (Ex1 and Ex2) are summed into one, it will have the name Ex1. Table 22 shows an example of a typical setup with 6 channels (before channel summation).

Table 22: Elmap channel naming convention

Measured quantity	Channel number, Elmap
Ex	**Ex1**
Ex	**Ex2**
Ey	**Ey1**
Ey	**Ey2**
Hx	**Hx1**
Hy	**Hy1**

Appendix IV - Data delivery file structure and storage method

The files in this delivery are stored in the following structure:

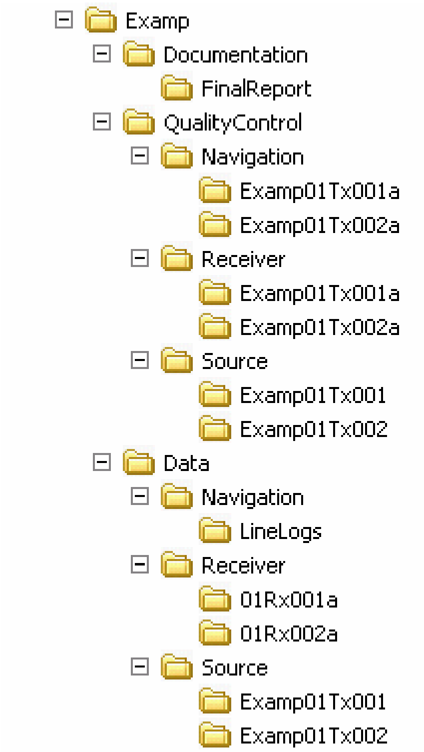


Figure 17: Example of file structure

The “Data” directory contains the data collected and is further divided:

- “Navigation”: Files containing equipment positions and instrumentation data.
- “Receivers”: Contains the time series data collected by the sub sea data loggers and also housekeeping data for the loggers.
- “Source”: Current monitoring files from the source.

The “Documentation” directory contains information about the Survey in software form.

The “Quality Control” directory is divided into several directories:

- “Navigation”: contains information about he navigation files, divided into towlines.
- “Receivers”: contains information about the demodulated time series, divided into towlines.
- “Source”: contains information about the source signal, divided into towlines.

Appendix V - Description of file formats used

This section contains specifications for the data formats included in this delivery.

The files produced on the ship are:

- Receiver data from the data loggers on the sea bed.
- Navigation files with positions and instrumentation data.
- Source files with current output data.

Receiver data

This document contains additional information about the format description of the files written by elise*. The name of these files normally ends with ".rx2 ". elise: Software used for converting raw data from 24 bits to 32 bits.

File format

The files are divided into two parts, one header and one large multiplexed sample buffer.

Header

The header consists of the first 4096 bytes of the file. The content of the header is ASCII strings, and unused portions of the header are set to 0.

The ASCII strings are in the following format:
`<Field ID>:<Field value>`

For instance:
`AS: 12.10.2005-06:39:37`

The various field ids can be found in table (1).

Table 23: RxII Header description

Field ID	Description	Field Value
VI	Version identifier	EMGS_RXII_2.0
AS	Acquire start	MM.DD.YYYY-HH:MM:SS
NC	Number of channels	6 or 9. It is the number of both active (and inactive) channels.
CI	Channel identifier	Three characters. [E][x,y,z][1,2] and [H][x,y,z][1] Example: Ex1 Ex2 Ey1 Ey2 Ez1 Ez2 Hx1 Hy1 Hz1
S[1-NC]	Sensor ID, Channel [1-NC]	emgs-E<amplifier no>_CALIBRATED***
S[1-NC]	Sensor ID, Channel [1-NC]	<Coil ID>-CALIBRATED***
S…		
DL	Sensor length	Length in meters. One number per channel
GN	Channel gain.	1.0 1.0 1.0 1.0 1.0 1.0 - . One factor per channel.
HF	Sampling frequency.	N – 50 Hz
HV	Header version of raw data file	00.28
FV	Firmware version of logger	E0.15
IL	ID Logger	31050021
TL	Type logger	1005 1504
EV	Calibration version	R-1-29
CL	Command line	Optional text entry
TI	Tilt	0.00
PI	Pitch	0.00

*** If a channel is not calibrated it gets the extension: _NOT_CALIBRATED

Example header (for a 6 ch receiver)

VI: EMGS_RXII_2.0
AS: 12.10.2005-06:39:37
NC: 6
CI: Ex1 Ex2 Ey1 Ey2 Hx1 Hy1
S1: emgs-E35050337_CALIBRATED
S2: emgs-E35050338_CALIBRATED
S3: emgs-E35050339_CALIBRATED
S4: emgs-E35050341_CALIBRATED
S5: mfs8u0041-CALIBRATED
S6: mfs8u0042-CALIBRATED
DL: 7.980 7.980 7.980 7.980 0.000 0.000
GN: 1 1 1 1 1 1
HF: N
HV: 0.26
FV: E0.14
IL: 16777215
TL: 1005 1504.01
EV: R-1-29
CL:
TI:
PI:

Data

The second part of the receiver file (*.rx2) contains the time-series for each of the receiver channels.

The first sample is recorded at the time given by the AS field of the header, t_0. The samples are multiplexed. First there are 6[9] samples for $t = t_0$, then 6 samples for $t = t_0 + dt$. The samples are for channels 1 to 6 inclusive, in that order.

The data is written as C floats, i.e. 4 byte floating point numbers, Little Endian, (LSB first – Intel convention).

[9] Assuming a 6 channel receiver unit.

Navigation data

Introduction

Two types of files are included:

- Navigation files
    - Transmitter [Survey][set].tx
    - Receivers [Survey][set].rx

Receiver File

The receiver file contains the positions of the receivers for a set.

Transmitter File

The transmitter file contains the positions of the antenna and tow fish, and other related information for a transmitter line.

General comments

General field layout

- All fields are separated by a comma character (","), not included in the maximum character count of any of the fields.

- Fields cannot contain tabs or other white space characters.

- Each record (line) is terminated by a CR/LF, so that files can be easily handled by more or less standard tools on most major platforms.

The column 'Flags' in each table of fields contains one of each of the following characters:

- 'S' String
- 'I' Integer
- 'F' Float

And optionally one of the following:

- 'C' Calculated
- 'M' Measured

The actual definition of the terms "calculated" and "measured" may not be precise. "Measured" refers to values derived directly from (filtered) sensor readings, possibly adjusted for offsets. "Calculated" refers to values derived from measured values.

Programs should preferably tolerate fields appended to the end of records, so that program changes can be avoided if new fields are added (but not needed by the program).
Programs can count on a single line not exceeding 2047 characters including line terminators (if longer lines are needed in future, this should be regarded as a major update of the standard that may require software updates).

All fields, including numerical, are given a maximum width which should be generous. The knowledge of these can be exploited by programs that e.g. want to read numerical fields into string buffers.

Numerical fields

Numerical fields are either ‘integer’ or ‘floating point’ (though in all cases they are of course coded as ASCII strings).

Integers are of the following form (in Perl regexp format):
/\A[ ]*[+-]?\d+\Z/

Floating point values are of the form:
/\A[ ]*[+-]?\d*\.?\d+([eE][+-]?\d+)?\Z/

Thus:

- All numerical fields are right-adjusted.
- Floating point values may have a dot (decimal separator) only if followed by a digit.
- Floating point values may be in ‘exponential format’.
- Spaces are tolerated in the beginning of the fields but are discouraged.

We recommend that the first digit is not 0, unless it is immediately followed by a dot (decimal separator). However, zero-padding is allowed.

An empty string, i.e. one comma directly following another, is used to signify “Not available”.

Timestamping

Time stamps for records are given as both easily readable fields, ‘Time’ and ‘Date’, and as a ‘continuous’ ‘day of year’ (this should not be referred to as ‘Julian date’).
‘Day of year’ is a floating point number (coded as decimal) which equals the number of days since January 1 00:00 of the year the logging started. This number thus increases with time throughout each day, and continues to increase whenever starting a new year.

- The ‘day of year’ should have a resolution of one second or better.
- The ‘Time’ field always has a resolution of one second.
- The actual year of the data are available (only) in the first four characters of ‘Date’.

- All dates and time are related to UTC (leap seconds introduced during Surveys may theoretically introduce minor problems, but these should be acceptable).

Thus, the 'Time' and the latter part of the 'date' field are superfluous, but are kept for ease of use by humans, as well as programs that can read those formats.

Orientation parameters

'Roll', 'pitch' and 'yaw' are the so called Euler angles that measure the orientation of a body-attached co-ordinate system relative to a base co-ordinate system (from base to body-attached system).
In our case, define the body-attached coordinate system by:

X_b: Starboard unit vector
Y_b: Forward vector
Z_b: "Up" (note the quotes) unit vector = $X_b \times Y_b$

and the reference co-ordinate system as:

X_n: Easting unit vector
Y_n: Northing unit vector
Z_n: Up unit vector

The EMGS navigation format uses the term 'heading' instead of 'yaw' to emphasize that it is anchored in a geographical reference system and that it has the same positive direction as conventional gyros.

Sign conventions are:

- Pitch is right-handed rotation around X
- Roll is right-handed rotation around Y
- Heading (yaw) is clockwise rotation around Z seen towards lower values of Z. (Not consistent with right-handed system but chosen to agree with conventional sensors (gyro).)

From this follows:

- Pitch is positive bow up
- Roll is positive port up
- Heading is positive bow starboard

In addition:

- Heave is positive up

Note that heading (yaw) is relative to grid north, not true or magnetic north.

Header Record Specification

Each file shall start with a number of header records that contain information about, and parameters controlling, all the data records that follow.

The general format for a header record shall be:

Description		Cols	Format
a.	Record identifier "H"	1	A1
b.	Header record type	2-3	I2
c.	Header record type modifier	4	I1
d.	Parameter description	5-32	7A4
e.	Parameter data	33-80	See below

Header record types H0 to H20 are mandatory for all Surveys even if a "N/A" entry is required ("N/A is not allowed for H18). Header records of types H21 to H25 are mandatory as far as they are applicable to the projection used.

Requirements for projection definition include the following header records:

Transverse Mercator	:	H220, H231, H232, H241, H242
UTM	:	H19, H220
Stereographic	:	H231, H232, H241, H242
Oblique Mercator	:	H231, H232, H241, H242, H259 and H256 or H257 or H258
Lambert Conical	:	H210, H220, H231, H232, H241, H242

Header record type H26 is a free format statement for any other relevant information.

Formats of parameter data fields for each of the header record types shall be:

Parameter description		**Parameters**	
Type	**Cols: 5-32**	**Cols**	**Format**
H00	EMGS format version num.	33-80	12A4
H01	Description of Survey area	33-80	12A4
H02	Date of Survey	33-80	12A4
H03	Client	33-80	12A4
H04	Geophysical contractor	33-80	12A4
H05	Positioning contractor	33-80	12A4
H06	Pos. proc. contractor	33-80	12A4
H07	Field computer system(s)	33-80	12A4
H10	Clock time w.r.t. UTC	33-80	12A4
H11	Spare	33-80	12A4
H12	Geodetic datum, -spheroid	33-80	3A4, 3A4, F12.3, F12.7
H13	Spare	33-80	12A4
H14	Geodetic datum parameters	33-80	3(F8.3), 4(F6.3)
H15	Spare	33-80	12A4
H16	Spare	33-80	12A4
H17	Vertical datum description	33-80	12A4
H18	Projection type	33-80	12A4
H19	Projection zone	33-80	12A4

H20	Description of grid units	33-56	6A4
H201	Factor to meter	33-46	F14.8
H210	Lat. Of standard parallel(s)	33-56	2(I3, I2, F6.3, A1)
H220	Long. of central meridian	33-44	I3, I2, F6.3, A1
H231	Grid origin	33-56	2(I3, I2, F6.3, A1)
H232	Grid coord. at origin	33-56	2(F11.2, A1)
H241	Scale factor	33-44	F12.10
H242	Lat., long. scale factor	33-56	2(F11.2, A1)
H256	Lat., long. initial line	33-56	4(I3, I2, F6.3, A1)
H257	Circular bearing of H256	33-44	I3, I2, F7.4
H258	Quadrant bearing of H256	33-44	A1, 2I2, F6.3, A1
H259	Angle from skew	33-44	I3, I2, F7.4
H26	Any other relevant information. This record can be repeated as required.	5-80	19A4
H30	Vessel Reference Point VRP	33-80	12A4
H31	Offset VRP to Umbilical CRP	33-52	F6.2, F6.2, F6.2
H32	Offset VRP to USBL URP	33-52	F6.2, F6.2, F6.2
H33	Planned Vessel Speed	33-43	F5.2, A6
H34	Sound Velocity Profile This record can be repeated as required	33-45	F6.1, F6.1
H40	Towfish Reference Pt. TRP	33-80	12A4
H41	Offset TRP to FE	33-52	F6.2, F6.2, F6.2
H42	Offset FE to TE	33-52	F6.2, F6.2, F6.2
H43	Offset TE to tail TP	33-52	F6.2, F6.2, F6.2
H44	Altimeter pitch	33-37	F5.1
H50	Description of receivers	33-80	12A4

Header Record Description

The text in bold type face are the parameter descriptions to be entered, left justified, into columns 5-32. The text in italics are examples of parameters to be entered, left justified, into positions 33-80. To enable parsing of free format (12A4) parameter fields, the following rule should be used: “The parameters entered into positions 33-80 must be separated by a comma and the parameter string must be terminated by a semicolon. Parameter text cannot contain commas ‘,’ or semicolons ‘;’.”

N.B. All units of distance are in meters except the grid coordinates whose units are defined by H20 and can be converted to meters using the conversion factor defined by H201;

H00 **SPS format version num.** The format version number and date of issue. *Example: EMGS001,2003-04-01;*

H01 **Description of Survey area.** The name of the country , Survey area, Survey type and project number. *Example: Norway, Block 99/99, EM, 6051 SBL;*

H02 **Date of Survey.** The date of recording first shotpoint of Survey and the last date of Survey on this file. *Example: 2003-04-01,2004-04-03;*

H03 **Client.** The client’s company name. *Example: NORSK HYDRO;*

H04 **Geophysical contractor.** The company name of the main Survey contractor, and the seismic party name. *Example: EMGS, SBL01;*

H05 **Positioning contractor.** The company name of contractor or sub-contractor responsible for the positioning/Survey control in the field. *Example: Multiwave Geophysical Co. AS;*

H06 **Position processing contractor.** The company name of contractor or sub-contractor responsible for the post processing of the positioning data. *Example: Multiwave Geophysical Co. AS;*

H07 **Field computer system(s).** The Navigation system (INS) name, the acquisition management system name and type of recording instrument(s). *Example: QINSy 7.0,MemA,EMI MMT-24;*

H10 **Clock time w.r.t. UTC.** The number of hours that the local (clock) time is behind or ahead of UTC. This is for information only, logged times should always be UTC. *Examples: +2; or -6; or 0;*

H11 **Spare;**

H12 **Geodetic datum, -spheroid.** Datum name, spheroid name, semi major axis (a), inverse flattening (I/f) as used for Survey. *Example: RD datum Bessel 1841 6377397.155 299.15281;*

H13 **Spare;**

H14 **Geodetic datum parameters.** Datum transformation parameters to WGS84 (dx,dy,dz,rx,ry,rz,ds) as used for Survey. *Example: 595.000 11.300 478.900 0.000 0.000 0.000 0.000;*

The datum transformation parameters are defined by the following model:

```
|x| |dx| | 1 -rz +ry| |x|
|y| = |dy| +|scale|* |+rz 1 -rx|*|y|
|z|(2)|dz| |-ry +rx 1| |z|(1)
```

where: x,y,z are the geocentric cartesian coordinates in meters dx, dy, dz are translation parameters in meters rx, ry, rz are clockwise rotations defined in arcsecs, but converted to radians for use in the formula. Scale is [1+ds(10E-6)], where ds is in parts per million.
For this example (1) is RD datum, (2) is WGS84 datum.

H15 **Spare;**

H16 **Spare;**

H17 **Vertical datum description.** Name, type (i.e. equipotential, LAT or spheroidal), origin (name or lat, long) and undulation of vertical datum with respect to WGS84. *Examples: LAT, Equipotential, Bergen, 0;*

H18 **Projection type.** Type of map projection used. *Example: Transverse Mercator.*

H19 **Projection zone.** Zone and hemisphere for UTM projections. *Example: Zone 30, North;*

H20 **Description of grid units.** Unit of coordinates. *Examples: Meters; or International Feet; or Indian Feet; or American Feet;*

H201 **Factor to meter.** The multiplication factor to convert grid units to meters.
Example given for American Feet*: 0.30480061;*

H210 **Lat. of standard parallel(s).** Latitude of standard parallel(s) as required for projection as per H18, in dddmmss.sss N/S.
Example given for 2 standard parallels of 5 deg N and 10 deg N*: 0050000.0000100000.000N;*

H220 **Long. of central meridian.** Longitude of central meridian as required for projection as per H18 above, in dddmmss.sss E/W. Example given for 15 deg 30 min E*: 0153000.000E;*

H231 **Grid origin.** Latitude and longitude of the grid origin in dddmmss.sss N/S dddmmss.sss E/W. Example given for 5 deg N, 15 deg 10 min and 25 sec E.*Example: 0050000.000N0151025.000E;*

H232 **Grid coord. at origin.** Grid coordinates (Eastings and Northings) at the origin of the projection system. Example given for false Easting of 50000 and false Northing of 0*: 50000000.0E 0.00N;*

H241 **Scale factor.** Scale factor for defined projection. *Example: 0.9996000000;*

H242 **Lat., Long. scale factor.** Latitude and longitude at which the scale factor (H241) is defined.
Example: 0050000.000N 151025.000E;

H256 **Lat., Long. initial line.** The two points defining the initial line of projection, as lat1, long1, lat2, long2. Example given for 5 degr N, 20 degr E, 10 degr N, 30 degr E*: 0050000.000N0200000.000E0100000.000N0300000.000E;*

H257 **Circular bearing of H256.** This is the true bearing to the east in the origin of the initial line of projection in dddmmss.ssss (max of 360 degrees). *Example: 1200000.0000;*

H258 **Quadrant bearing of H256.** Quadrant bearing of the initial line of projection in N/S ddmmss.sss E/W. *Example: S300000.000E;*

H259 **Angle from skew.** The angle between the skew and the rectified (North oriented) grid, in dddmmsss.ssss. *Example: 0883000.0000;*

H26 **Free format in positions 5-80.** Any other information can be included using header records of this type,

H30 **Vessel Reference Point VRP.** A description of the vessel reference point.
Example: CoG, Centre of Gravity;

H31 **Offset VRP to Umbilical CRP.** The x, y, z offset from the vessel reference point (VRP) to the cable reference point (CRP), i.e. where the tow cable enters the water.
Example: 0.00,-54.20,0.00;

H32 **Offset VRP to USBL URP.** The x, y, z offset from VRP to USBL reference point (URP).
Example: 0.00,0.00,0.00

H33 **Planned vessel speed.** The planned vessel speed for the line and the unit. *Example: 0.75,m/s*

H34 **Sound velocity profile.** One depth and velocity pair (depth, velocity) per record, repeated as many times as required. Units: m and m/s. If only one record is entered it gives the mean velocity and the depth this was calculated for. *Example: 1250.0,1492.1;*

H40 **Towfish Reference Pt. TRP.** Description of reference point on towfish.
Example: Centre of bottom Frame

H41 **Offset TRP to FE.** Nominal X, Y, Z offset from towfish reference point to centre of front electrode of antenna (FE). *Example: 0.00,-27.60,1.00;*

H42 **Offset FE to TE.** Nominal X, Y, Z offset from centre of front electrode to centre of tail electrode (TE). *Example: 0.00,-250.00,0.00;*

H43 **Offset TE to tail TP.** Nominal X, Y, Z offset from centre of tail electrode to tail USBL transponder.
Example: 0.00,-15.00,0.00;

H44 **Altimeter pitch.** Mounting angle in degrees of altimeter measured as deviation from the XZ-plane. Zero if pointing straight down, negative if pointing backwards. *Example: -15.0;*

H50 **Description of receivers.** Free text description of receivers in use. Type(s), number etc.
Example: 10x EMI MMT24;

Transmitter File

Table 24: Transmitter file format

Field	Description	Flags	Unit	Max length	Comment	Example
1	Record ID = 'T'	S	NA	1		T
2	Date	S	NA	10	YYYY-MM-DD	2003-02-27
3	Time	S	NA	8	hh:mm:ss	23:55:00
4	Continuous day of year	F	days	31	Increases during day and after new year, should have a resolution of 1 second or better	312.67891
5	Fix number	I	NA	31		12345678
6	Easting (midpoint antenna)	FC	m	31		2497312.2
7	Northing (midpoint antenna)	FC	m	31		7891234.2
8	Depth below vert datum (midpoint antenna)	FC	m	31		1685.3
9	Altitude antenna	FC	m	31	If tail transponder is available: Altitude of the geometrical midpoint between front and tail electrode. If tail transponder is not available: Altitude of towfish skewed back to nominal position of antenna midpoint.	50.2
10	Heading rel. grid north (antenna)	FC	deg	31		2.312
11	Pitch antenna	FC	deg	31		1.234
12	Roll antenna	FC	deg	31	Leave blank for single dipole	NA
13	Surface elevation wrt vert datum	FC	m	31	Positive for surface above datum	100.2
14	Easting (fish)	FM	m	31		2497312.2
15	Northing (fish)	FM	m	31		7891234.2
16	Depth below vertical datum(fish)	FM	m	31		1685.3
17	Pressure (fish)	FM	dBar	31	From bathy	NA
18	Altitude (fish)	FM	m	31	From altimeter	50.2
19	Conductivity (fish)	FM	mS/cm	31		NA
20	Water temperature (fish)	FM	degC	31		-0.45
21	Doppler speed x (fish)	FM	m/s	31		1.123
22	Doppler speed y (fish)	FM	m/s	31		2.345
23	Doppler speed z (fish)	FM	m/s	31		3.456
24	Doppler pressure (fish)	FM	dBar	31	Pressure sensor in doppler log	1.123
25	Doppler depth (fish)	FM	m	31		2.345
26	Doppler altitude (fish)	FM	m	31	Altitude measured by doppler log	3.456
27	Heading rel. grid north (fish)	FM	deg	31		1.234
28	Roll (fish)	FM	deg	31		NA
29	Pitch (fish)	FM	deg	31		NA
30	Easting (tail)	FM	m	31		2497312.2
31	Northing (tail)	FM	m	31		7891234.2
32	Depth below vertical datum (tail)	FM	m	31		1685.3
33	Altitude (tail)	FM	m	31		NA
34	Easting (VRP)	FM	m	31		2497312.2
35	Northing (VRP)	FM	m	31		7891234.2
36	Echosounder depth below vert datum	FM	m	31		1685.3
37	Winch Length	FM	m	31		1700.23
38	Winch Tension	FM	N	31		21423.4
39	Pressure (Front Electrode)	FM	dBar	31	From pressure sensor close to electrode Leave blank (undefined) if not available	1731.3
40	Pressure (Tail)	FM	dBar	31	Leave blank (undefined) if not available	1735.3
41	HDOP (Vessel DGPS)	FC	m	31	Horizontal dilution of GPS precision	0.20

42	VDOP (Vessel DGPS)	FC	m	31	Vertical dilution of GPS precision	0.32
43	Horizontal SMA (midpoint antenna)	FC	m	31	The longest axis of the error ellipsoid within 1σ	3.55
44	STD Midpoint antenna Depth below vert datum	FC	m	31	Vertical accuracy within 1σ	2.45
45	Horizontal SMA (fish)	FC	m	31	The longest axis of the error ellipsoid within 1σ	1.15
46	STD Fish Depth below vert datum	FC	m	31	Vertical accuracy within 1σ	0.94
47	Horizontal SMA (tail)	FC	m	31	The longest axis of the error ellipsoid within 1σ	2.14
48	STD Tail Depth below vert datum	FC	m	31	Vertical accuracy within 1σ	1.23
49	STD Heading antenna	FC	deg	31	Accuracy within 1σ	0.45
50	STD Pitch antenna	FC	deg	31	Accuracy within 1σ	0.53
51	STD Roll antenna	FC	deg	31	Leave blank (undefined) for single dipole	0.73

Example: (all in one line)
T,2003-02-27,23:55:00,57.99652778,1234,249731.2,7891234.2,1685.3,50.2,2.31,1.23,,7.2,249731.2,7891234.2,1685.3,1701.2,
50.2,3.216,0.3,0.123,0.645,0.156,1723,1675,53.4,1.23,1.234,1.234,249731.2,7891234.2,1685.3,55.3,249731.2,7891234.2,1735.3,
2700.23,31423.4,1731.3,1735.3,0.20,0.32,3.55,2.45,1.15,0.94,2.14,1.23,0.45,0.53,0.73

Receiver File

Table 25: Receiver file format

Field	Description	Flags	Unit	Max length	Comment	Example
1	Record ID = "R"	S	NA	1		R
2	Receiver name	S	NA	31	No white space, so that the names can portably be easily used as e g file names. Allowed characters: A-Z, a-z, 0-9, -(dash), _(underscore)	Receiver1
3	Easting	F	m	31		2497312.2
4	Northing	F	m	31		7891234.2
5	Depth below vert datum	F	m	31		1685.3
6	Heading relative to grid north	FM	deg	31	Measured by deployment tool Leave blank (undefined) if not available	2.31
7	Pitch	FM	deg	31	Measured by deployment tool Leave blank (undefined) if not available	1.42
8	Roll	FM	deg	31	Measured by deployment tool Leave blank (undefined) if not available	-1.23
9	HDOP (Vessel DGPS)	FC	m	31	Mean Horizontal dilution of GPS precision for the deployment period	0.20
10	VDOP (Vessel DGPS)	FC	m	31	Mean Vertical dilution of GPS precision for the deployment period	0.32
11	Horizontal SMA	FC	m	31	Length of the longest axis of the error ellipsoid (1σ)	2.33
12	STD Depth below vert datum	FC	m	31	Vertical accuracy within 1σ	1.89

Example:

R,Receiver1,2497312.2,7891234.2,1685.3,2.31,1.42,-1.23,0.20,0.32,2.33,1.89

Source Data

The source current amplitude files are stored as YYYYMMDDHHMMSSmmm_200Hz.ant
(e.g. 20041231235959999_200Hz.ant)

Table 26: Source definition file format

Description	Details	Type	16bits / 32bits	Nr of bytes	Start byte	Stop byte	Remarks
Mainheader							
	Header Version	char	1	7	0		HV:XX.X
	Filename	char	1	24			FN:YYYYMMDDHHMMSSmmm_200Hz.ant
	System ID	char	1	13			ID:XXXXXXXXXX
	SW version Subsea PLC	char	1	4			i.e: 0112=version 1.12
	SW version TopSide PLC	char	1	4			i.e: 0112=version 1.12
	SW version TopSide Computer	char	1	4			i.e: 0112=version 1.12
	Samplingtime Current	char	1	9			TA:SS.mmm
	Spare			35		99	
Current package							
Current Sensor ID		byte	8	1	100	100	Set to be sensor ID nr. **1**
Current Timestamp	Days since 1990*	int	16	2	101	102	Common timestamp for a package of 1000 current samples.
	Miliseconds after midnigth	long	32	4	103	106	
Current sample values	1000 samples a 2 byte	int	16	2000	107	2106	
Current package							
	Next current package				2107		

* The variable "Days since 1990" is defined as days since 1. January 1990, i.e. 1. January=day 0 and 2. January =day 1

Appendix VI - Channel Parameters

This section lists the channels used for rotation. “1” means that the channel should be included, whereas “0” indicates that the channel should be ignored. “2” means that the channel should be included and that this is a fixed gain channel. If a receiver has two good channels of the same type (e.g. both Ex1 and Ex2 are good), the average of these two channels will be used. The table also lists the applied rotation angles for the rotated data.

Table 27: Wolse01Tx01de Parameters and Rotation Angles

Receiver	Ex1	Ex2	Ey1	Ey2	Hx1	Hy1	Angle(deg)
01Rx001a	1	0	1	2	1	1	-68.65
01Rx002a	0	2	1	0	1	1	-117.45
01Rx003a	0	2	1	0	1	1	-118.32
01Rx004a	1	0	1	0	1	1	-284.34
01Rx005a	1	2	0	2	1	1	42.70
01Rx006a	0	2	0	2	1	1	208.82
01Rx007a	1	0	1	0	1	1	-173.9
01Rx008a	1	0	0	2	1	1	-211.37
01Rx009a	1	2	0	2	1	1	-130.6
01Rx010a	1	0	1	0	1	1	-186.23
01Rx011a	1	0	1	0	1	1	-134.16
01Rx012a	0	2	1	0	1	1	-192.83
01Rx013a	1	0	1	0	1	1	-50.41
01Rx014a	1	0	1	0	1	1	7.23
01Rx015a	1	0	0	2	1	1	-157.07
01Rx016a	0	2	0	2	1	1	-91.85
01Rx017a	0	2	1	0	1	1	-44.39
01Rx018a	1	2	1	0	1	1	-162.3
01Rx019a	0	2	1	0	1	1	-127.19
01Rx020a	0	2	1	0	1	1	-101.43
01Rx021a	1	0	1	0	1	1	-146.23
01Rx022a	1	0	1	0	1	1	-5.08
01Rx023a	1	2	0	2	1	1	-185.38

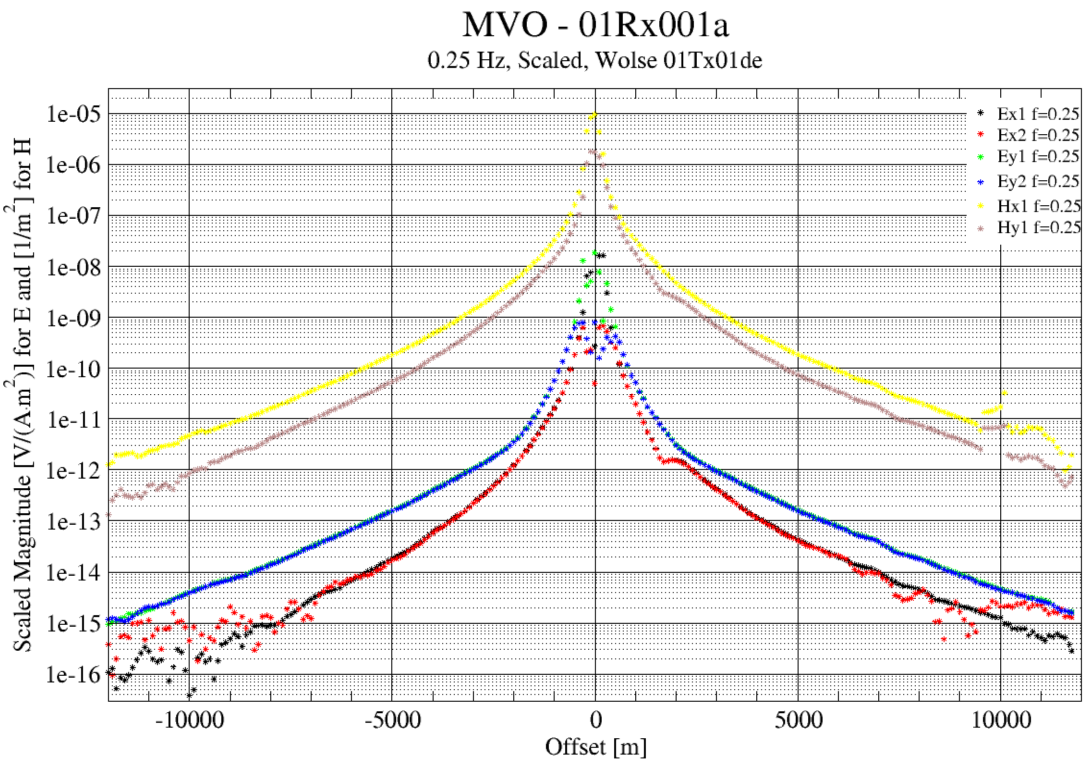
Table 28: Wolse02Tx01c Parameters and Rotation Angles

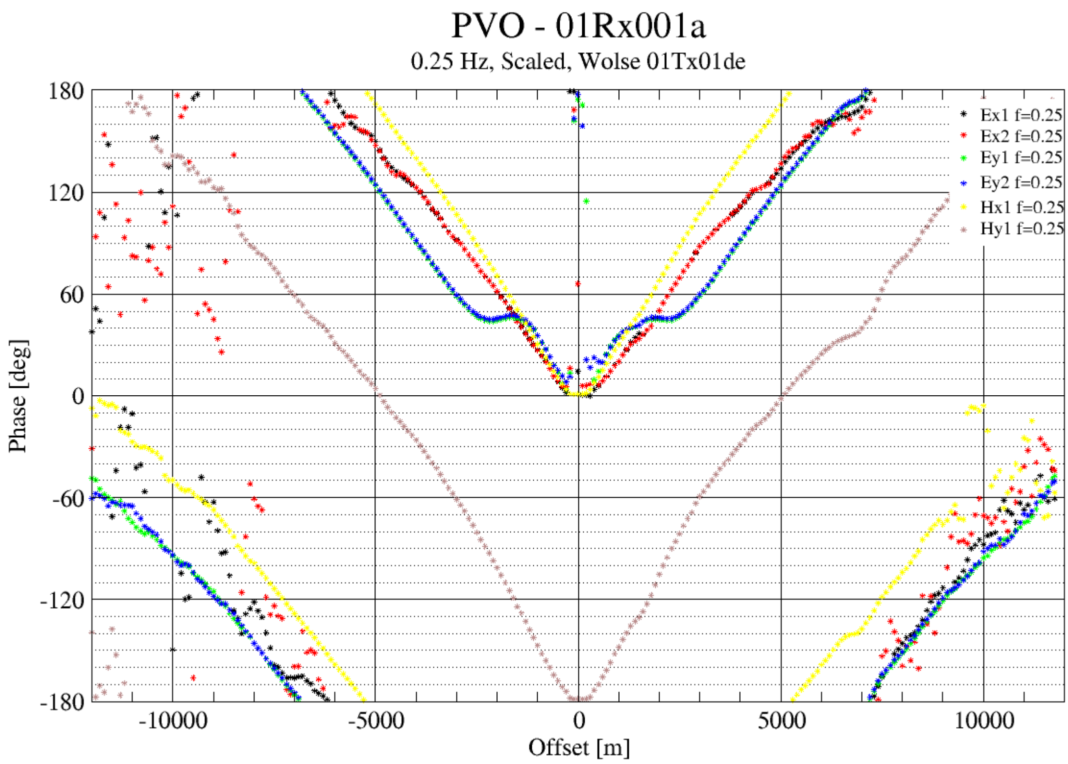
Receiver	Ex1	Ex2	Ey1	Ey2	Hx	Hy	Angle(deg)
01Rx024a	0	2	1	0	1	1	-39.31
01Rx025a	0	2	1	0	1	1	-95.24
01Rx027a	1	0	1	0	1	1	-226.93
01Rx028a	1	0	1	0	1	1	-267.72
01Rx029a	1	0	1	0	1	1	19.16
01Rx030a	1	0	1	0	1	1	22.17
01Rx031a	1	0	1	0	1	1	-269.88
01Rx032a	1	0	0	2	1	1	29.89
01Rx033a	1	0	0	2	1	1	-232.85
01Rx034a	1	0	1	0	1	1	-2.09
01Rx035a	1	0	1	0	1	1	-18.47
02Rx001a	1	0	1	0	1	1	33.39
02Rx002b	1	0	0	2	1	1	-242.18
02Rx003b	0	2	1	0	1	1	-80.75
02Rx004b	1	0	1	0	1	1	-68.33
02Rx005b	1	0	0	2	1	1	-131.67

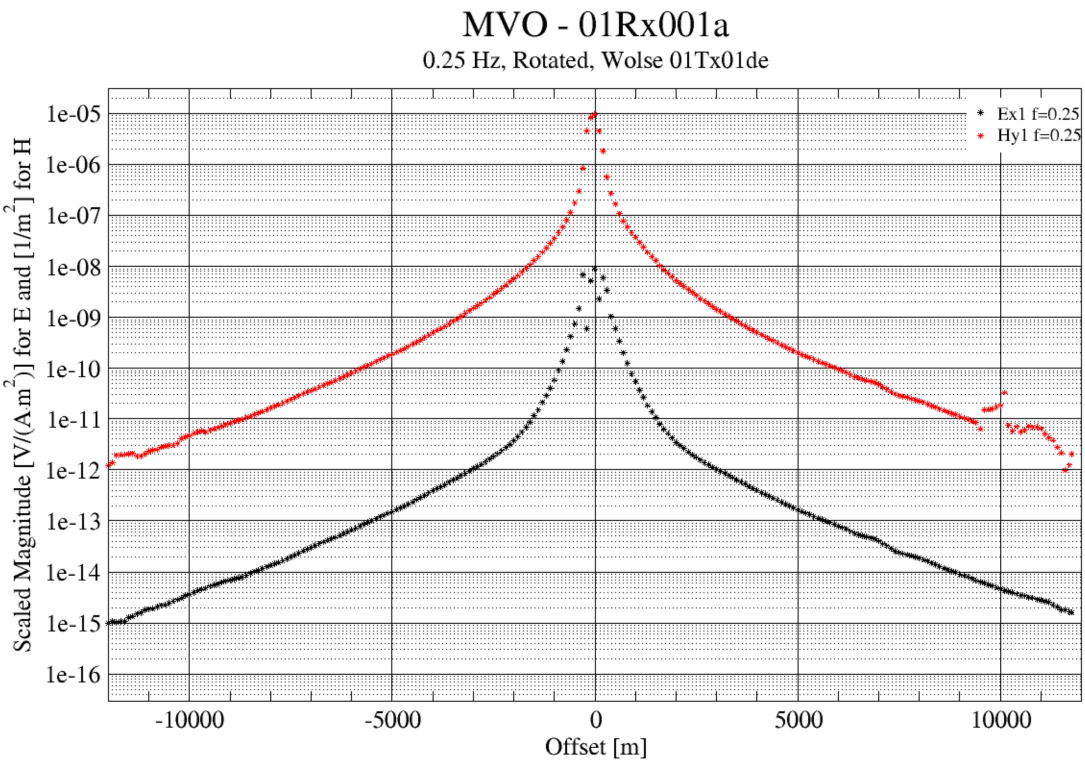
Appendix VII - MVO & PVO plots – Wolse01Tx01de

Plot Parameters	
Filter frequency	0.25 Hz

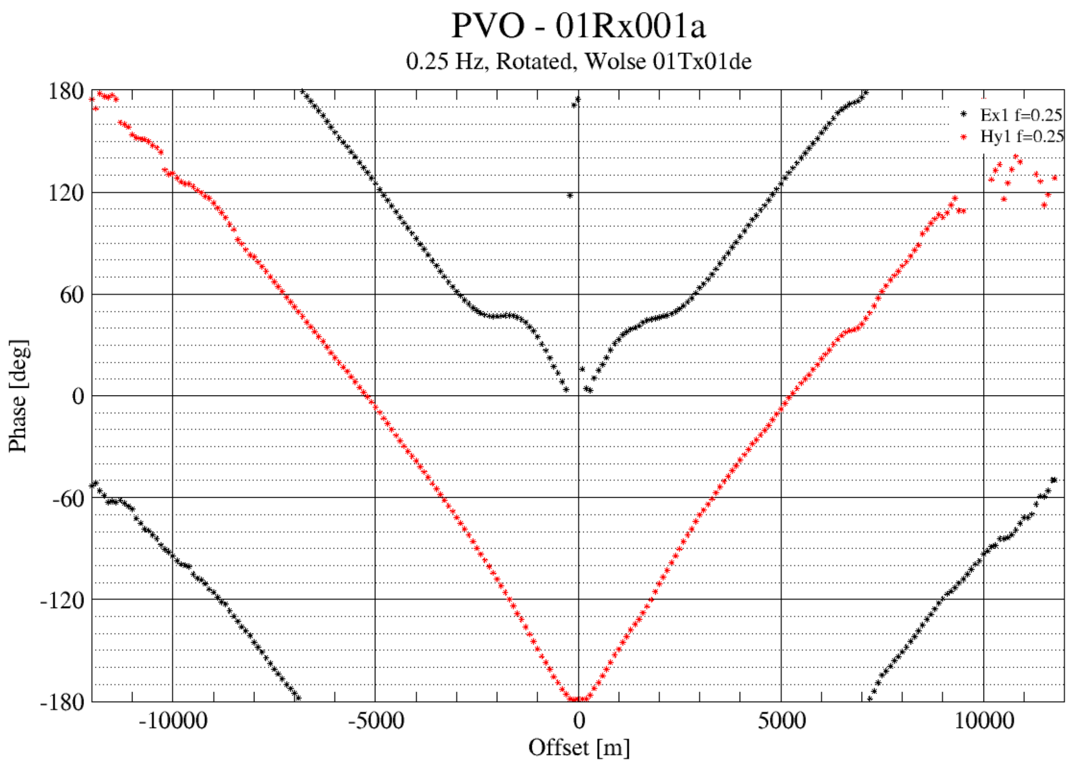
Plot Inventory for Towline Wolse01Tx01de			
Receiver	Rotated Channels	Receiver	Rotated Channels
01Rx001a	E + H	01Rx013a	E + H
01Rx002a	E + H	01Rx014a	E + H
01Rx003a	E + H	01Rx015a	E + H
01Rx004a	E + H	01Rx016a	E + H
01Rx005a	E + H	01Rx017a	E + H
01Rx006a	E + H	01Rx018a	E + H
01Rx007a	E + H	01Rx019a	E + H
01Rx008a	E + H	01Rx020a	E + H
01Rx009a	E + H	01Rx021a	E + H
01Rx010a	E + H	01Rx022a	E + H
01Rx011a	E + H	01Rx023a	E + H
01Rx012a	E + H		


MVO - 01Rx001a
0.25 Hz, Scaled, Wolse 01Tx01de
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
1e-05
1e-06
1e-07
1e-08
1e-09
1e-10
1e-11
1e-12
1e-13
1e-14
1e-15
1e-16
-10000
-5000
0
5000
10000
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25

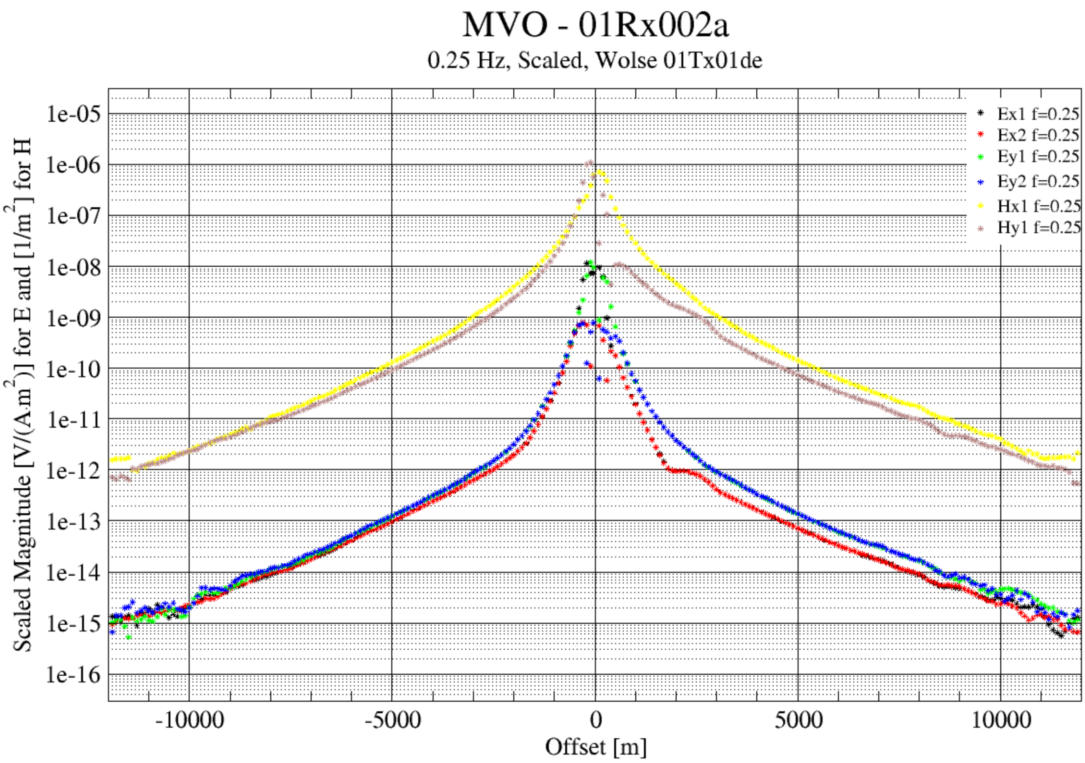

PVO - 01Rx001a
0.25 Hz, Scaled, Wolse 01Tx01de
Phase [deg]
180
120
60
0
-60
-120
-180
-10000
-5000
0
5000
10000
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25

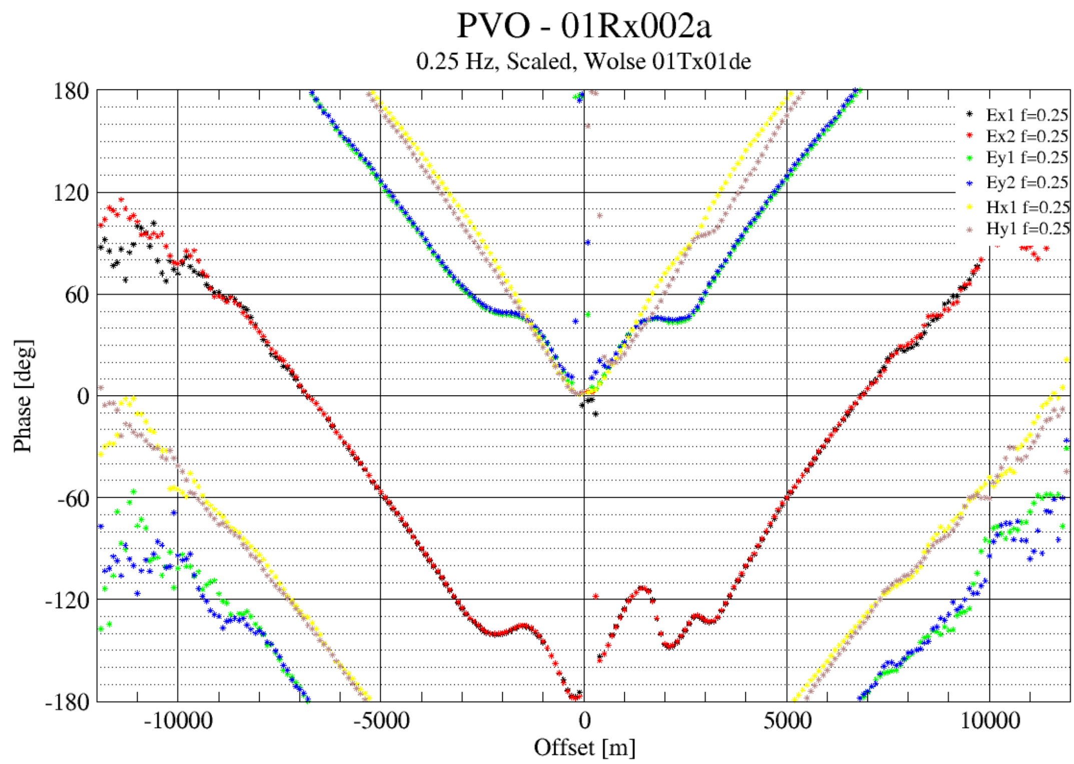


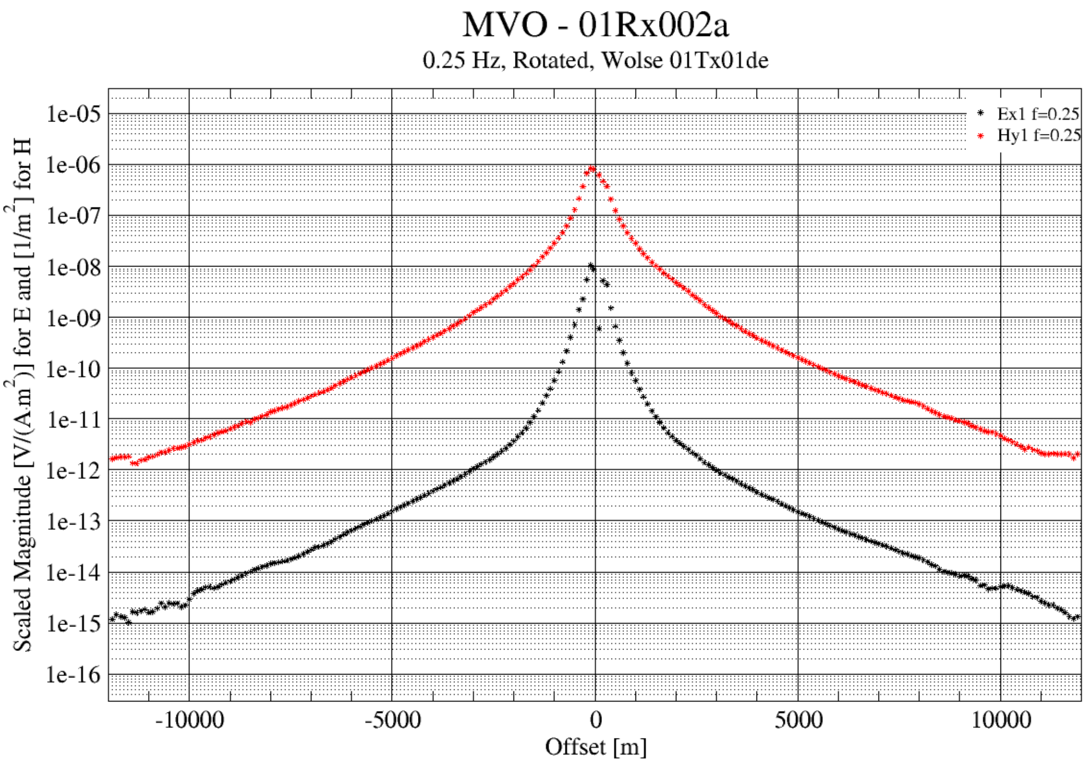
MVO - 01Rx001a
0.25 Hz, Rotated, Wolse 01Tx01de
Scaled Magnitude [V/(A.m²)] for E and [1/m²] for H
Offset [m]
Ex1 f=0.25
Hy1 f=0.25
1e-05
1e-06
1e-07
1e-08
1e-09
1e-10
1e-11
1e-12
1e-13
1e-14
1e-15
1e-16
-10000
-5000
0
5000
10000

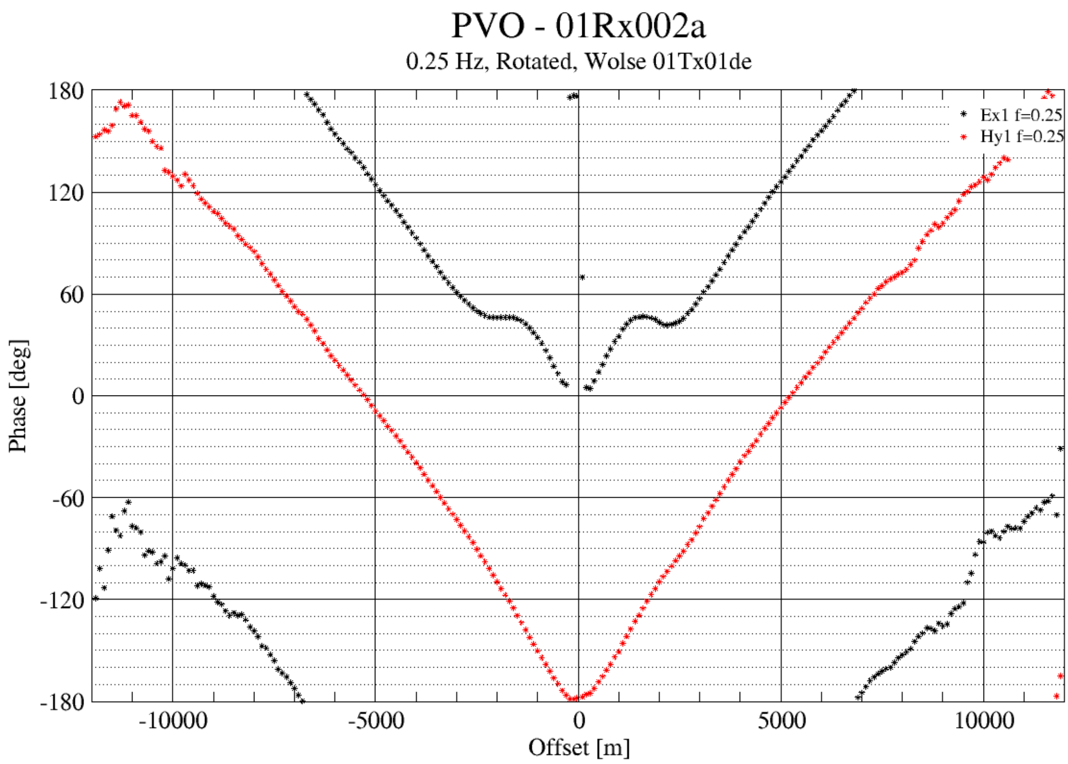


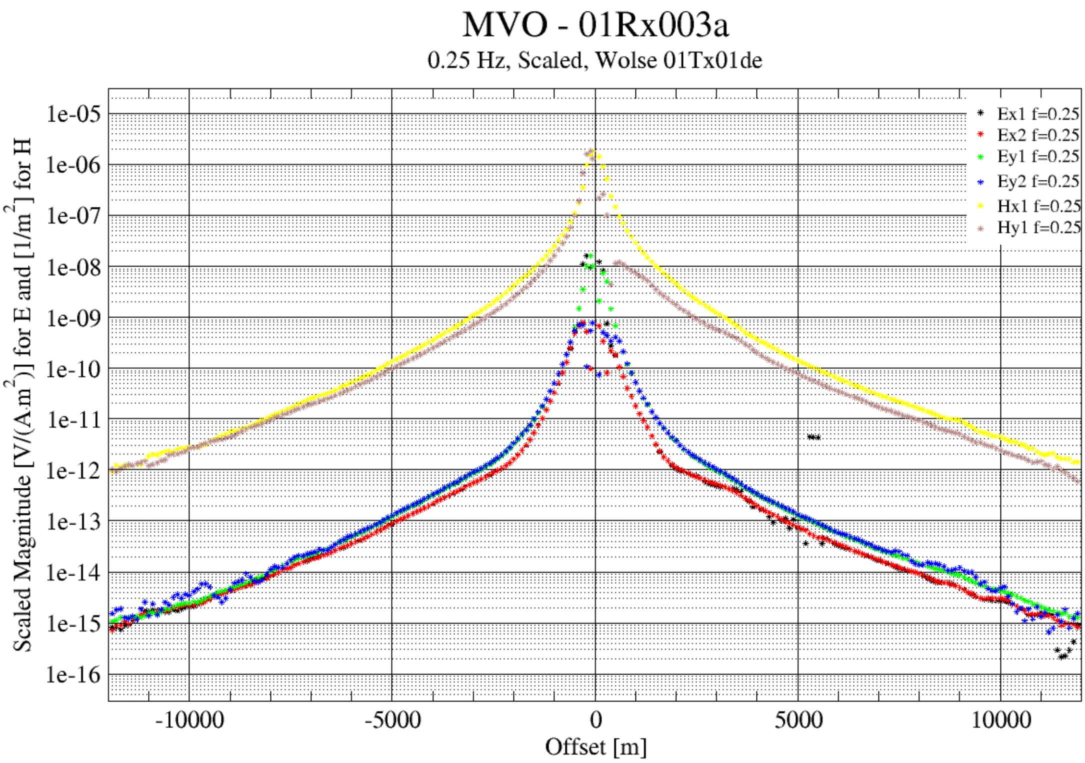
PVO - 01Rx001a
0.25 Hz, Rotated, Wolse 01Tx01de
Phase [deg]
Offset [m]
Ex1 f=0.25
Hy1 f=0.25
180
120
60
0
-60
-120
-180
-10000
-5000
0
5000
10000


MVO - 01Rx002a
0.25 Hz, Scaled, Wolse 01Tx01de
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25

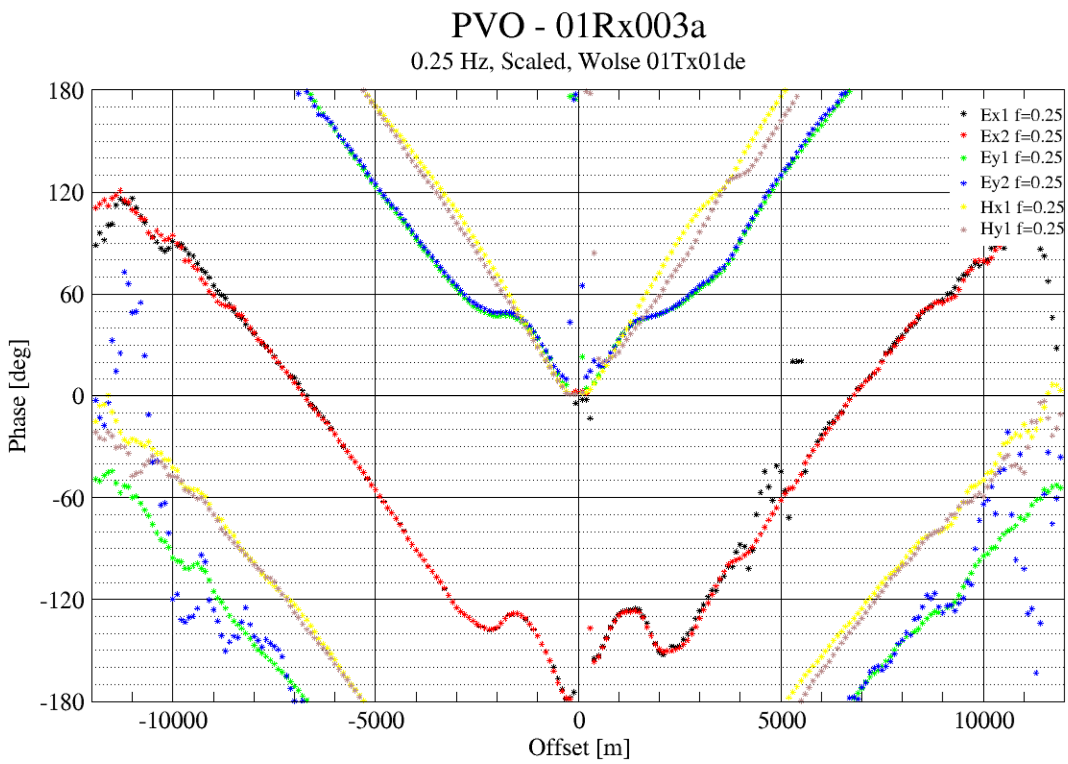

PVO - 01Rx002a
0.25 Hz, Scaled, Wolse 01Tx01de
Phase [deg]
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25


