Gravity Models of The Budaghers Fault

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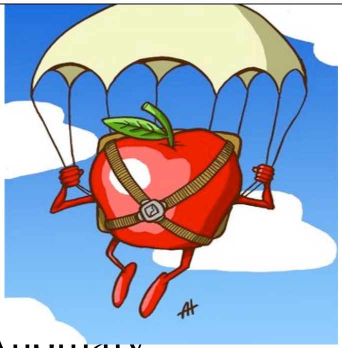
SAGE 2008

Questions

- Can we see the fault with gravity data?
- If so can we determine the offset?
- How good is the data?
- Can we model it with GM-SYS?
- How do the constraints improve the models?

Introduction



•Gravity Measured in Milligals

•(1milligal=1*10^-5 m/s^s)

•Denser Objects = Bigger Gravity Anomaly

•F=GMm/r^2 ----> Higher Up = Less Gravity

•Need Very Precise Insturments to Measure this

•How good of resolution do you need?

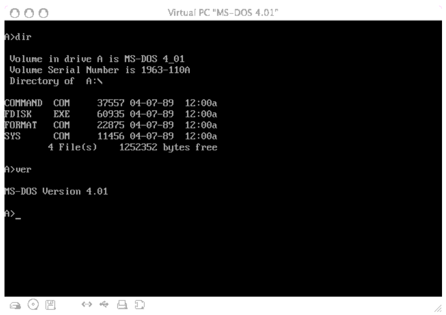
Closer Spacing=Higher Resolution

Equipment

Differential GPS

Scintrex Digital Gravimeter

Data Reduction

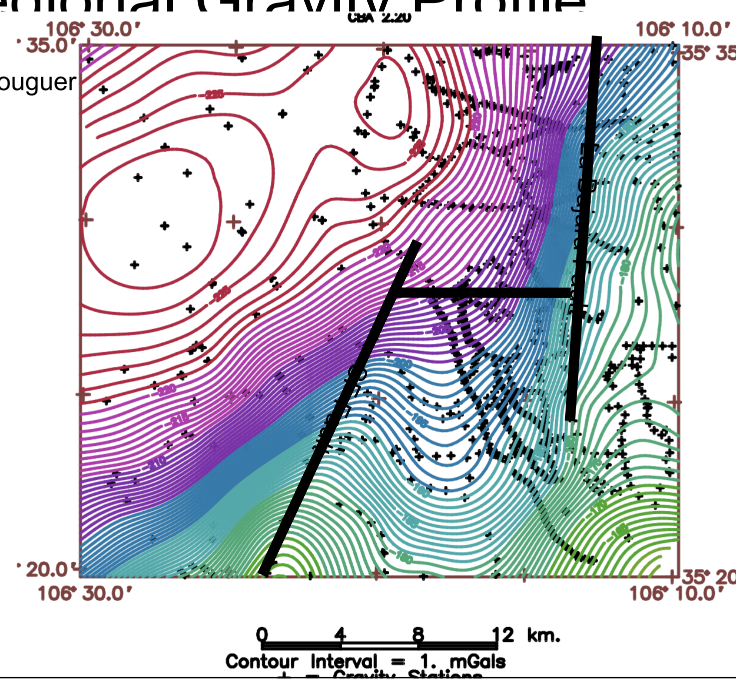


- Tidal Correction
- Free Air Correction
- Simple Bouguer Anomaly
- Terrain Correction
- Complete Bouguer Anomaly

