Geology and geothermal resource utilization options at Arus-Lake Bogoria prospect, northern Kenya rift

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Introduction

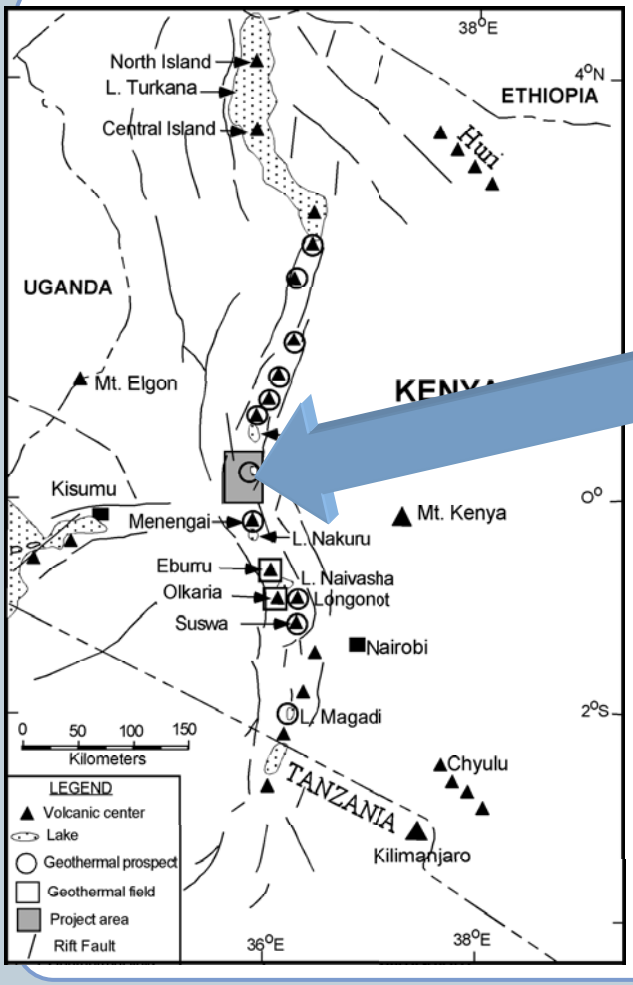
Blowout well close to L. Baringo

- 90 m borehole drilled for domestic water produced hot water 92°C (local BP) .
- Self discharged sprouting to a height of 50 m.

Objectives

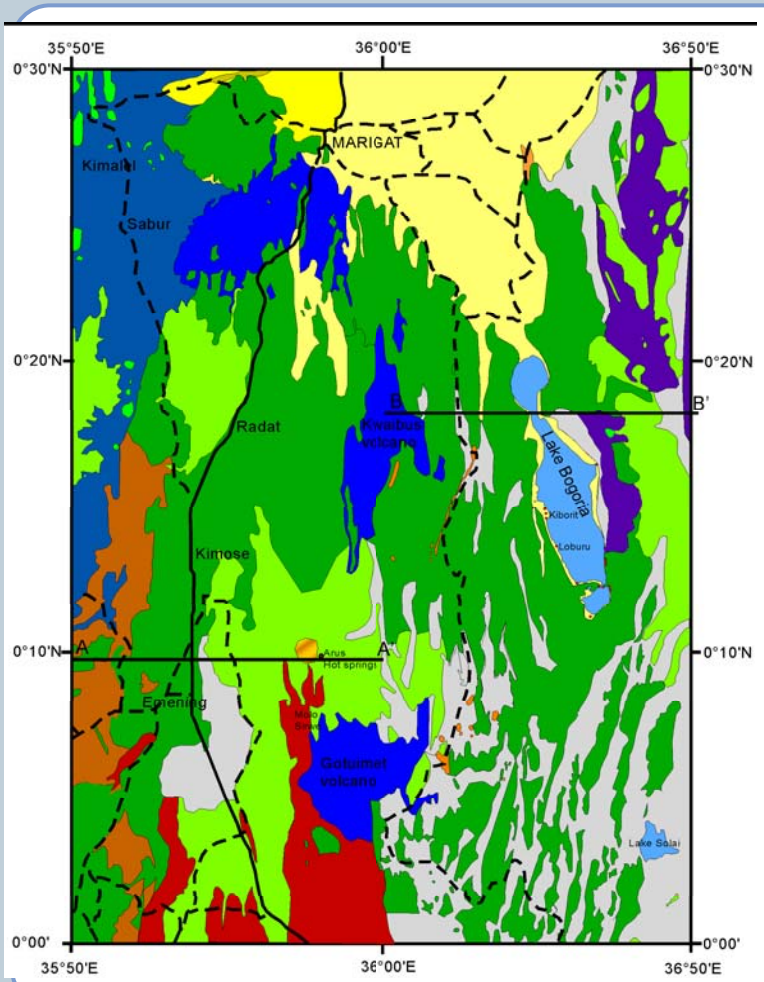
1. Investigate and examine/report all geologic features that may be associated with development, and occurrence of geothermal potential in Arus-Lake Bogoria.
2. Determine whether the prospect deserves further exploration by drilling and if so, recommend targets and sites for exploration drilling sites.
3. Recommend how best the geothermal resource could be utilized.

