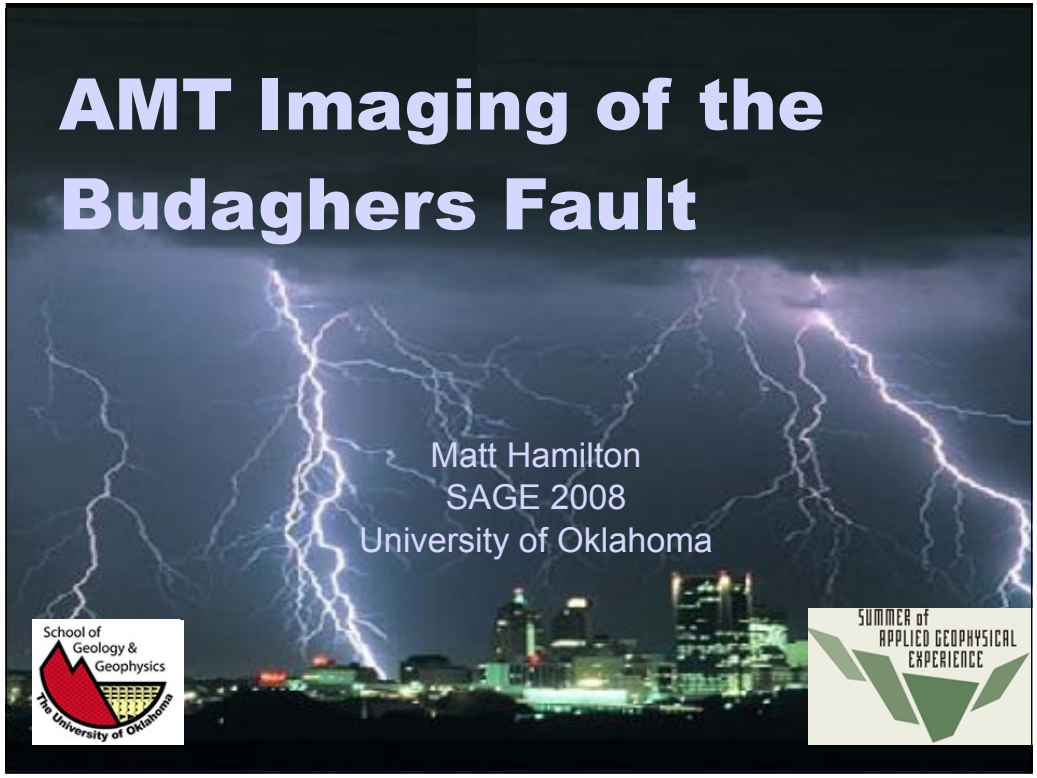
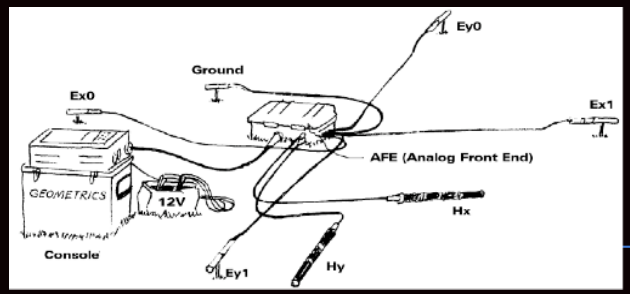
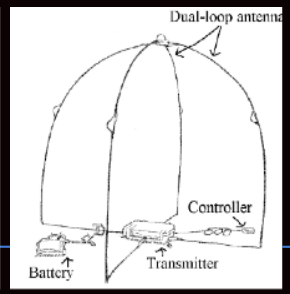

AMT Imaging of the Budaghers Fault
Matt Hamilton
SAGE 2008
University of Oklahoma
School of Geology & Geophysics
The University of Oklahoma
SUMMER of APPLIED GEOPHYSICAL EXPERIENCE

AMT Basics

- AudioMagnetoTellurics – audio frequencies
- 10 Hz – 100 kHz, natural source is lightning
- “Augmented Magnetotellurics” – transmitter to fill in a “dead zone” in the natural strength of signal in the 1 kHz – 70 kHz frequency range.



