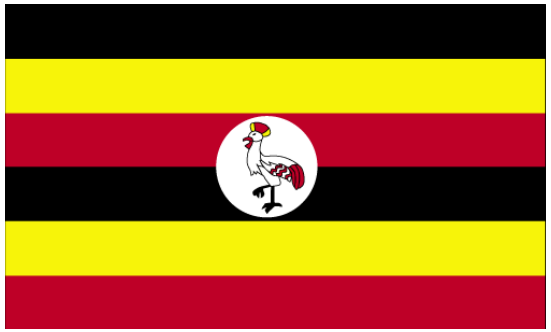
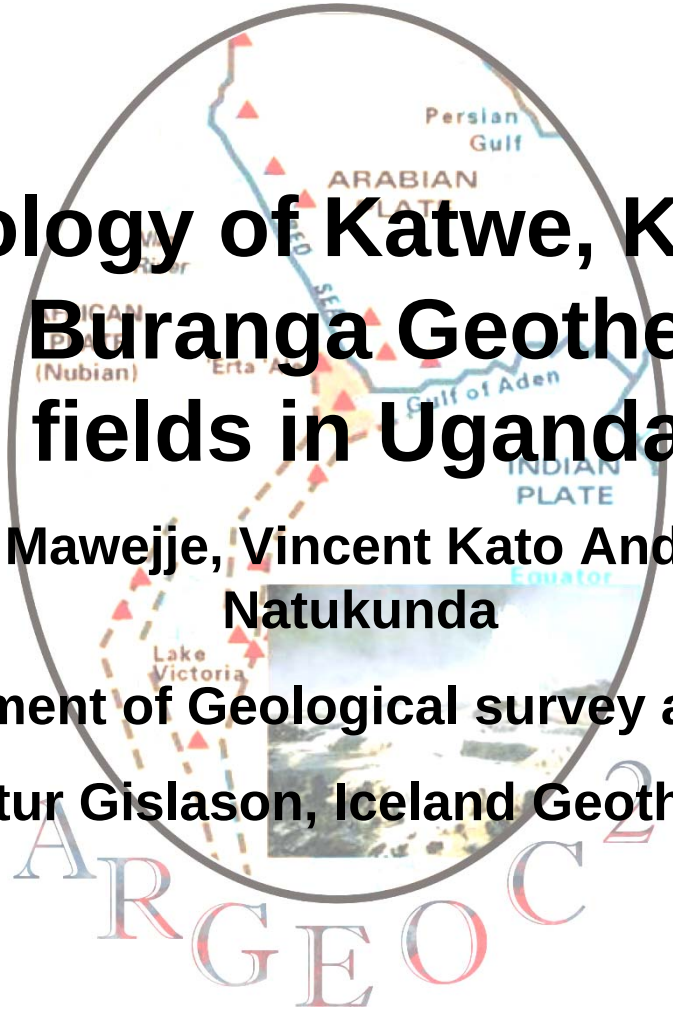


