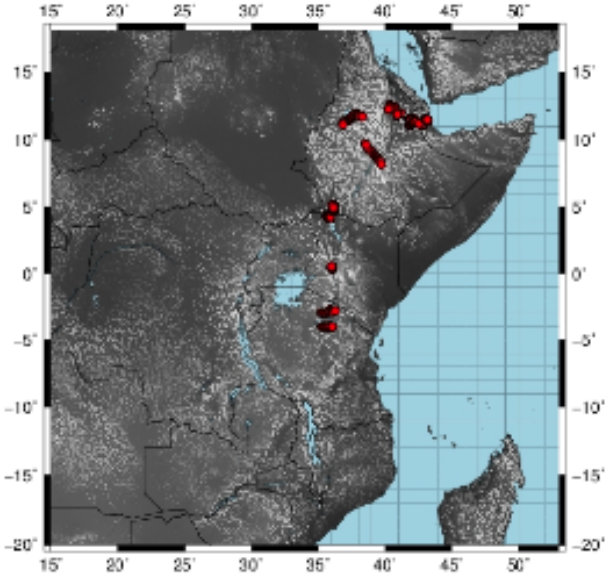
Geophysical Studies

Rift structure and basin control revealed by 3-D magnetotelluric

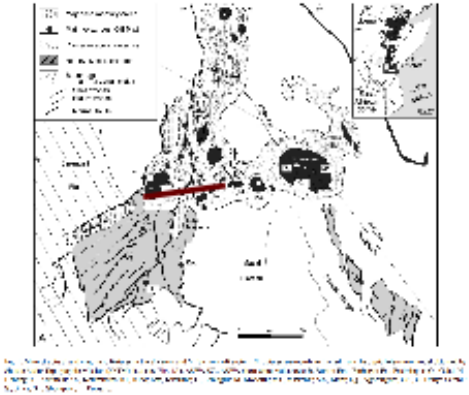
Sophie Hautot, IMAGIR, Brest, France

- Eastern Africa is characterised by complex geology (rifting, large volcanic provinces, sub-basalt basins,..).
- In this context, 3D magnetotelluric performs very well to provide an accurate geological background of possible prospects prior extensive exploration.
- We developed a 3-D imaging scheme which does not require heavy smoothing technique as other methods. Thus it is possible to image accurately resistivity contrasts such as boundary faults/sediments or basement/sediments.
- 3D properties of MT are used even when data are collected along profiles.

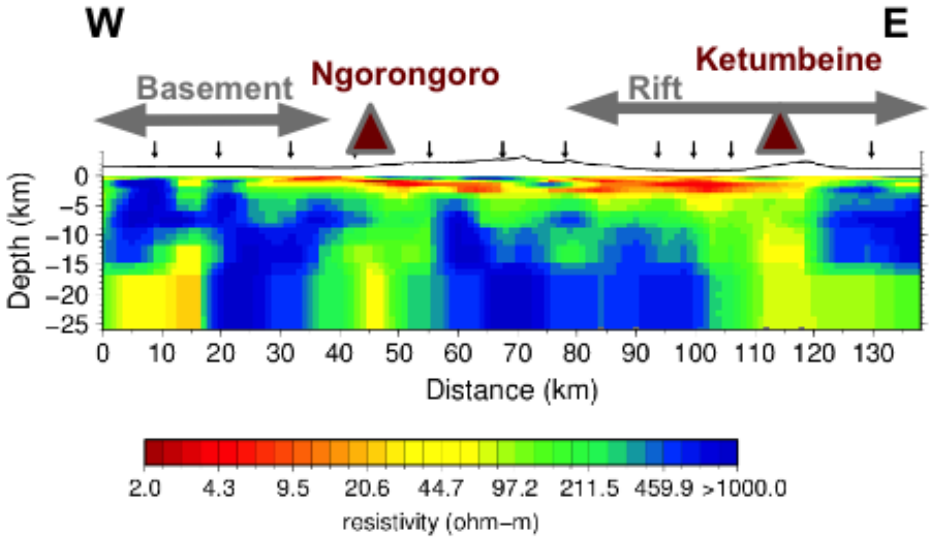
MT exploration



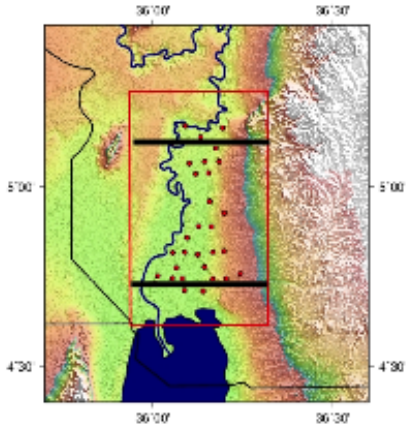
Example of the North Tanzanian Divergence