Location



- ***Northern Kenya rift.***
- ***North of Menengai prospect and south of Lake Baringo prospects.***
- ***Area extend more than 2000 km²***

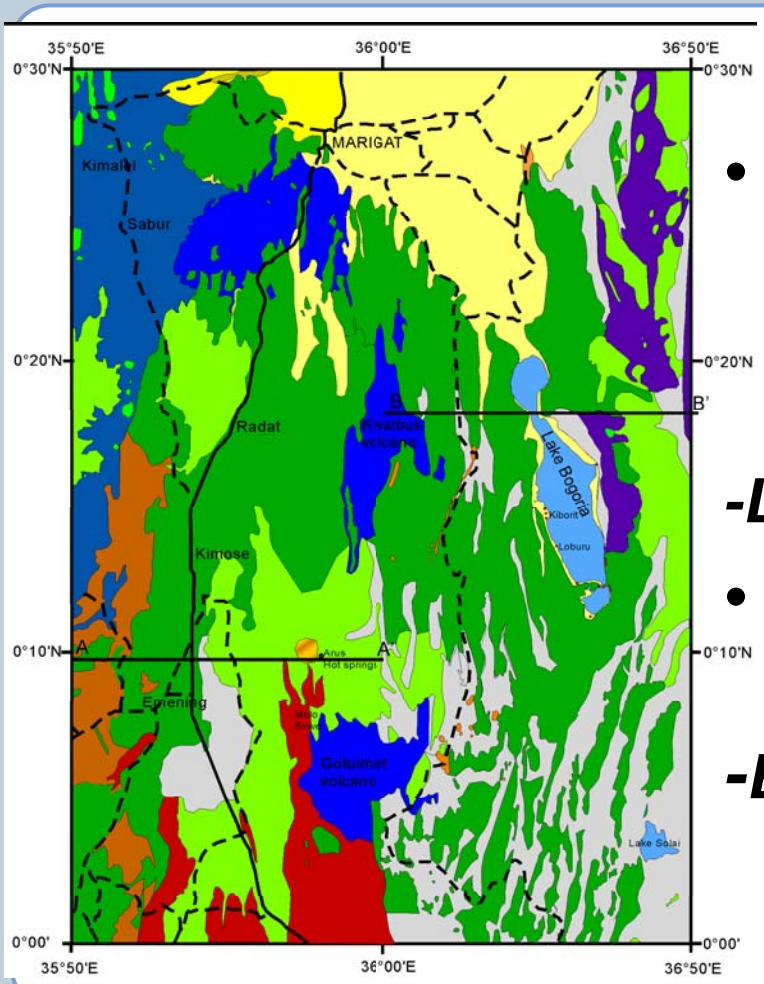
Geology...1



- ***Miocene;*** ***represented by Samburu basalts to***

