

GEOTHERMAL TRAINING PROGRAMME Orkustofnun, Grensasvegur 9, IS-108 Reykjavik, Iceland

# APPENDIX I TO THE REPORT: JOINT 1D INVERSION OF MT AND TEM DATA FROM MENENGAI GEOTHERMAL FIELD, KENYA

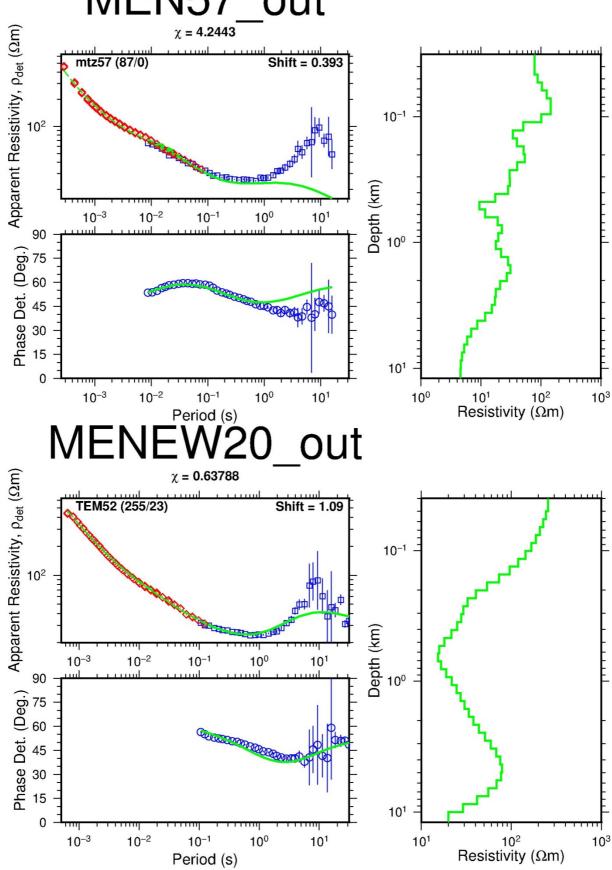
by

Joseph M. Gichira

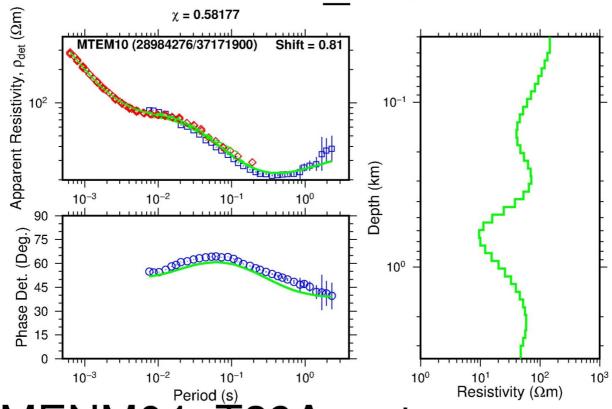
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United Nations University Geothermal Training Programme Reykjavík, Iceland Published in 2012 This is Appendix I to the report "Joint 1D inversion of MT and TEM data from Menengai geothermal field, Kenya" by Joseph M. Gichira at the UNU Geothermal Training Programme in 2012. The appendix shows the TEM and MT resistivity data from the Menengai geothermal field in Kenya and 1-D joint inversion of the MT and TEM profiles and the corresponding model curves.