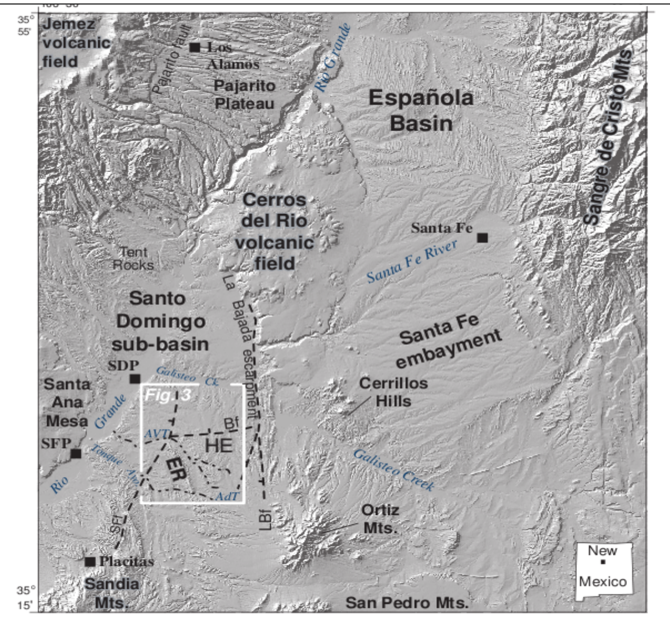
... Shawn did all for us this in DOS

Regional Gravity Profile

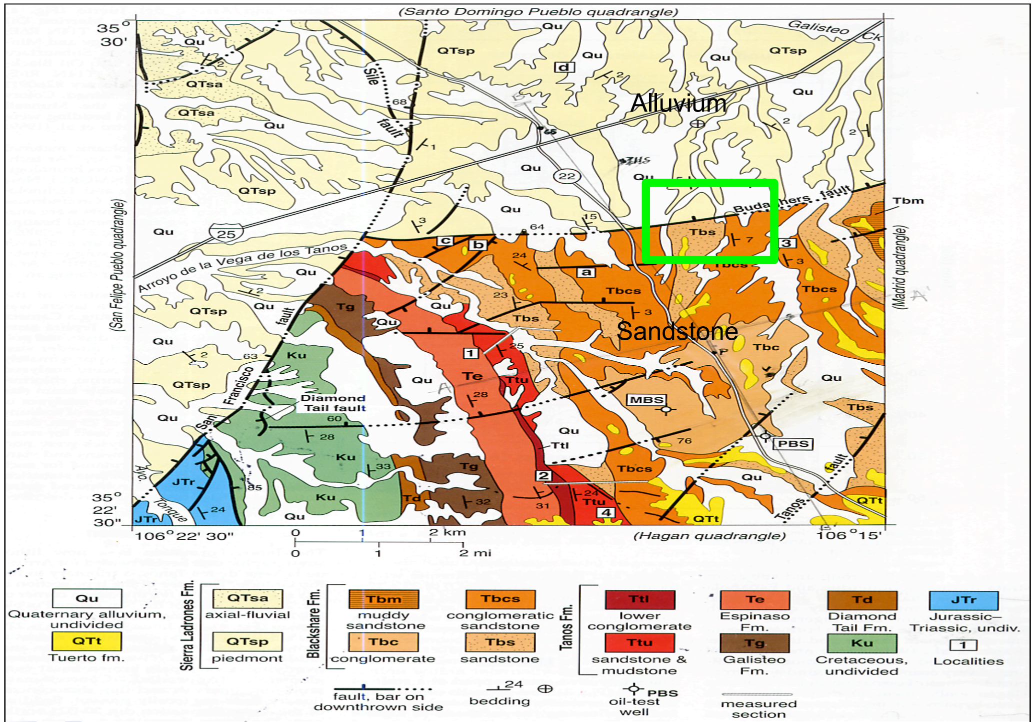
Complete Bouguer Anomaly



Map of Field Area



SFP = San Felipe Pueblo
SDP = Santo Domingo Pueblo
HE = Hagan embayment
SFf = San Francisco fault
Bf = Budaghers fault
LBf = La Bajada fault
ER = Espinaso Ridge
AVT = Arroyo de la Vega de los Tanos
AdT = Arroyo del Tuerto