- ***Recent;*** ***represented by Alluvial and fluvial sediments***

Geology....2

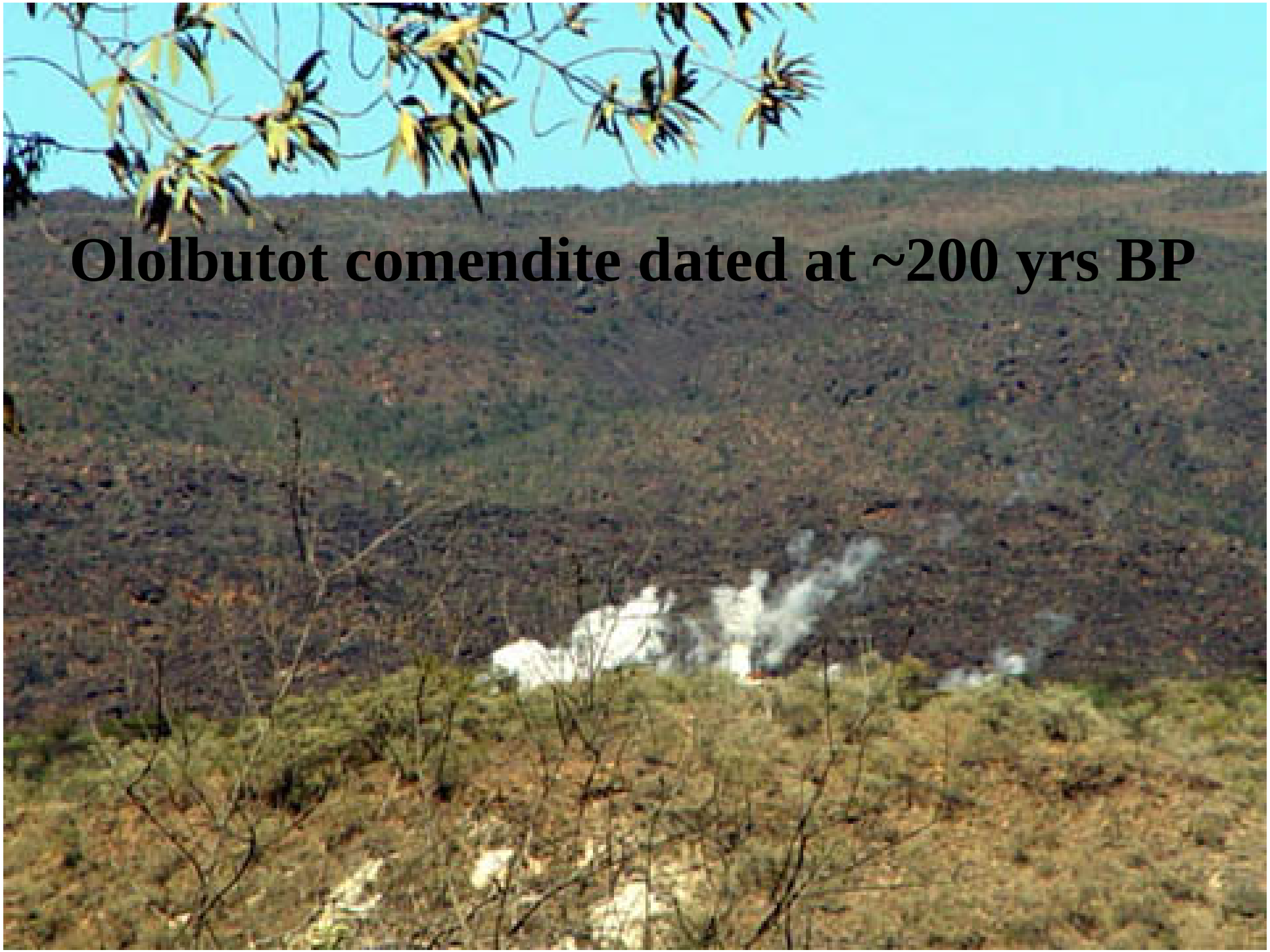


- ***Area has no young volcanic centre; the youngest eruptions dated about 2 Ma BP.***