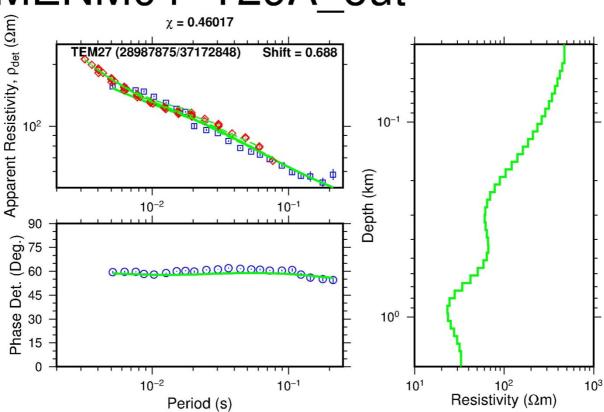
#### MEN57\_out



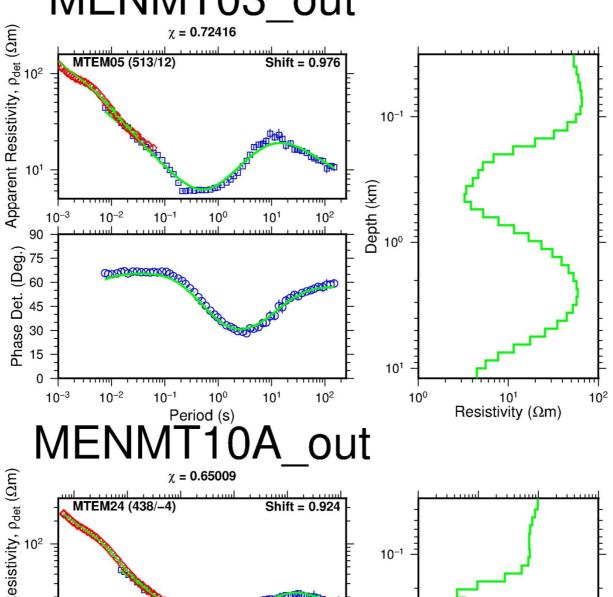
### MENM04-T13A\_out

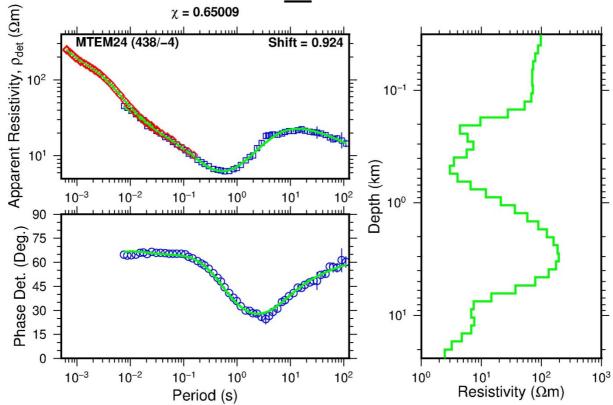


#### MENM04–T29A\_out

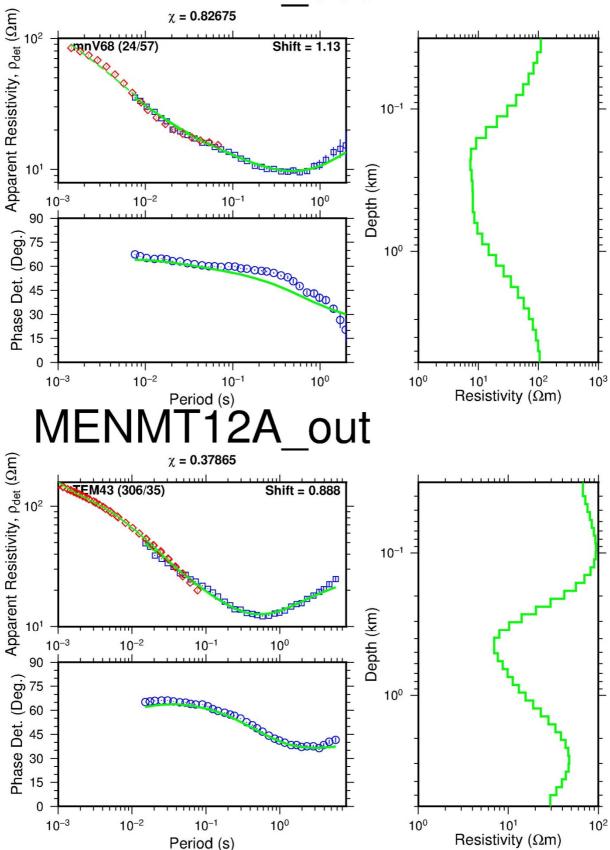


# MENMT03\_out

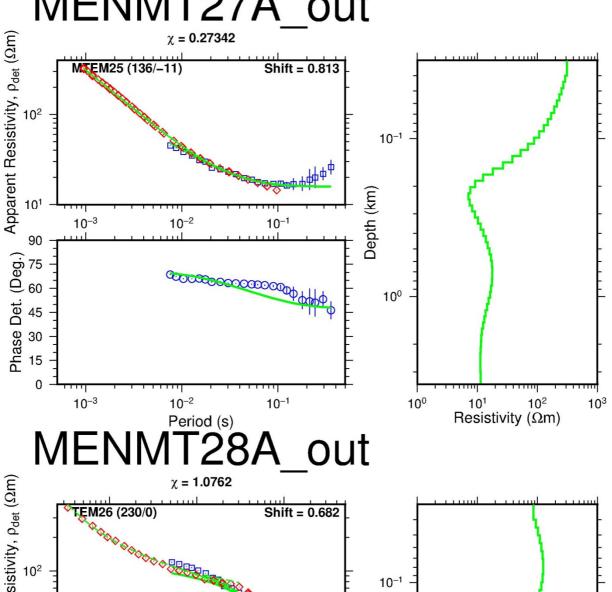


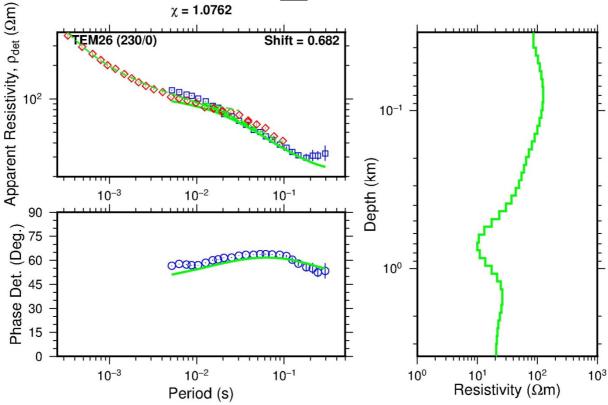


# MENMT11A out

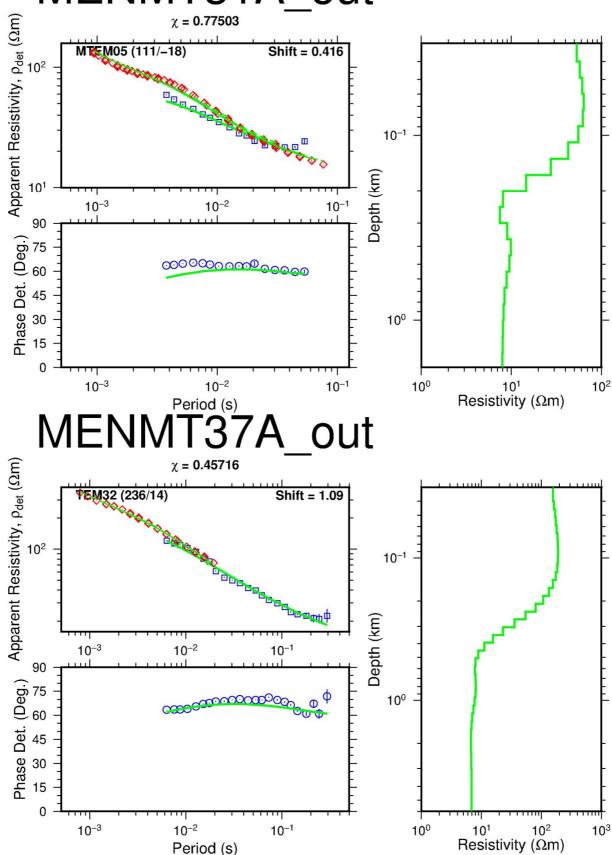


# MENMT27A\_out

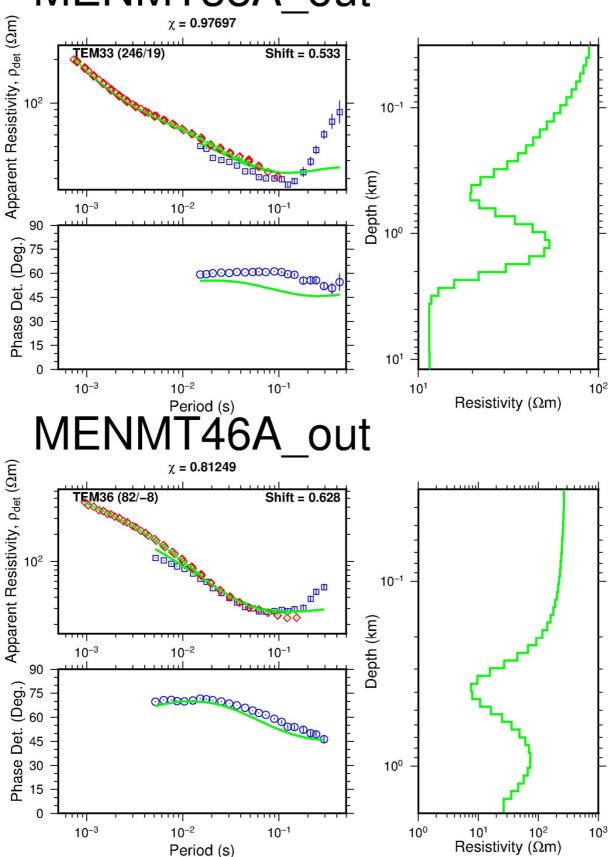




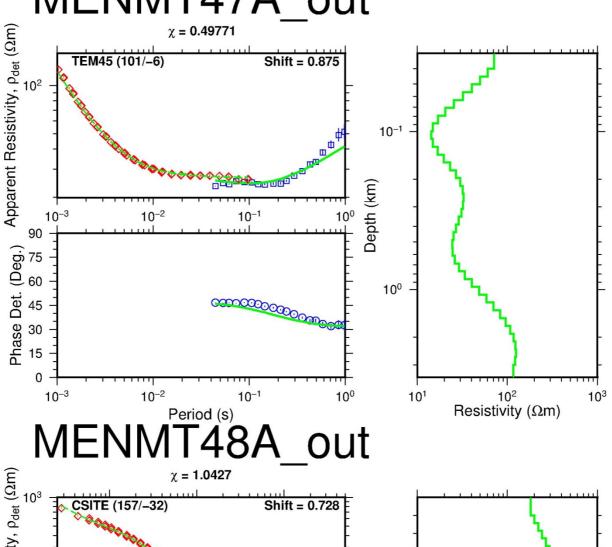
### MENMT31A out

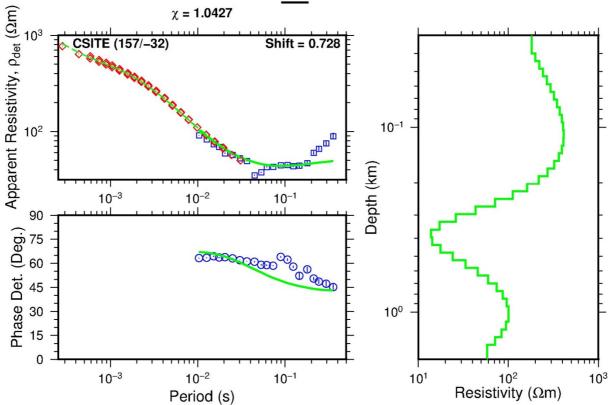


### MENMT38A out

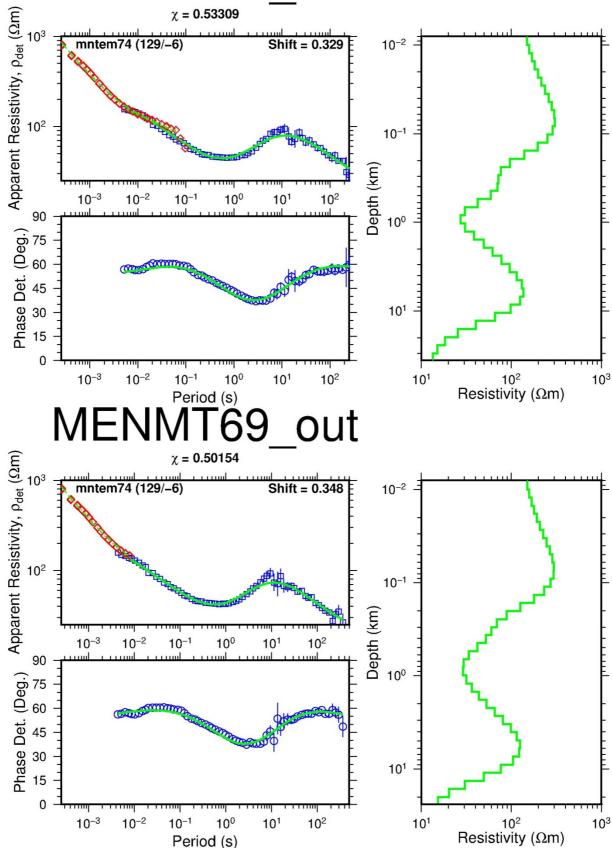