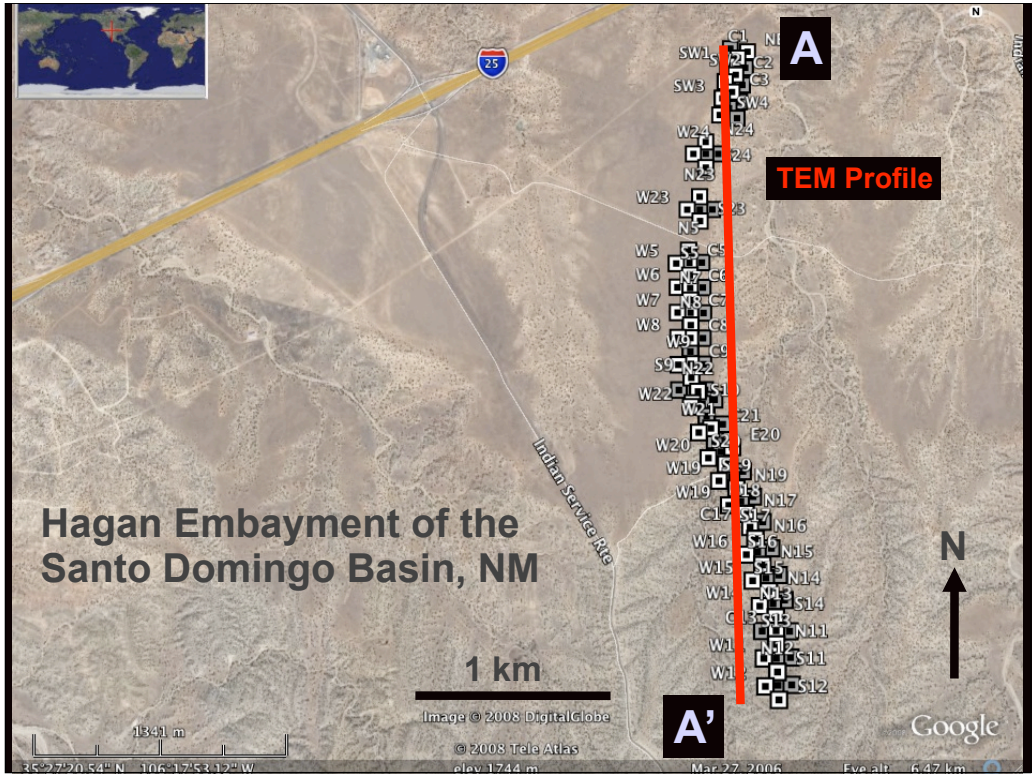


AMT (cont'd)

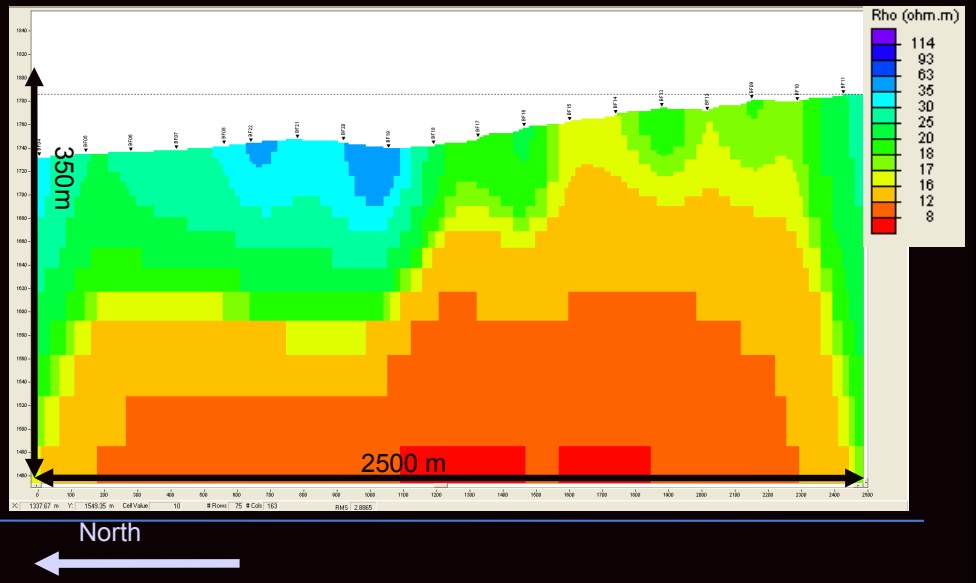
- Two modes – TE (Transverse Electric) and TM (Transverse Magnetic)
- TM more sensitive to structure.