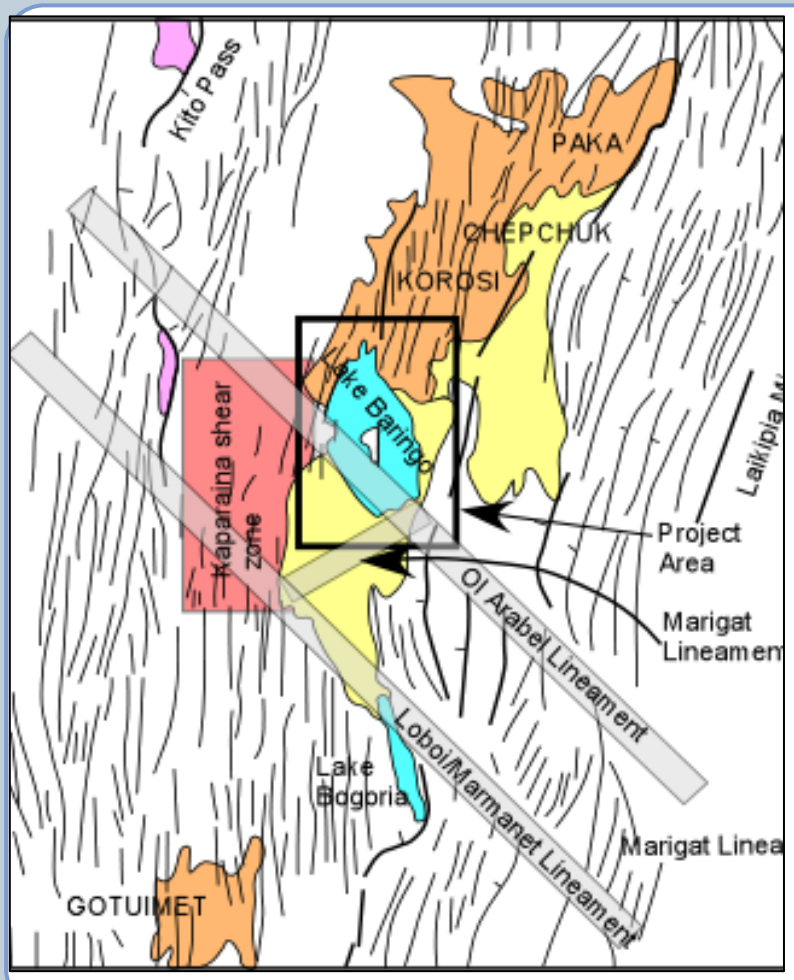
-Lake Bogoria trachytes

- ***Manifested by wonderful surface manifestations;***

-Existence of a geothermal system


Ololbutot comendite dated at ~200 yrs BP

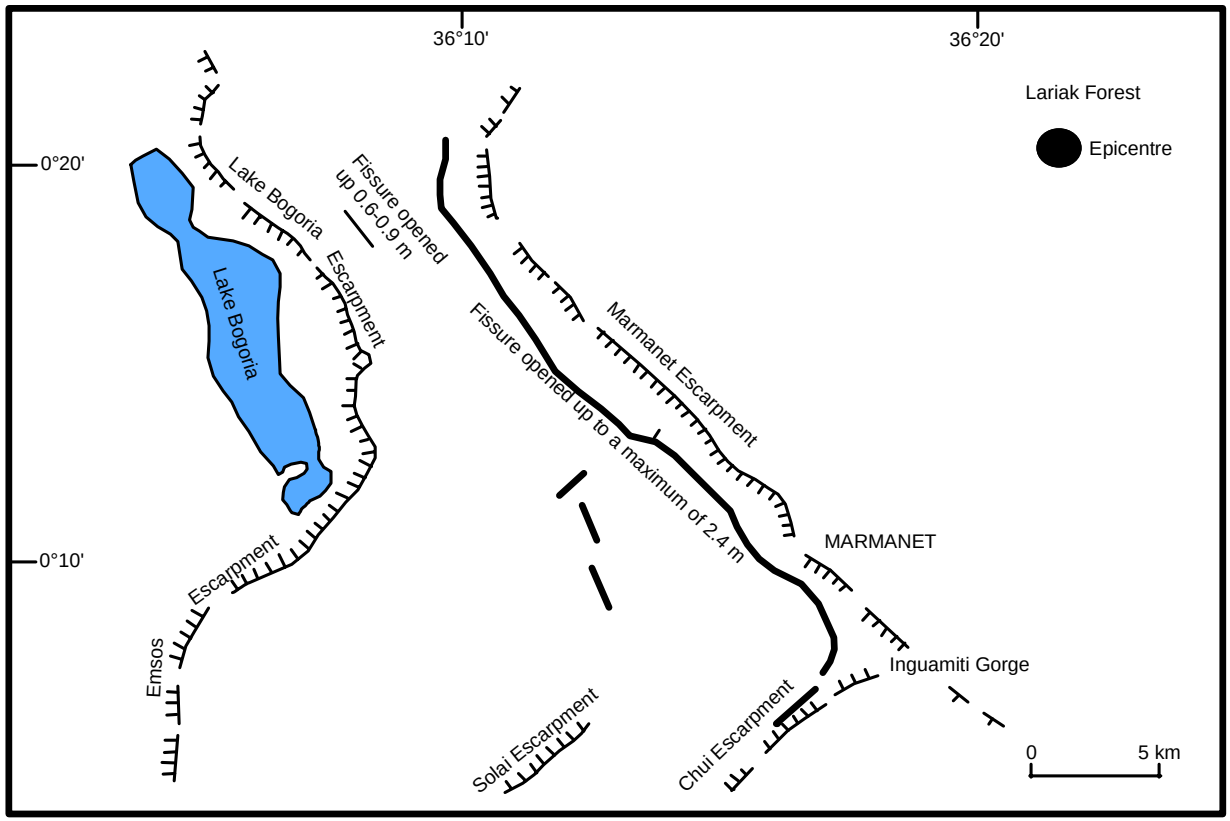
Structures