It's not our fault

GM-SYS

- GM-SYS is a 2.5D forward modeling program
- Take Constraints (density, thickness, etc.)
  - Draw a Model
    - Tweak it and Try to Fit it to Data
- It can be used for gravity and magnetic data

Limitations:

- In student Student Edition can only have 7 bodies and 35 data points
- Non-Unique (only as good as your constraints)

Constraints:

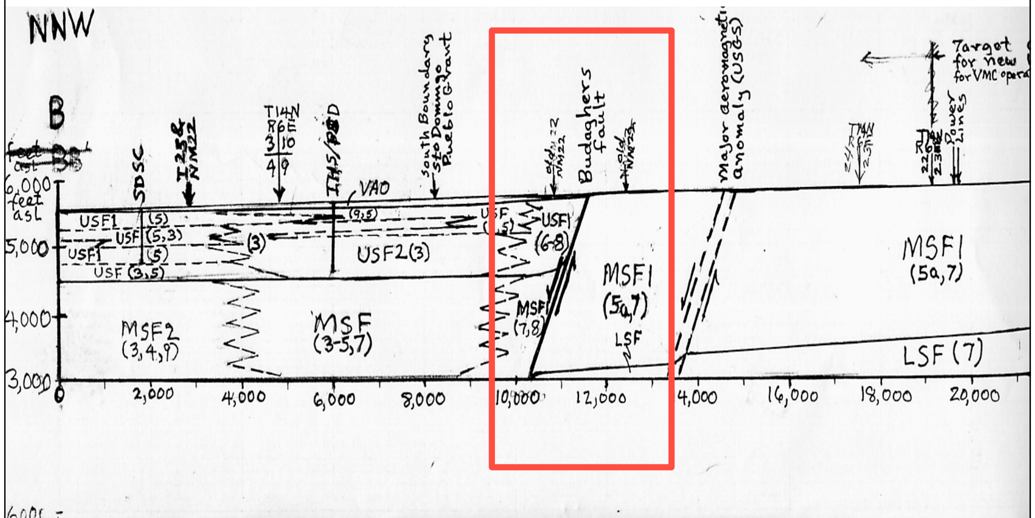
Depth to Basement- About 4km