Survey Parameters

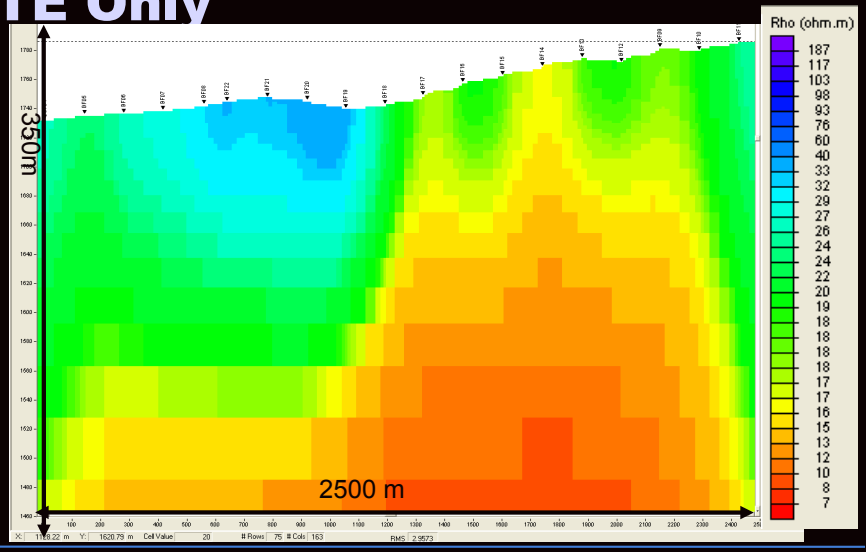
- 22 total stations, spaced ~140 m apart on a roughly N-S line.
- 3 stations ~1 km N of the rest, not included here.
- Transmitter ~200-300 m from receiver.


A
TEM Profile
A'
Hagan Embayment of the
Santo Domingo Basin, NM
1 km
N
Indian Service Rte
Image © 2008 DigitalGlobe
© 2008 Tele Atlas
Google