MVO - 01Rx002a
0.25 Hz, Rotated, Wolse 01Tx01de
Ex1 f=0.25
Hy1 f=0.25
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
1e-05
1e-06
1e-07
1e-08
1e-09
1e-10
1e-11
1e-12
1e-13
1e-14
1e-15
1e-16
-10000
-5000
0
5000
10000
Offset [m]

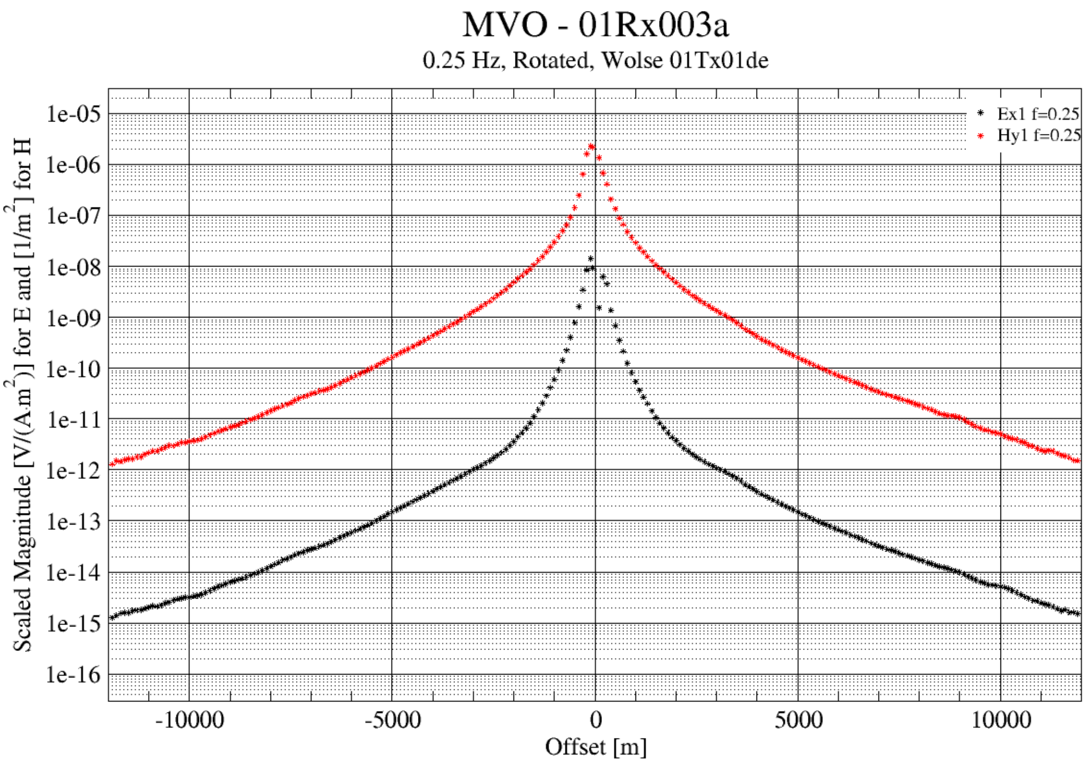

PVO - 01Rx002a
0.25 Hz, Rotated, Wolse 01Tx01de
Ex1 f=0.25
Hy1 f=0.25
Phase [deg]
180
120
60
0
-60
-120
-180
-10000
-5000
0
5000
10000
Offset [m]



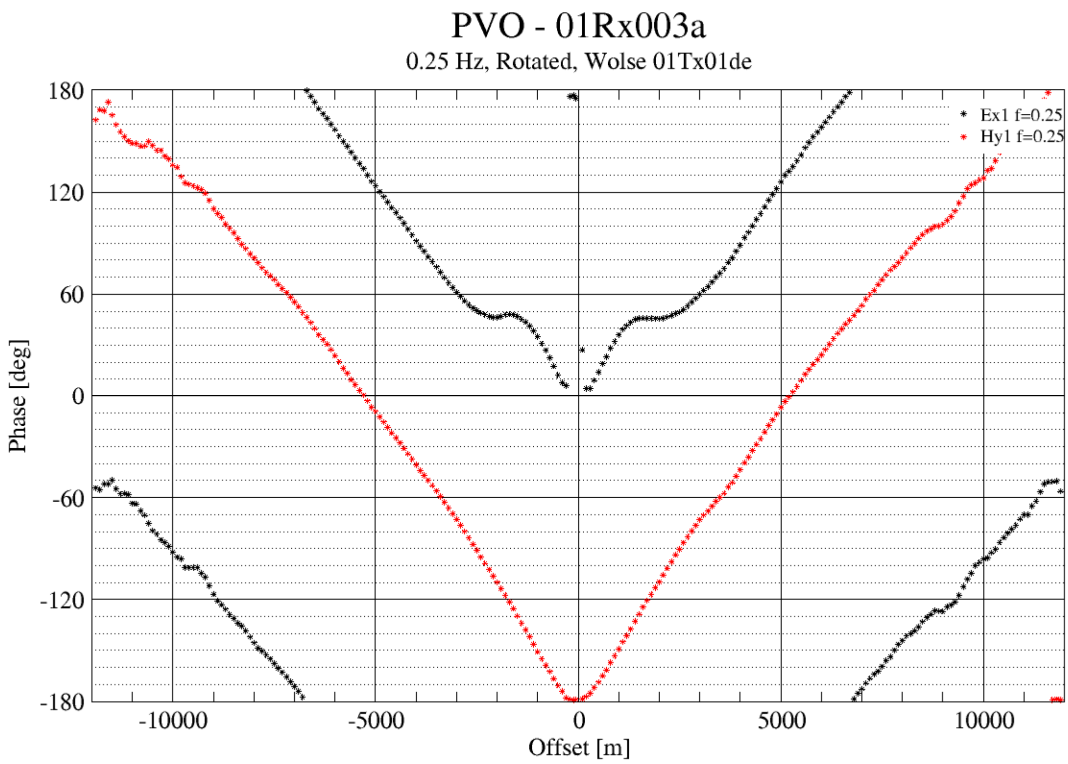
MVO - 01Rx003a
0.25 Hz, Scaled, Wolse 01Tx01de
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25



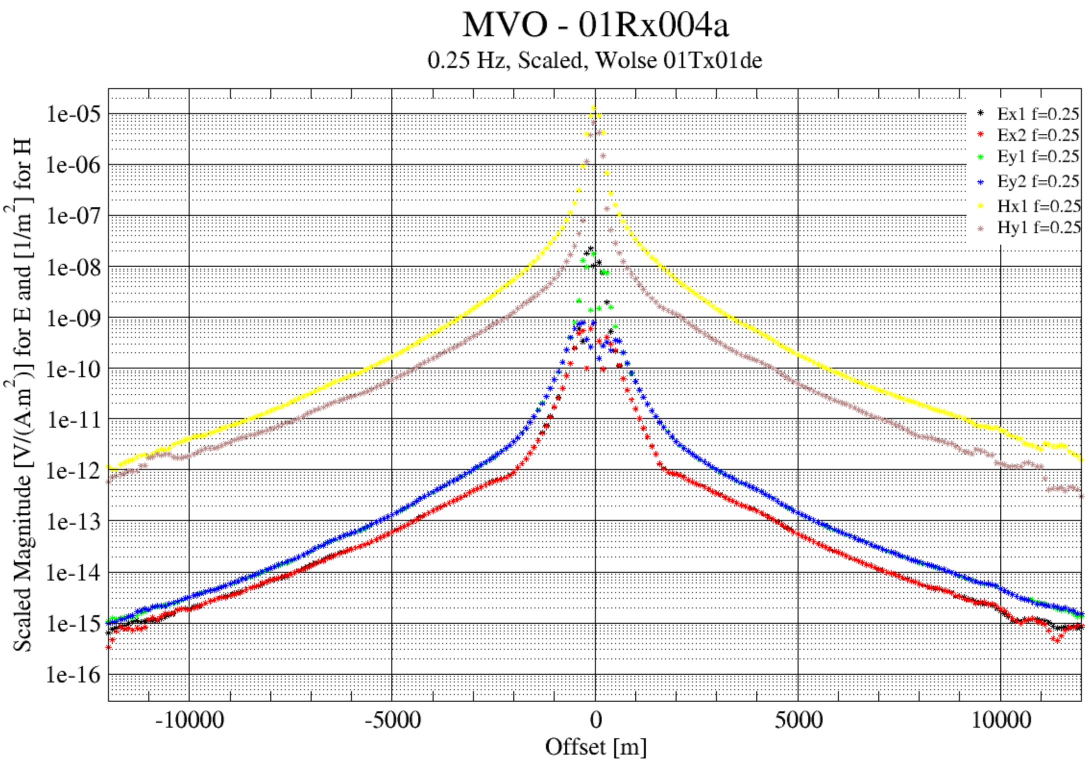
PVO - 01Rx003a
0.25 Hz, Scaled, Wolse 01Tx01de
Phase [deg]
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25



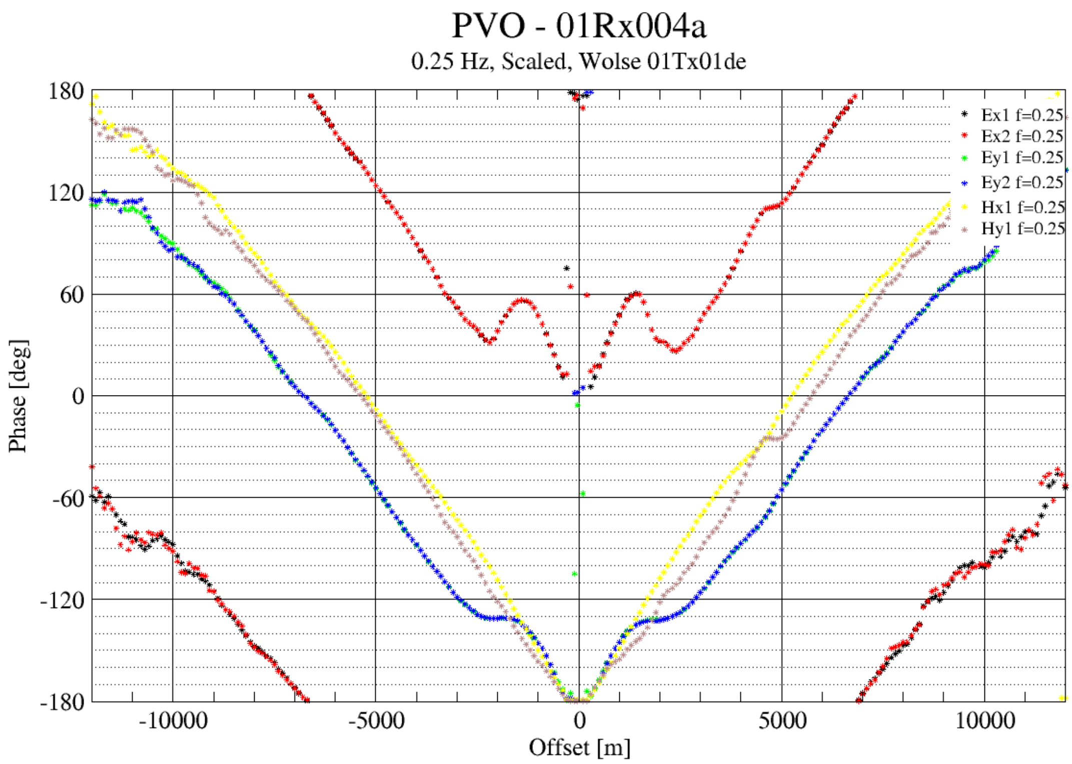
MVO - 01Rx003a
0.25 Hz, Rotated, Wolse 01Tx01de
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
1e-05
1e-06
1e-07
1e-08
1e-09
1e-10
1e-11
1e-12
1e-13
1e-14
1e-15
1e-16
-10000
-5000
0
5000
10000
Offset [m]
Ex1 f=0.25
Hy1 f=0.25



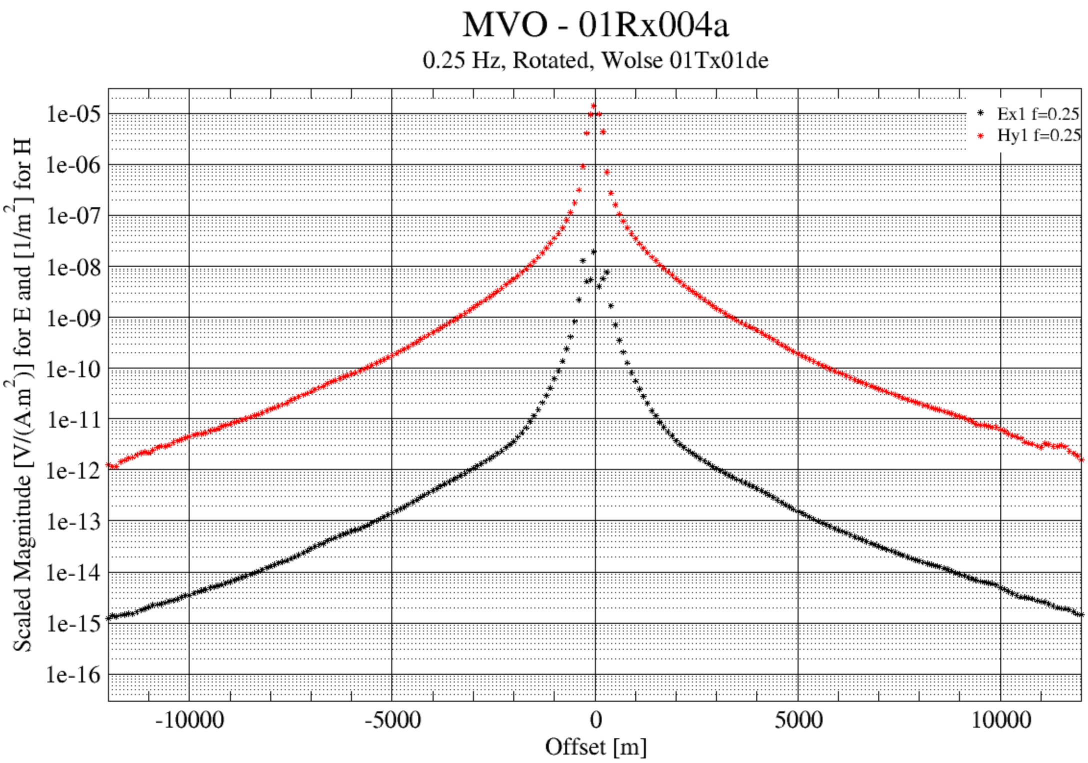
PVO - 01Rx003a
0.25 Hz, Rotated, Wolse 01Tx01de
Phase [deg]
180
120
60
0
-60
-120
-180
-10000
-5000
0
5000
10000
Offset [m]
Ex1 f=0.25
Hy1 f=0.25

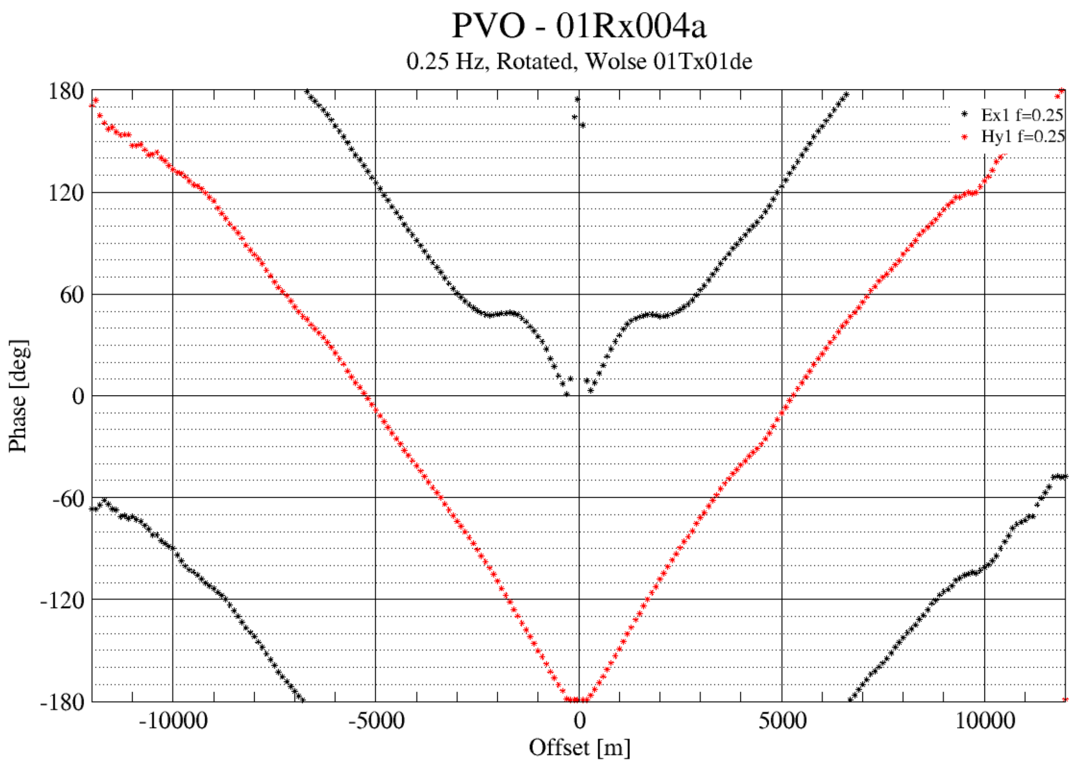


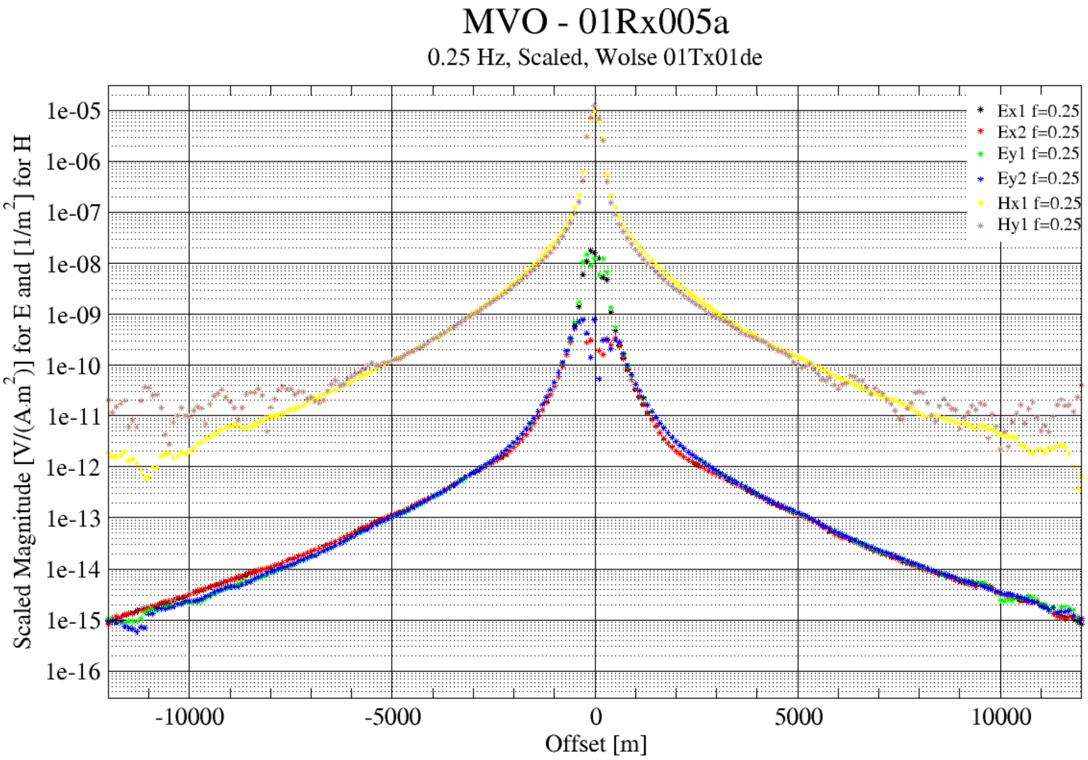
MVO - 01Rx004a
0.25 Hz, Scaled, Wolse 01Tx01de
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
1e-05
1e-06
1e-07
1e-08
1e-09
1e-10
1e-11
1e-12
1e-13
1e-14
1e-15
1e-16
-10000
-5000
0
5000
10000
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25



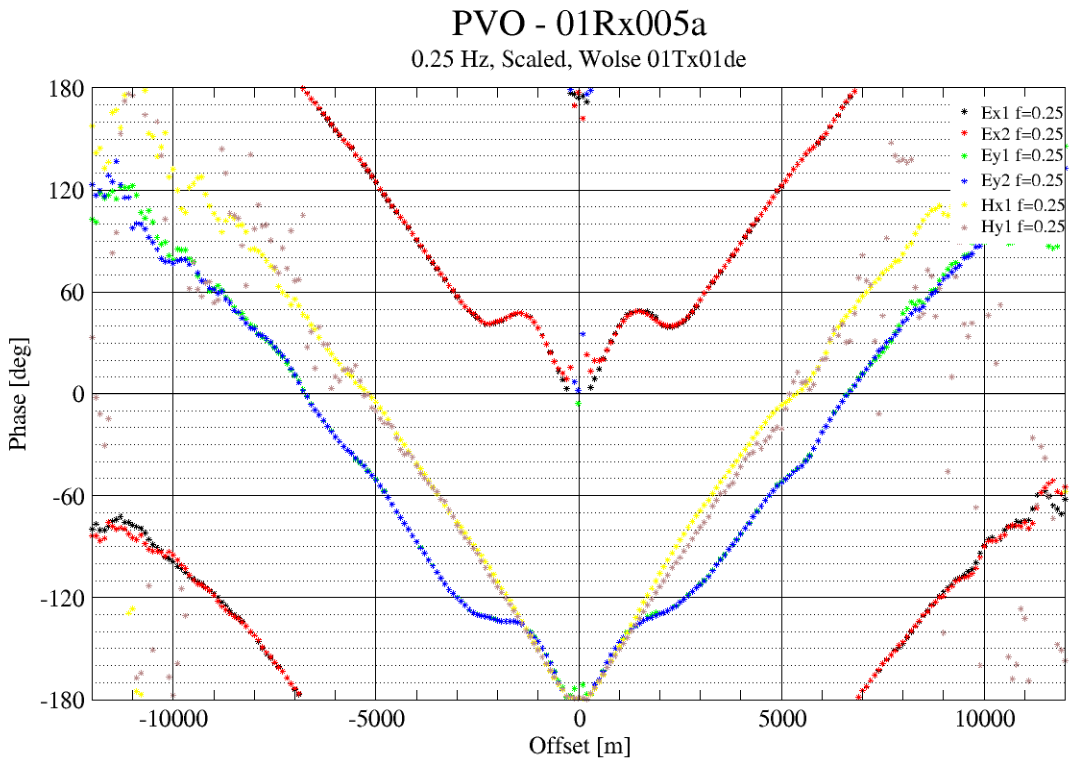
PVO - 01Rx004a
0.25 Hz, Scaled, Wolse 01Tx01de
Phase [deg]
180
120
60
0
-60
-120
-180
-10000
-5000
0
5000
10000
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25


MVO - 01Rx004a
0.25 Hz, Rotated, Wolse 01Tx01de
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
Offset [m]
Ex1 f=0.25
Hy1 f=0.25

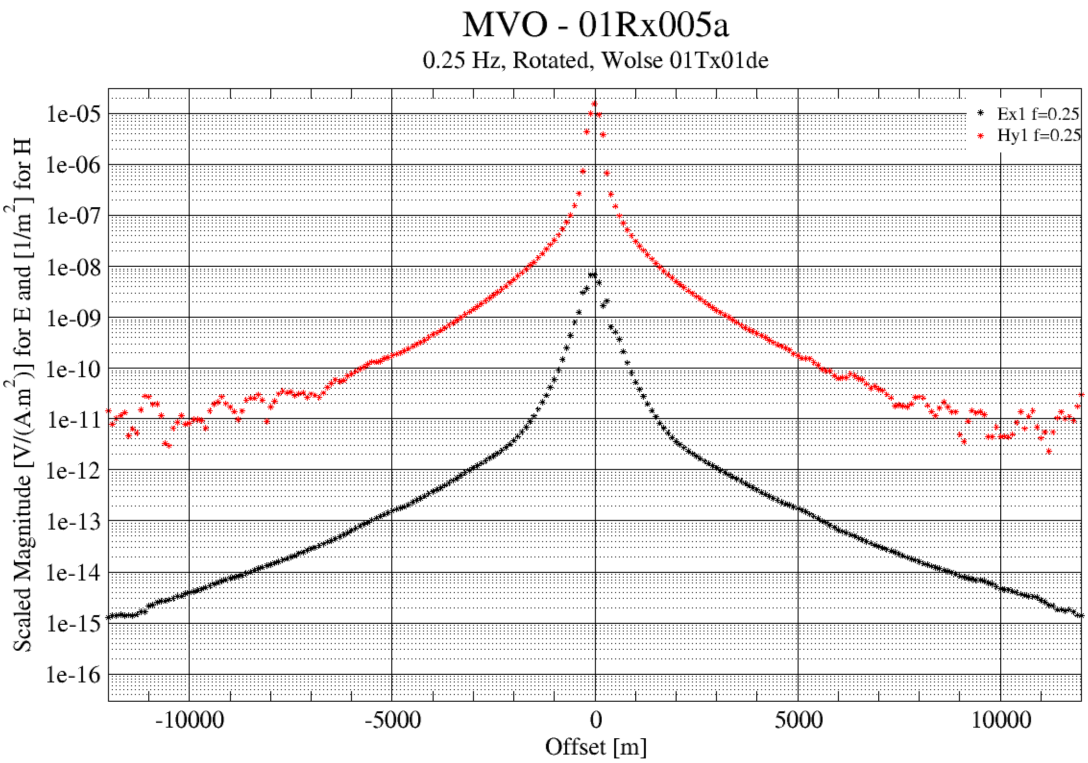

PVO - 01Rx004a
0.25 Hz, Rotated, Wolse 01Tx01de
Phase [deg]
Offset [m]
Ex1 f=0.25
Hy1 f=0.25

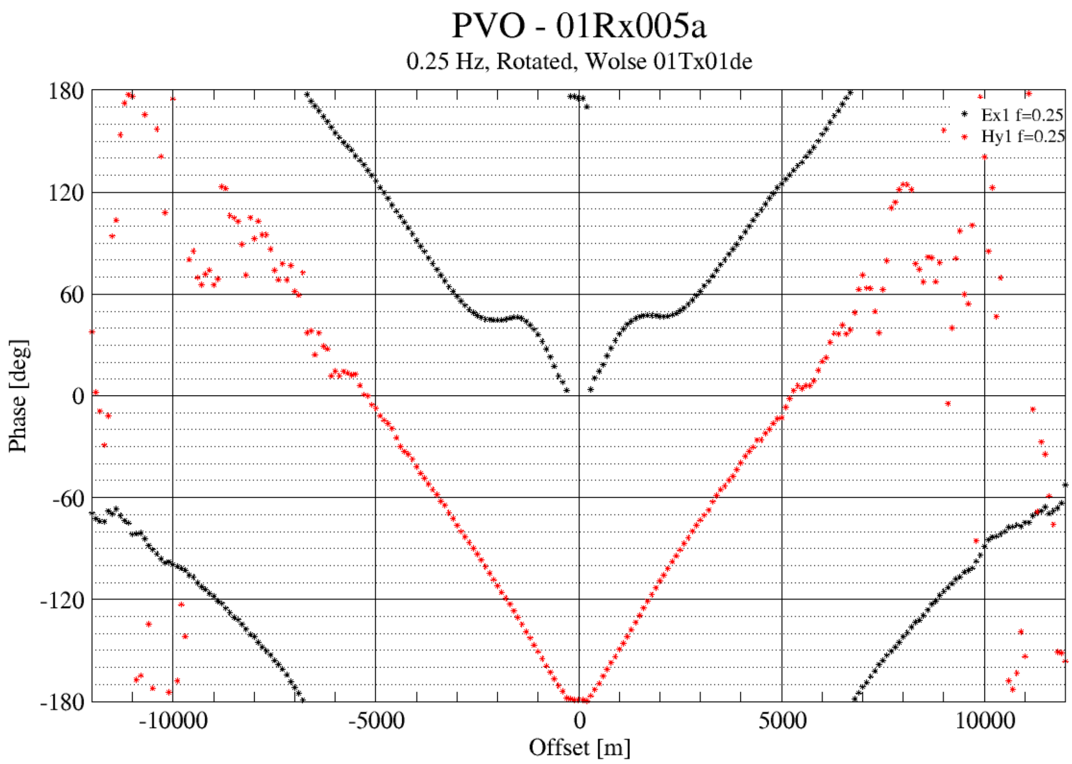


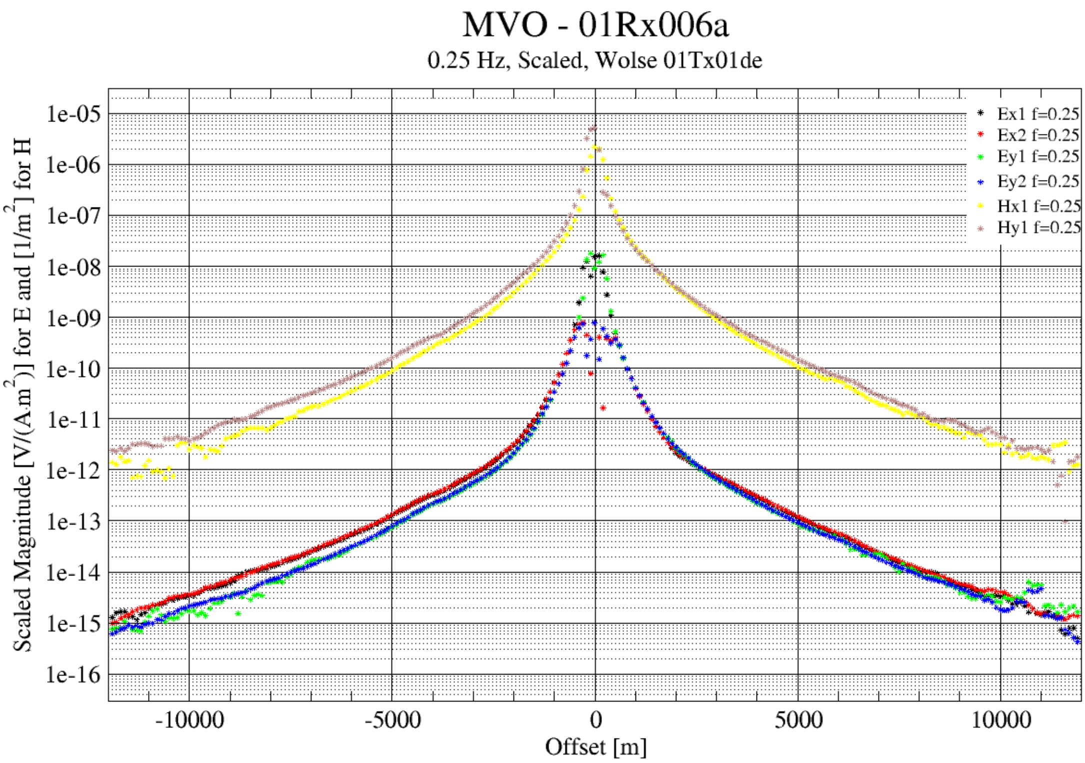
MVO - 01Rx005a
0.25 Hz, Scaled, Wolse 01Tx01de
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25

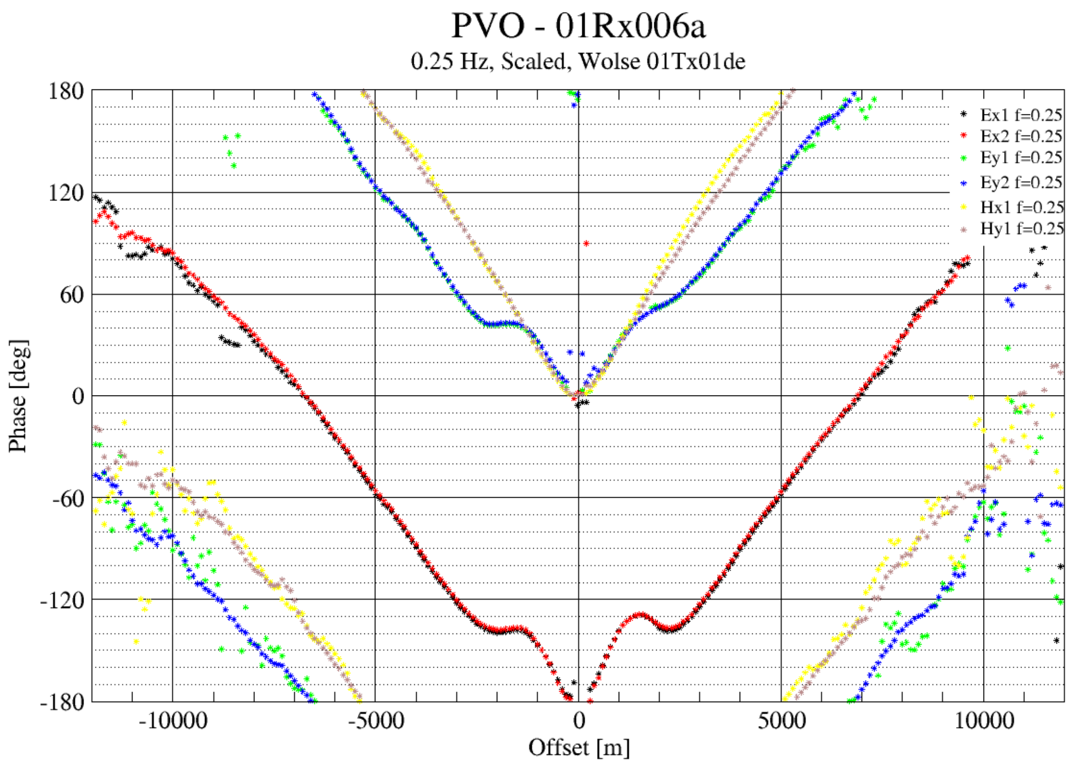


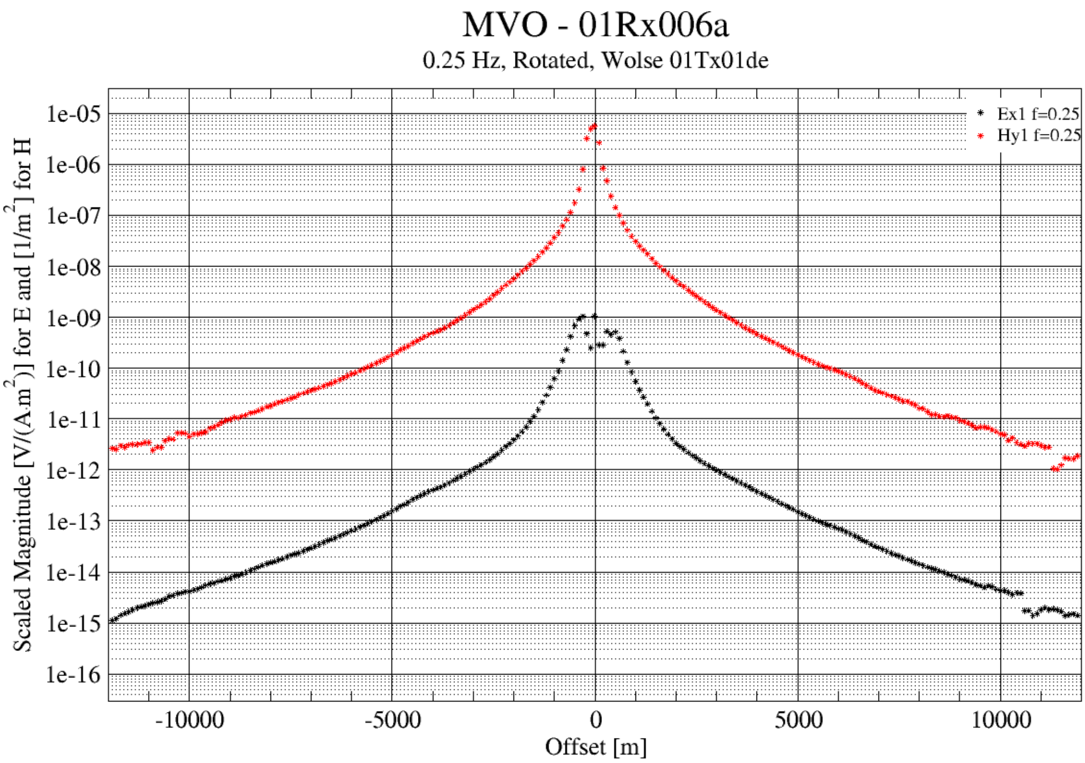
PVO - 01Rx005a
0.25 Hz, Scaled, Wolse 01Tx01de
Phase [deg]
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25


MVO - 01Rx005a
0.25 Hz, Rotated, Wolse 01Tx01de
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
Offset [m]
Ex1 f=0.25
Hy1 f=0.25
1e-05
1e-06
1e-07
1e-08
1e-09
1e-10
1e-11
1e-12
1e-13
1e-14
1e-15
1e-16
-10000
-5000
0
5000
10000

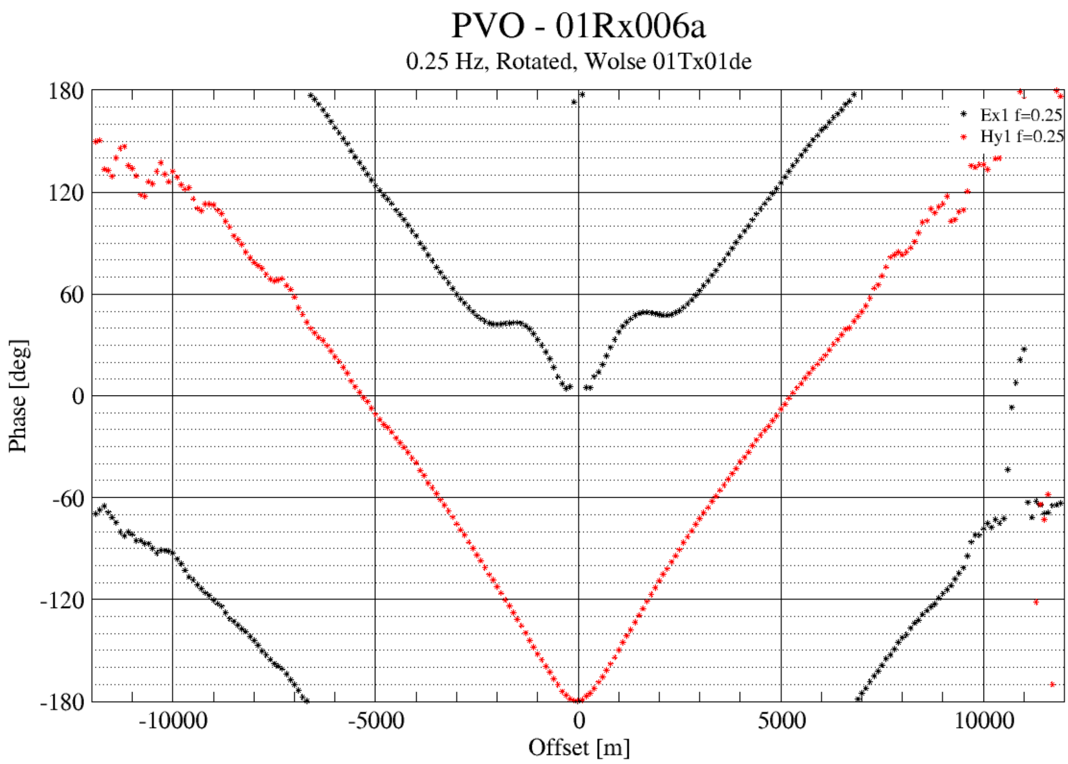

PVO - 01Rx005a
0.25 Hz, Rotated, Wolse 01Tx01de
Phase [deg]
Offset [m]
Ex1 f=0.25
Hy1 f=0.25
180
120
60
0
-60
-120
-180
-10000
-5000
0
5000
10000


MVO - 01Rx006a
0.25 Hz, Scaled, Wolse 01Tx01de
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25

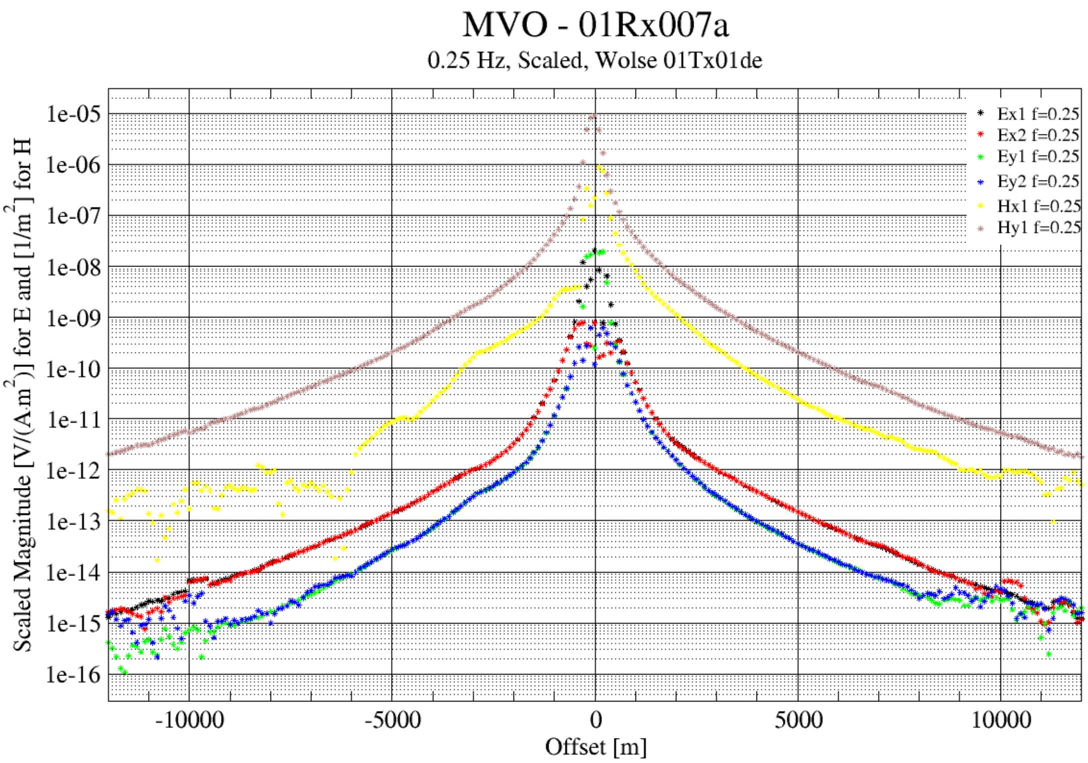

PVO - 01Rx006a
0.25 Hz, Scaled, Wolse 01Tx01de
Phase [deg]
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25

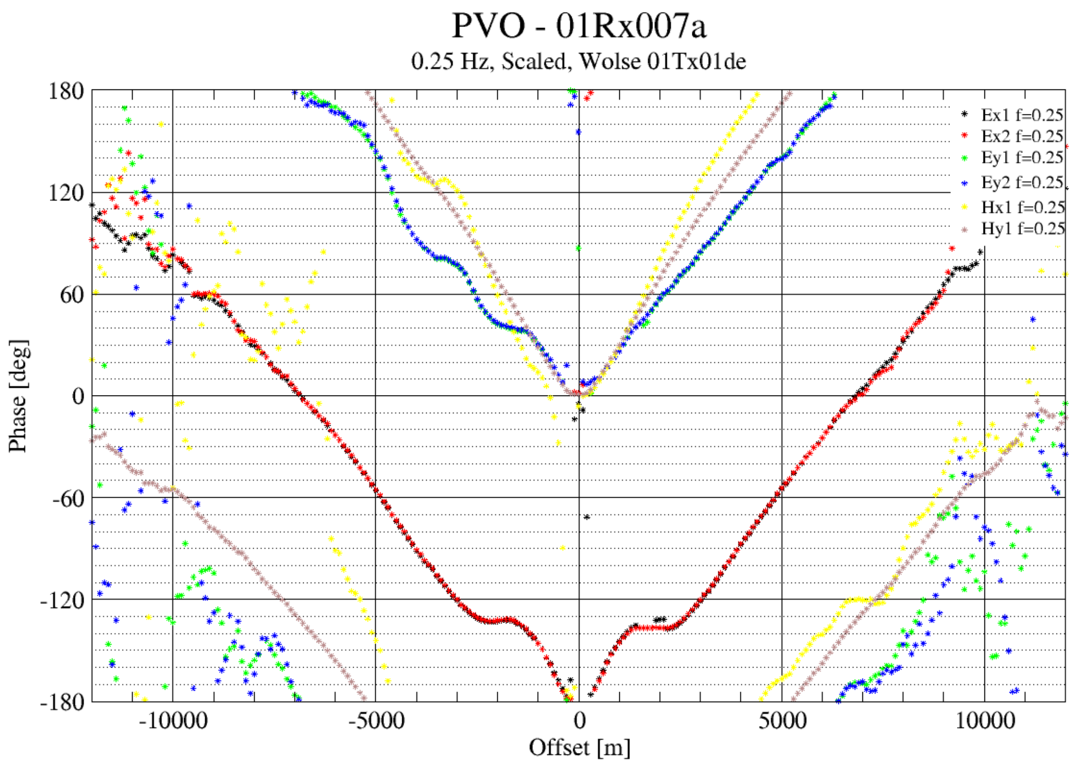


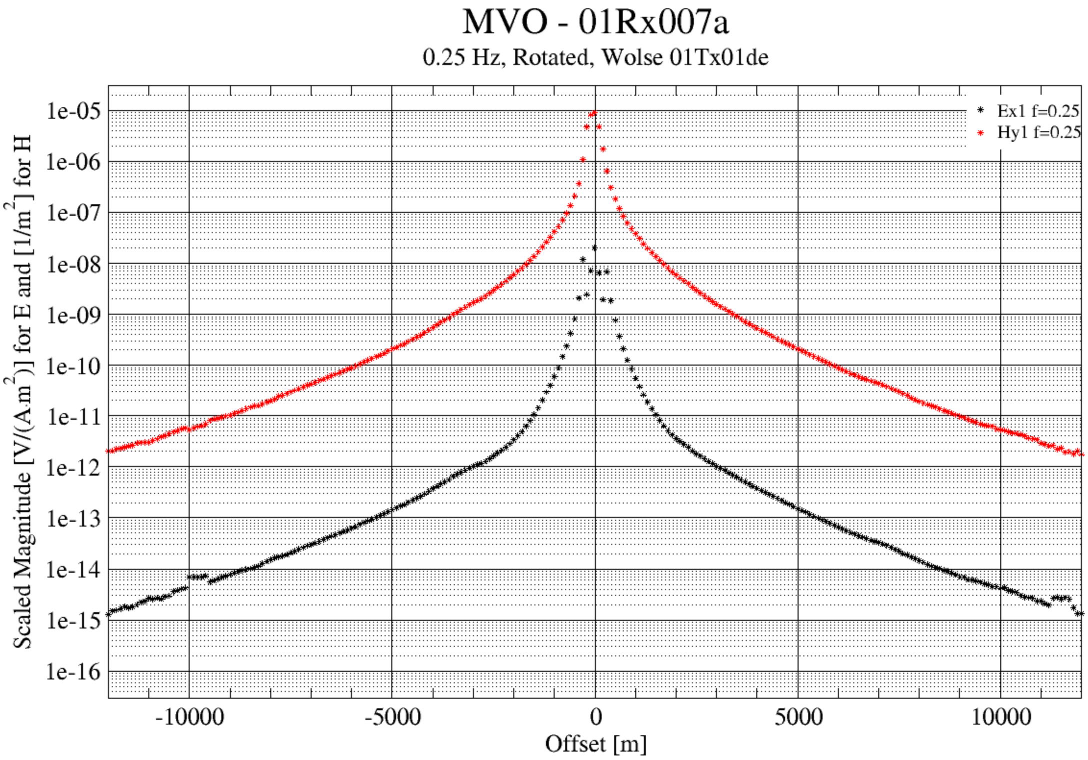
MVO - 01Rx006a
0.25 Hz, Rotated, Wolse 01Tx01de
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
Offset [m]
Ex1 f=0.25
Hy1 f=0.25
1e-05
1e-06
1e-07
1e-08
1e-09
1e-10
1e-11
1e-12
1e-13
1e-14
1e-15
1e-16
-10000
-5000
0
5000
10000



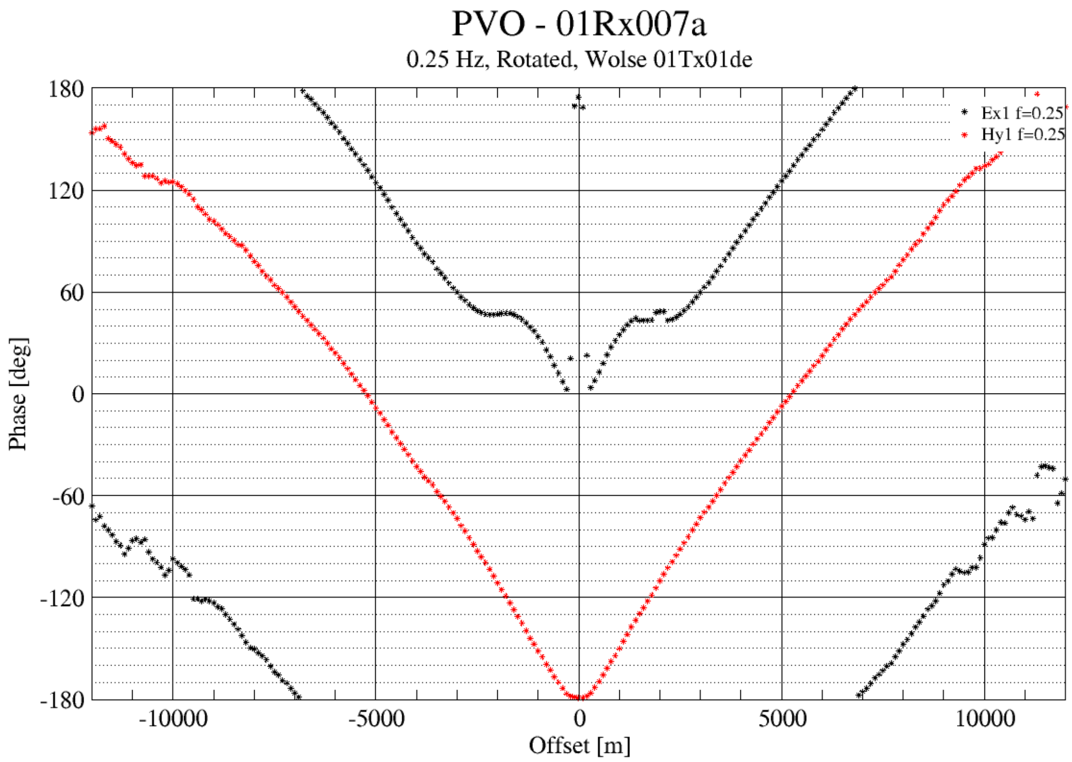
PVO - 01Rx006a
0.25 Hz, Rotated, Wolse 01Tx01de
Phase [deg]
Offset [m]
Ex1 f=0.25
Hy1 f=0.25
180
120
60
0
-60
-120
-180
-10000
-5000
0
5000
10000


MVO - 01Rx007a
0.25 Hz, Scaled, Wolse 01Tx01de
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25


PVO - 01Rx007a
0.25 Hz, Scaled, Wolse 01Tx01de
Phase [deg]
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25



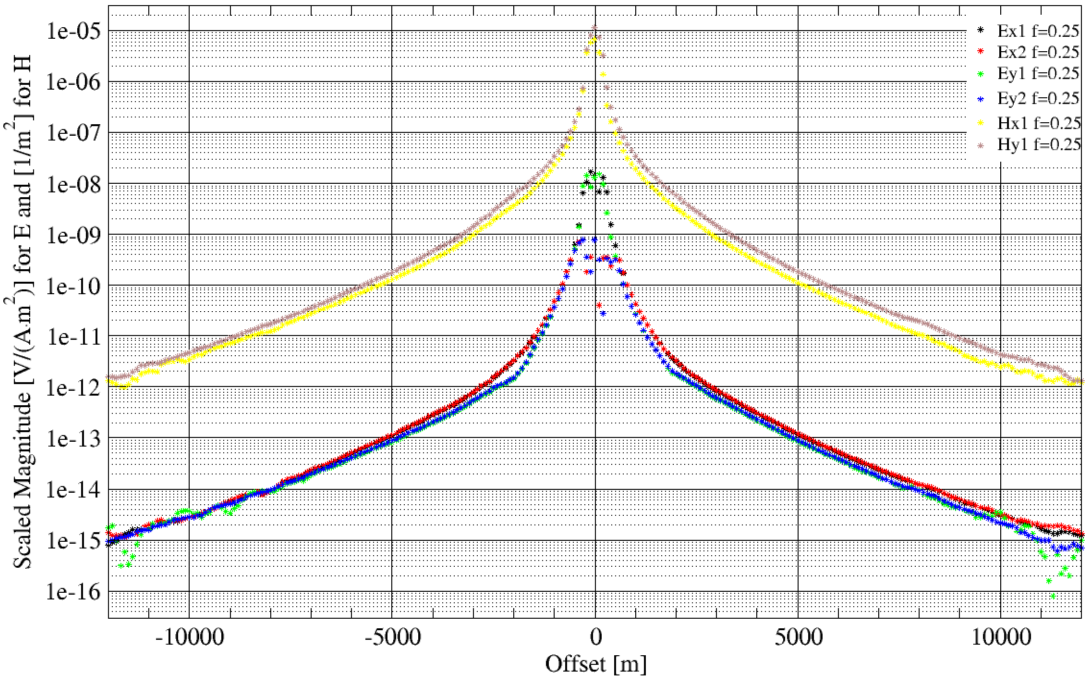
MVO - 01Rx007a
0.25 Hz, Rotated, Wolse 01Tx01de
Ex1 f=0.25
Hy1 f=0.25
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
1e-05
1e-06
1e-07
1e-08
1e-09
1e-10
1e-11
1e-12
1e-13
1e-14
1e-15
1e-16
-10000
-5000
0
5000
10000
Offset [m]



PVO - 01Rx007a
0.25 Hz, Rotated, Wolse 01Tx01de
Ex1 f=0.25
Hy1 f=0.25
Phase [deg]
180
120
60
0
-60
-120
-180
-10000
-5000
0
5000
10000
Offset [m]