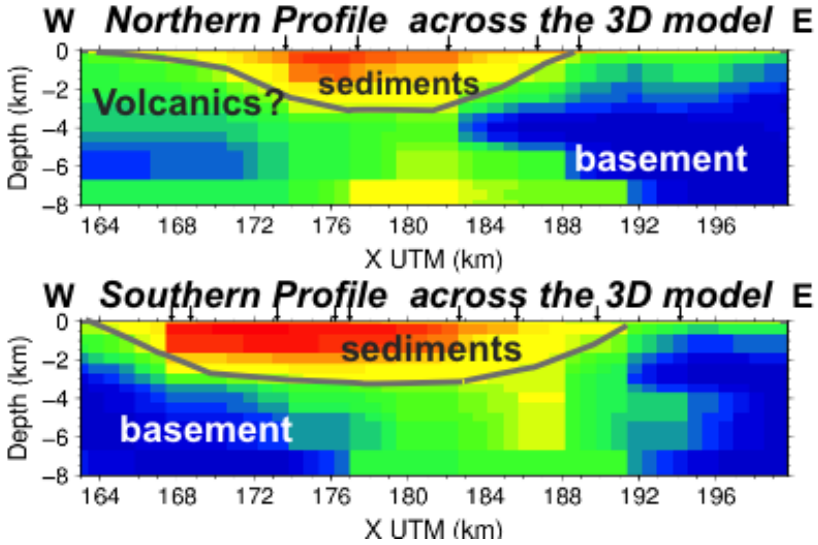


Le Gall et al. (2008)



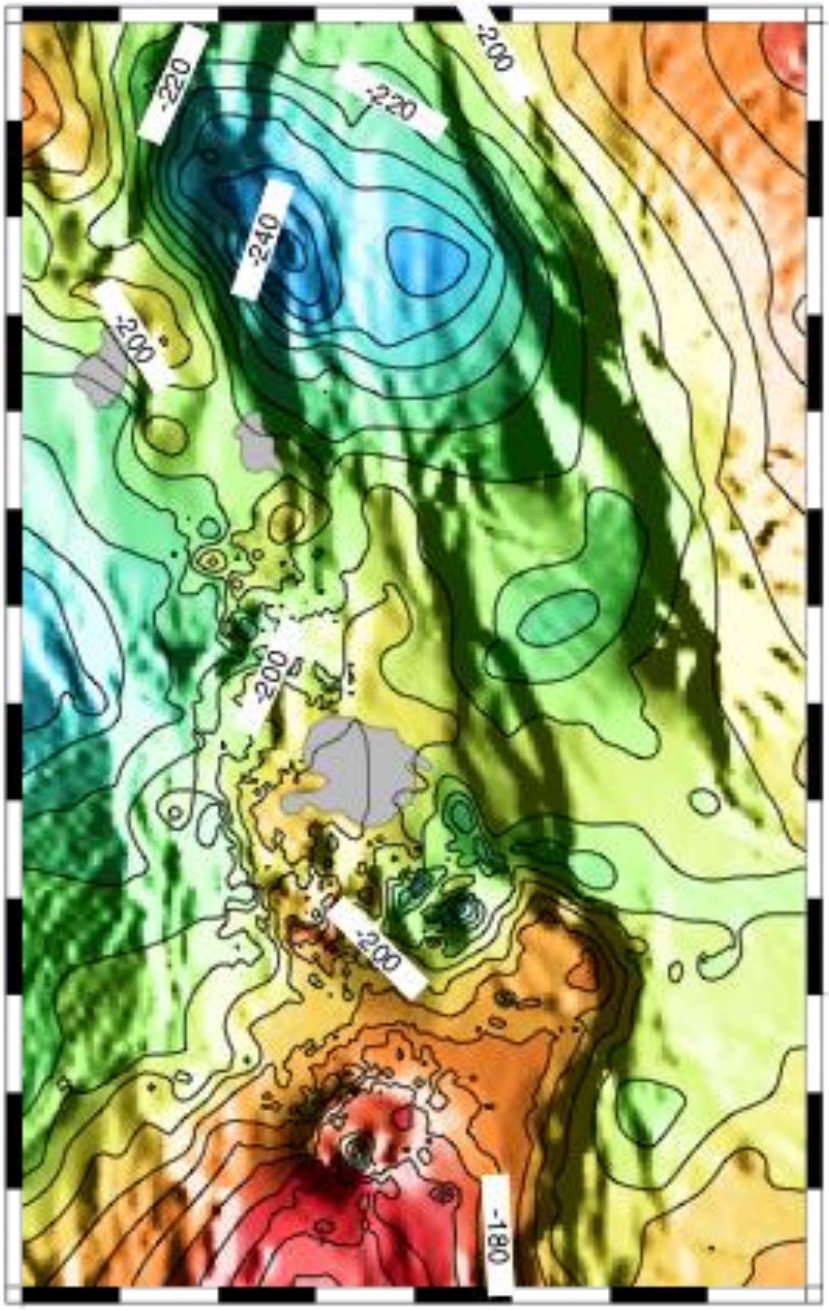
Example of the Omo Basin, SW Ethiopia





Priorities

- Collate and share existing academic, industry, and internal data bases, reports, and publications – some may be in climate change literature
- Inexpensive: Re-evaluate regional gravity and magnetic data. (Challenge is reduction to pole or equator for magnetic data near equator)
- Use new remote sensing tools
- Need rate information