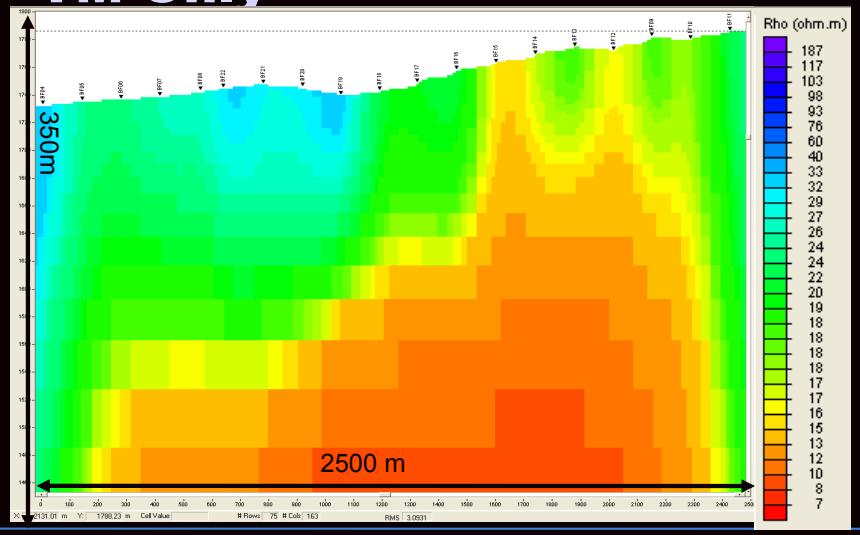
Comparison of Mode Inversions – TE+TM



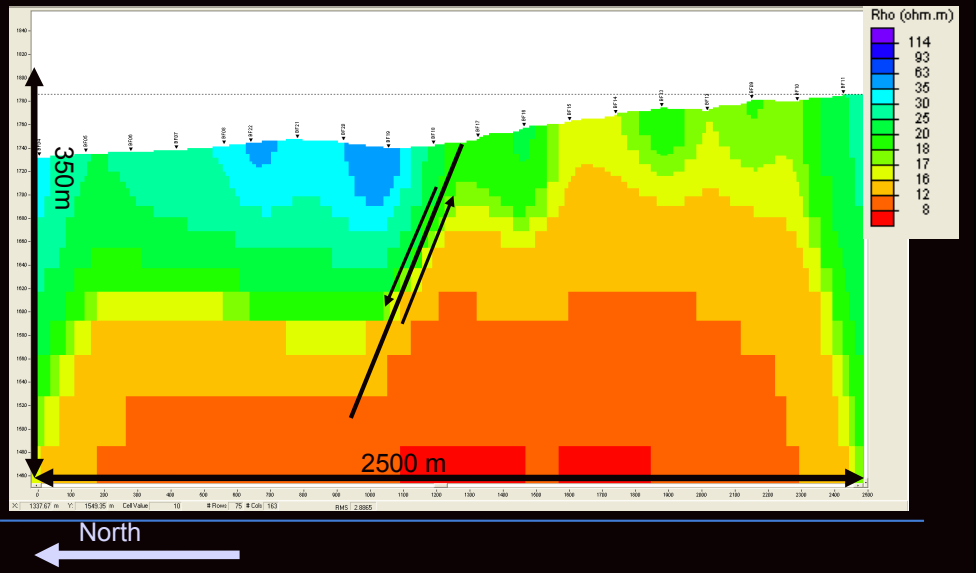
Comparison of Mode Inversions – TE Only



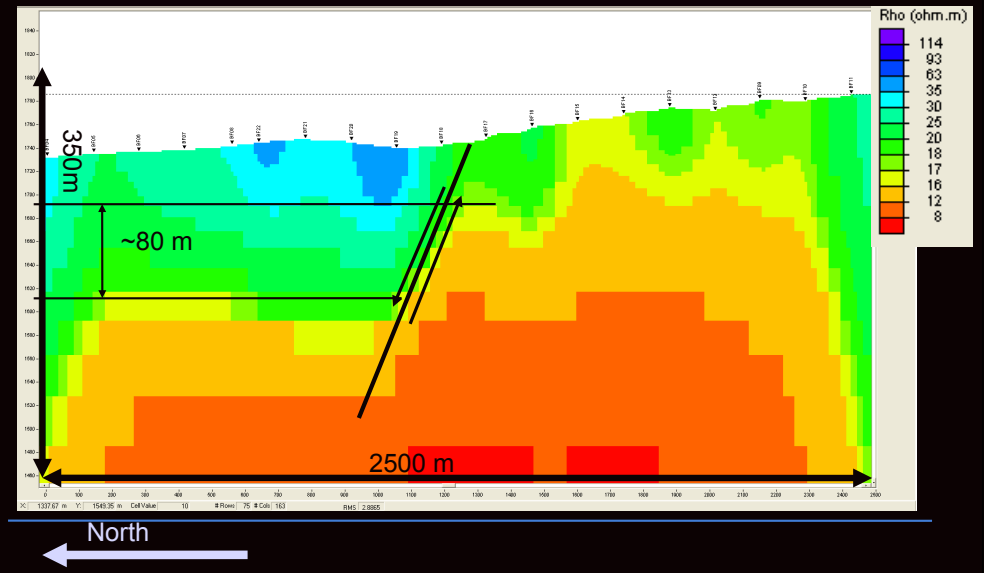
