UNITED NATIONS UNIVERSITY
GEOTHERMAL TRAINING PROGRAMME
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APPENDICES TO THE REPORT:

JOINT 1-D INVERSION OF TEM AND MT DATA FROM OLKARIA DOMES GEOTHERMAL AREA, KENYA

by

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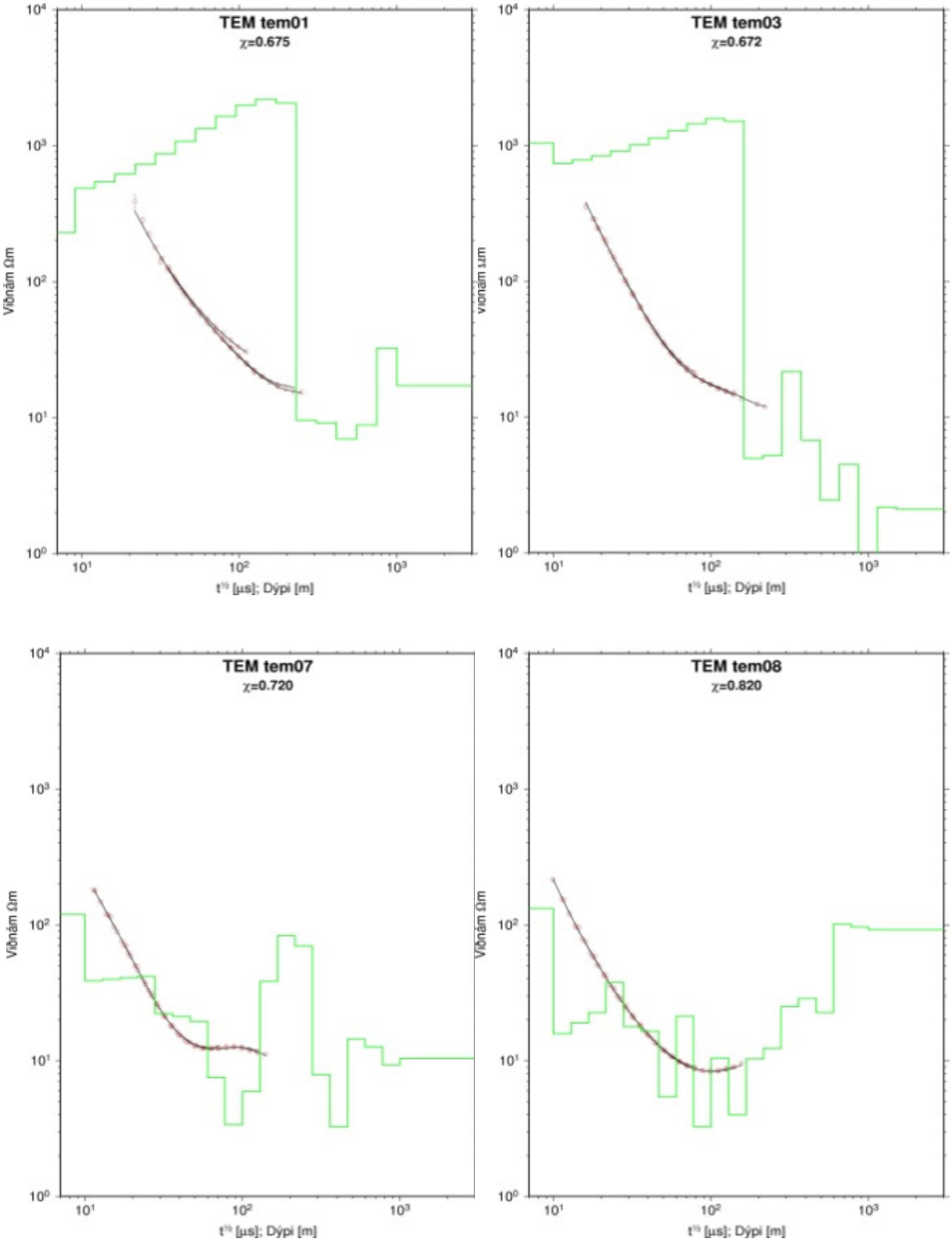
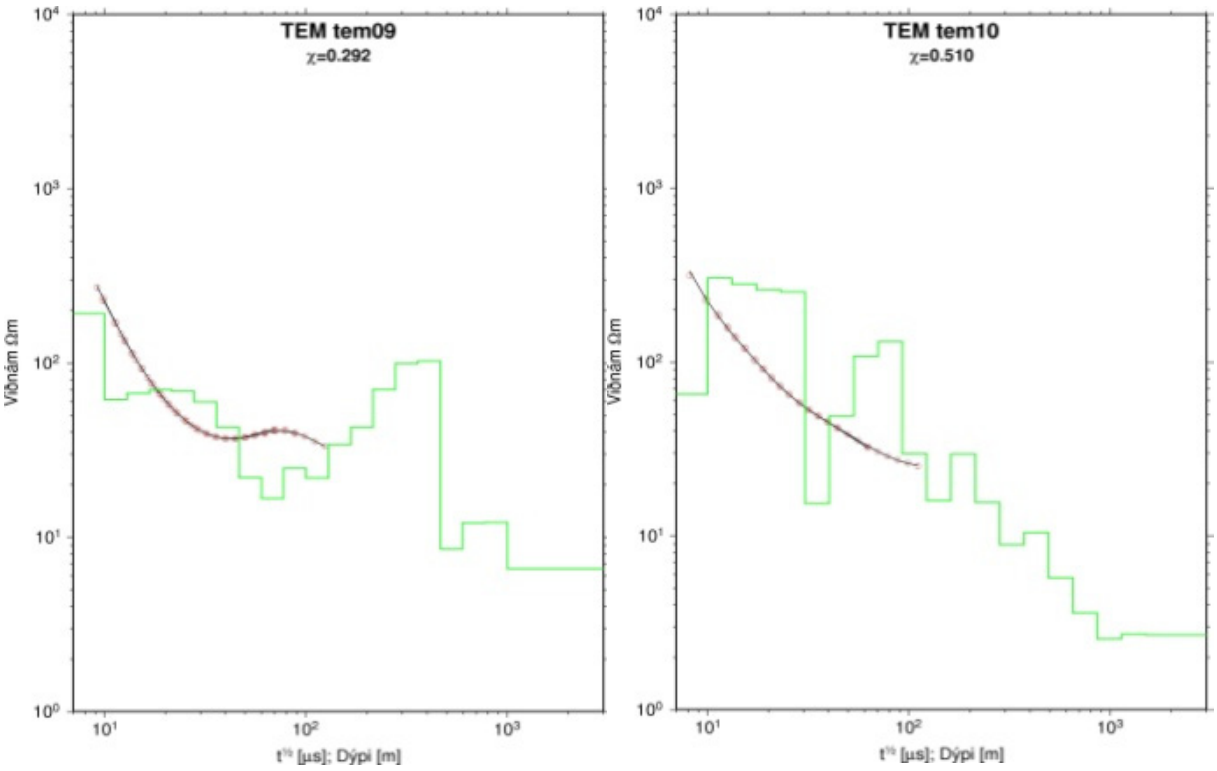
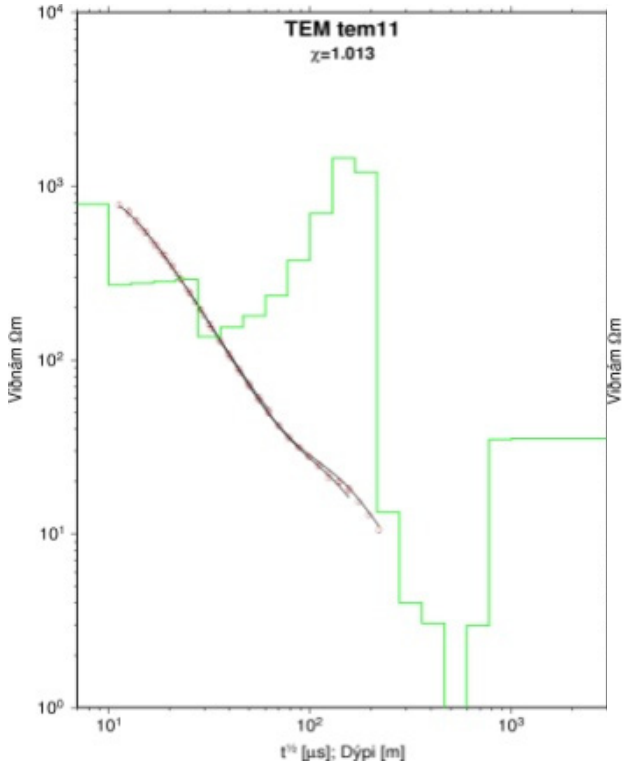
These are appendices to the report "Joint 1-D inversion of TEM and MT data from Olkaria Domes geothermal area, Kenya" by Charles Muturia Lichoro at the UNU Geothermal Training Programme in 2009. Appendix I shows the TEM profiles from the Olkaria Domes area and Occam inversion of the resistivity data. Appendix II shows the TEM and MT resistivity data from the Olkaria Domes area and 1-D joint inversion of the MT and TEM profiles and the corresponding model curves. Appendix III contains additional iso-resistivity maps from the Olkaria Domes area to ones shown in the main report. Appendix IV, finally, shows additional resistivity cross-sections from the Olkaria Domes area and their locations.

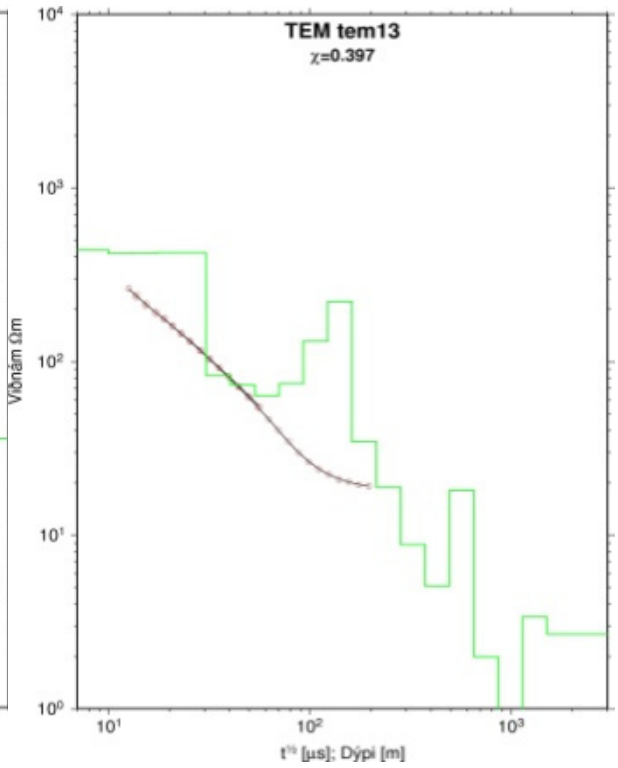
APPENDIX I: TEM profiles from the Olkaria Domes area and Occam inversion of the resistivity data

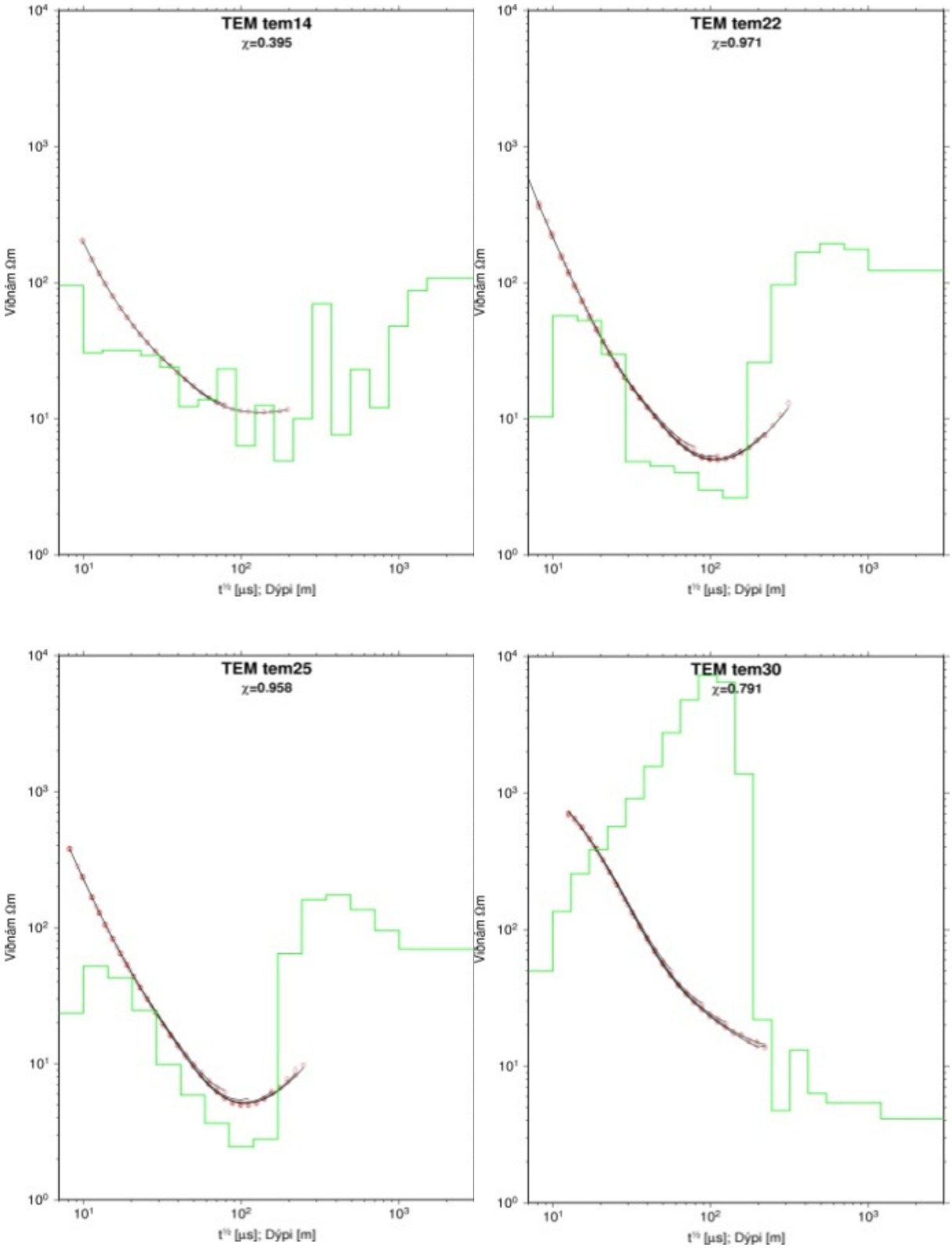


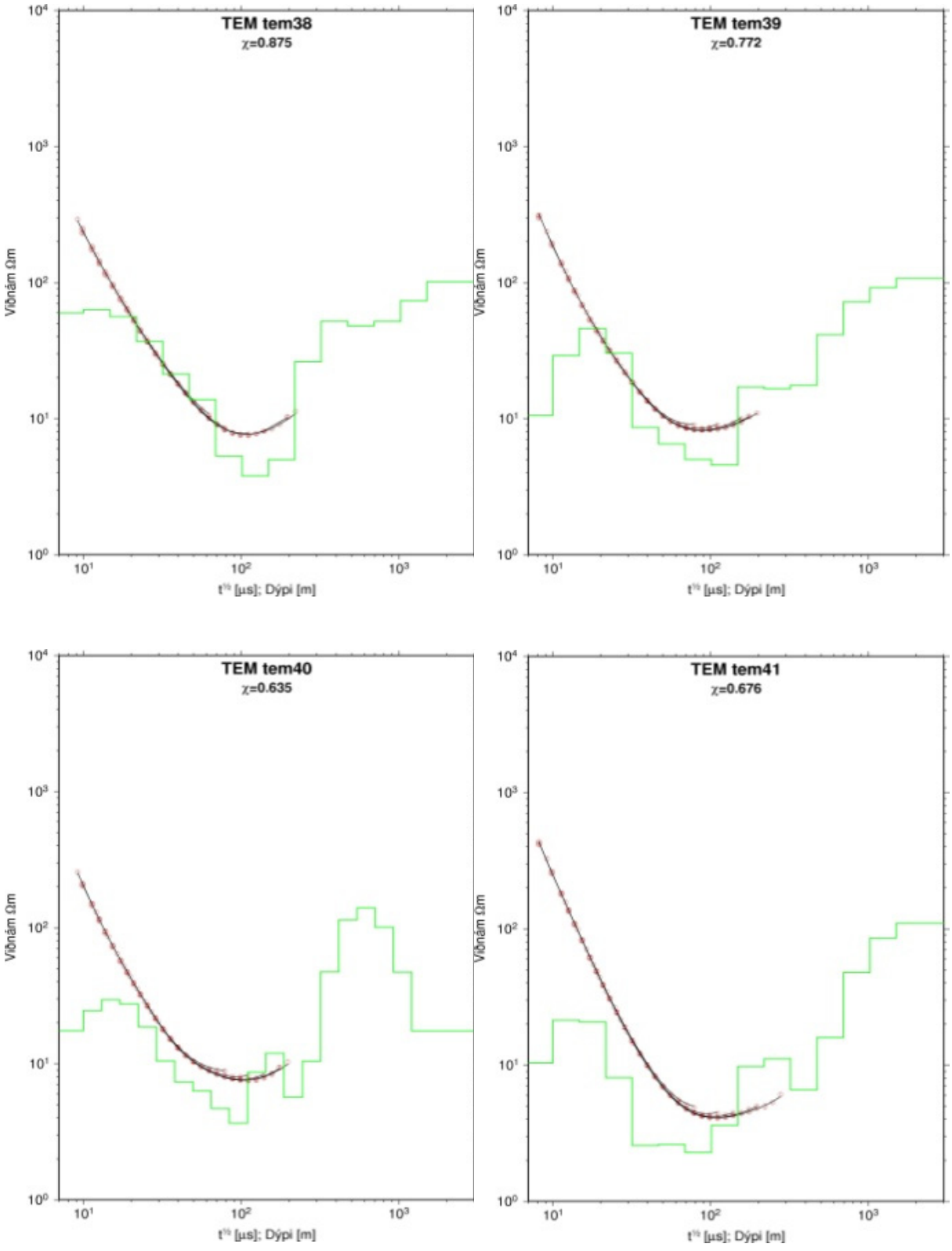

TEM tem09
χ=0.292
Vlõnám Ωm
t½ [µs]; Dýpi [m]

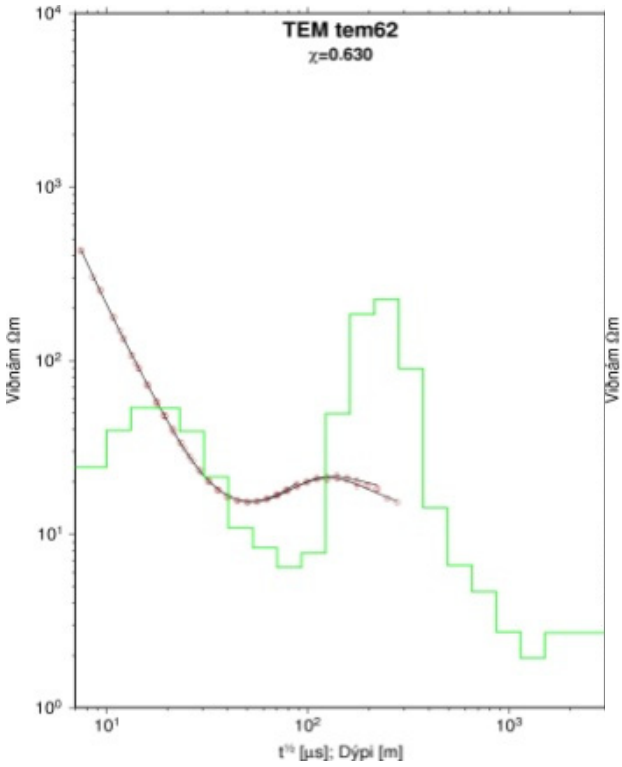
TEM tem10
χ=0.510
Vlõnám Ωm
t½ [µs]; Dýpi [m]

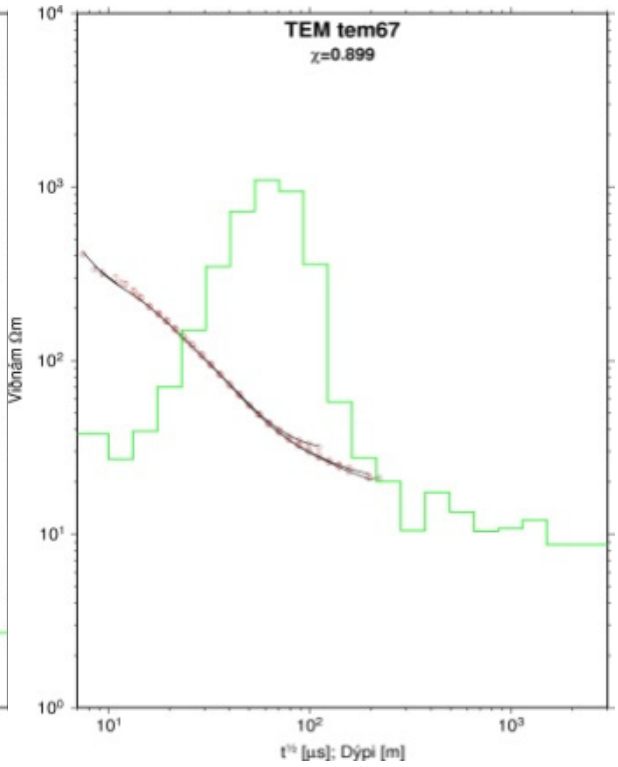

TEM tem11
χ=1.013
Vlõnám Ωm
t½ [µs]; Dýpi [m]

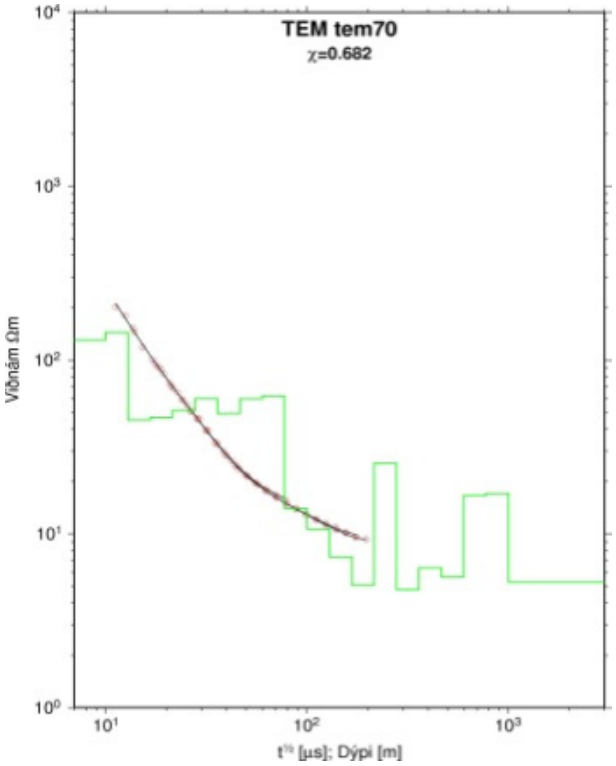

TEM tem13
χ=0.397
Vlõnám Ωm
t½ [µs]; Dýpi [m]


TEM tem14
χ=0.395
TEM tem22
χ=0.971
TEM tem25
χ=0.958
TEM tem30
χ=0.791
Vlõnám Ωm
t½ [µs]; Dýpi [m]

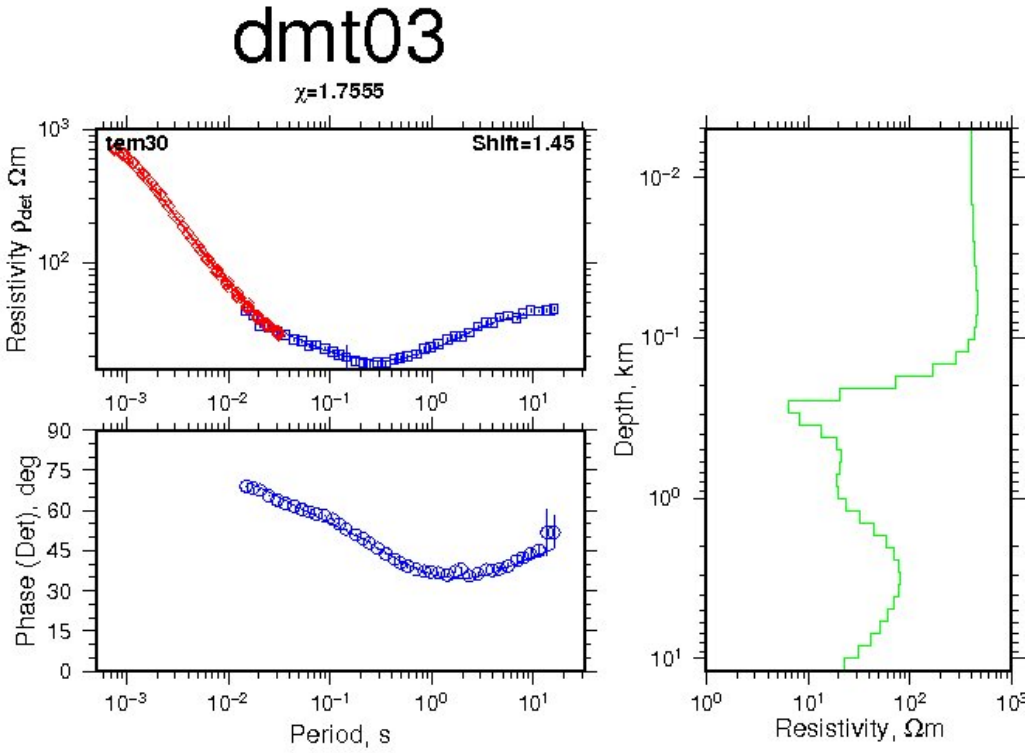

TEM tem38
χ=0.875
TEM tem39
χ=0.772
TEM tem40
χ=0.635
TEM tem41
χ=0.676
Vlõnám Ωm
t½ [µs]; Dýpi [m]

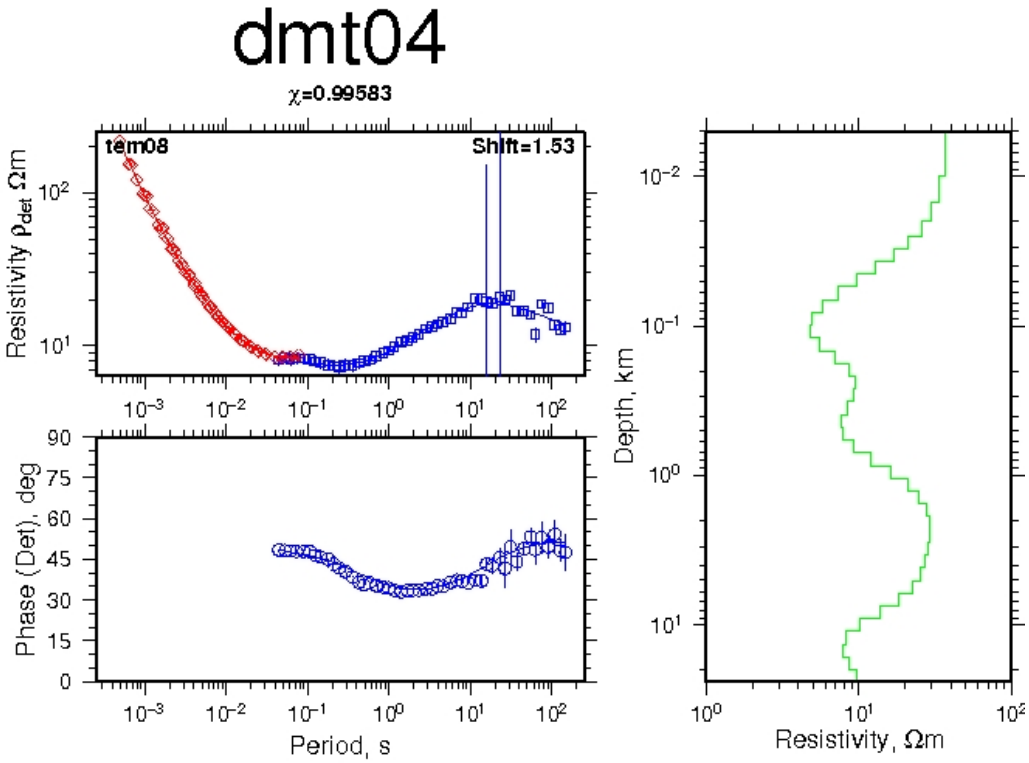

TEM tem62
χ=0.630
Vlčnám Ωm
t½ [µs]; Dýpi [m]


TEM tem67
χ=0.899
Vlčnám Ωm
t½ [µs]; Dýpi [m]