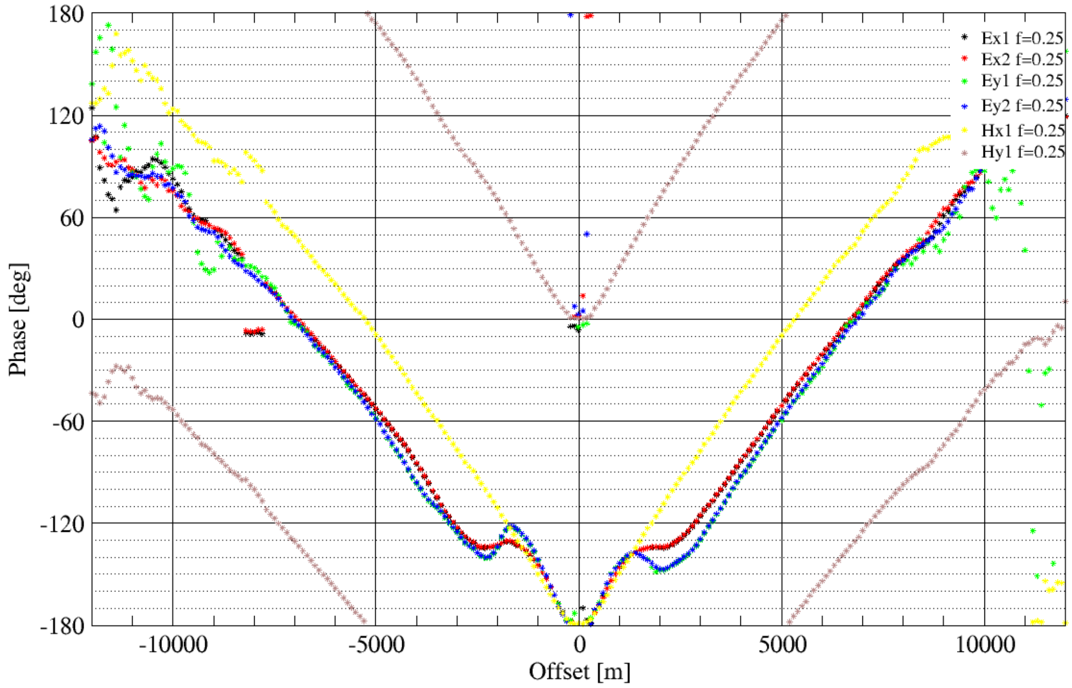
MVO - 01Rx008a

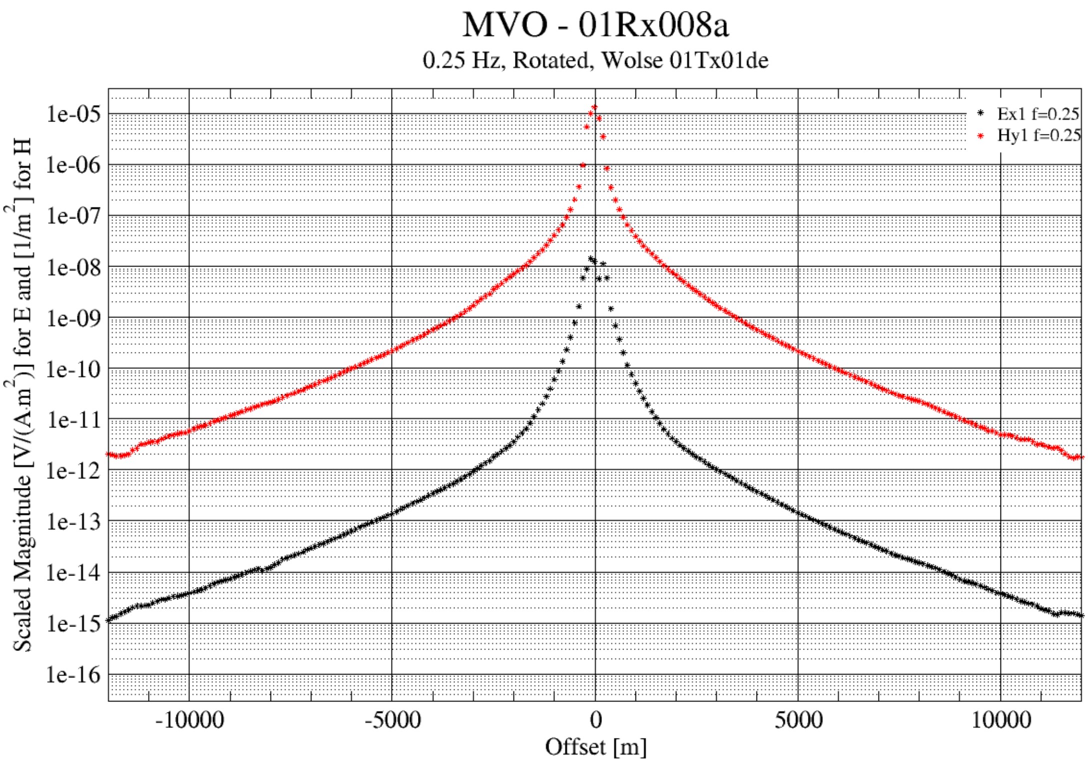
0.25 Hz, Scaled, Wolse 01Tx01de



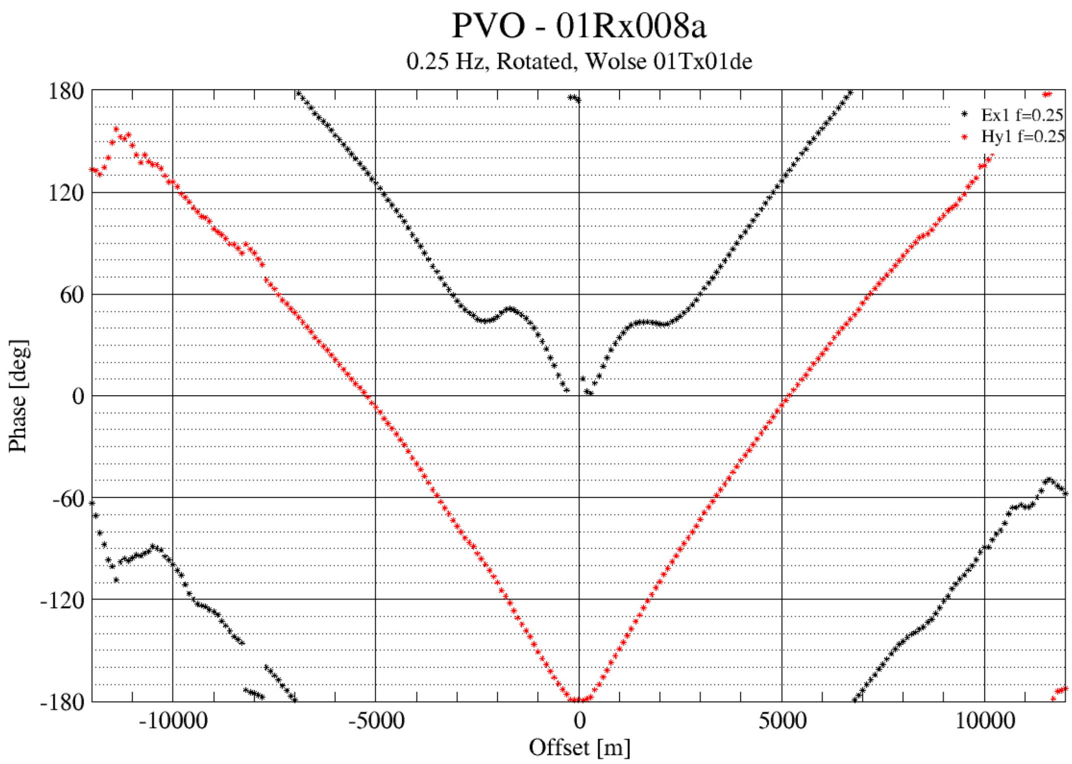
PVO - 01Rx008a

0.25 Hz, Scaled, Wolse 01Tx01de

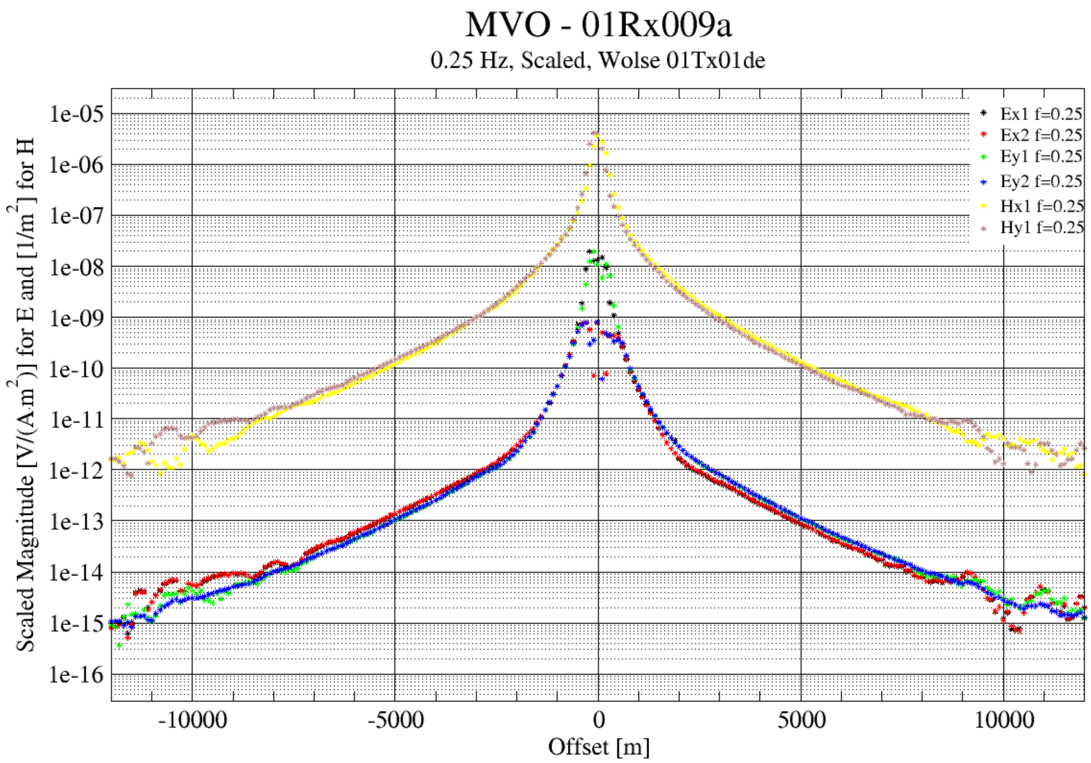


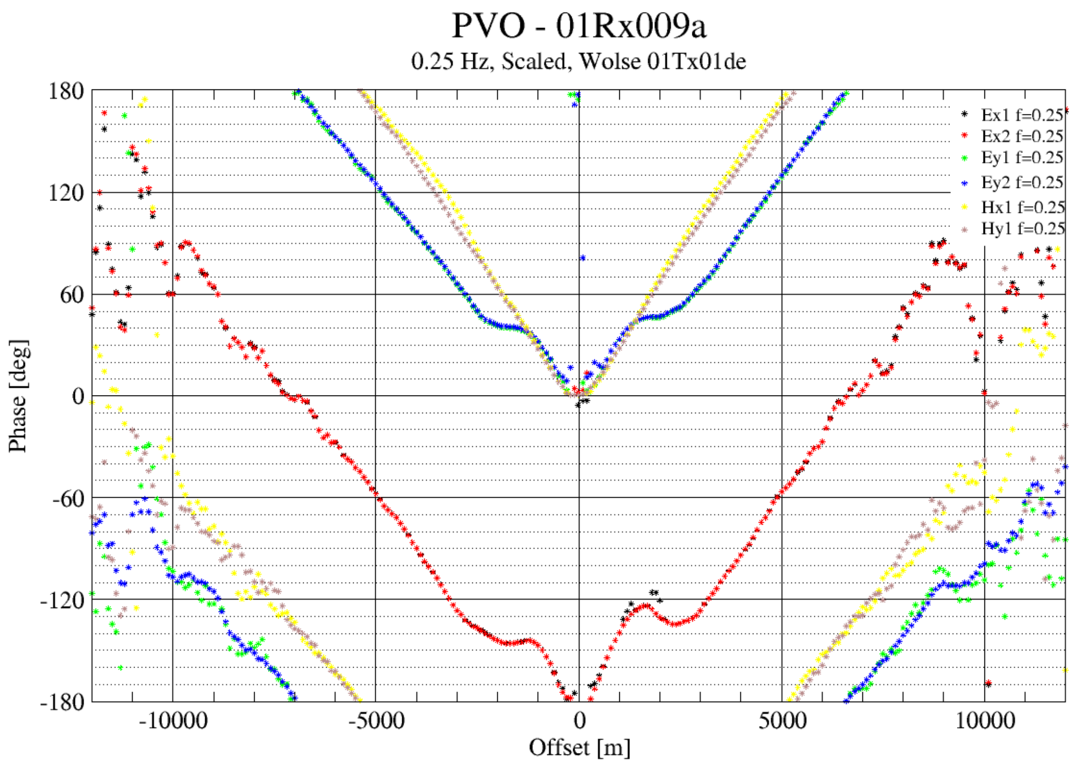


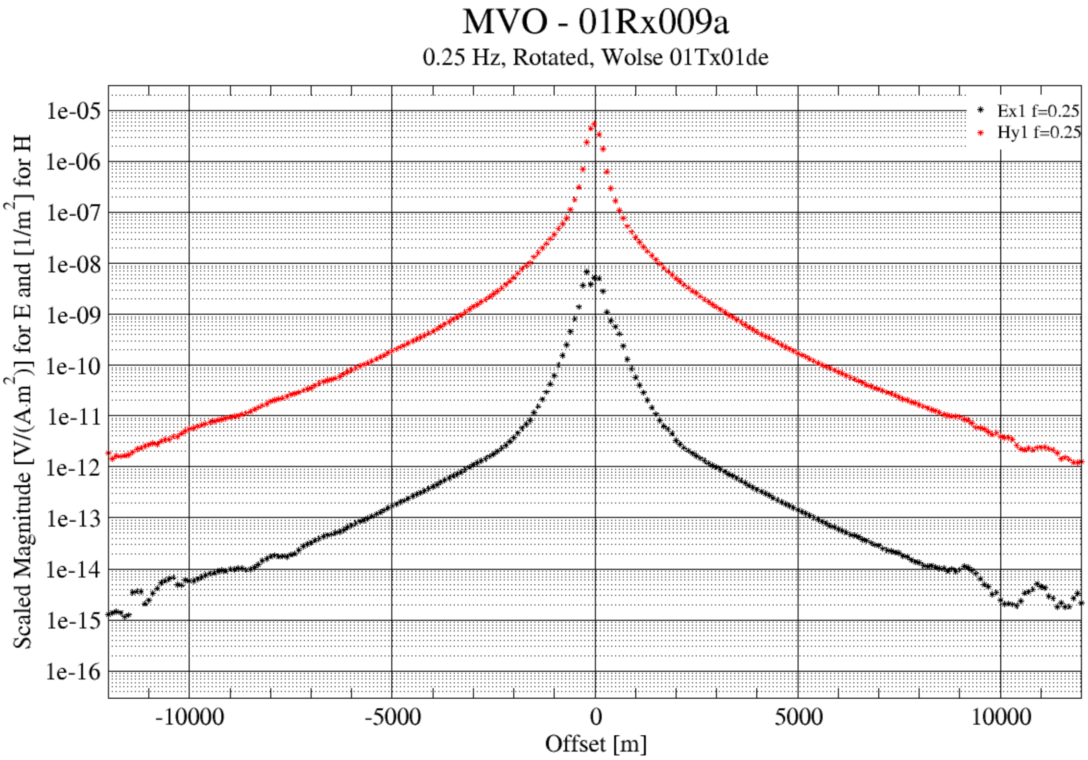
MVO - 01Rx008a
0.25 Hz, Rotated, Wolse 01Tx01de
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
Offset [m]
Ex1 f=0.25
Hy1 f=0.25



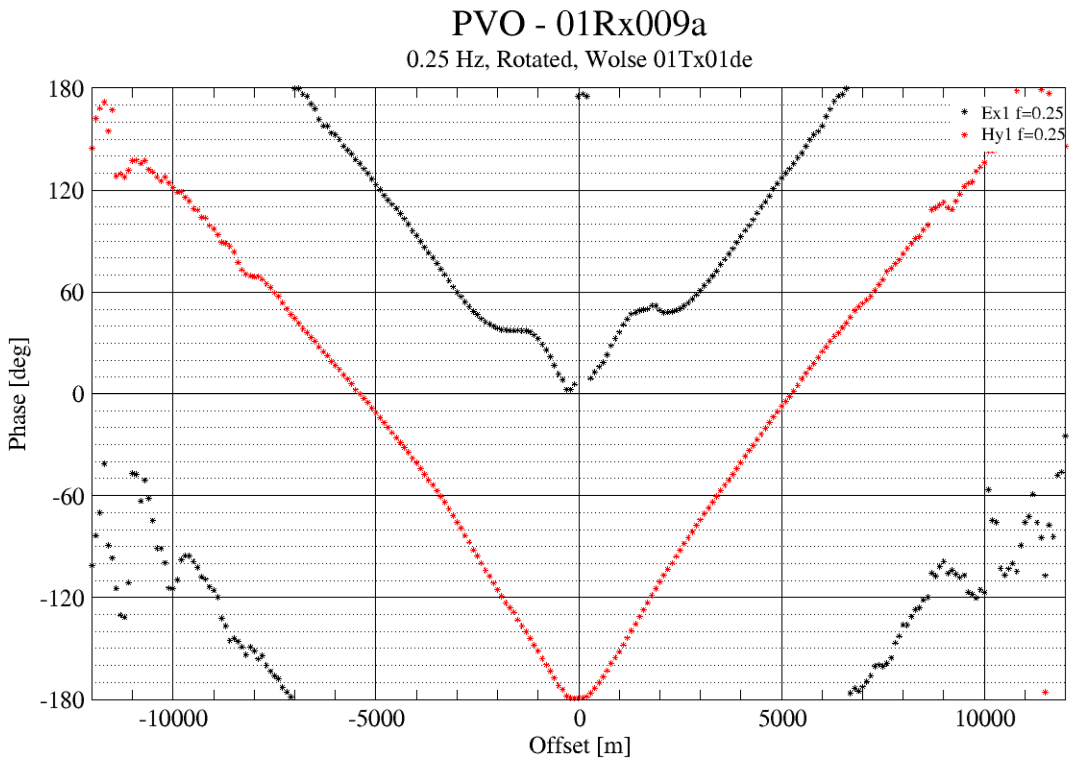
PVO - 01Rx008a
0.25 Hz, Rotated, Wolse 01Tx01de
Phase [deg]
Offset [m]
Ex1 f=0.25
Hy1 f=0.25


MVO - 01Rx009a
0.25 Hz, Scaled, Wolse 01Tx01de
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
1e-05
1e-06
1e-07
1e-08
1e-09
1e-10
1e-11
1e-12
1e-13
1e-14
1e-15
1e-16
-10000
-5000
0
5000
10000
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25


PVO - 01Rx009a
0.25 Hz, Scaled, Wolse 01Tx01de
Phase [deg]
180
120
60
0
-60
-120
-180
-10000
-5000
0
5000
10000
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25



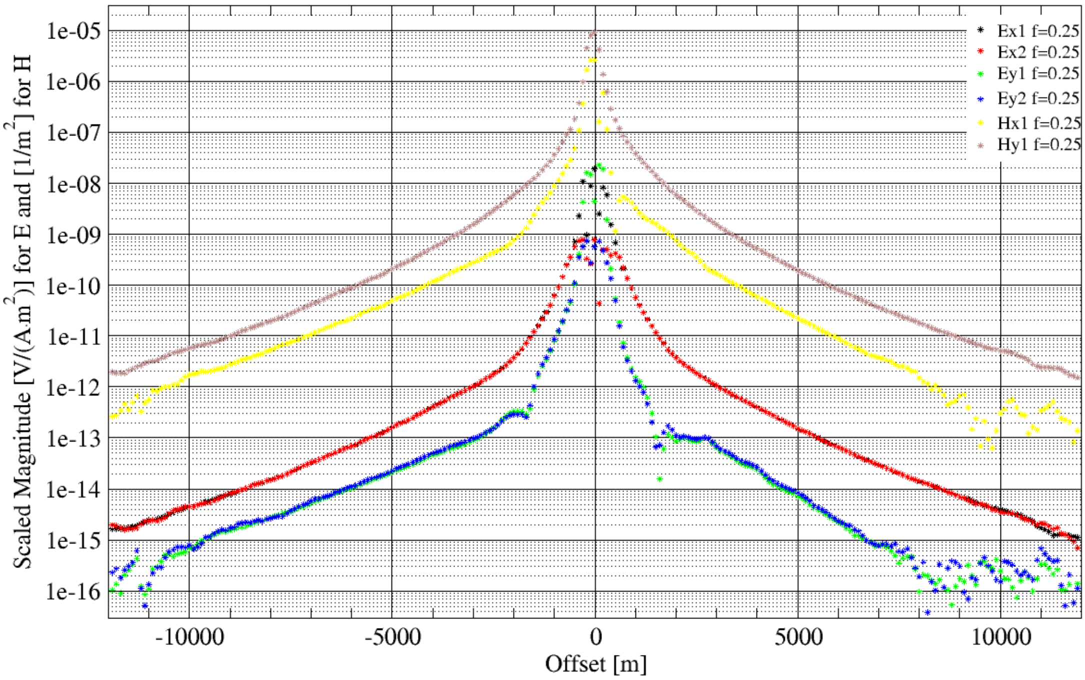
MVO - 01Rx009a
0.25 Hz, Rotated, Wolse 01Tx01de
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
1e-05
1e-06
1e-07
1e-08
1e-09
1e-10
1e-11
1e-12
1e-13
1e-14
1e-15
1e-16
-10000
-5000
0
5000
10000
Offset [m]
Ex1 f=0.25
Hy1 f=0.25



PVO - 01Rx009a
0.25 Hz, Rotated, Wolse 01Tx01de
Phase [deg]
180
120
60
0
-60
-120
-180
-10000
-5000
0
5000
10000
Offset [m]
Ex1 f=0.25
Hy1 f=0.25

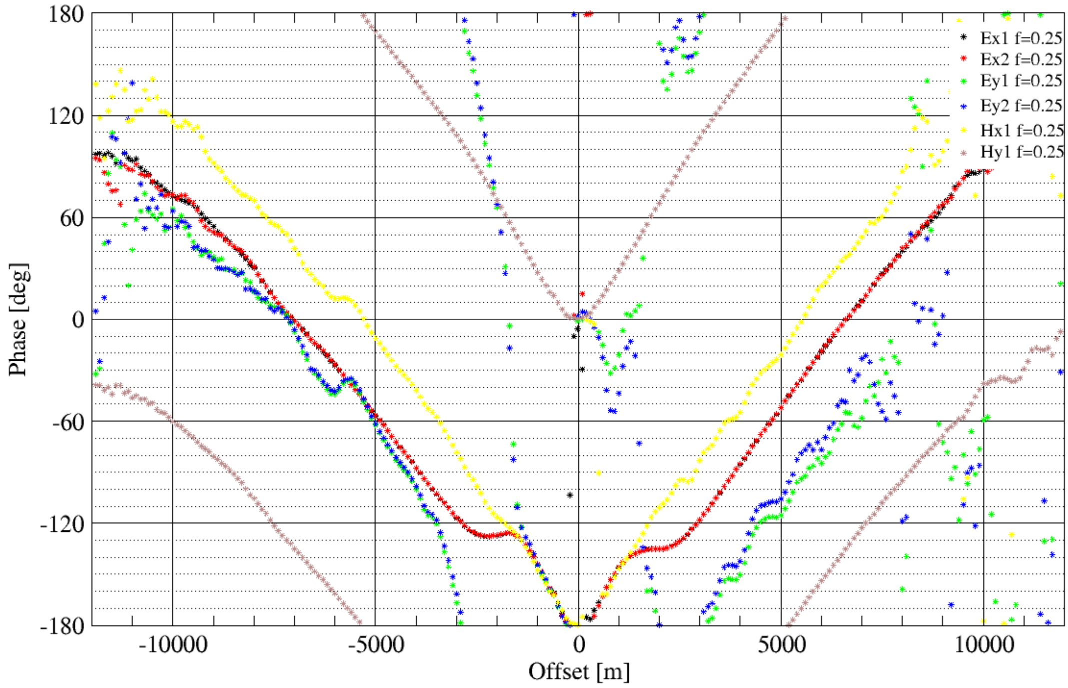
MVO - 01Rx010a

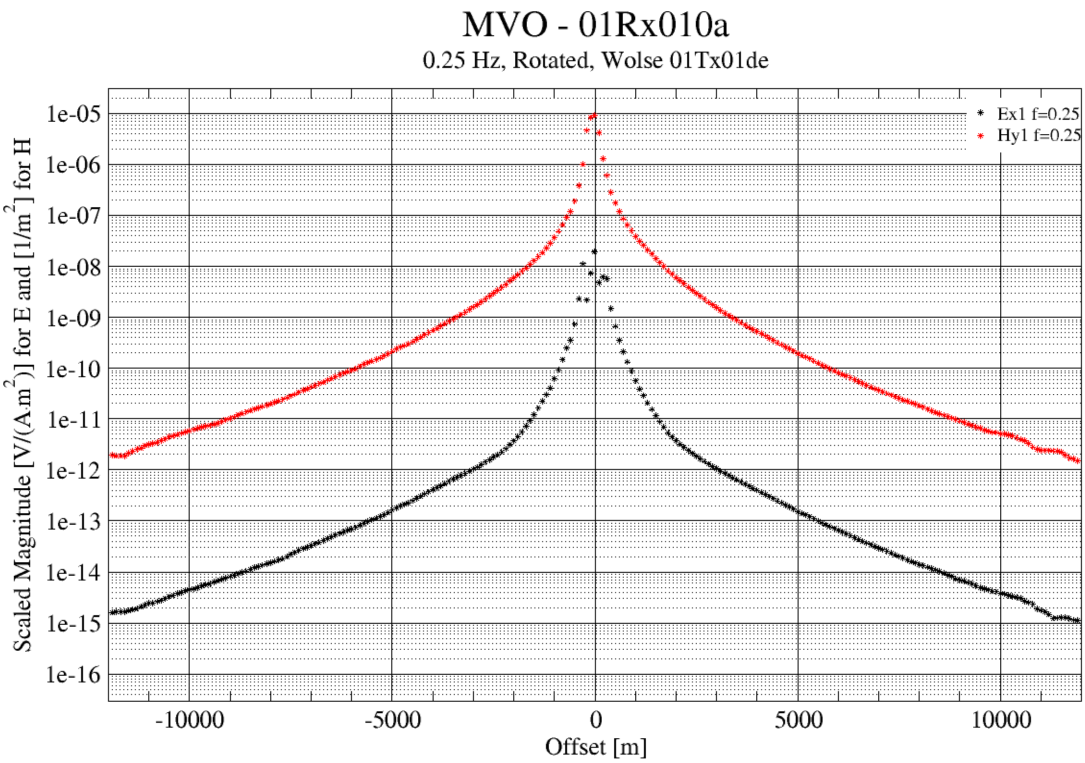
0.25 Hz, Scaled, Wolse 01Tx01de

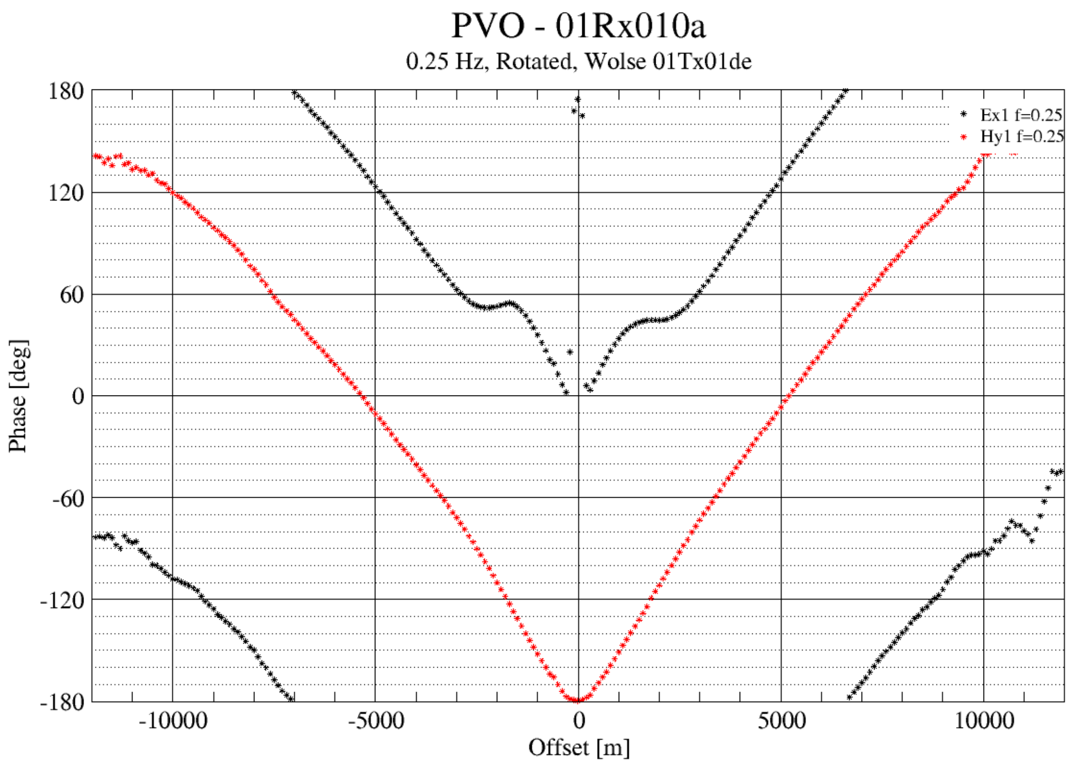


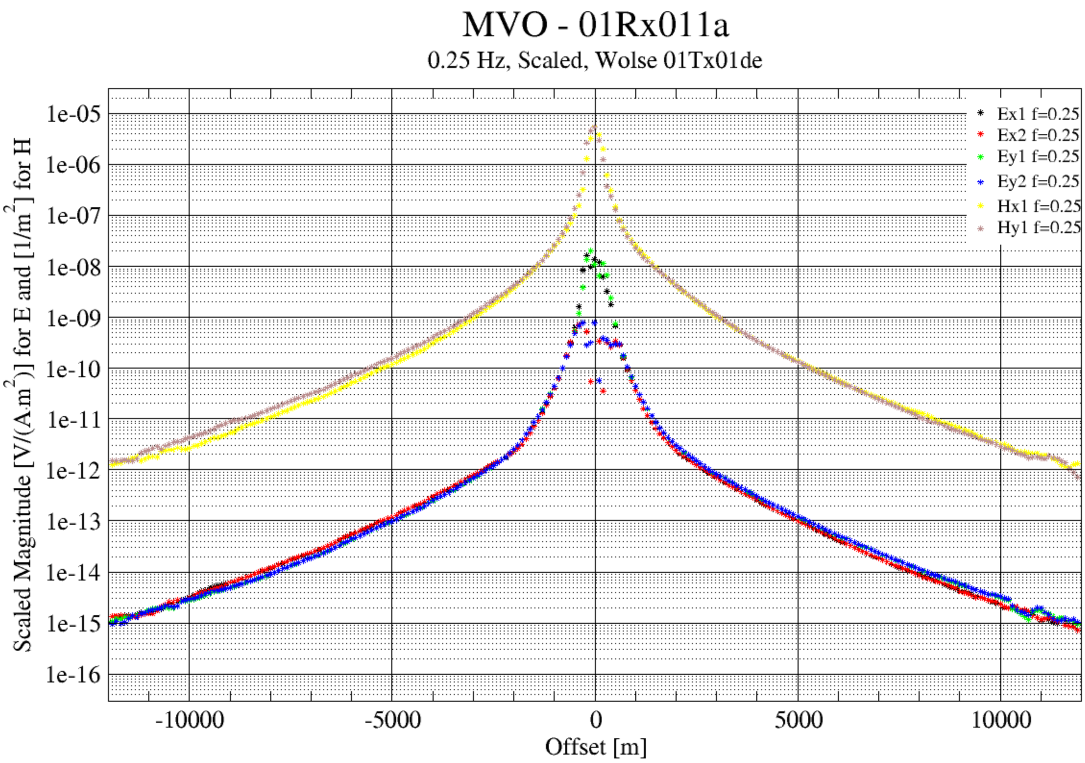
PVO - 01Rx010a

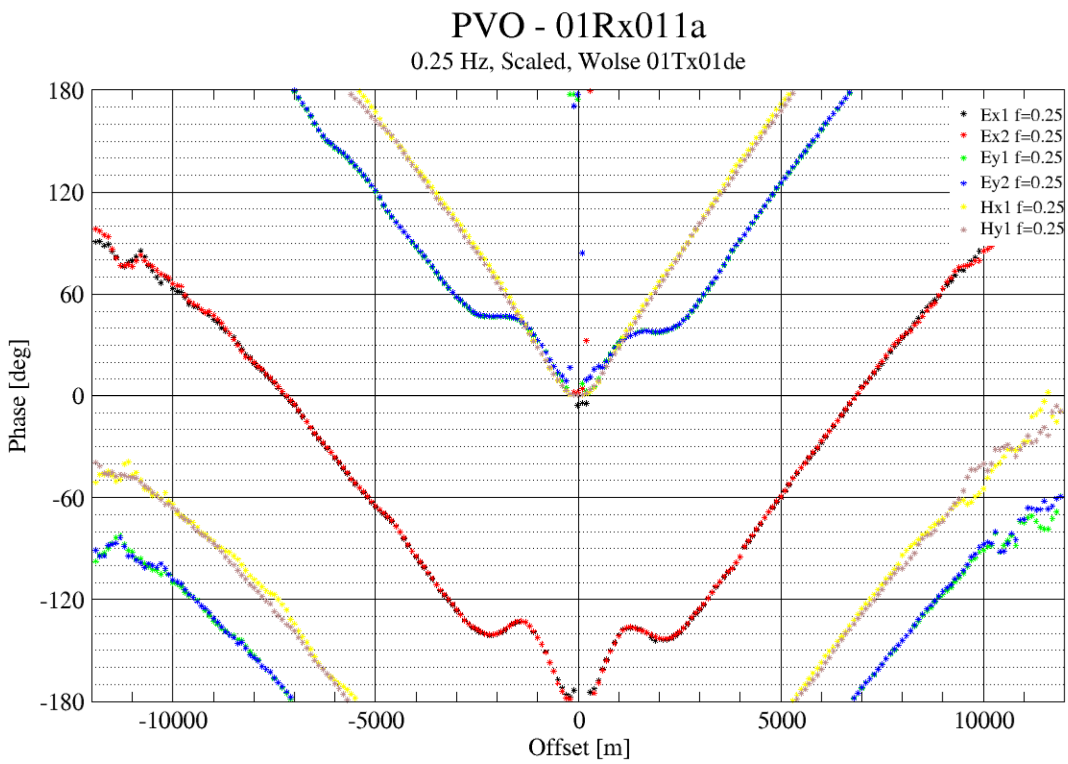
0.25 Hz, Scaled, Wolse 01Tx01de

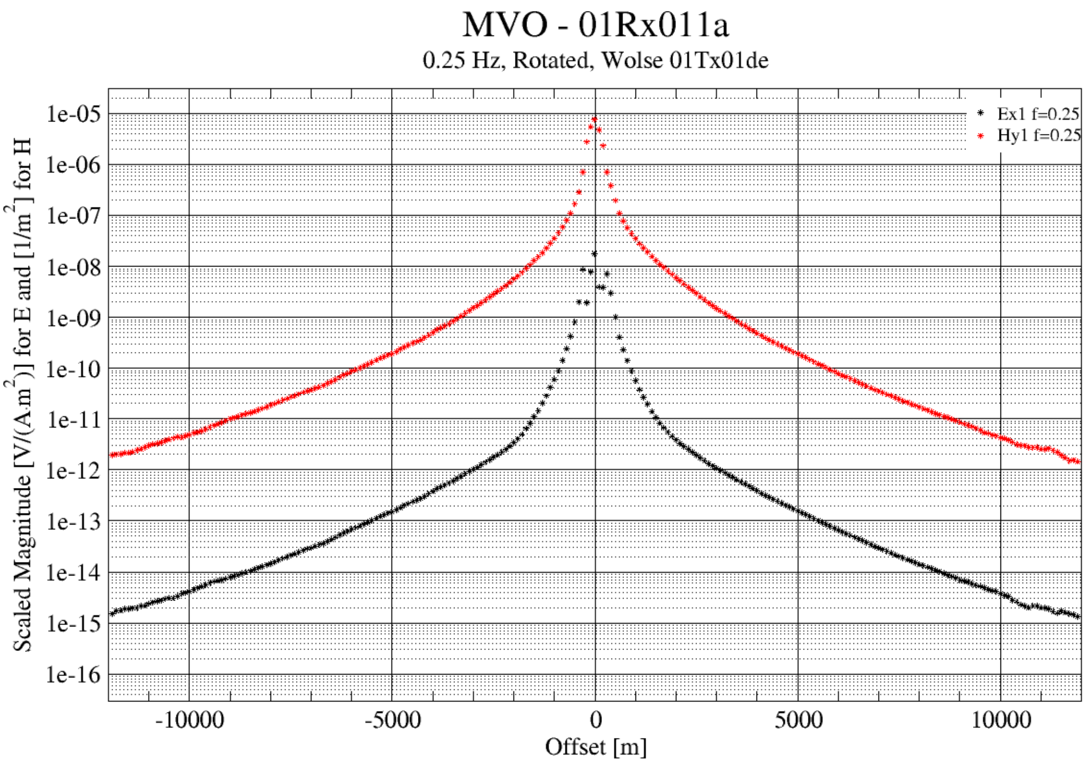



MVO - 01Rx010a
0.25 Hz, Rotated, Wolse 01Tx01de
Ex1 f=0.25
Hy1 f=0.25
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
1e-05
1e-06
1e-07
1e-08
1e-09
1e-10
1e-11
1e-12
1e-13
1e-14
1e-15
1e-16
-10000
-5000
0
5000
10000
Offset [m]

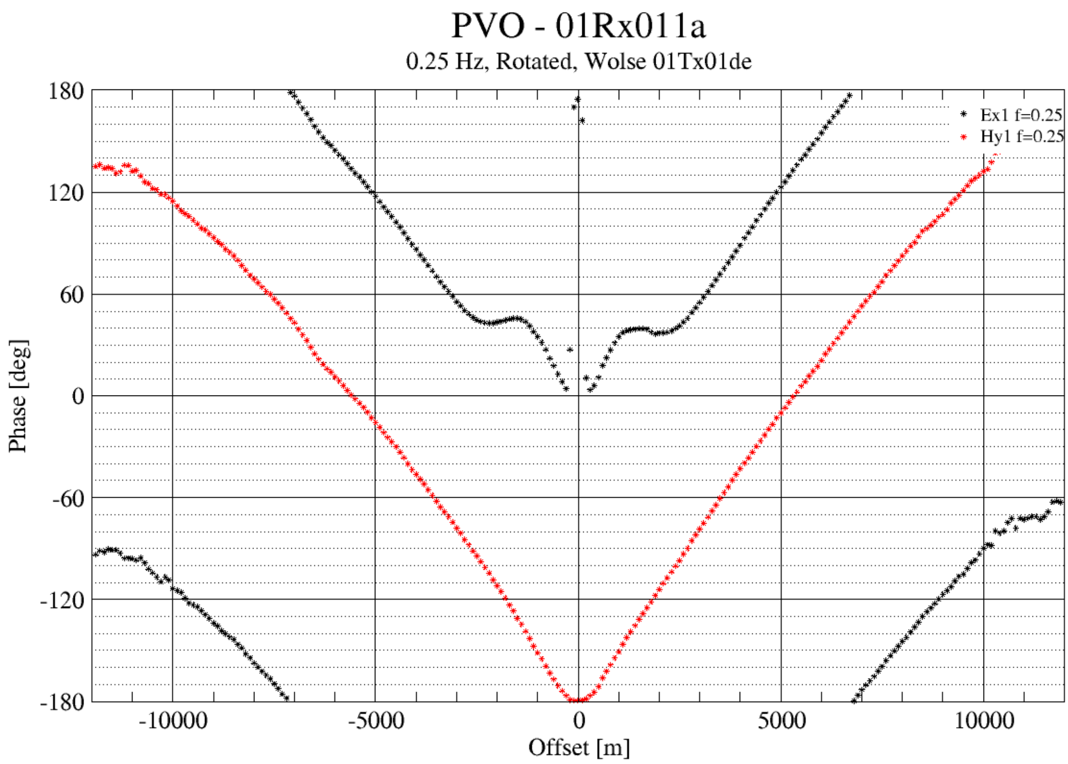

PVO - 01Rx010a
0.25 Hz, Rotated, Wolse 01Tx01de
Ex1 f=0.25
Hy1 f=0.25
Phase [deg]
180
120
60
0
-60
-120
-180
-10000
-5000
0
5000
10000
Offset [m]


MVO - 01Rx011a
0.25 Hz, Scaled, Wolse 01Tx01de
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
1e-05
1e-06
1e-07
1e-08
1e-09
1e-10
1e-11
1e-12
1e-13
1e-14
1e-15
1e-16
-10000
-5000
0
5000
10000
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25

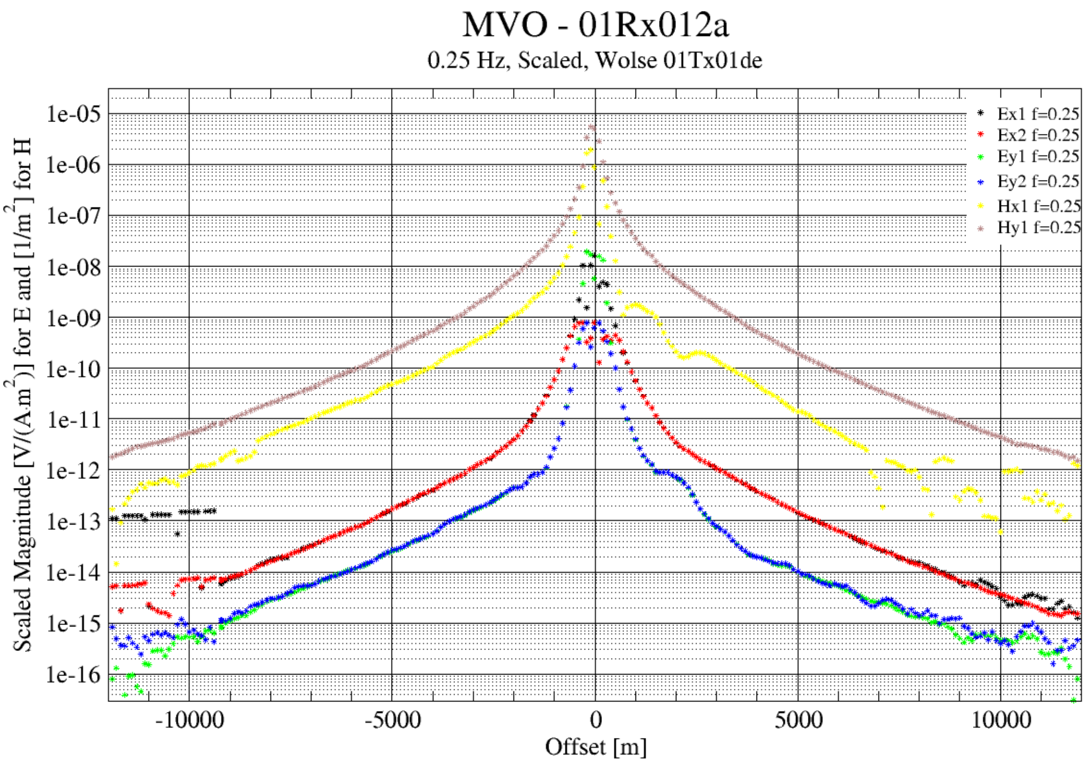

PVO - 01Rx011a
0.25 Hz, Scaled, Wolse 01Tx01de
Phase [deg]
180
120
60
0
-60
-120
-180
-10000
-5000
0
5000
10000
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25

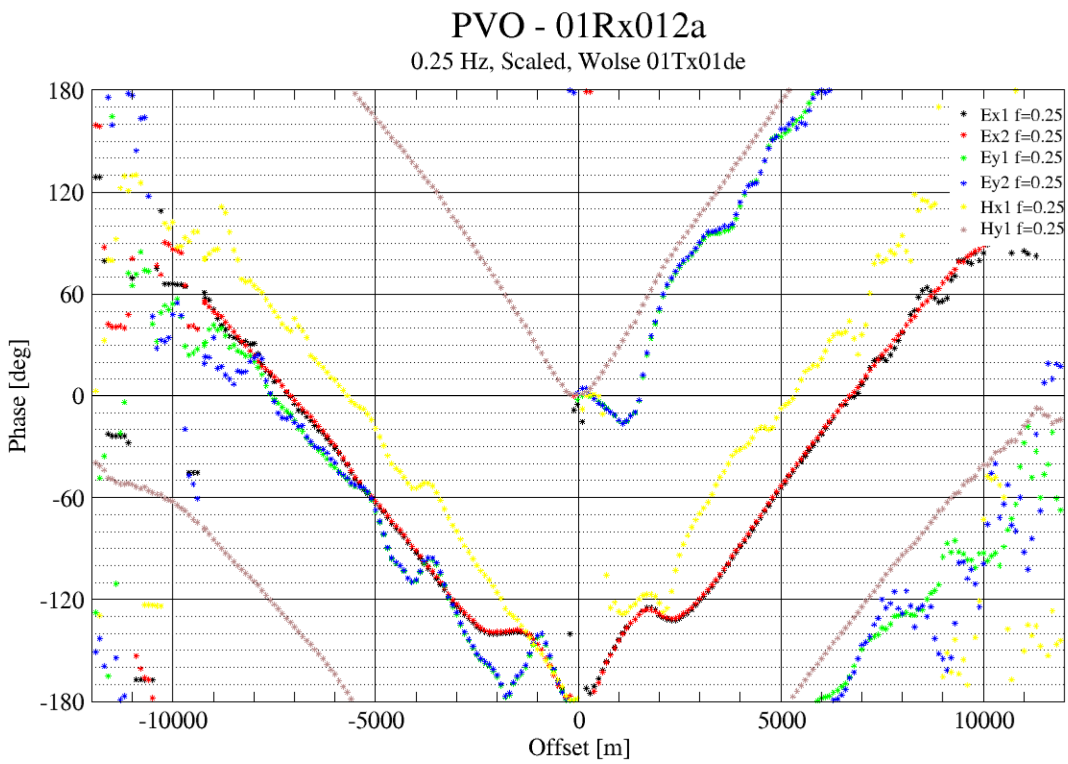


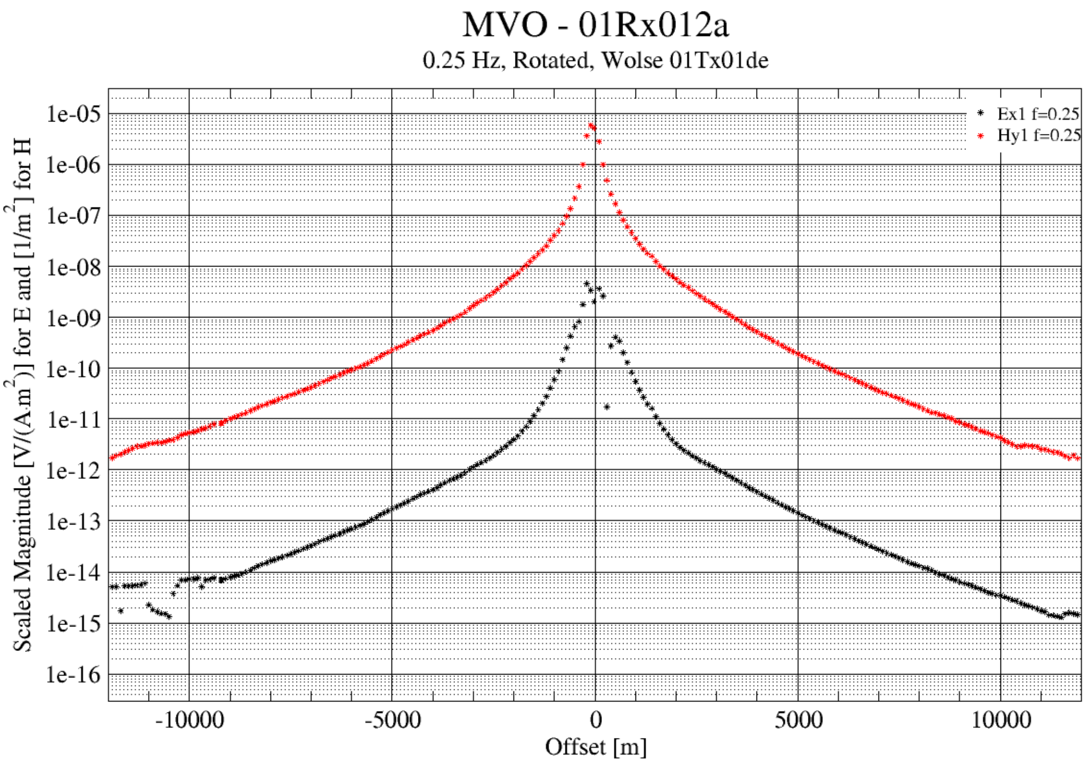
MVO - 01Rx011a
0.25 Hz, Rotated, Wolse 01Tx01de
Ex1 f=0.25
Hy1 f=0.25
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
1e-05
1e-06
1e-07
1e-08
1e-09
1e-10
1e-11
1e-12
1e-13
1e-14
1e-15
1e-16
-10000
-5000
0
5000
10000
Offset [m]

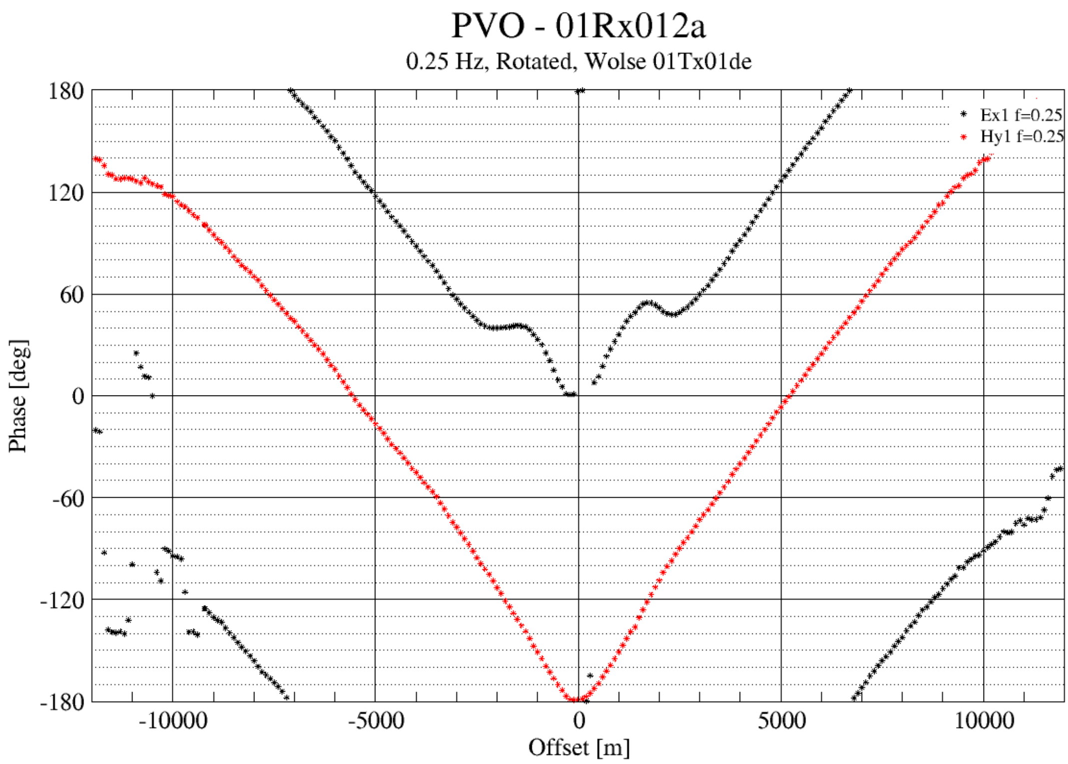


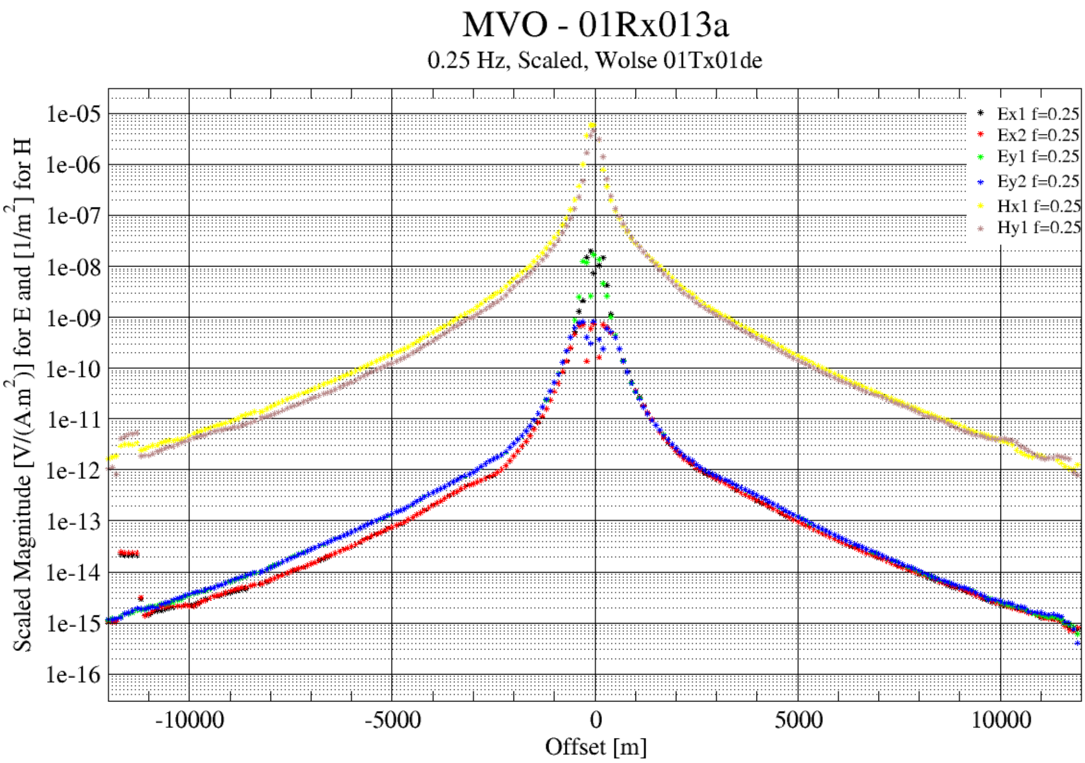
PVO - 01Rx011a
0.25 Hz, Rotated, Wolse 01Tx01de
Ex1 f=0.25
Hy1 f=0.25
Phase [deg]
180
120
60
0
-60
-120
-180
-10000
-5000
0
5000
10000
Offset [m]

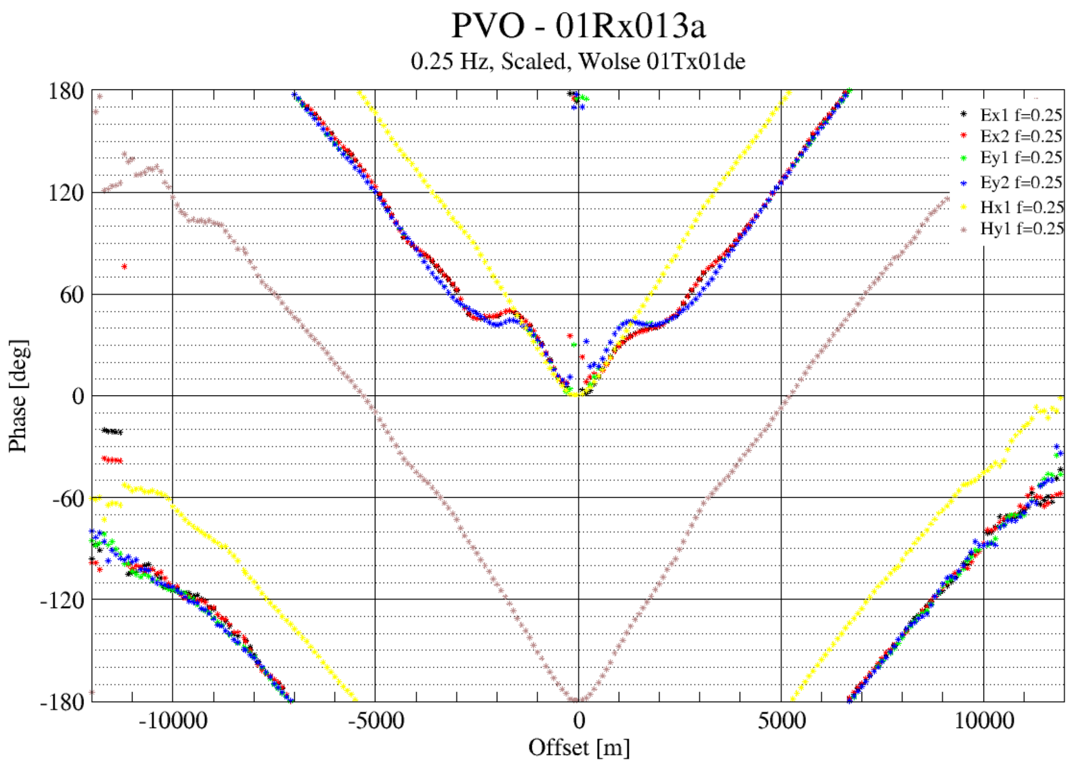

MVO - 01Rx012a
0.25 Hz, Scaled, Wolse 01Tx01de
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25

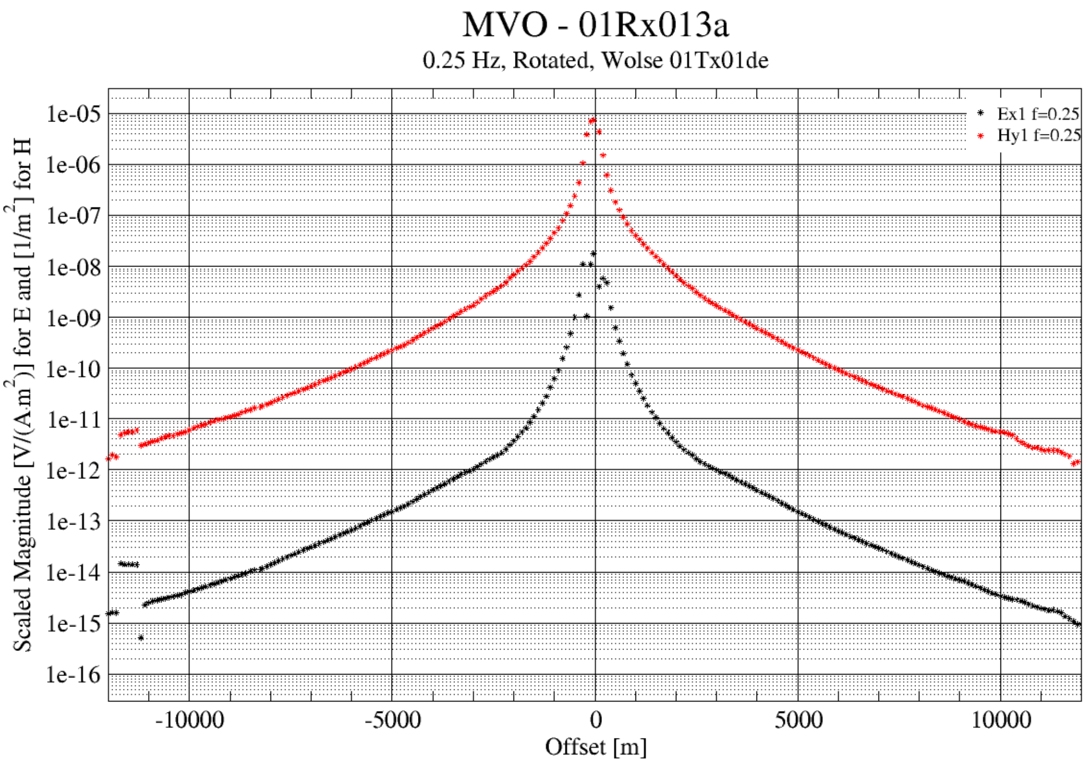

PVO - 01Rx012a
0.25 Hz, Scaled, Wolse 01Tx01de
Phase [deg]
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25

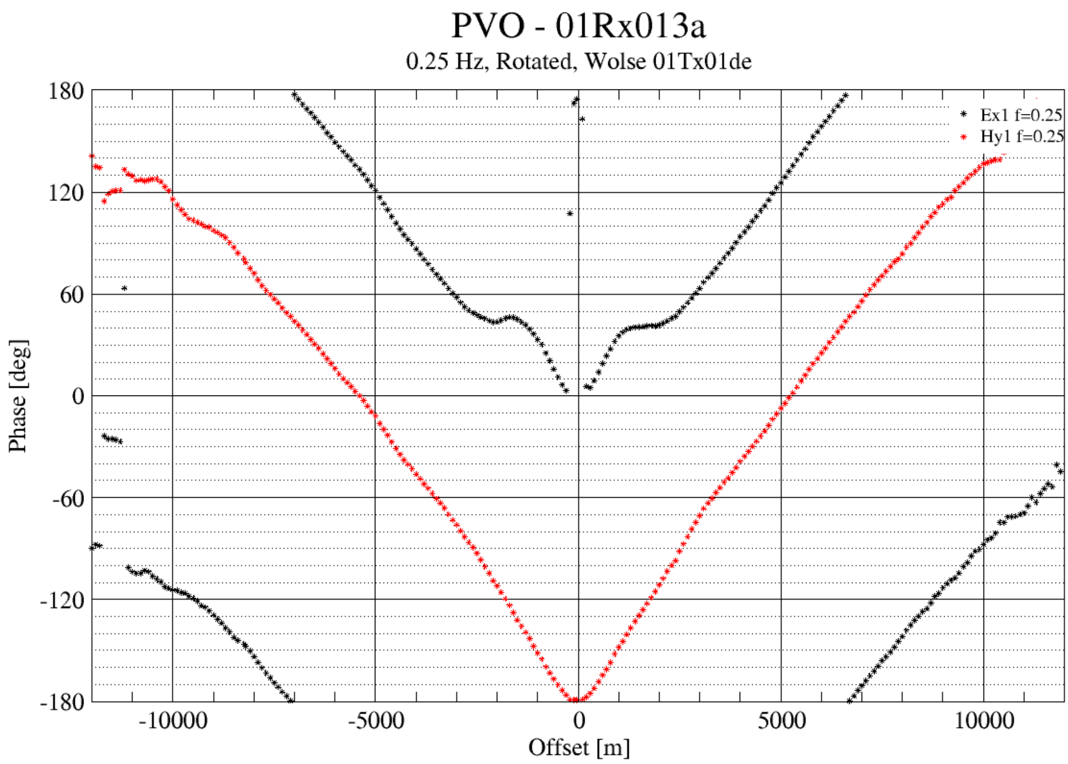

MVO - 01Rx012a
0.25 Hz, Rotated, Wolse 01Tx01de
Ex1 f=0.25
Hy1 f=0.25
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
1e-05
1e-06
1e-07
1e-08
1e-09
1e-10
1e-11
1e-12
1e-13
1e-14
1e-15
1e-16
-10000
-5000
0
5000
10000
Offset [m]