Geology of Katwe, Kibiro and Buranga Geothermal fields in Uganda

Peter Mawejje, Vincent Kato And James Natukunda

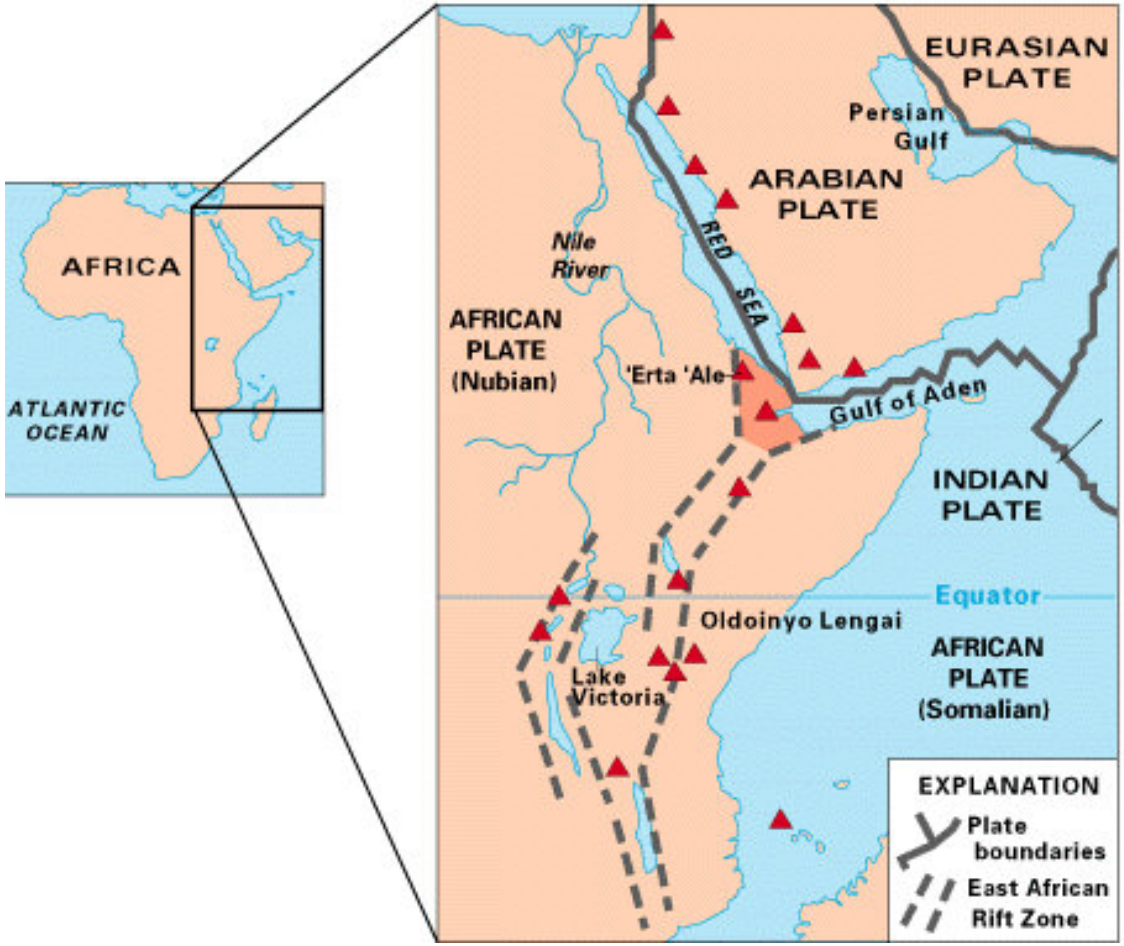
Department of Geological survey and mines