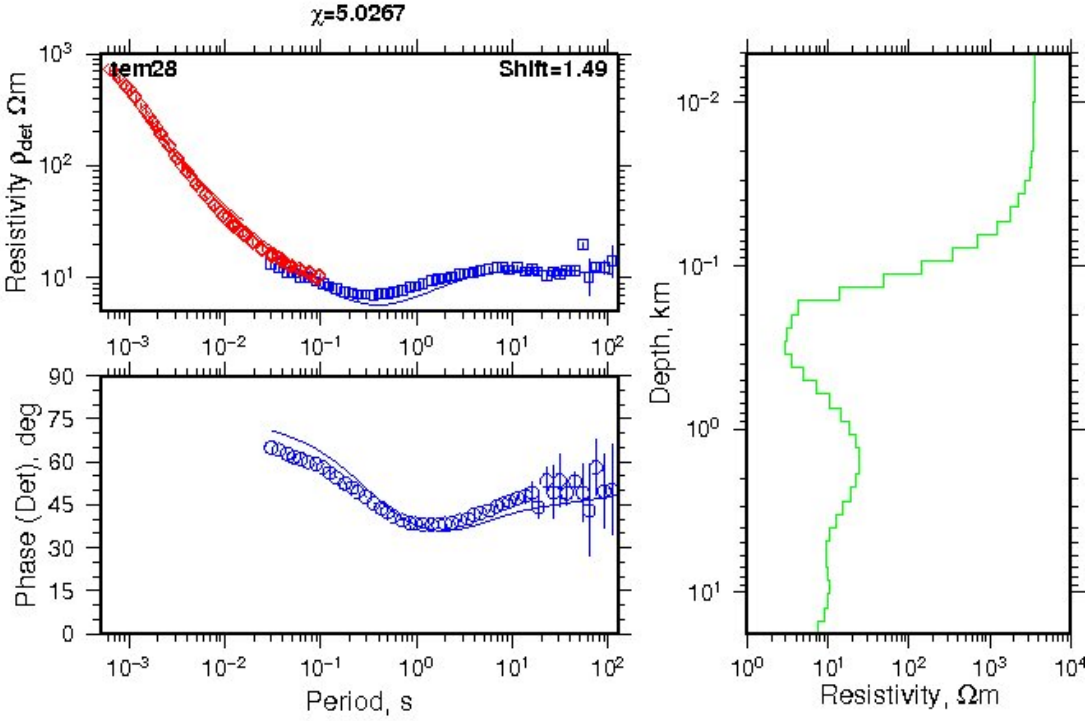

TEM tem70
χ=0.682
Vlčnám Ωm
t½ [µs]; Dýpi [m]

APPENDIX II: TEM and MT resistivity data from the Olkaria Domes area and 1-D joint inversion of the MT and TEM profiles

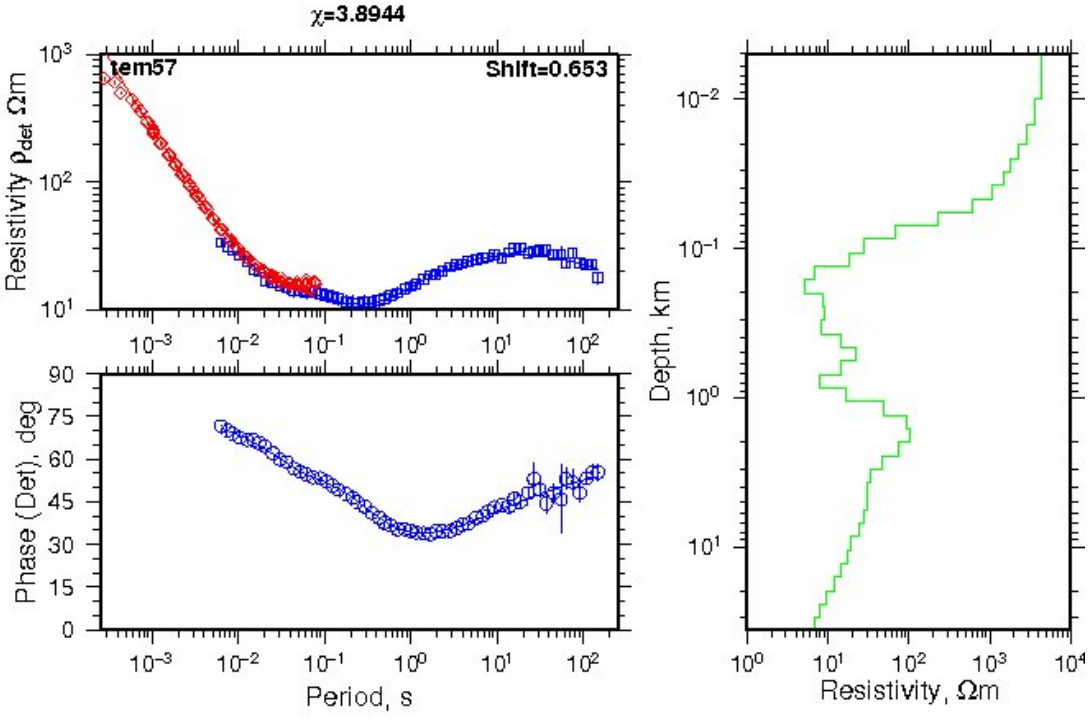




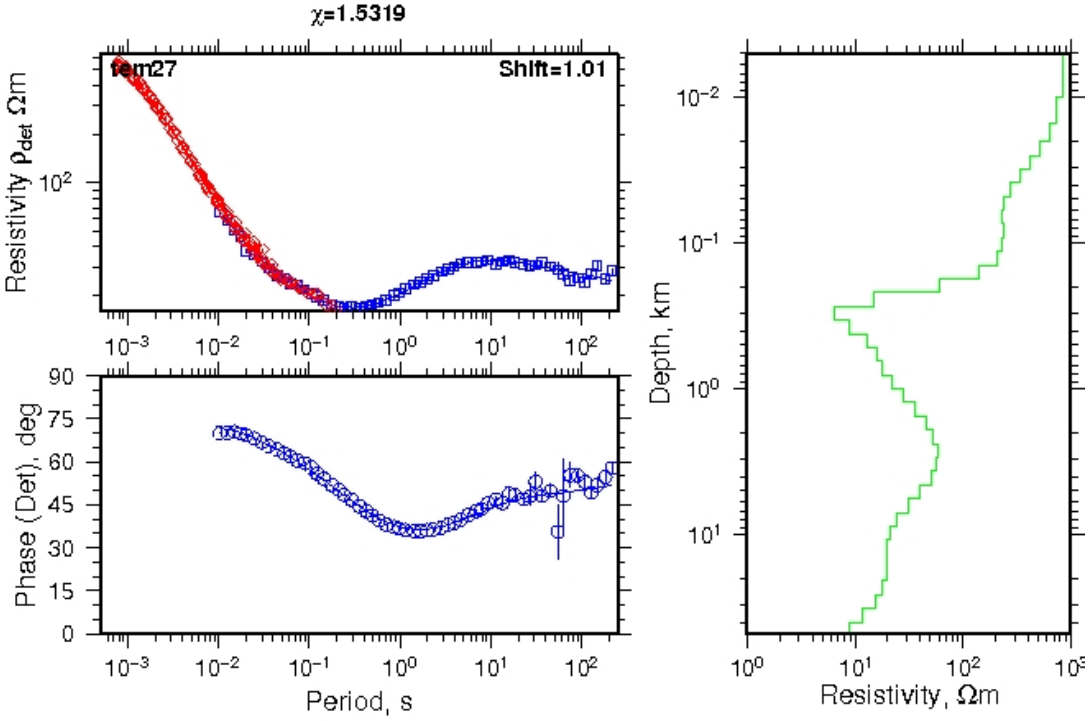
dmt05


χ=5.0267
tem28
Shift=1.49
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm

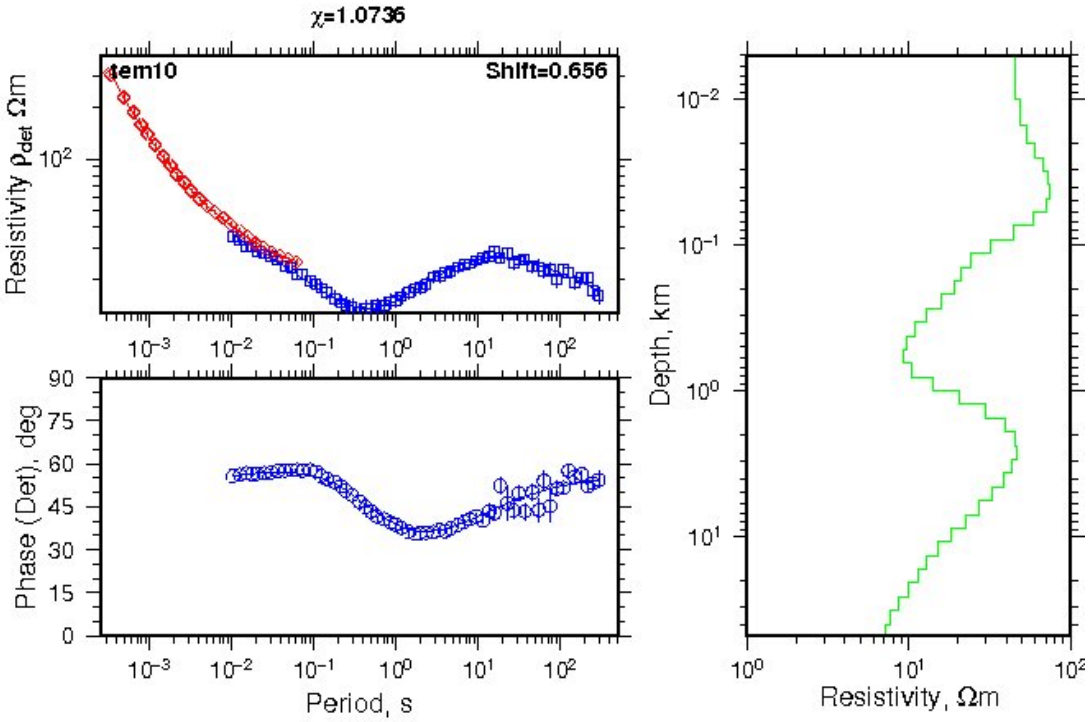
dmt06


χ=3.8944
tem57
Shift=0.653
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm

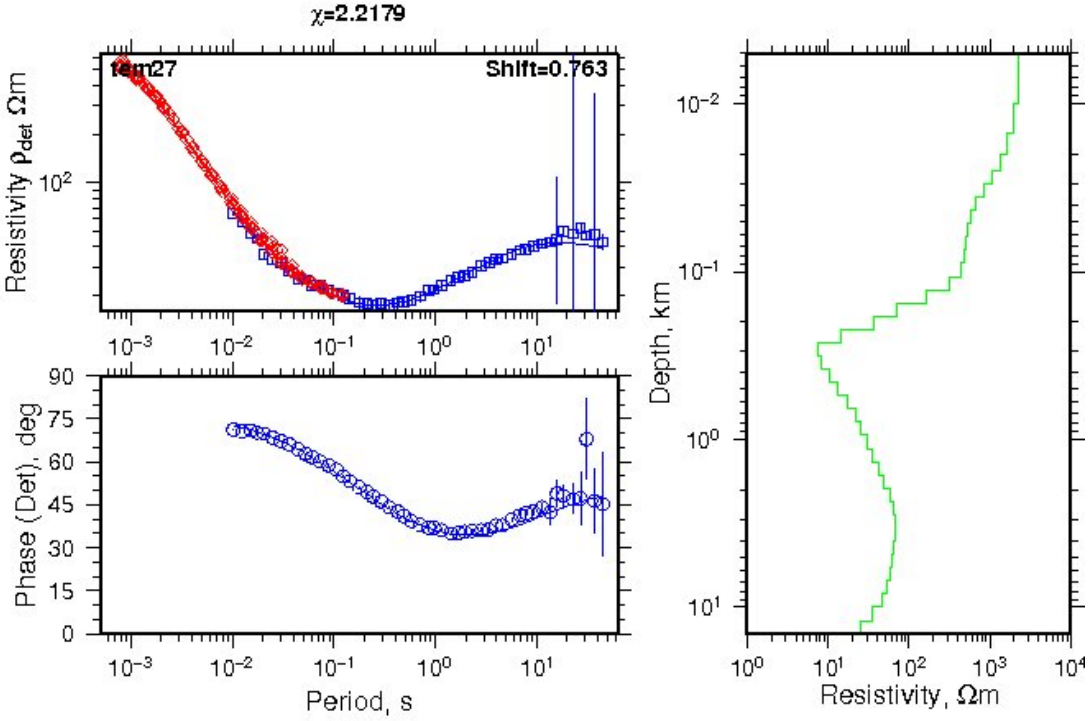
dmt07


χ=1.5319
tem27
Shift=1.01
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm

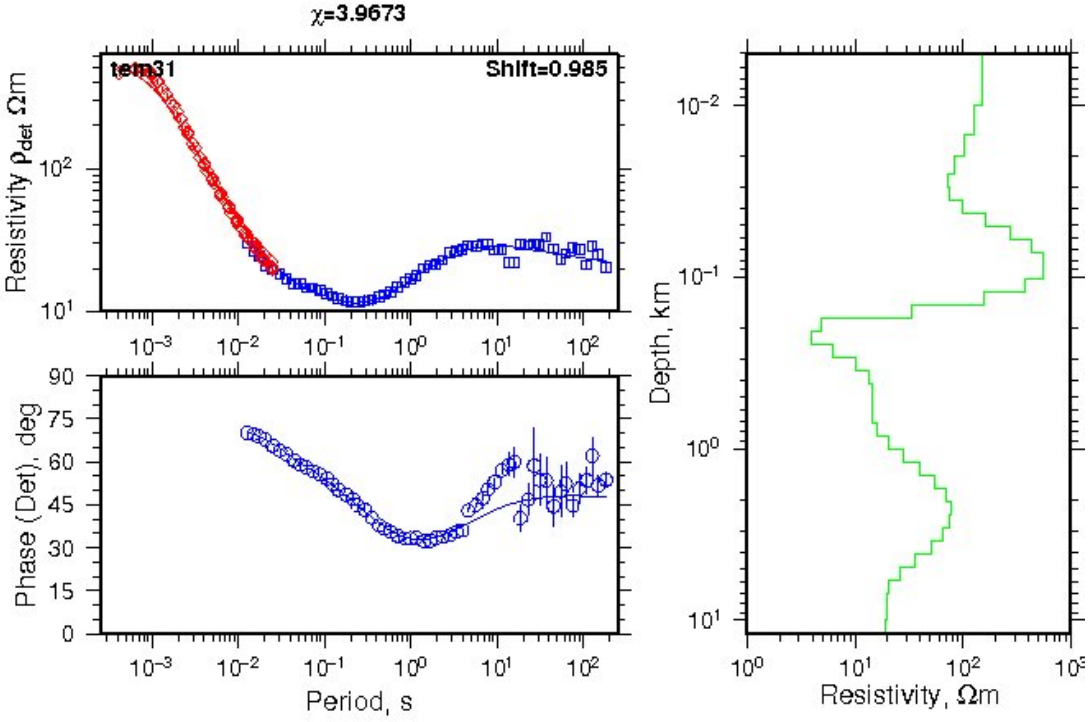
dmt08


χ=1.0736
tem10
Shift=0.656
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm

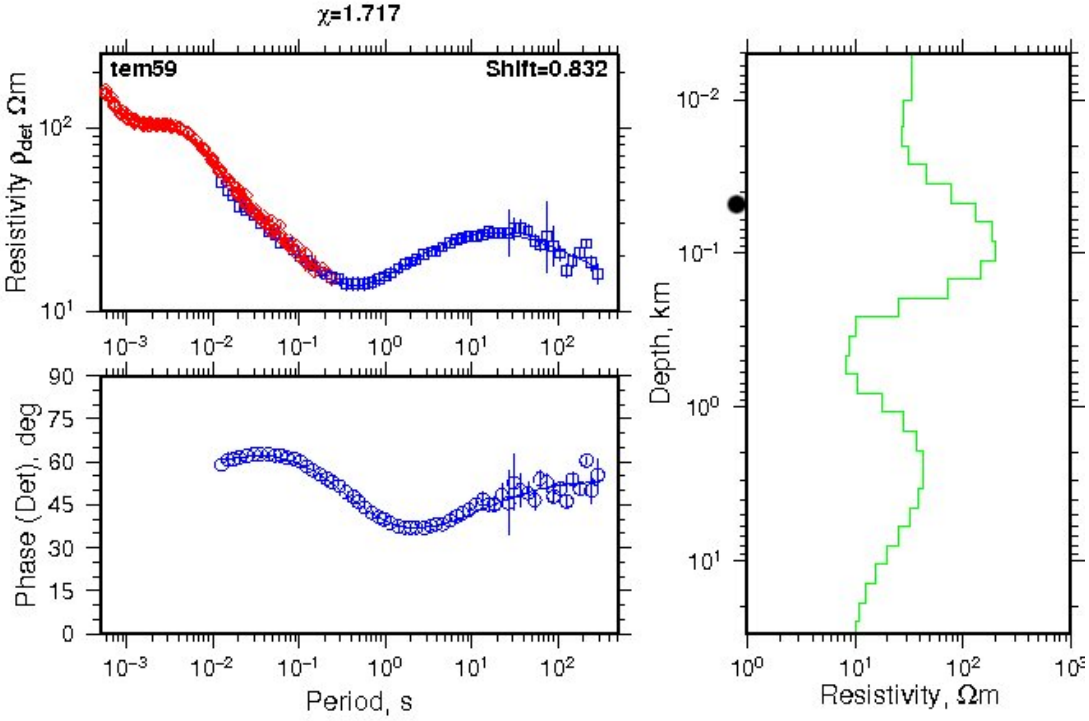
dmt09


χ=2.2179
tem27
Shift=0.763
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm

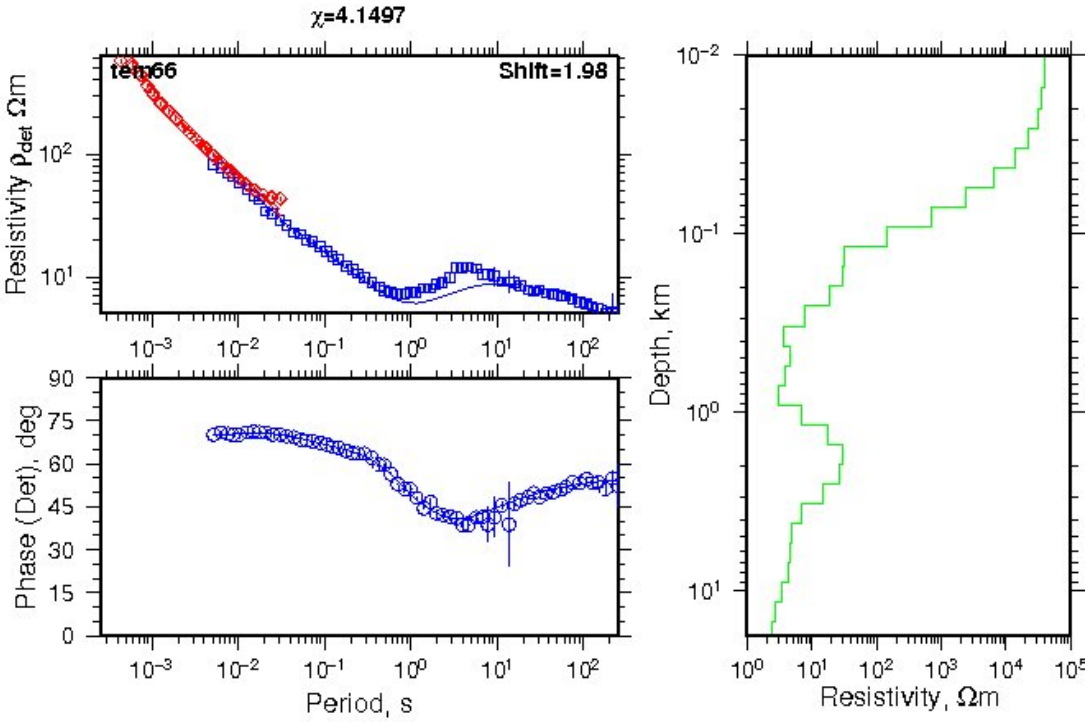
dmt10


χ=3.9673
tem31
Shift=0.985
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm

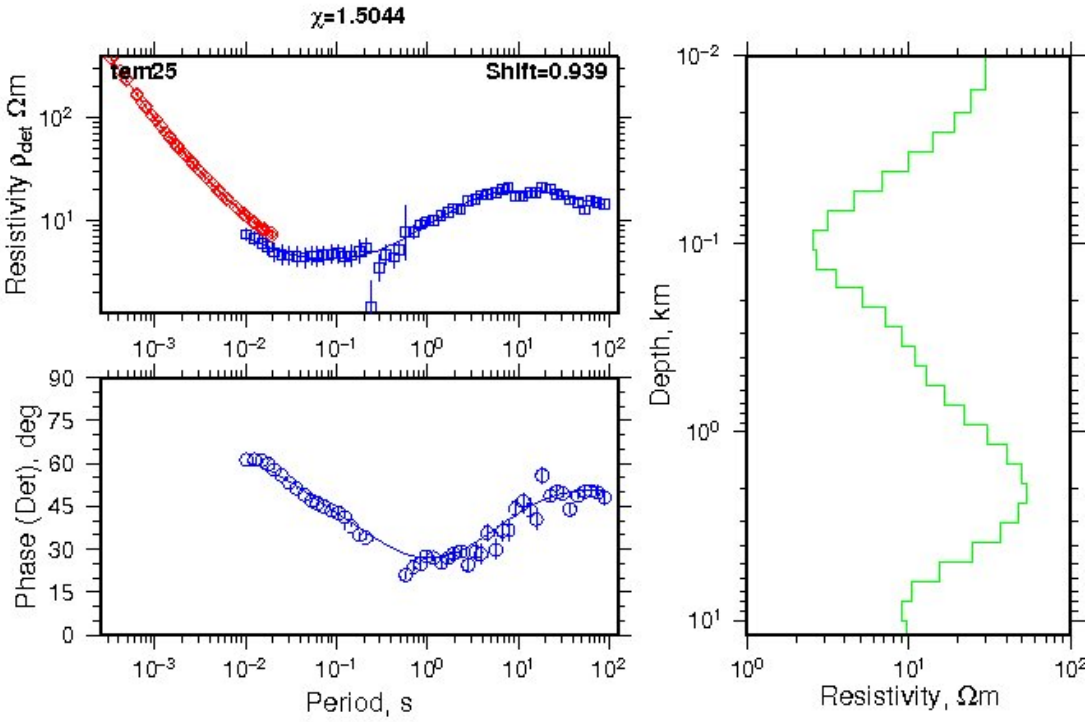
dmt11


χ=1.717
tem59
Shift=0.832
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm

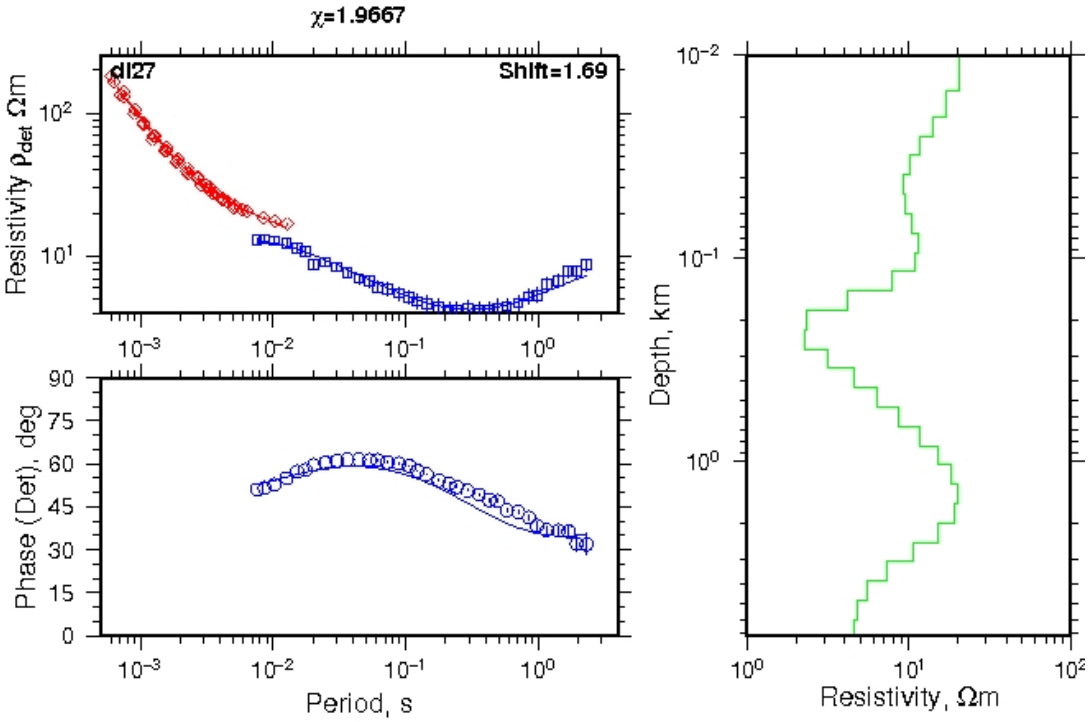
dmt12


χ=4.1497
tem66
Shift=1.98
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm

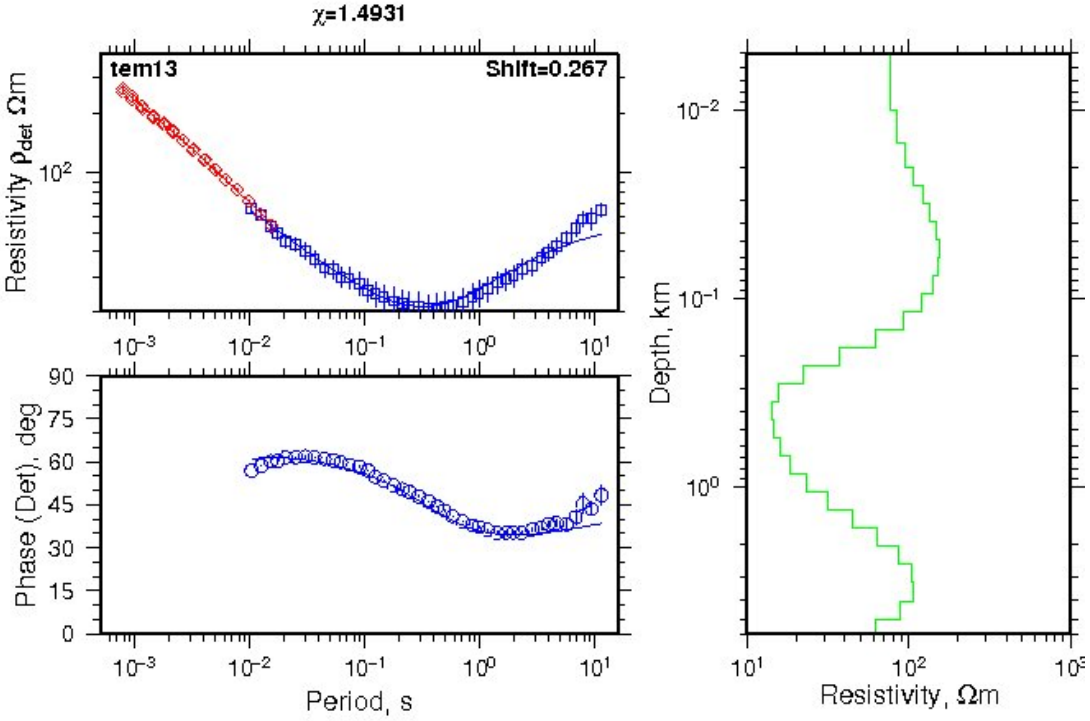
dmt16


χ=1.5044
tem25
Shift=0.939
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm

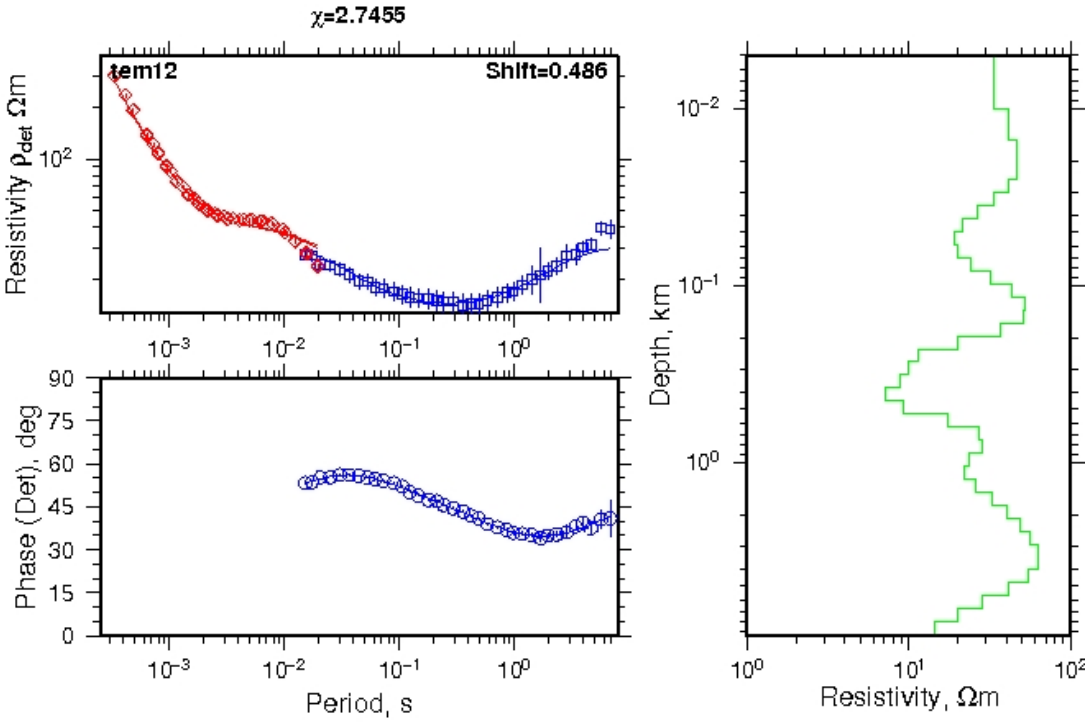
dmt17


χ=1.9667
dl27
Shift=1.69
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm

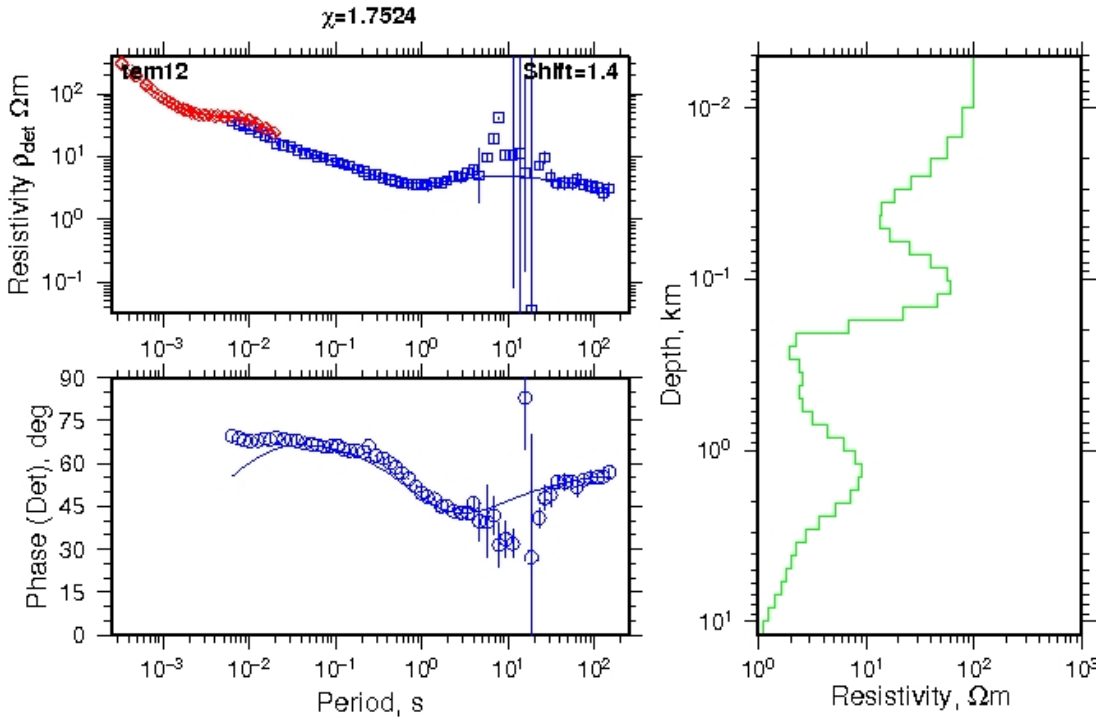
dmt20


χ=1.4931
tem13
Shift=0.267
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm

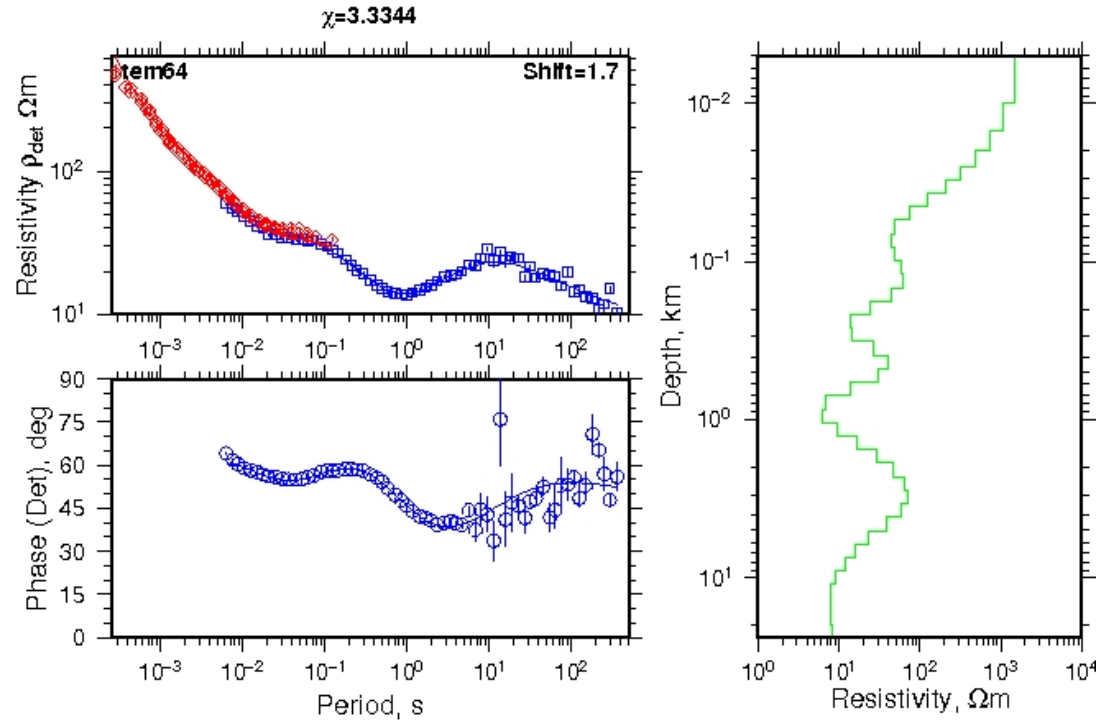
dmt24

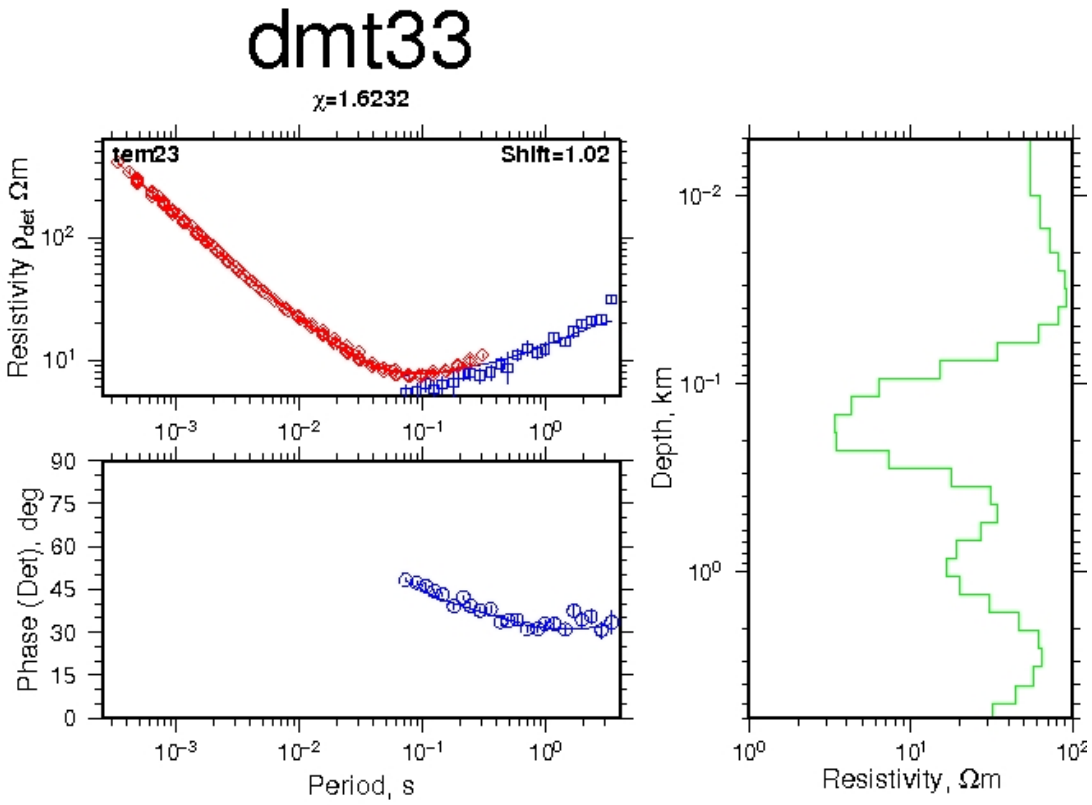

χ=2.7455
tem12
Shift=0.486
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm

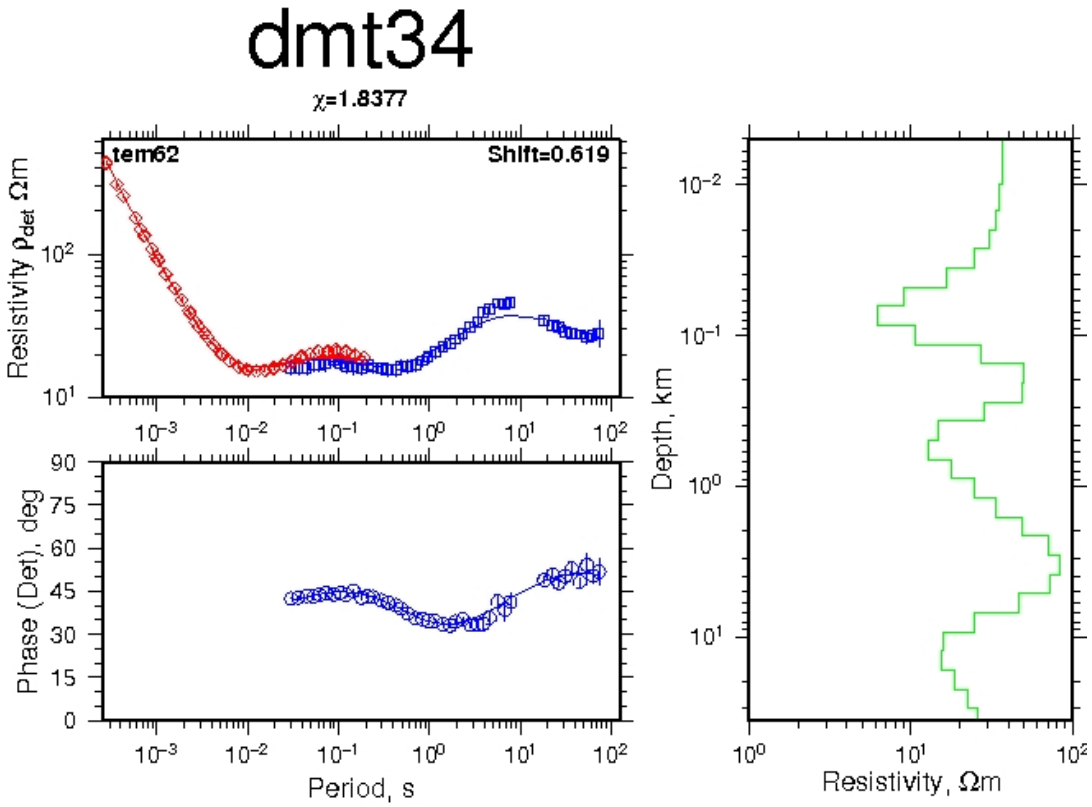
dmt27

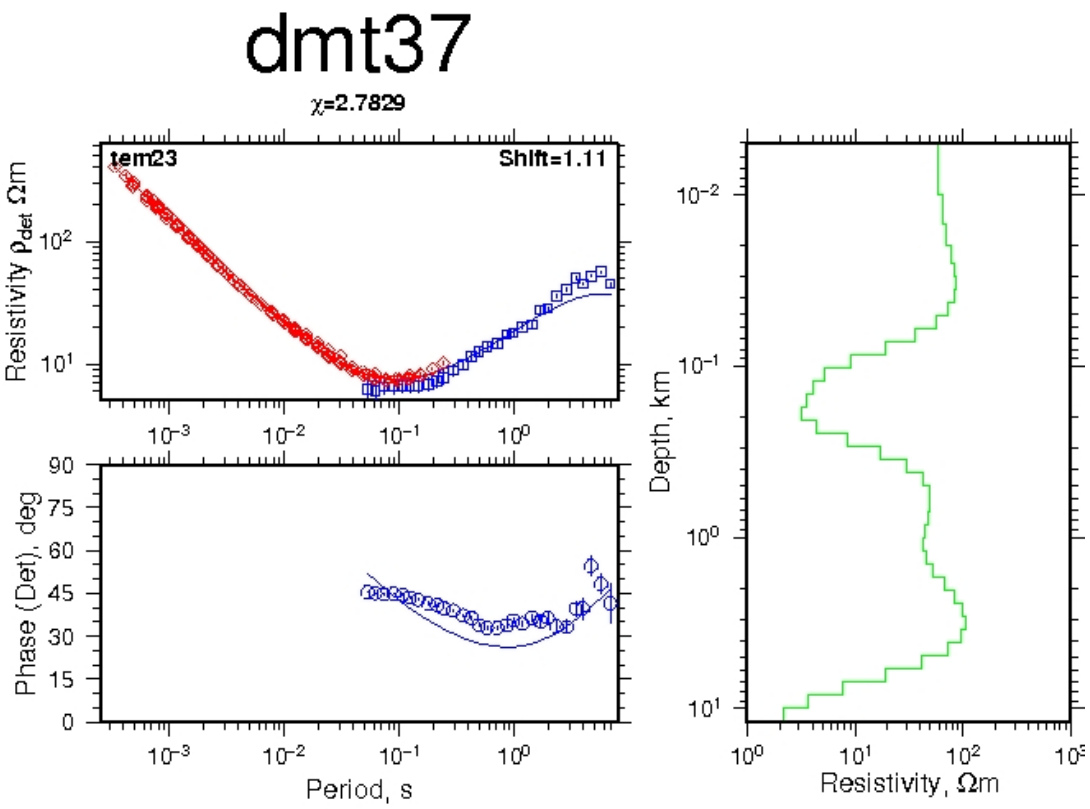

χ=1.7524
tem12
Shift=1.4
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm

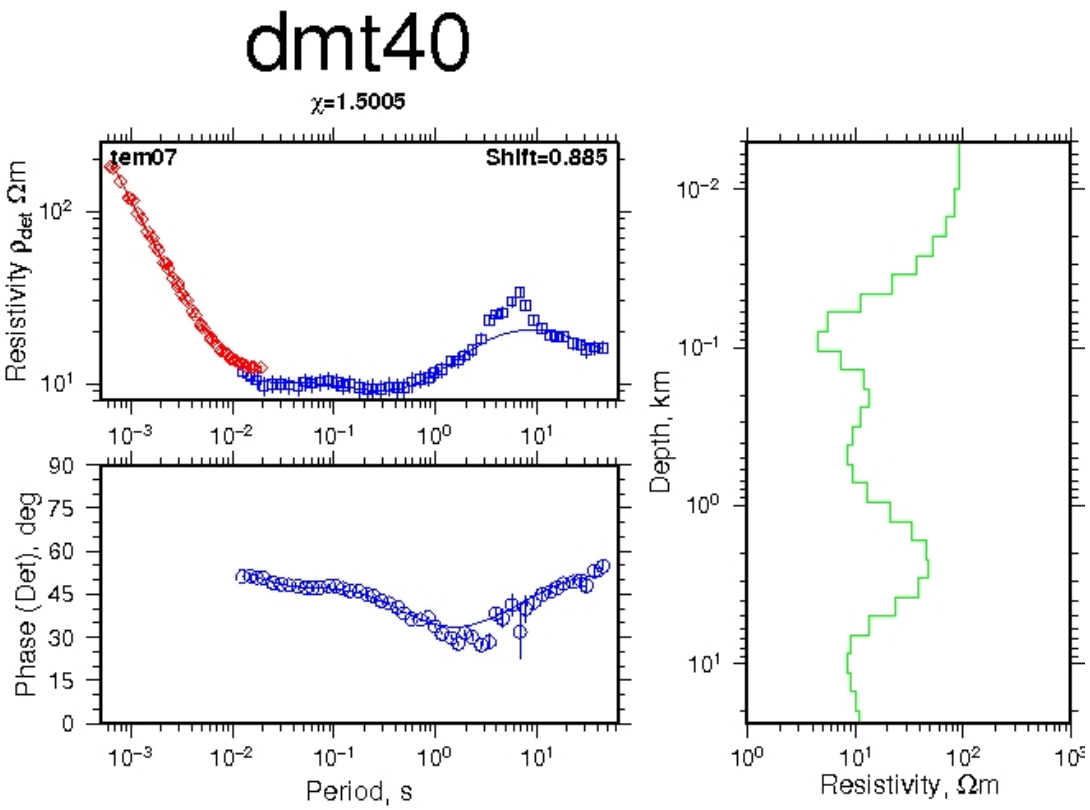
dmt28


χ=3.3344
tem64
Shift=1.7
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm

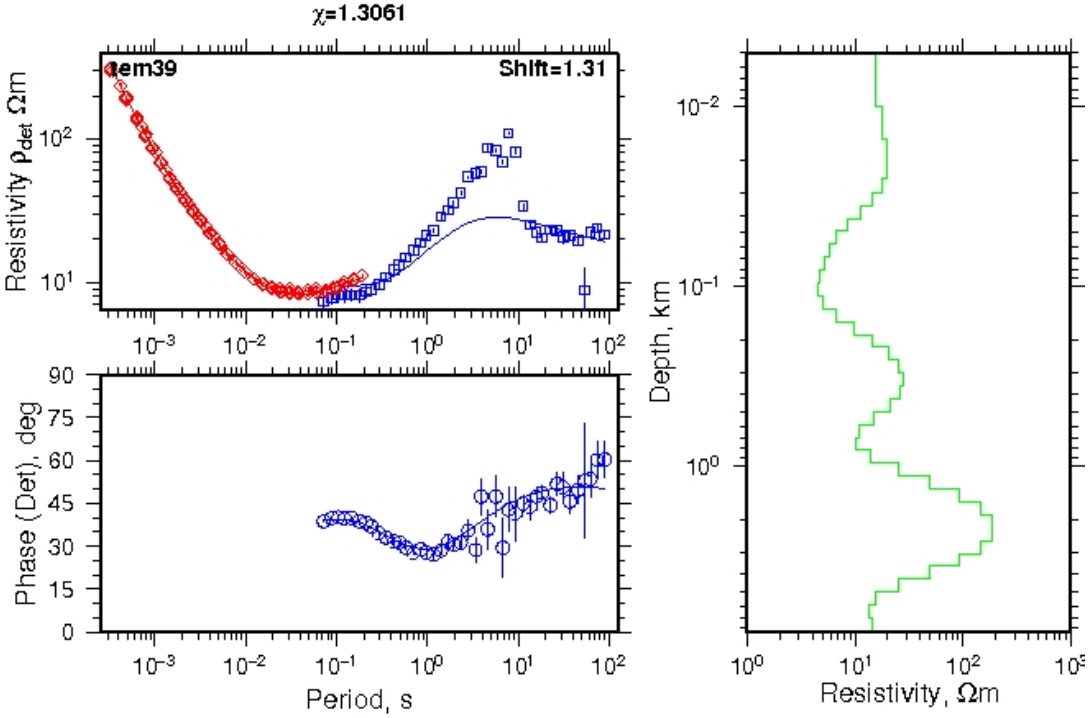

dmt33
χ=1.6232
tem23
Shift=1.02
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm


dmt34
χ=1.8377
tem62
Shift=0.619
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm

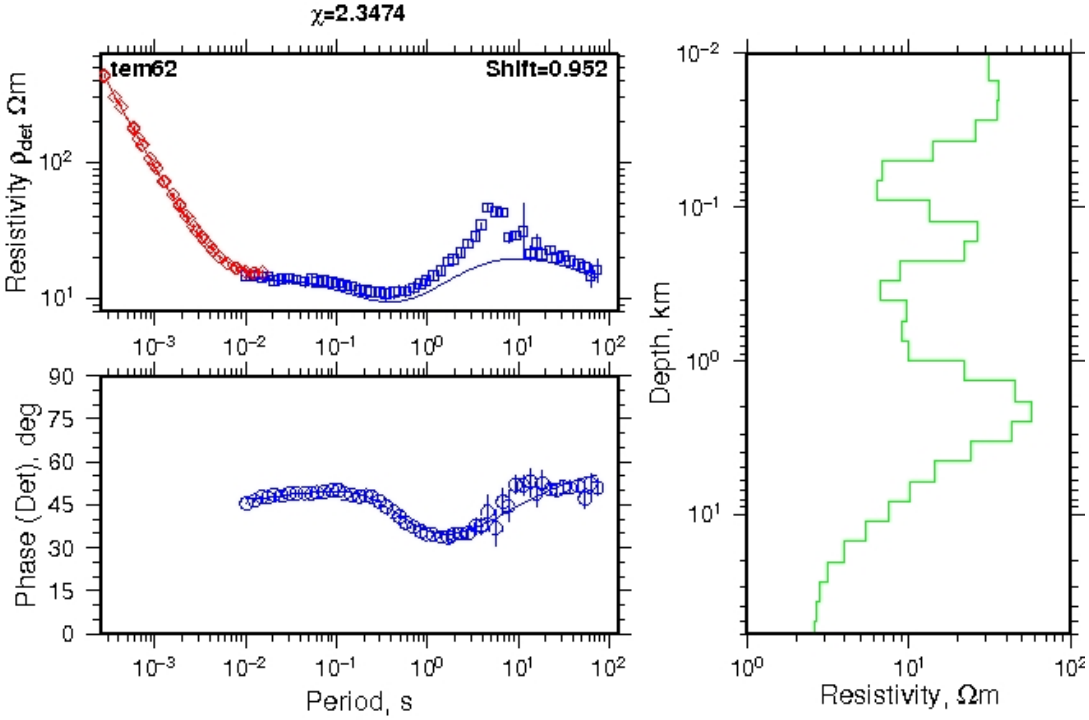

dmt37
χ=2.7829
tem23
Shift=1.11
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm

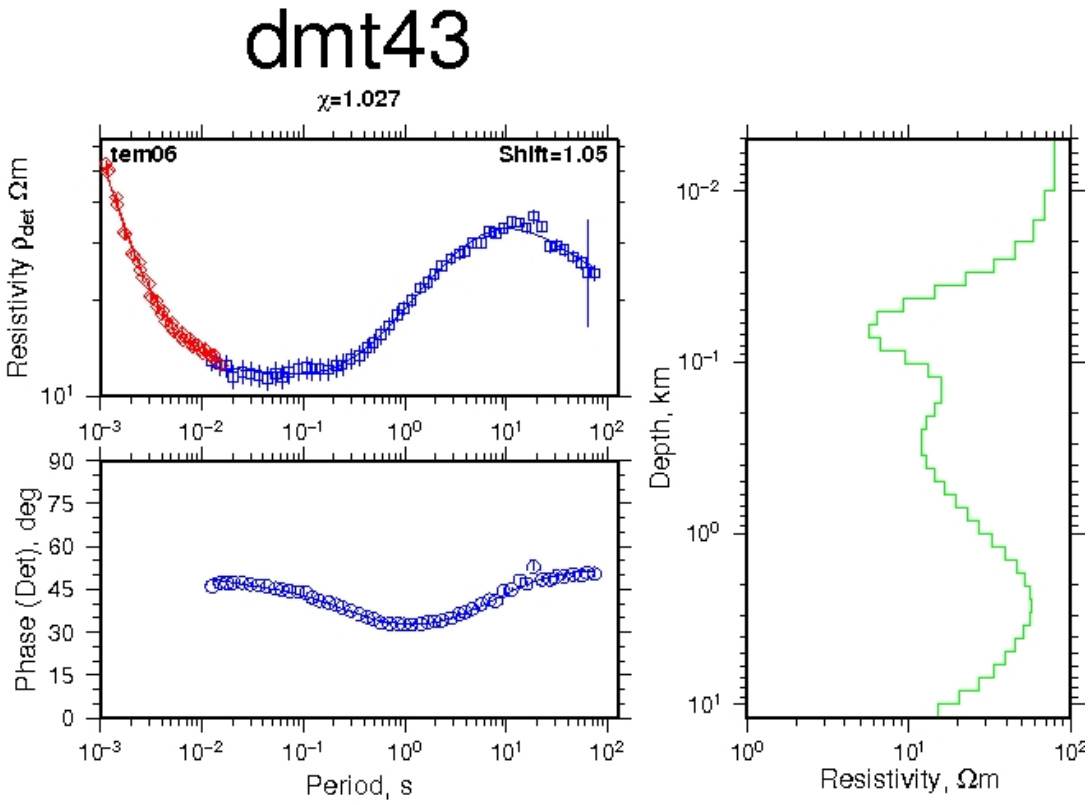

dmt40
χ=1.5005
tem07
Shift=0.885
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm

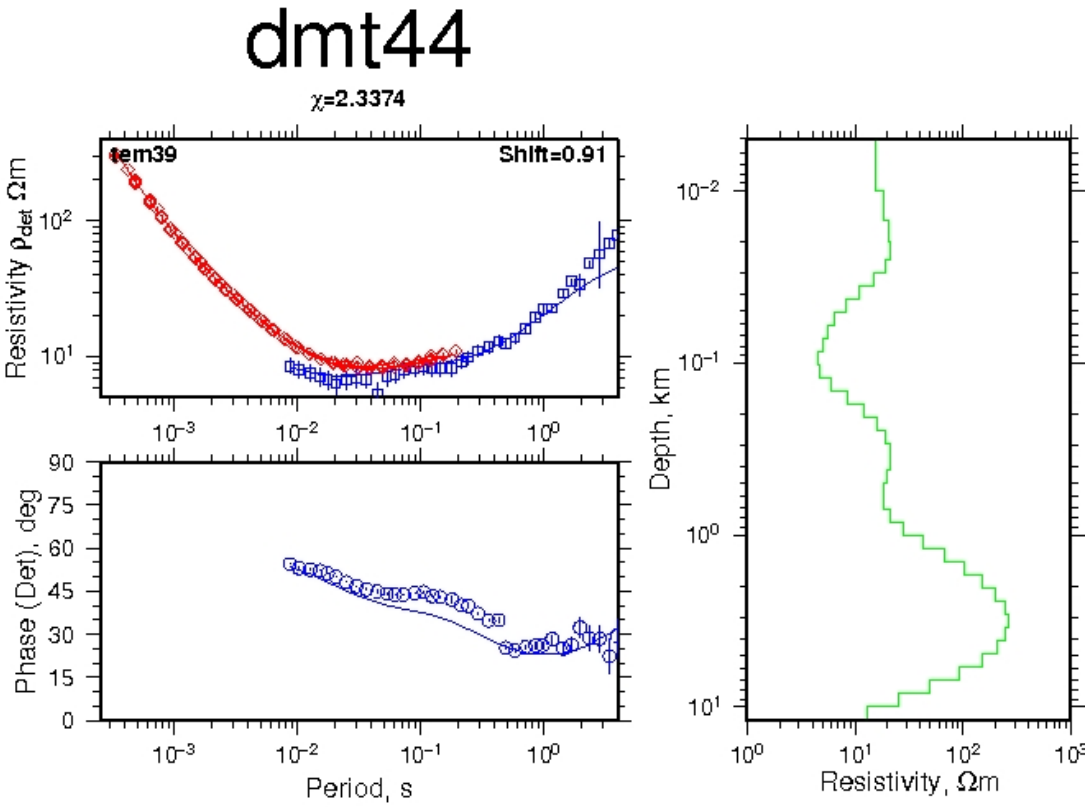
dmt41


χ=1.3061
tem39
Shift=1.31
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm

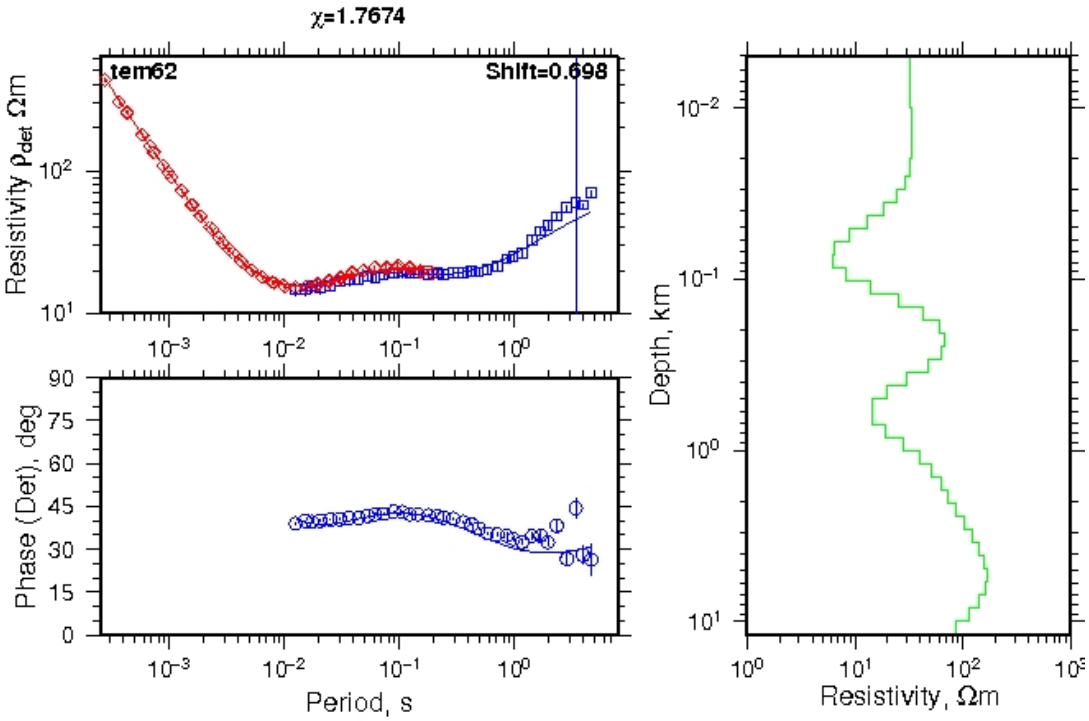
dmt42


χ=2.3474
tem62
Shift=0.952
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm

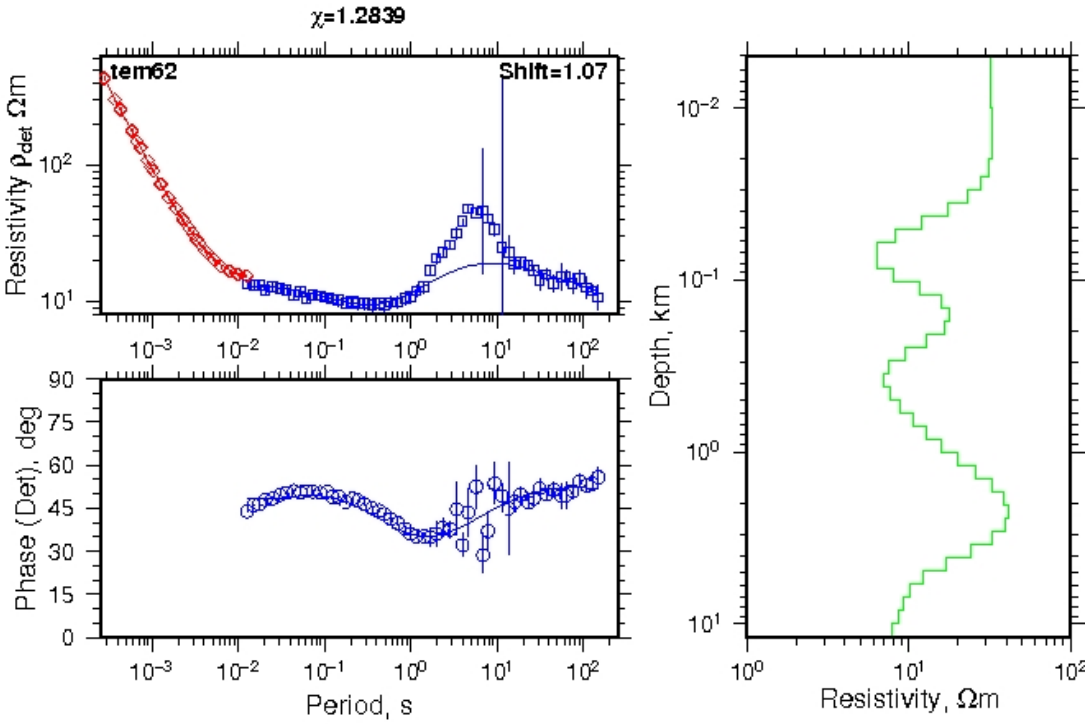

dmt43
χ=1.027
tem06
Shift=1.05
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm


dmt44
χ=2.3374
tem39
Shift=0.91
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm

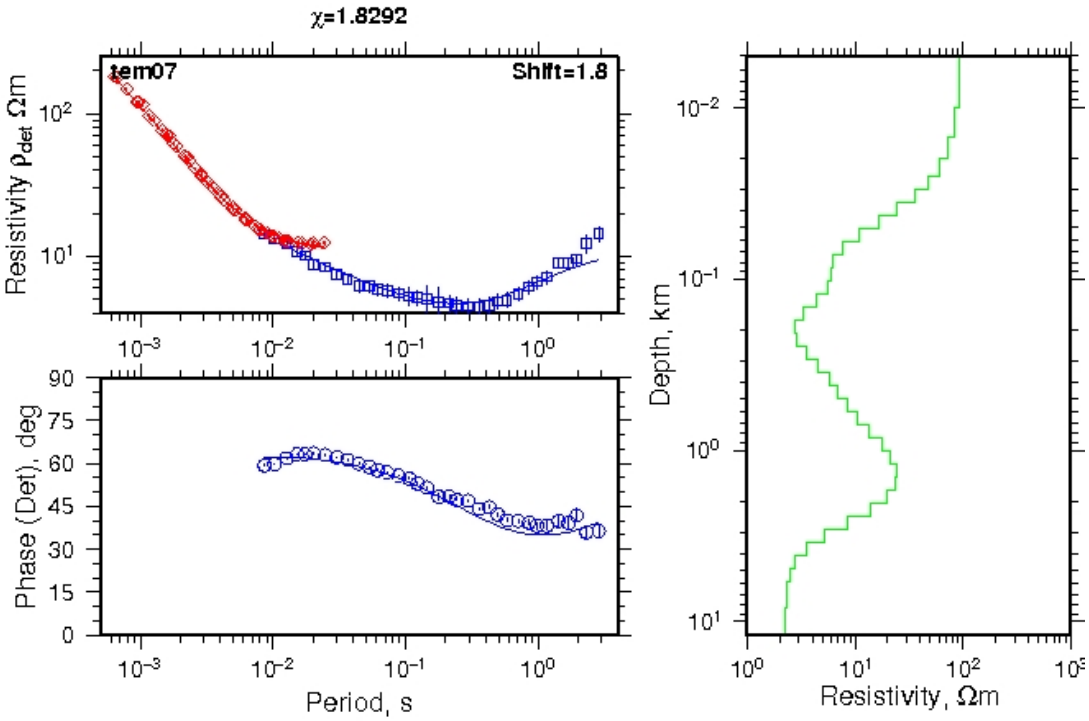
dmt50


χ=1.7674
tem62
Shift=0.698
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm

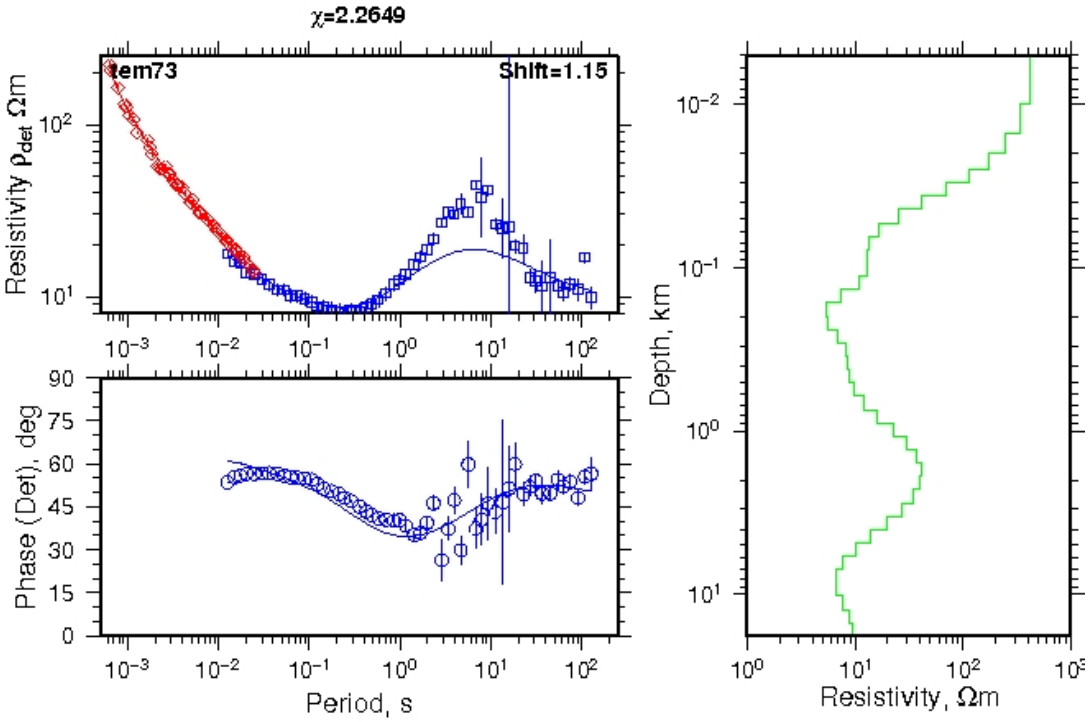
dmt56


χ=1.2839
tem62
Shift=1.07
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm

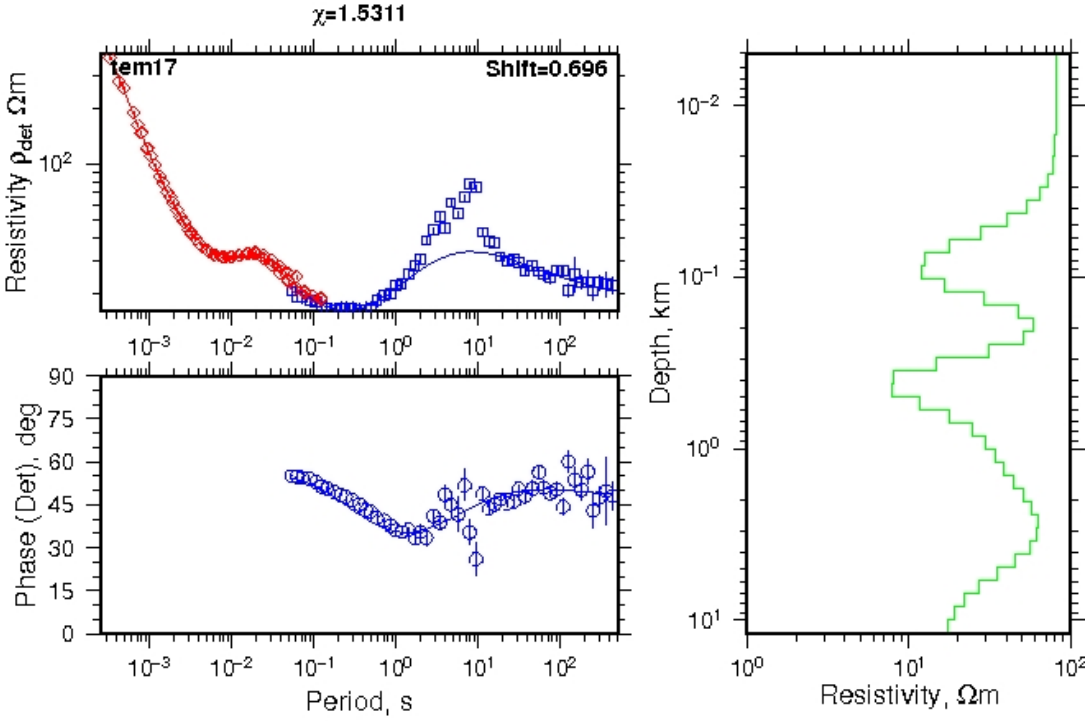
dmt58


χ=1.8292
tem07
Shift=1.8
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm

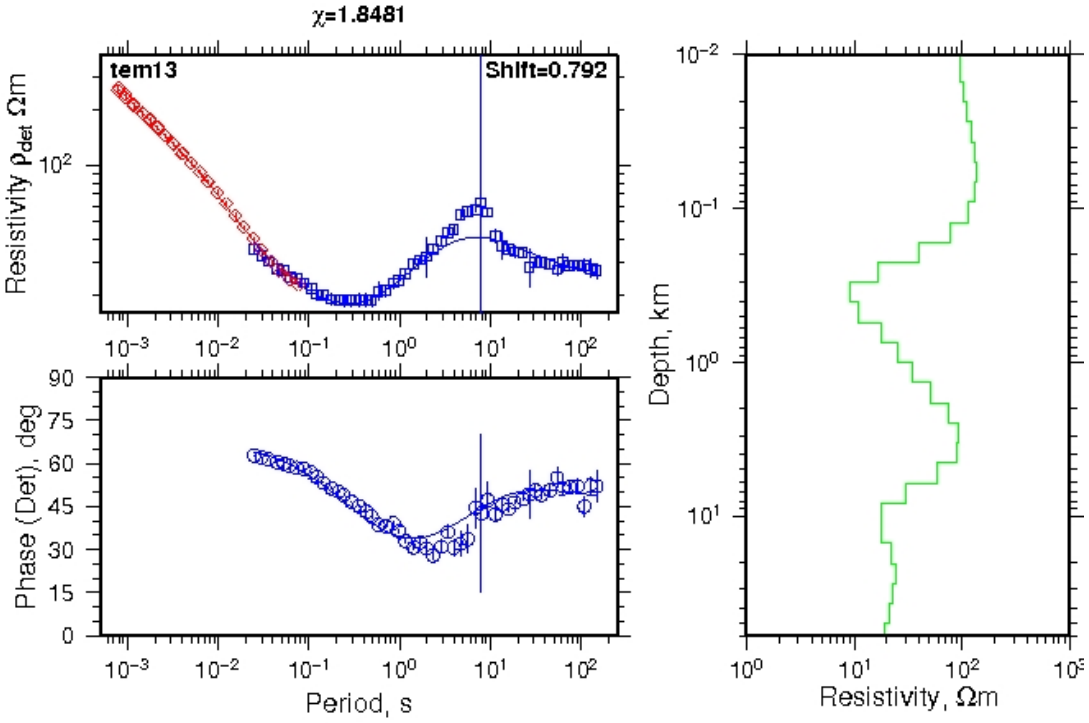
dmt63

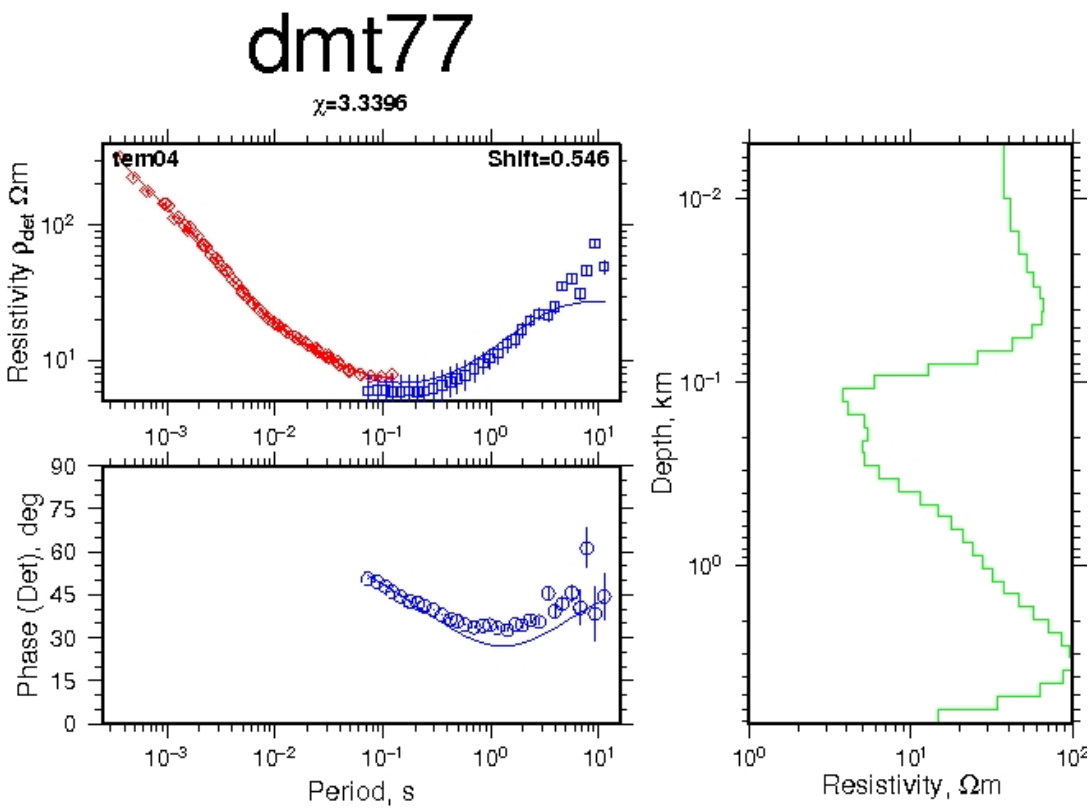

χ=2.2649
tem73
Shift=1.15
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm

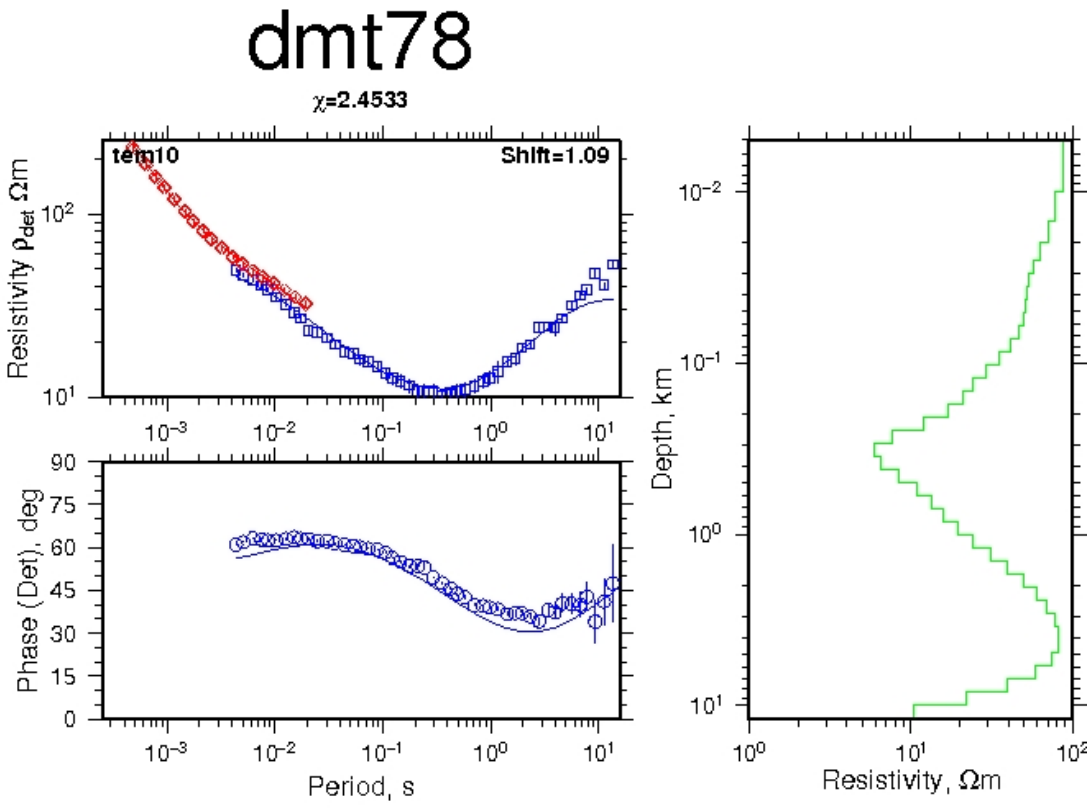
dmt72


χ=1.5311
tem17
Shift=0.696
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm

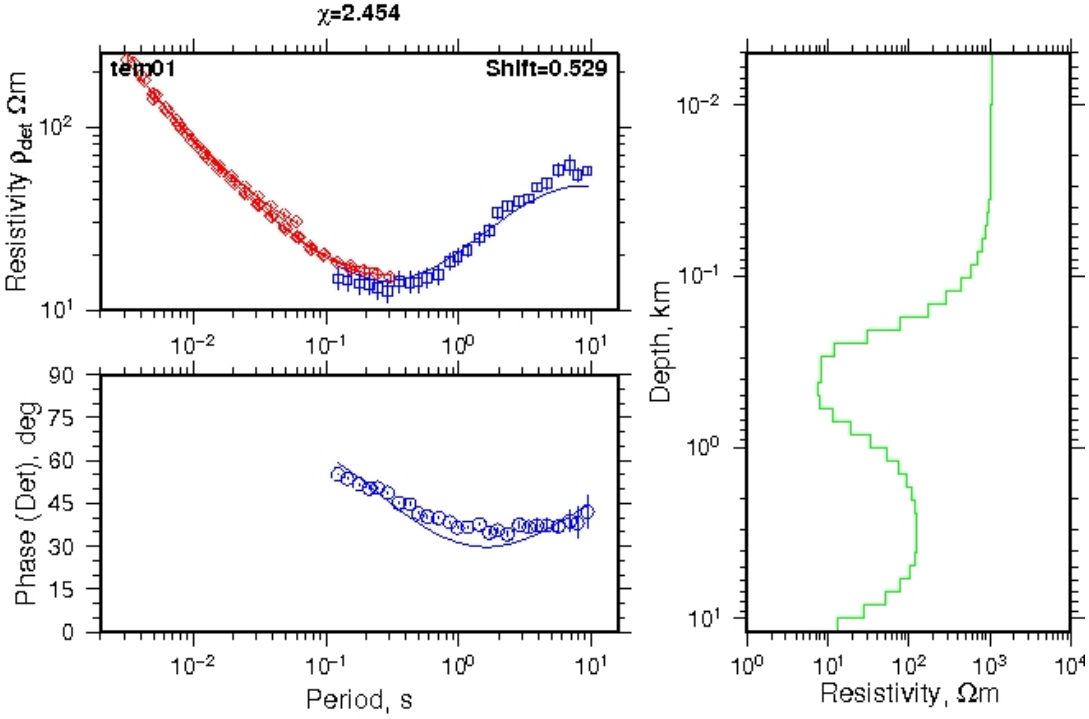
dmt76


χ=1.8481
tem13
Shift=0.792
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm

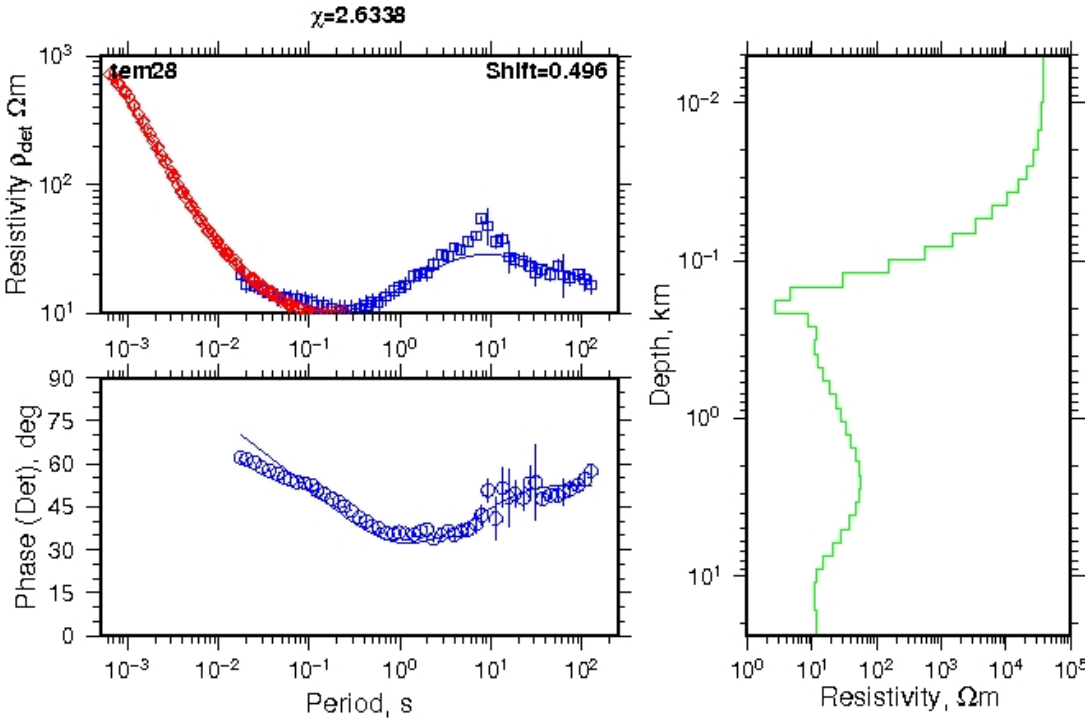

dmt77
χ=3.3396
tem04
Shift=0.546
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm

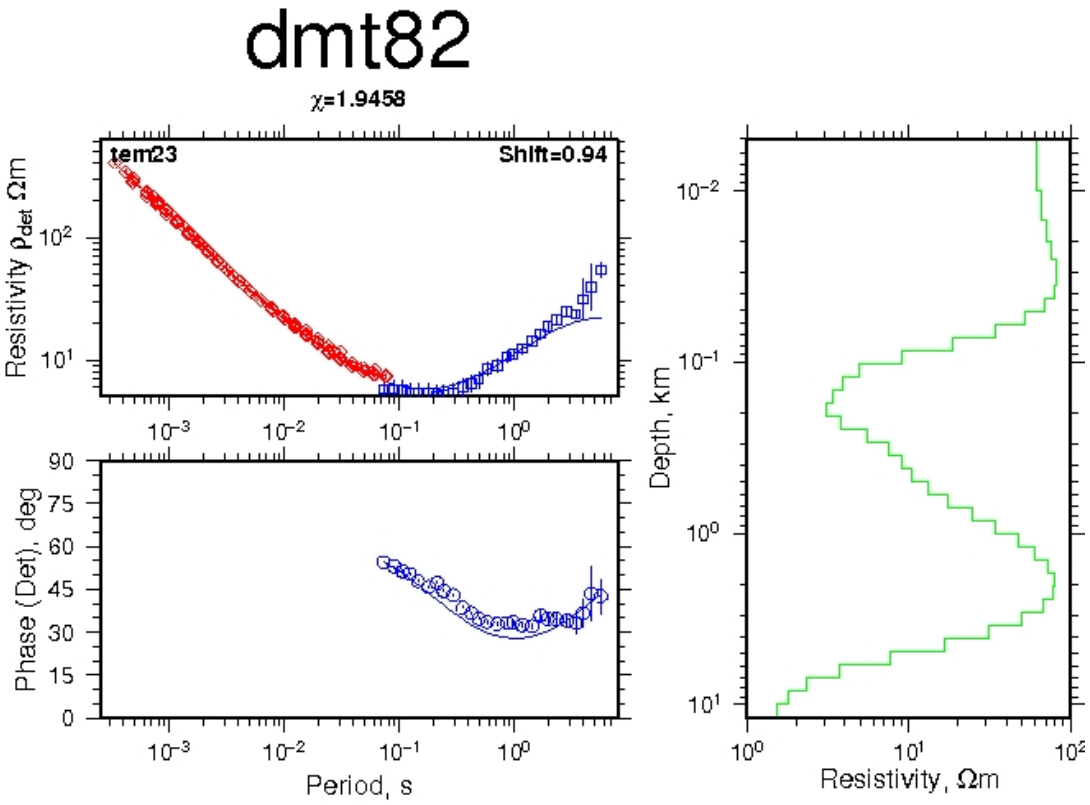

dmt78
χ=2.4533
tem10
Shift=1.09
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm

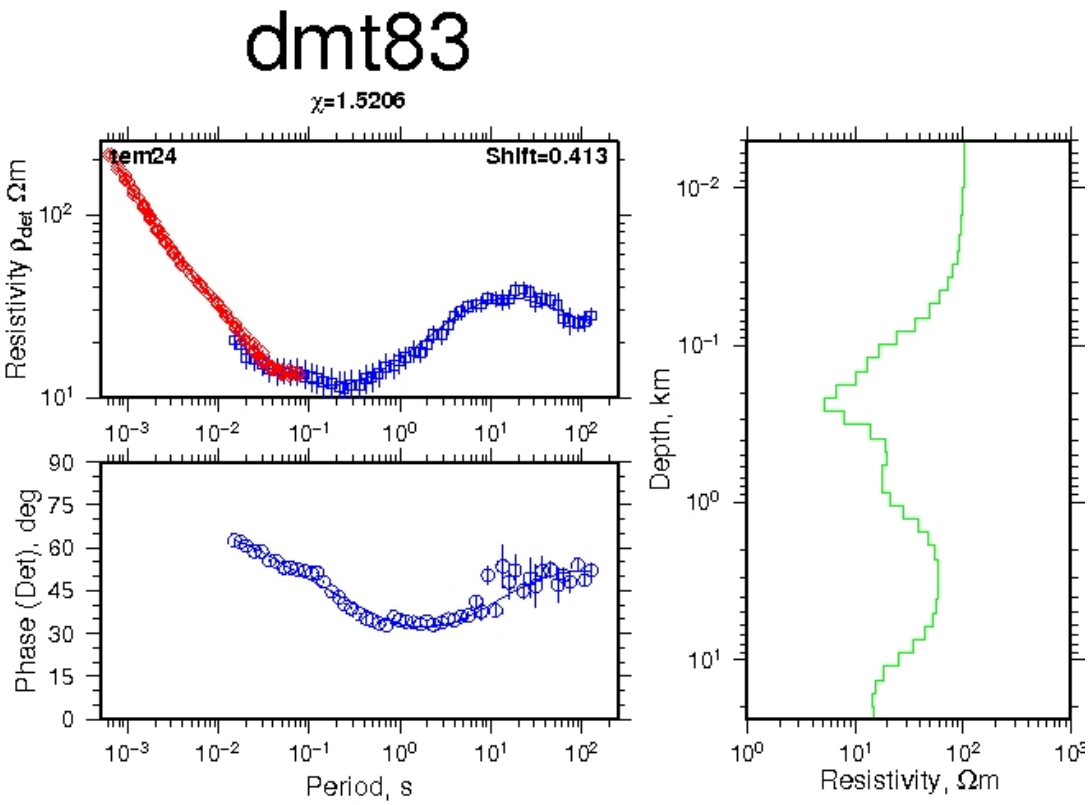
dmt79

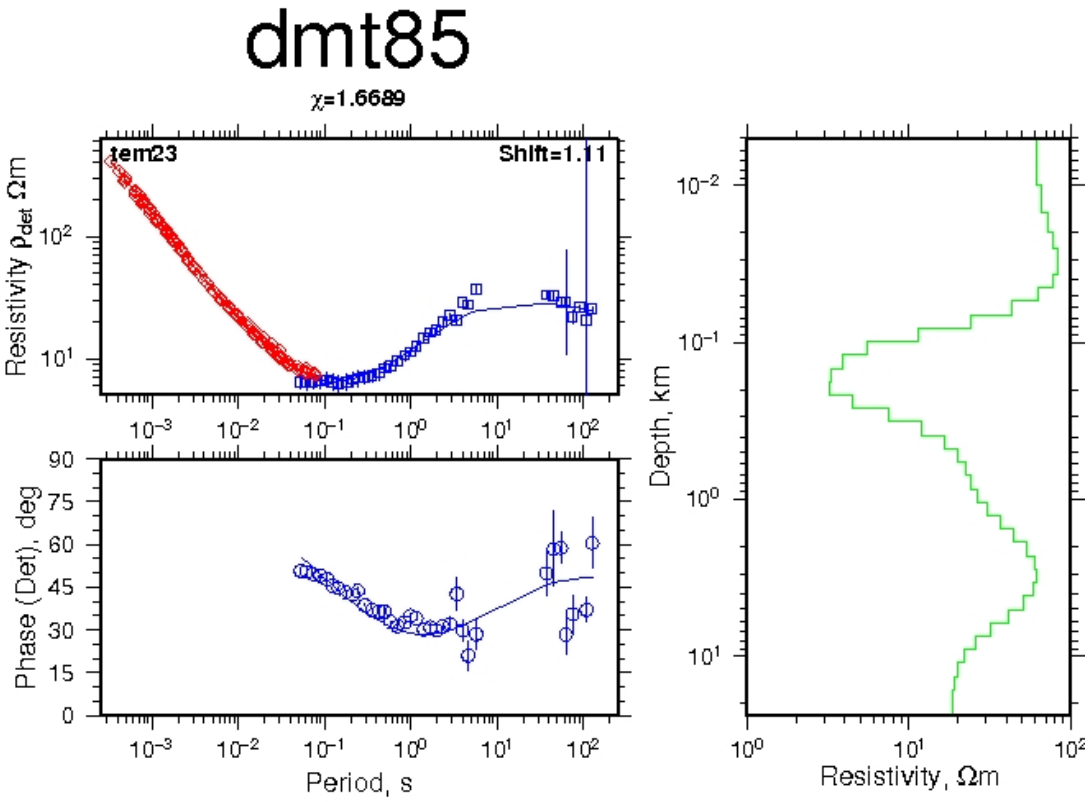

χ=2.454
tem01
Shift=0.529
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm

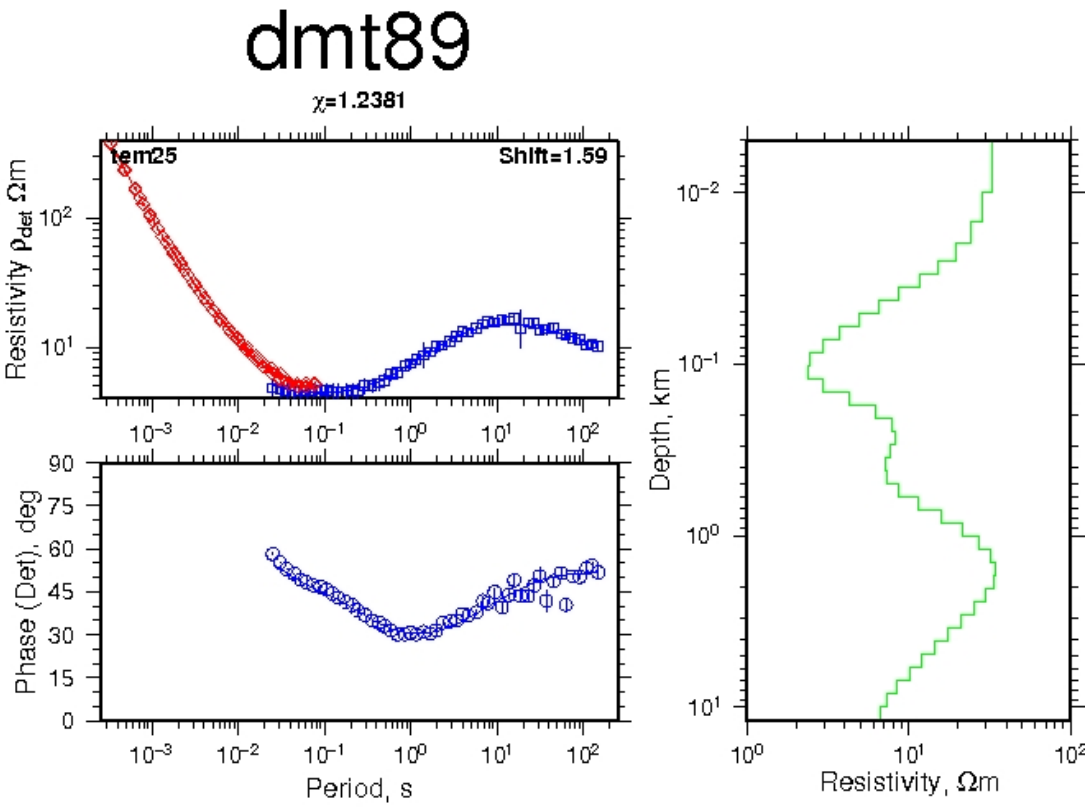
dmt81

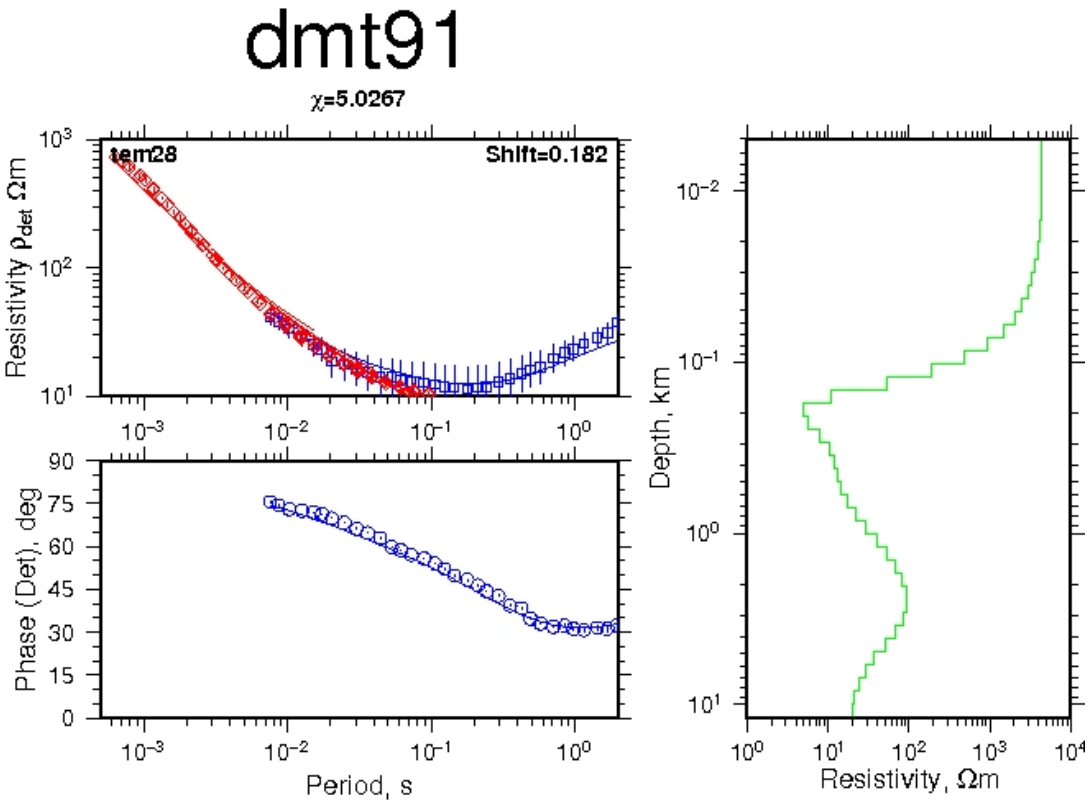

χ=2.6338
tem28
Shift=0.496
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm

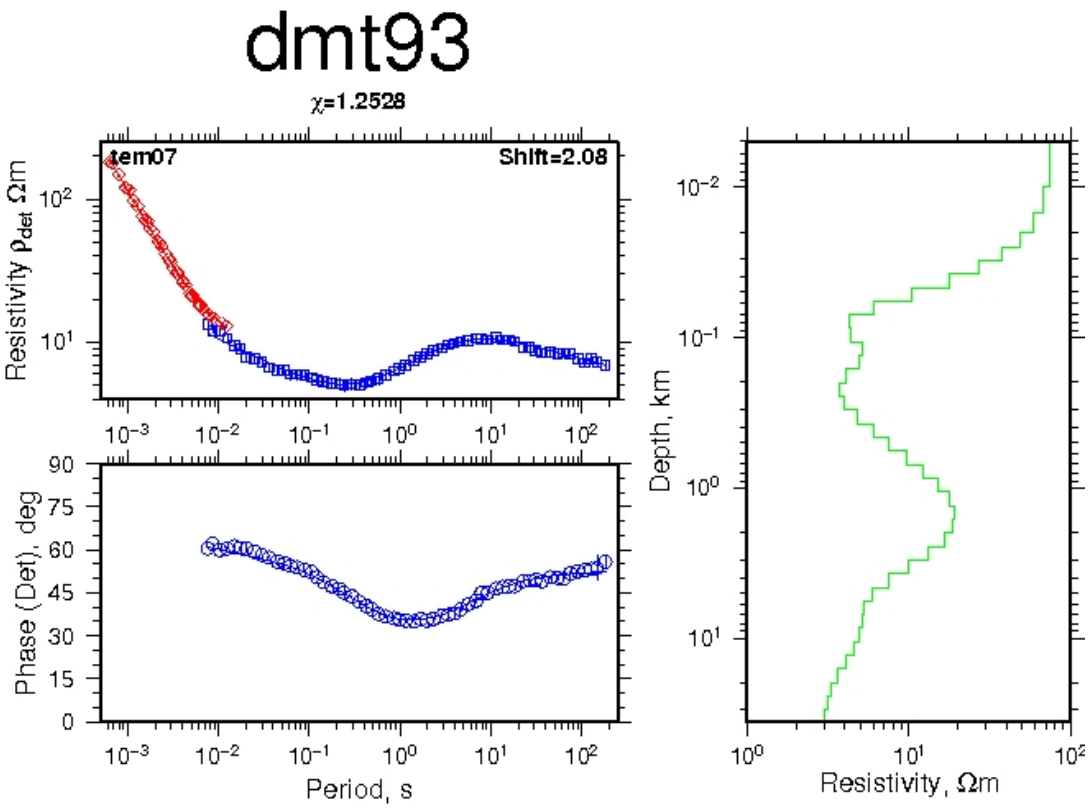

dmt82
χ=1.9458
tem23
Shift=0.94
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm

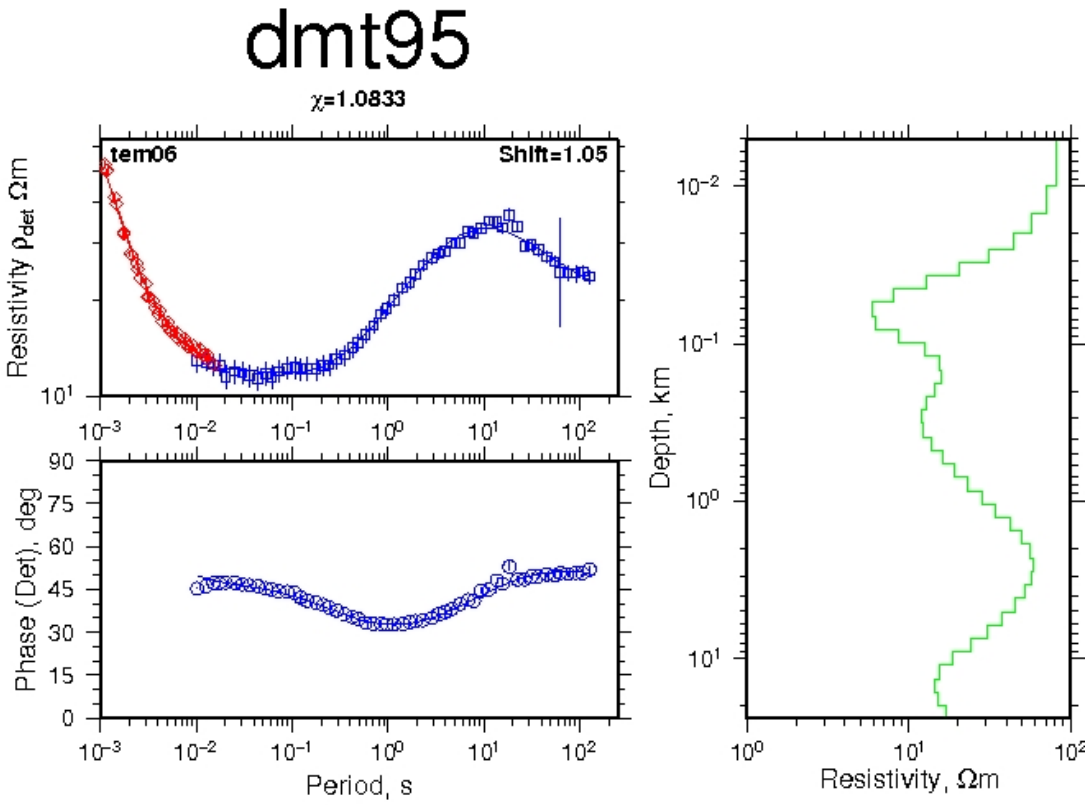

dmt83
χ=1.5206
tem24
Shift=0.413
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm

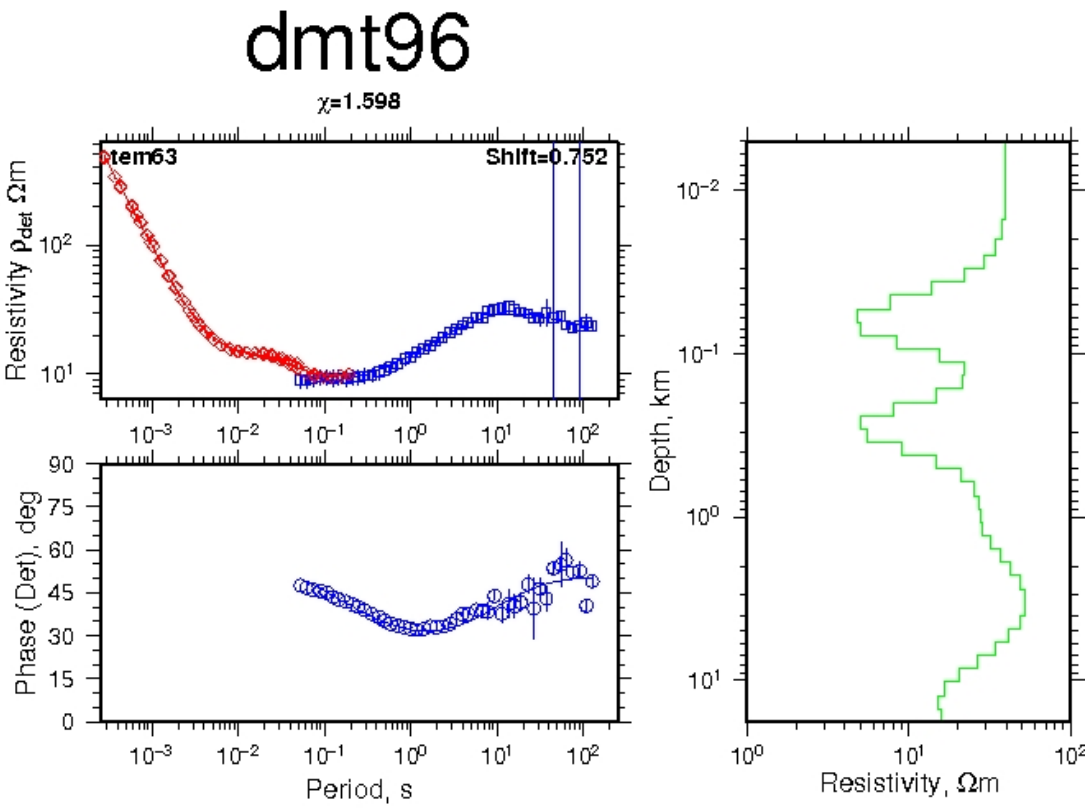

dmt85
χ=1.6689
tem23
Shift=1.11
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm

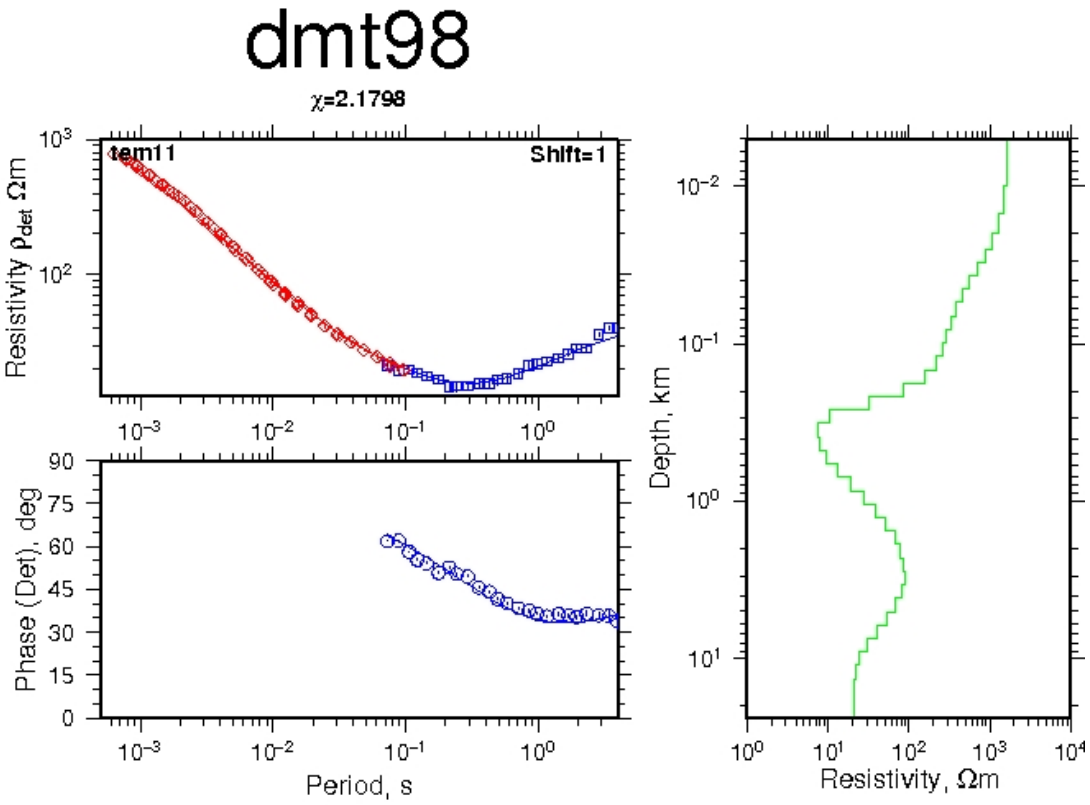

dmt89
χ=1.2381
tem25
Shift=1.59
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm

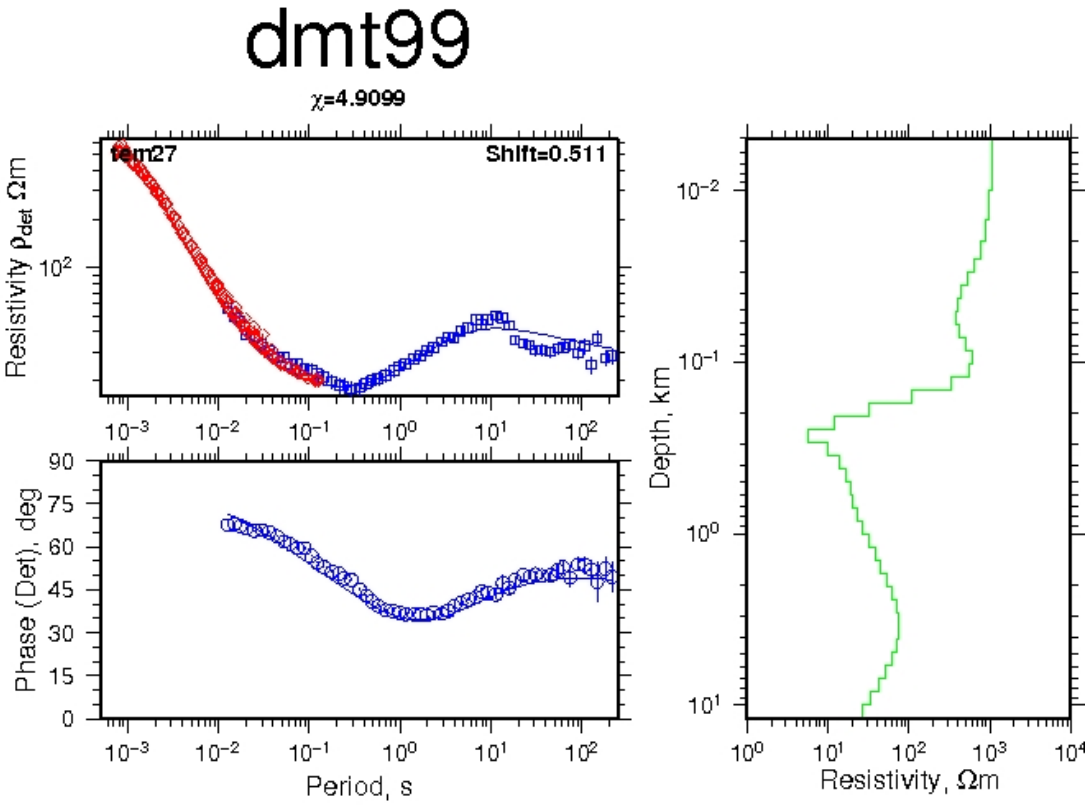

dmt91
χ=5.0267
tem28
Shift=0.182
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm

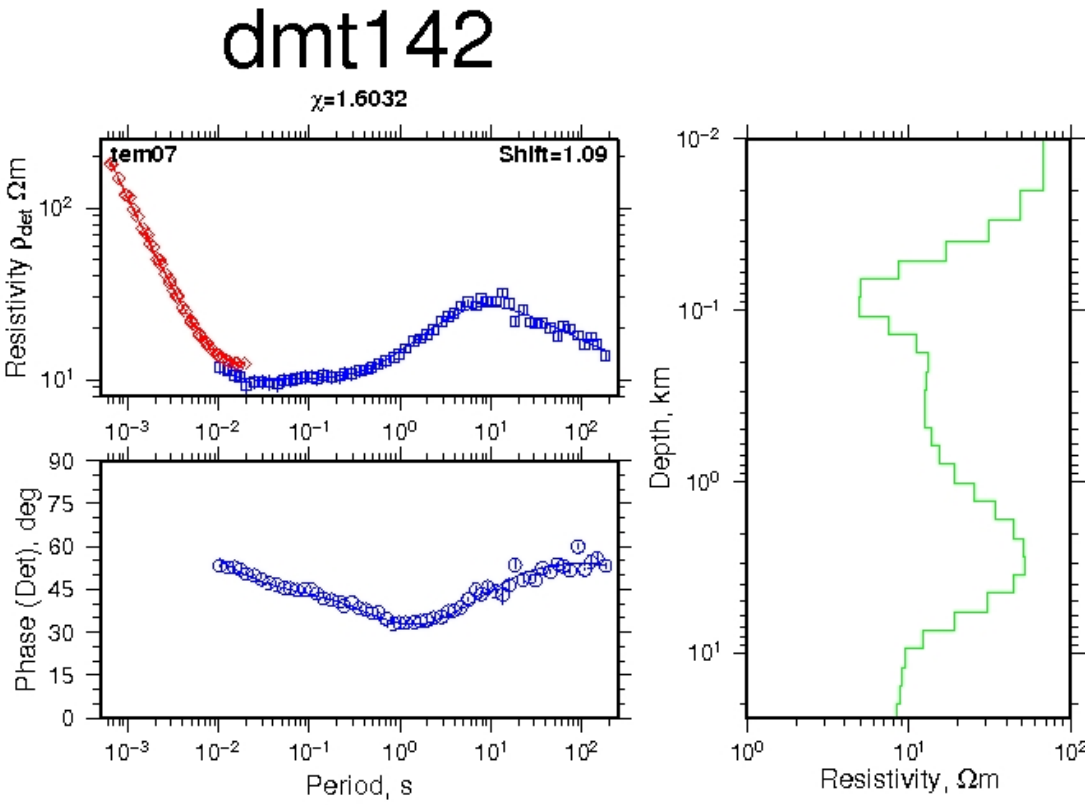

dmt93
χ=1.2528
tem07
Shift=2.08
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm

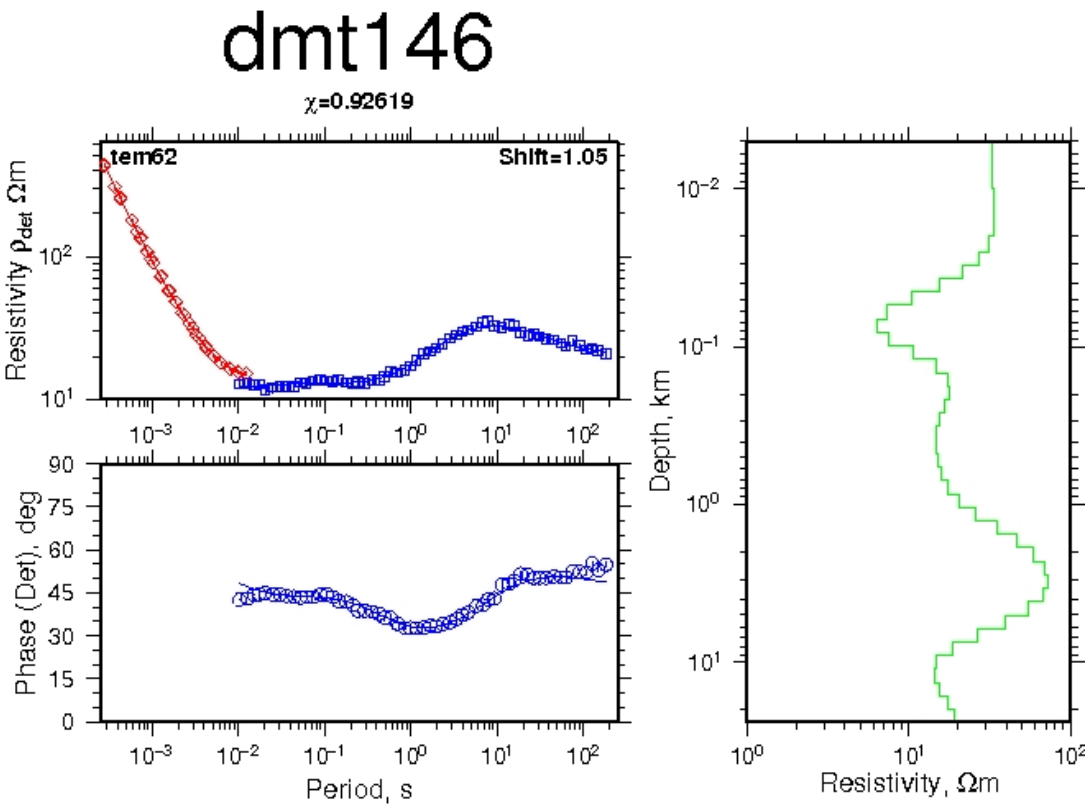

dmt95
χ=1.0833
tem06
Shift=1.05
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm


dmt96
χ=1.598
tem63
Shift=0.752
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm

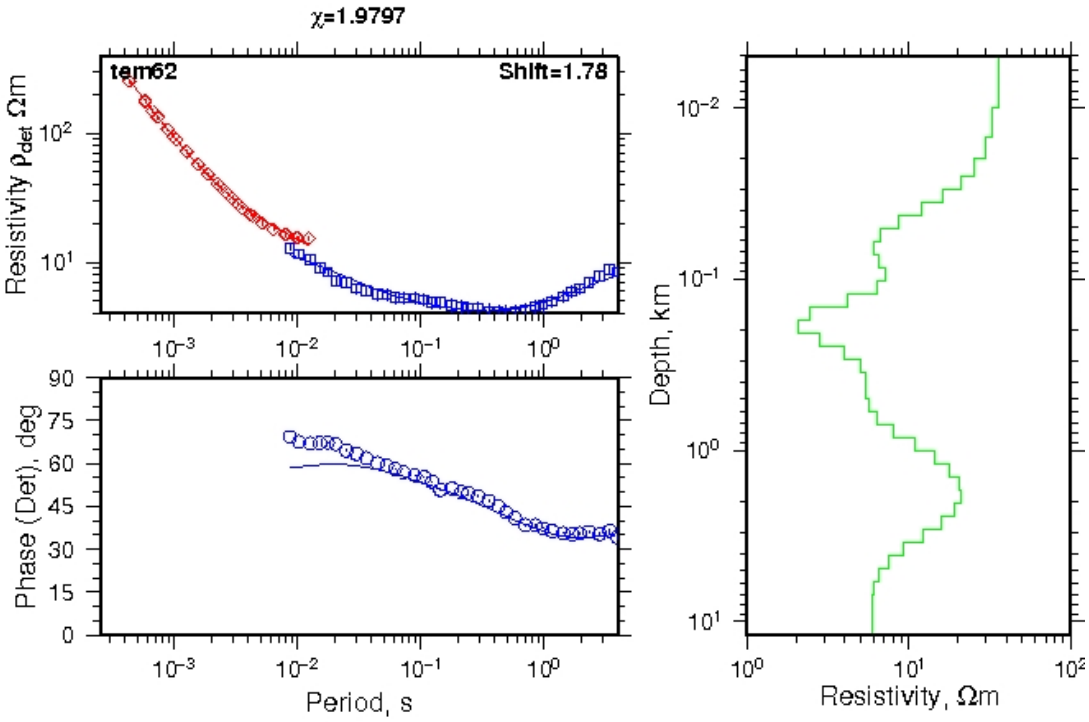

dmt98
χ=2.1798
tem11
Shift=1
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm


dmt99
χ=4.9099
tem27
Shift=0.511
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm

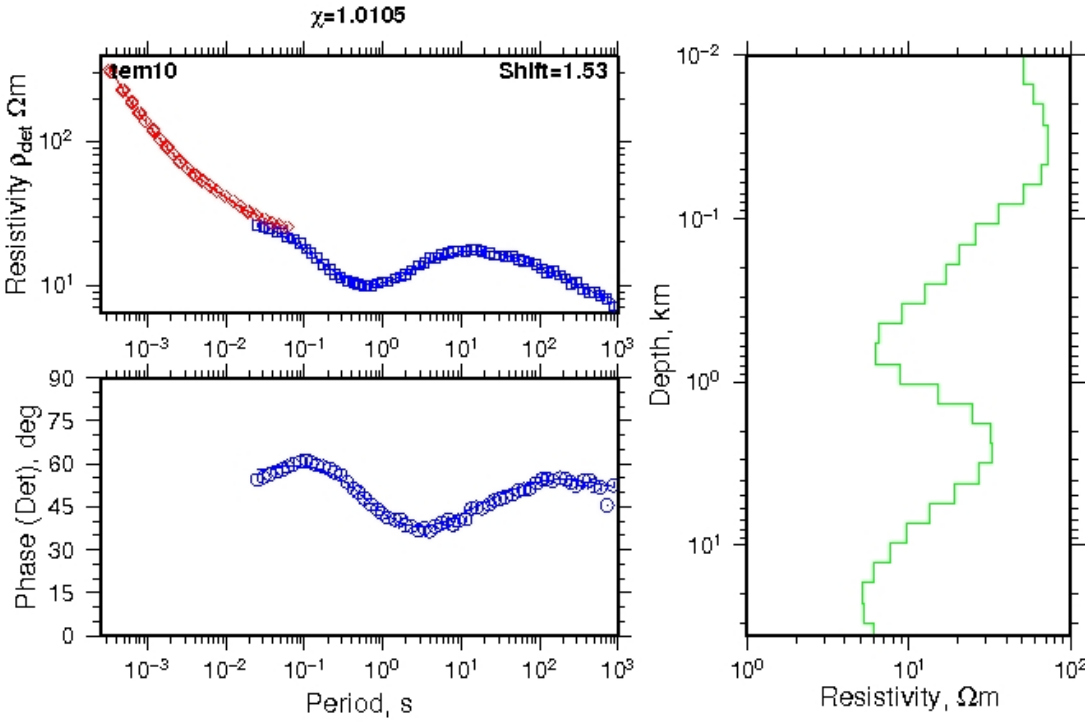

dmt142
χ=1.6032
tem07
Shift=1.09
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm

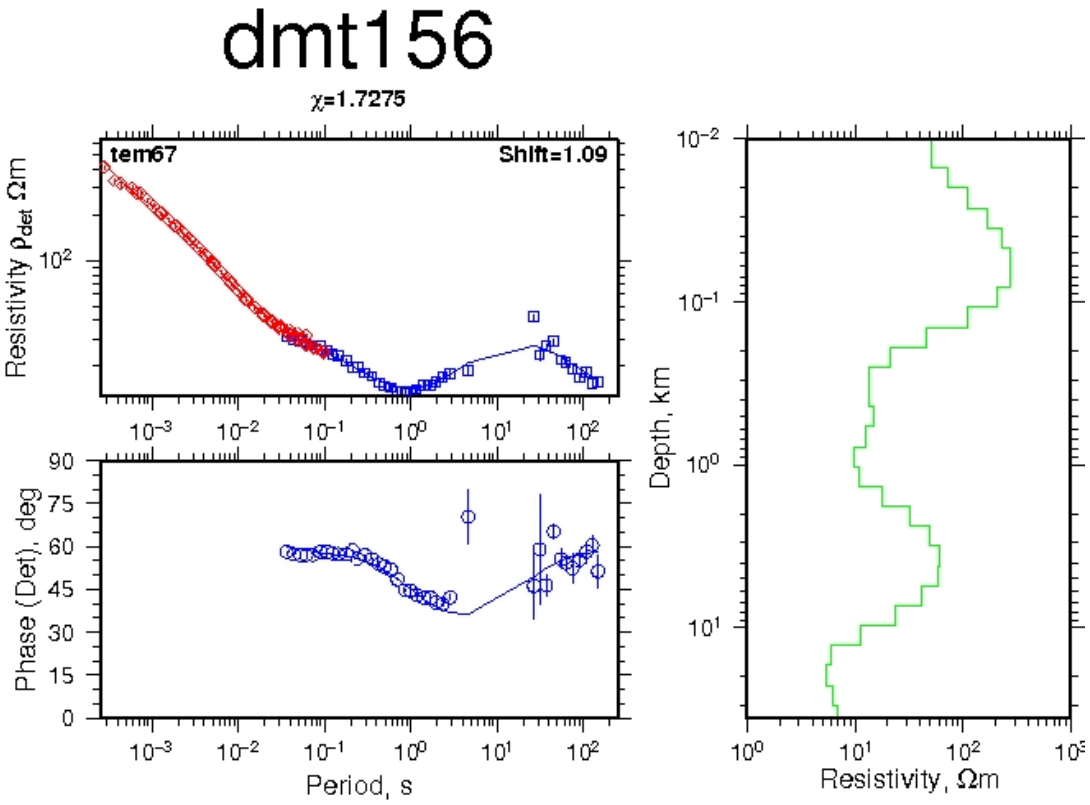

dmt146
χ=0.92619
tem62
Shift=1.05
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm

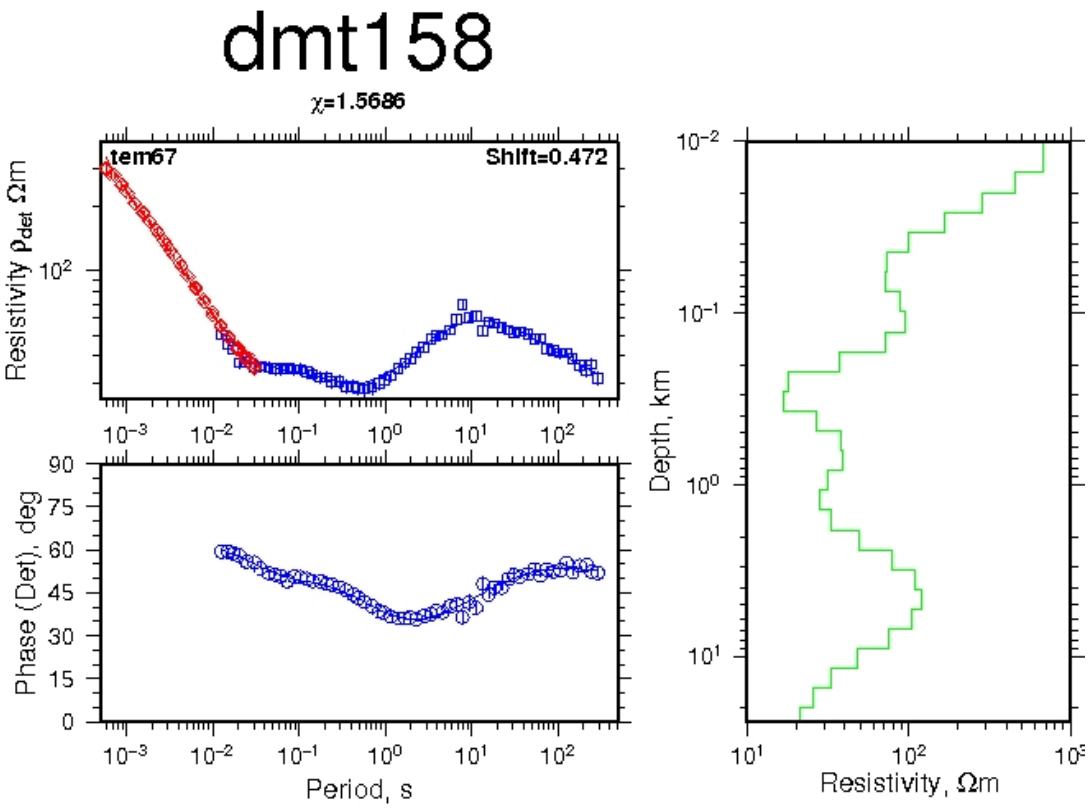
dmt147

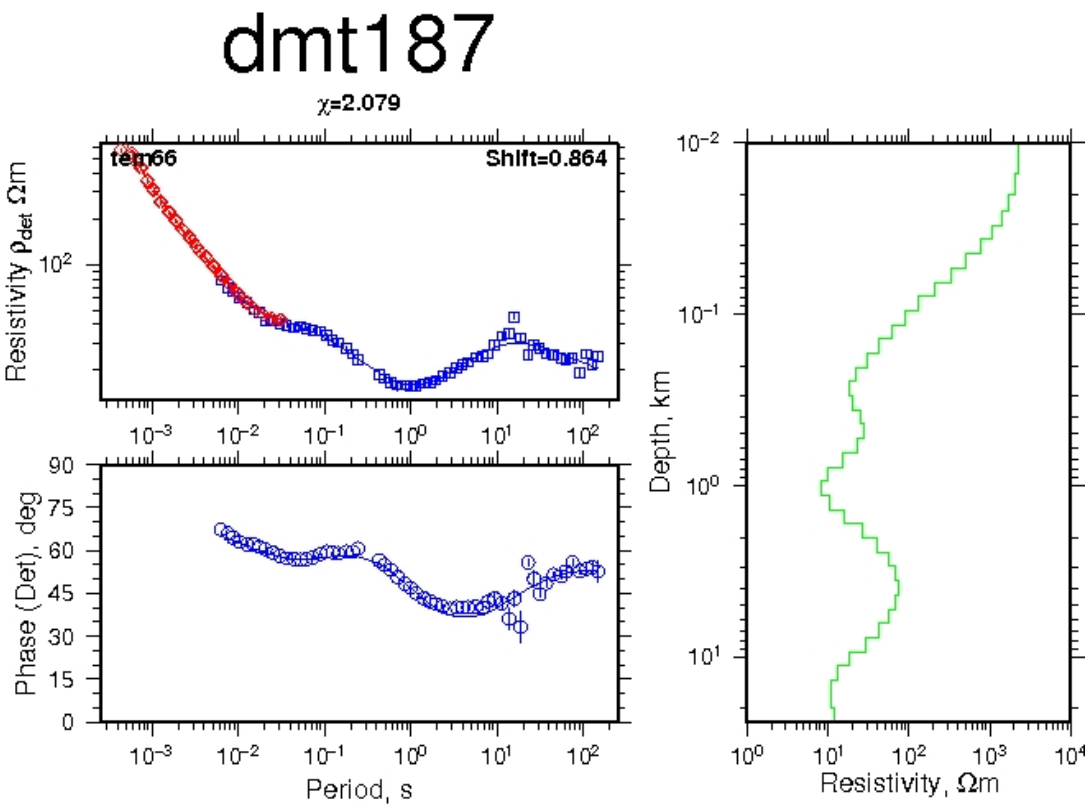


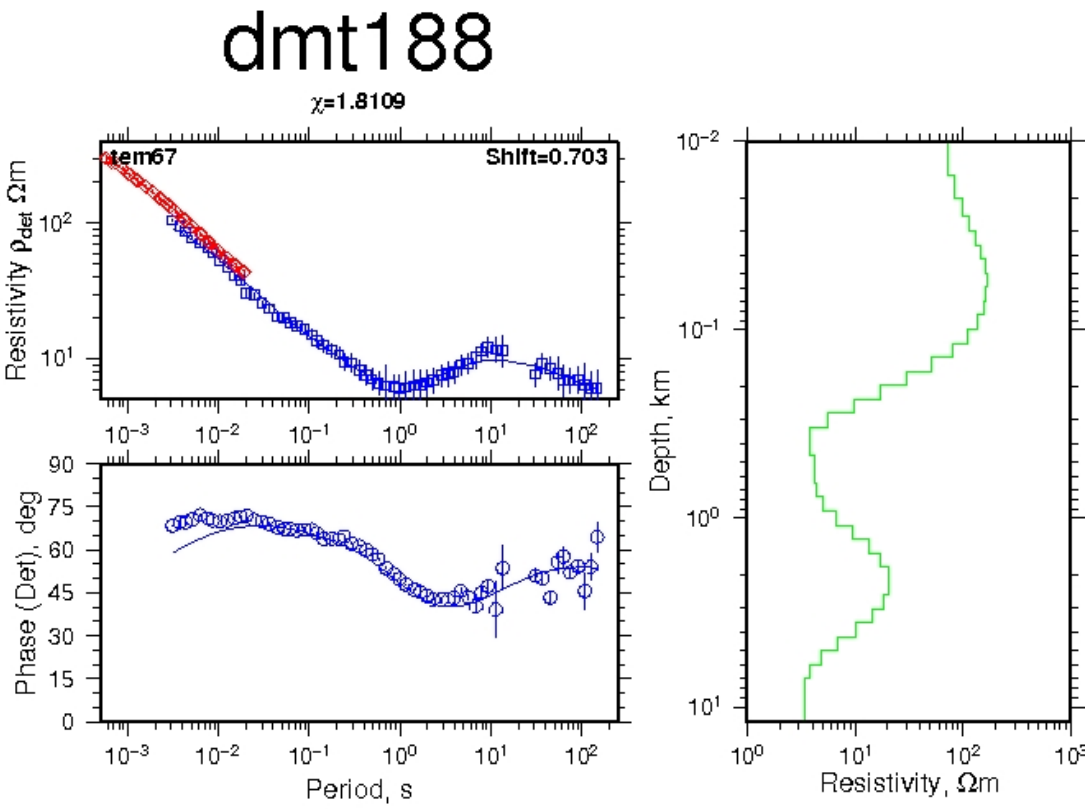
dmt152



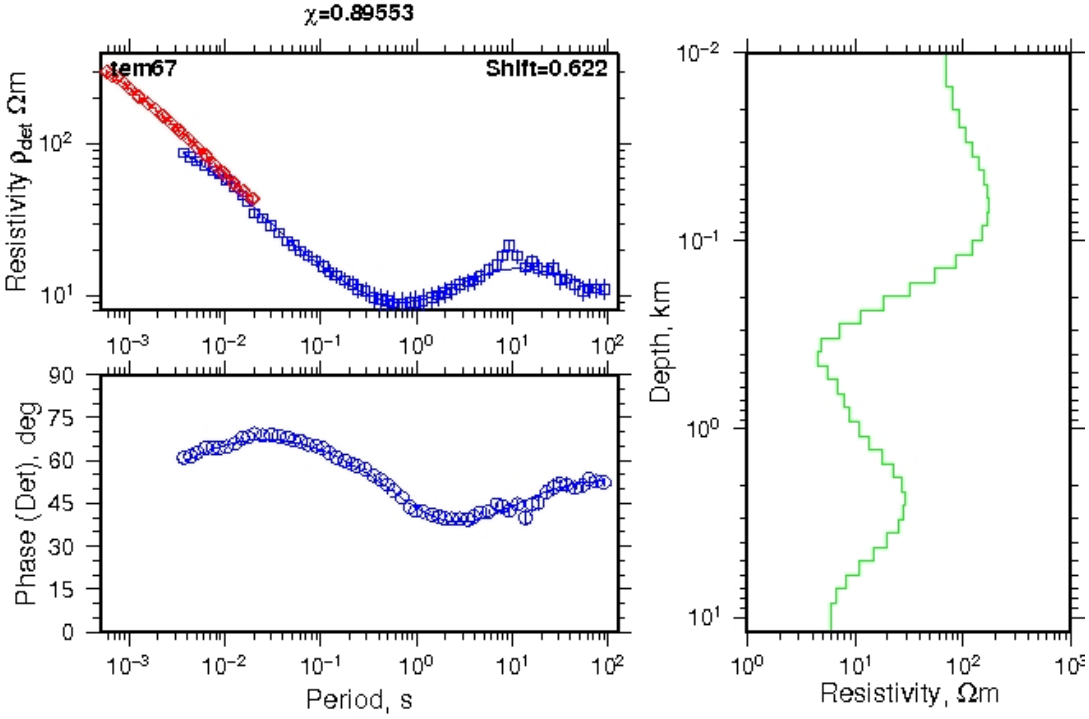

dmt156
χ=1.7275
tem67
Shift=1.09
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm


dmt158
χ=1.5686
tem67
Shift=0.472
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm

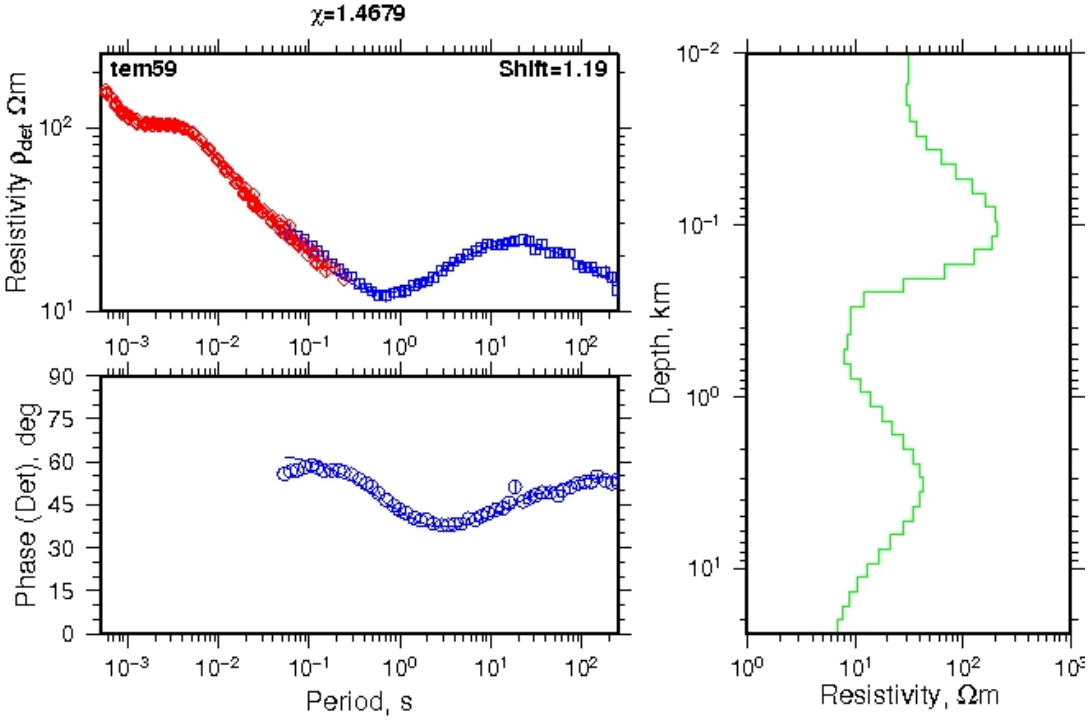

dmt187
χ=2.079
tem66
Shift=0.864
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm

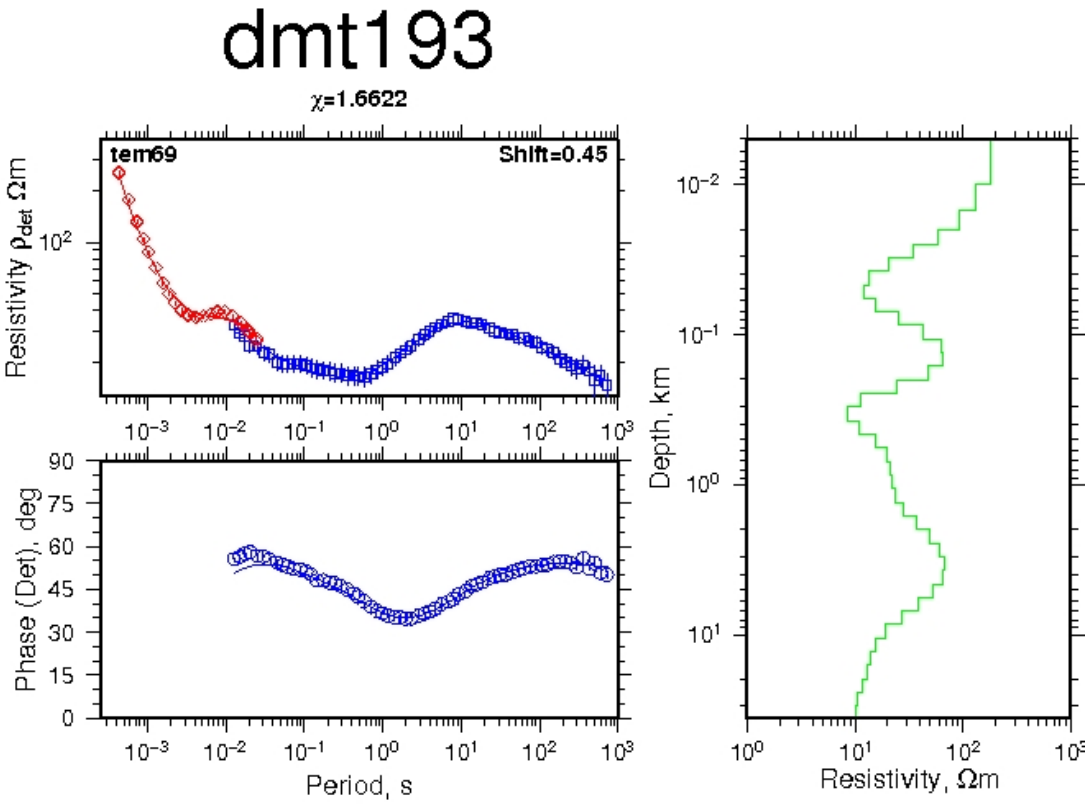

dmt188
χ=1.8109
tem67
Shift=0.703
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm

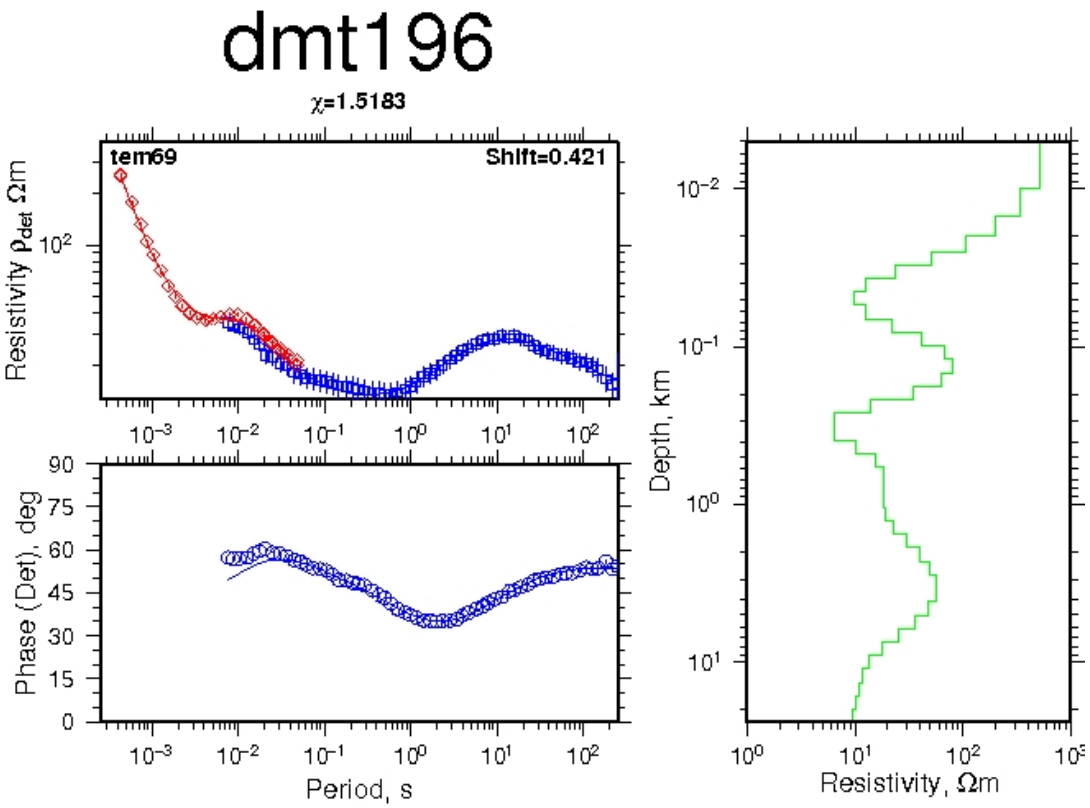
dmt190



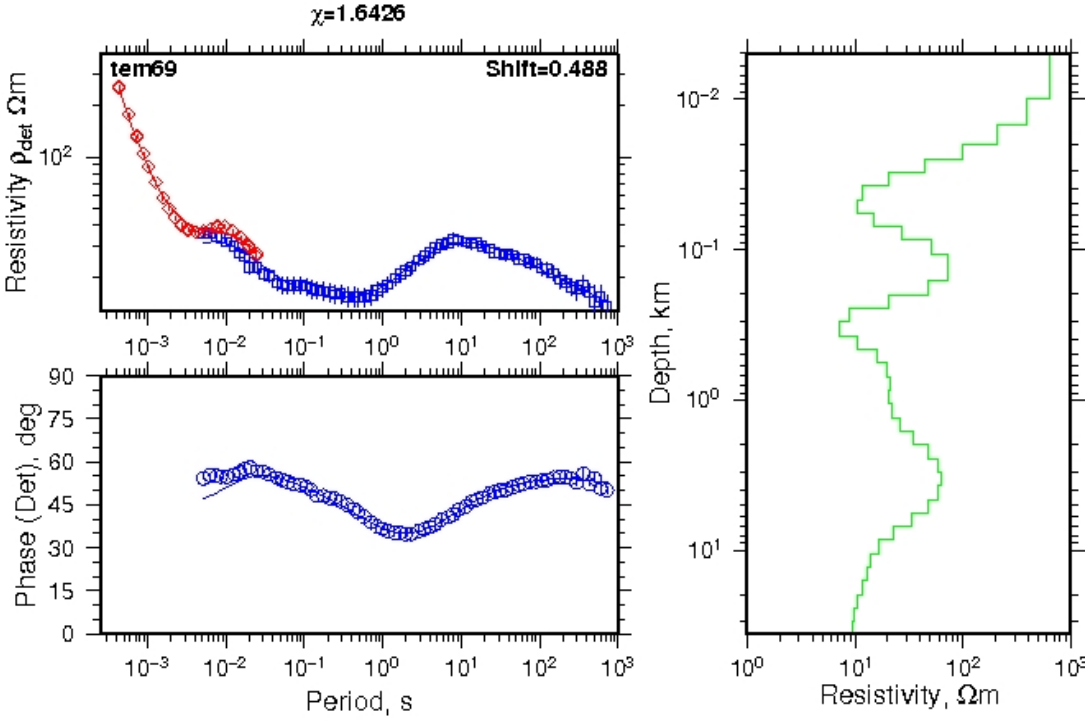
dmt192



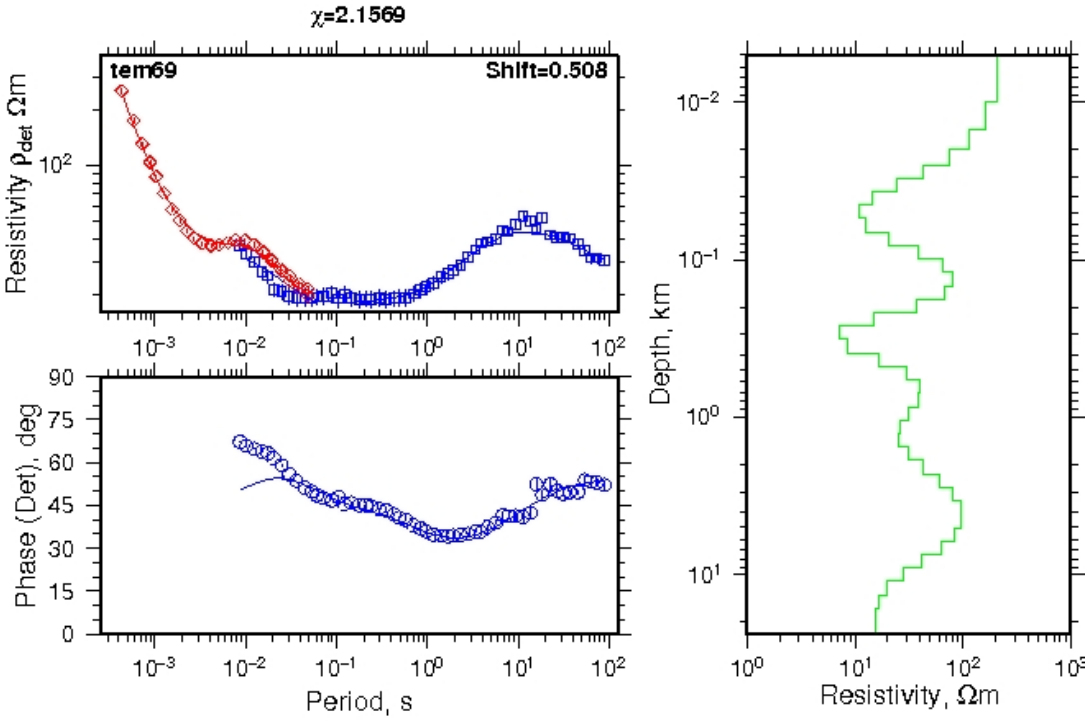

dmt193
χ=1.6622
tem69
Shift=0.45
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm


dmt196
χ=1.5183
tem69
Shift=0.421
Resistivity ρdet Ωm
Phase (Det), deg
Period, s
Depth, km
Resistivity, Ωm

dmt197



dmt200



APPENDIX III: Additional iso-resistivity maps from the Olkaria Domes area

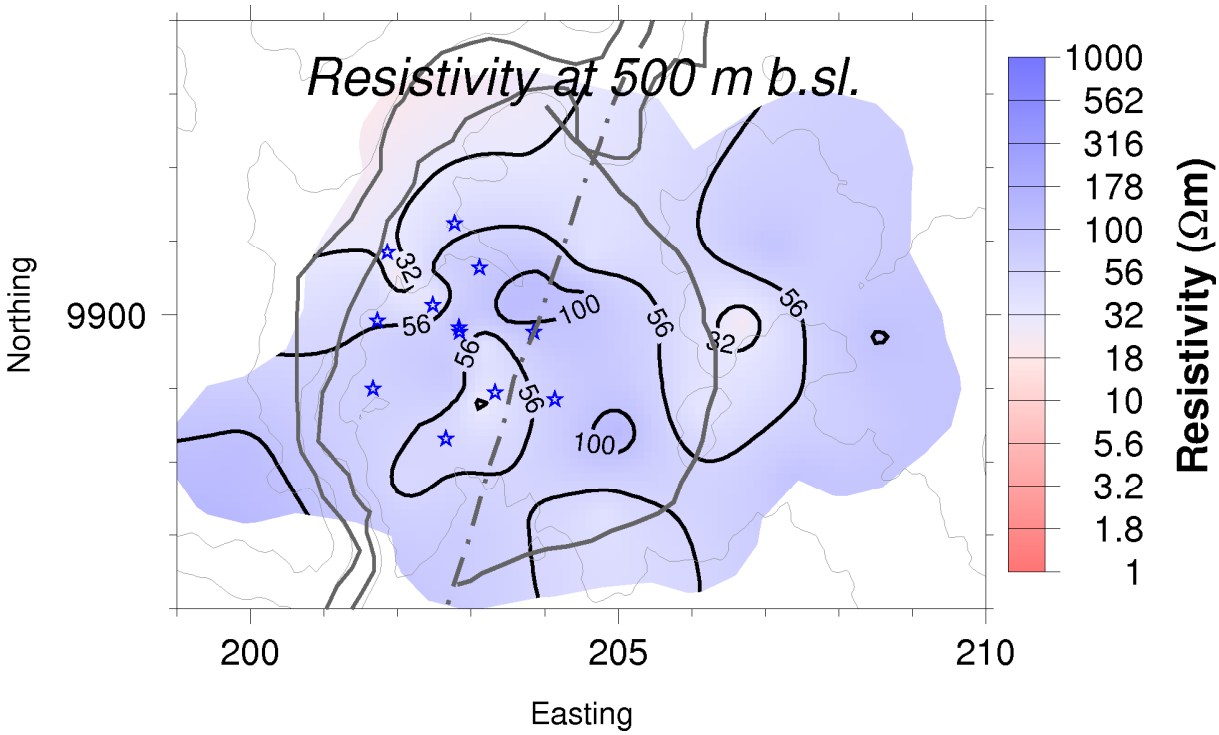


FIGURE 1: Resistivity in the Domes area at 500 m a.s.l. according to joint 1-D inversion of TEM and MT data; the blue (gray) stars show the drilled wells in Domes area while fault strucutres are shown with irregular dark lines; elevation contours are seen in the background

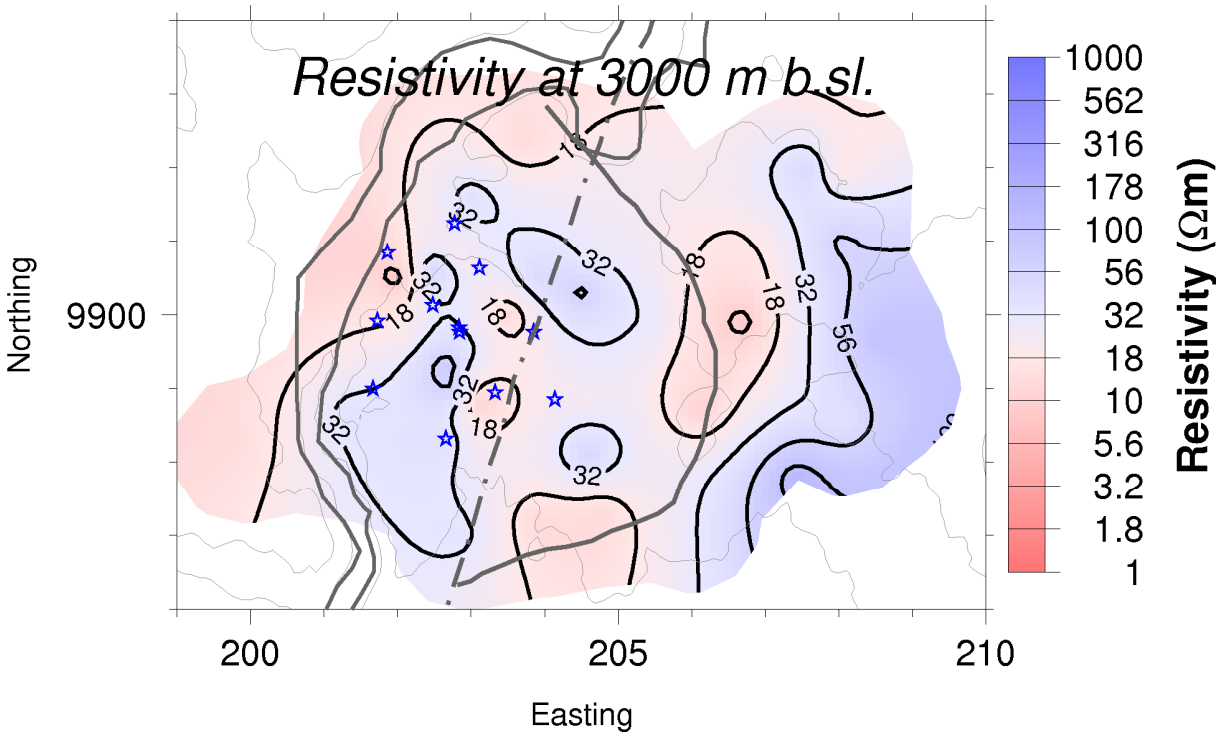


FIGURE 2: Resistivity in the Domes area at 3000 m b.s.l.

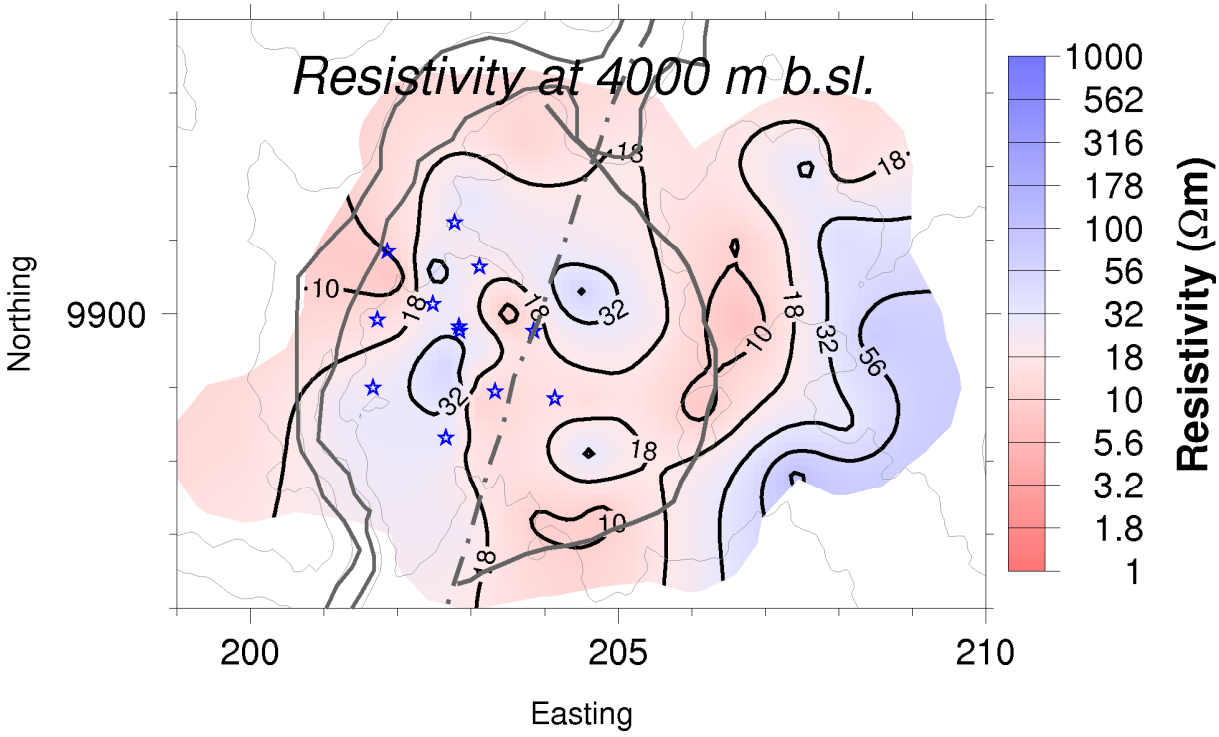


FIGURE 3: Resistivity in the Domes area at 4000 m b.s.l.

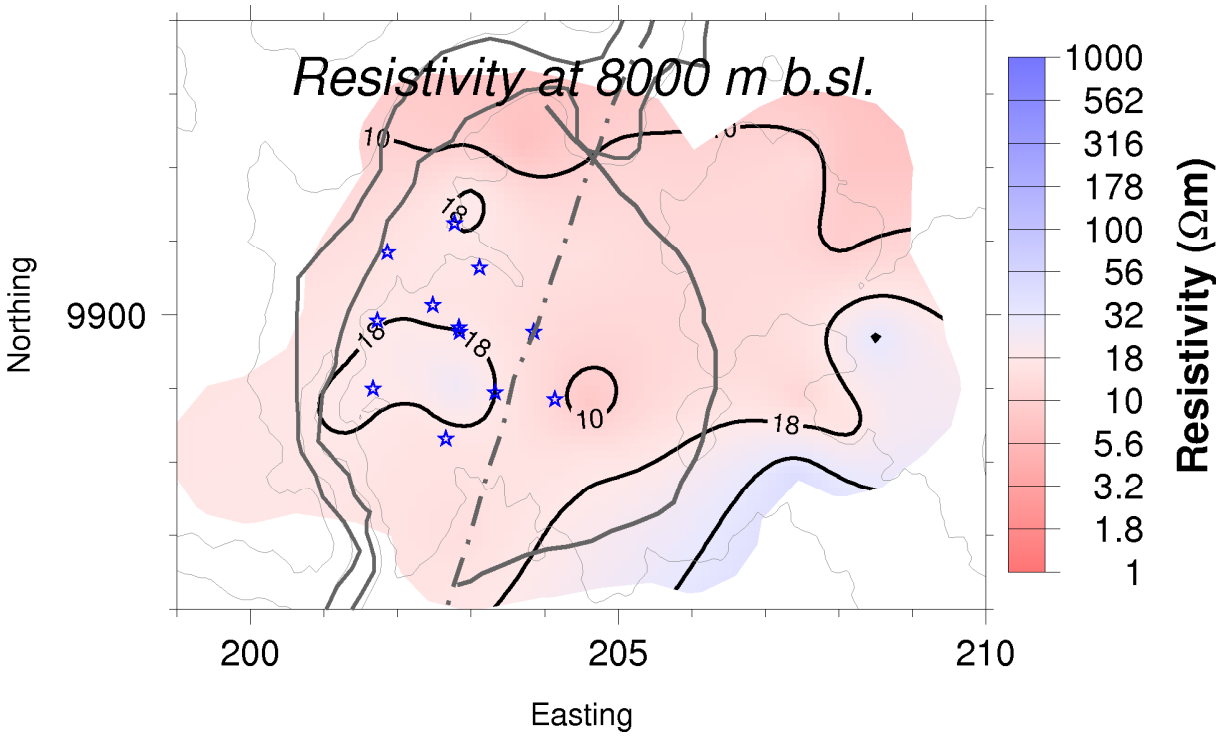


FIGURE 4: Resistivity in the Domes area at 8000 m b.s.l.

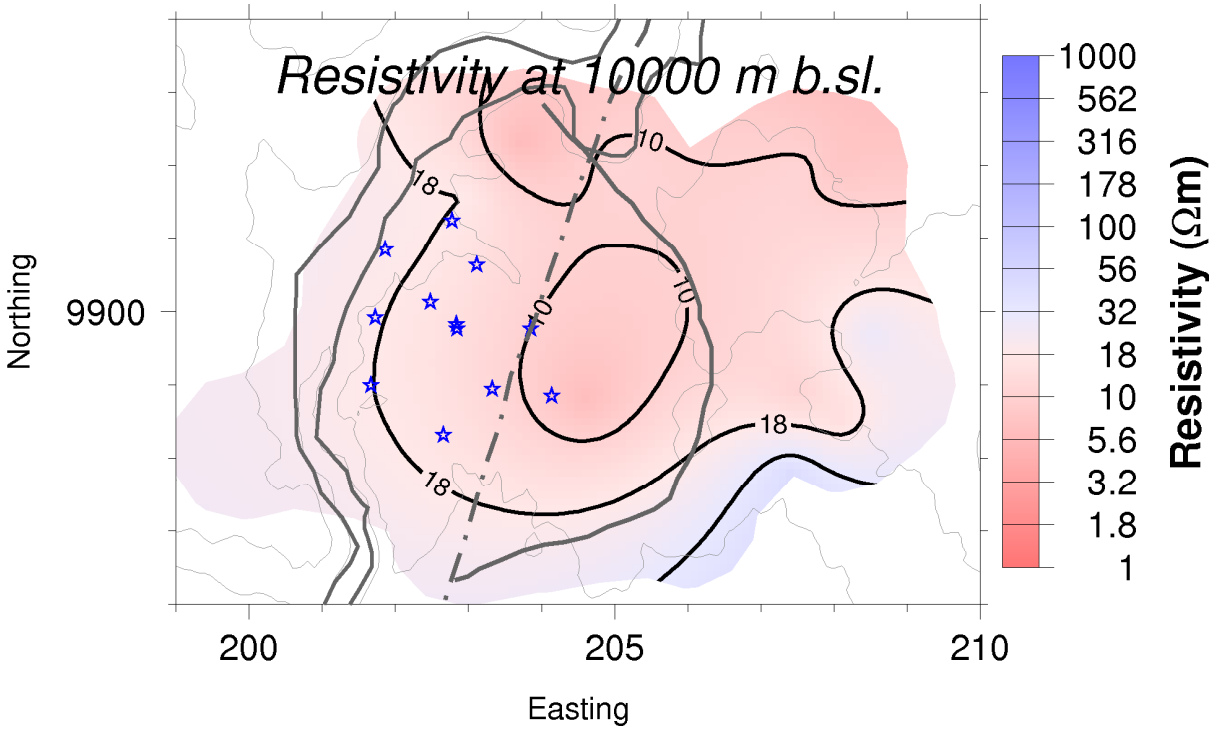


FIGURE 5: Resistivity in the Domes area at 10000 m b.s.l.

APPENDIX IV: Additional resistivity cross-sections from the Olkaria Domes area

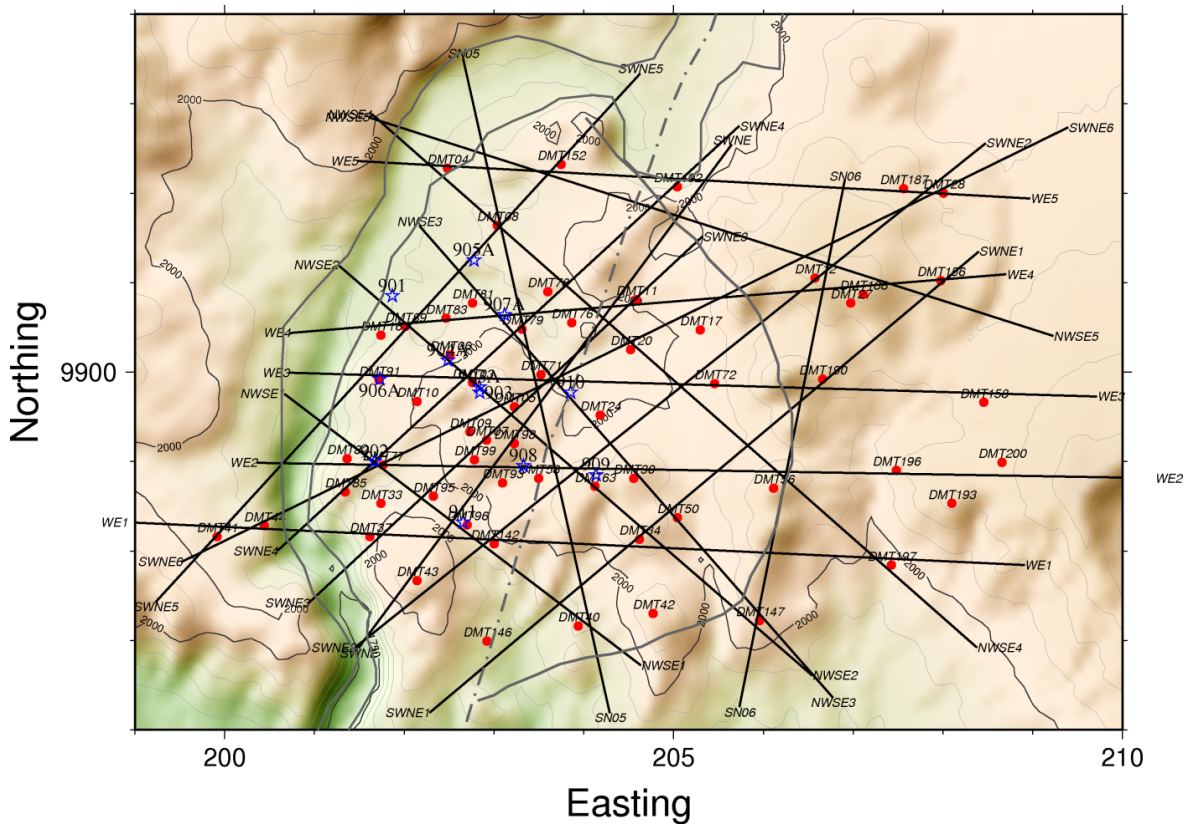


FIGURE 1: Locations of resistivity cross-sections in the Olkaria Domes area (black lines); red (dark) dots show distribution of MT soundings, while the blue (gray) stars show locations of wells

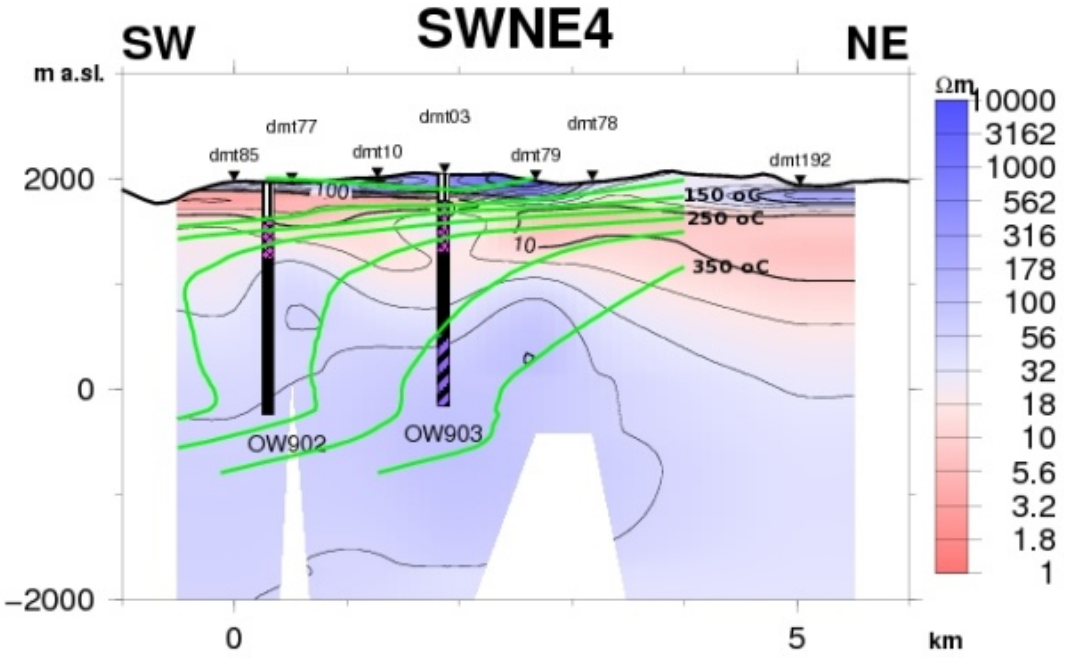


FIGURE 2: Resistivity cross-section SWNE4; the vertical (colour) coded bars indicate alteration mineralogy from nearby wells projected on the profile

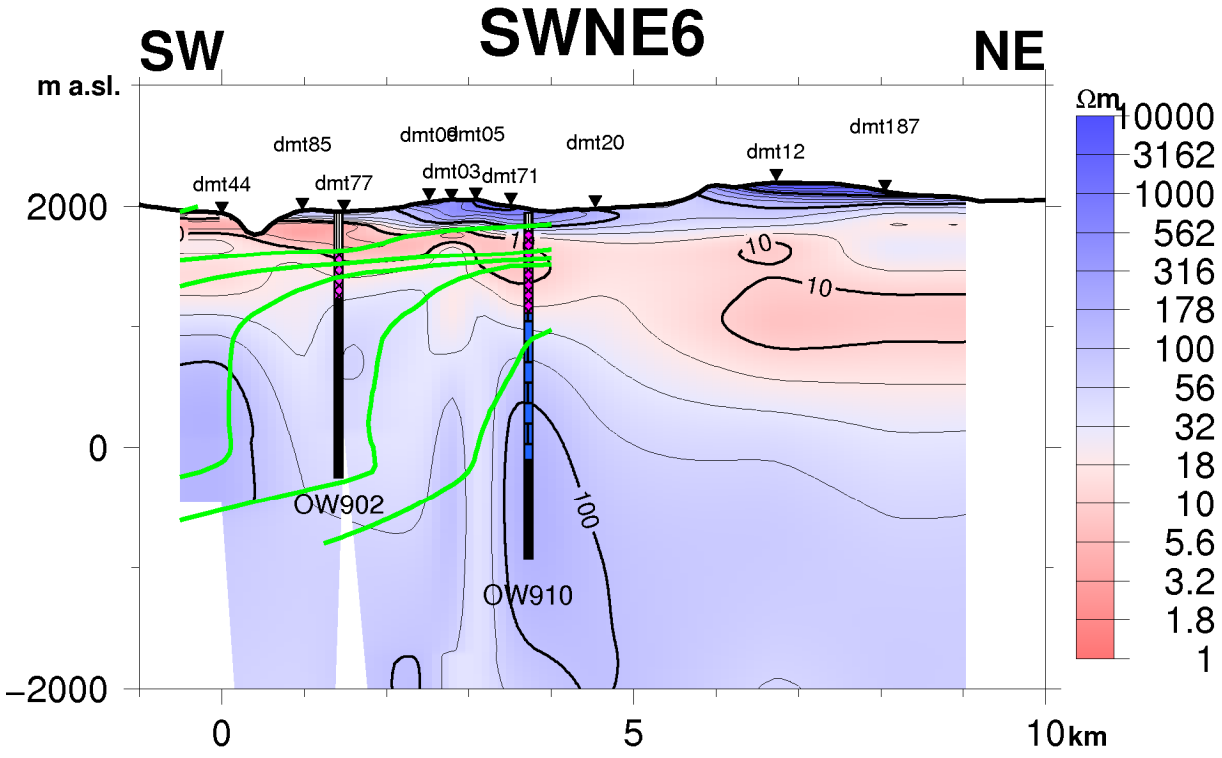


FIGURE 3: Resistivity cross-section SWNE6; the vertical (colour) coded bars indicate alteration mineralogy from nearby wells projected on the profile