Comparison of Mode Inversions – TM Only



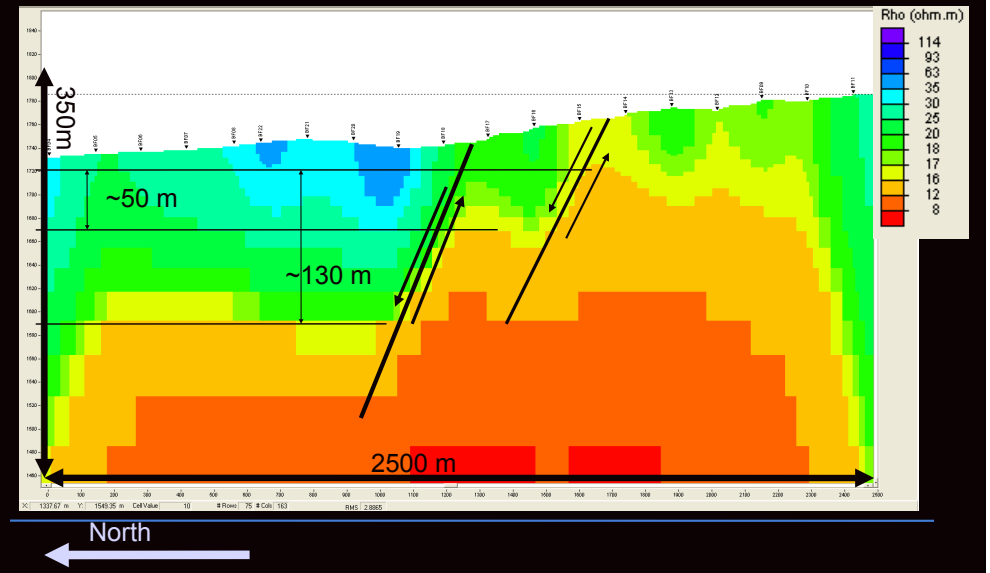
Picking The Fault



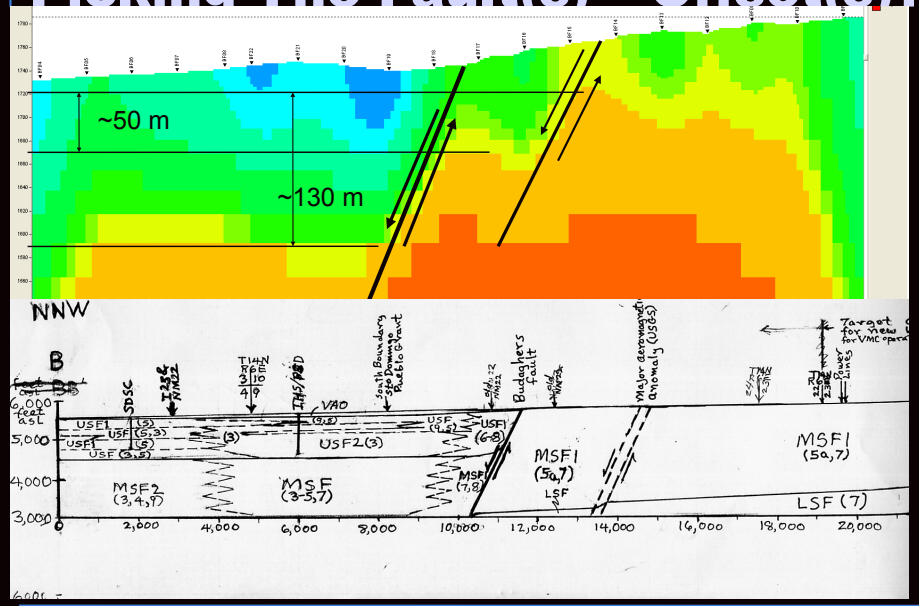
Picking The Fault – Offset?



Picking The Fault(s) – Offset(s)?



Picking The Fault(s) – Offset(s)?

