

East Africa O&G Exploration: Hints from Remote Sensing and Potential Fields data from Continental to Prospect scale

Fugro Gravity and Magnetics Inc.

Finding Petroleum

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Continents Below the Oceans ?



Presentation Outline











Tectonic Atlases





East Africa Rifts System – Regional Study



The project will use Landsat ETM+ data and Shuttle Radar Topographic Mission (SRTM) DEM data to complete regional interpretation of the larger rift system area.

Public Domain Gravity and Magnetic data will be used to complement the tectonic interpretation

The interpretation will map (mega) regional basement to assess:

- regional tectonic grain
- gross lithology

Regional Mapping at 1:500/200K scale





Regional interpretation: Basin-defining and intra-basinal faulting







Summary Map



Detailed mapping: From basin-bounding to minor faulting and fracture networks





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Defining detailed style and dip



Structure, stratigraphy and dip from imagery of the US (Oklahoma)



Geological Mapping from Satellite Imagery



Stratigraphidtanpageapicedatiating)



Tanganyka Region











The Sandwell & Smith Model



Sandwell & Smith Gravity Model



The latest Sandwell & Smith model (as of June 2008) is version 16 (a 1' by 1' grid).

Satellite Altimetry





The DNSC Models





Free Air Gravity Anomalies from Satellite Altimetry

The latest DNSC (Danish National Space Center) model was released in April 2008.

Gravity on land in the 1' by 1' grid uses model EGM2008.

5'×5' Δg Data Sources for EGM2008





- The Earth Gravitational Model is developed by National Geospatial Intelligence Agency (NGA) of the US for a variety of applications. EGM2008 replaces EGM1996.
- The mathematical tool used to build the EGM models is the spherical harmonic analysis. EGM2008 has a degree and order of 2160, i.e., the shortest full-wavelength of ~18 km.

From: N. K. Pavlis et al., 2008, A presentation at European Geophysical Union General Assembly.



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Seychelles Multi Client Project





Survey Lines





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Geology and Resolution





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ALL FALCON gravity is conformed to regional gravity



FALCON AGG and Conformed Gravity





Boggs & Dransfield, 2004; van Kann, 2004.

SLIDE 21 www.fugro.com

Example in West Africa



- Rifting (subsidence) → long wavelength gravity
- Shallow complex salt → short wavelength gravity
- FALCON gravity has both.



Schematic geology in similar area. (Cameron & Gill, Leading Edge, 2002)



Free-air gravity. (Satellite gravity overlain by Falcon gravity.)

Lamu Basin Transition Zone – Flow Energy





Figure 1. Location of the part of the Lamu Basin on global GTOPO30 data; black outline = L-6 permit block, blue lines = G07-LAM seismic survey; and red outline = Kipini FALCON[®] Survey.



Figure 2. Mapped seismic depth to Top Oligocene unconformity event within the L-6 block; red outline = FALCON[®] Survey area; black outline = L-6 permit block; fine black lines = G07-LAM seismic survey; black poly-lines = faults interpreted at this level.

Top Oligocene important event as it is recognized as a potential source rock or seal for older shales

Lamu Basin – Falcon Data





lines = gravity low edge/trend; red lines

edge/trend; bold black lines = major structure

lines = undefined lineaments.

palaeo-channels; red lines = dominant litho-magnetic unit/trend; green lines = secondary litho-magnetic unit/trend; bold black lines = major structure; dashed black lines = undefined lineament.

hold 500mmbls

Lamu Basin – Integrated Results





LEGEND

Seismic Faults Interpreted at Oligocene Unconformity Level

FALCON Lineaments

----- Seismically Correlated Fault - Vague

- Seismically Correlated Fault Distinct (Ambiguous Dip)
- Seismically Correlated Fault Well Defined With Inferred Dip

FALCON Lineaments - Extrapolated Onshore



Southern Kenya Aeromagnetic Project



Madagascar onshore basins





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A view from the ground



Our **FALCON** Gravity Gradiometer Was **Born to Fly**.



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