# MENMT47A\_out

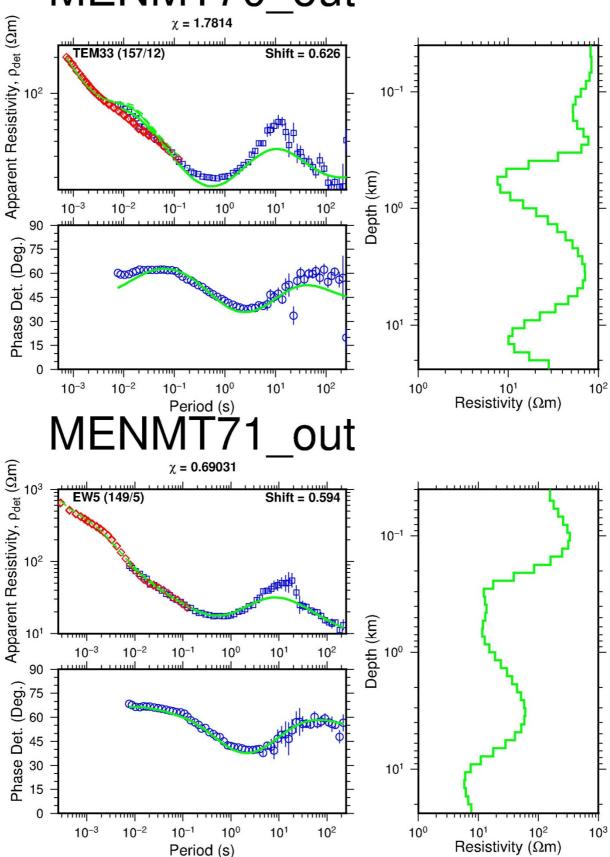




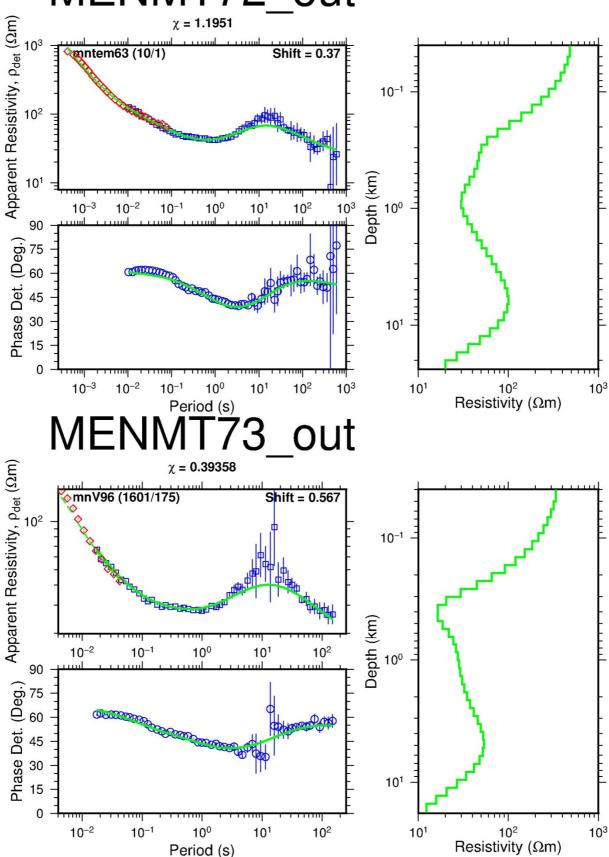
### MENMT68\_out



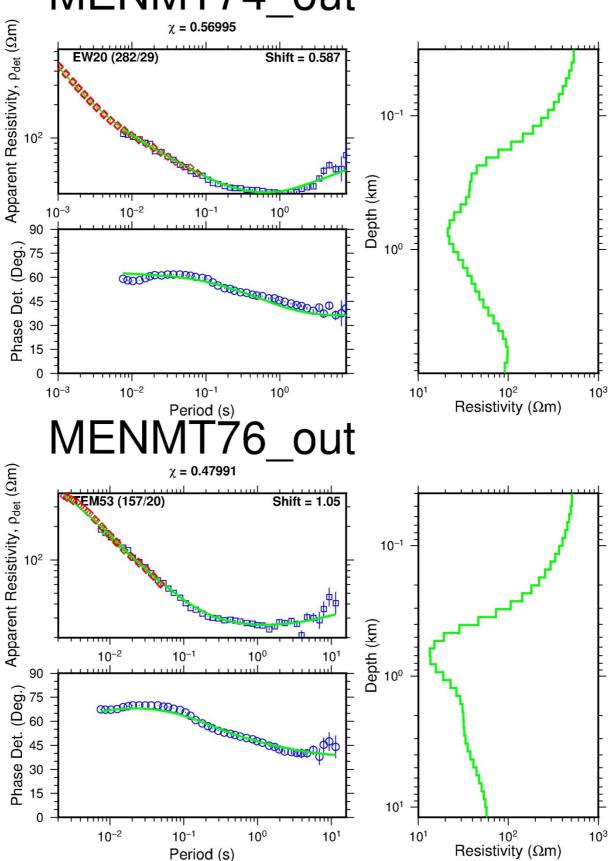
### MENMT70 out



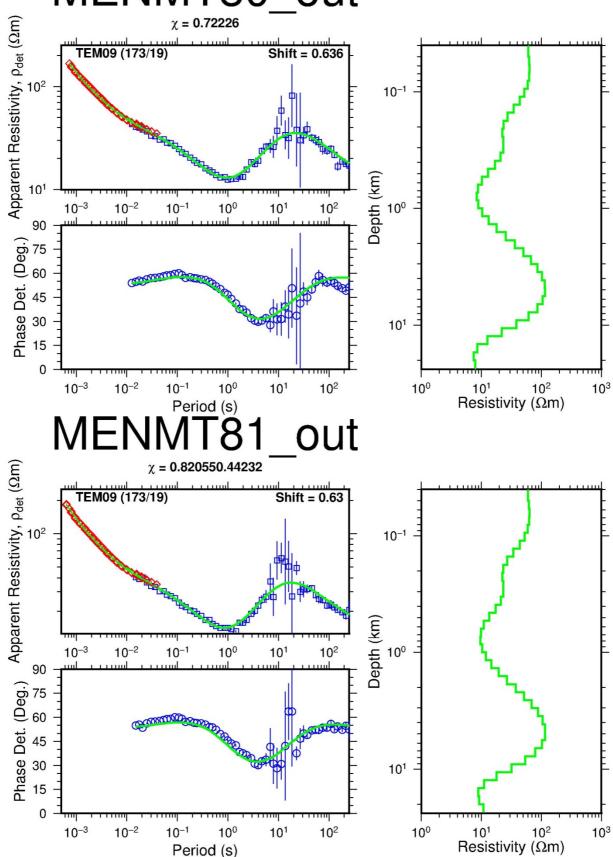
# MENMT72\_out



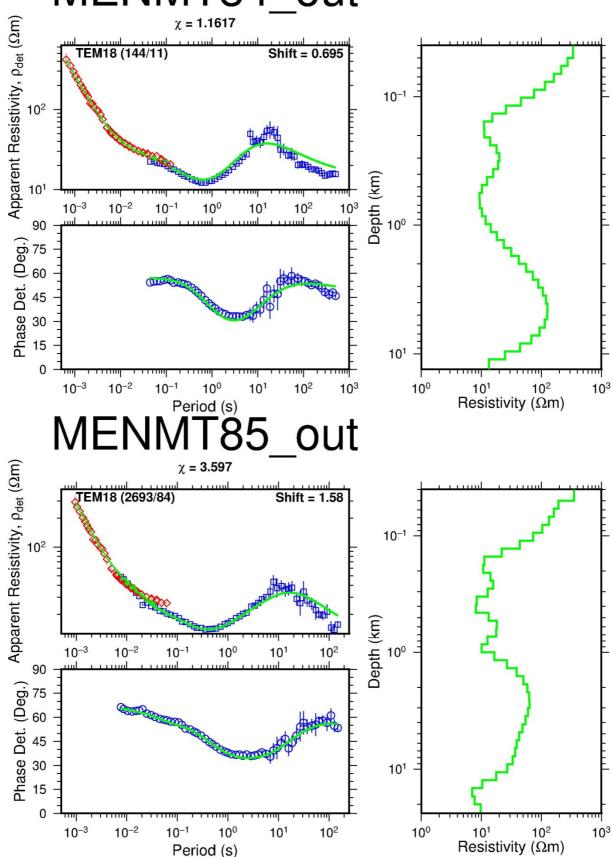
# MENMT74 out



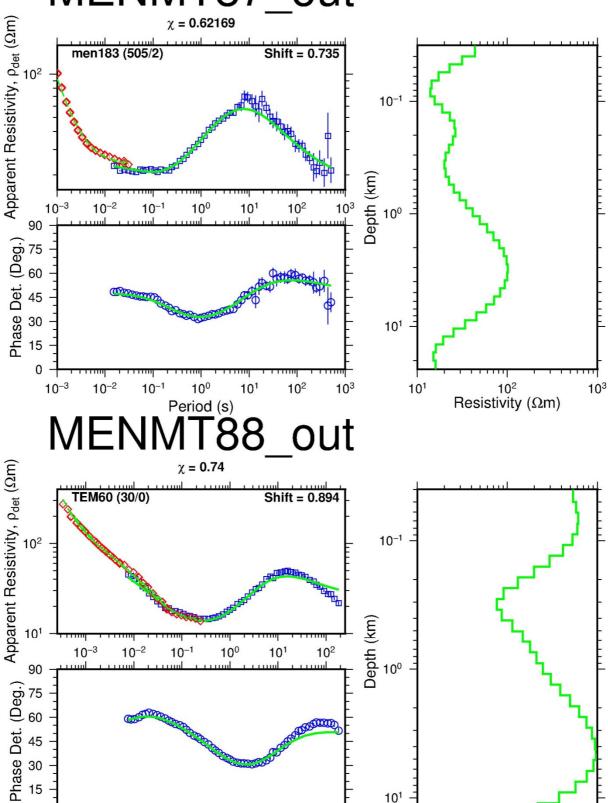
# MENMT80\_out



#### MENMT84 out



#### MENMT87\_out



10<sup>1</sup>

10<sup>0</sup>

 $10^{1}$  Resistivity ( $\Omega$ m)

10<sup>2</sup>

10<sup>2</sup>

10<sup>1</sup>

 $10^{-2}$ 

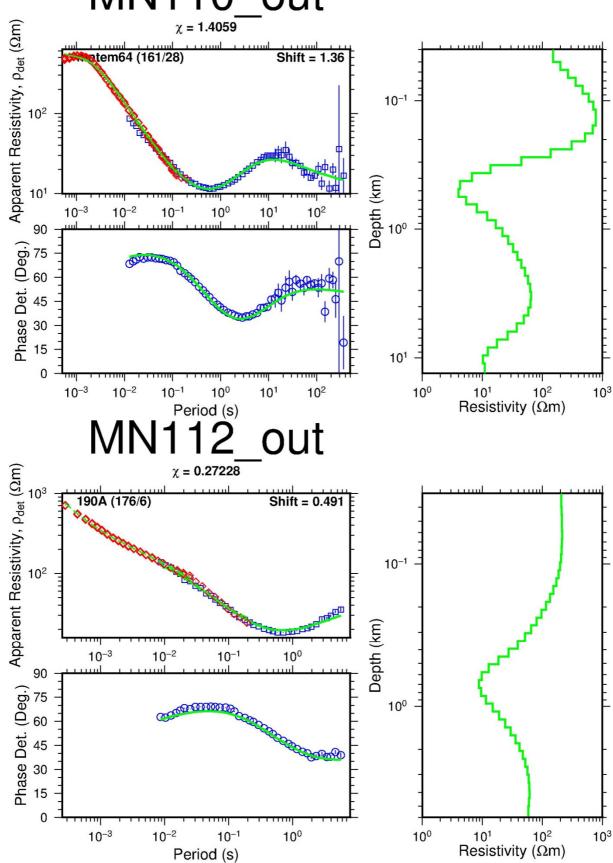
 $10^{-1}$ 

Period (s)