Gestur Gislason, Iceland Geothermal



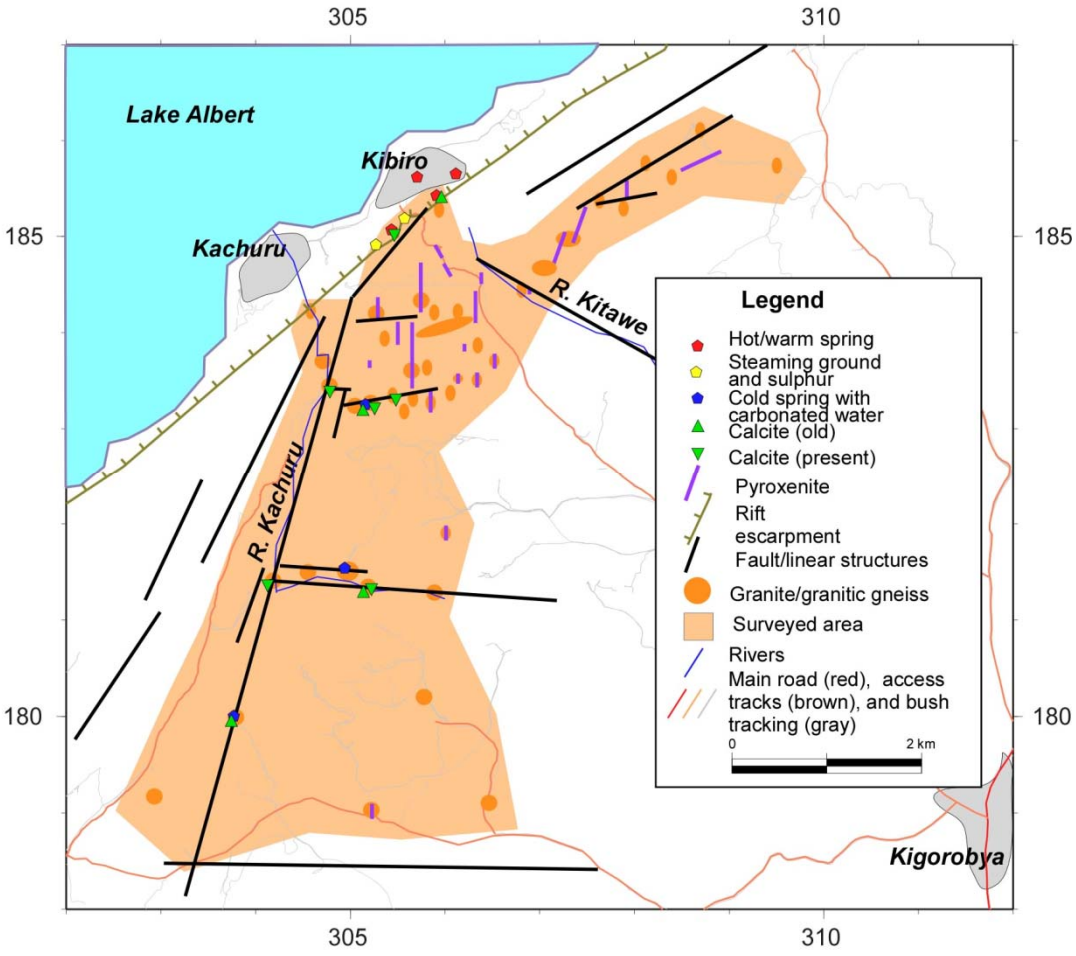
General geological setting

- Located in East African Rift System (EARS) – Gregory & Albertine Rifts
- All geothermal prospects located in Albertine Rift
- Geophy. Surveys indicate 2500 – 3000m thickness of sedts



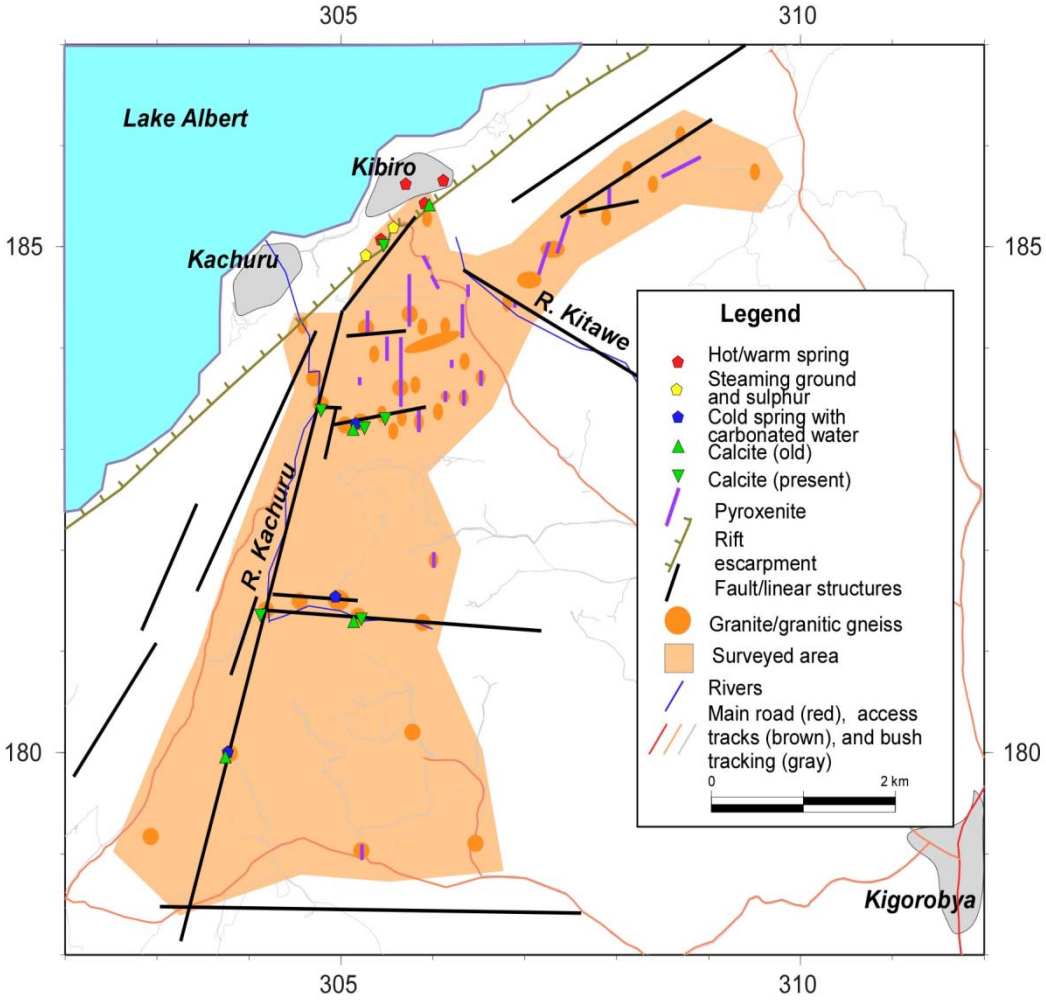
Kibiro - Geology

- Kibiro geothermal prospect is located at the Eastern escarpment of Albertine Rift
- Hot springs emerge at the escarpment, which forms a boundary between the old basement rocks (to the east) and the young sedimentary formation of the rift (to the west)
- Rift sedts - Miocene to Recent deposits:
  - Epi-Kaiso gravels ~ 20m thick
  - Kaiso beds – Predominantly arenaceous ~ 500m thick
  - Kisegi beds - Argillaceous



Kibiro Geology Contd.