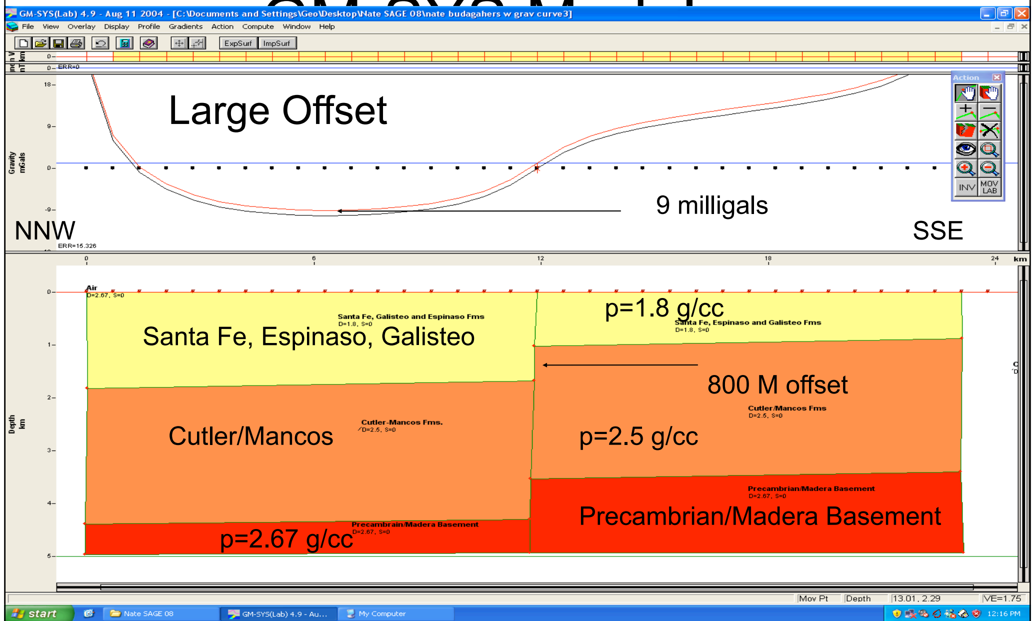
Density and Thickness of Units

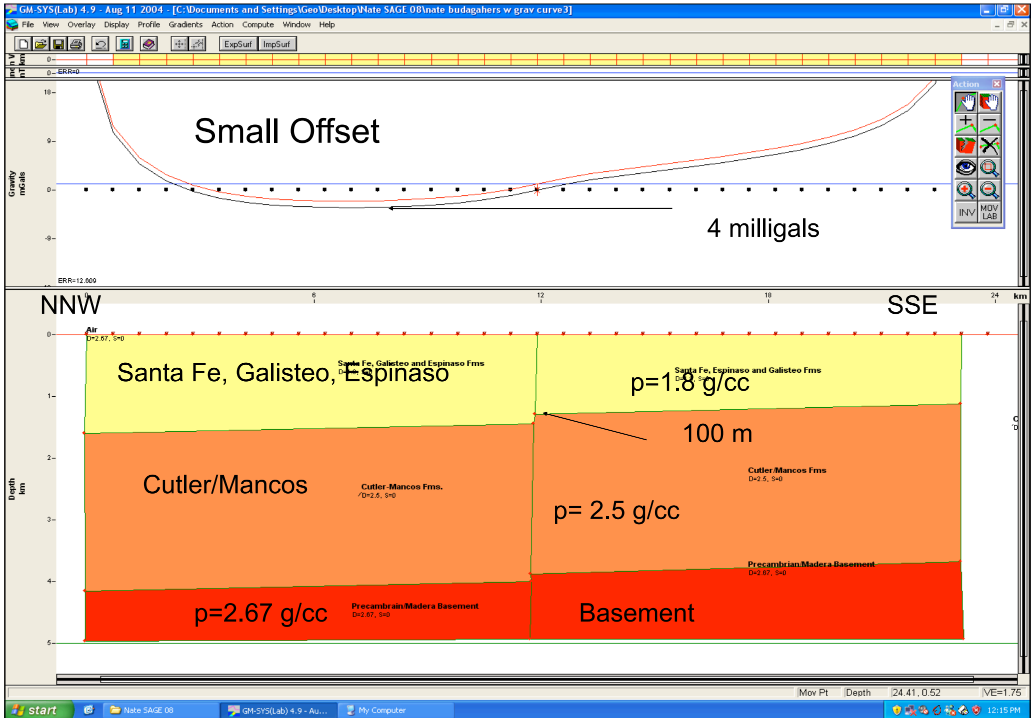
Hawley Model of Fault

Magnetics

Hawley Model of Budaghers Fault

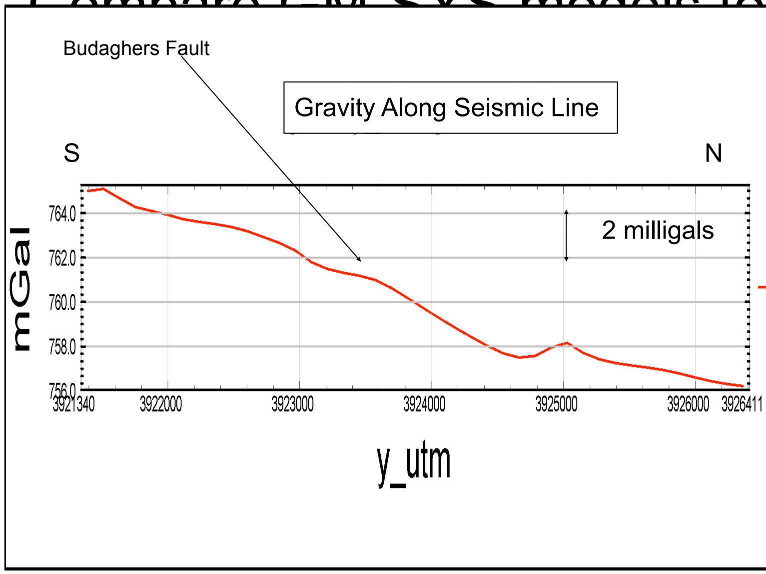


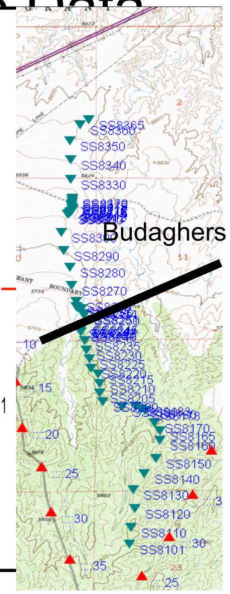

Large Offset
9 milligals
NNW
SSE
p=1.8 g/cc
Santa Fe, Espinaso, Galisteo
800 M offset
Cutler/Mancos
p=2.5 g/cc
Precambrian/Madera Basement
p=2.67 g/cc