Main structures:

- *Rift flanks on E & W*
- *NNE-SSW and N-S faults.*
- *NW-SE & NE-SW lineaments*

Structures



Earthquake of Jan 28th 1928 indicate continuation of activity

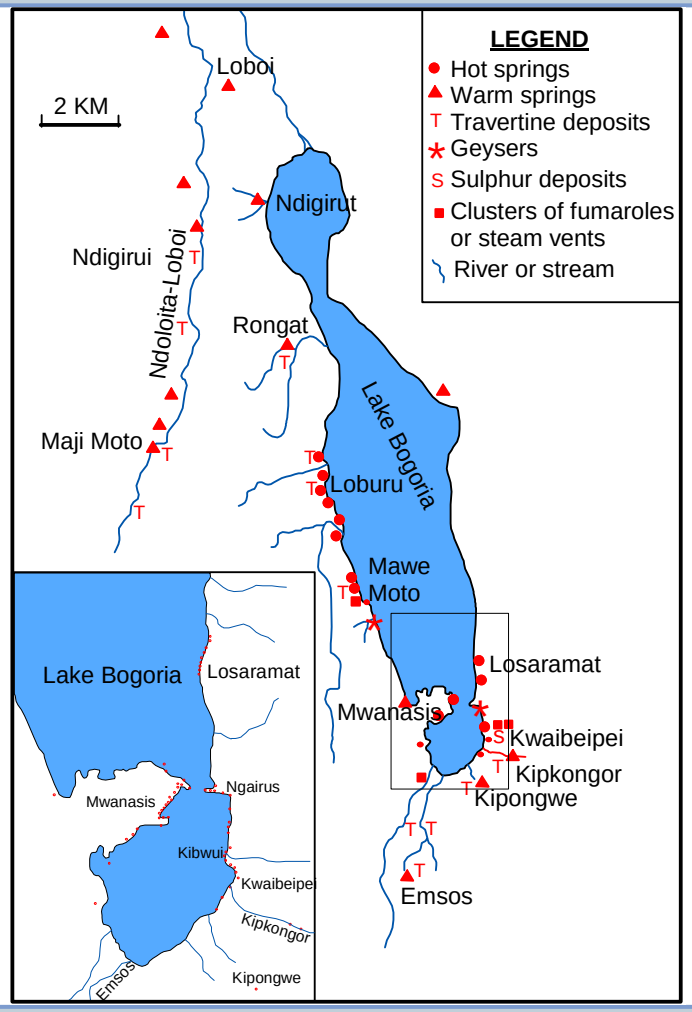
Fissure opening of up to 2.4 m were recorded.