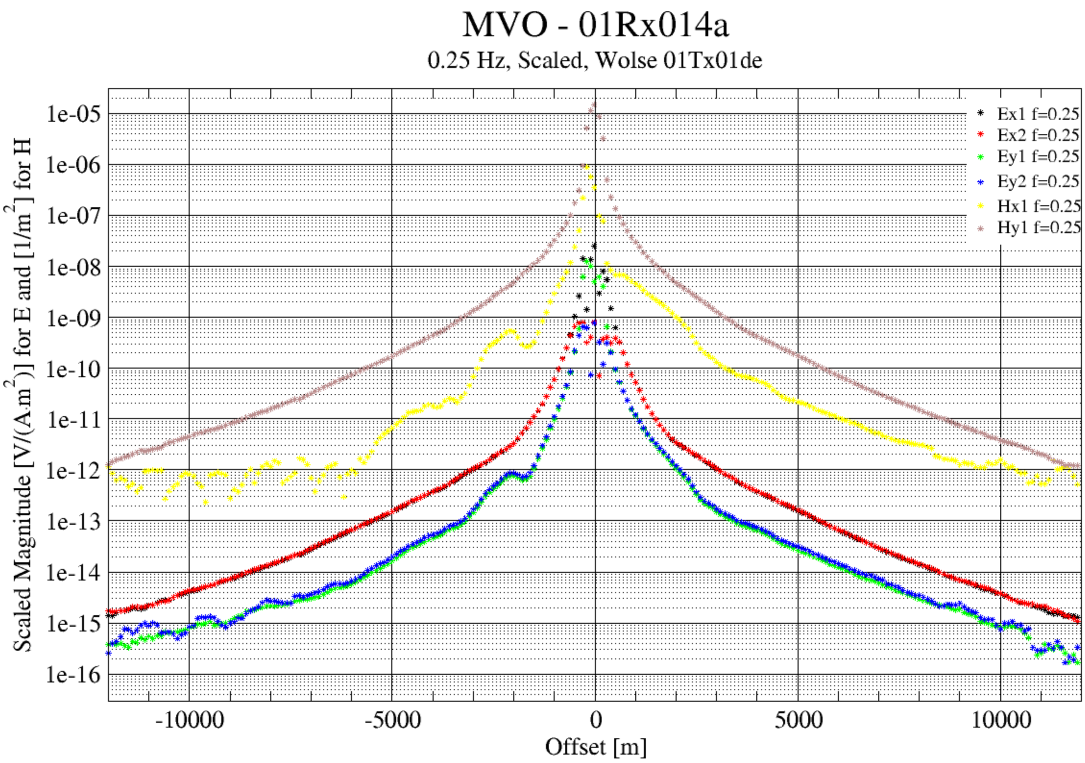

PVO - 01Rx012a
0.25 Hz, Rotated, Wolse 01Tx01de
Ex1 f=0.25
Hy1 f=0.25
Phase [deg]
180
120
60
0
-60
-120
-180
-10000
-5000
0
5000
10000
Offset [m]

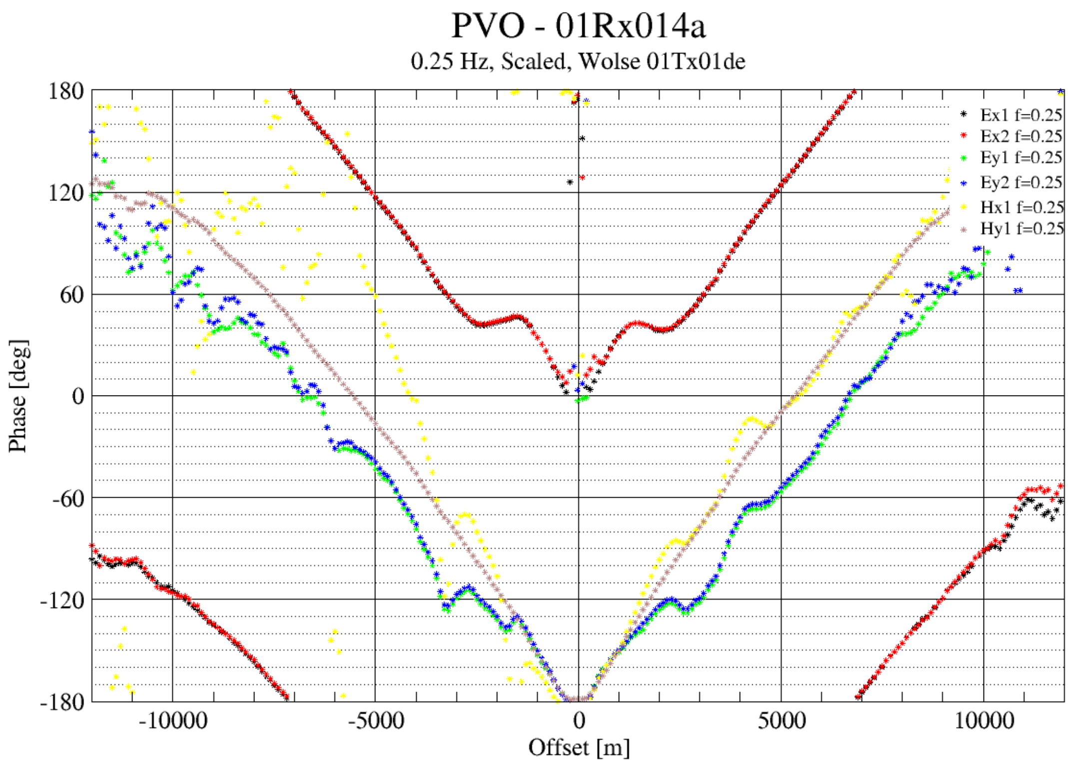

MVO - 01Rx013a
0.25 Hz, Scaled, Wolse 01Tx01de
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25

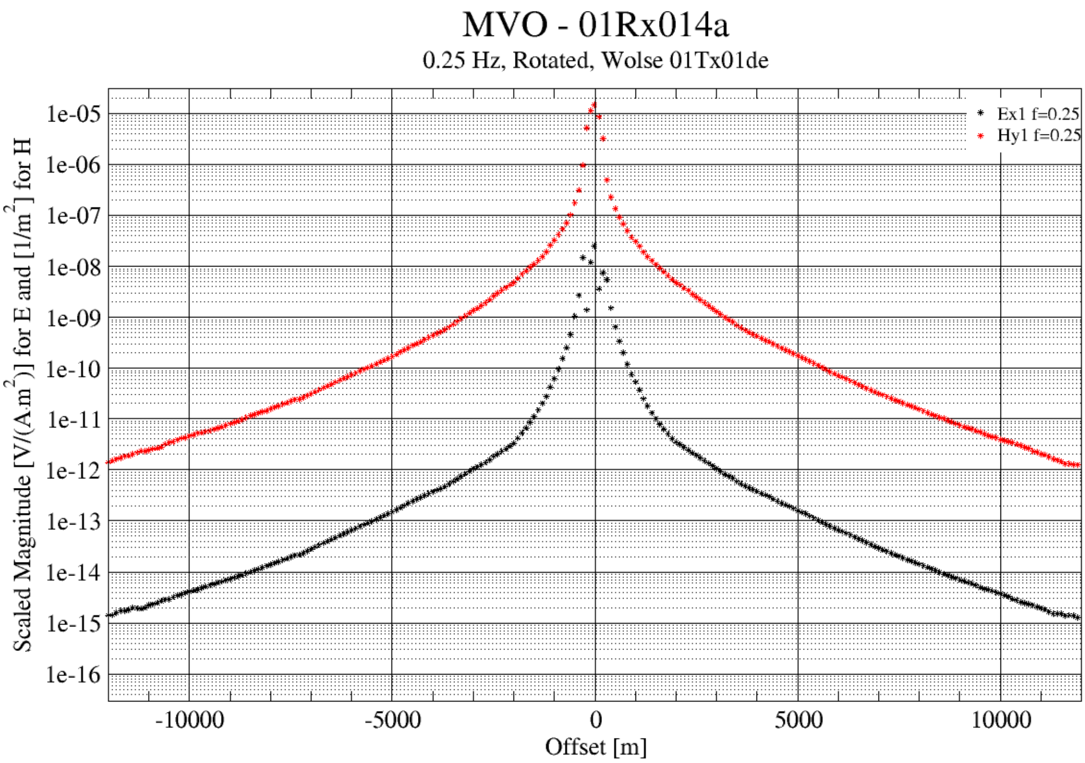

PVO - 01Rx013a
0.25 Hz, Scaled, Wolse 01Tx01de
Phase [deg]
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25

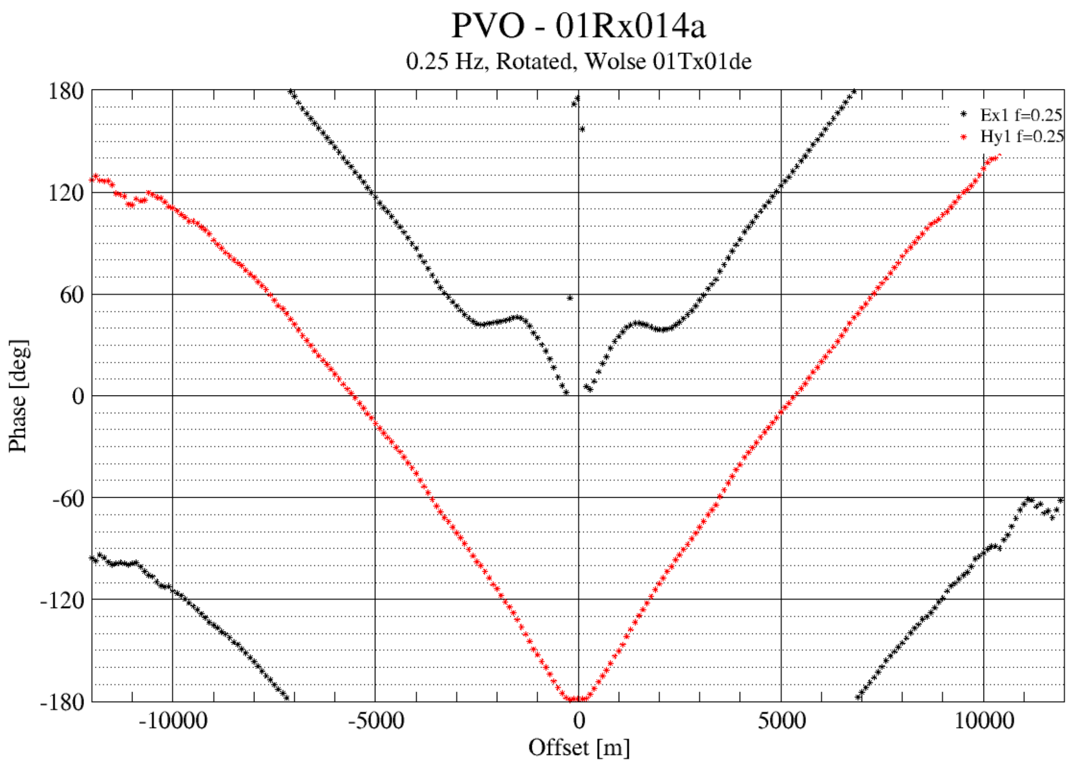

MVO - 01Rx013a
0.25 Hz, Rotated, Wolse 01Tx01de
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
Offset [m]
Ex1 f=0.25
Hy1 f=0.25

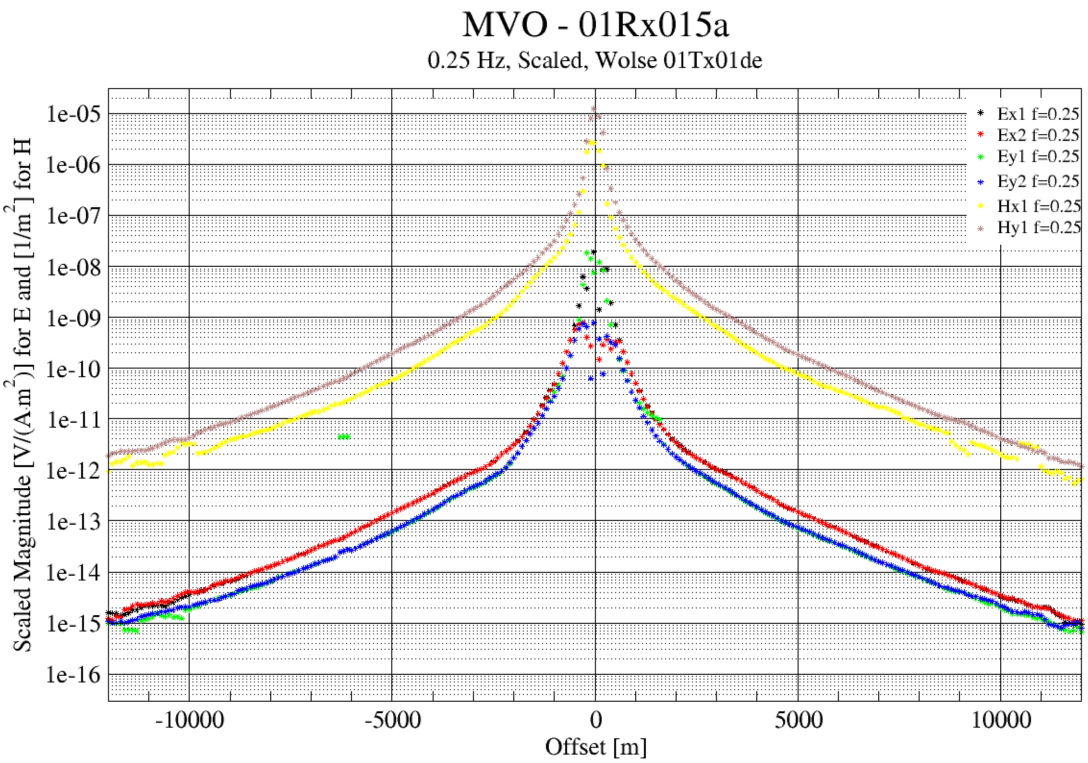

PVO - 01Rx013a
0.25 Hz, Rotated, Wolse 01Tx01de
Phase [deg]
Offset [m]
Ex1 f=0.25
Hy1 f=0.25


MVO - 01Rx014a
0.25 Hz, Scaled, Wolse 01Tx01de
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25

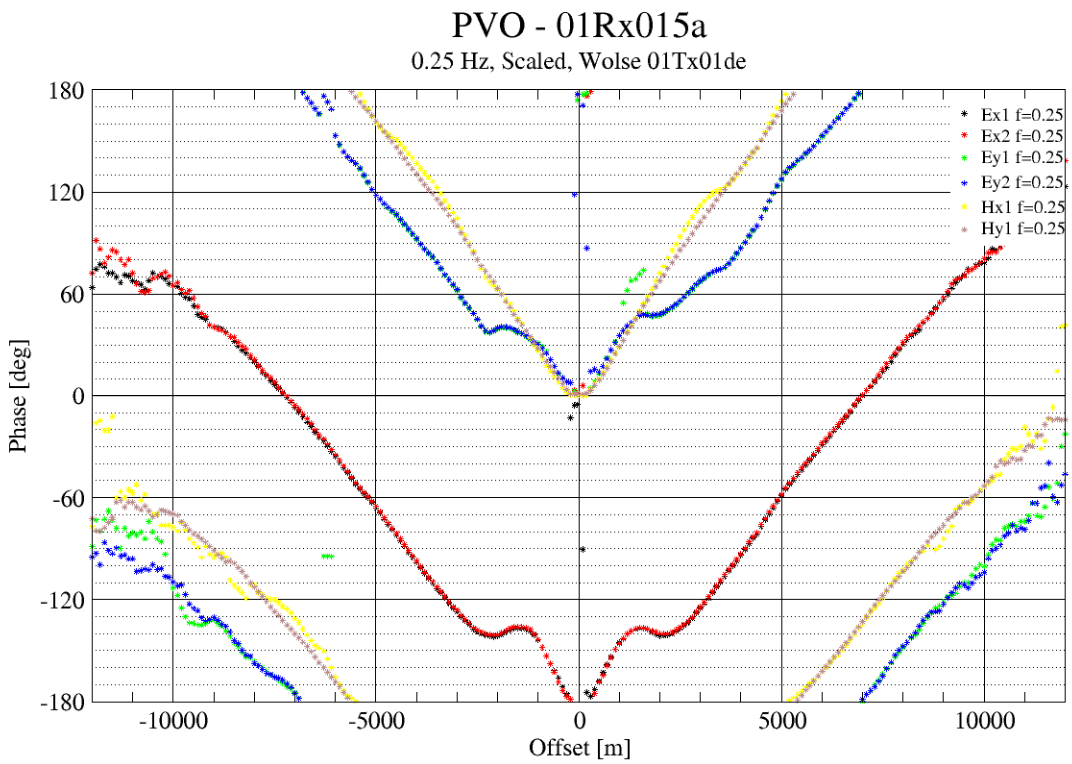

PVO - 01Rx014a
0.25 Hz, Scaled, Wolse 01Tx01de
Phase [deg]
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25


MVO - 01Rx014a
0.25 Hz, Rotated, Wolse 01Tx01de
Ex1 f=0.25
Hy1 f=0.25
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
1e-05
1e-06
1e-07
1e-08
1e-09
1e-10
1e-11
1e-12
1e-13
1e-14
1e-15
1e-16
-10000
-5000
0
5000
10000
Offset [m]


PVO - 01Rx014a
0.25 Hz, Rotated, Wolse 01Tx01de
Ex1 f=0.25
Hy1 f=0.25
Phase [deg]
180
120
60
0
-60
-120
-180
-10000
-5000
0
5000
10000
Offset [m]



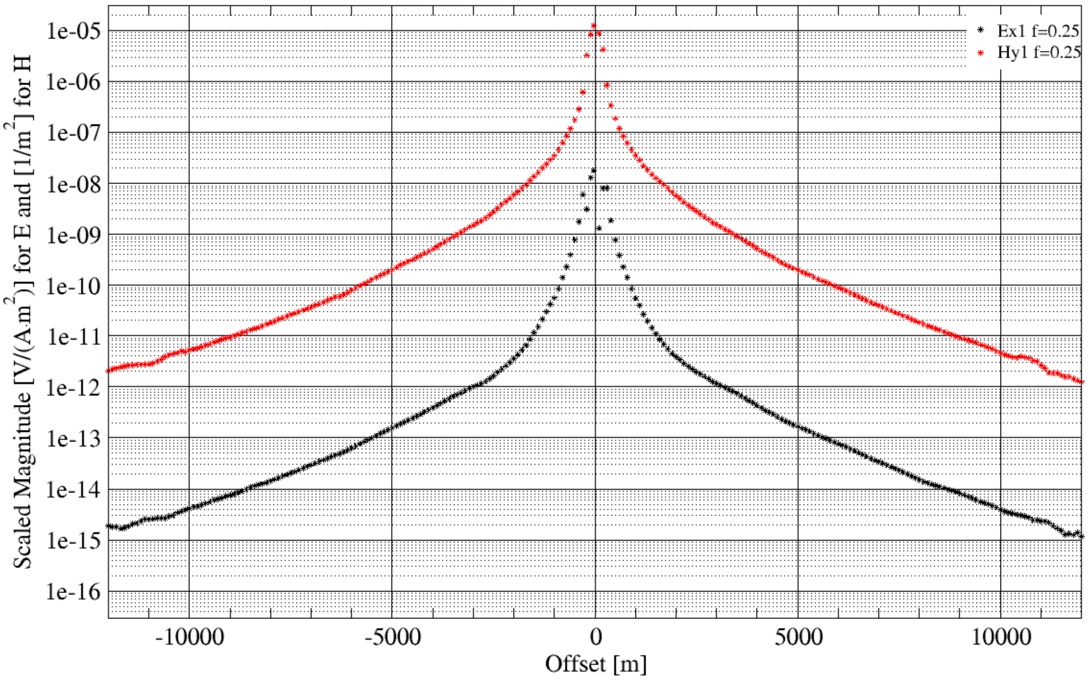
MVO - 01Rx015a
0.25 Hz, Scaled, Wolse 01Tx01de
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25



PVO - 01Rx015a
0.25 Hz, Scaled, Wolse 01Tx01de
Phase [deg]
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25

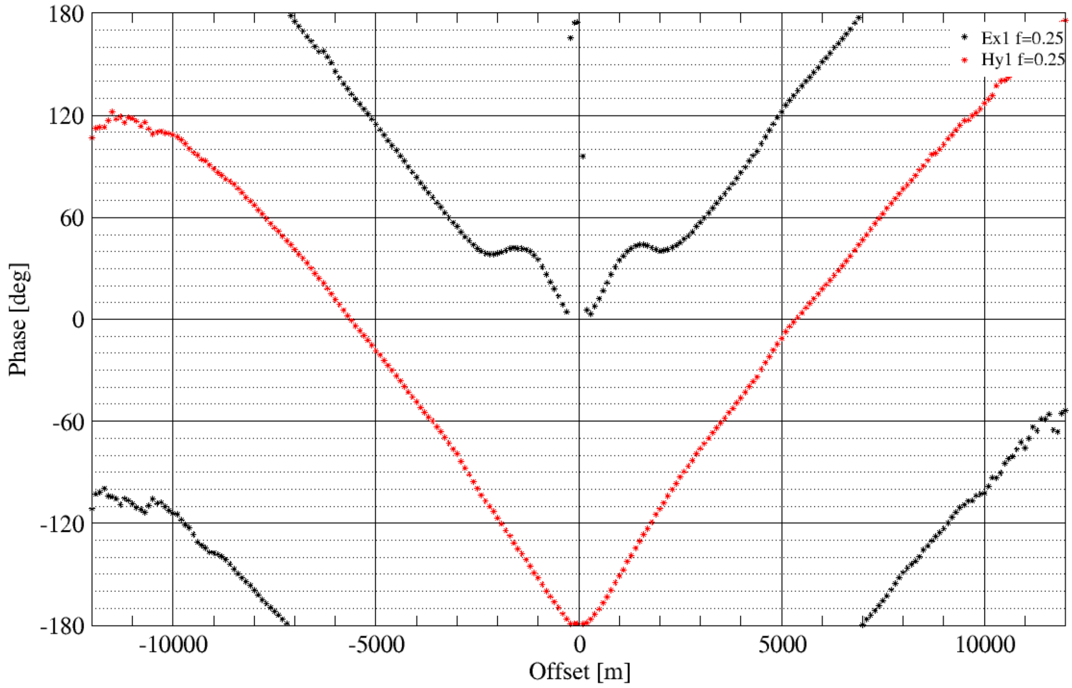
MVO - 01Rx015a

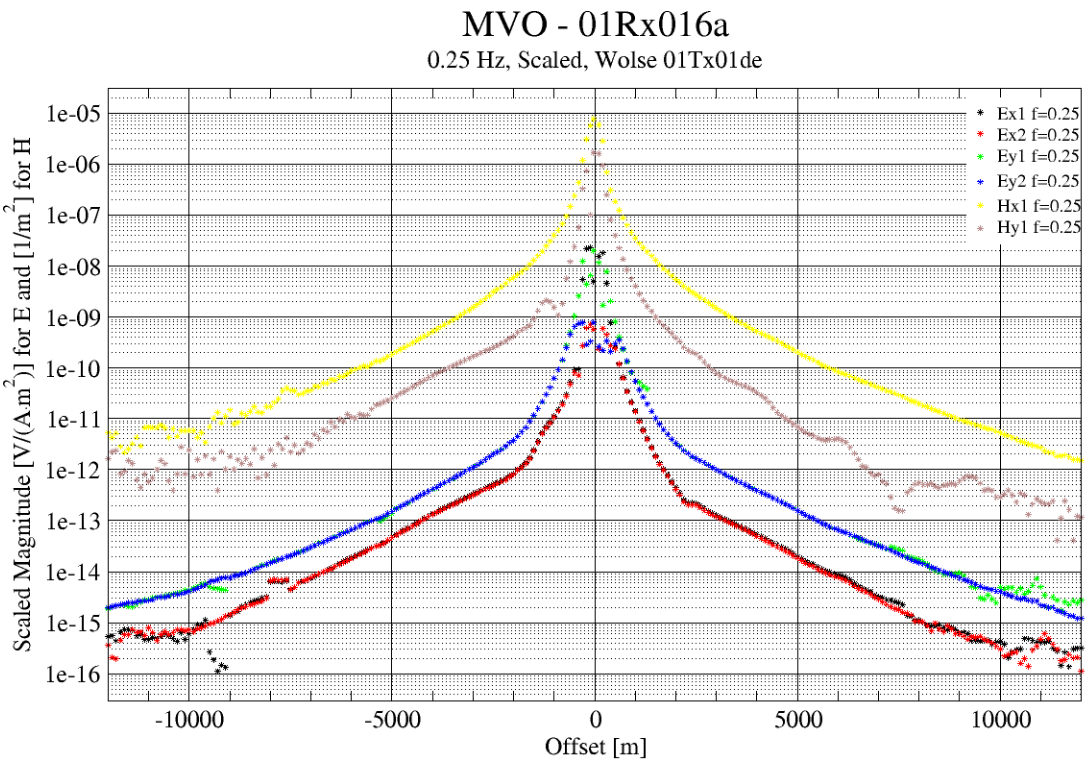
0.25 Hz, Rotated, Wolse 01Tx01de



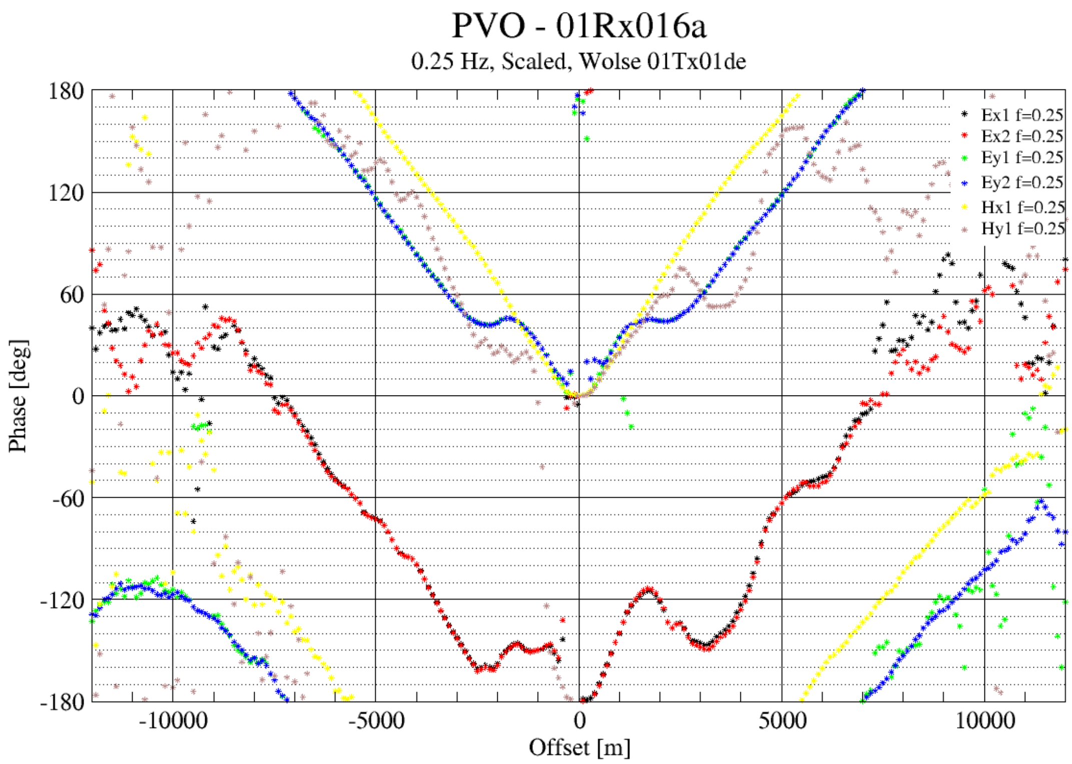
PVO - 01Rx015a

0.25 Hz, Rotated, Wolse 01Tx01de

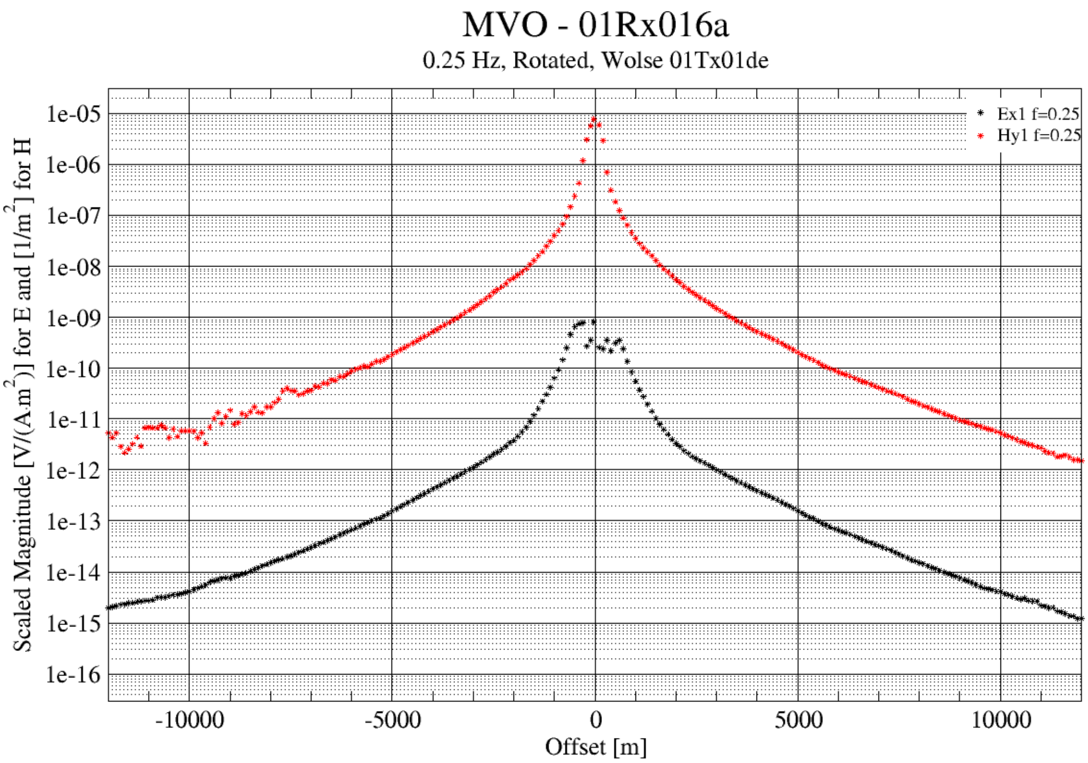


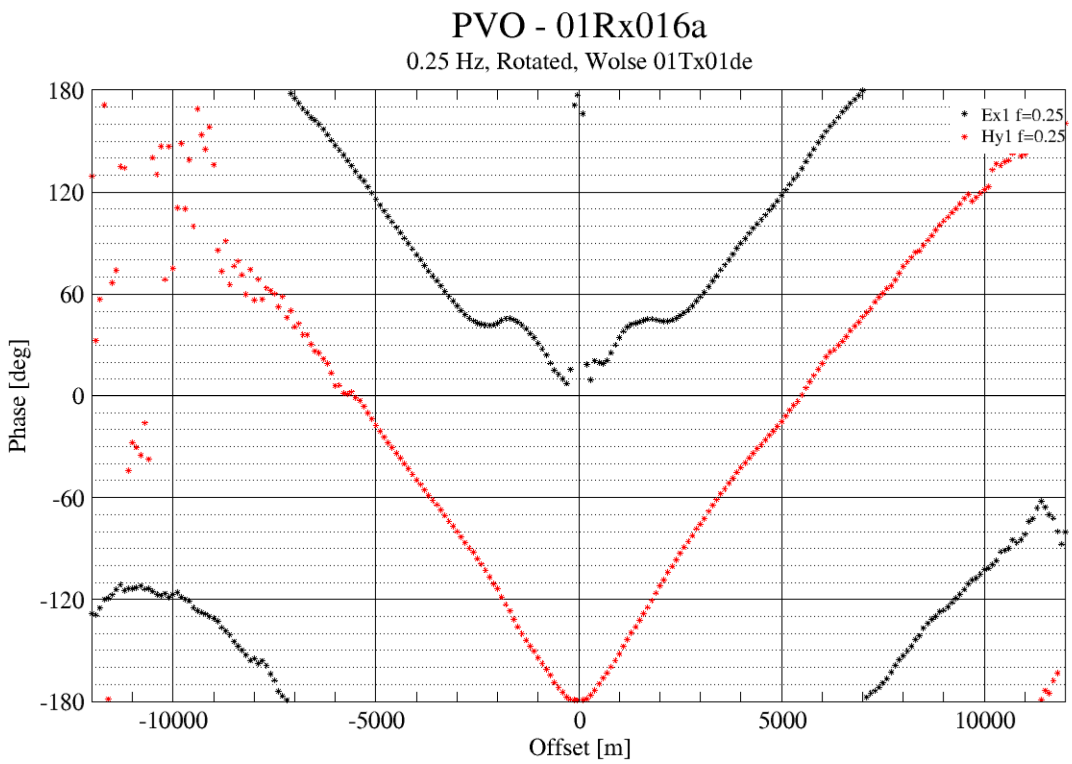


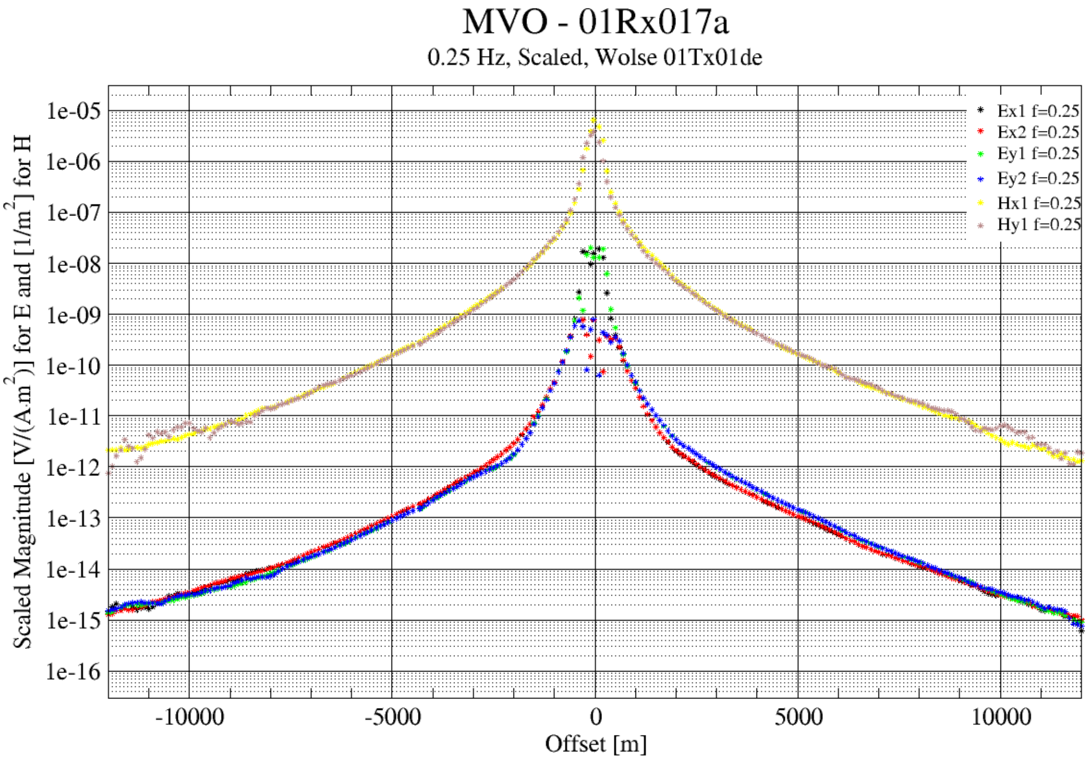
MVO - 01Rx016a
0.25 Hz, Scaled, Wolse 01Tx01de
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25

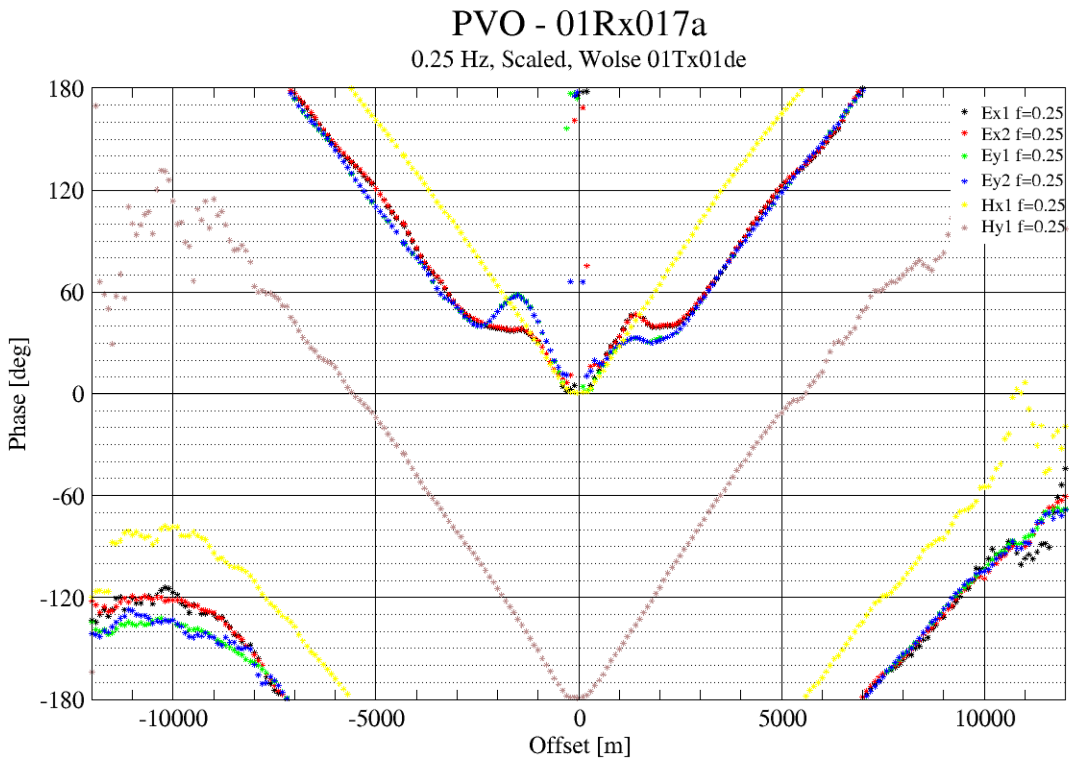


PVO - 01Rx016a
0.25 Hz, Scaled, Wolse 01Tx01de
Phase [deg]
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25


MVO - 01Rx016a
0.25 Hz, Rotated, Wolse 01Tx01de
Scaled Magnitude [V/(A.m²)] for E and [1/m²] for H
Offset [m]
Ex1 f=0.25
Hy1 f=0.25
1e-05
1e-06
1e-07
1e-08
1e-09
1e-10
1e-11
1e-12
1e-13
1e-14
1e-15
1e-16
-10000
-5000
0
5000
10000

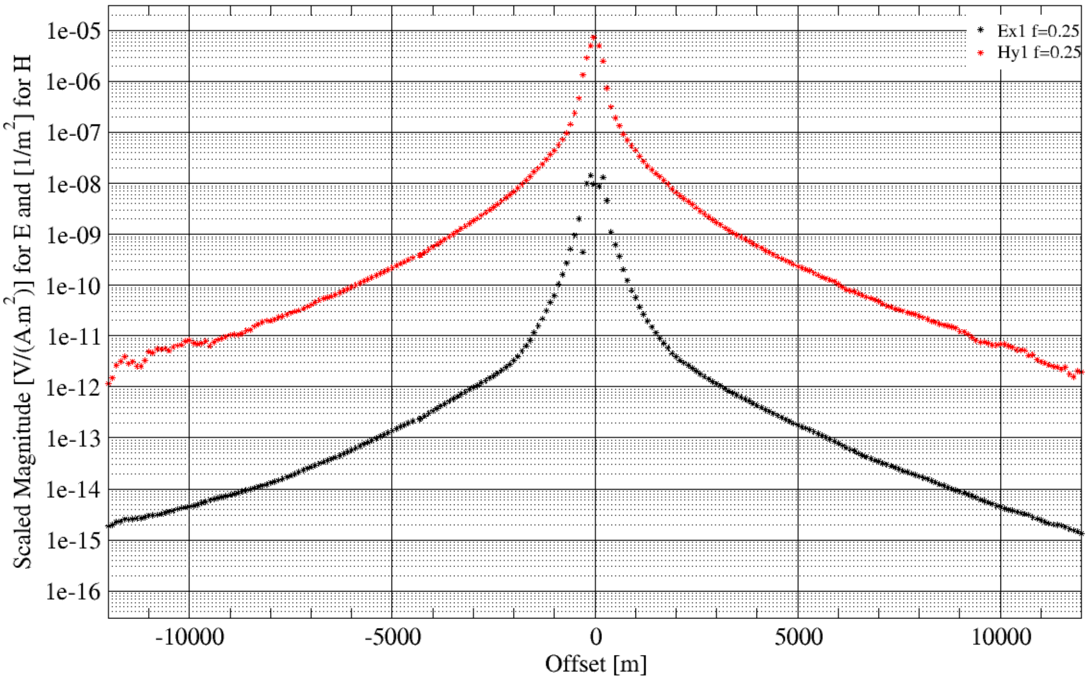

PVO - 01Rx016a
0.25 Hz, Rotated, Wolse 01Tx01de
Phase [deg]
Offset [m]
Ex1 f=0.25
Hy1 f=0.25
180
120
60
0
-60
-120
-180
-10000
-5000
0
5000
10000


MVO - 01Rx017a
0.25 Hz, Scaled, Wolse 01Tx01de
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25


PVO - 01Rx017a
0.25 Hz, Scaled, Wolse 01Tx01de
Phase [deg]
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25

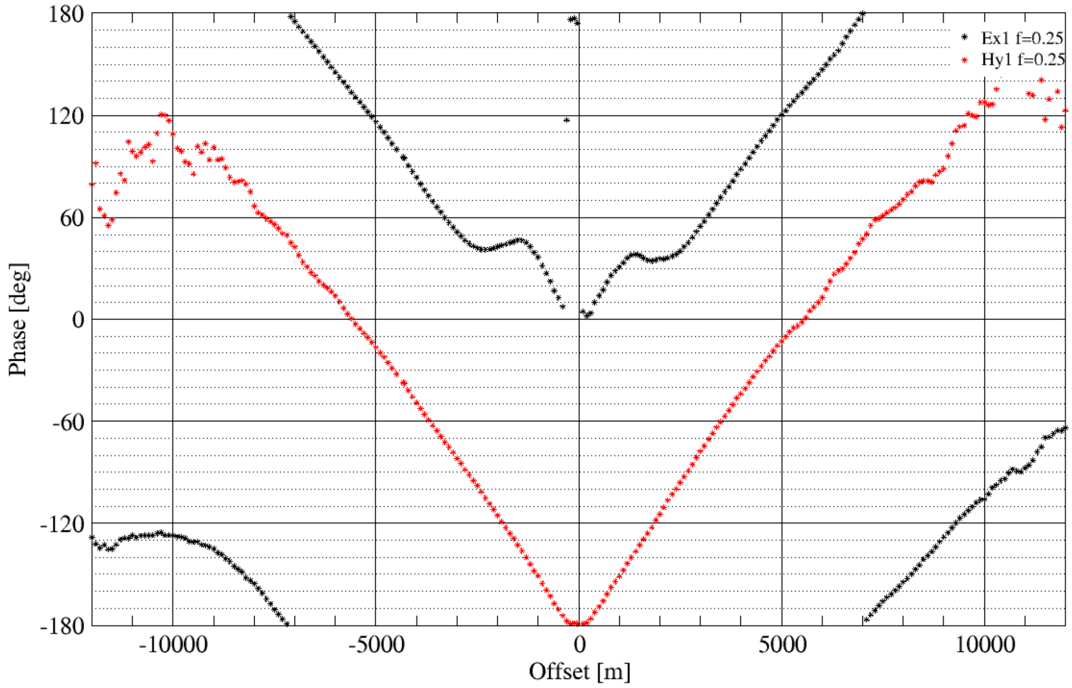
MVO - 01Rx017a

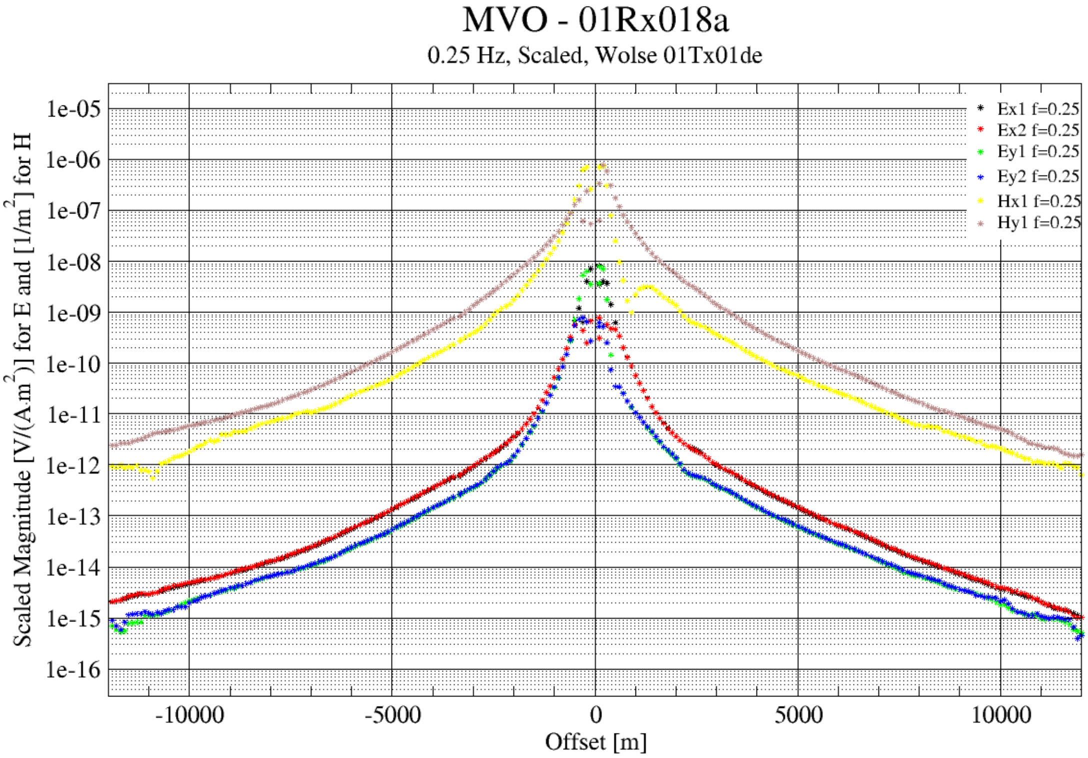
0.25 Hz, Rotated, Wolse 01Tx01de

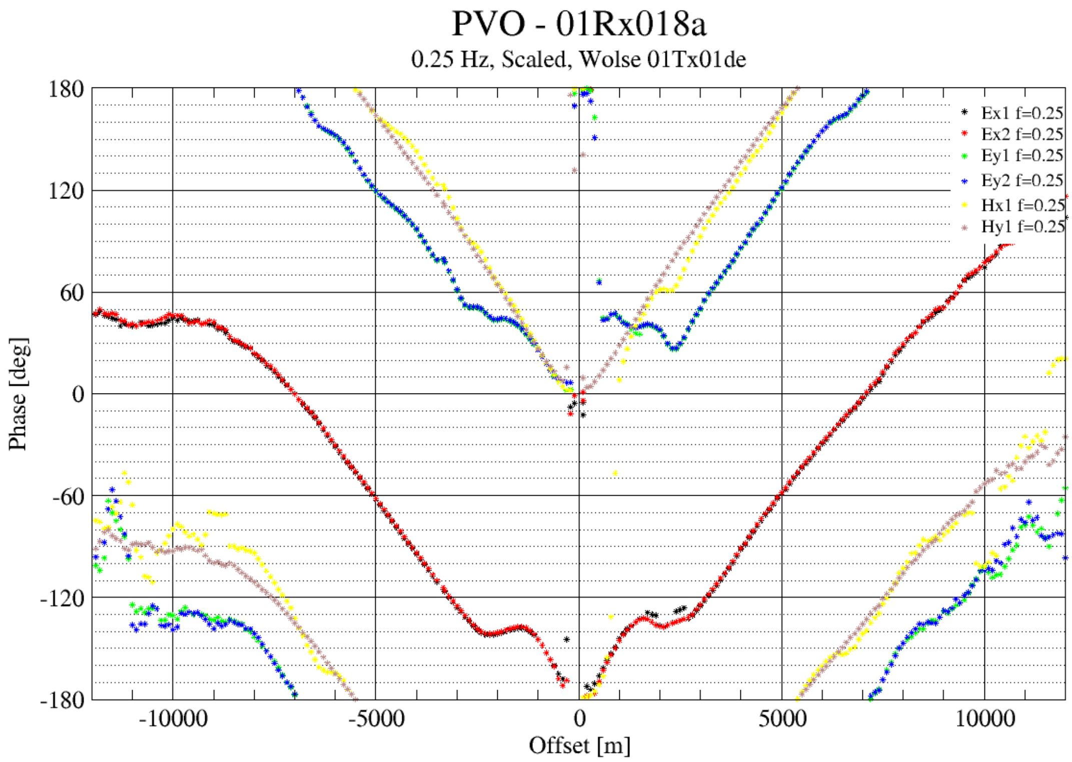


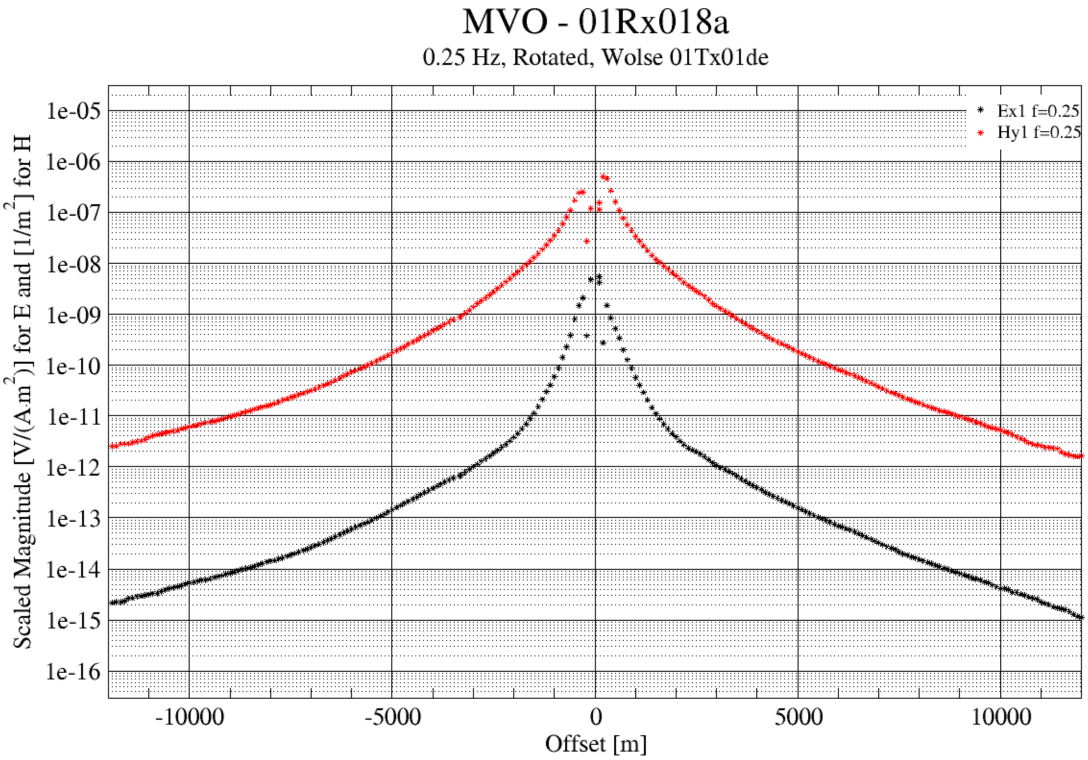
PVO - 01Rx017a

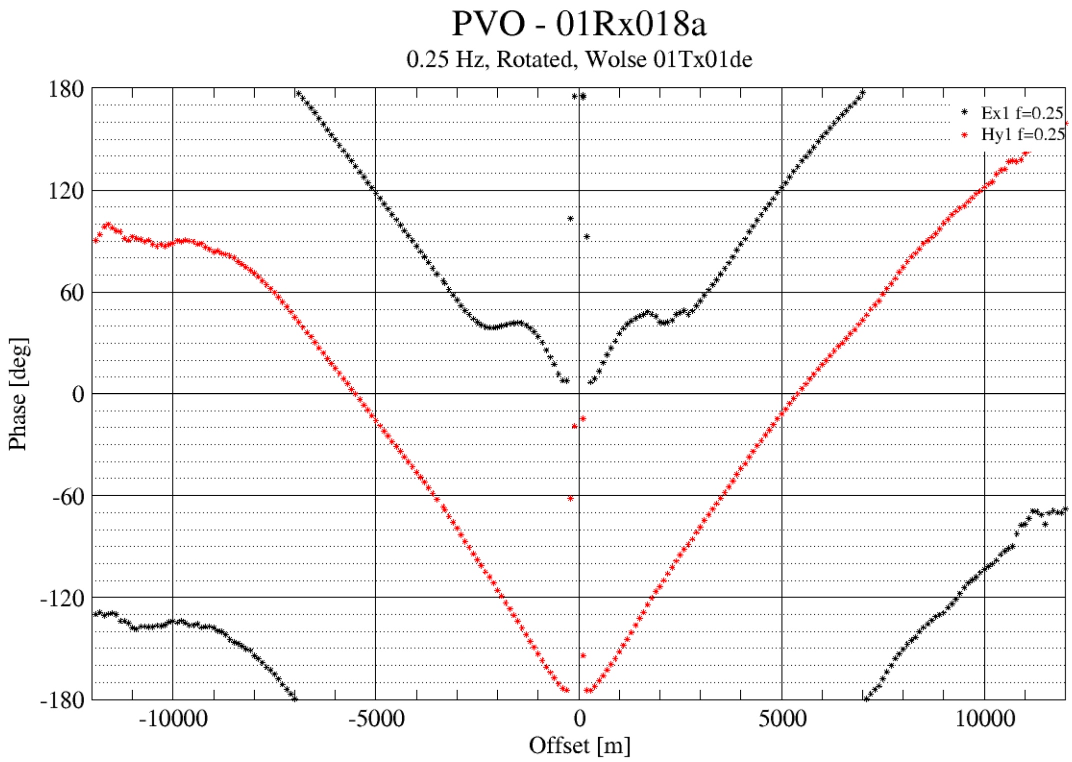
0.25 Hz, Rotated, Wolse 01Tx01de

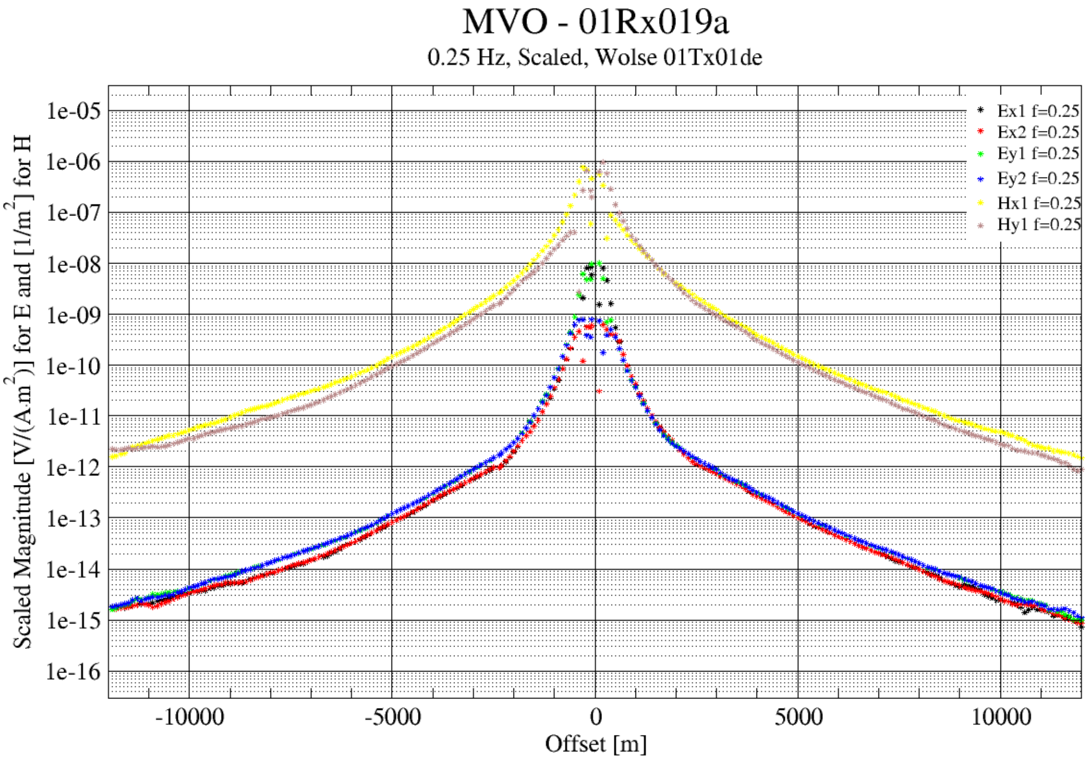


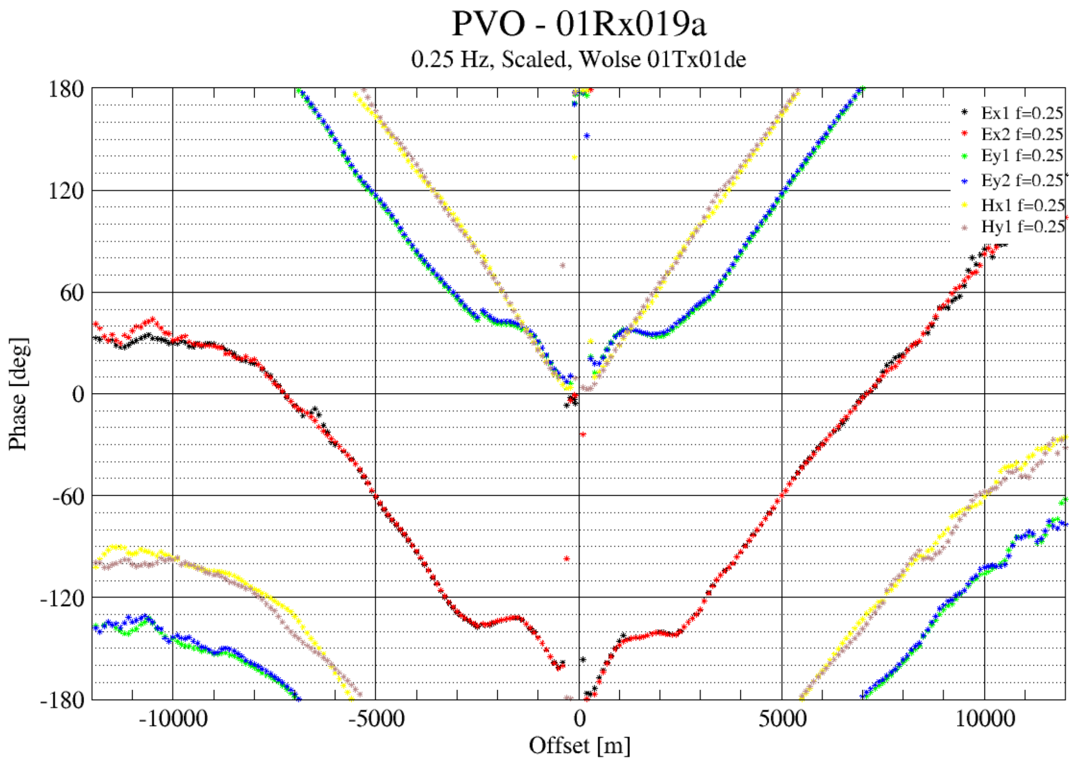

MVO - 01Rx018a
0.25 Hz, Scaled, Wolse 01Tx01de
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25