 $10^{-3}$ 

10<sup>0</sup>

# MN110\_out



0

10-3

10-2

10<sup>-1</sup> Period (s)

10<sup>0</sup>

10<sup>1</sup>

#### MN114 out $\chi = 0.44194$ Apparent Resistivity, $\rho_{det}$ ( $\Omega m$ ) Shift = 0.609 mntem73 (126/-5) $10^{-1}$ 10<sup>2</sup> Depth (km) 10-3 $10^{-2}$ 10<sup>0</sup> $10^{-1}$ 10<sup>0</sup> 0 10<sup>-1</sup> Period (s) 10-2 $10^{-3}$ 10<sup>0</sup> $10^2$ Resistivity ( $\Omega$ m) 10<sup>3</sup> 10¹ out Apparent Resistivity, ρ<sub>det</sub> (Ωm) $\chi = 1.0028$ EM36 (105/–12) Shift = 0.62 $10^{-1}$ 10<sup>2</sup> Depth (km) 10-3 $10^{-2}$ 10<sup>0</sup> 10<sup>1</sup> $10^{-1}$

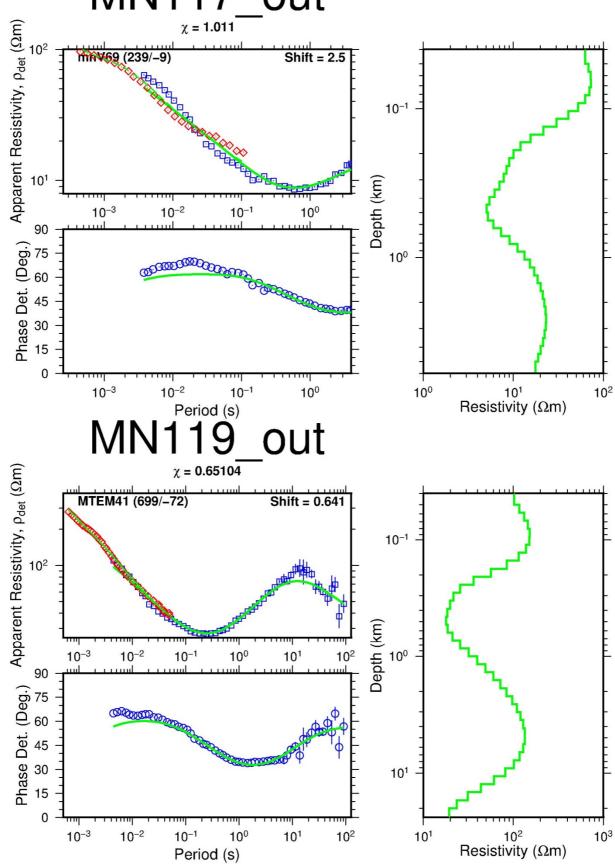
10¹

10<sup>0</sup>

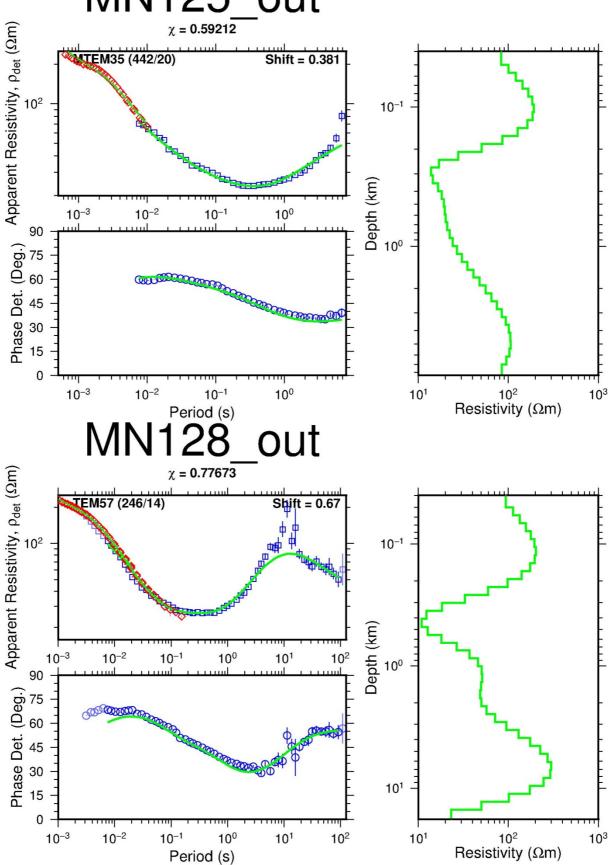
 $\begin{array}{ccc} 10^1 & 10^2 \\ \text{Resistivity } (\Omega \text{m}) \end{array}$ 