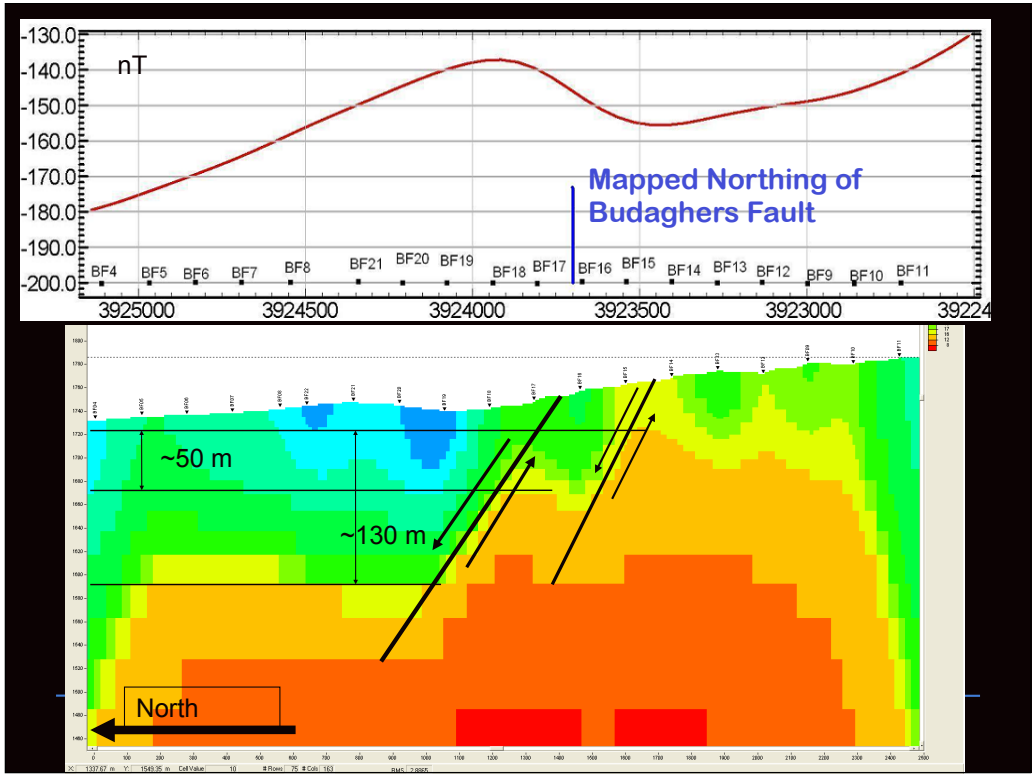


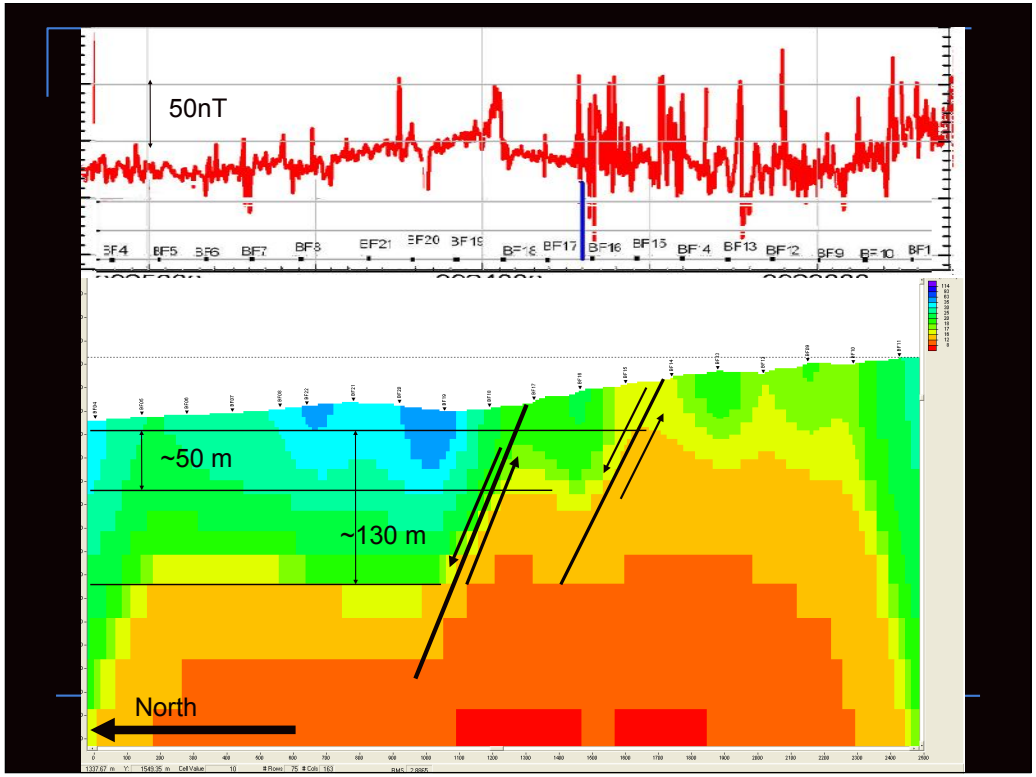
North

X-section from Hawley (1999)

Integration with Magnetics

- Existing hi-res Aeromagnetic data from USGS and a SAGE ground magnetic profile parallel to seismic line.


-130.0
-140.0
-150.0
-160.0
-170.0
-180.0
-190.0
-200.0
nT
Mapped Northing of
Budaghers Fault
BF4
BF5
BF6
BF7
BF8
BF21
BF20
BF19
BF18
BF17
BF16
BF15
BF14
BF13
BF12
BF9
BF10
BF11
3925000
3924500
3924000
3923500
3923000
~50 m
~130 m
North


50nT
BF4
BF5
BF6
BF7
BF8
BF21
BF20
BF19
BF17
BF16
BF15
BF13
BF12
BF9
BF10
BF1
~50 m
~130 m
North

Conclusions

- 2-D inversion of AMT in all modes indicates 1-2 faults with a total vertical offset of about 80-130 meters.
- Larger fault indicated by AMT is coincident with mapped location of Budaghers Fault.
- Aeromagnetic and ground magnetic profiles agree with presence and location of at least one fault and provide additional clues to lithology.