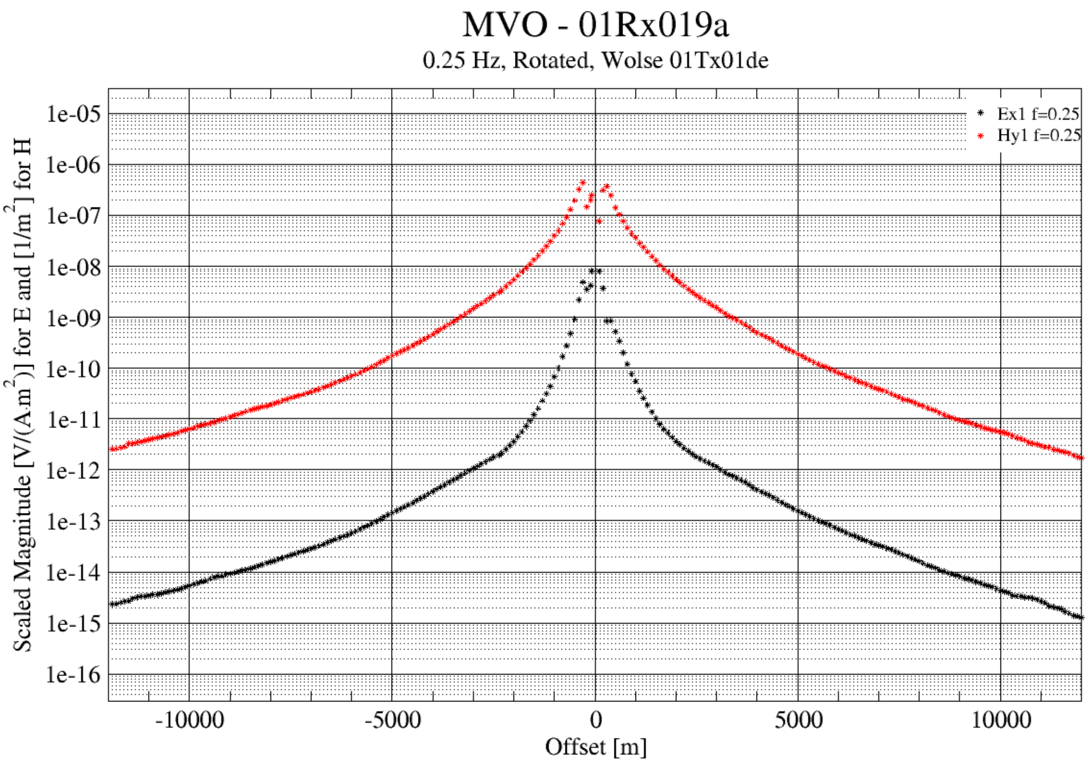

PVO - 01Rx018a
0.25 Hz, Scaled, Wolse 01Tx01de
Phase [deg]
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25

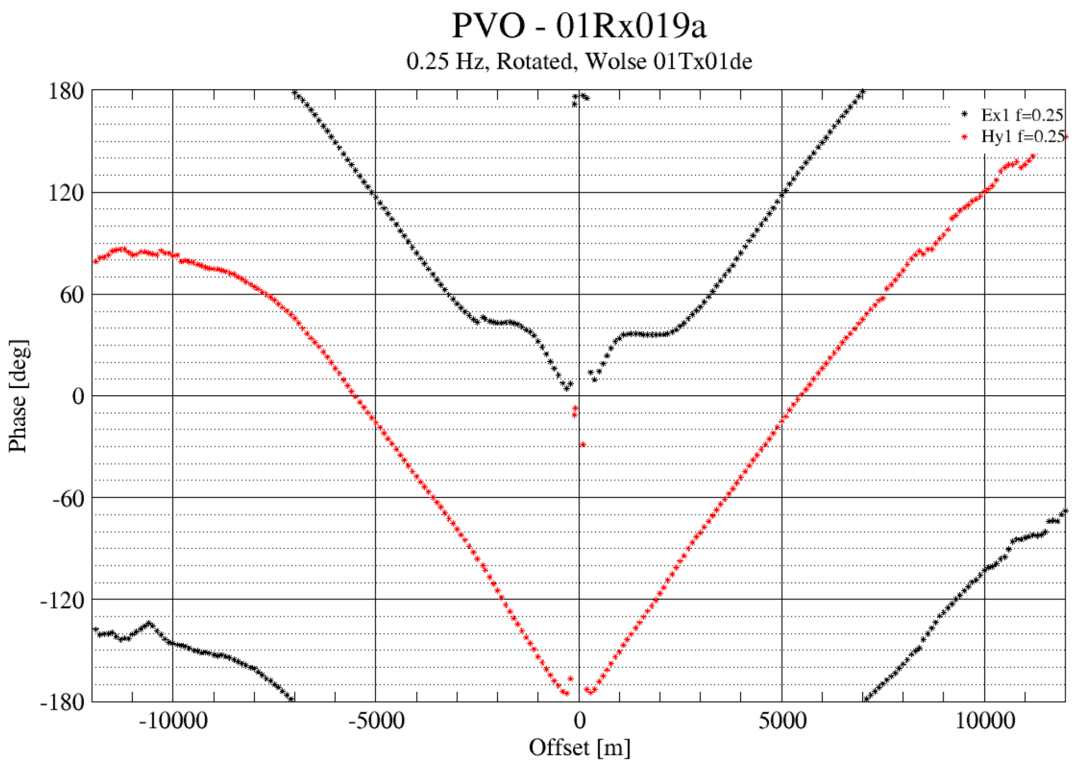

MVO - 01Rx018a
0.25 Hz, Rotated, Wolse 01Tx01de
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
1e-05
1e-06
1e-07
1e-08
1e-09
1e-10
1e-11
1e-12
1e-13
1e-14
1e-15
1e-16
-10000
-5000
0
5000
10000
Offset [m]
Ex1 f=0.25
Hy1 f=0.25

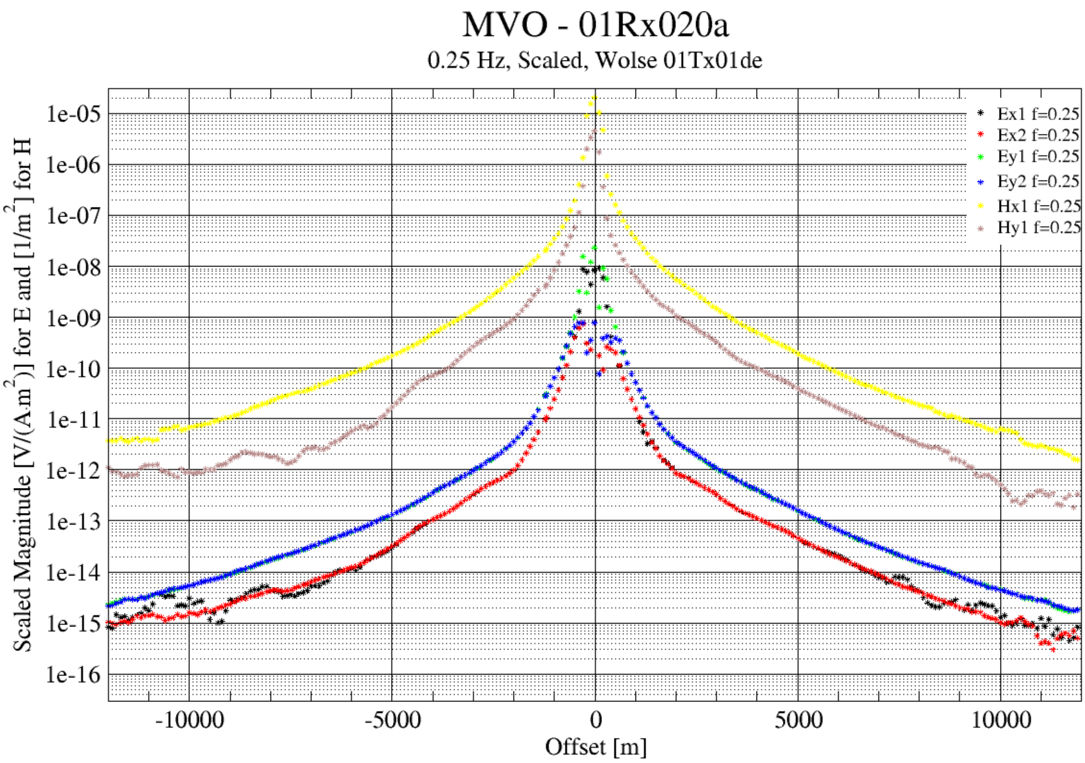

PVO - 01Rx018a
0.25 Hz, Rotated, Wolse 01Tx01de
Phase [deg]
180
120
60
0
-60
-120
-180
-10000
-5000
0
5000
10000
Offset [m]
Ex1 f=0.25
Hy1 f=0.25

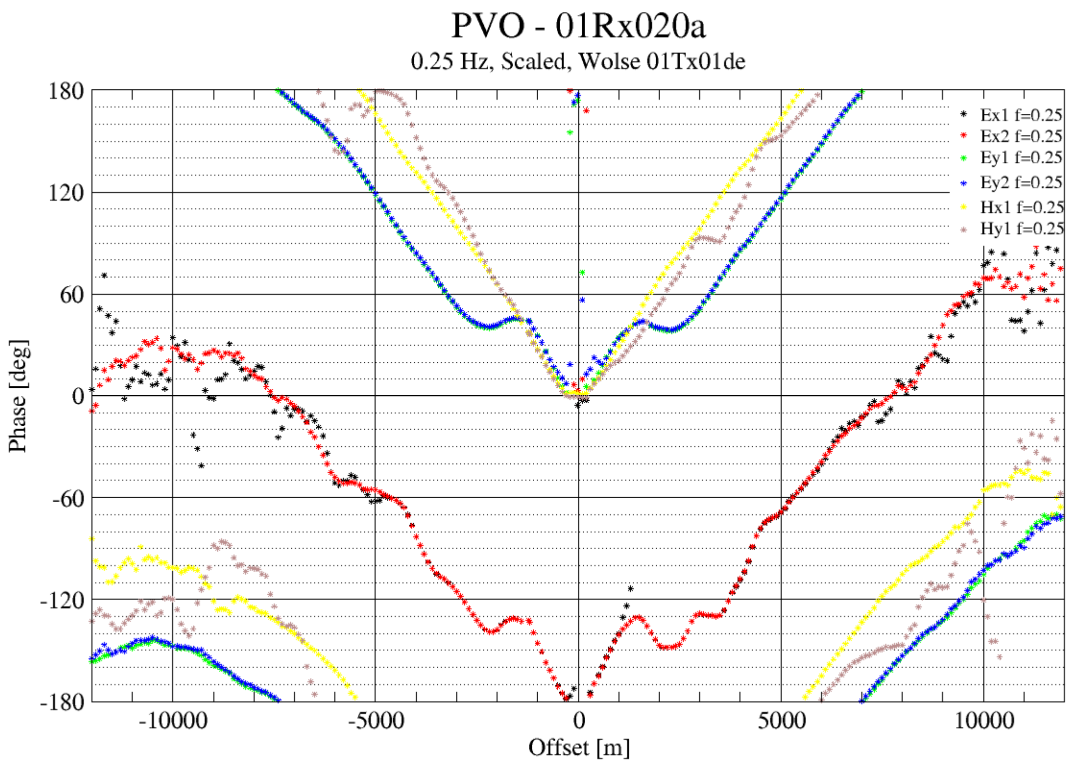

MVO - 01Rx019a
0.25 Hz, Scaled, Wolse 01Tx01de
Scaled Magnitude [V/(A.m²)] for E and [1/m²] for H
1e-05
1e-06
1e-07
1e-08
1e-09
1e-10
1e-11
1e-12
1e-13
1e-14
1e-15
1e-16
-10000
-5000
0
5000
10000
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25

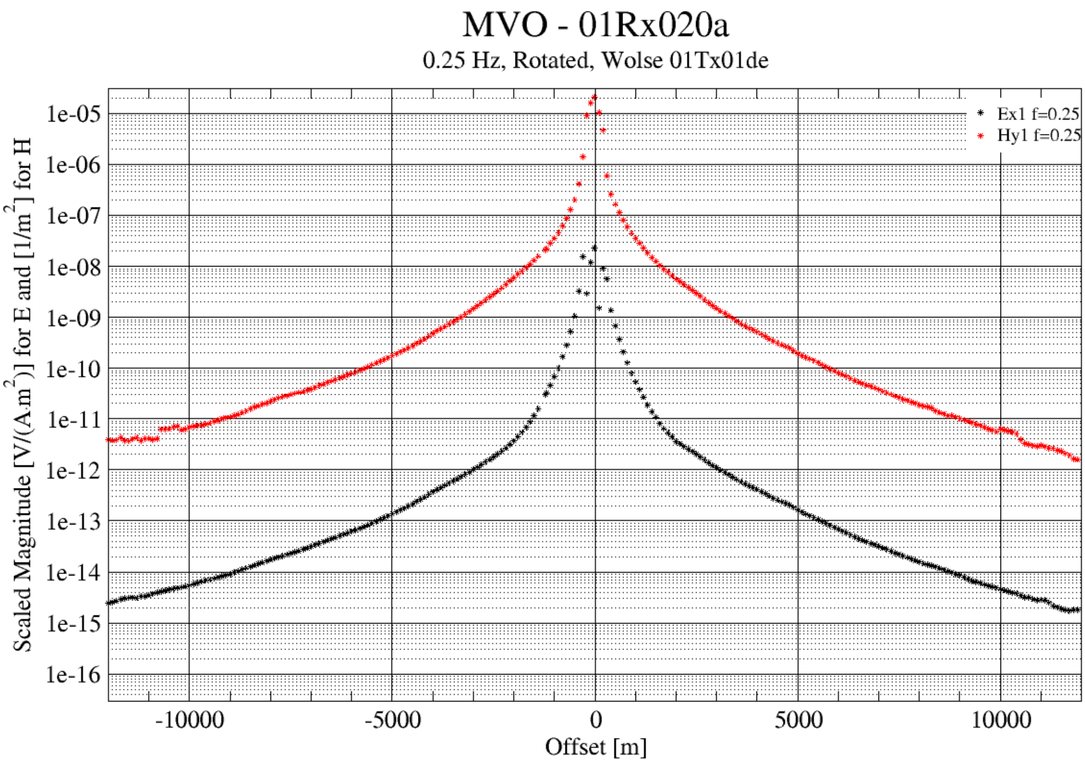

PVO - 01Rx019a
0.25 Hz, Scaled, Wolse 01Tx01de
Phase [deg]
180
120
60
0
-60
-120
-180
-10000
-5000
0
5000
10000
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25

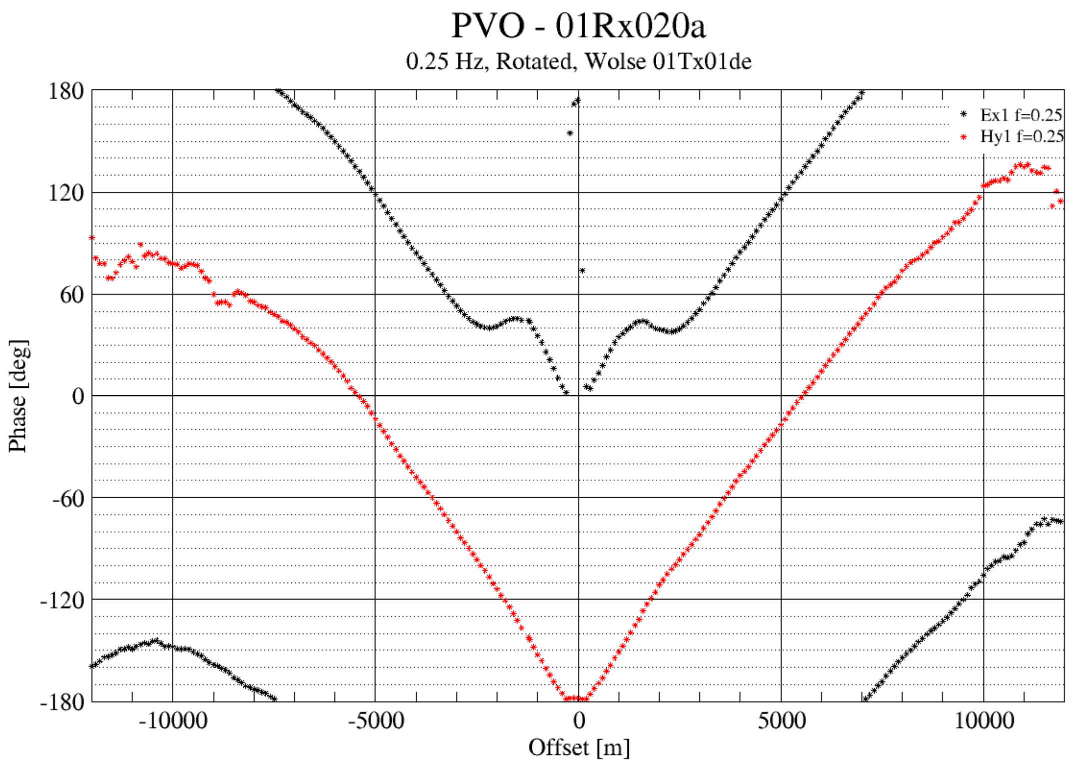

MVO - 01Rx019a
0.25 Hz, Rotated, Wolse 01Tx01de
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
Offset [m]
Ex1 f=0.25
Hy1 f=0.25

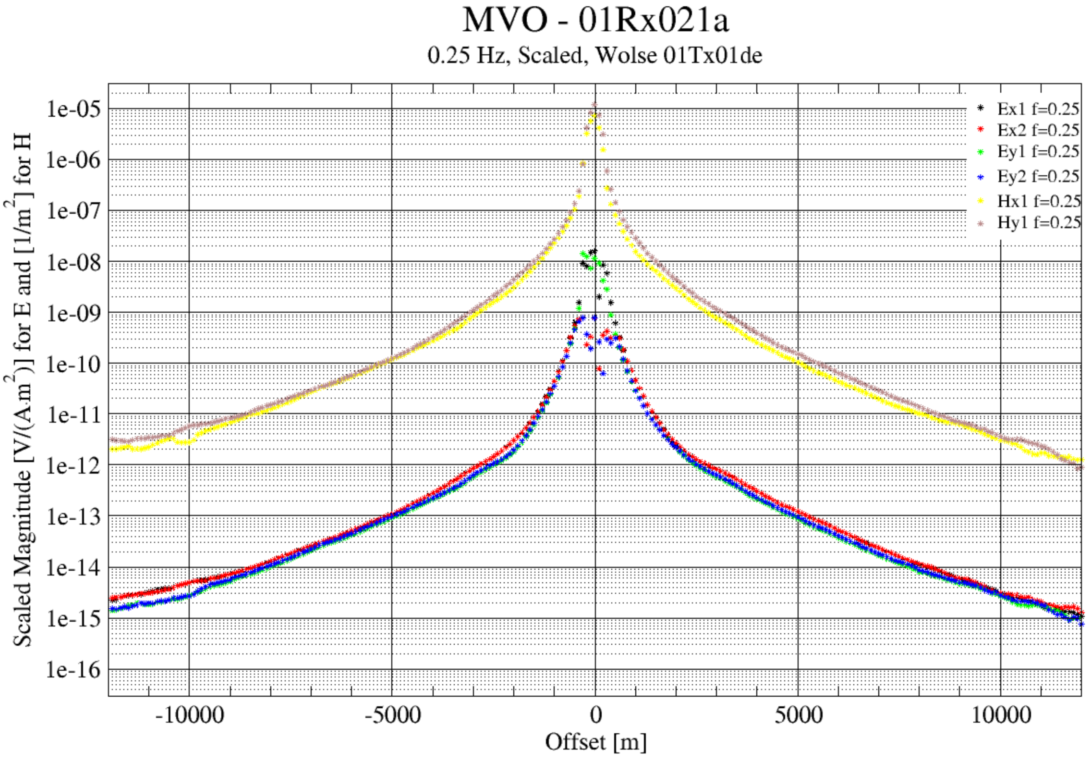

PVO - 01Rx019a
0.25 Hz, Rotated, Wolse 01Tx01de
Phase [deg]
Offset [m]
Ex1 f=0.25
Hy1 f=0.25


MVO - 01Rx020a
0.25 Hz, Scaled, Wolse 01Tx01de
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25

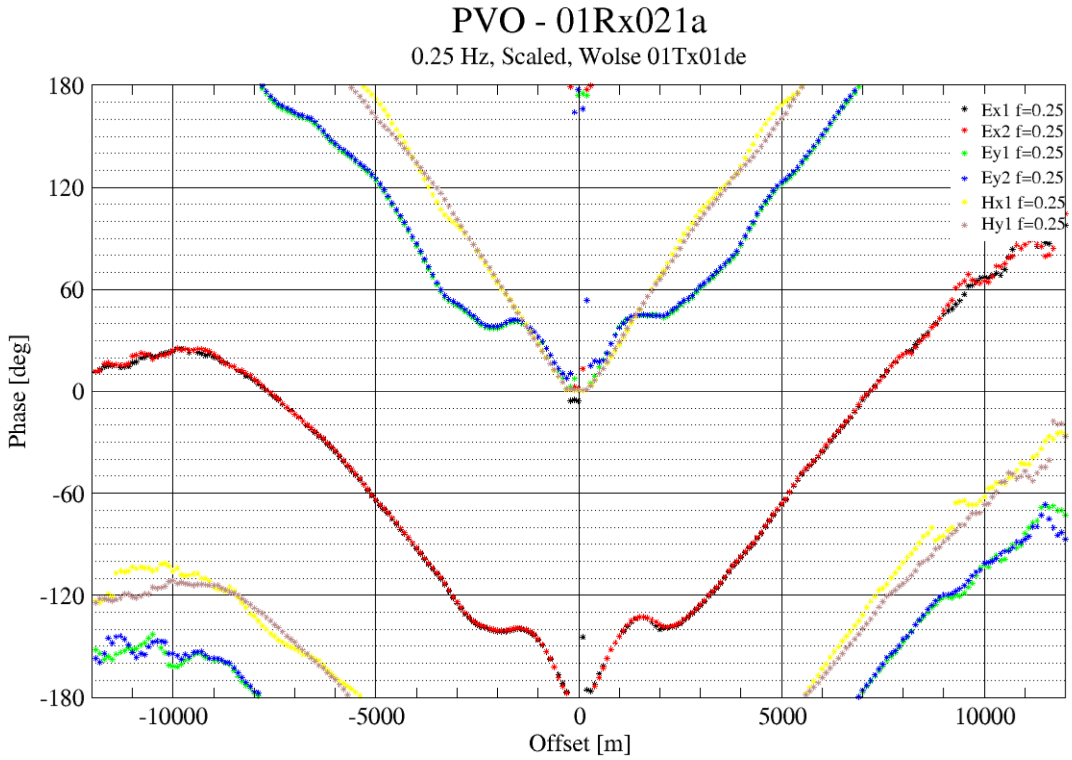

PVO - 01Rx020a
0.25 Hz, Scaled, Wolse 01Tx01de
Phase [deg]
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25


MVO - 01Rx020a
0.25 Hz, Rotated, Wolse 01Tx01de
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
Ex1 f=0.25
Hy1 f=0.25
1e-05
1e-06
1e-07
1e-08
1e-09
1e-10
1e-11
1e-12
1e-13
1e-14
1e-15
1e-16
-10000
-5000
0
5000
10000
Offset [m]

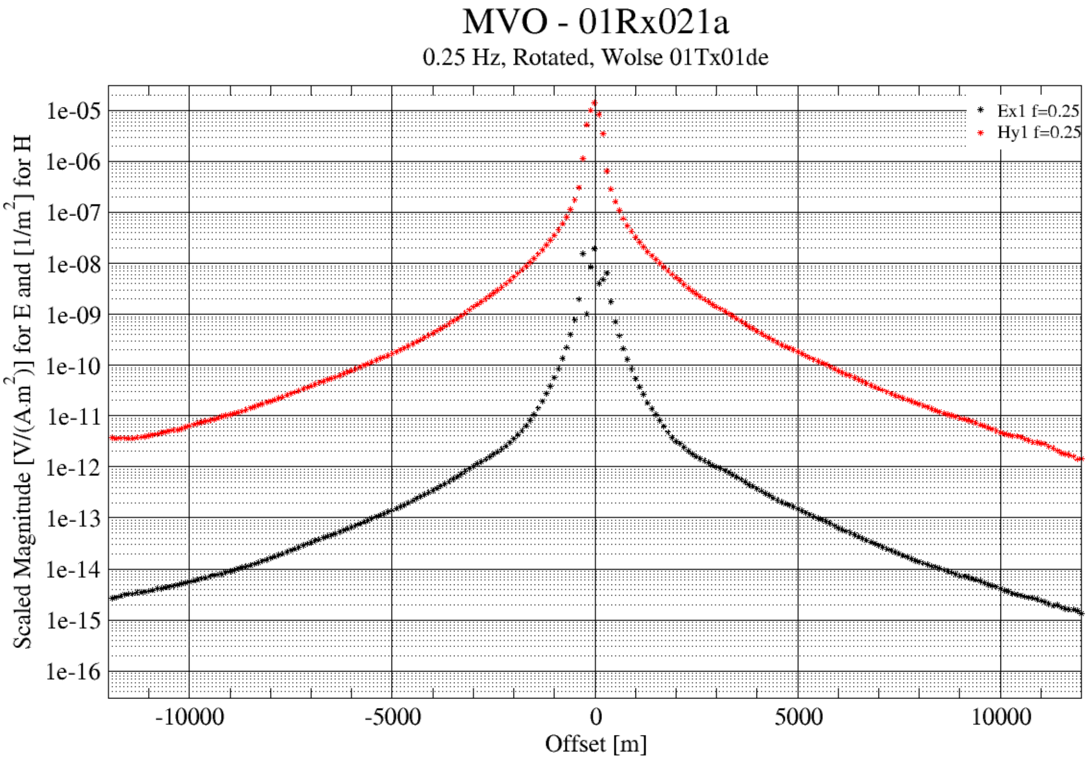

PVO - 01Rx020a
0.25 Hz, Rotated, Wolse 01Tx01de
Phase [deg]
Ex1 f=0.25
Hy1 f=0.25
180
120
60
0
-60
-120
-180
-10000
-5000
0
5000
10000
Offset [m]



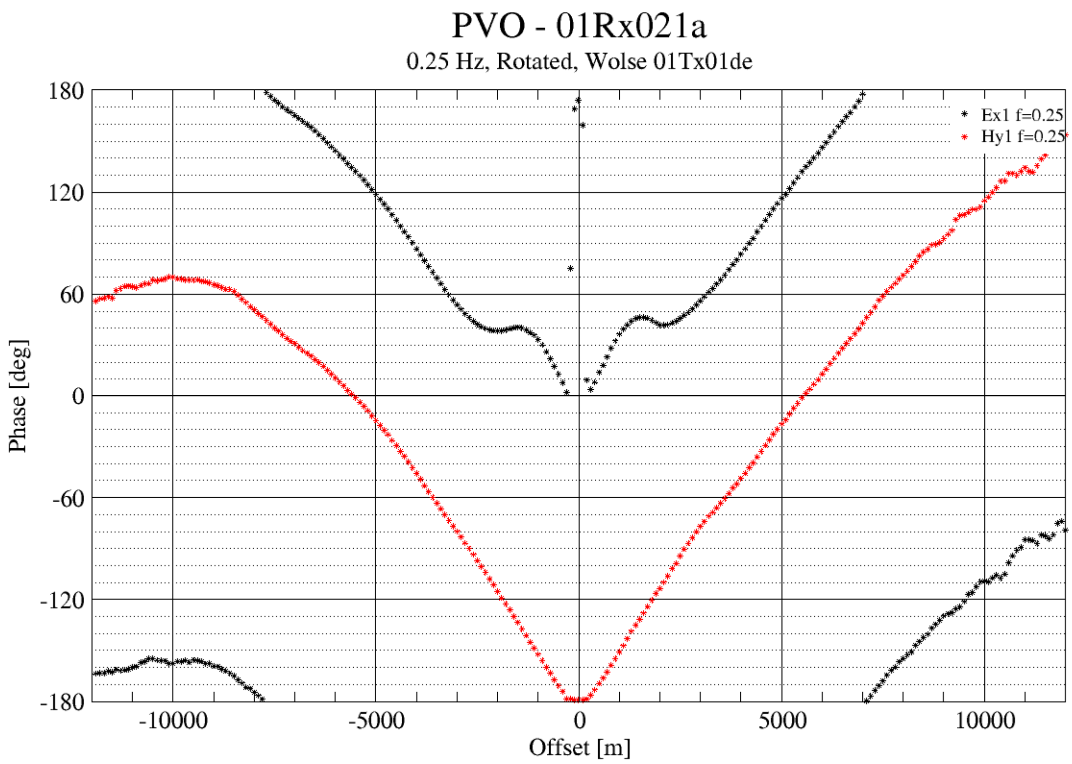
MVO - 01Rx021a
0.25 Hz, Scaled, Wolse 01Tx01de
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25



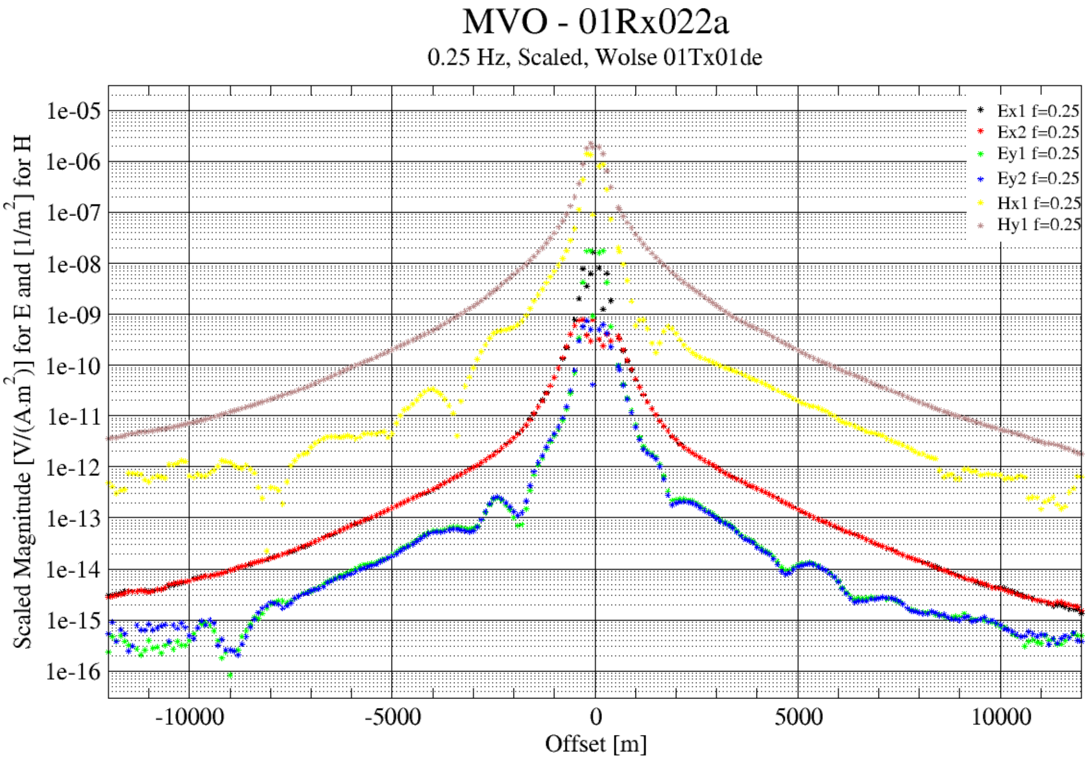
PVO - 01Rx021a
0.25 Hz, Scaled, Wolse 01Tx01de
Phase [deg]
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25

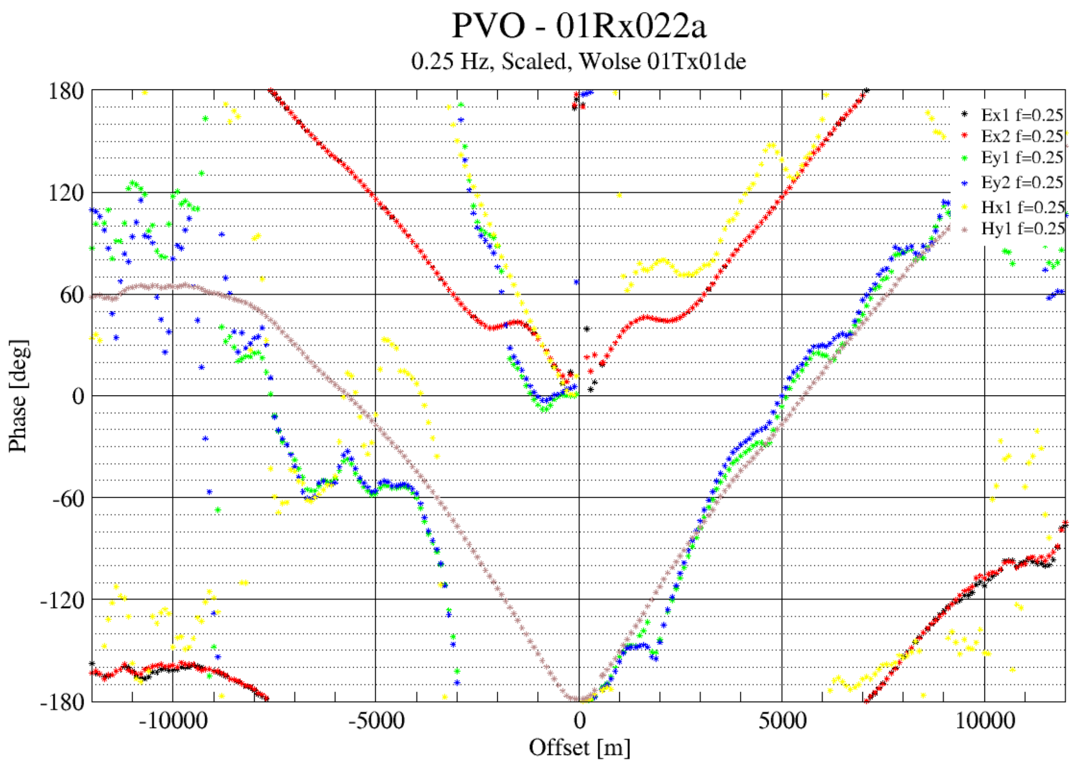


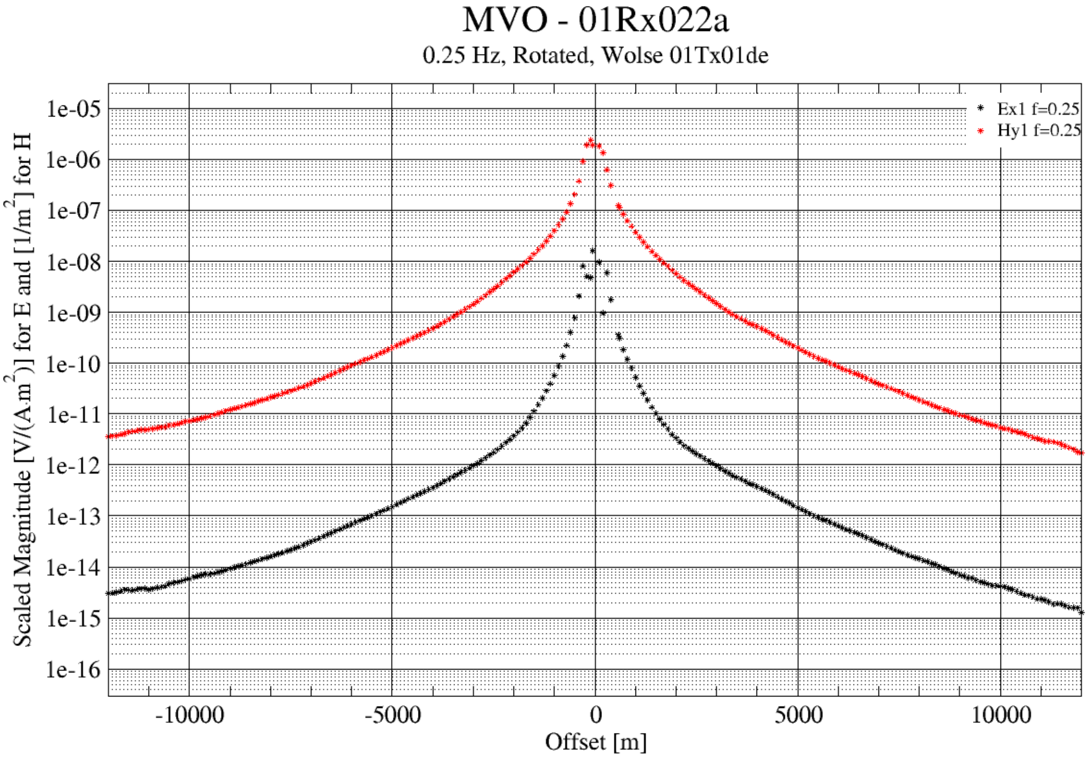
MVO - 01Rx021a
0.25 Hz, Rotated, Wolse 01Tx01de
Ex1 f=0.25
Hy1 f=0.25
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
1e-05
1e-06
1e-07
1e-08
1e-09
1e-10
1e-11
1e-12
1e-13
1e-14
1e-15
1e-16
-10000
-5000
0
5000
10000
Offset [m]



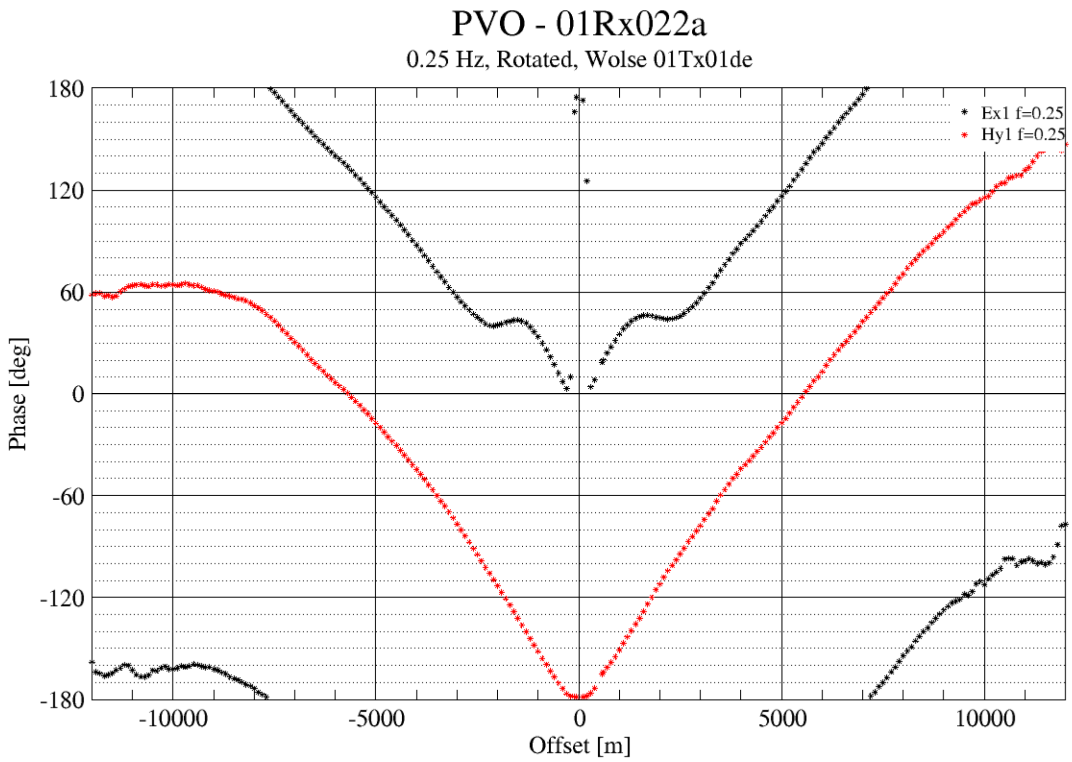
PVO - 01Rx021a
0.25 Hz, Rotated, Wolse 01Tx01de
Ex1 f=0.25
Hy1 f=0.25
Phase [deg]
180
120
60
0
-60
-120
-180
-10000
-5000
0
5000
10000
Offset [m]


MVO - 01Rx022a
0.25 Hz, Scaled, Wolse 01Tx01de
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25

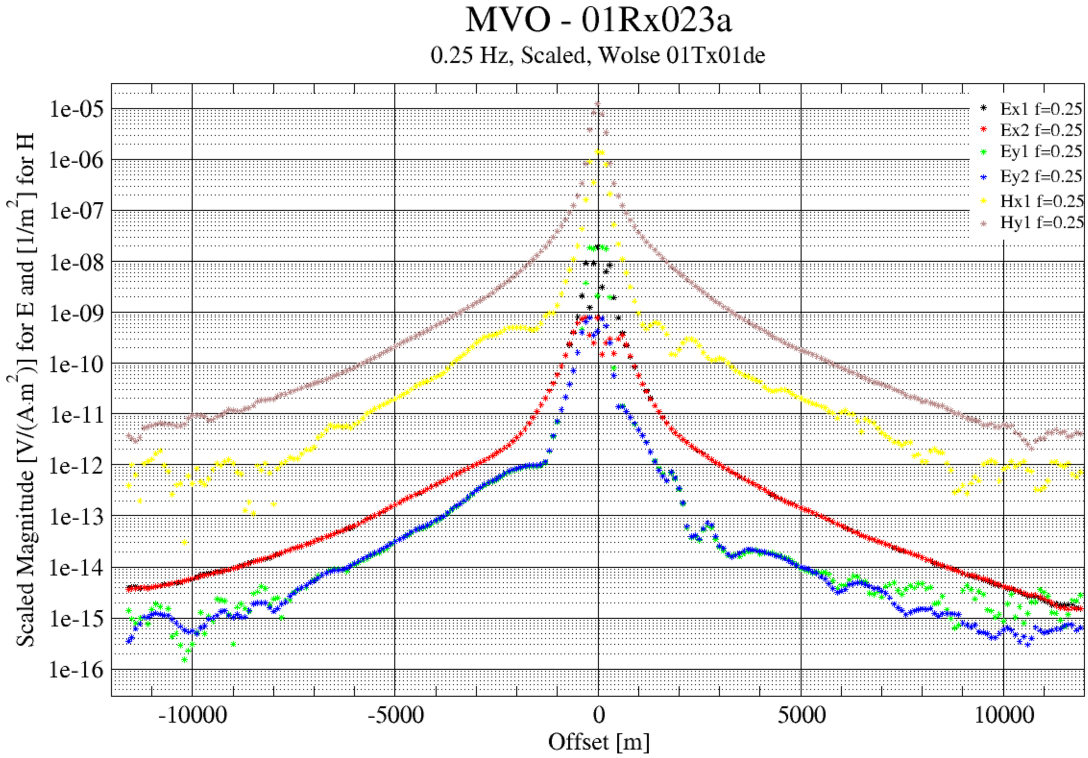

PVO - 01Rx022a
0.25 Hz, Scaled, Wolse 01Tx01de
Phase [deg]
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25

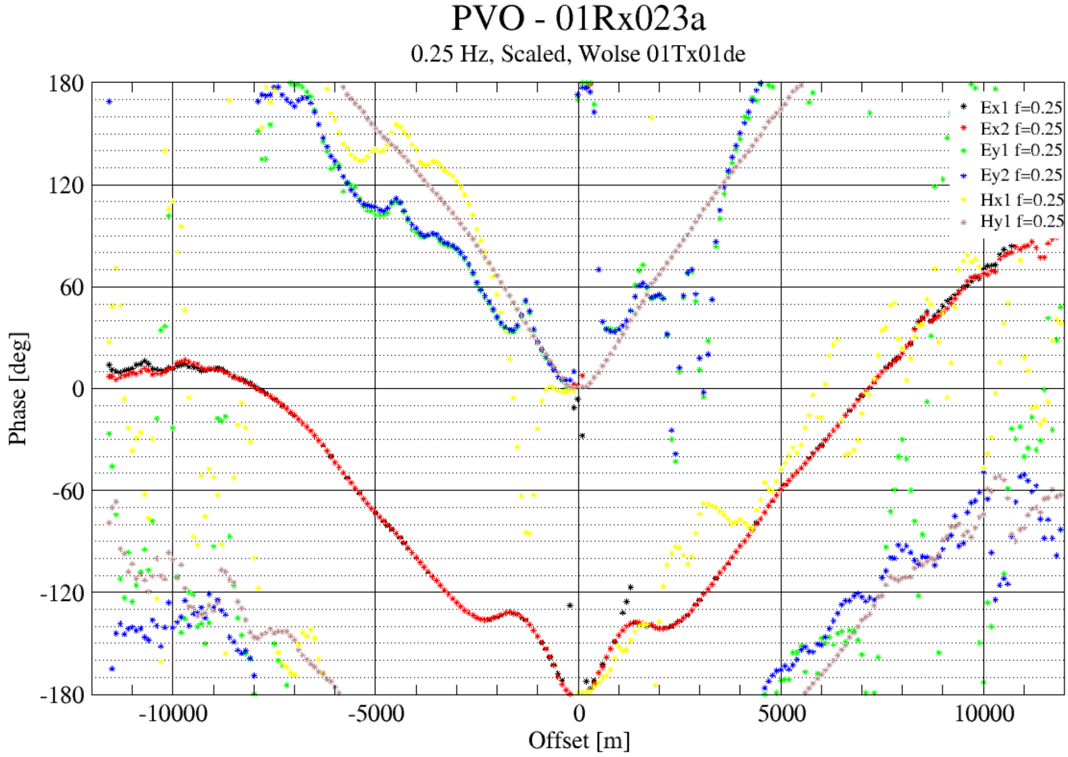


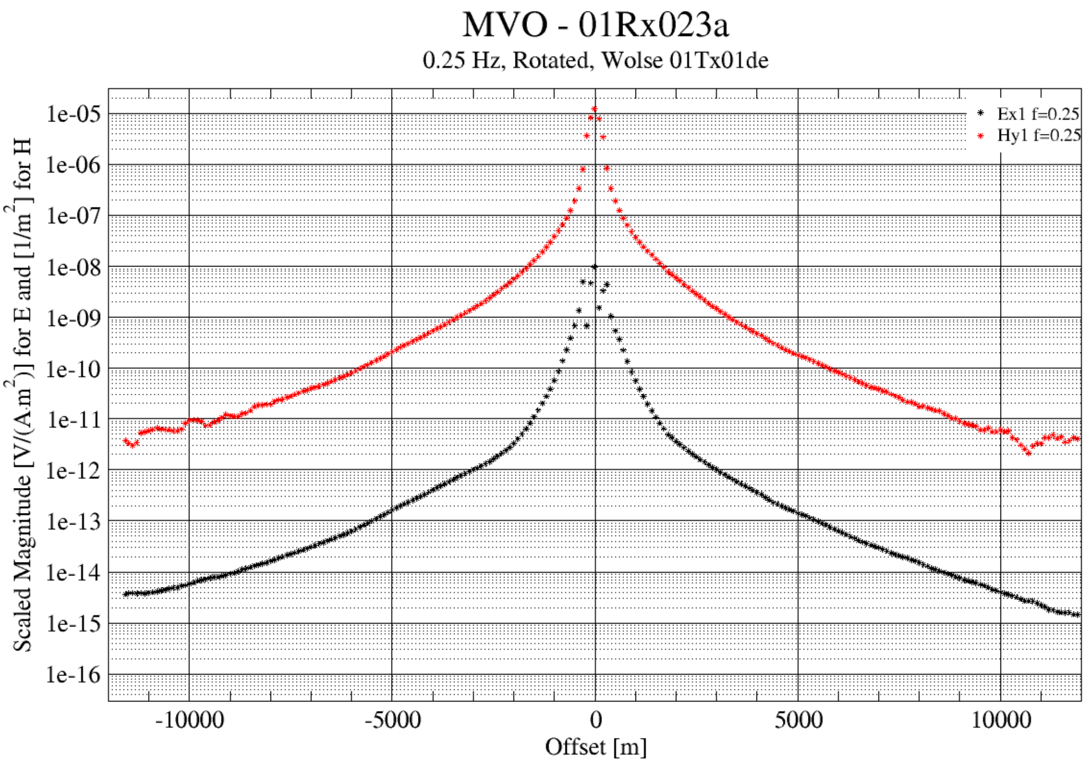
MVO - 01Rx022a
0.25 Hz, Rotated, Wolse 01Tx01de
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
Offset [m]
Ex1 f=0.25
Hy1 f=0.25



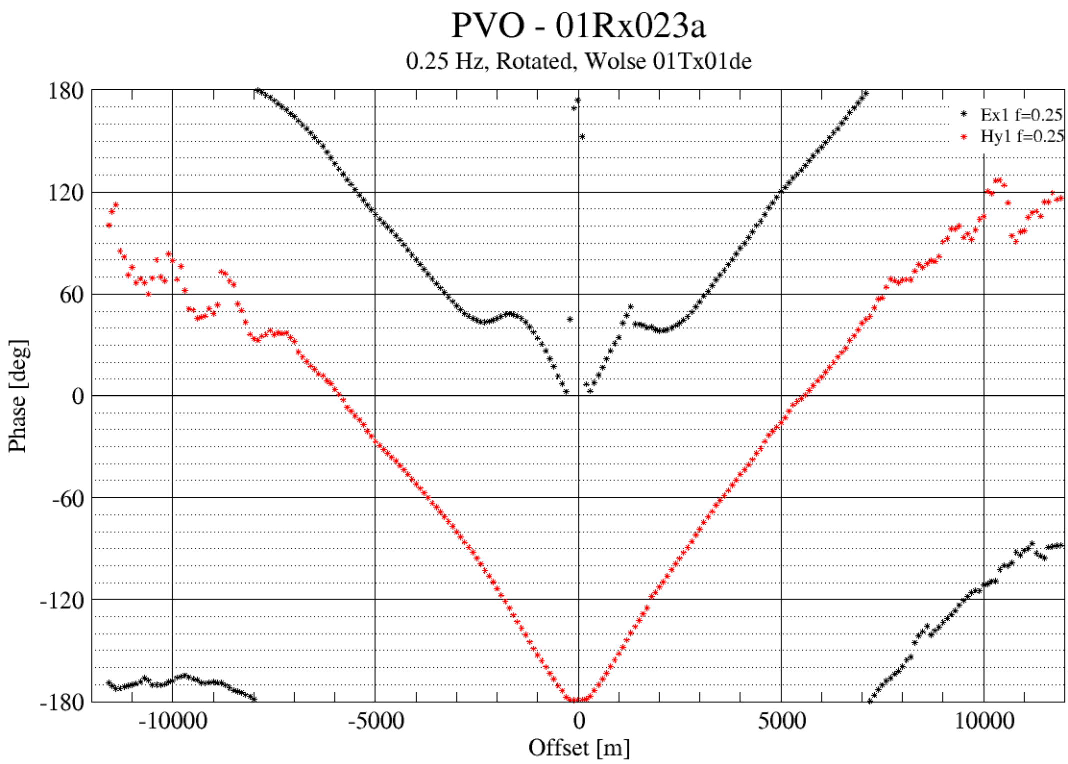
PVO - 01Rx022a
0.25 Hz, Rotated, Wolse 01Tx01de
Phase [deg]
Offset [m]
Ex1 f=0.25
Hy1 f=0.25


MVO - 01Rx023a
0.25 Hz, Scaled, Wolse 01Tx01de
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25


PVO - 01Rx023a
0.25 Hz, Scaled, Wolse 01Tx01de
Phase [deg]
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25



MVO - 01Rx023a
0.25 Hz, Rotated, Wolse 01Tx01de
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
1e-05
1e-06
1e-07
1e-08
1e-09
1e-10
1e-11
1e-12
1e-13
1e-14
1e-15
1e-16
-10000
-5000
0
5000
10000
Offset [m]
Ex1 f=0.25
Hy1 f=0.25

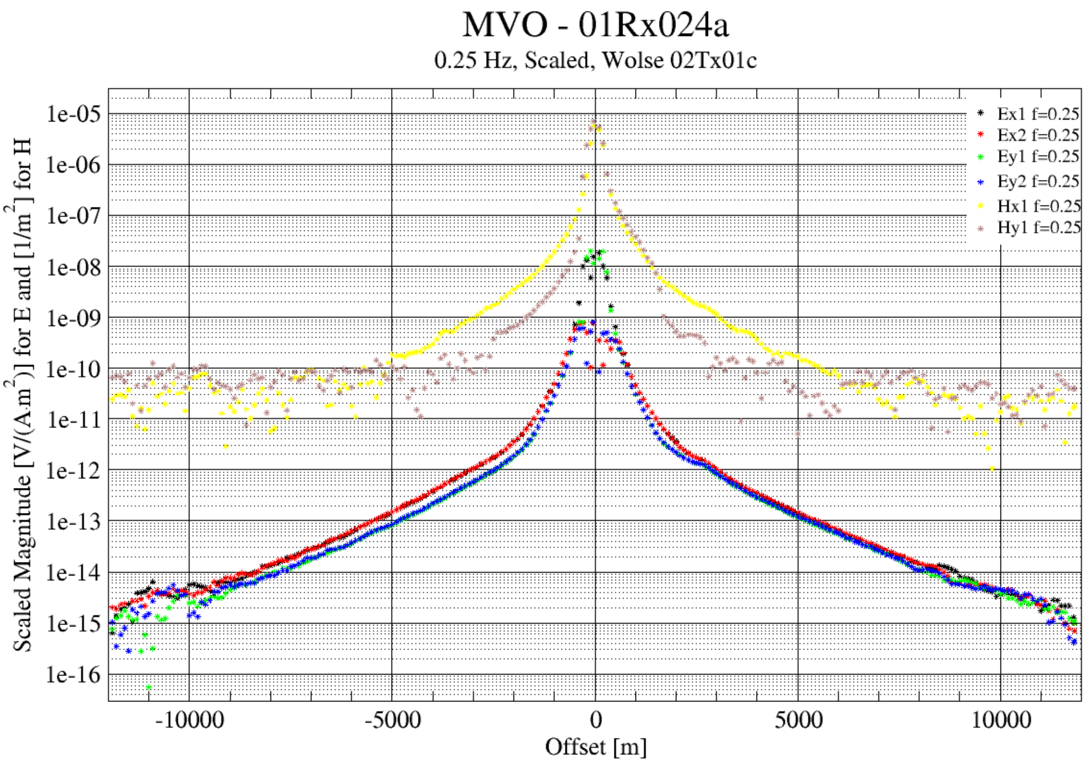


PVO - 01Rx023a
0.25 Hz, Rotated, Wolse 01Tx01de
Phase [deg]
180
120
60
0
-60
-120
-180
-10000
-5000
0
5000
10000
Offset [m]
Ex1 f=0.25
Hy1 f=0.25