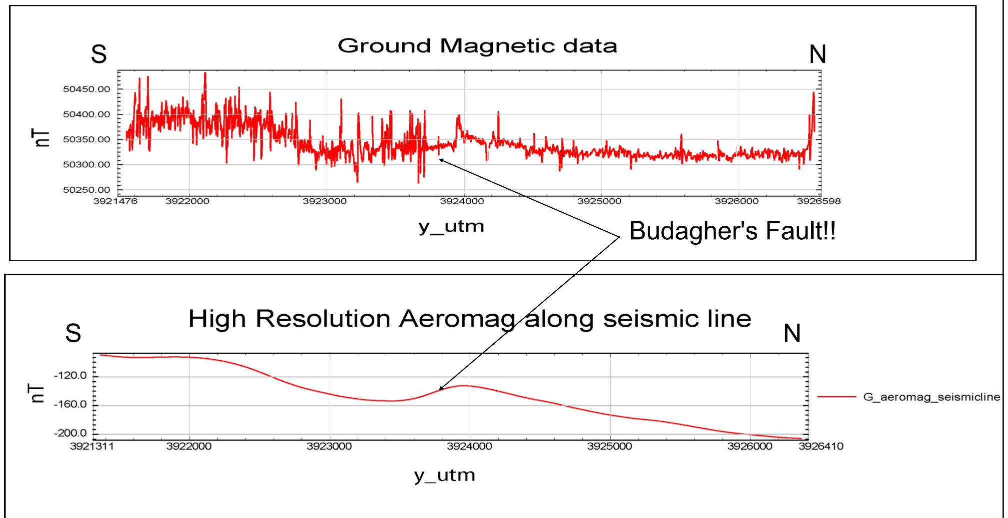
It's not our fault

Compare GM-SYS models to Data

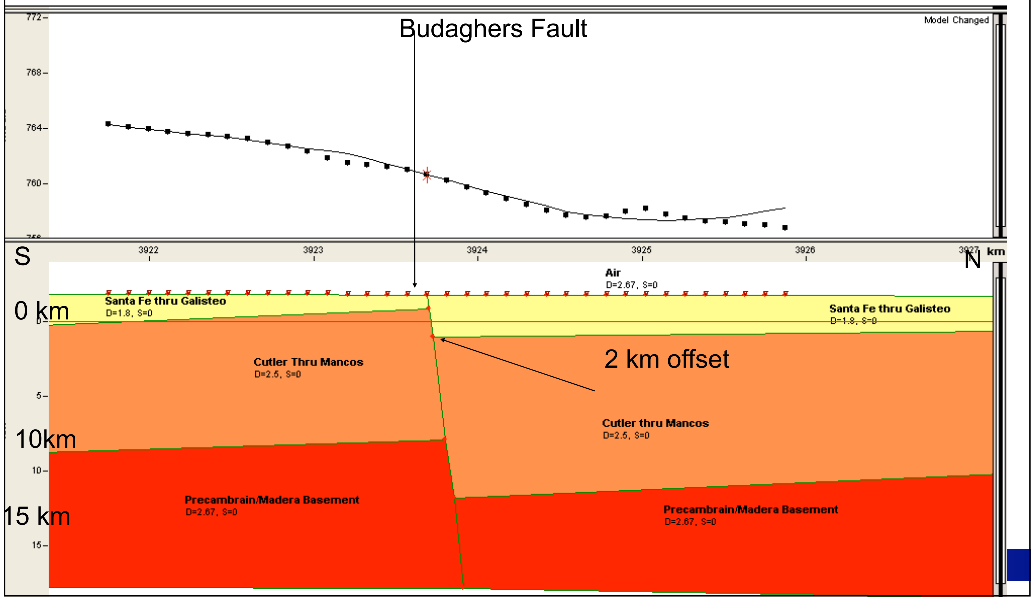


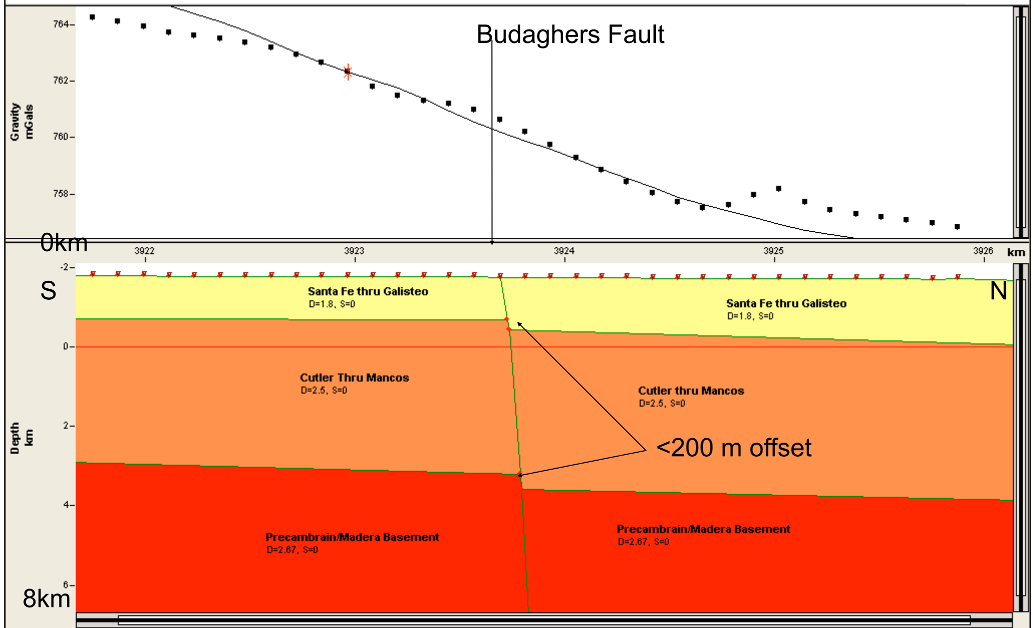


Magnetic Data:



Models are Non-Unique: Constraints are Important





It's not our fault

Conclusions

•We see an inflection in our data that corresponds to the fault but can't interpret a fault with gravity data alone
•Offset of the Budaghers Fault is <200 m.
•To accurately model the fault we need higher resolution data since the difference we are looking for is <1 mgal.
•GM-SYS is a non-unique forward modelling tool that is only useful when several constraints are known.
•Constraints are VERY IMPORTANT!!

Thanks

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