10<sup>3</sup>

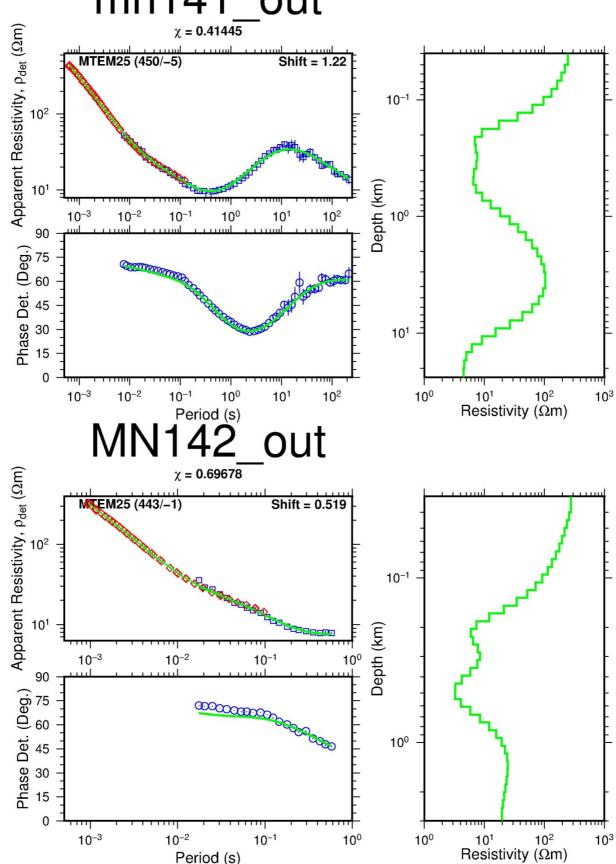
### MN117\_out



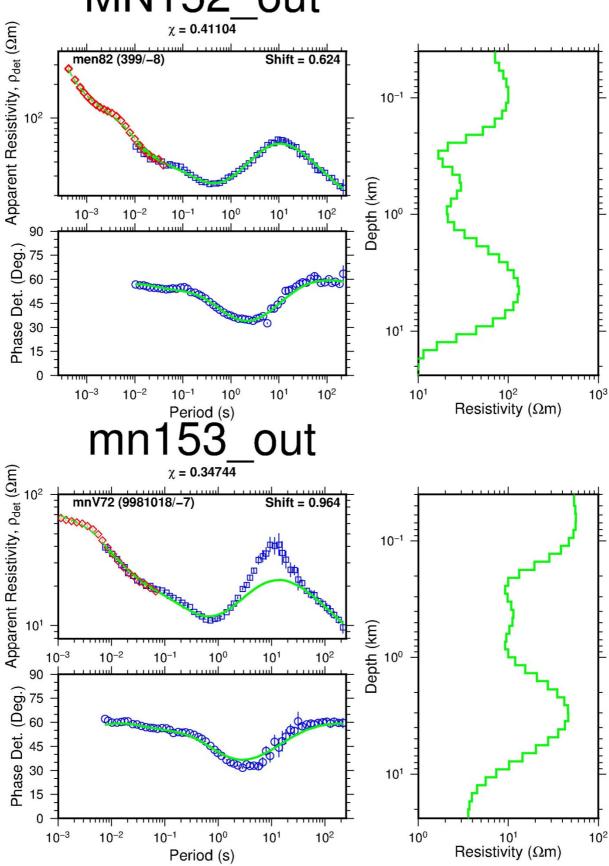
#### MN125\_out



### mn141 out

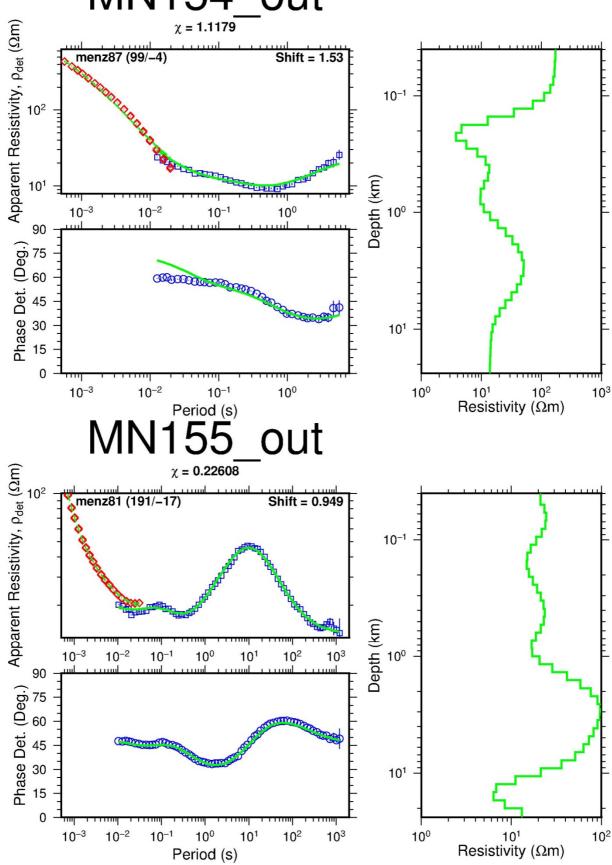


# MN152\_out



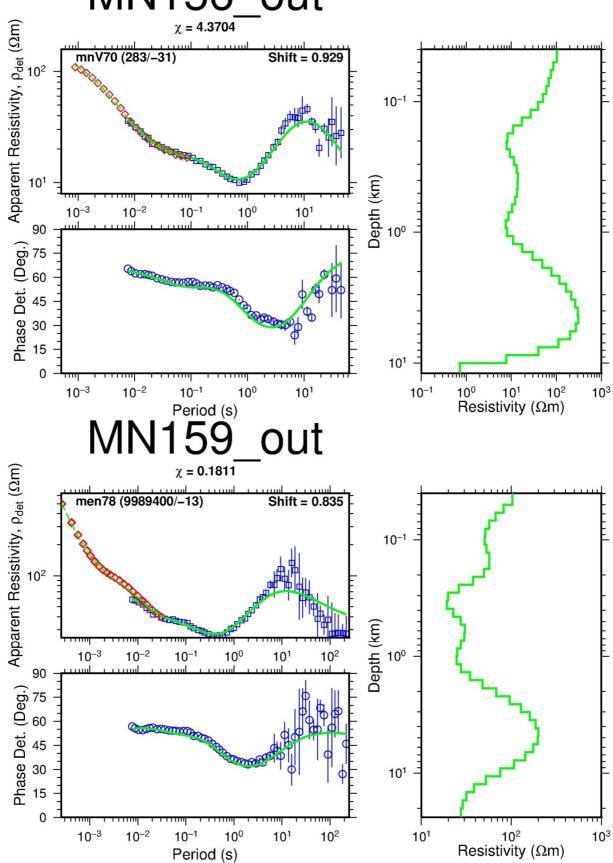
23

#### MN154 out

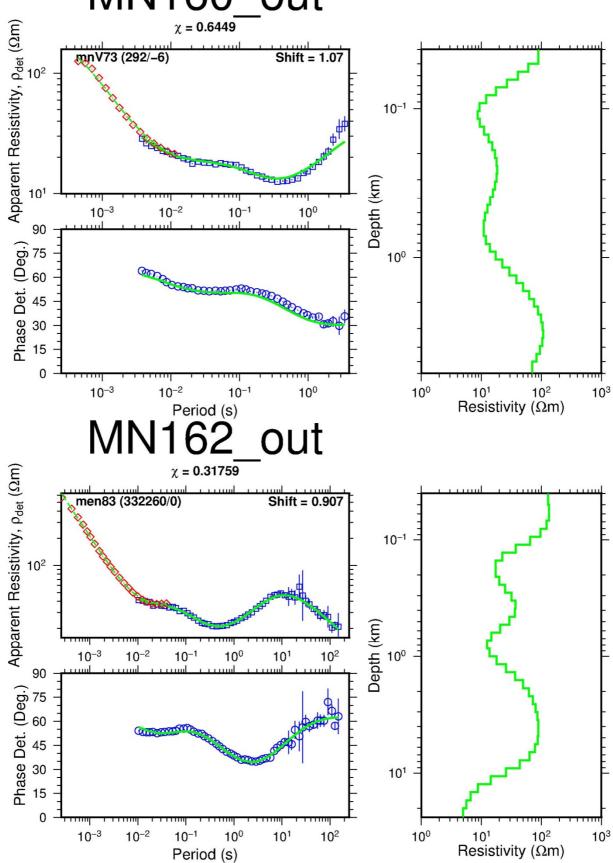


24

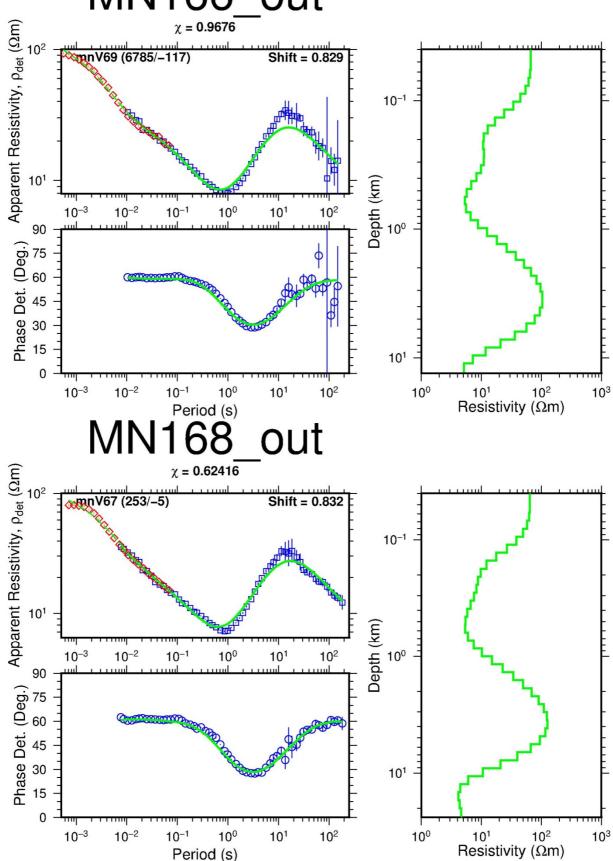
#### MN156\_out



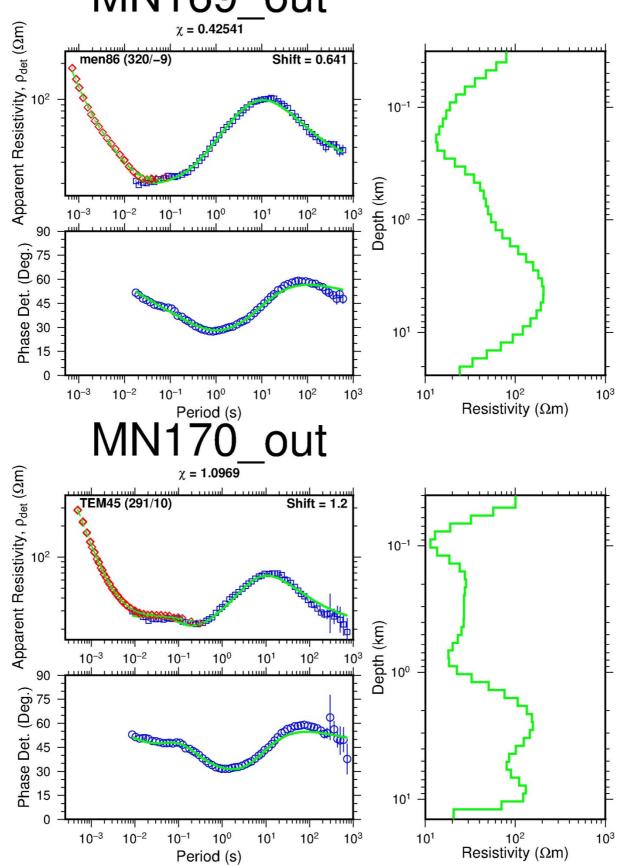
## MN160\_out



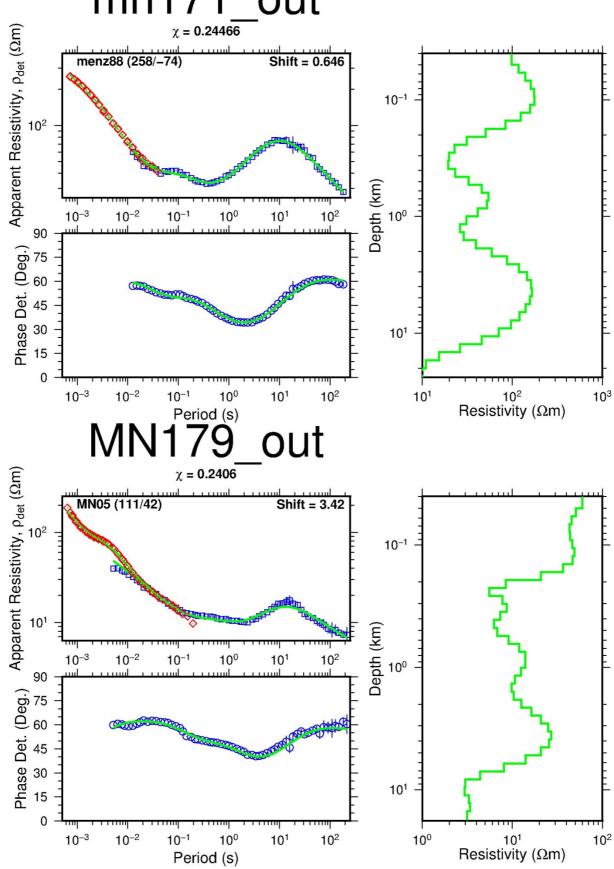