Geothermal manifestations 1

Occur in forms of:

Fumaroles, hot and steaming grounds, anomalous boreholes, hot springs, steam jets, altered grounds and sulphur, calcite, travertine and calcite deposits

Geothermal manifestations 2



- ***Manifestations mainly occur on the southern parts of the lake***
- ***Occur in a linear arrangement indicating structural control***
- ***Temps range from 85-98 ˚C***

Geothermal manifestations

Steaming fumaroles at Arus

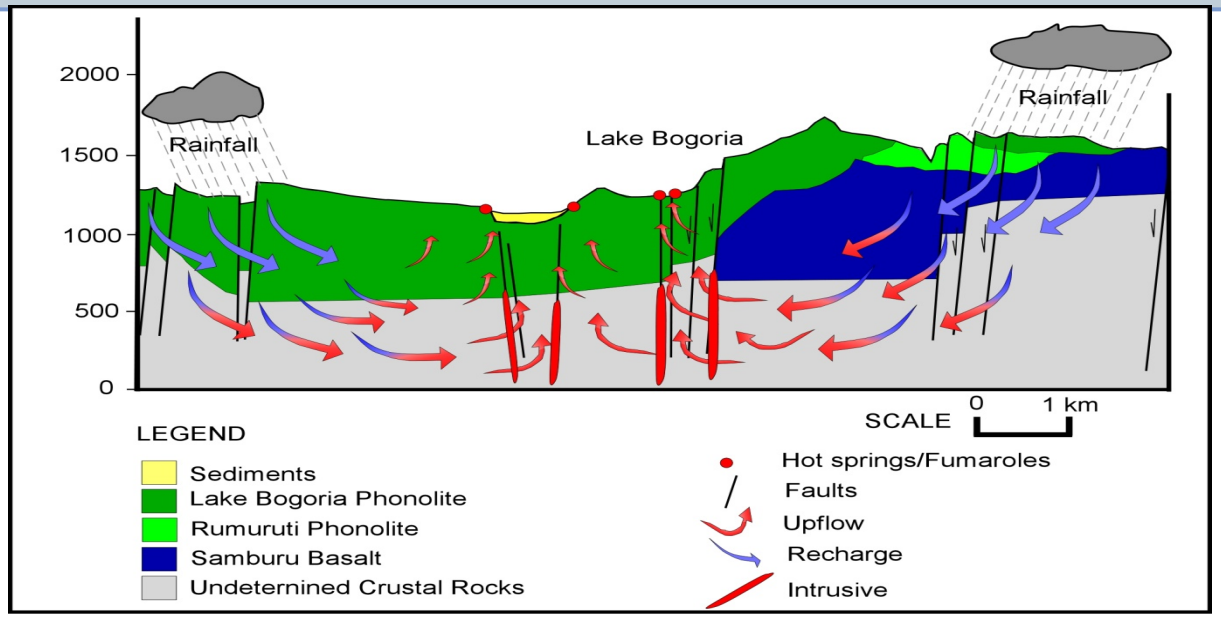
Silica veins near Arus

Geothermal manifestations

Steaming fumarole at Arus

At a closer look

Geothermal model



Heat source;Thin crust and shallow intrusives.