-220
-220
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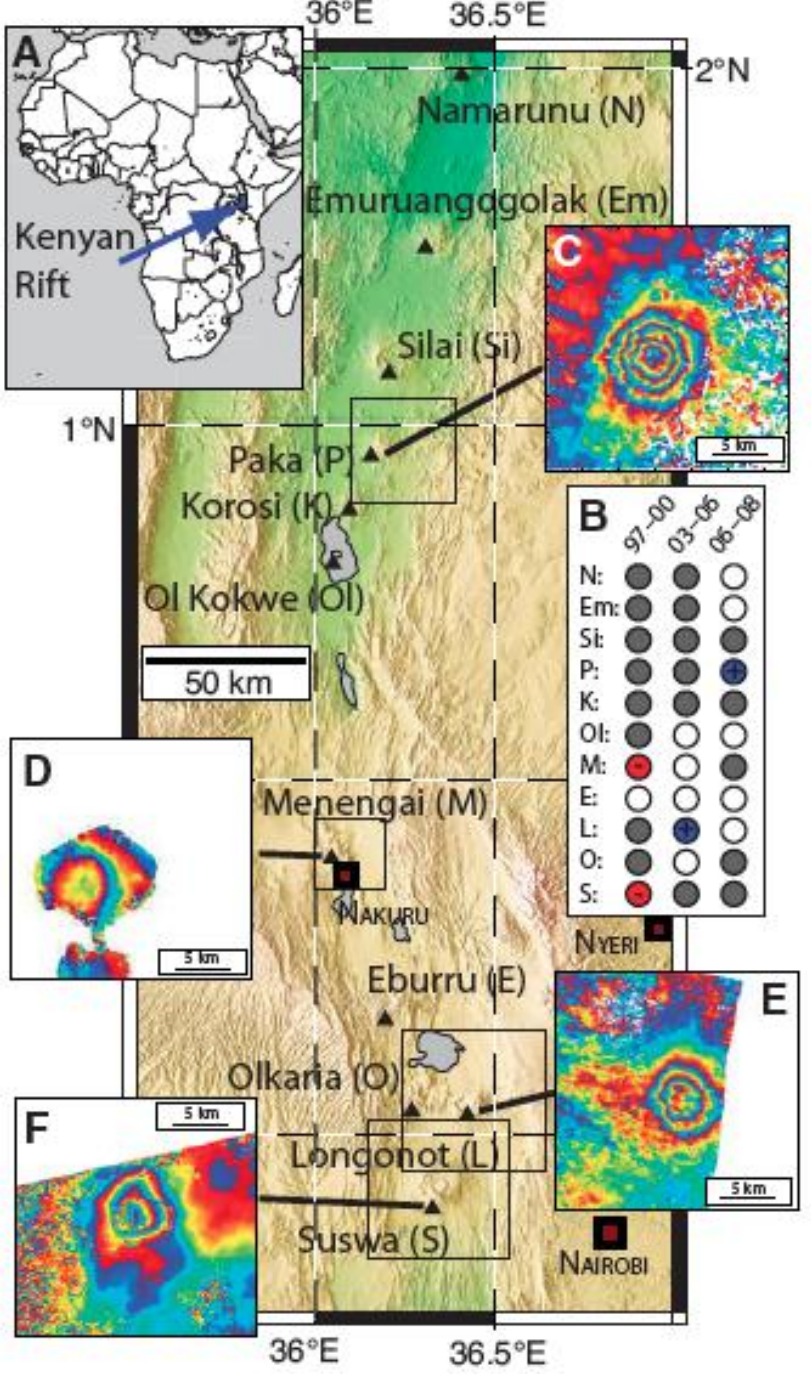
36°E
36.5°E
2°N
1°N
A
Kenyan Rift
Namarunu (N)
Emuruangogolak (Em)
Silai (Si)
C
5 km
Paka (P)
Korosi (K)
Ol Kokwe (Ol)
50 km
B
97–00
03–05
05–08
N:
Em:
Si:
P:
K:
Ol:
M:
E:
L:
O:
S:
D
Menengai (M)
Nakuru
5 km
Nyeri
Eburru (E)
E
Olkaria (O)
F
Longonot (L)
Suswa (S)
Nairobi
36°E
36.5°E

TABLE 1. KEY SOURCE PARAMETERS FROM ELASTIC MODELING FOR DEFORMATION EPISODES AT KENYAN VOLCANOES

Volcano	Date	U_z (cm)	Depth (km)	Radius (km)
Suswa	1997–2000	–4.6	1.9	3.7
Longonot	2004–2006	9.2	4.1	6.2
Menengai	1997–2000	–3.0	0.7	5.2
Paka	2006–2007	21.3	2.8	6.3

Note: The dates for each event represent the bracket of time during which the deformation occurred and likely overestimate the duration of the event. Uz is the peak vertical displacement. Depth and radius are given for the penny-shaped crack model, which provides a better fit to the data. A complete list of parameters and realistic error bounds is given in the supplementary information (see text footnote 1).

InSAR provides simple kinematic information