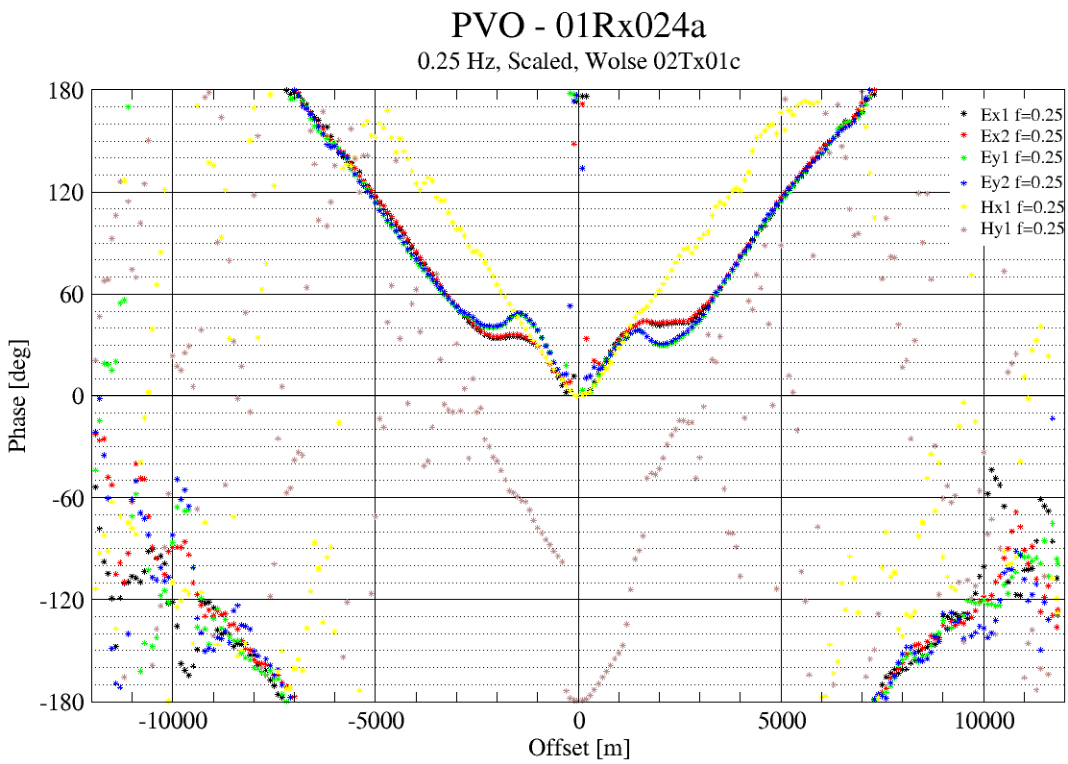
Appendix VIII - MVO & PVO plots – Wolse02Tx01c

Plot Parameters	
Filter frequency	0.25 Hz

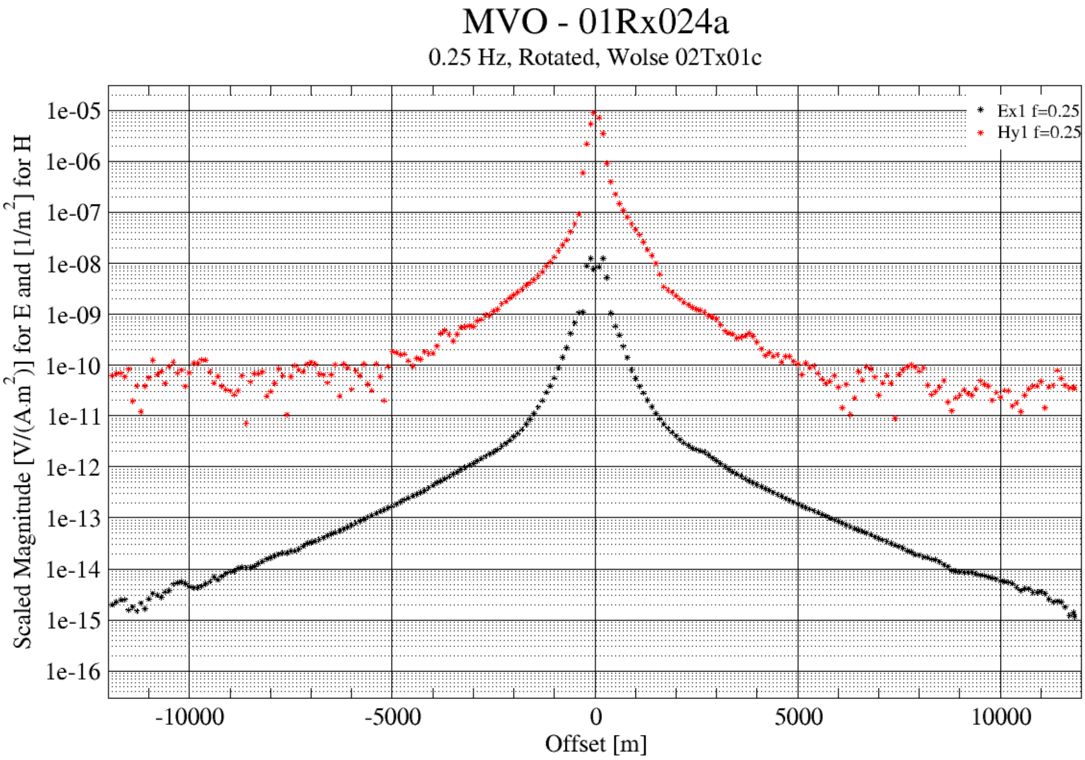
Plot Inventory for Towline Wolse02Tx01c			
Receiver	**Rotated Channels**	**Receiver**	**Rotated Channels**
01Rx024a	E + H	01Rx033a	E + H
01Rx025a	E + H	01Rx034a	E + H
01Rx027a	E + H	01Rx035a	E + H
01Rx028a	E + H	02Rx001a	E + H
01Rx029a	E + H	02Rx002b	E + H
01Rx030a	E + H	02Rx003b	E + H
01Rx031a	E + H	02Rx004b	E + H
01Rx032a	E + H	02Rx005b	E + H

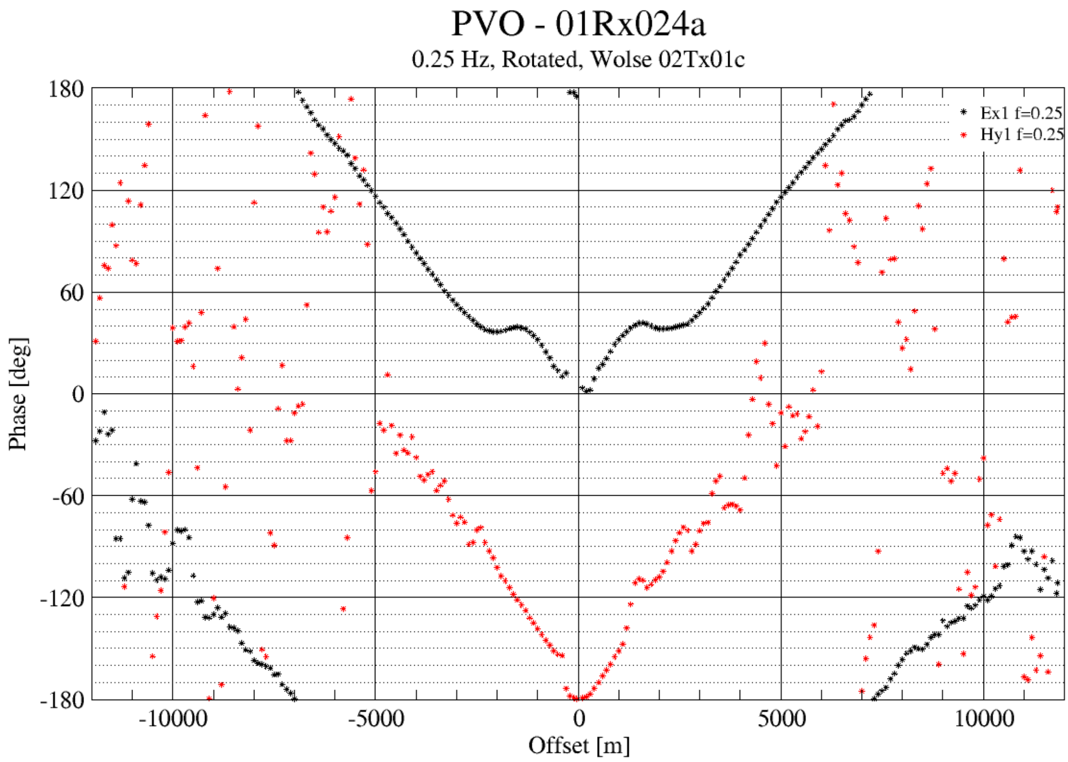


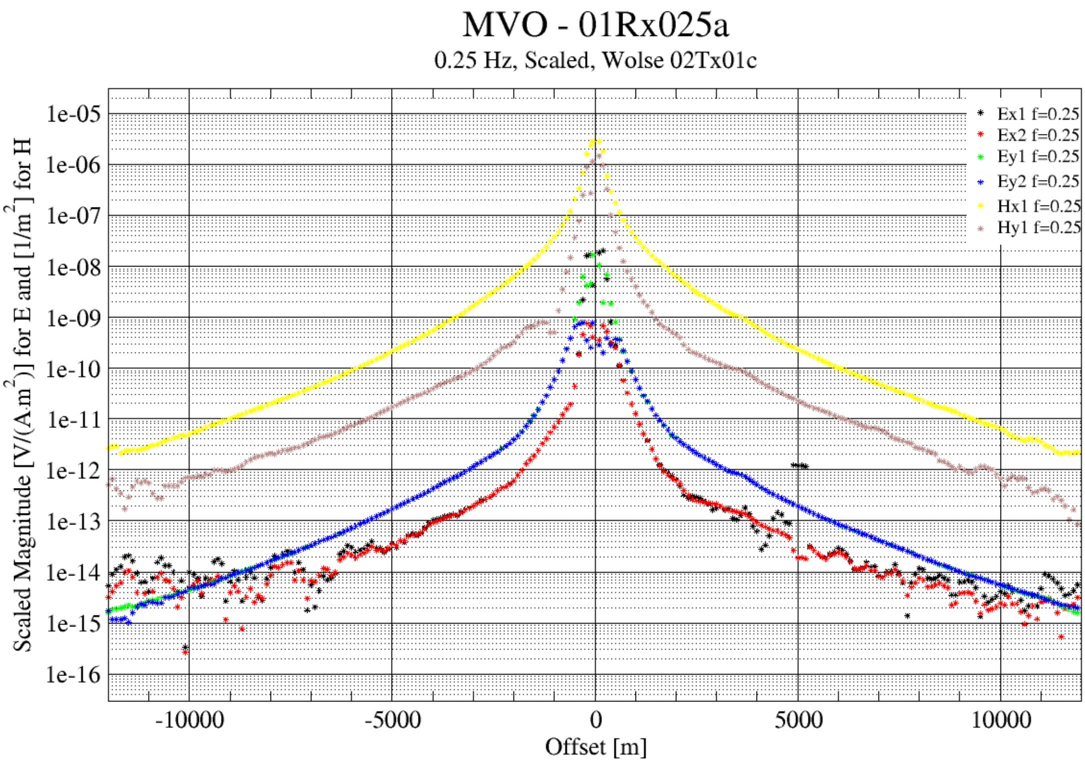
MVO - 01Rx024a
0.25 Hz, Scaled, Wolse 02Tx01c
Scaled Magnitude [V/(A.m2)] for E and [1/m2] for H
1e-05
1e-06
1e-07
1e-08
1e-09
1e-10
1e-11
1e-12
1e-13
1e-14
1e-15
1e-16
-10000
-5000
0
5000
10000
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25

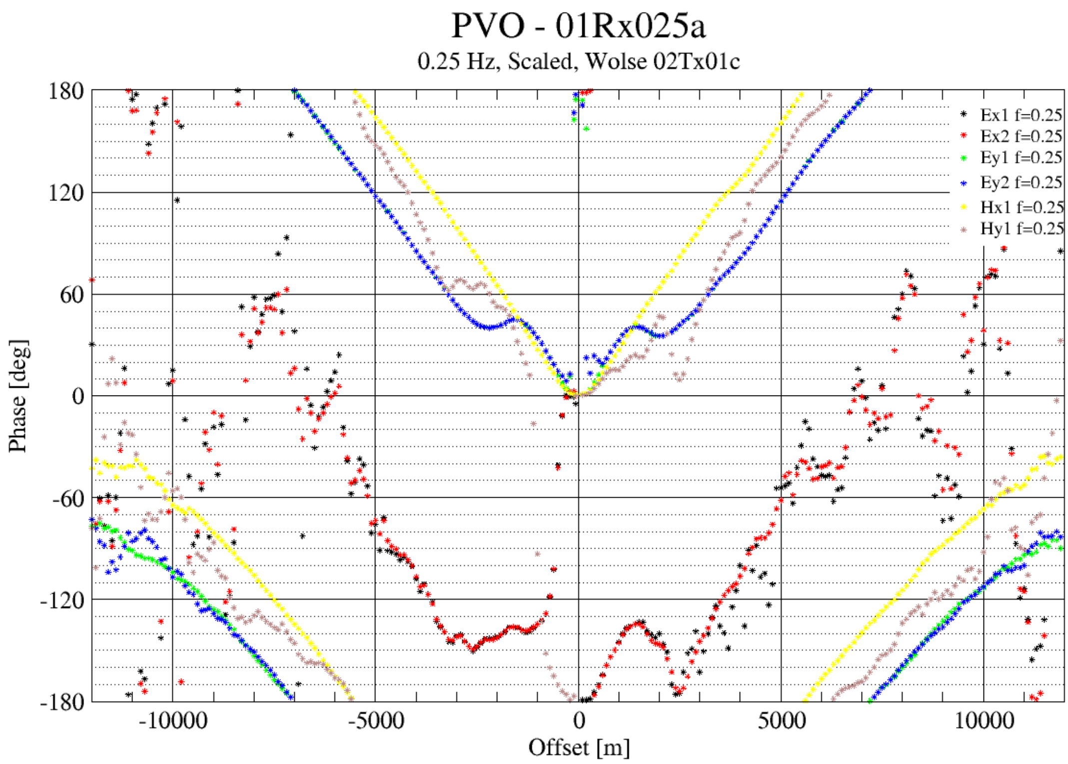


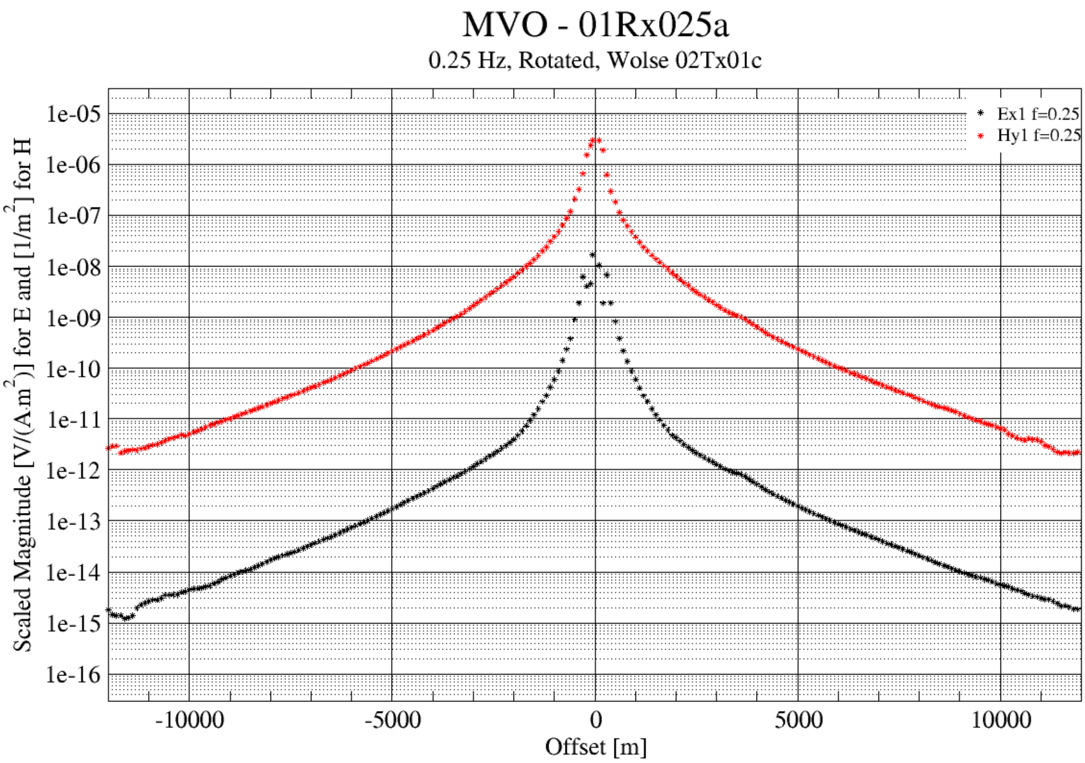
PVO - 01Rx024a
0.25 Hz, Scaled, Wolse 02Tx01c
Phase [deg]
180
120
60
0
-60
-120
-180
-10000
-5000
0
5000
10000
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25

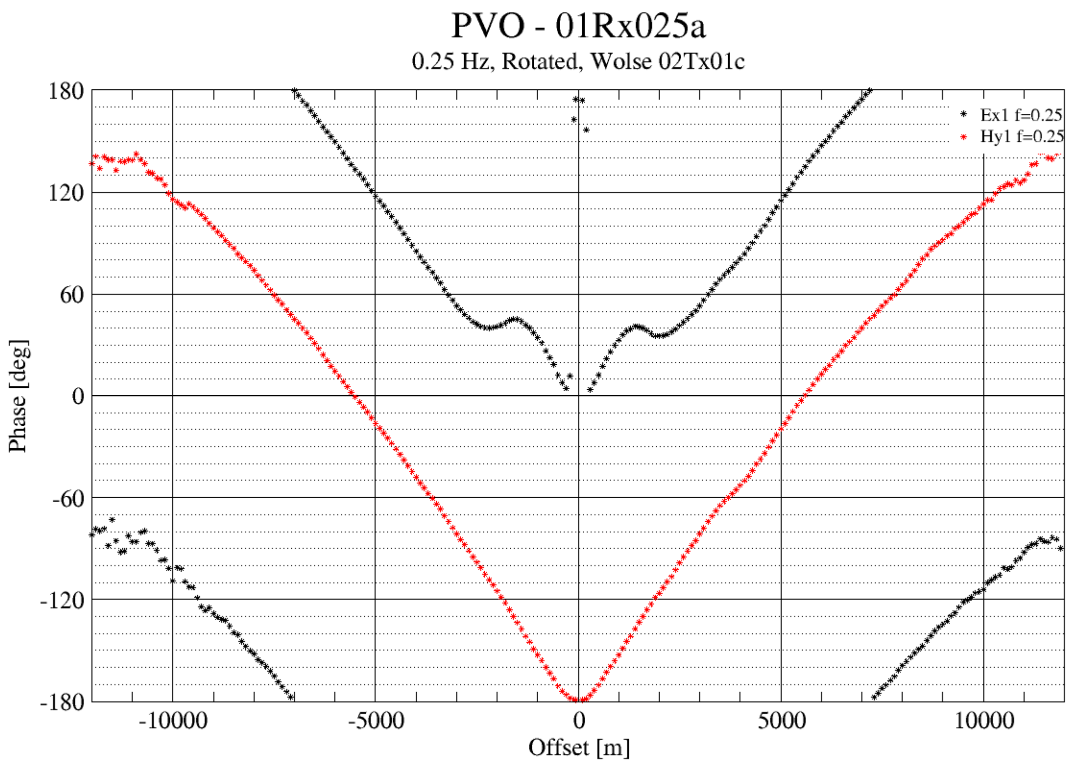

MVO - 01Rx024a
0.25 Hz, Rotated, Wolse 02Tx01c
Ex1 f=0.25
Hy1 f=0.25
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
1e-05
1e-06
1e-07
1e-08
1e-09
1e-10
1e-11
1e-12
1e-13
1e-14
1e-15
1e-16
-10000
-5000
0
5000
10000
Offset [m]

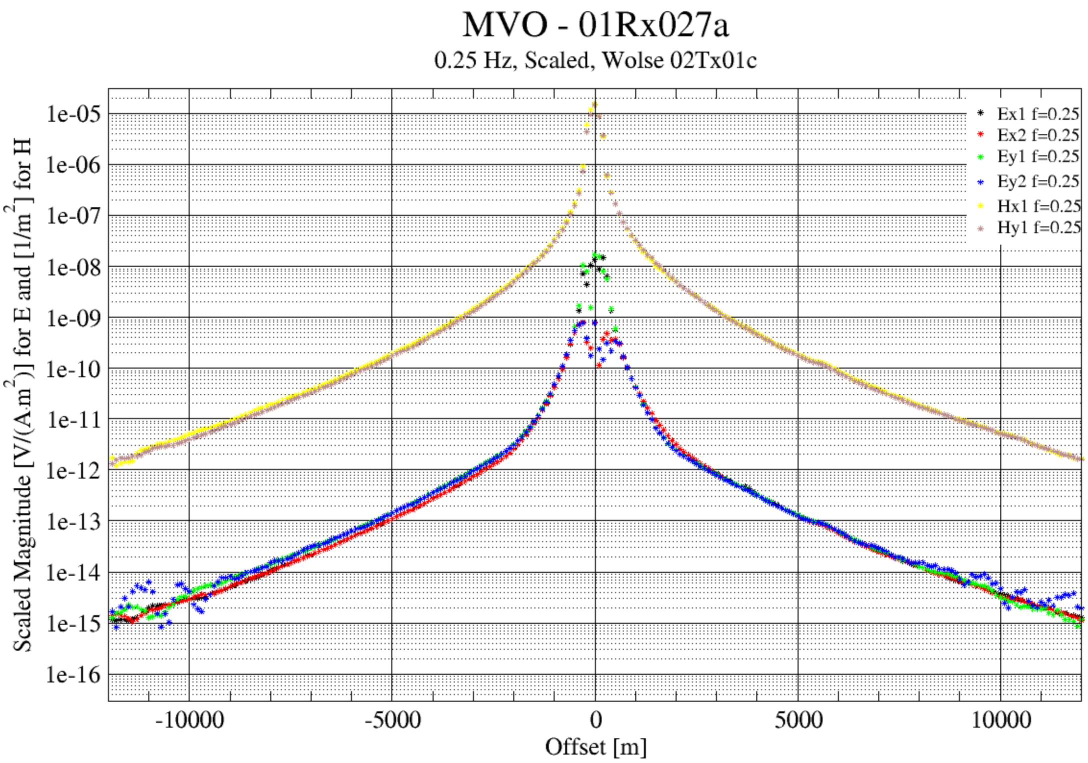

PVO - 01Rx024a
0.25 Hz, Rotated, Wolse 02Tx01c
Ex1 f=0.25
Hy1 f=0.25
Phase [deg]
180
120
60
0
-60
-120
-180
-10000
-5000
0
5000
10000
Offset [m]

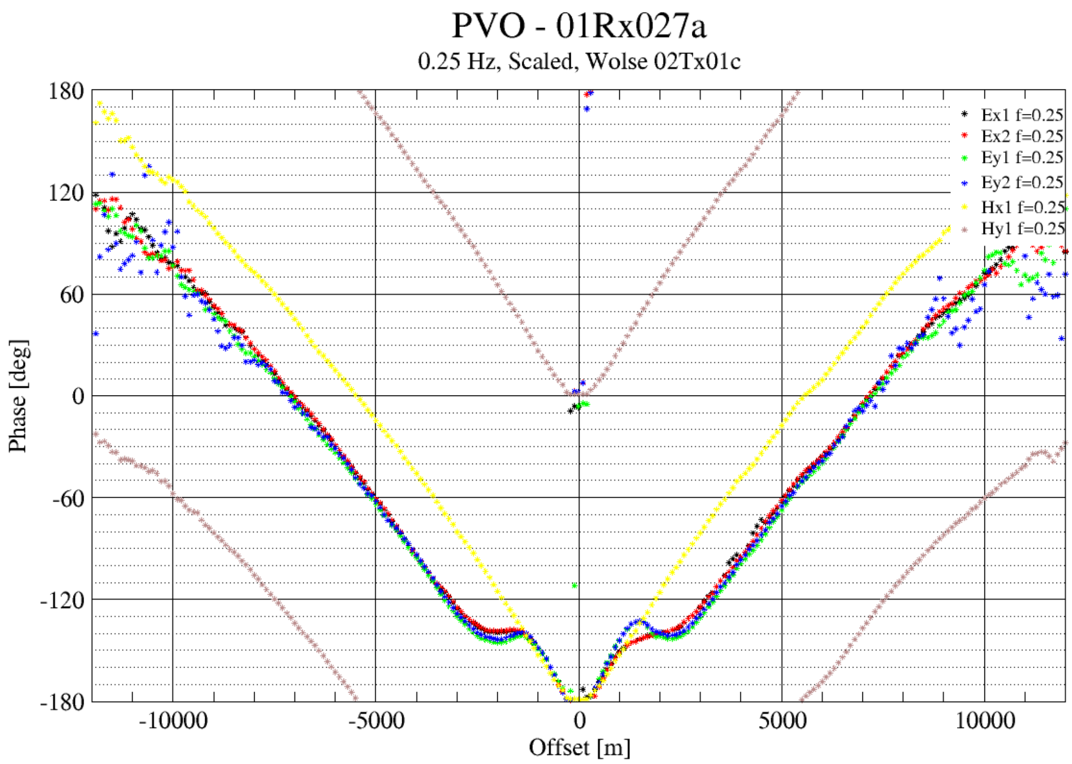

MVO - 01Rx025a
0.25 Hz, Scaled, Wolse 02Tx01c
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25

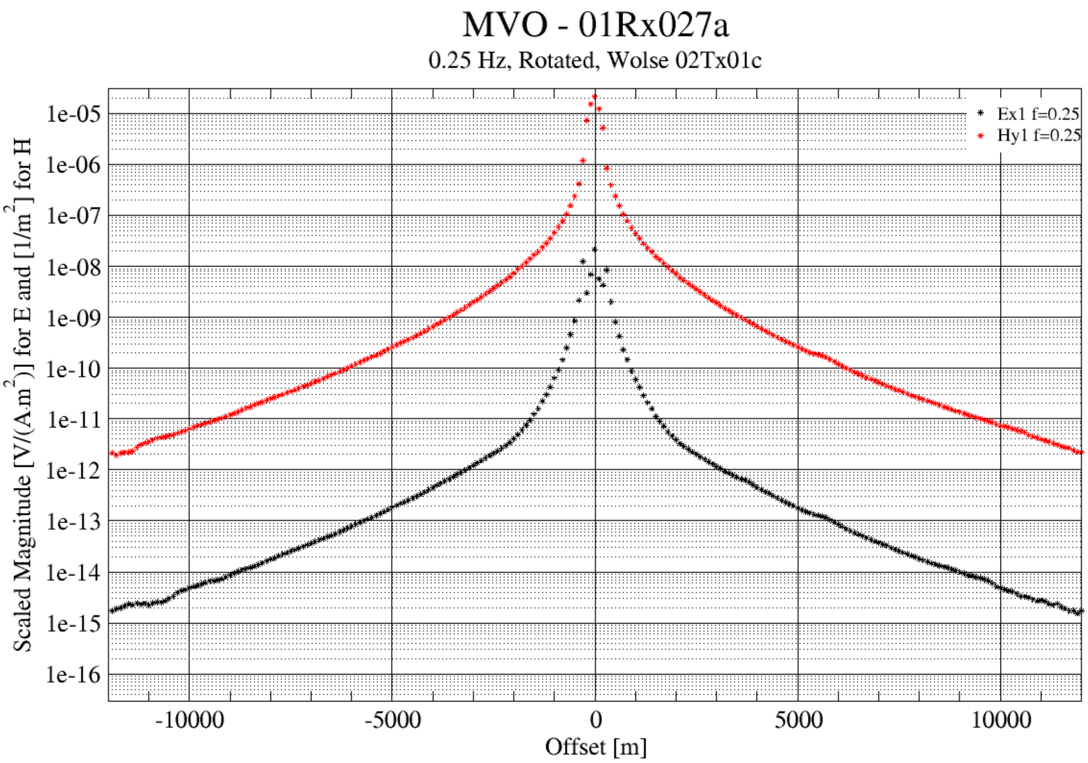

PVO - 01Rx025a
0.25 Hz, Scaled, Wolse 02Tx01c
Phase [deg]
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25


MVO - 01Rx025a
0.25 Hz, Rotated, Wolse 02Tx01c
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
Offset [m]
Ex1 f=0.25
Hy1 f=0.25
1e-05
1e-06
1e-07
1e-08
1e-09
1e-10
1e-11
1e-12
1e-13
1e-14
1e-15
1e-16
-10000
-5000
0
5000
10000

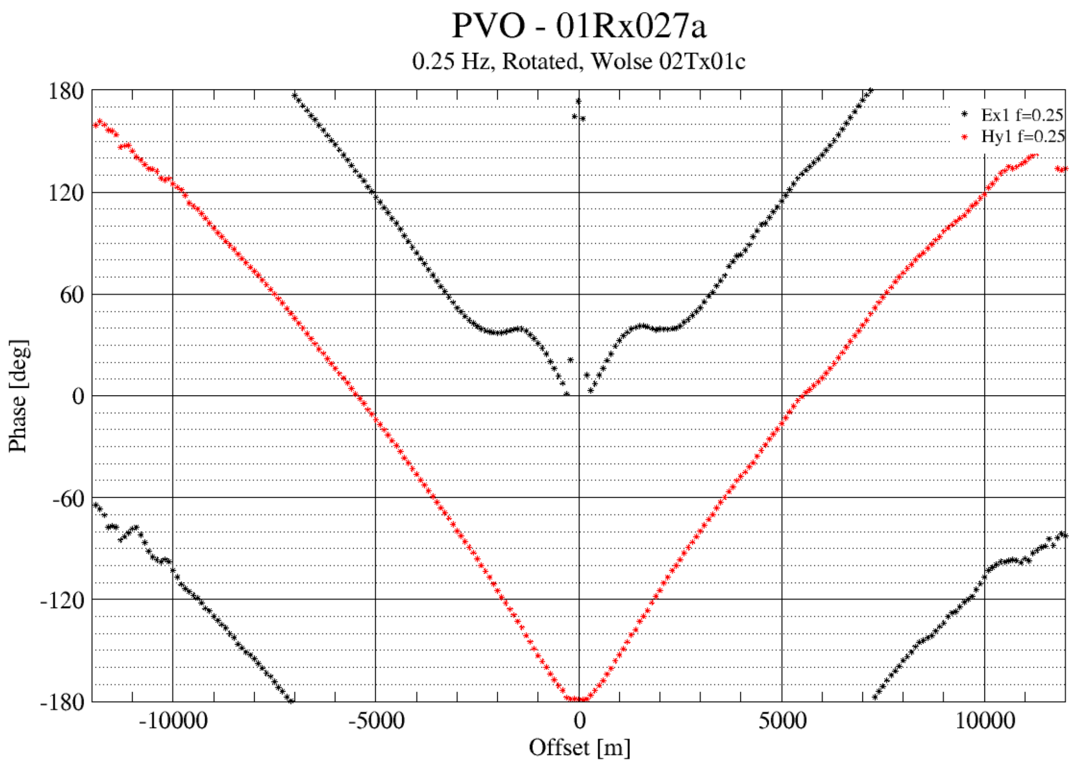

PVO - 01Rx025a
0.25 Hz, Rotated, Wolse 02Tx01c
Phase [deg]
Offset [m]
Ex1 f=0.25
Hy1 f=0.25
180
120
60
0
-60
-120
-180
-10000
-5000
0
5000
10000


MVO - 01Rx027a
0.25 Hz, Scaled, Wolse 02Tx01c
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
1e-05
1e-06
1e-07
1e-08
1e-09
1e-10
1e-11
1e-12
1e-13
1e-14
1e-15
1e-16
-10000
-5000
0
5000
10000
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25

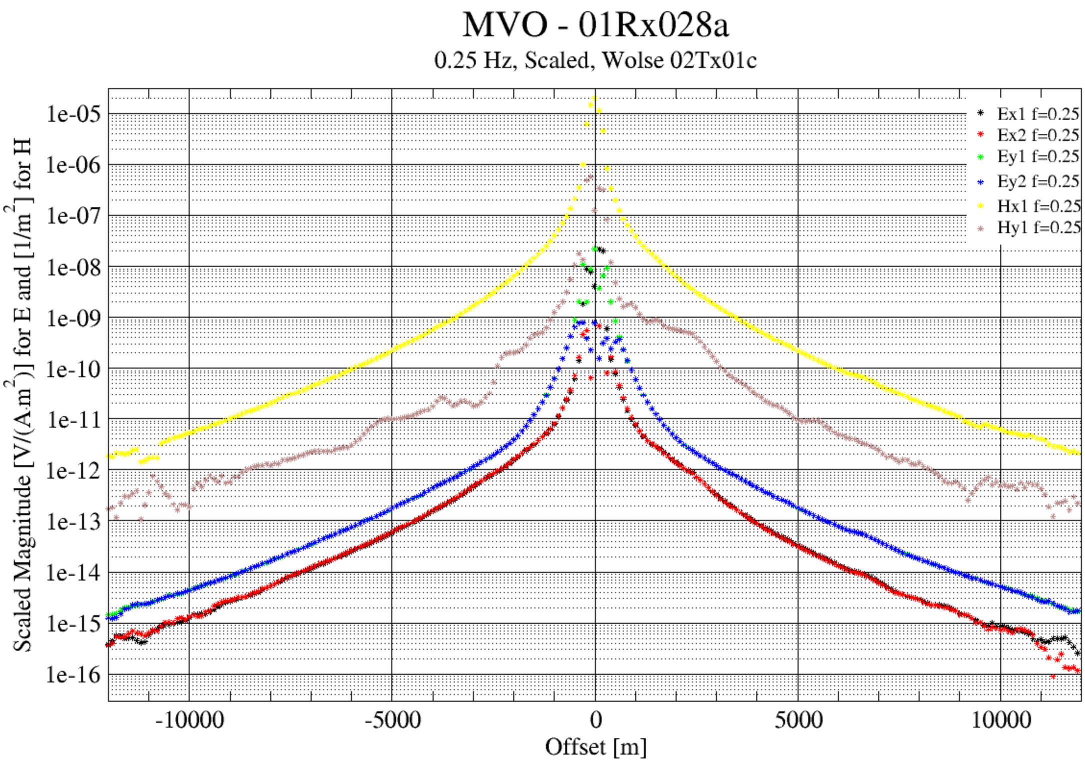

PVO - 01Rx027a
0.25 Hz, Scaled, Wolse 02Tx01c
Phase [deg]
180
120
60
0
-60
-120
-180
-10000
-5000
0
5000
10000
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25

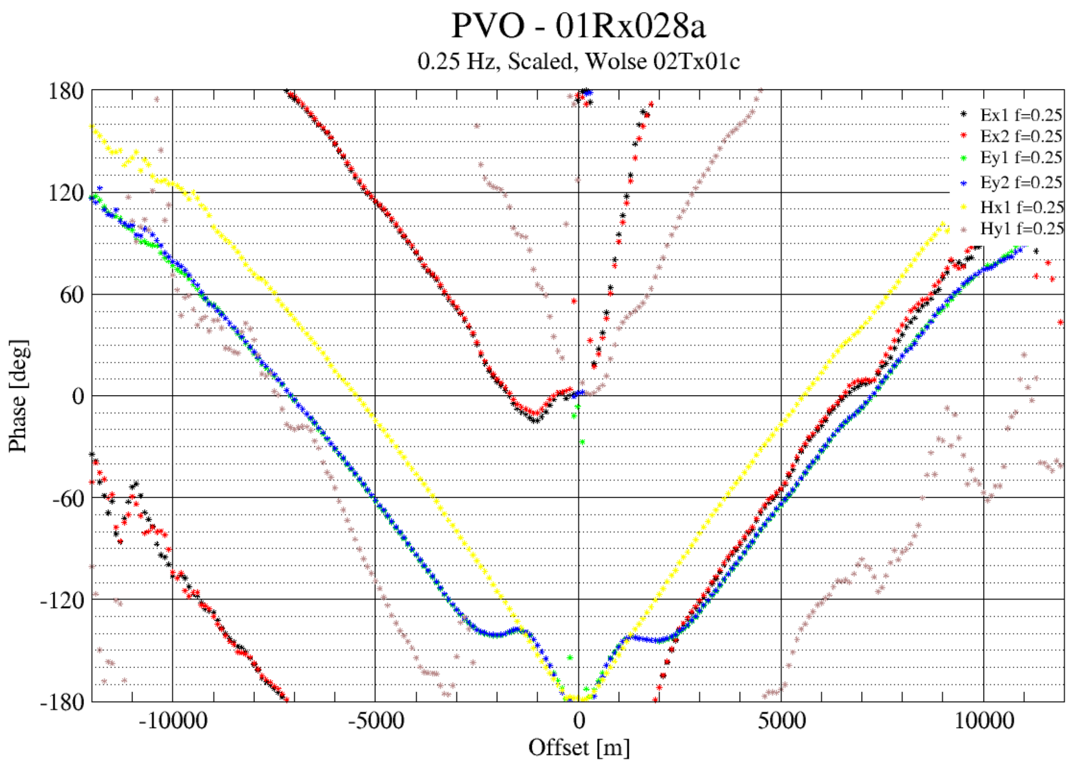


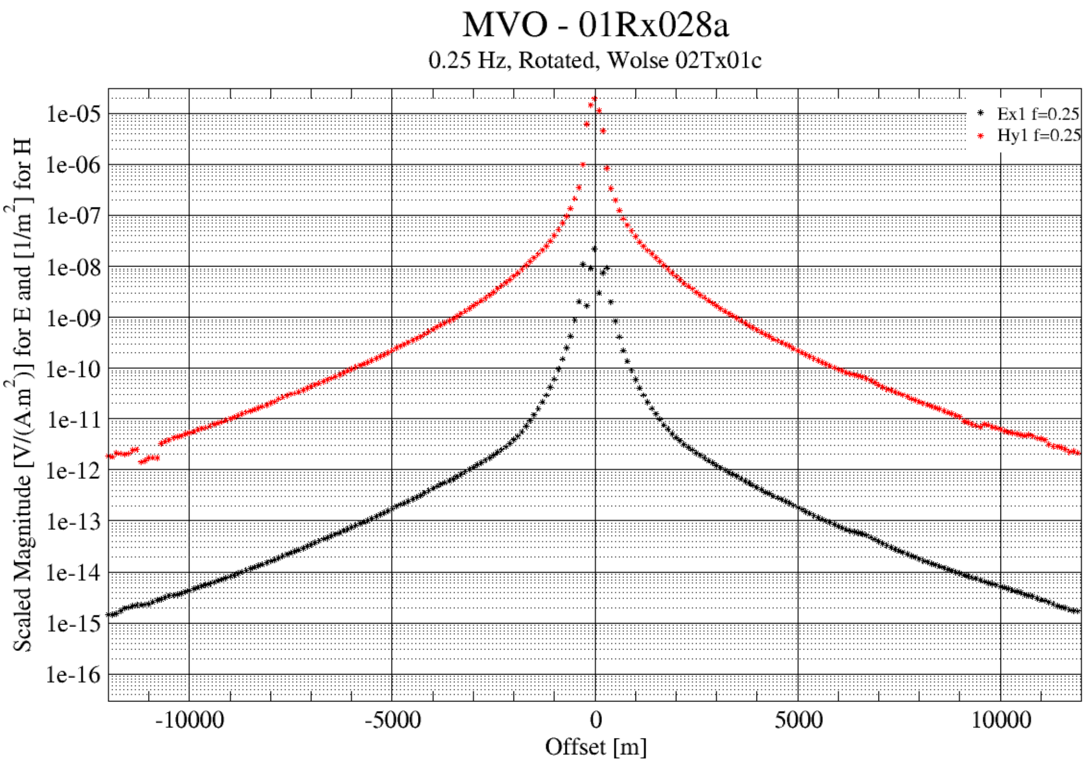
MVO - 01Rx027a
0.25 Hz, Rotated, Wolse 02Tx01c
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
Offset [m]
Ex1 f=0.25
Hy1 f=0.25



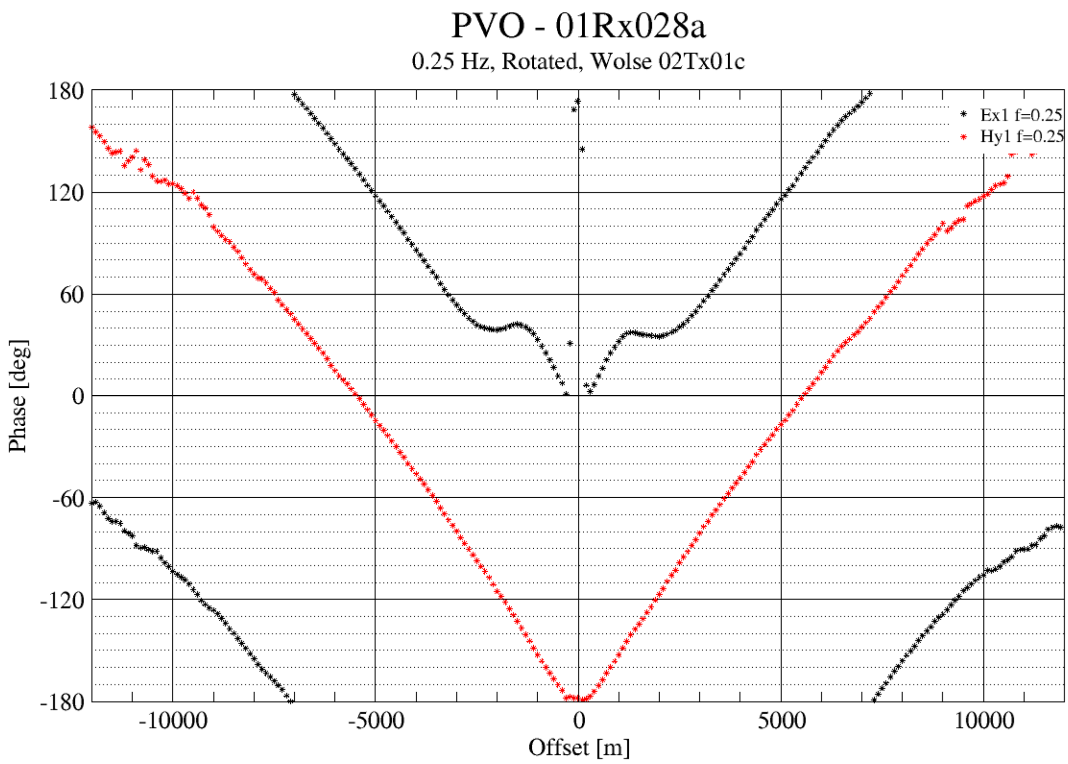
PVO - 01Rx027a
0.25 Hz, Rotated, Wolse 02Tx01c
Phase [deg]
Offset [m]
Ex1 f=0.25
Hy1 f=0.25


MVO - 01Rx028a
0.25 Hz, Scaled, Wolse 02Tx01c
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25

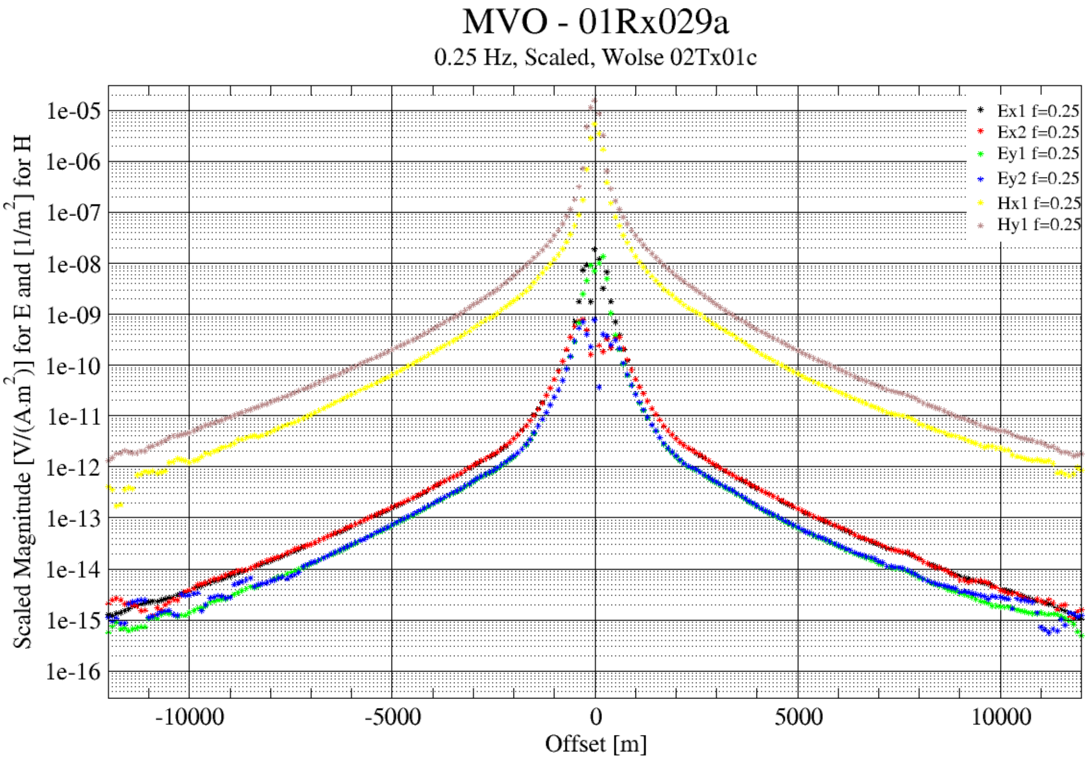

PVO - 01Rx028a
0.25 Hz, Scaled, Wolse 02Tx01c
Phase [deg]
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25



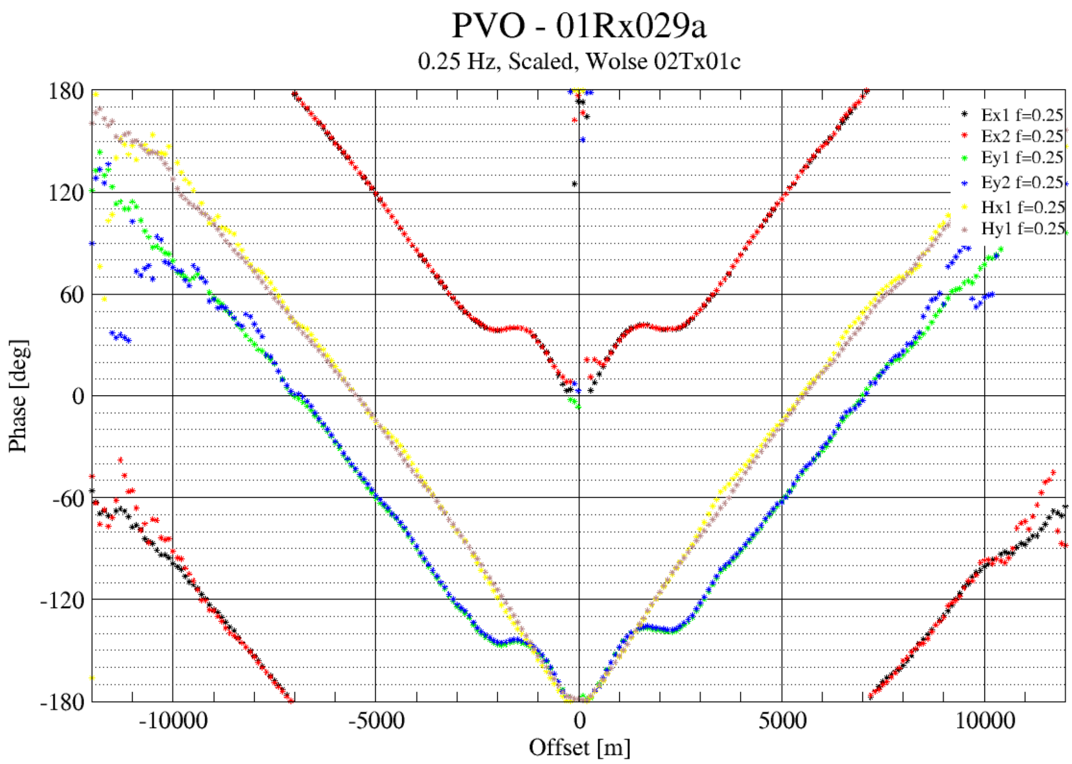
MVO - 01Rx028a
0.25 Hz, Rotated, Wolse 02Tx01c
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
Offset [m]
Ex1 f=0.25
Hy1 f=0.25



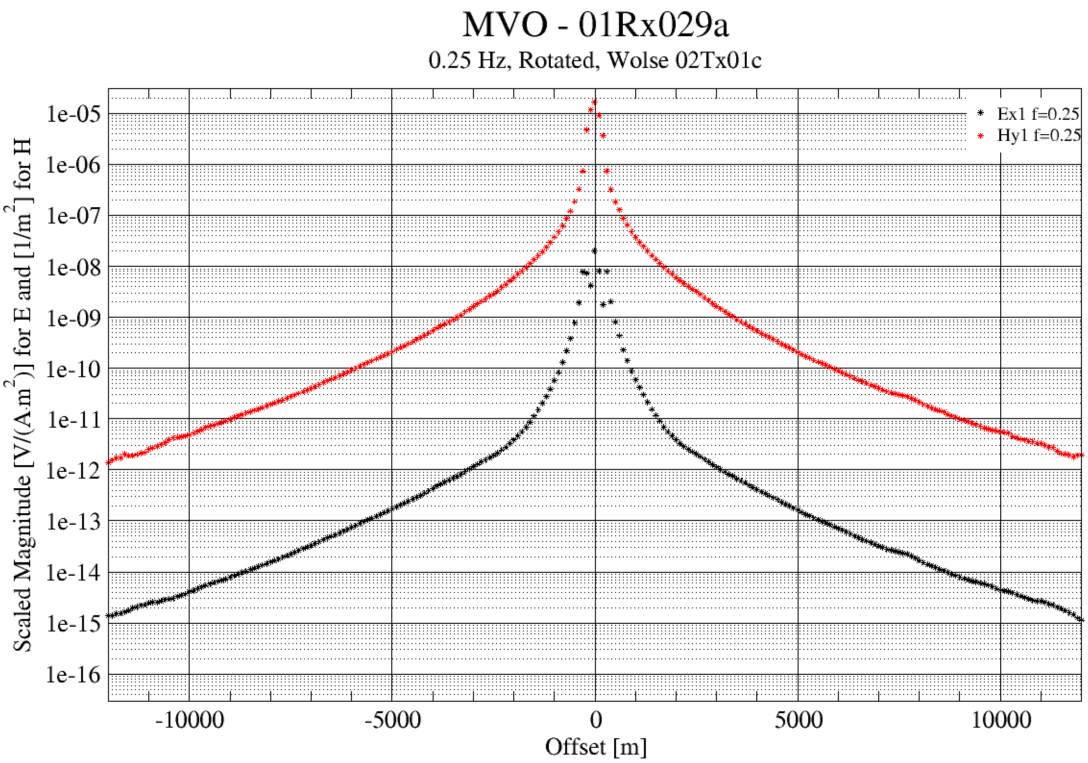
PVO - 01Rx028a
0.25 Hz, Rotated, Wolse 02Tx01c
Phase [deg]
Offset [m]
Ex1 f=0.25
Hy1 f=0.25

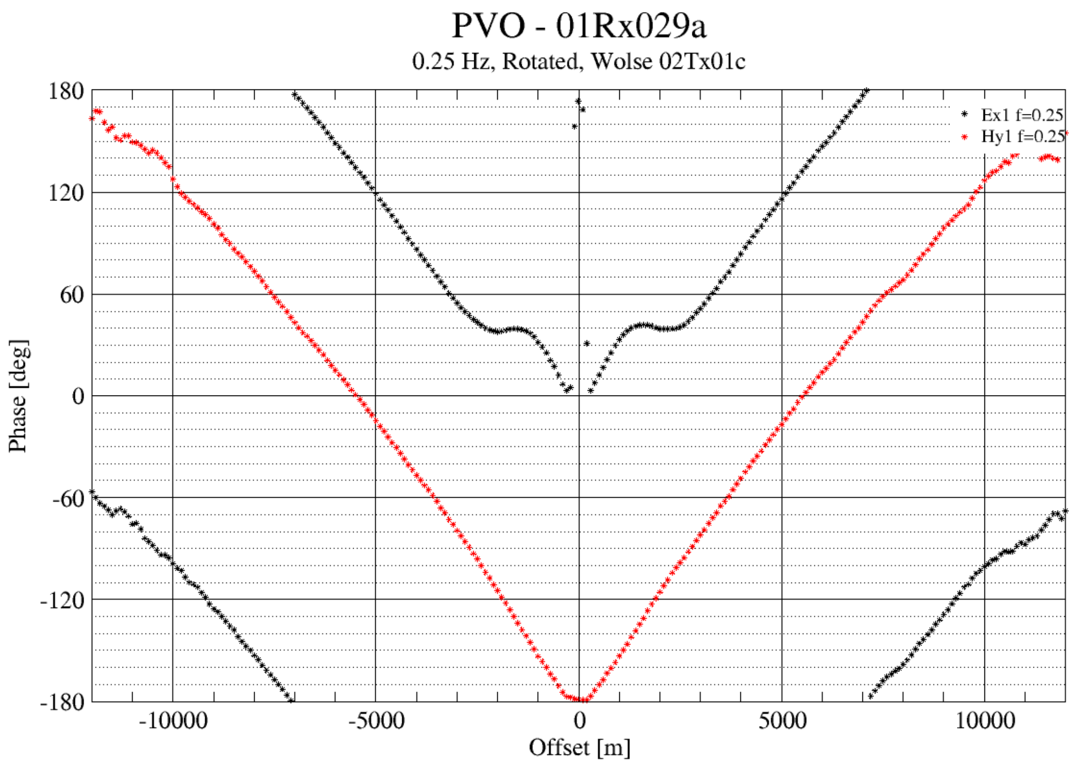


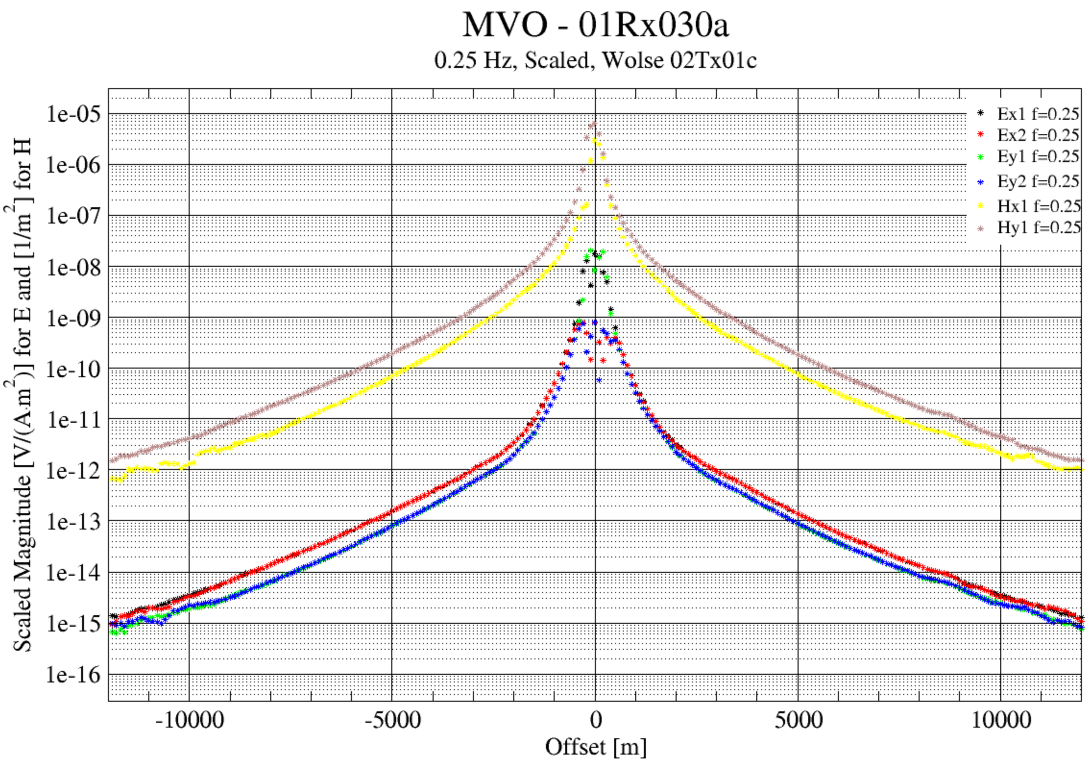
MVO - 01Rx029a
0.25 Hz, Scaled, Wolse 02Tx01c
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
1e-05
1e-06
1e-07
1e-08
1e-09
1e-10
1e-11
1e-12
1e-13
1e-14
1e-15
1e-16
-10000
-5000
0
5000
10000
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25

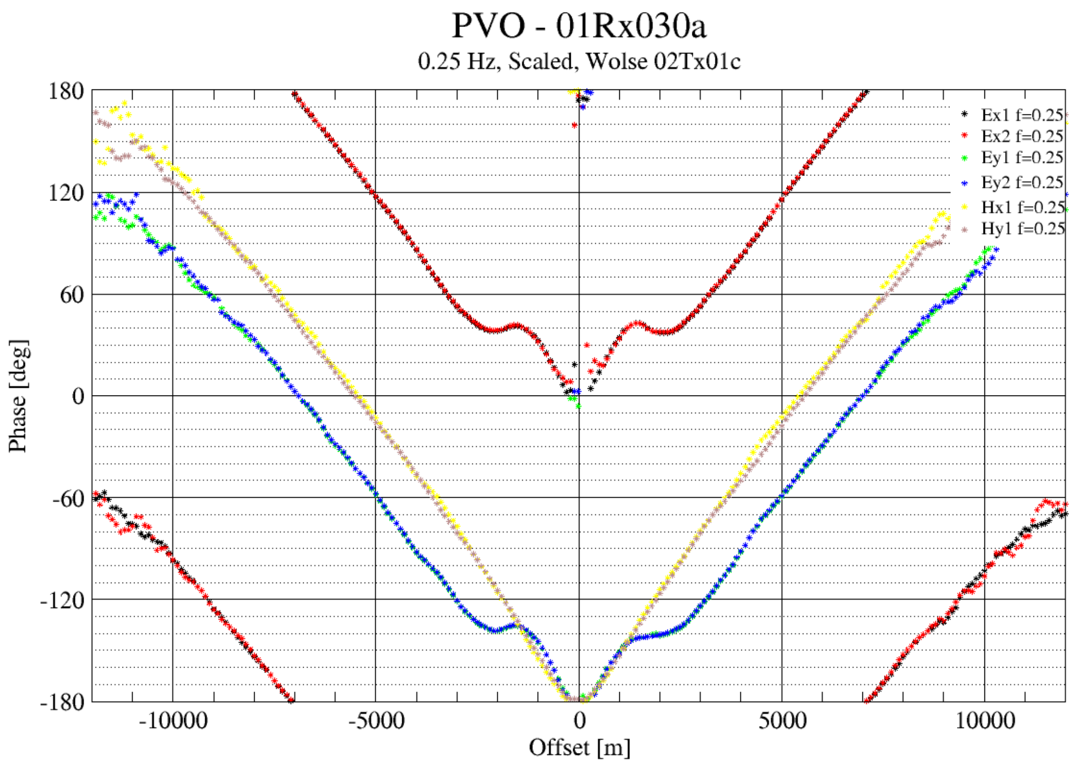


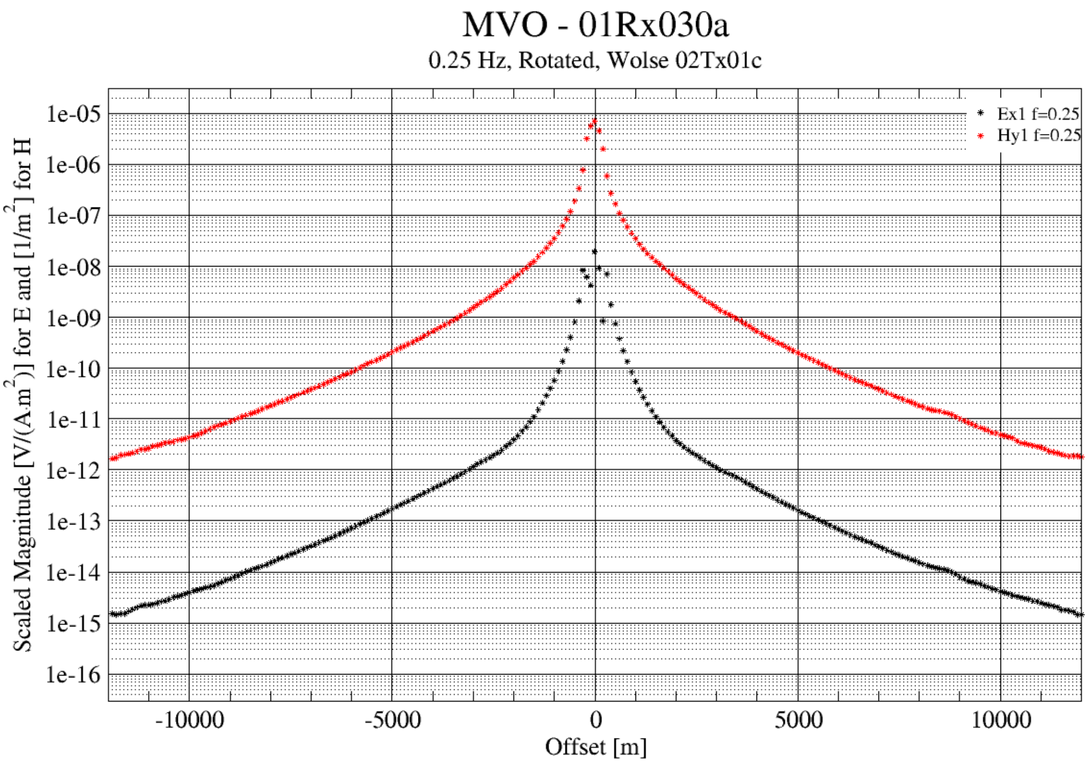
PVO - 01Rx029a
0.25 Hz, Scaled, Wolse 02Tx01c
Phase [deg]
180
120
60
0
-60
-120
-180
-10000
-5000
0
5000
10000
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25