Recharge; Meteoric water -Kenya Rift Meteoric line

Reservoir rocks; Flood Plio-Pleistocene trachytes

Reservoir Temps; <200ºC from gas geothermometry

Curent utilization..1

Spa pool at L. Bogoria Hotel

- Hot water at 38°C from a near by hot spring used to heat the spa pool

Curent utilization..2

Tourist attraction

- Hot springs and flamingos add value to Lake Bogoria game reserve

Utilization options..1

1. Binary cycle electricity generation.

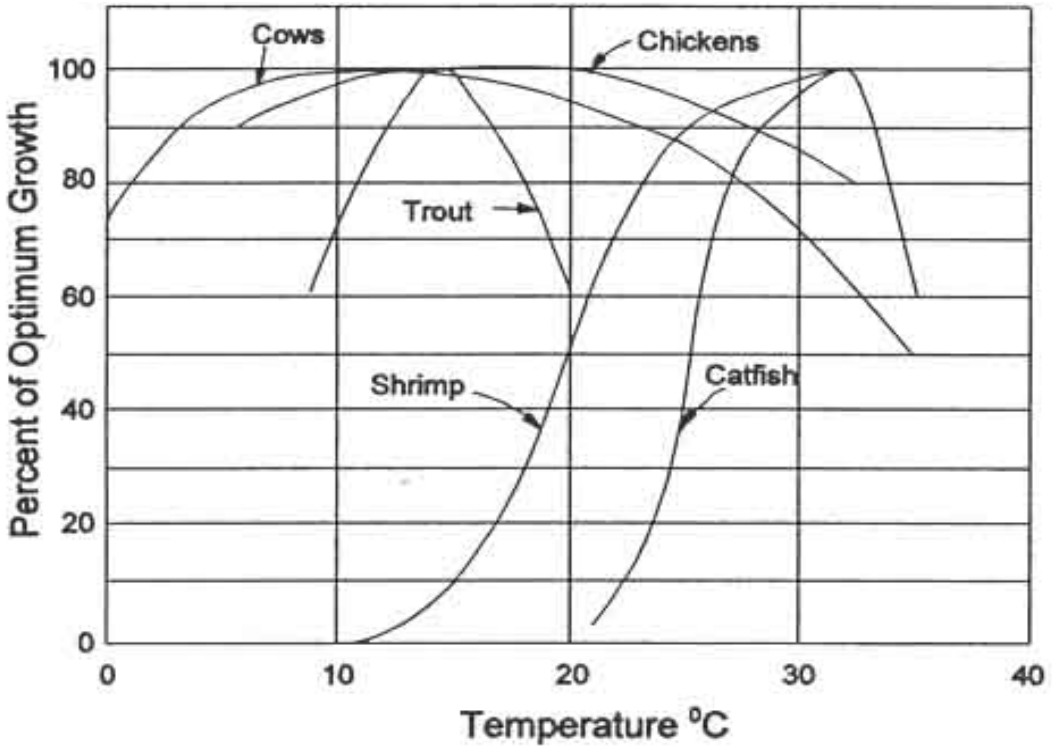
Utilization options…2

2. Swimming pools, bathing and balneology using natural springs.

3. Greenhouse heating in flowers and vegetables growing

Utilization options…3

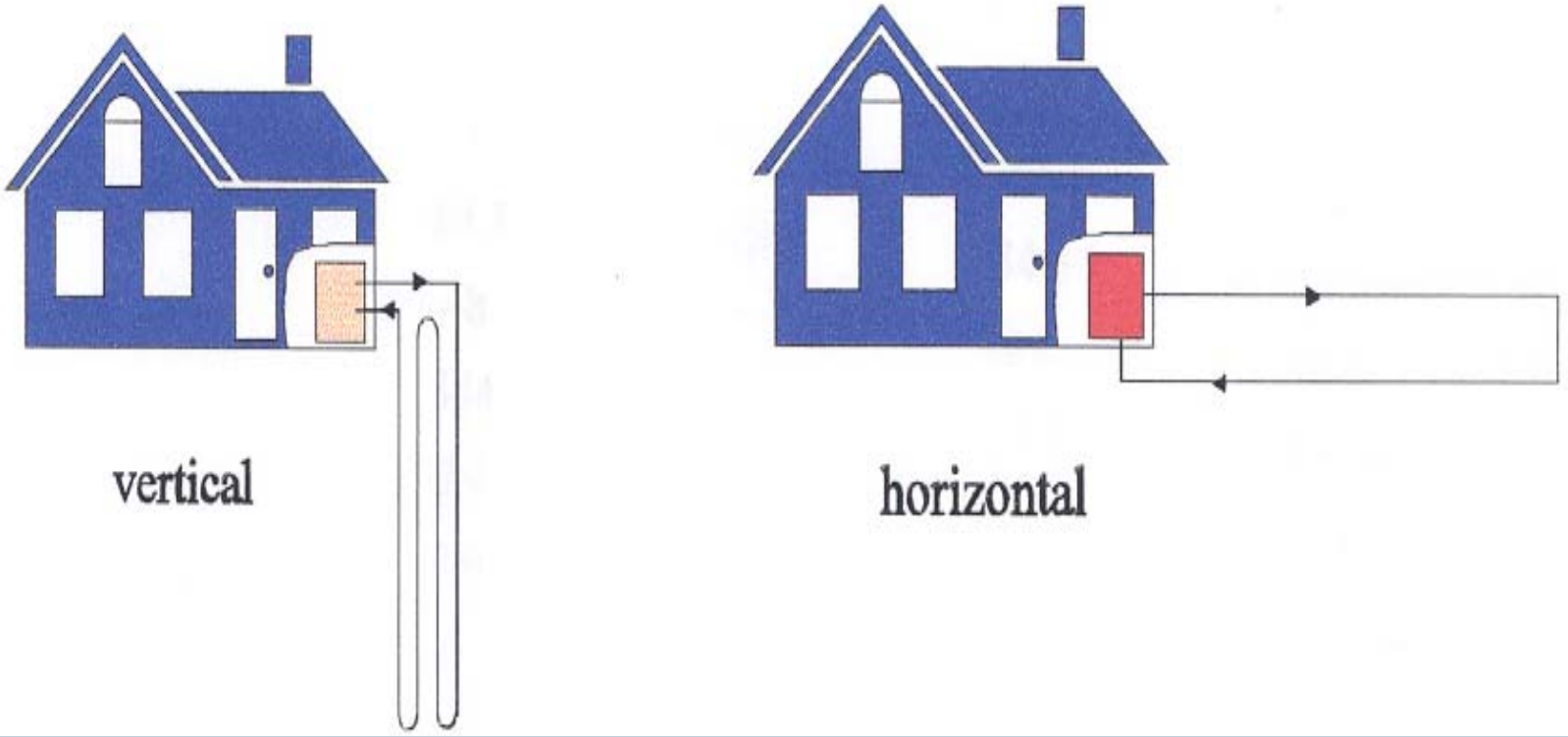
4. Aquaculture.



- Study on effects of temp. on animal and fish
- Require certain temperature for optimum growth.

Utilization options…3

5. Residential cooling by use of heat pumps-Ground coupled closed loops



Utilization options…4

6. Drying of agricultural produce:
    1. Drying of sisal
    2. Drying of fruits and vegetables
    3. Raw wool washing and drying

Utilization options…5

7. Industrial applications.
    1. CO_2 mining
    2. Wood industry

Conclusions

1. **Several low to intermediate fault controlled geothermal systems exist in the prospect area.**
2. **A huge potential of untapped low enthalpy energy resource is available in Arus-Lake Bogoria prospect area.**
3. **The geothermal resource in the prospect area can be utilized for electricity generation using binary and direct uses.**


Thank you for your attention