#### MN166 out



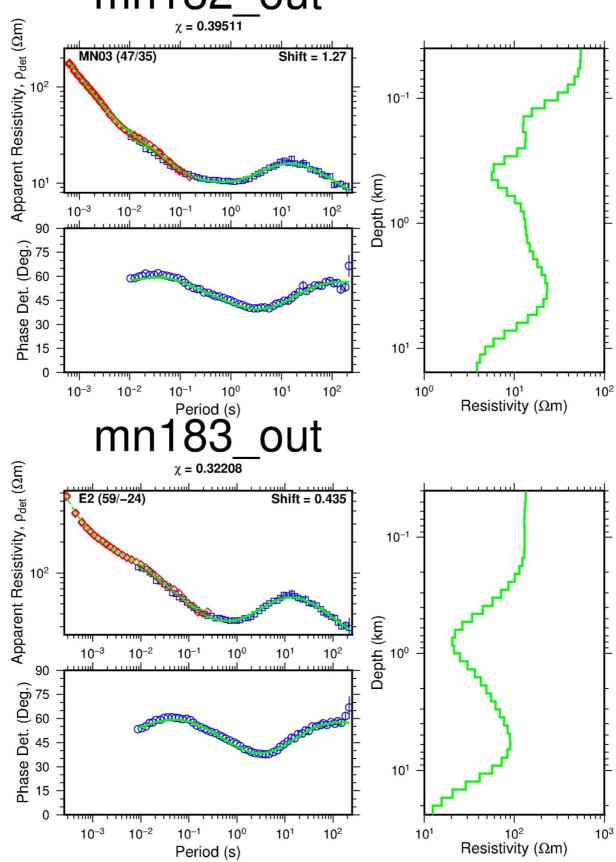
# MN169\_out

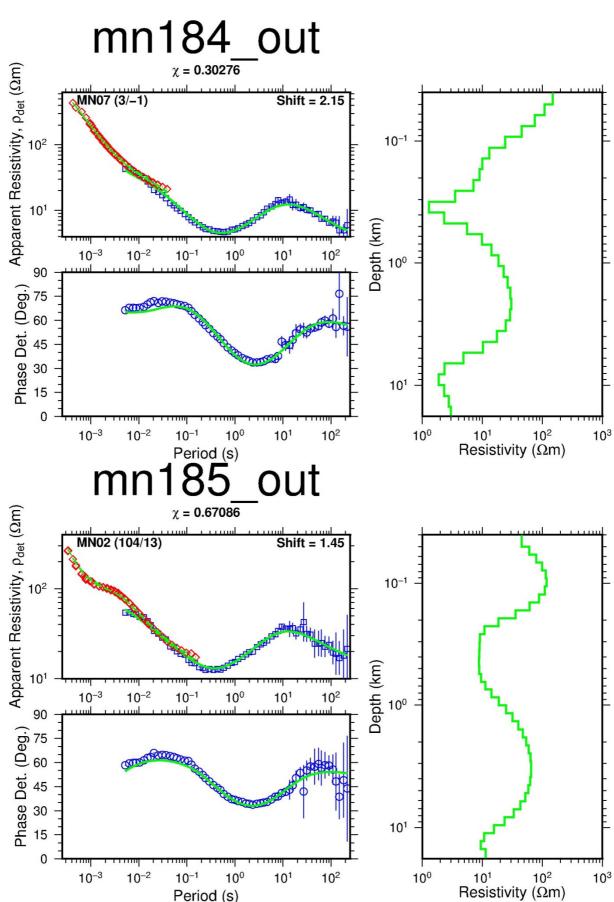


#### mn171 out

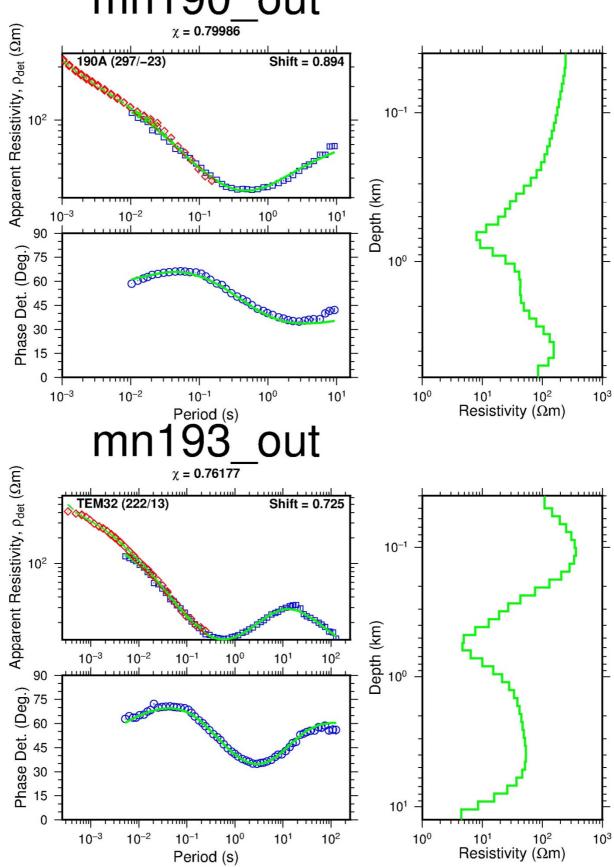


#### mn182\_out





#### mn190 out



 $10^{-2}$ 

 $10^{-1}$ 

Period (s)

10<sup>0</sup>

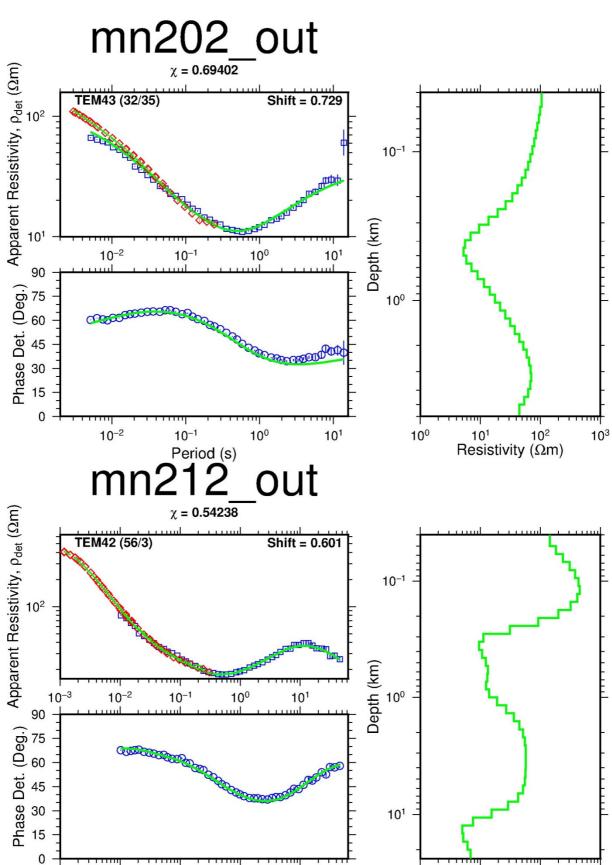
10<sup>1</sup>

 $10^{-3}$ 

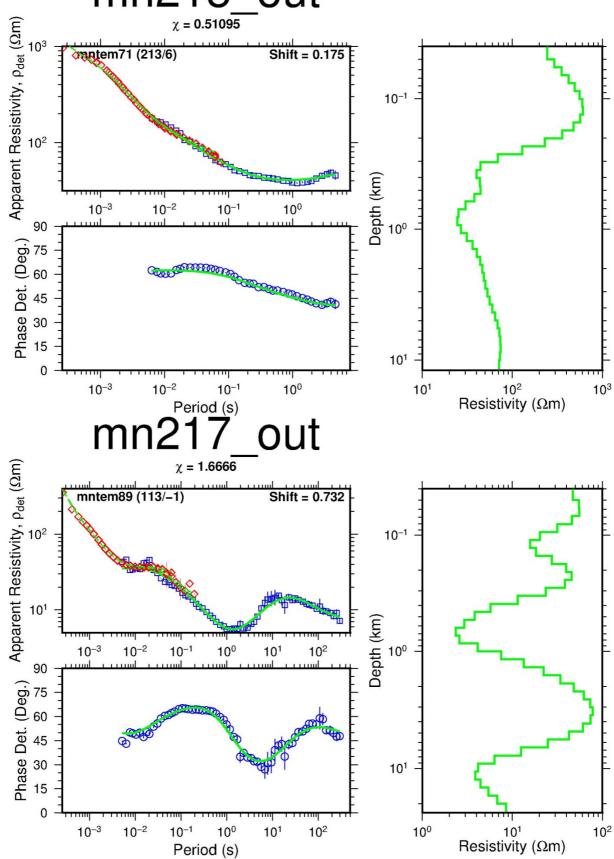
 $\begin{array}{cc} 10^1 & 10^2 \\ \text{Resistivity } (\Omega \text{m}) \end{array}$ 