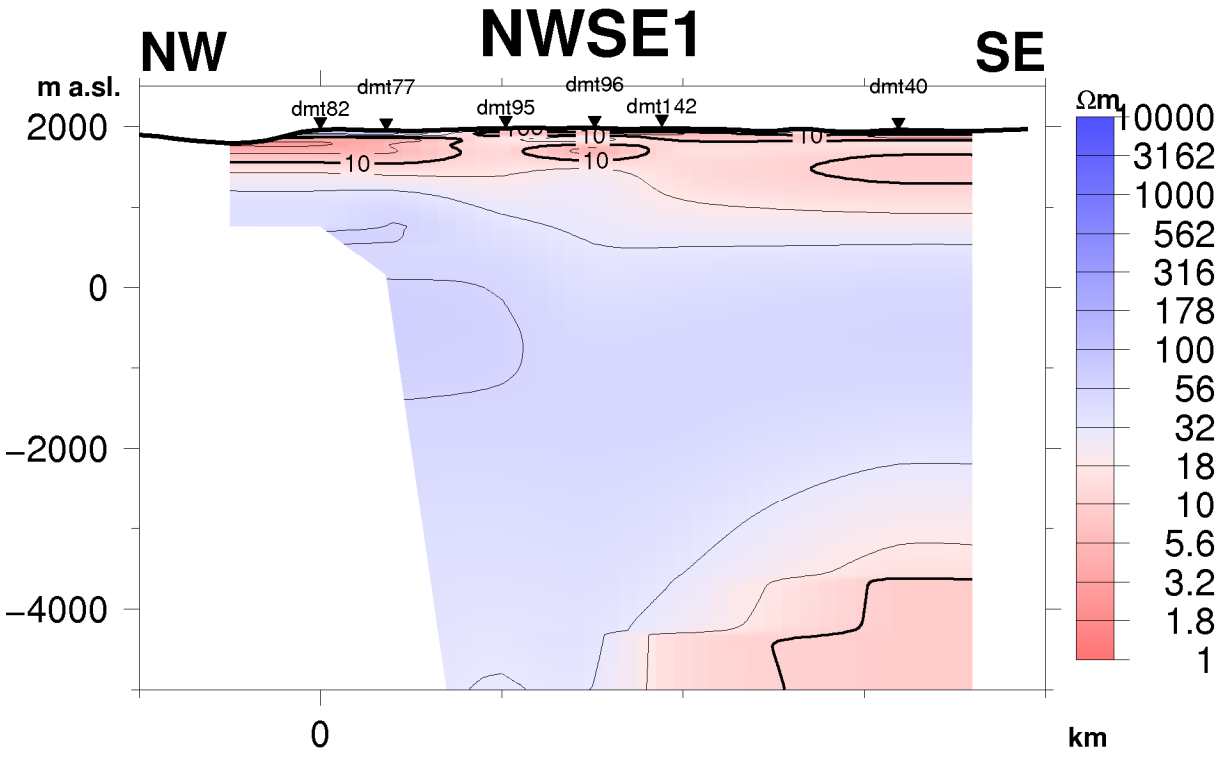


FIGURE 4: Resistivity cross-section NWSE1

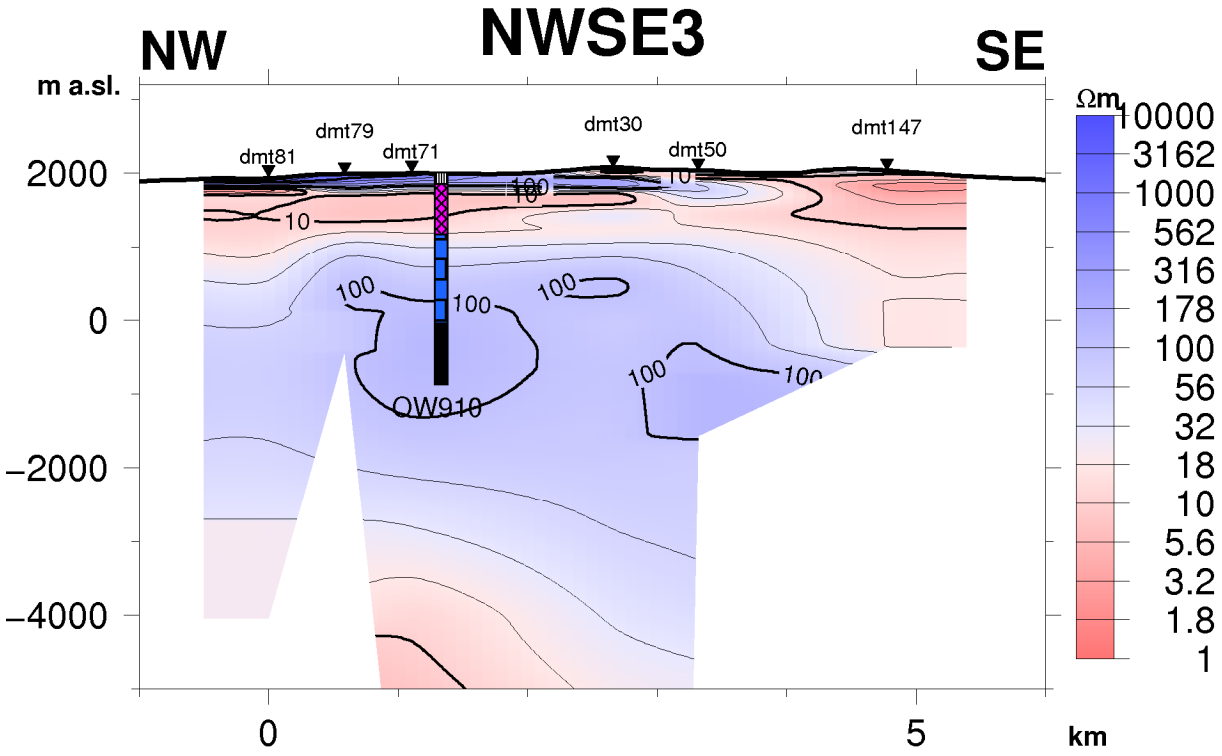


FIGURE 5: Resistivity cross-section NWSE3; the vertical (colour) coded bars indicate alteration mineralogy from nearby wells projected on the profile

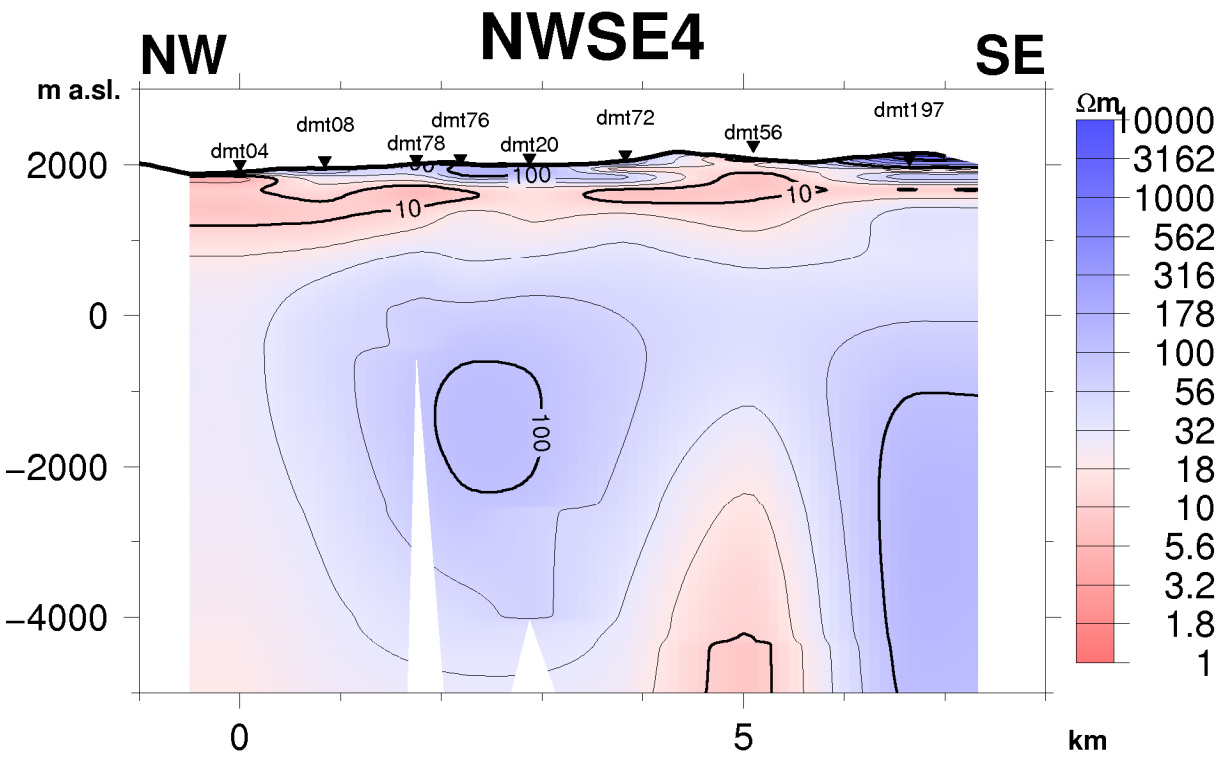


FIGURE 6: Resistivity cross-section NWSE4

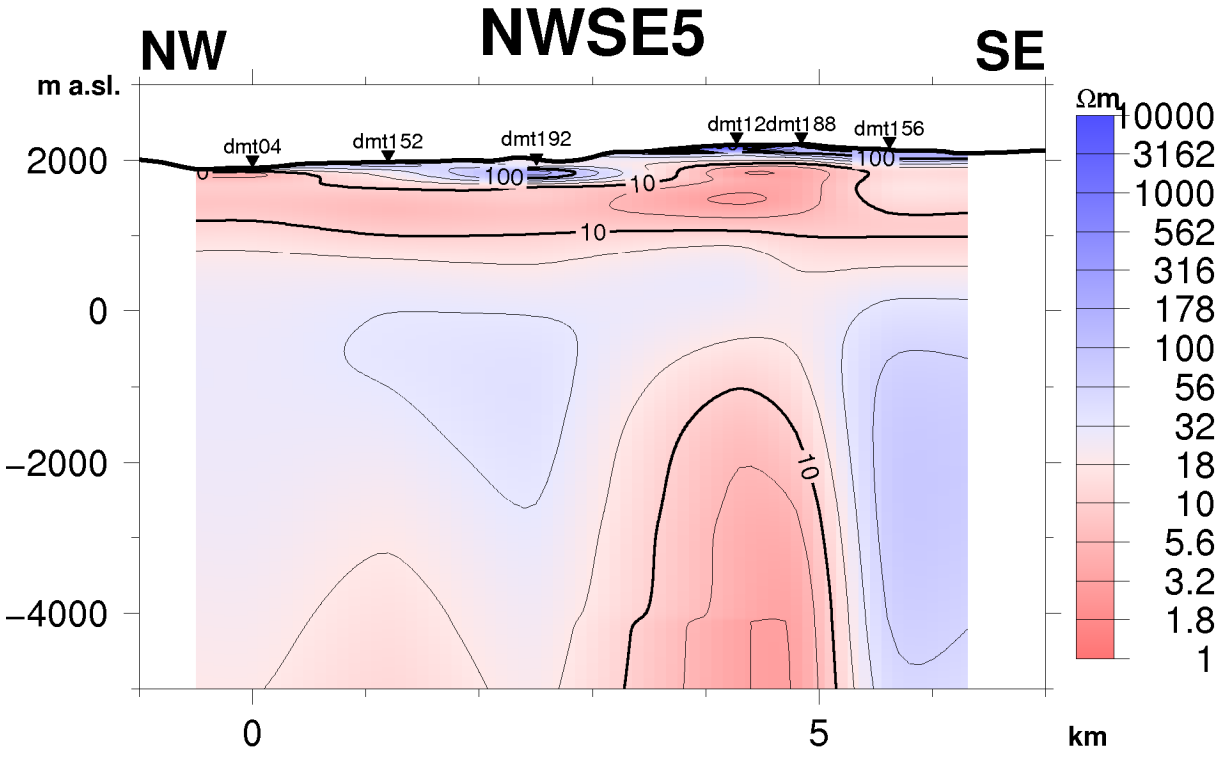


FIGURE 7: Resistivity cross-section NWSE5

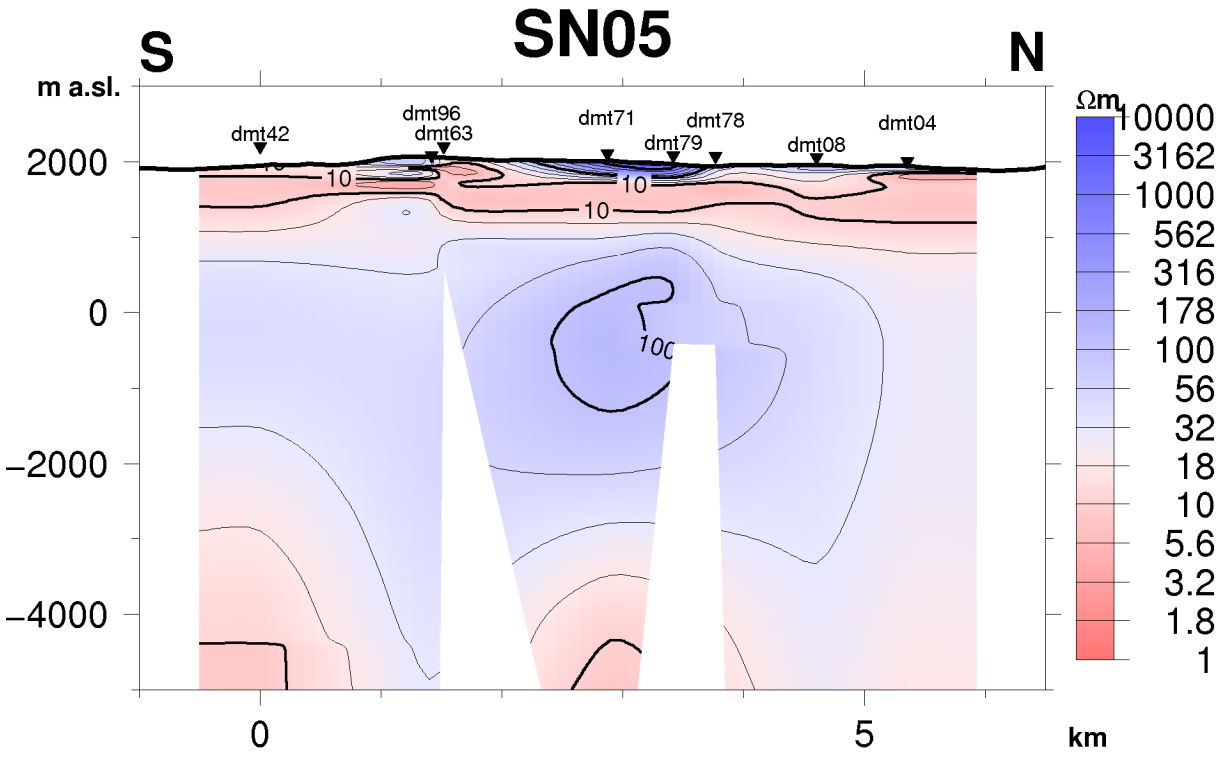


FIGURE 8: Resistivity cross-section SN05

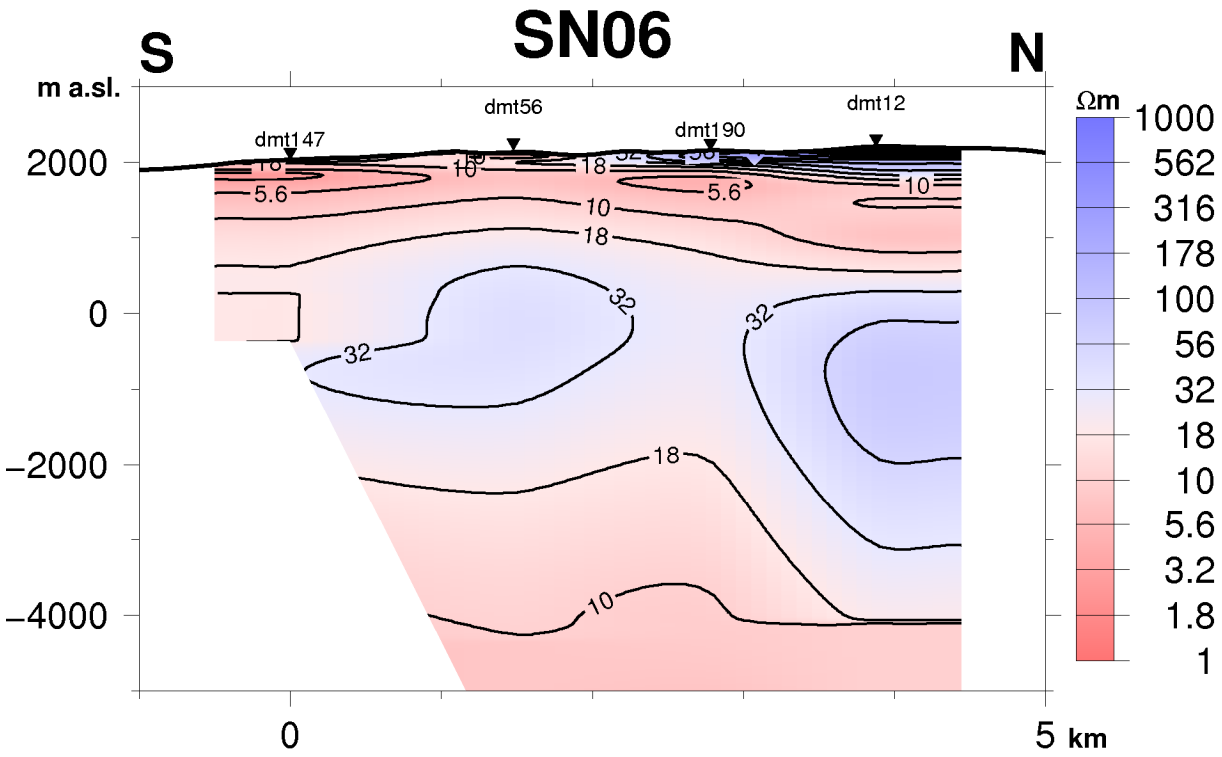


FIGURE 9: Resistivity cross-section NWSE1

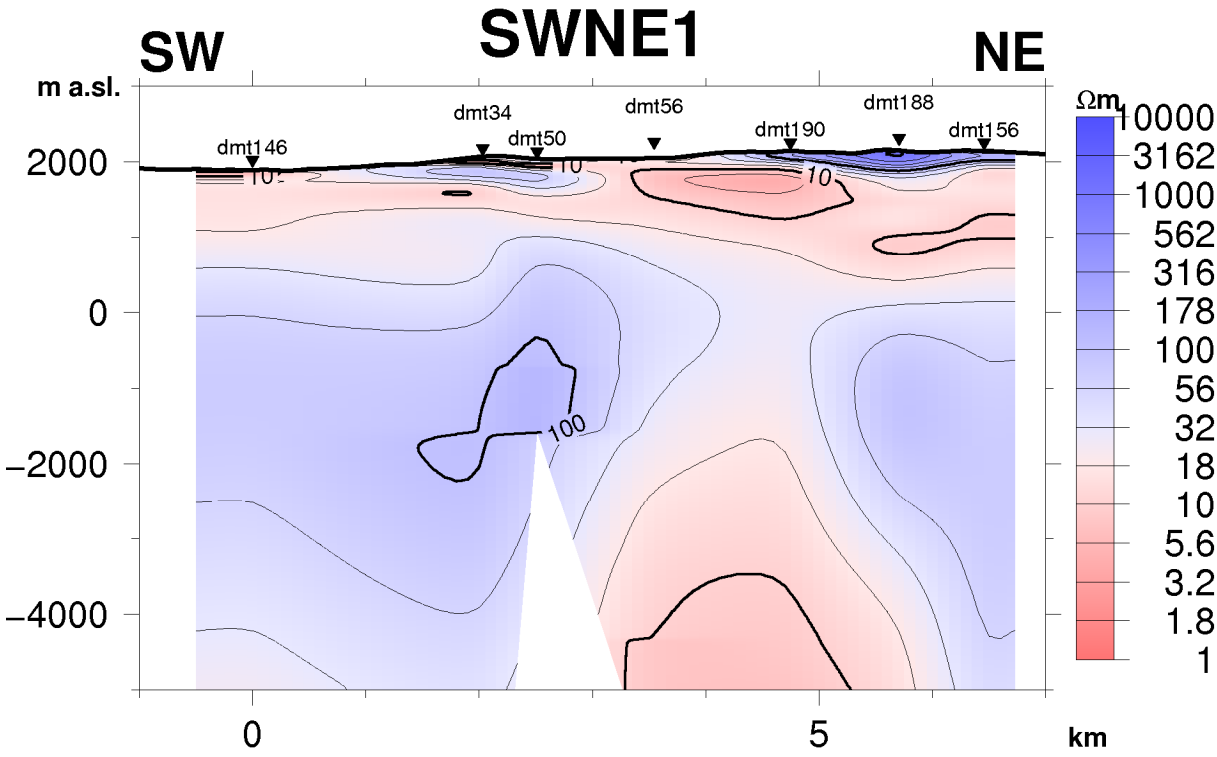


FIGURE 10: Resistivity cross-section SWNE1

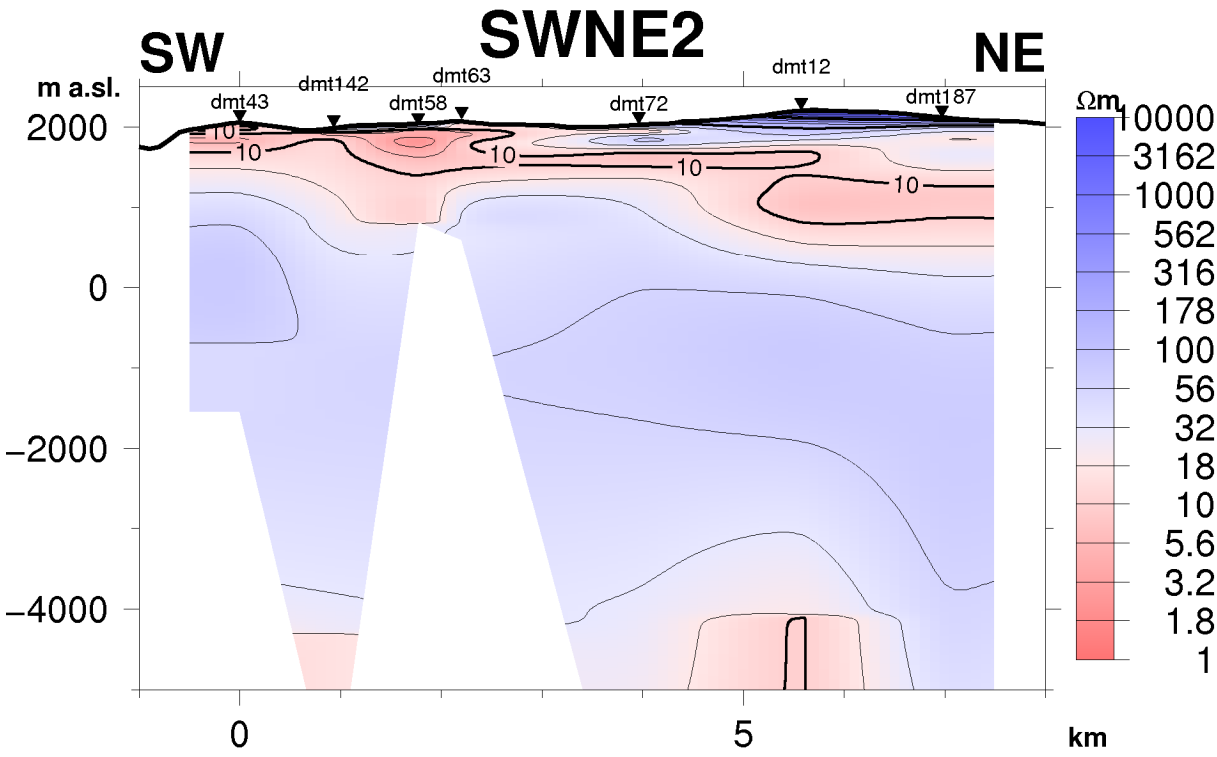


FIGURE 11: Resistivity cross-section SWNE2

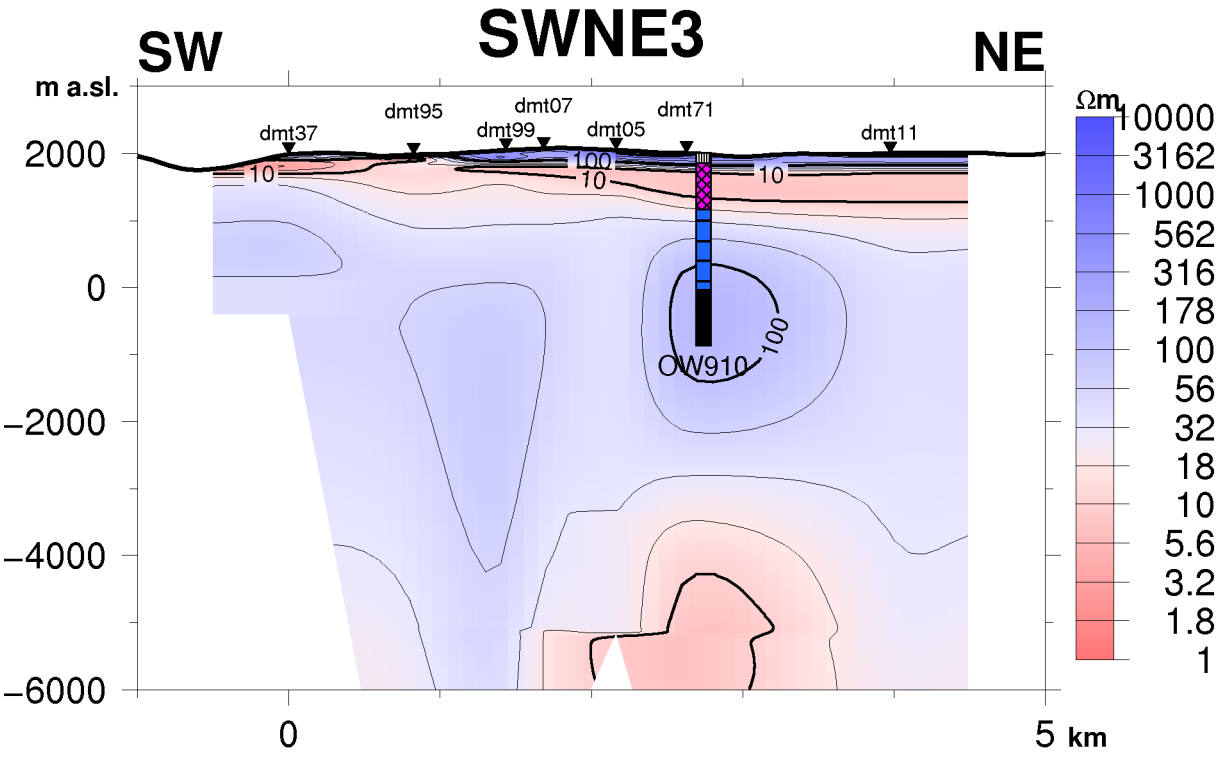


FIGURE 12: Resistivity cross-section SWNE3; the vertical (colour) coded bar indicates alteration mineralogy from nearby wells projected on the profile

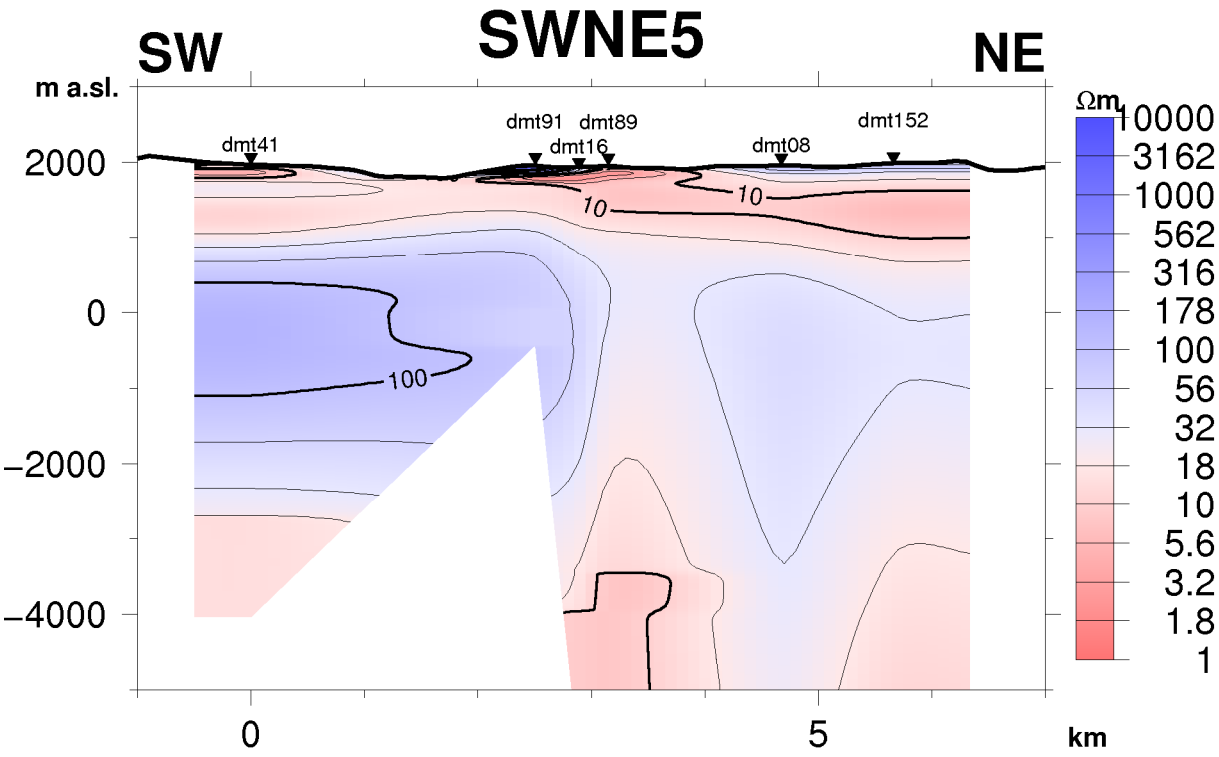


FIGURE 13: Resistivity cross-section SWNE5