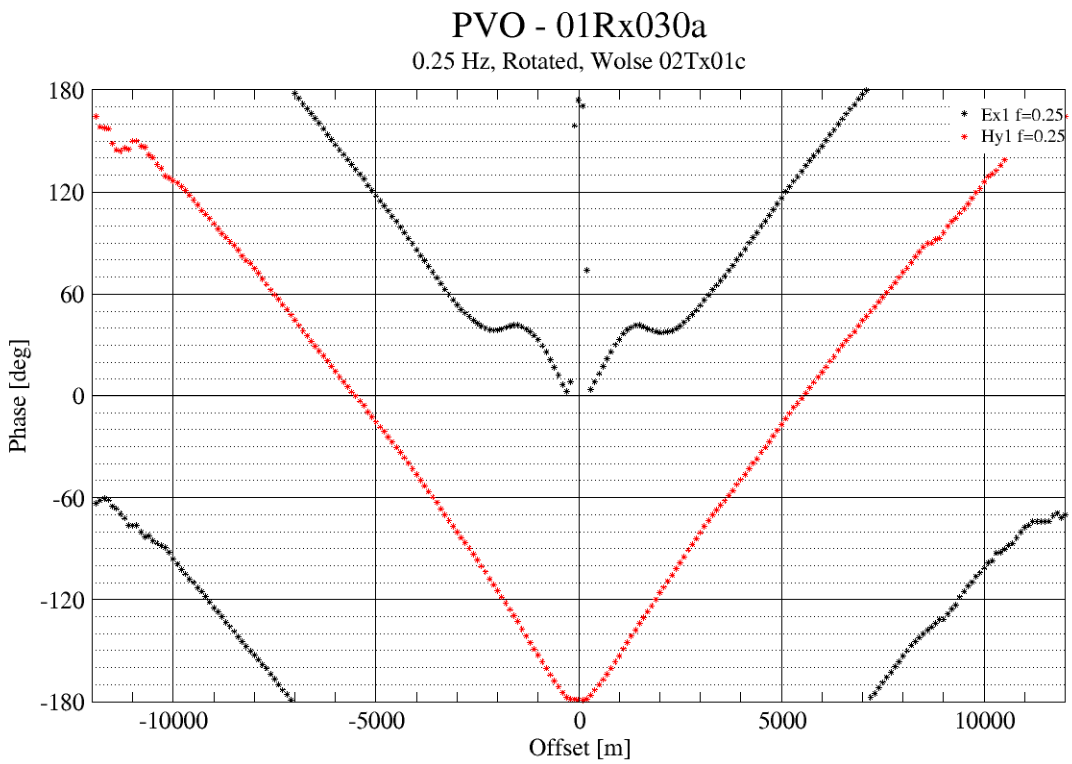

MVO - 01Rx029a
0.25 Hz, Rotated, Wolse 02Tx01c
Ex1 f=0.25
Hy1 f=0.25
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
1e-05
1e-06
1e-07
1e-08
1e-09
1e-10
1e-11
1e-12
1e-13
1e-14
1e-15
1e-16
-10000
-5000
0
5000
10000
Offset [m]

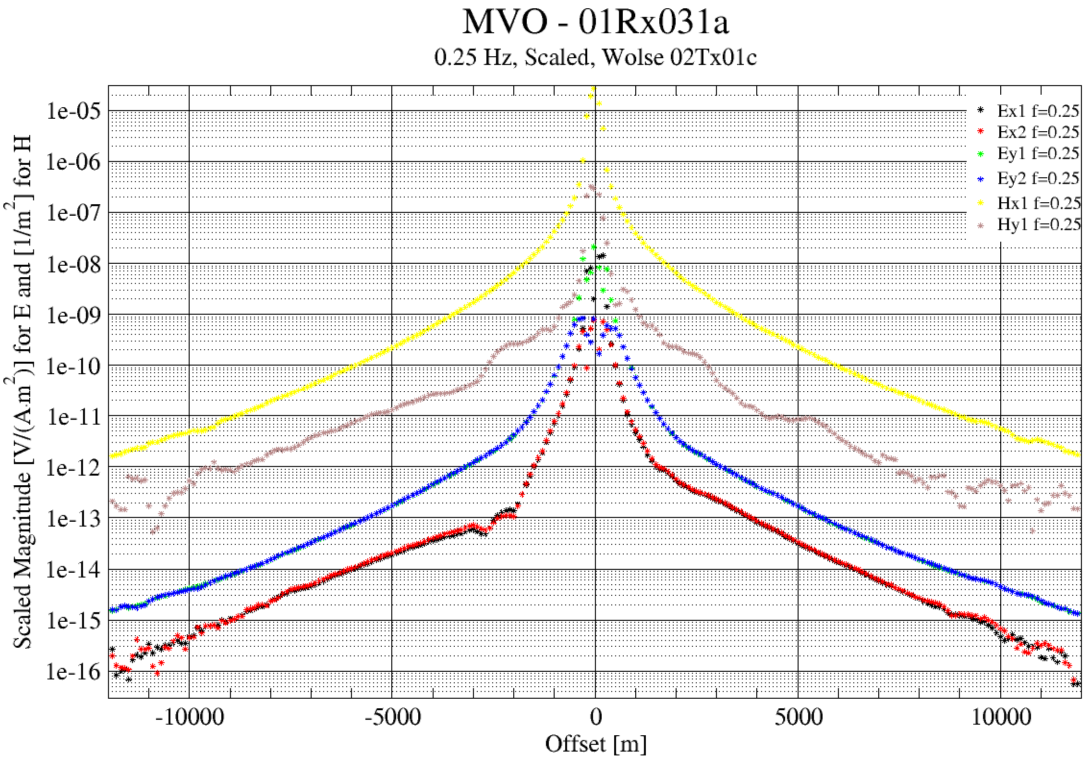

PVO - 01Rx029a
0.25 Hz, Rotated, Wolse 02Tx01c
Ex1 f=0.25
Hy1 f=0.25
Phase [deg]
180
120
60
0
-60
-120
-180
-10000
-5000
0
5000
10000
Offset [m]


MVO - 01Rx030a
0.25 Hz, Scaled, Wolse 02Tx01c
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25

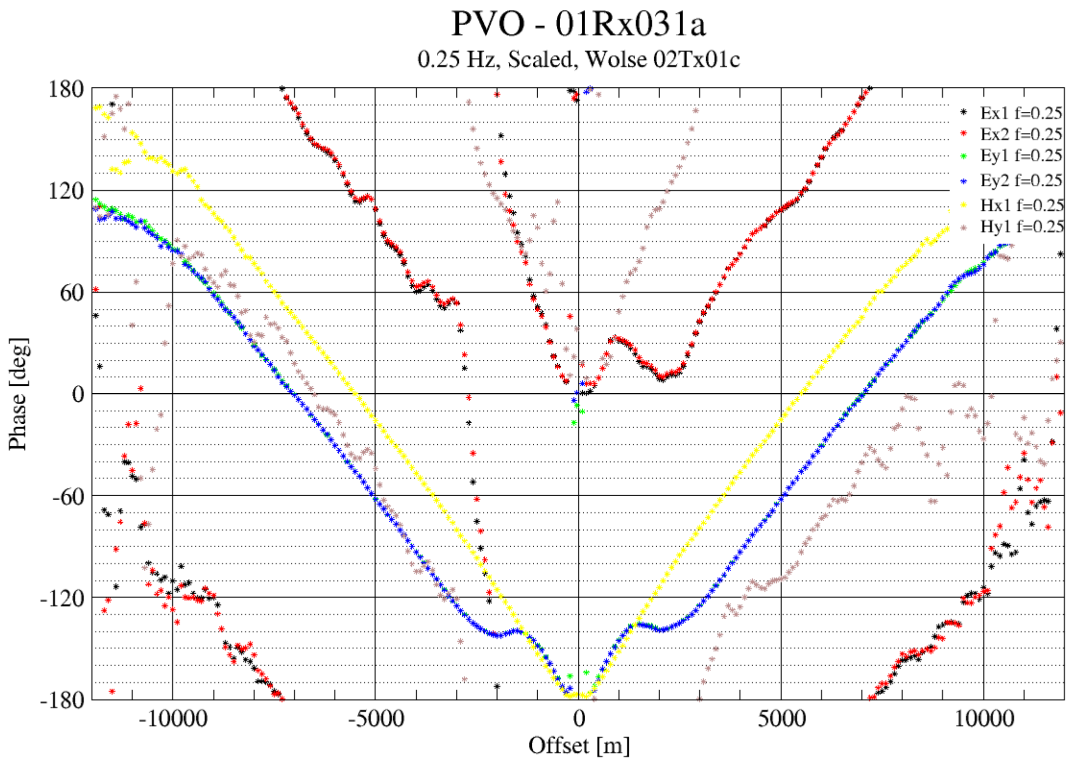

PVO - 01Rx030a
0.25 Hz, Scaled, Wolse 02Tx01c
Phase [deg]
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25


MVO - 01Rx030a
0.25 Hz, Rotated, Wolse 02Tx01c
Ex1 f=0.25
Hy1 f=0.25
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
1e-05
1e-06
1e-07
1e-08
1e-09
1e-10
1e-11
1e-12
1e-13
1e-14
1e-15
1e-16
-10000
-5000
0
5000
10000
Offset [m]

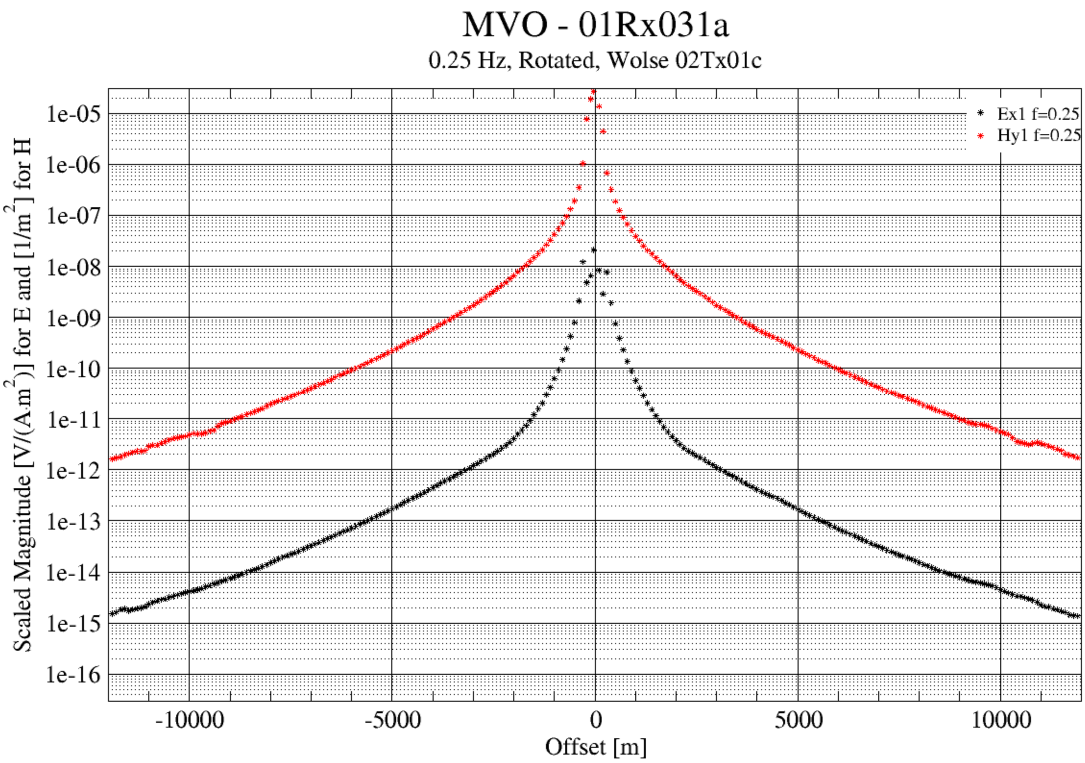

PVO - 01Rx030a
0.25 Hz, Rotated, Wolse 02Tx01c
Ex1 f=0.25
Hy1 f=0.25
Phase [deg]
180
120
60
0
-60
-120
-180
-10000
-5000
0
5000
10000
Offset [m]

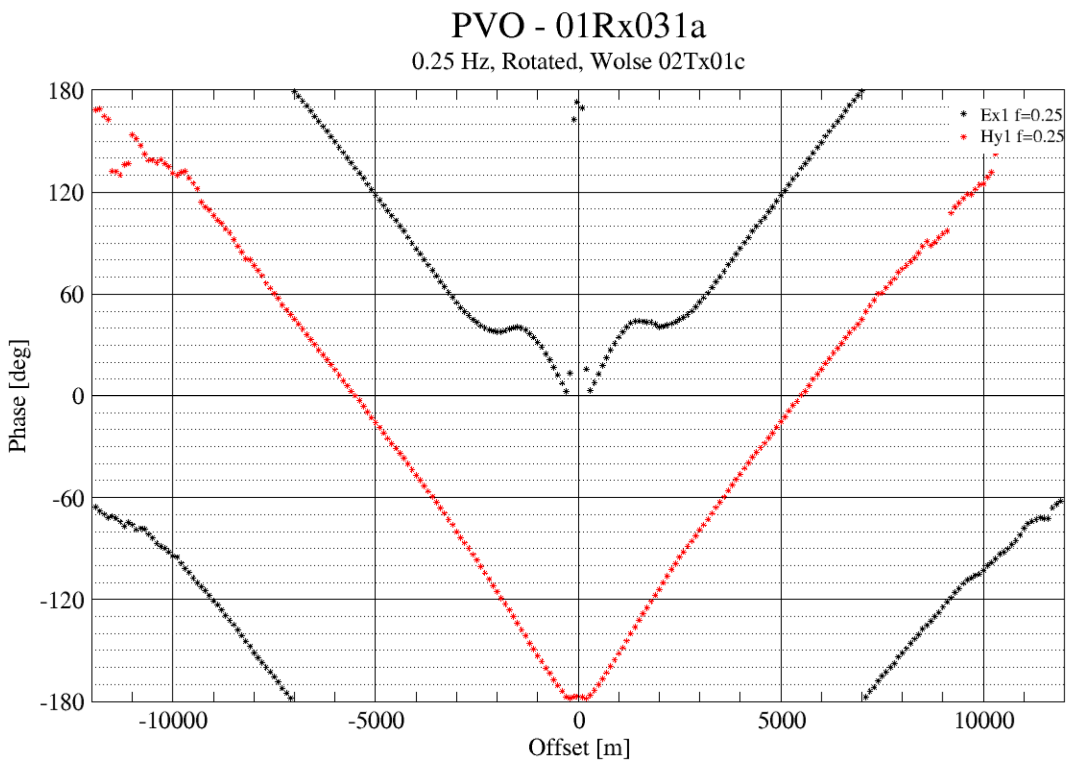


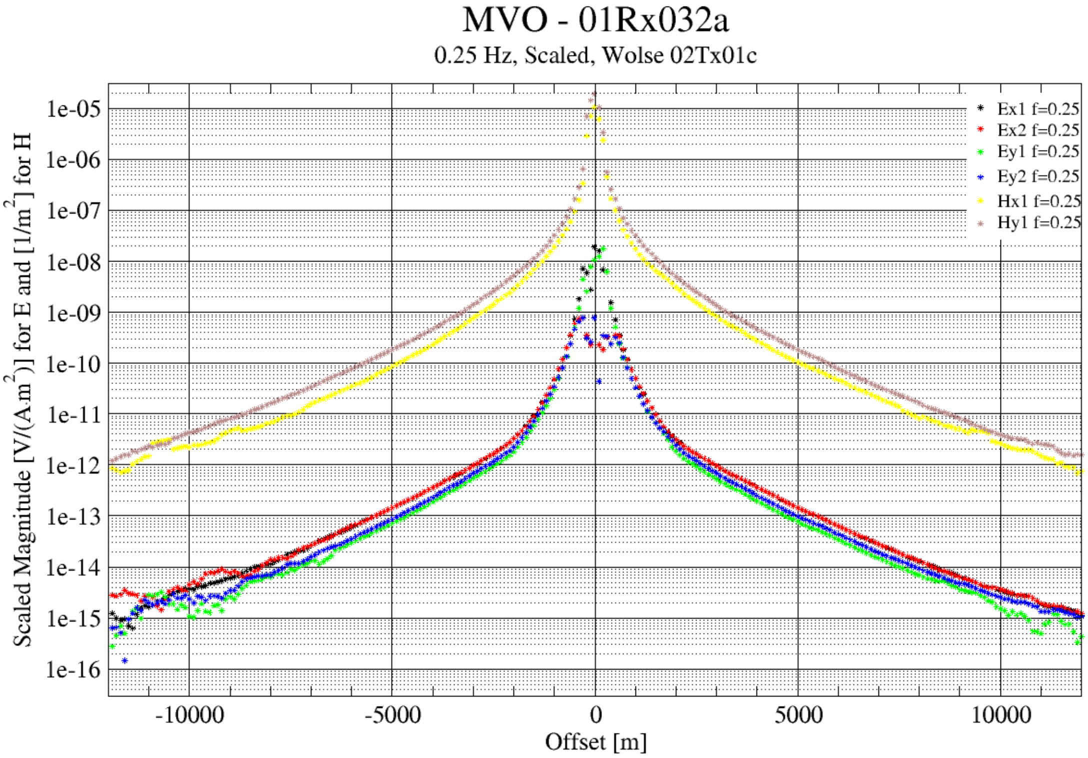
MVO - 01Rx031a
0.25 Hz, Scaled, Wolse 02Tx01c
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
1e-05
1e-06
1e-07
1e-08
1e-09
1e-10
1e-11
1e-12
1e-13
1e-14
1e-15
1e-16
-10000
-5000
0
5000
10000
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25



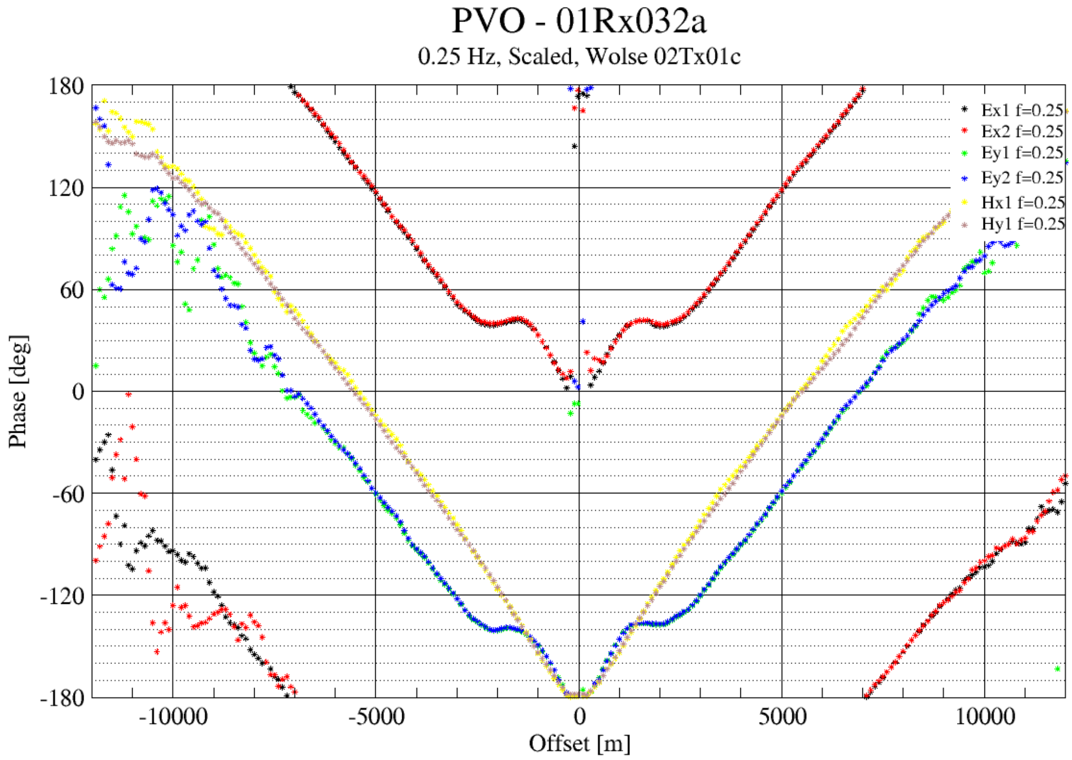
PVO - 01Rx031a
0.25 Hz, Scaled, Wolse 02Tx01c
Phase [deg]
180
120
60
0
-60
-120
-180
-10000
-5000
0
5000
10000
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25


MVO - 01Rx031a
0.25 Hz, Rotated, Wolse 02Tx01c
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
1e-05
1e-06
1e-07
1e-08
1e-09
1e-10
1e-11
1e-12
1e-13
1e-14
1e-15
1e-16
-10000
-5000
0
5000
10000
Offset [m]
Ex1 f=0.25
Hy1 f=0.25

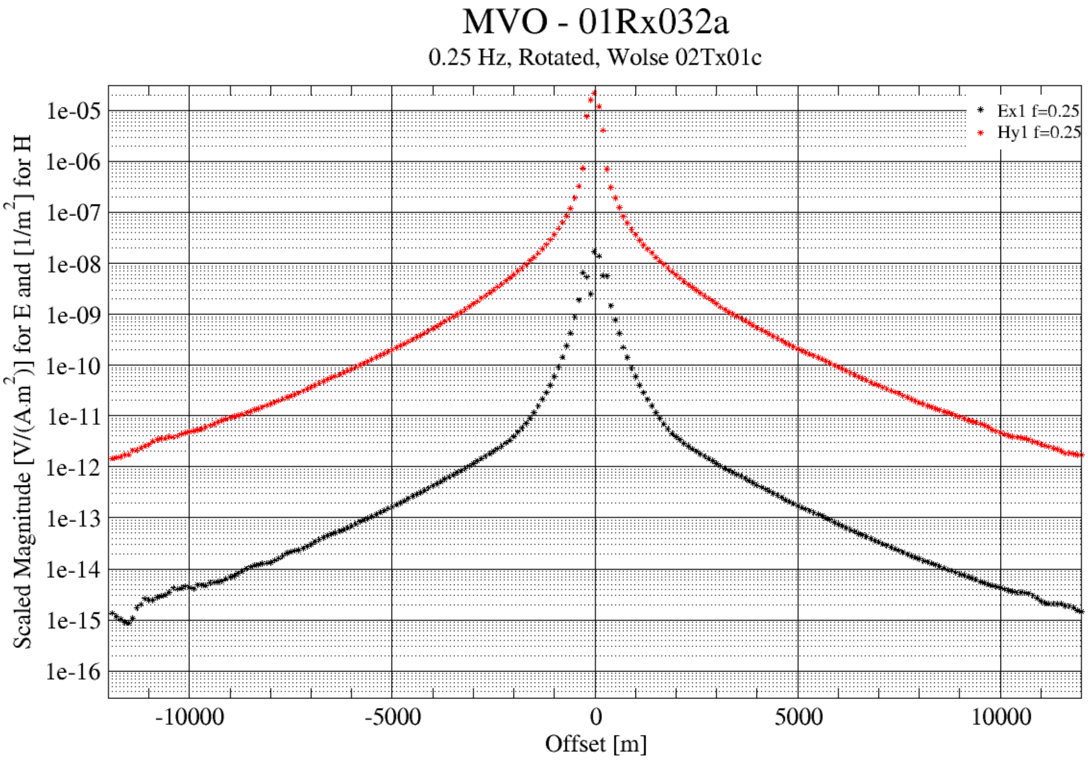

PVO - 01Rx031a
0.25 Hz, Rotated, Wolse 02Tx01c
Phase [deg]
180
120
60
0
-60
-120
-180
-10000
-5000
0
5000
10000
Offset [m]
Ex1 f=0.25
Hy1 f=0.25



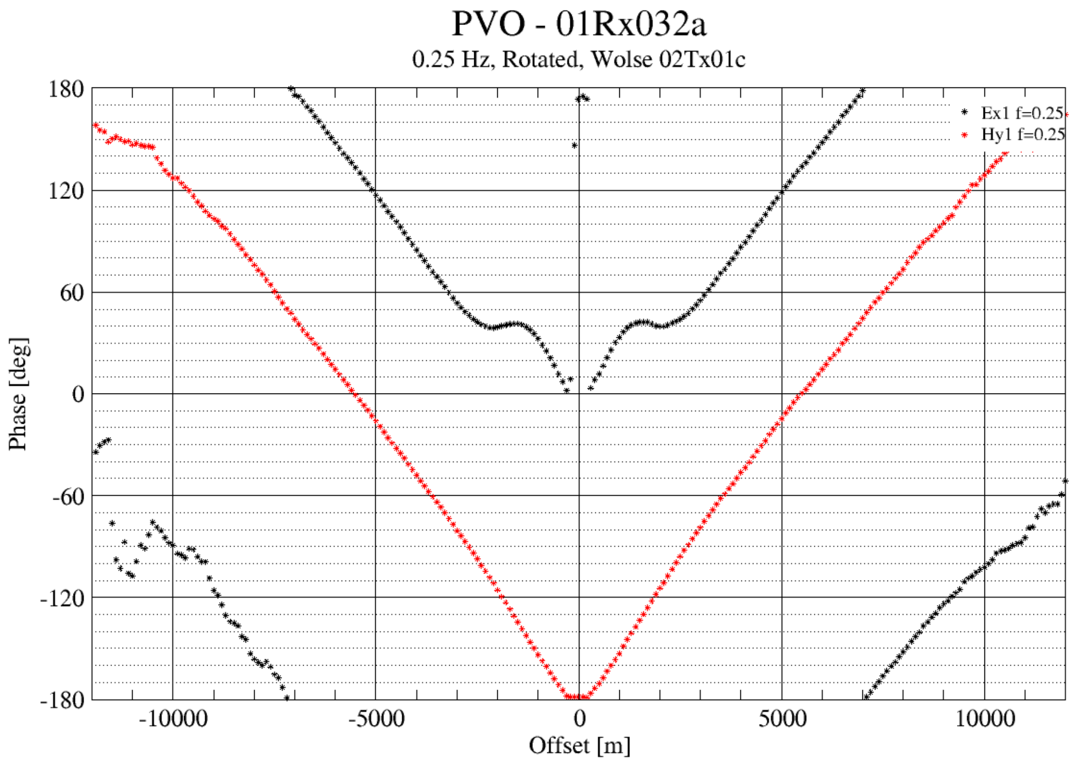
MVO - 01Rx032a
0.25 Hz, Scaled, Wolse 02Tx01c
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25



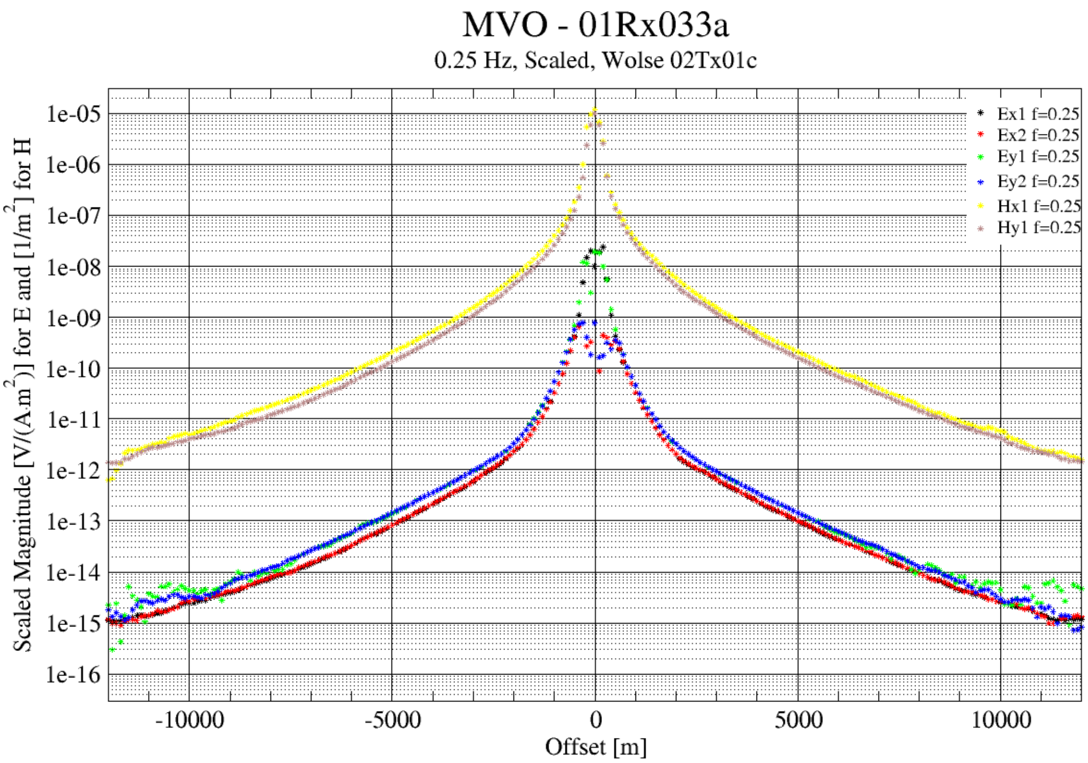
PVO - 01Rx032a
0.25 Hz, Scaled, Wolse 02Tx01c
Phase [deg]
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25

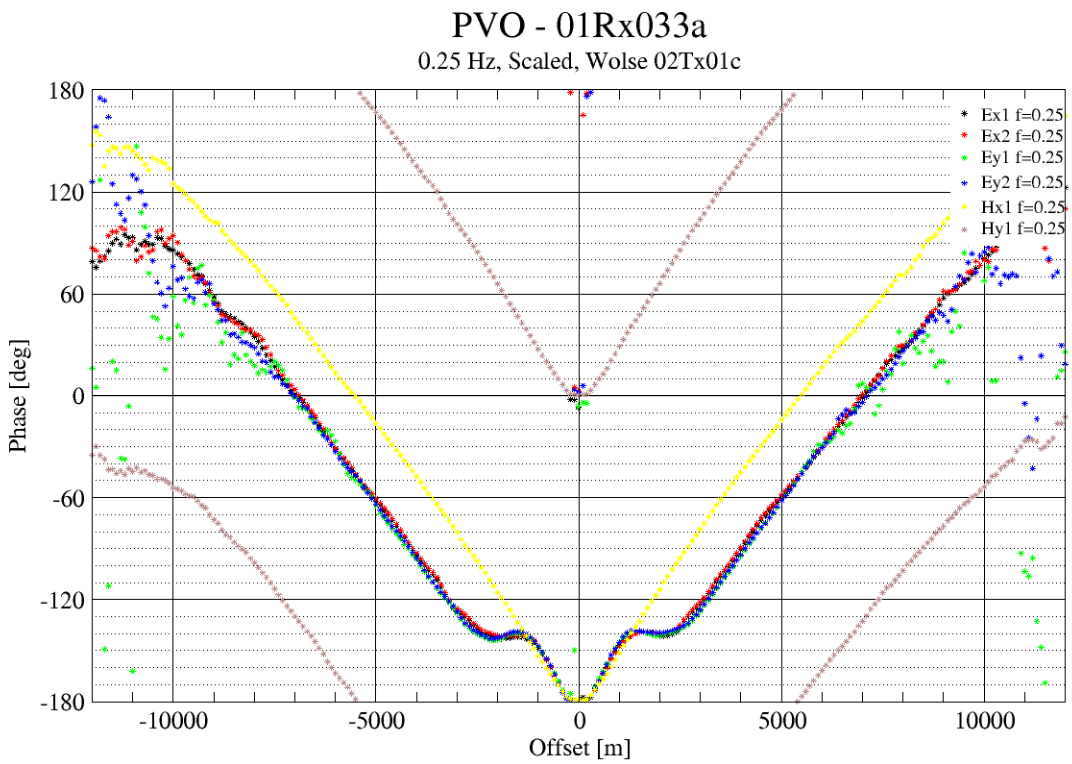


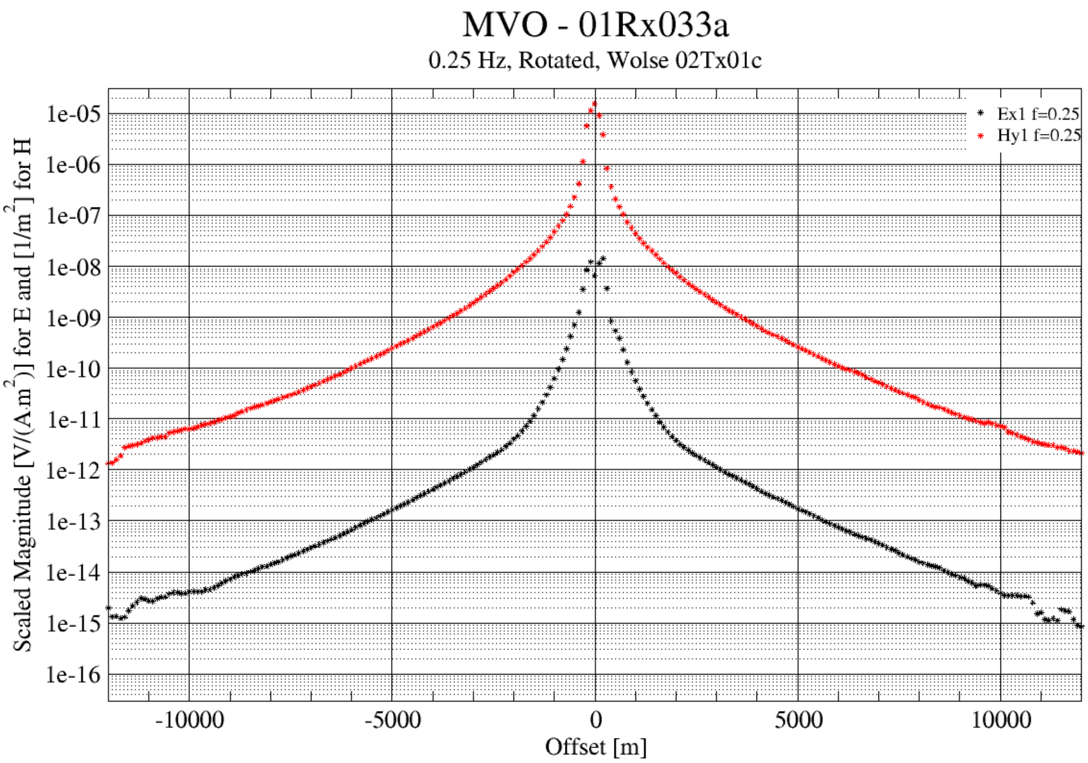
MVO - 01Rx032a
0.25 Hz, Rotated, Wolse 02Tx01c
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
1e-05
1e-06
1e-07
1e-08
1e-09
1e-10
1e-11
1e-12
1e-13
1e-14
1e-15
1e-16
-10000
-5000
0
5000
10000
Offset [m]
Ex1 f=0.25
Hy1 f=0.25

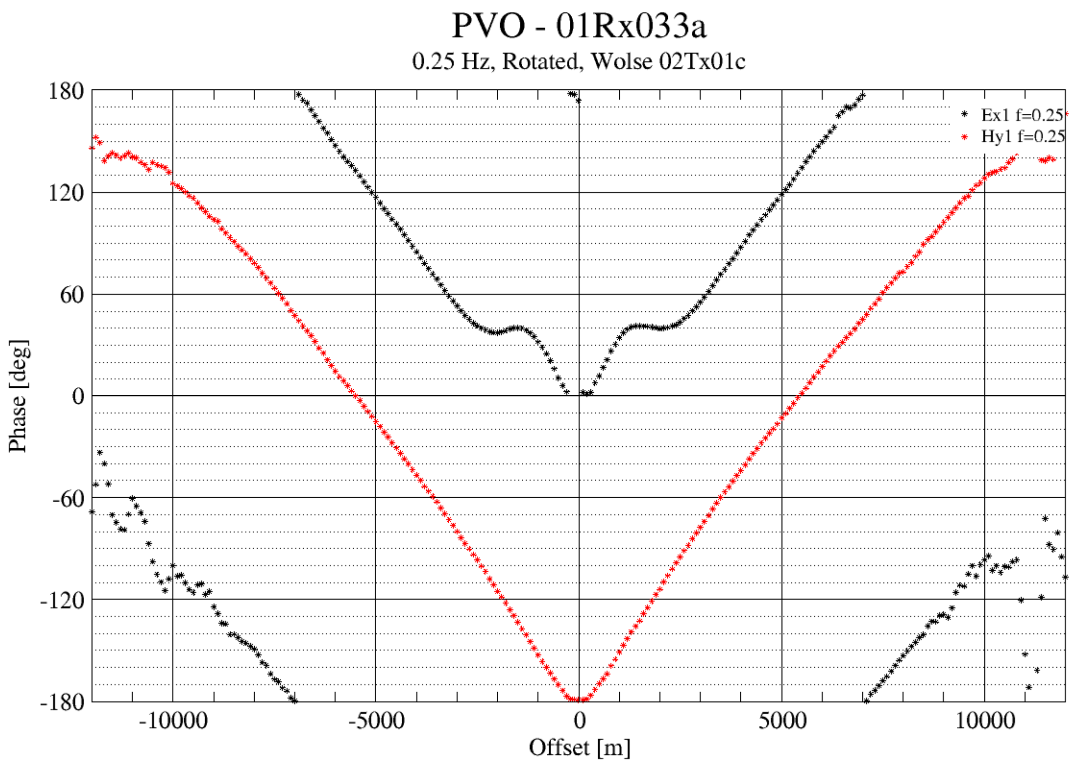


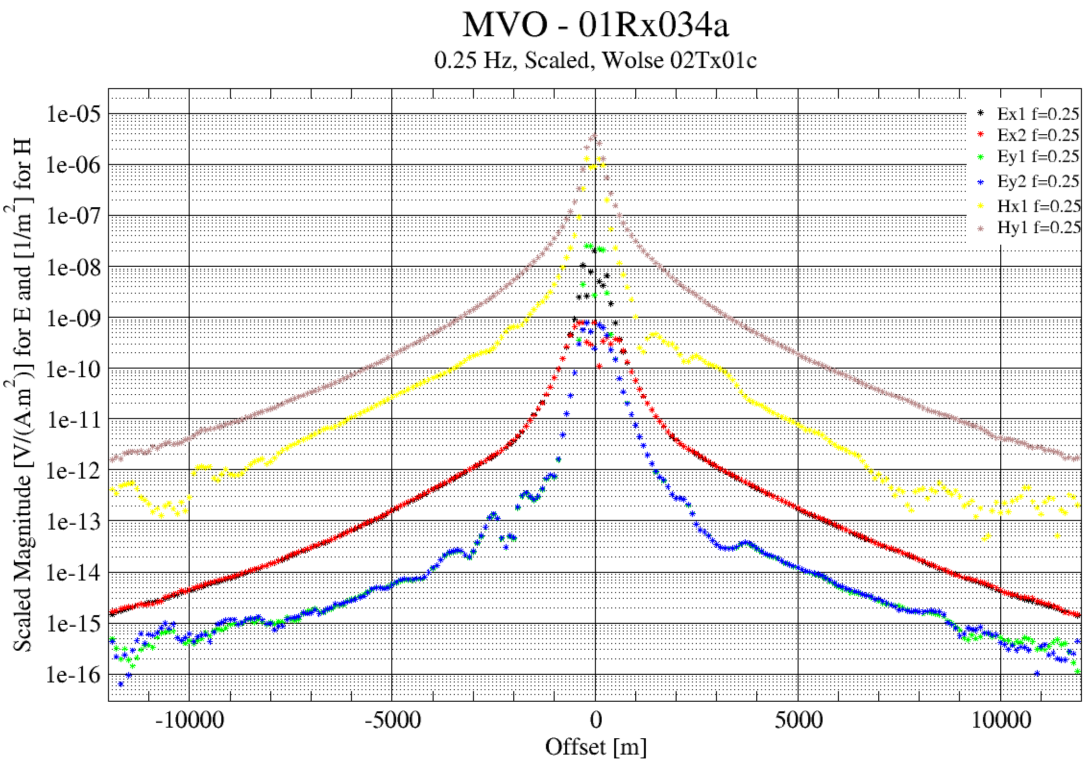
PVO - 01Rx032a
0.25 Hz, Rotated, Wolse 02Tx01c
Phase [deg]
180
120
60
0
-60
-120
-180
-10000
-5000
0
5000
10000
Offset [m]
Ex1 f=0.25
Hy1 f=0.25

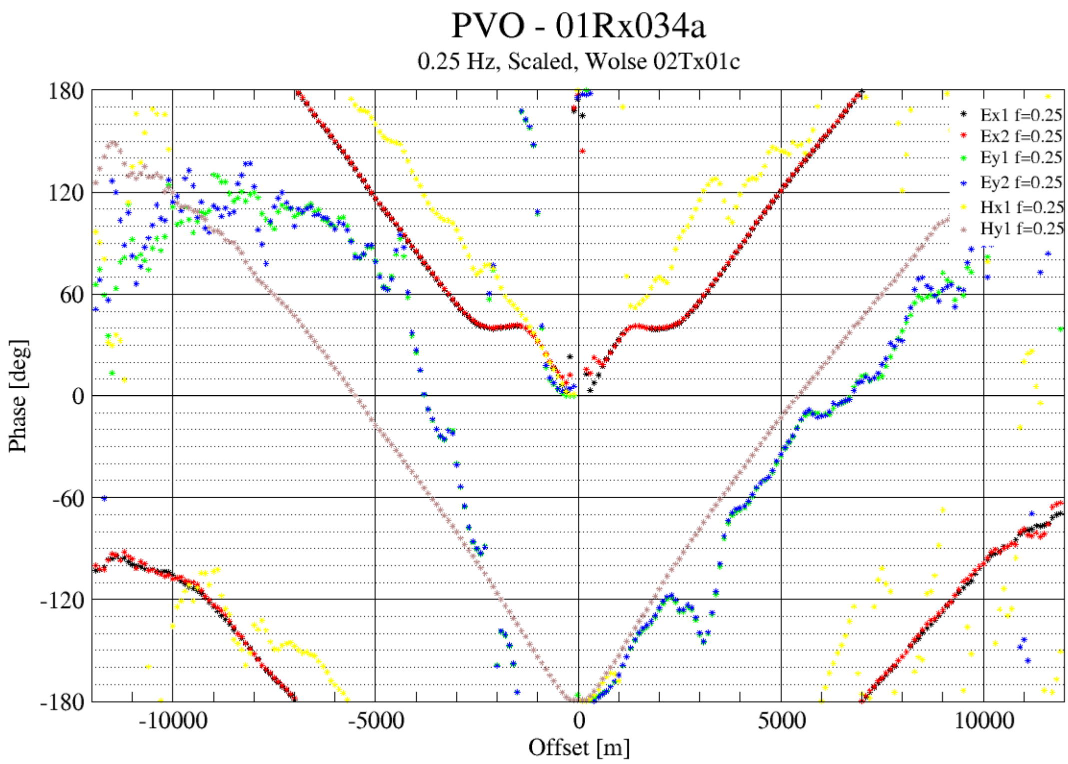

MVO - 01Rx033a
0.25 Hz, Scaled, Wolse 02Tx01c
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
1e-05
1e-06
1e-07
1e-08
1e-09
1e-10
1e-11
1e-12
1e-13
1e-14
1e-15
1e-16
-10000
-5000
0
5000
10000
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25

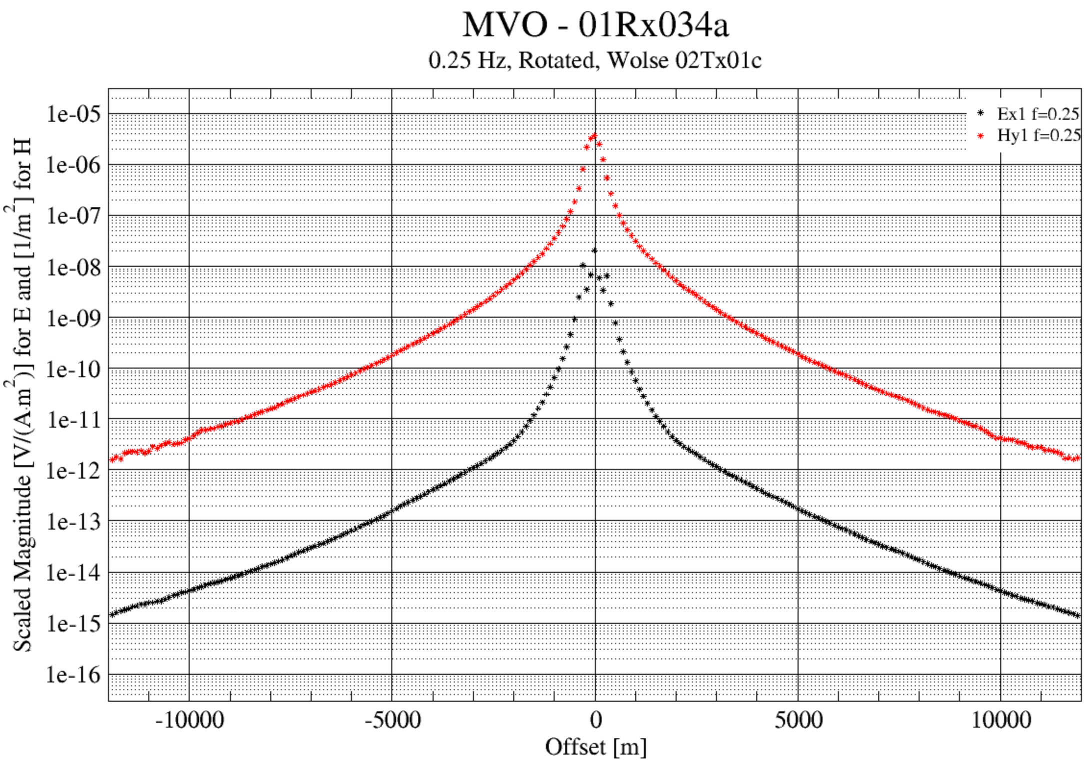

PVO - 01Rx033a
0.25 Hz, Scaled, Wolse 02Tx01c
Phase [deg]
180
120
60
0
-60
-120
-180
-10000
-5000
0
5000
10000
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25


MVO - 01Rx033a
0.25 Hz, Rotated, Wolse 02Tx01c
Ex1 f=0.25
Hy1 f=0.25
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
1e-05
1e-06
1e-07
1e-08
1e-09
1e-10
1e-11
1e-12
1e-13
1e-14
1e-15
1e-16
-10000
-5000
0
5000
10000
Offset [m]

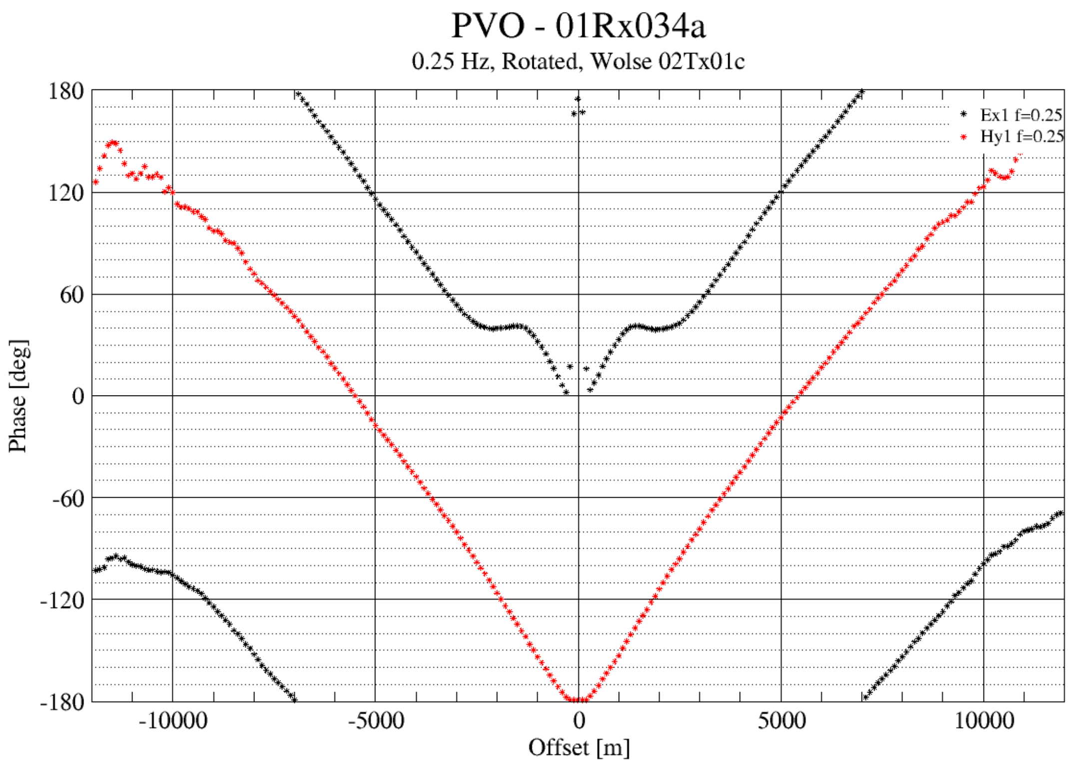

PVO - 01Rx033a
0.25 Hz, Rotated, Wolse 02Tx01c
Ex1 f=0.25
Hy1 f=0.25
Phase [deg]
180
120
60
0
-60
-120
-180
-10000
-5000
0
5000
10000
Offset [m]


MVO - 01Rx034a
0.25 Hz, Scaled, Wolse 02Tx01c
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
1e-05
1e-06
1e-07
1e-08
1e-09
1e-10
1e-11
1e-12
1e-13
1e-14
1e-15
1e-16
-10000
-5000
0
5000
10000
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25

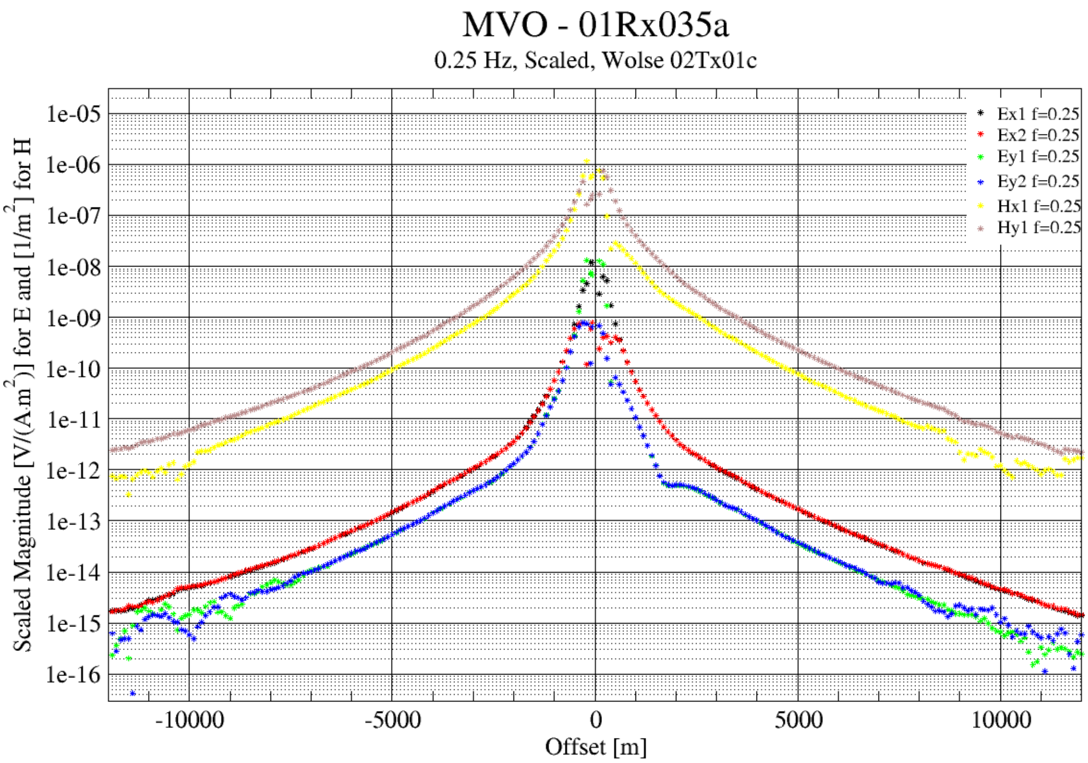

PVO - 01Rx034a
0.25 Hz, Scaled, Wolse 02Tx01c
Phase [deg]
180
120
60
0
-60
-120
-180
-10000
-5000
0
5000
10000
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25



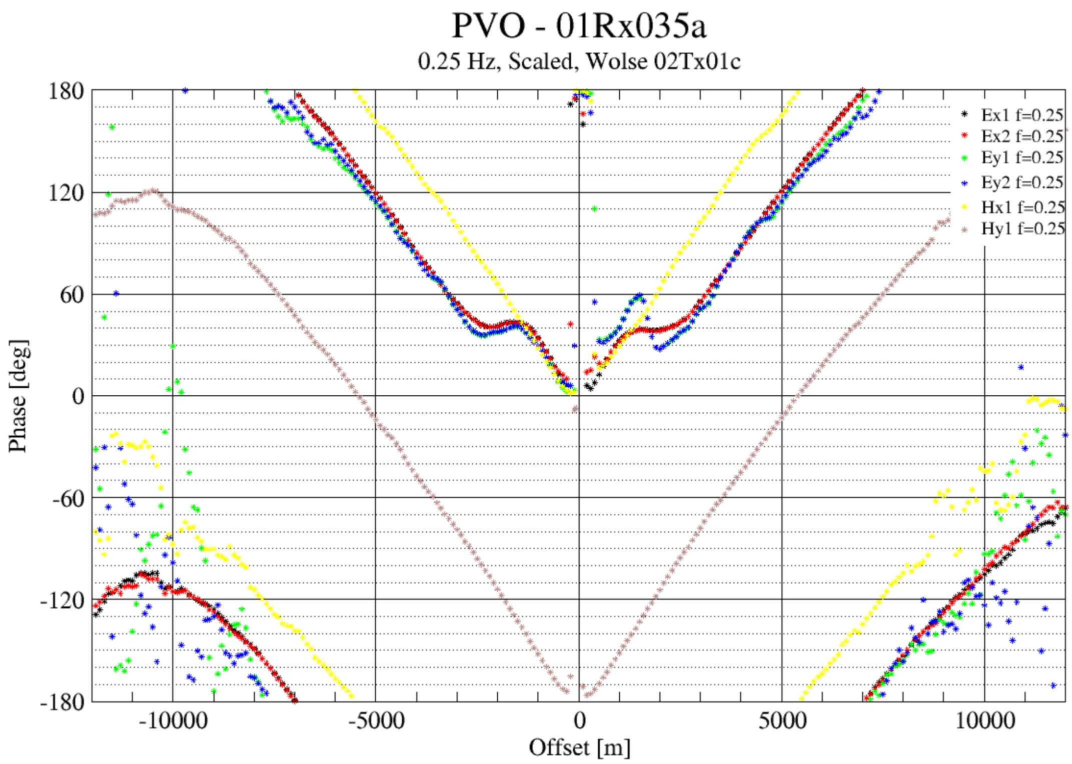
MVO - 01Rx034a
0.25 Hz, Rotated, Wolse 02Tx01c
Ex1 f=0.25
Hy1 f=0.25
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
1e-05
1e-06
1e-07
1e-08
1e-09
1e-10
1e-11
1e-12
1e-13
1e-14
1e-15
1e-16
-10000
-5000
0
5000
10000
Offset [m]



PVO - 01Rx034a
0.25 Hz, Rotated, Wolse 02Tx01c
Ex1 f=0.25
Hy1 f=0.25
Phase [deg]
180
120
60
0
-60
-120
-180
-10000
-5000
0
5000
10000
Offset [m]