 $10^{3}$ 

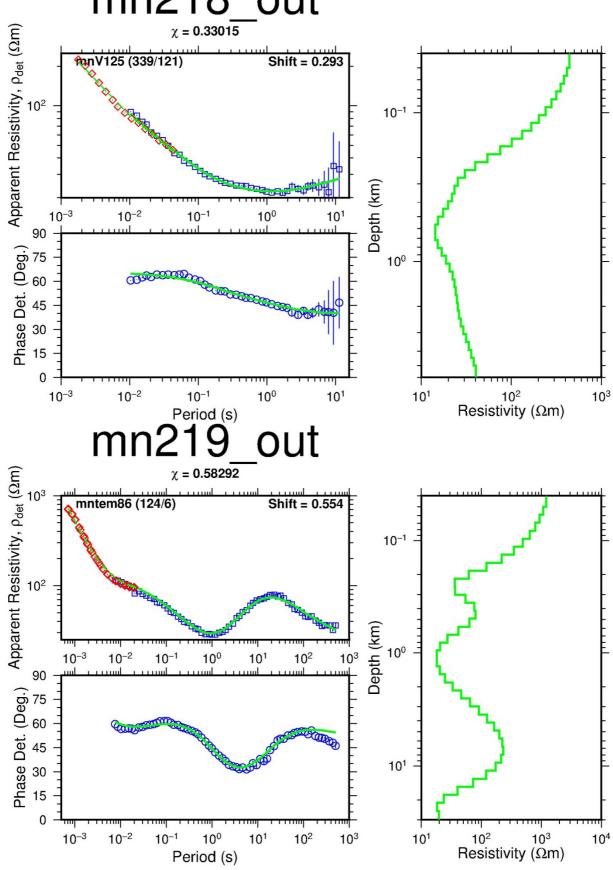
10<sup>0</sup>



#### mn215 out



#### mn218\_out



 $10^{-3}$ 

10-2

10<sup>0</sup>

Period (s)

 $10^{-1}$ 

#### mn220 out $\chi = 0.73695$ Shift = 0.865 mntem88 (392/-11) $10^{-1}$ Depth (km) 10<sup>1</sup> 10<sup>0</sup> 10-3 $10^{-2}$ $10^{-1}$ 10<sup>2</sup> 0 10-2 10<sup>-1</sup> 1 Period (s) $\begin{array}{ccc} 10^1 & 10^2 \\ \text{Resistivity } (\Omega \text{m}) \end{array}$ 10<sup>0</sup> 10<sup>0</sup> 10-3 10<sup>1</sup> 10<sup>2</sup> 10<sup>3</sup> out Phase Det. (Deg.) Apparent Resistivity, ρ<sub>det</sub> (Ωm) $\chi = 0.70766$ mntem90 (275/4) Shift = 0.577 $10^{-1}$ Depth (km) 10-2 10-3 10<sup>0</sup> 10<sup>2</sup> 10<sup>1</sup> $10^{-1}$ 90 75 60 45 30 15 10<sup>1</sup> 0

10<sup>2</sup>

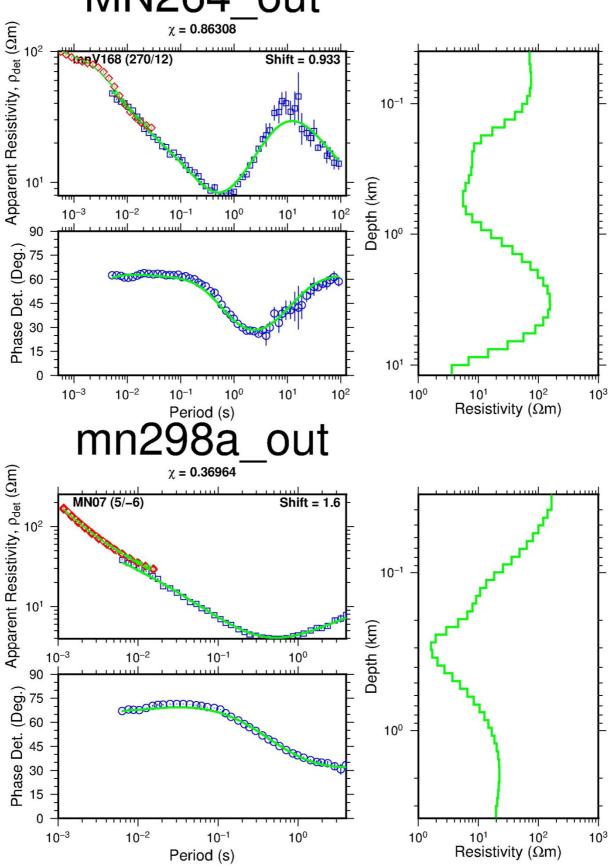
10<sup>1</sup>

10<sup>0</sup>

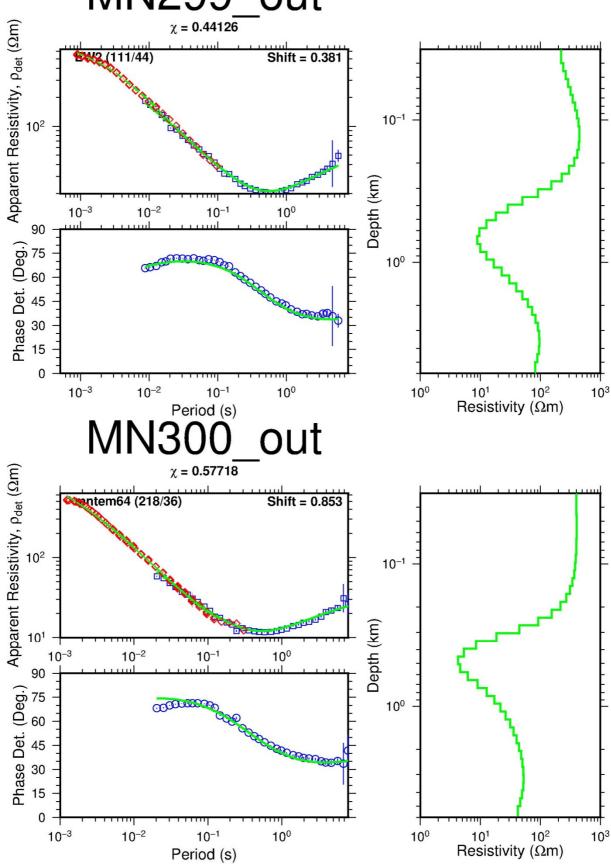
 $10^1$   $10^2$  Resistivity ( $\Omega$ m)

 $10^{3}$ 

# MN264\_out

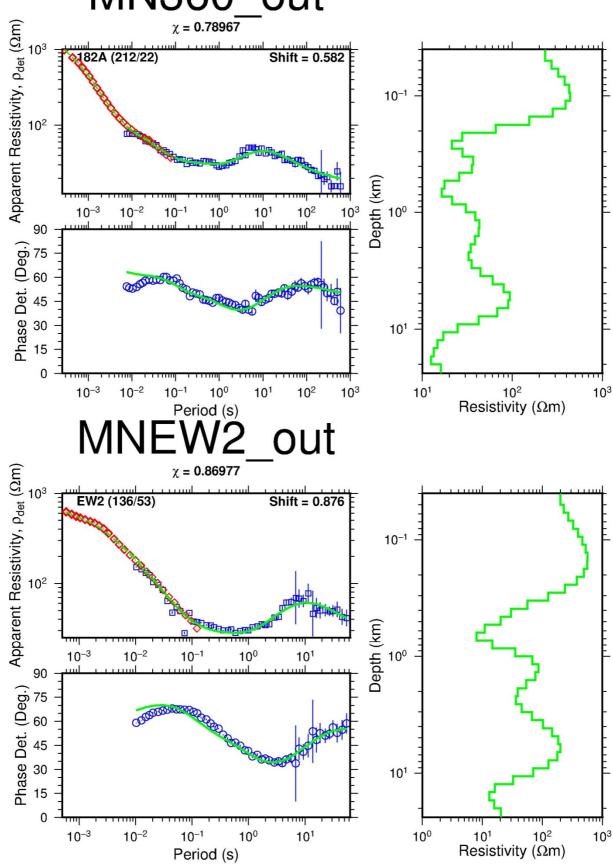


## MN299\_out



#### MN301 out $\chi = 0.61918$ Apparent Resistivity, ρ<sub>det</sub> (Ωm) MN07 (344/-37) Shift = 2.03 $10^{-1}$ 10¹ Depth (km) 10-3 10-2 10<sup>0</sup> 10<sup>1</sup> $10^{-1}$ Phase Det. (Deg.) 10<sup>0</sup> 0 10-2 10<sup>-1</sup> Period (s) 10-3 10<sup>0</sup> 10<sup>0</sup> $10^1$ $10^2$ Resistivity ( $\Omega$ m) 10<sup>3</sup> 10<sup>1</sup> out Phase Det. (Deg.) Apparent Resistivity, ρ<sub>det</sub> (Ωm) $\chi = 0.57882$ E5 (205/-35) Shift = 0.28 $10^{-1}$ $10^{2}$ Depth (km) 10-3 $10^{-2}$ $10^{-1}$ 10° 90 10<sup>0</sup> 60 45 30 15 0 $10^2$ Resistivity ( $\Omega$ m) 10-1 10<sup>0</sup> 10<sup>1</sup> $10^{-3}$ $10^{-2}$ 10<sup>3</sup>

#### MN360\_out



 $10^2$  Resistivity ( $\Omega$ m)

10<sup>3</sup>

#### MNEW3 out Apparent Resistivity, $\rho_{det}$ ( $\Omega m$ ) TEM33 (163/16) Shift = 0.637 $10^{-1}$ Depth (km) 10-2 $10^{-3}$ 10<sup>0</sup> $10^{-1}$ 10¹ $10^{2}$ 10<sup>1</sup> 0 $\begin{array}{cc} 10^1 & 10^2 \\ \text{Resistivity } (\Omega \text{m}) \end{array}$ 10-2 10<sup>0</sup> $10^{-1}$ 10<sup>2</sup> $10^{-3}$ 10<sup>1</sup> 10<sup>0</sup> $10^{3}$ Period (s) out Phase Det. (Deg.) Apparent Resistivity, ρ<sub>det</sub> (Ωm) $\chi = 1.0122$ EW23 (63/6) Shift = 0.218 $10^{-1}$ 10<sup>2</sup> Depth (km) 10-2 10<sup>2</sup> 10-3 10<sup>0</sup> 10<sup>1</sup> $10^{-1}$ 90 75 60 45 30 10¹ 15

10<sup>2</sup>

10¹

10¹

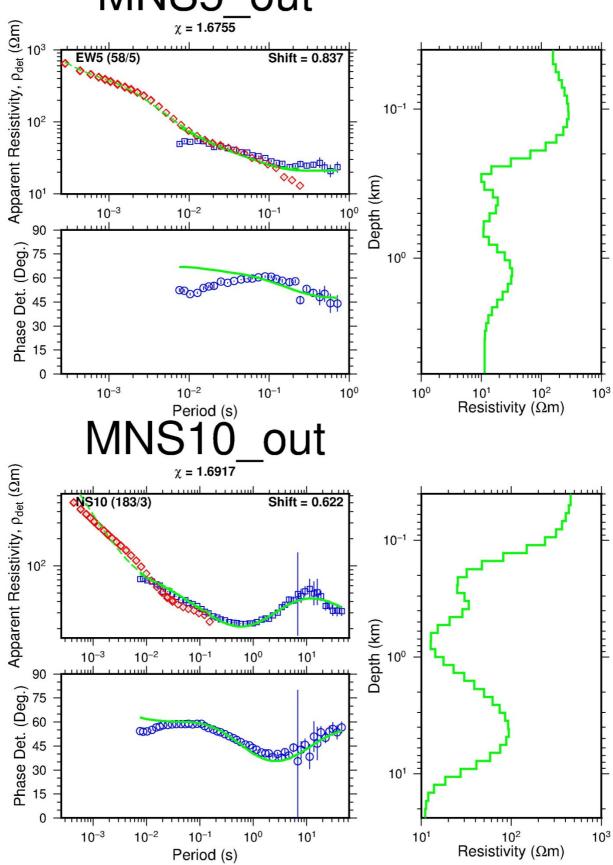
10<sup>-1</sup> 1 Period (s)

10<sup>0</sup>

10-3

 $10^{-2}$ 

#### MNS5 out



 $10^{-2}$ 

 $10^{-3}$ 

10<sup>0</sup>

Period (s)

 $10^{-1}$ 

10<sup>1</sup>

10<sup>2</sup>

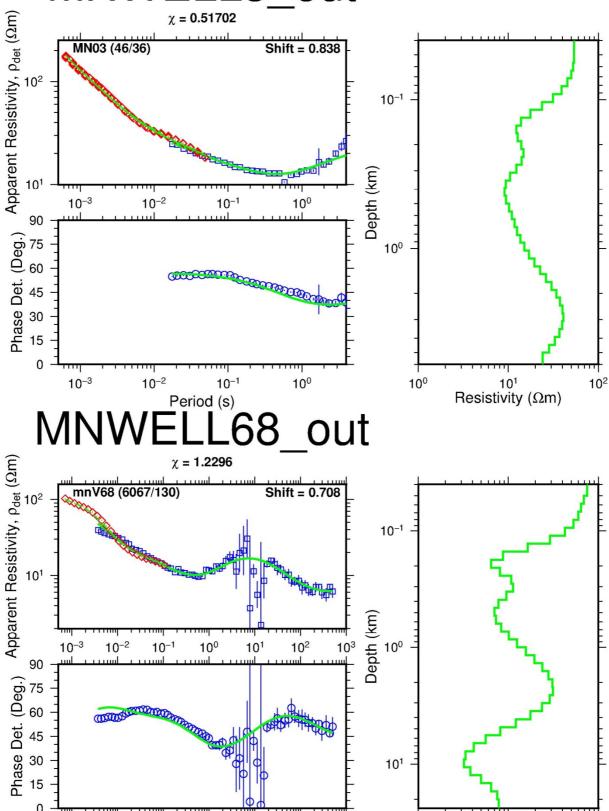
10<sup>3</sup>

10<sup>0</sup>

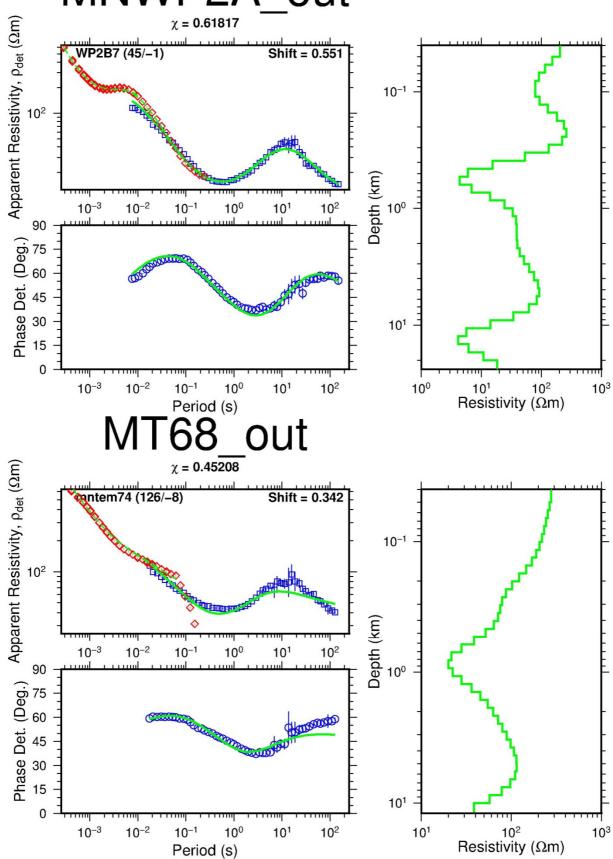
 $10^{1}$  Resistivity ( $\Omega$ m)

10<sup>2</sup>

#### MNWELL3\_out



# MNWP2A\_out



#### out $\chi = 0.66\overline{342}$ Apparent Resistivity, $\rho_{det}\left(\Omega m\right)$ TEM33 (157/12) Shift = 0.687 $10^{-1}$ Depth (km) 10-3 100 10-2 10<sup>2</sup> 10<sup>1</sup> $10^{-1}$ 10¹ 0 10-2 $\begin{array}{cc} 10^1 & 10^2 \\ \text{Resistivity } (\Omega \text{m}) \end{array}$ 10° 10-3 $10^{-1}$ 10<sup>2</sup> 10<sup>0</sup> 10<sup>3</sup> 10¹ Period (s) $\chi = 0.81575$ Apparent Resistivity, $\rho_{det}$ ( $\Omega m$ ) EW5 (152/5) Shift = 0.665 $10^{-1}$ 10<sup>2</sup> 10¹ 10-3 100 10-2 10<sup>1</sup> $10^{-1}$ 90 Phase Det. (Deg.) 75 60 45 30 10<sup>1</sup> 15 10<sup>-1</sup> Period (s) 10-2 $\begin{array}{cc} 10^1 & 10^2 \\ \text{Resistivity } (\Omega \text{m}) \end{array}$ $10^{-3}$ 10<sup>0</sup> 10<sup>1</sup> 10<sup>0</sup> 10<sup>3</sup>

#### MT72\_out $\chi = 0.461$ Phase Det. (Deg.) Apparent Resistivity, $\rho_{det}$ ( $\Omega$ m) of $\omega$ of $\omega$ of $\omega$ mntem63 (13/3) Shift = 0.382 $10^{-1}$ Depth (km) 10-3 10<sup>2</sup> $10^{-1}$ 10<sup>0</sup> 10<sup>1</sup> $10^{-2}$ 10¹ 0 10-1 $\stackrel{\cdot}{\text{10}^2} \text{Resistivity } (\Omega \text{m})$ 10-2 10<sup>2</sup> $10^{-3}$ 10<sup>0</sup> 10<sup>1</sup> 10<sup>1</sup> $10^{3}$ Period (s) out $\chi = 0.57049$ Apparent Resistivity, $\rho_{det}\left(\Omega m\right)$ TEM09 (173/21) Shift = 0.657 $10^{-1}$ Depth (km) 10¹ 10<sup>2</sup> 100 $10^{-3}$ $10^{-1}$ 10<sup>1</sup> $10^{-2}$ 90 Phase Det. (Deg.) 75 60 45 30 10<sup>1</sup> 15 10<sup>2</sup> $\begin{array}{ccc} 10^1 & 10^2 \\ \text{Resistivity } (\Omega \text{m}) \end{array}$ 10<sup>0</sup> 10<sup>0</sup> $10^{-3}$ $10^{-2}$ $10^{-1}$ 10<sup>3</sup> 10<sup>1</sup>

#### MT84 out