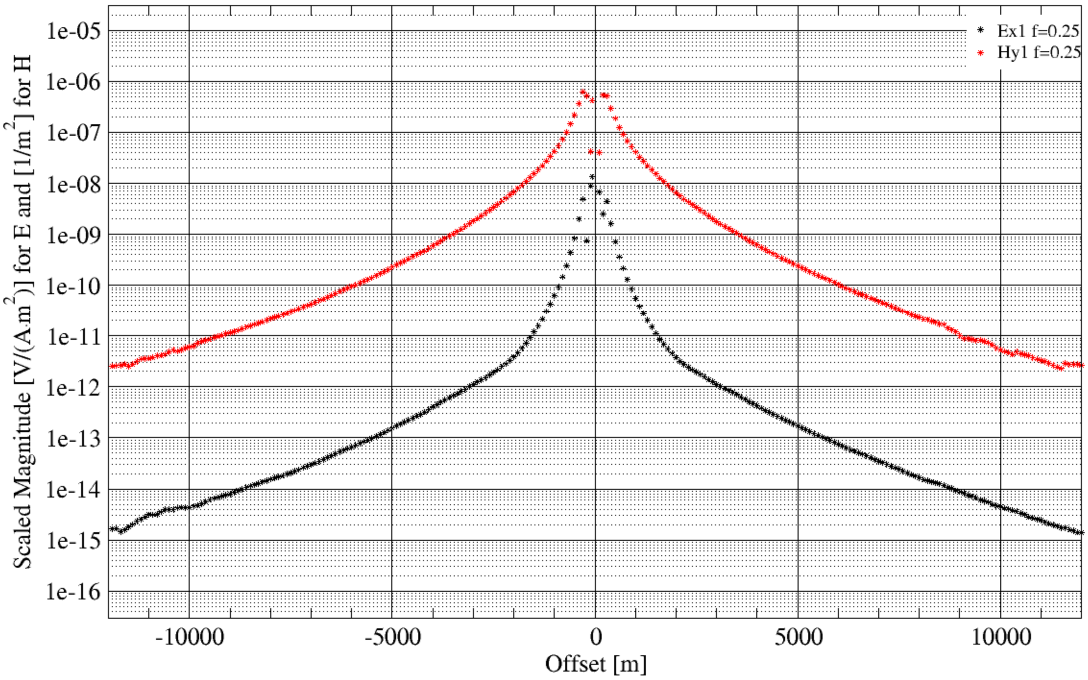
MVO - 01Rx035a
0.25 Hz, Scaled, Wolse 02Tx01c
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25



PVO - 01Rx035a
0.25 Hz, Scaled, Wolse 02Tx01c
Phase [deg]
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25

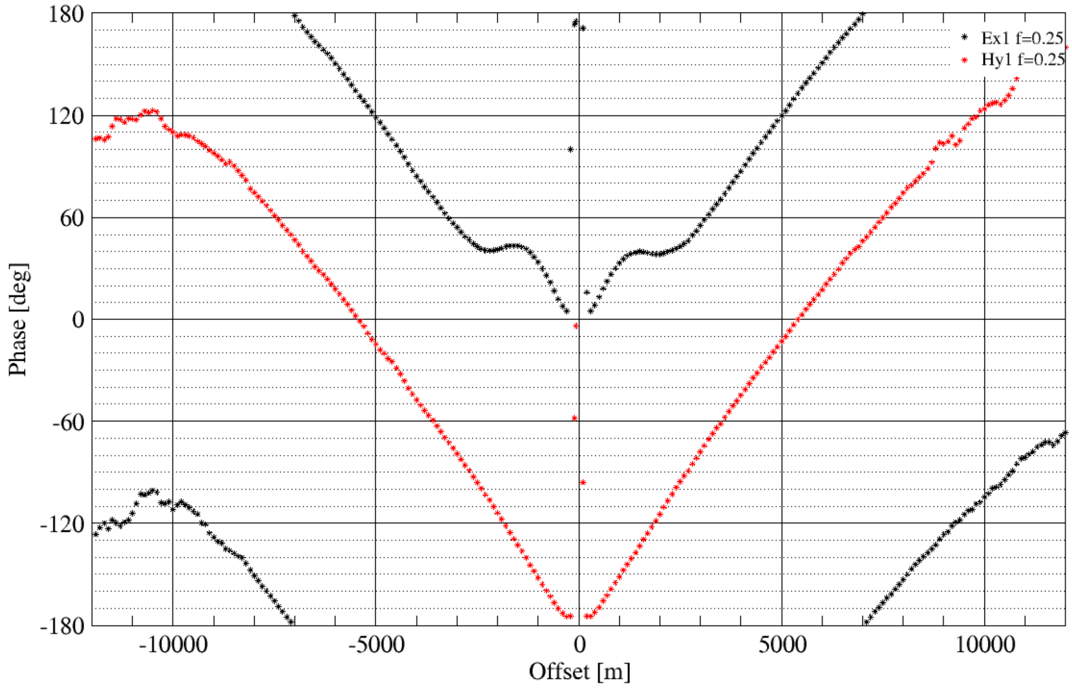
MVO - 01Rx035a

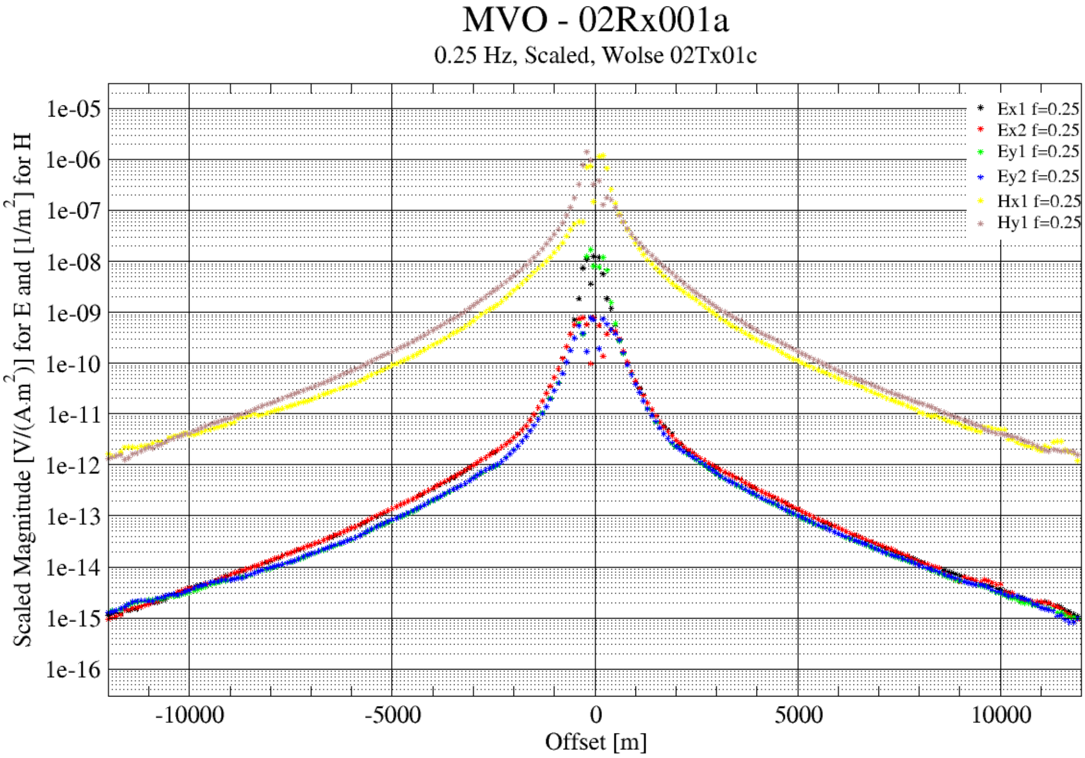
0.25 Hz, Rotated, Wolse 02Tx01c

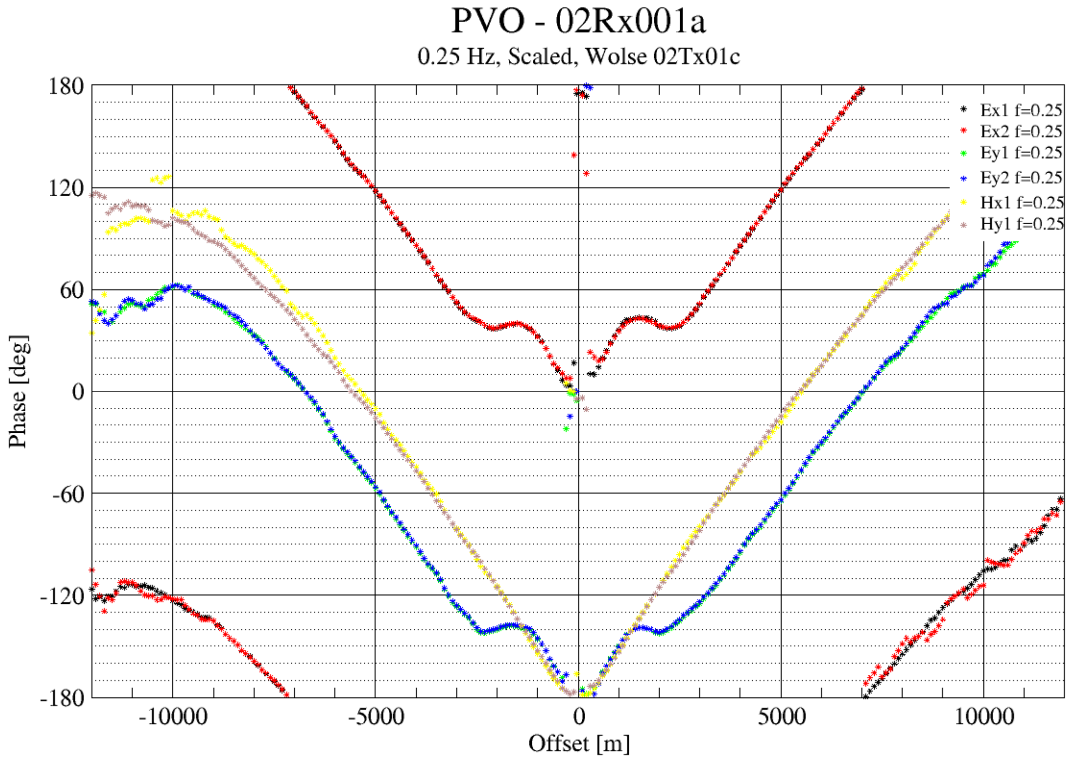


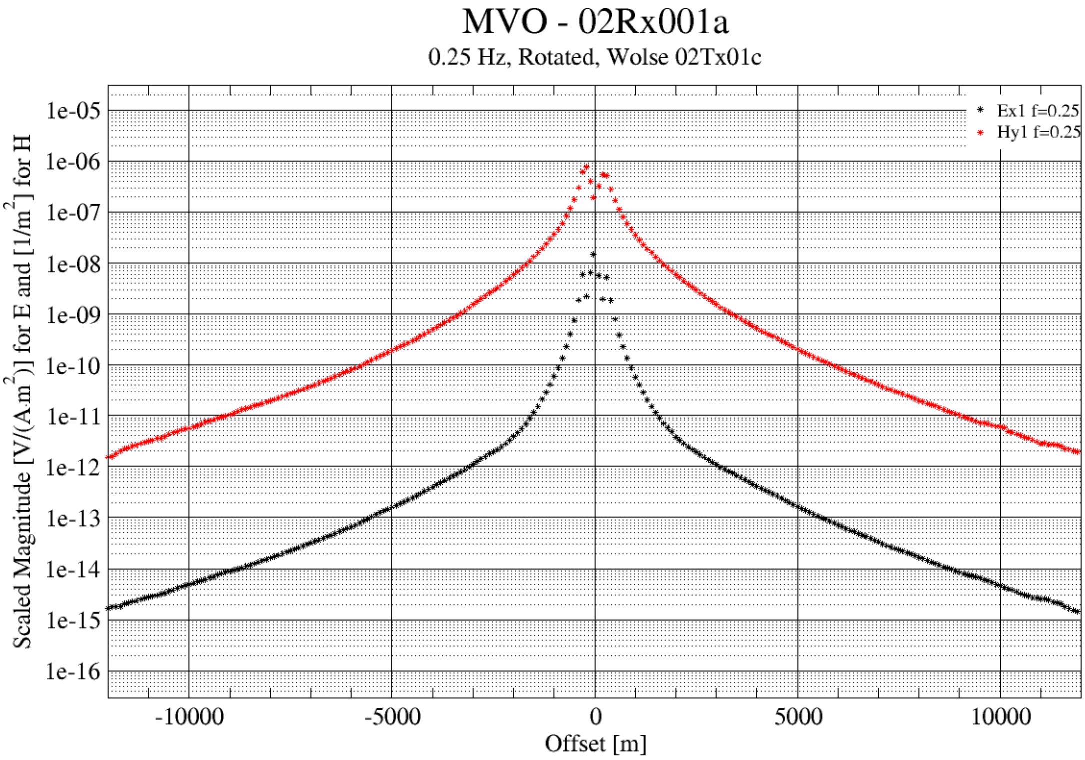
PVO - 01Rx035a

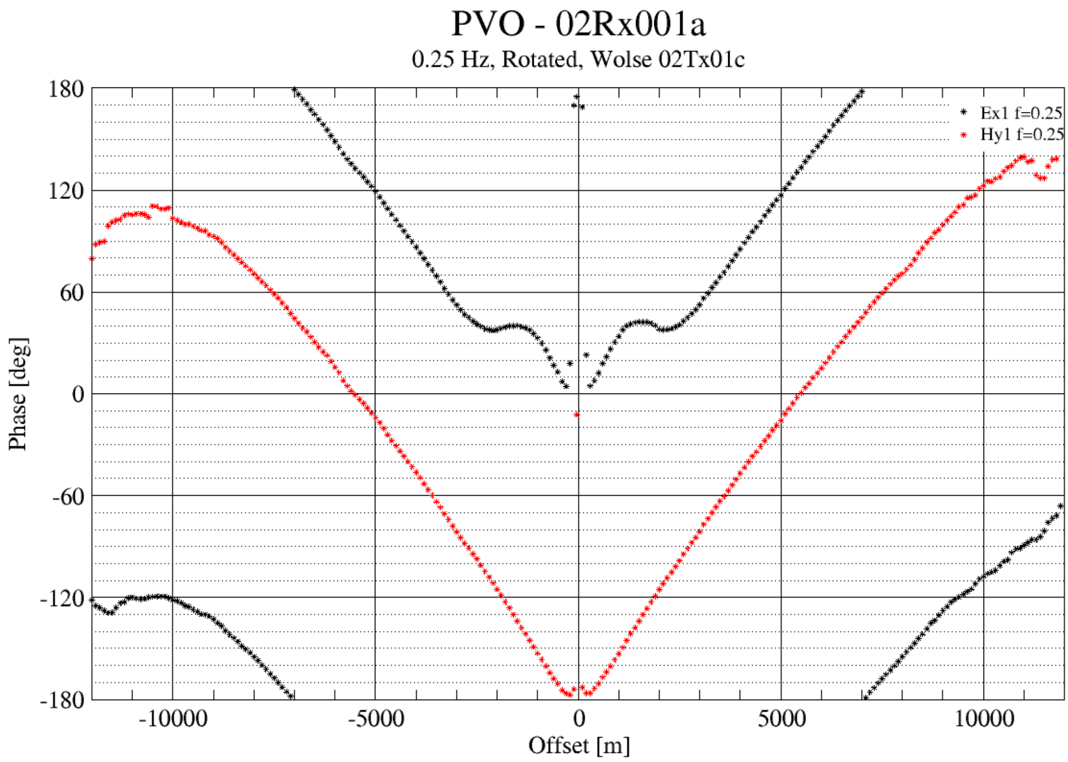
0.25 Hz, Rotated, Wolse 02Tx01c

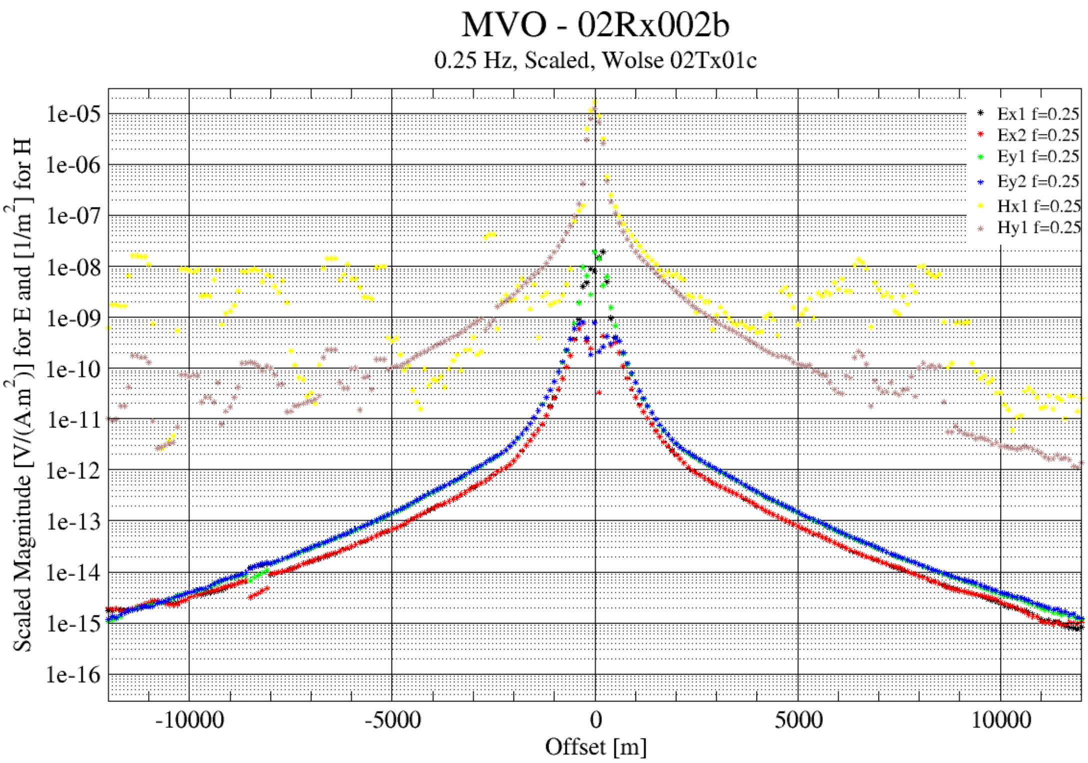



MVO - 02Rx001a
0.25 Hz, Scaled, Wolse 02Tx01c
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25

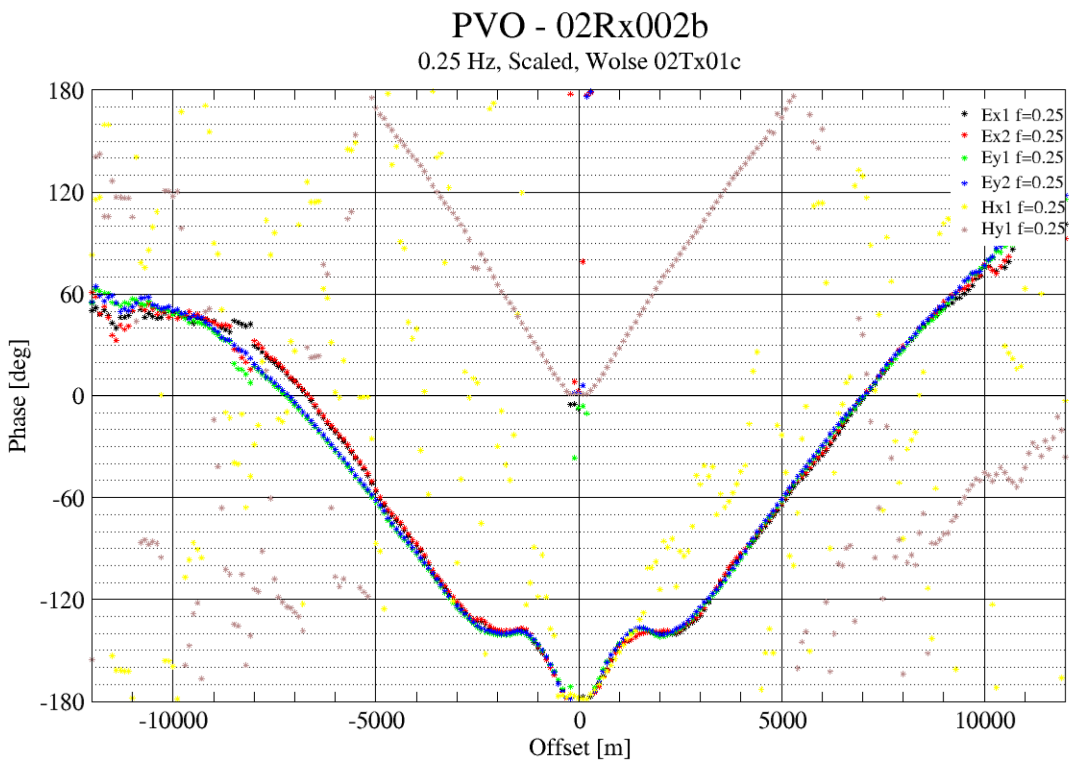

PVO - 02Rx001a
0.25 Hz, Scaled, Wolse 02Tx01c
Phase [deg]
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25


MVO - 02Rx001a
0.25 Hz, Rotated, Wolse 02Tx01c
Ex1 f=0.25
Hy1 f=0.25
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
1e-05
1e-06
1e-07
1e-08
1e-09
1e-10
1e-11
1e-12
1e-13
1e-14
1e-15
1e-16
-10000
-5000
0
5000
10000
Offset [m]

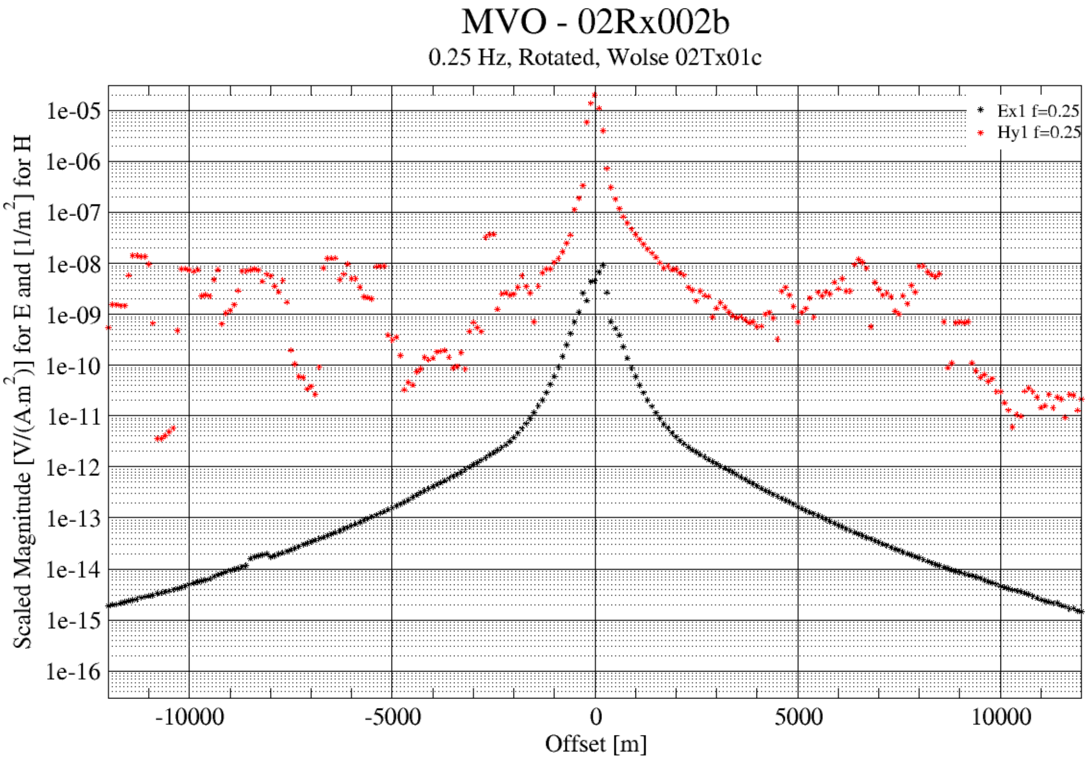

PVO - 02Rx001a
0.25 Hz, Rotated, Wolse 02Tx01c
Ex1 f=0.25
Hy1 f=0.25
Phase [deg]
180
120
60
0
-60
-120
-180
-10000
-5000
0
5000
10000
Offset [m]



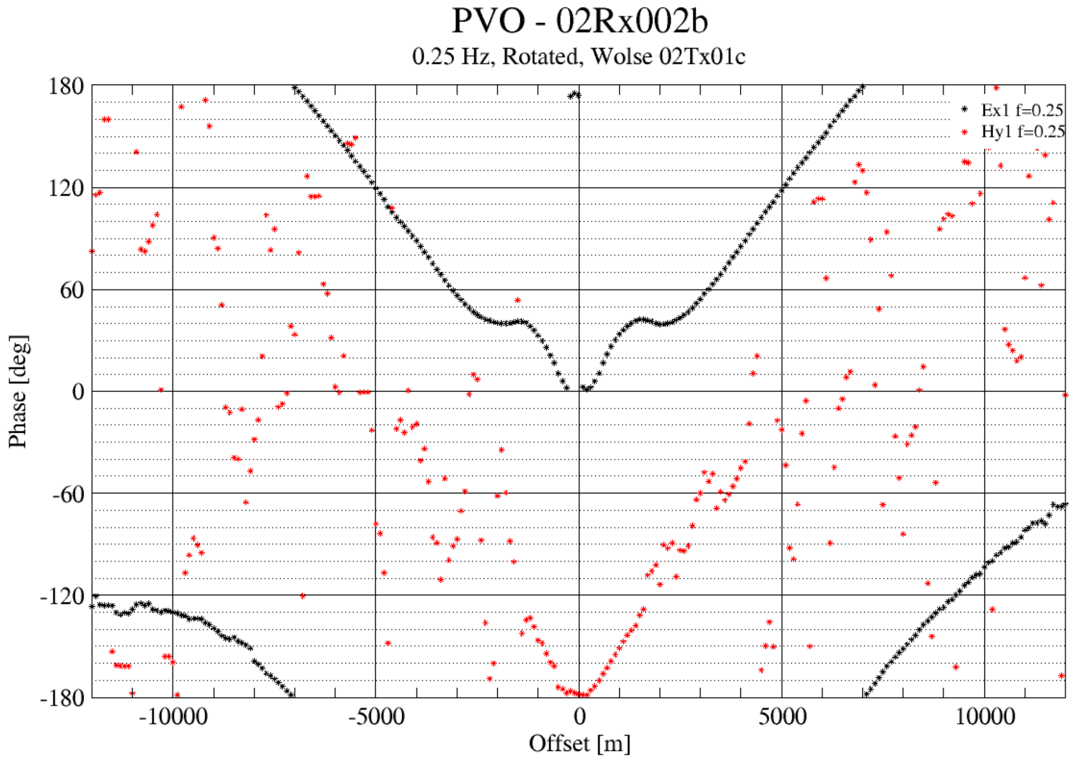
MVO - 02Rx002b
0.25 Hz, Scaled, Wolse 02Tx01c
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25



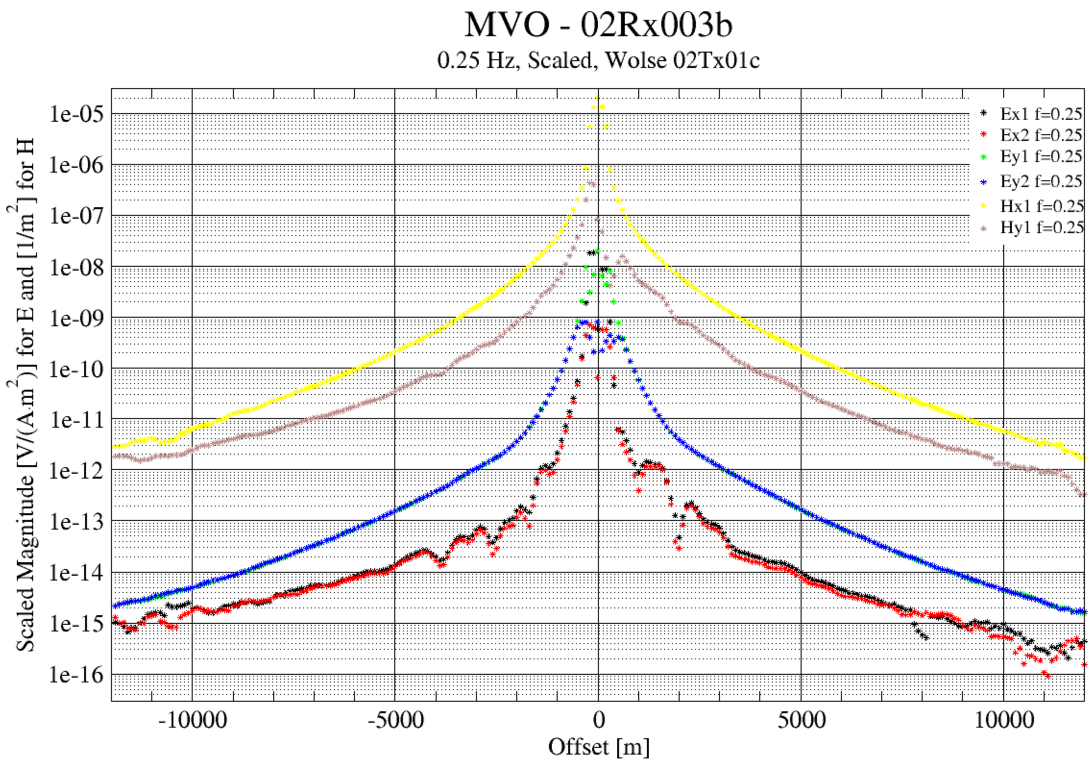
PVO - 02Rx002b
0.25 Hz, Scaled, Wolse 02Tx01c
Phase [deg]
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25



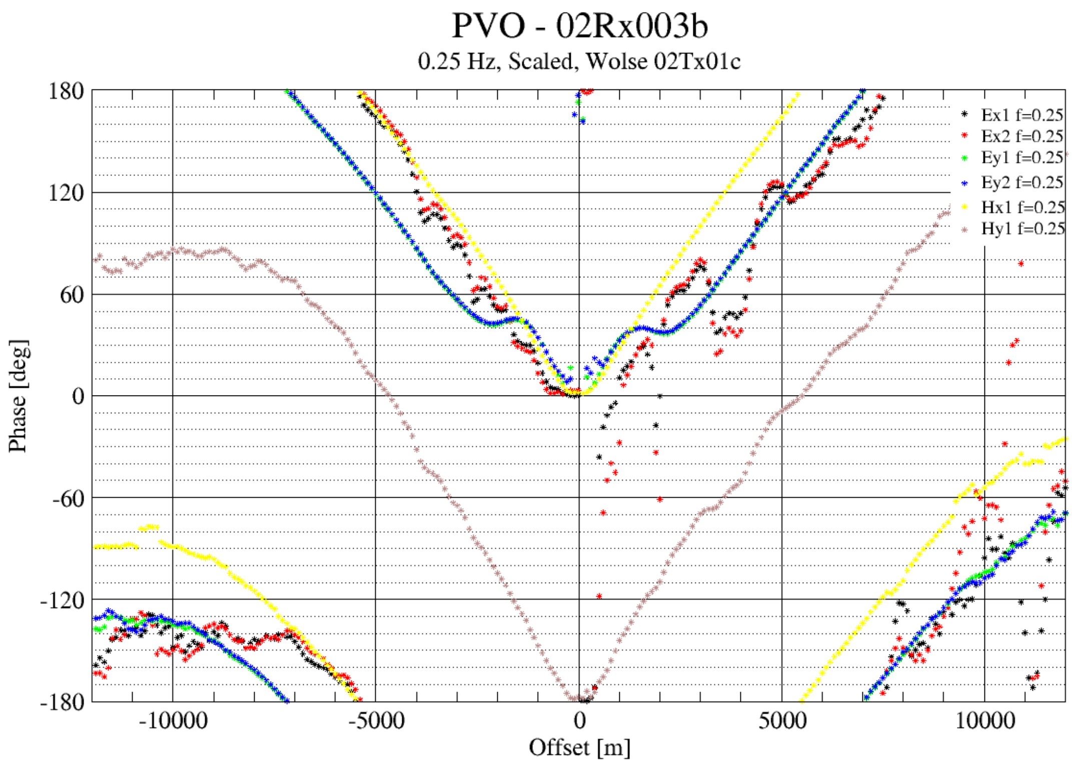
MVO - 02Rx002b
0.25 Hz, Rotated, Wolse 02Tx01c
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
Ex1 f=0.25
Hy1 f=0.25
1e-05
1e-06
1e-07
1e-08
1e-09
1e-10
1e-11
1e-12
1e-13
1e-14
1e-15
1e-16
-10000
-5000
0
5000
10000
Offset [m]



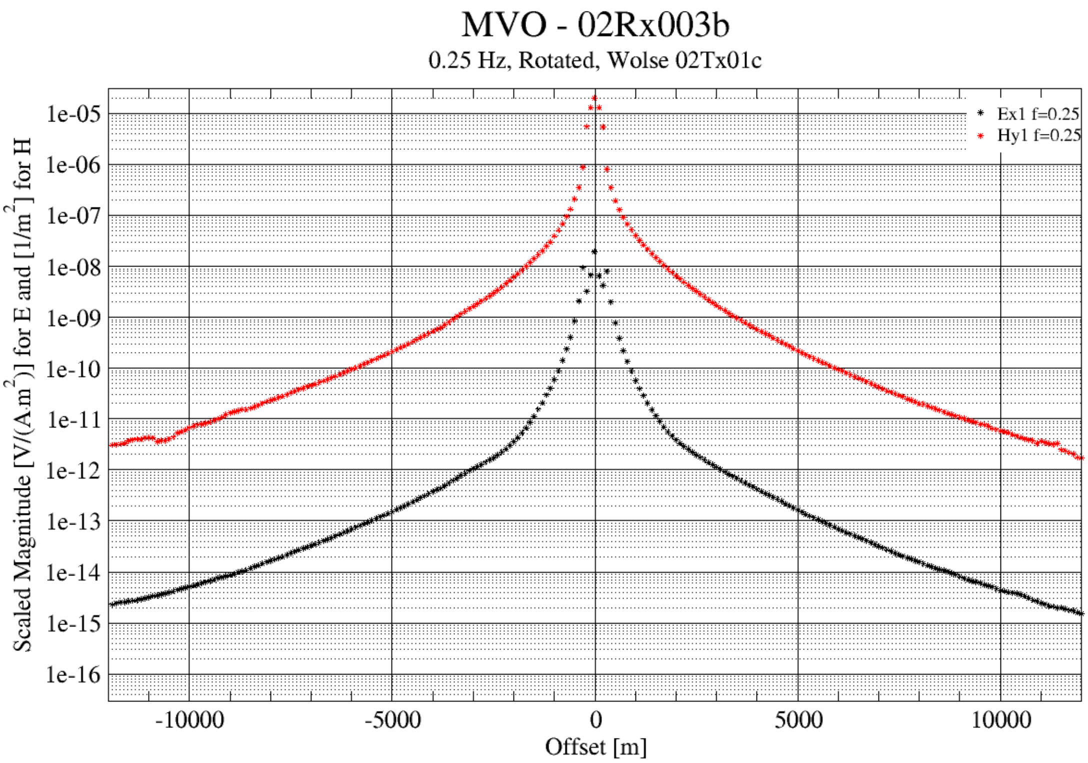
PVO - 02Rx002b
0.25 Hz, Rotated, Wolse 02Tx01c
Phase [deg]
Ex1 f=0.25
Hy1 f=0.25
180
120
60
0
-60
-120
-180
-10000
-5000
0
5000
10000
Offset [m]

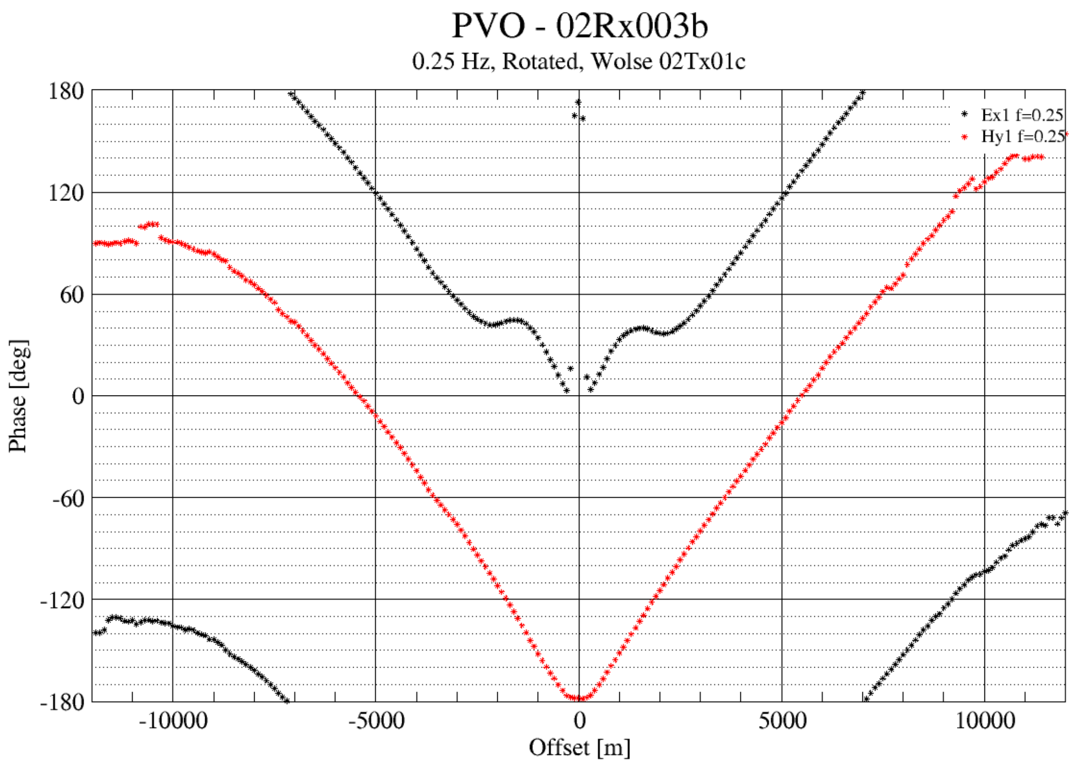


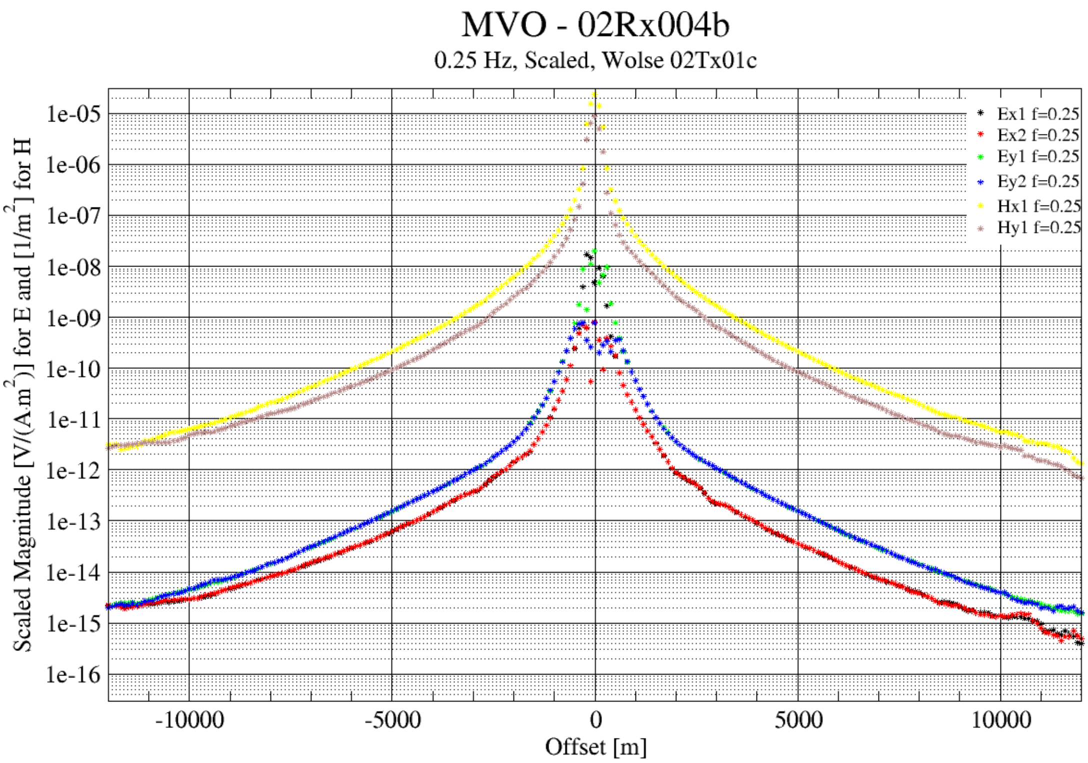
MVO - 02Rx003b
0.25 Hz, Scaled, Wolse 02Tx01c
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25



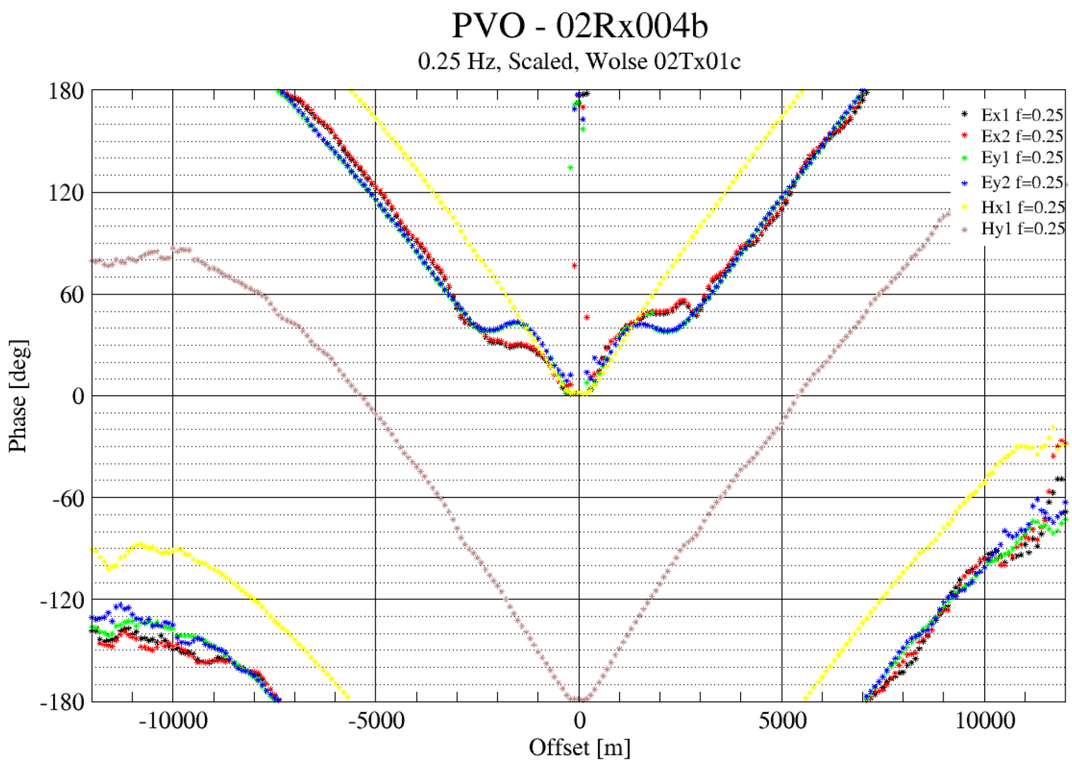
PVO - 02Rx003b
0.25 Hz, Scaled, Wolse 02Tx01c
Phase [deg]
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25


MVO - 02Rx003b
0.25 Hz, Rotated, Wolse 02Tx01c
Ex1 f=0.25
Hy1 f=0.25
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
1e-05
1e-06
1e-07
1e-08
1e-09
1e-10
1e-11
1e-12
1e-13
1e-14
1e-15
1e-16
-10000
-5000
0
5000
10000
Offset [m]

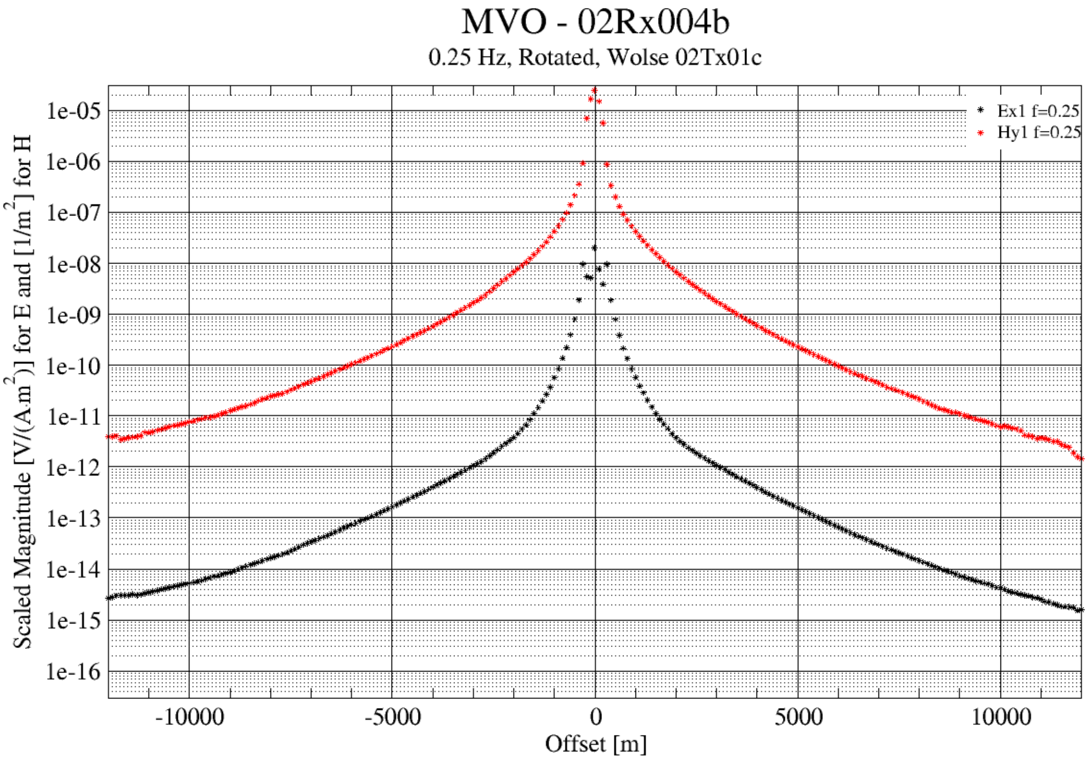

PVO - 02Rx003b
0.25 Hz, Rotated, Wolse 02Tx01c
Ex1 f=0.25
Hy1 f=0.25
Phase [deg]
180
120
60
0
-60
-120
-180
-10000
-5000
0
5000
10000
Offset [m]

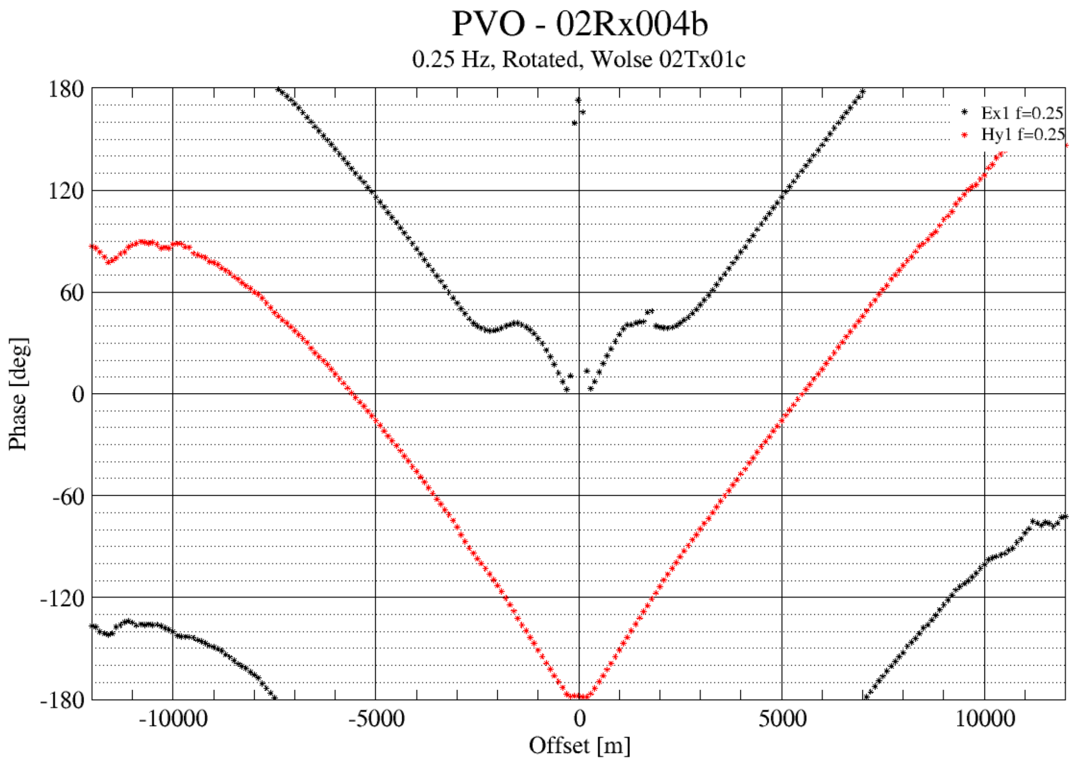


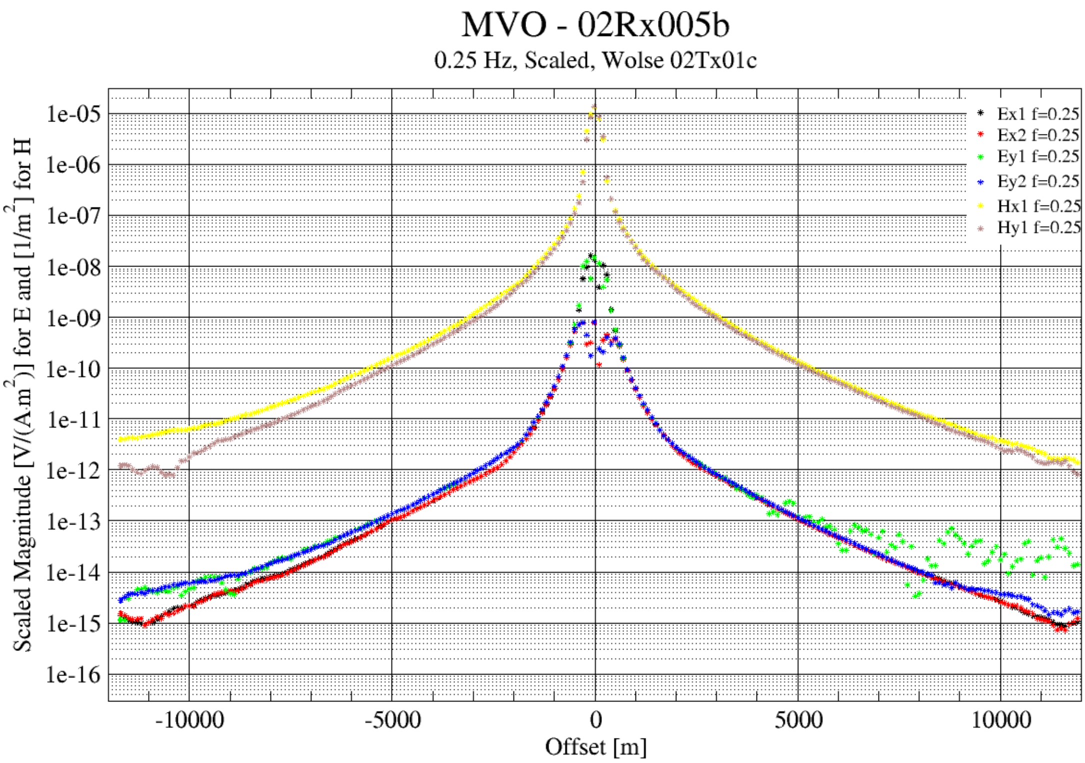
MVO - 02Rx004b
0.25 Hz, Scaled, Wolse 02Tx01c
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
1e-05
1e-06
1e-07
1e-08
1e-09
1e-10
1e-11
1e-12
1e-13
1e-14
1e-15
1e-16
-10000
-5000
0
5000
10000
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25

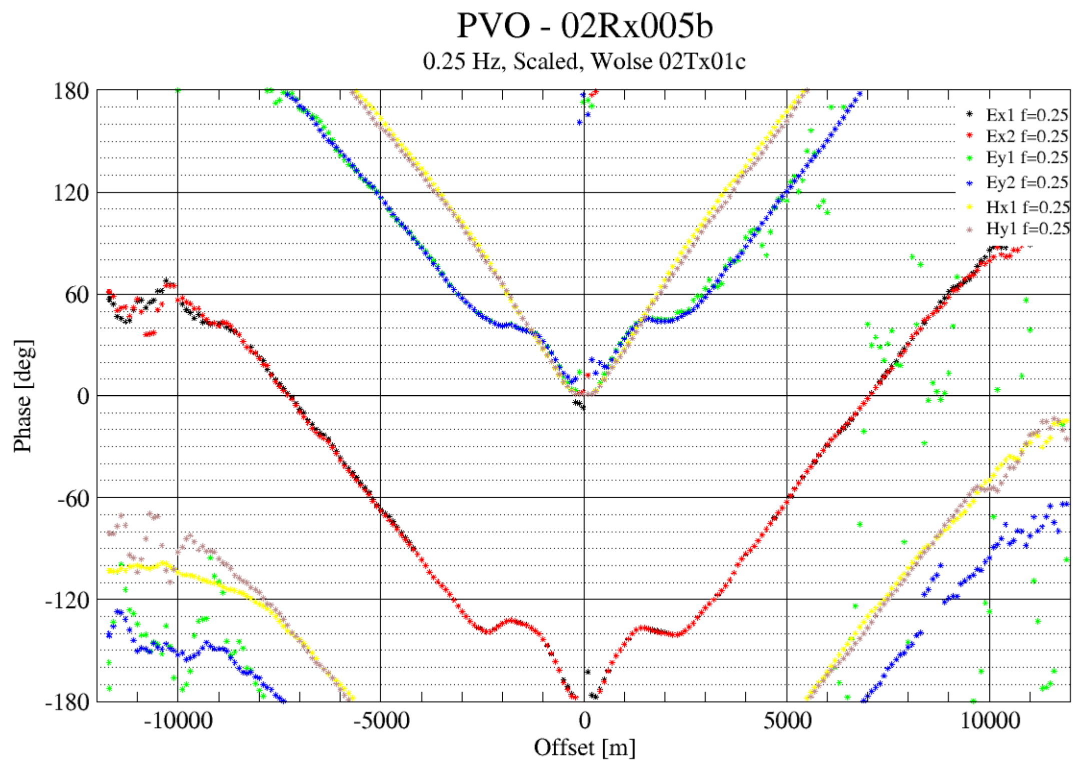


PVO - 02Rx004b
0.25 Hz, Scaled, Wolse 02Tx01c
Phase [deg]
180
120
60
0
-60
-120
-180
-10000
-5000
0
5000
10000
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25


MVO - 02Rx004b
0.25 Hz, Rotated, Wolse 02Tx01c
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
Offset [m]
Ex1 f=0.25
Hy1 f=0.25
1e-05
1e-06
1e-07
1e-08
1e-09
1e-10
1e-11
1e-12
1e-13
1e-14
1e-15
1e-16
-10000
-5000
0
5000
10000

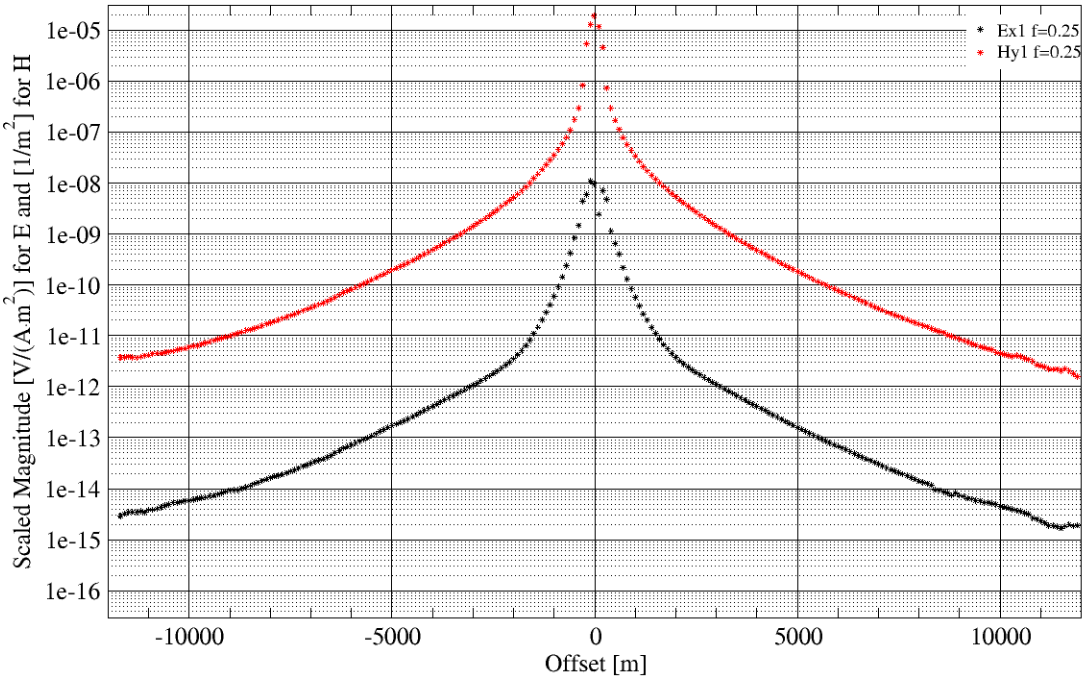

PVO - 02Rx004b
0.25 Hz, Rotated, Wolse 02Tx01c
Phase [deg]
Offset [m]
Ex1 f=0.25
Hy1 f=0.25
180
120
60
0
-60
-120
-180
-10000
-5000
0
5000
10000


MVO - 02Rx005b
0.25 Hz, Scaled, Wolse 02Tx01c
Scaled Magnitude [V/(A.m^2)] for E and [1/m^2] for H
1e-05
1e-06
1e-07
1e-08
1e-09
1e-10
1e-11
1e-12
1e-13
1e-14
1e-15
1e-16
-10000
-5000
0
5000
10000
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25


PVO - 02Rx005b
0.25 Hz, Scaled, Wolse 02Tx01c
Phase [deg]
180
120
60
0
-60
-120
-180
-10000
-5000
0
5000
10000
Offset [m]
Ex1 f=0.25
Ex2 f=0.25
Ey1 f=0.25
Ey2 f=0.25
Hx1 f=0.25
Hy1 f=0.25

MVO - 02Rx005b

0.25 Hz, Rotated, Wolse 02Tx01c



PVO - 02Rx005b

0.25 Hz, Rotated, Wolse 02Tx01c