- Oil exploration well (with crude oil) – 2Km NE Kibiro
- Basement consists of Precambrian acidic granites, granitic gneisses, gneisses & N-S striking basic diorite intrusives
- Mylonitic gneisses x-terise the fault controlled valleys
- NE striking faults oblique to main rift fault & crosscutting E-W striking faults occur
- All rocks are heavily fractured with cross-cutting joints



Mylonitic gneiss in Kitawe fault

Kibiro Surface manifestations

- Hot springs
  - At base of main fault escarpment
  - Issuing from boulders and gravels
  - Flow rate 4 l/s
  - Max. temp. 86.4^{o}C

Kibiro Surface manifestations contd.

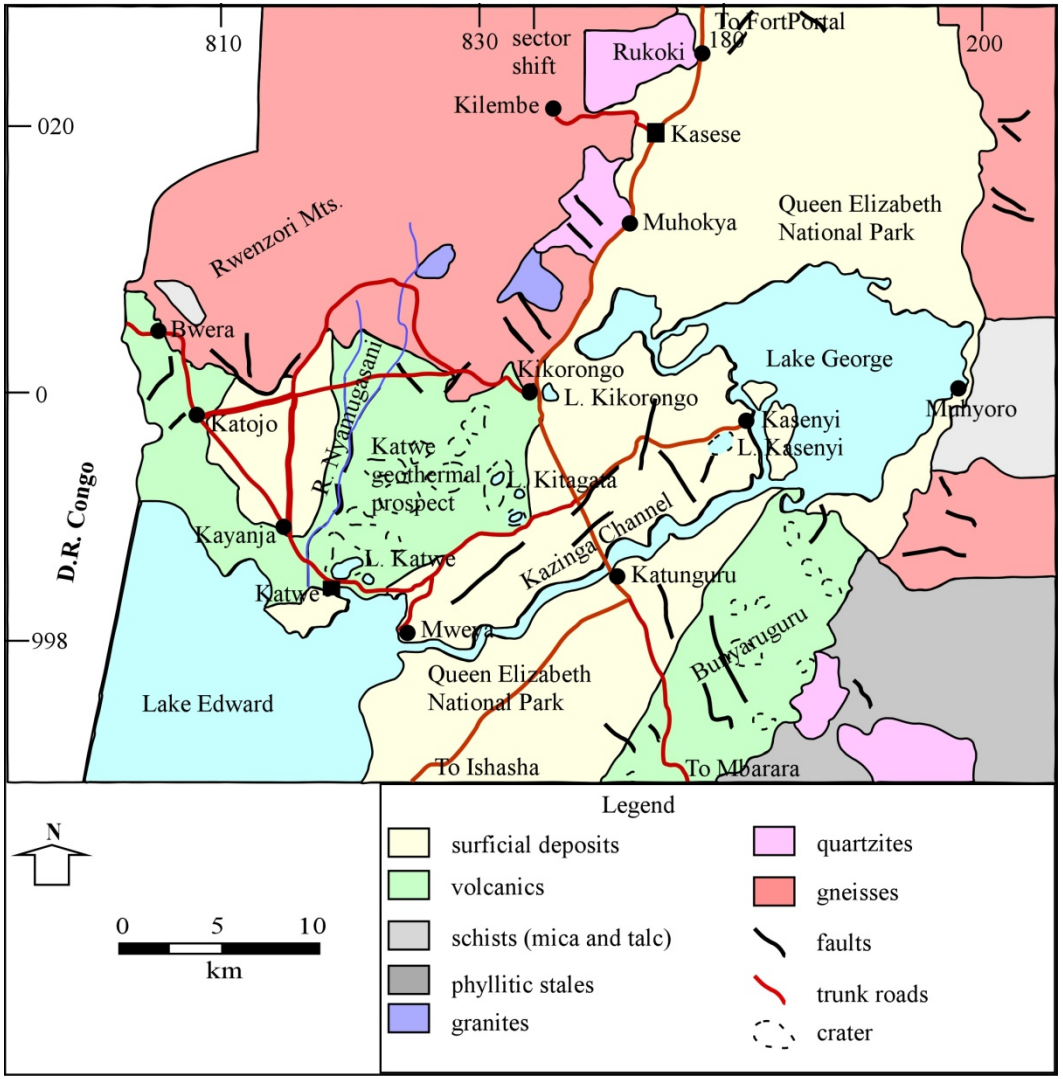
- Fumaroles
- Extinct clayey alterations

Kibiro Surface manifestations contd.

- Calcite - in altered mylonitic gneisses on escarpment

Katwe - Geology

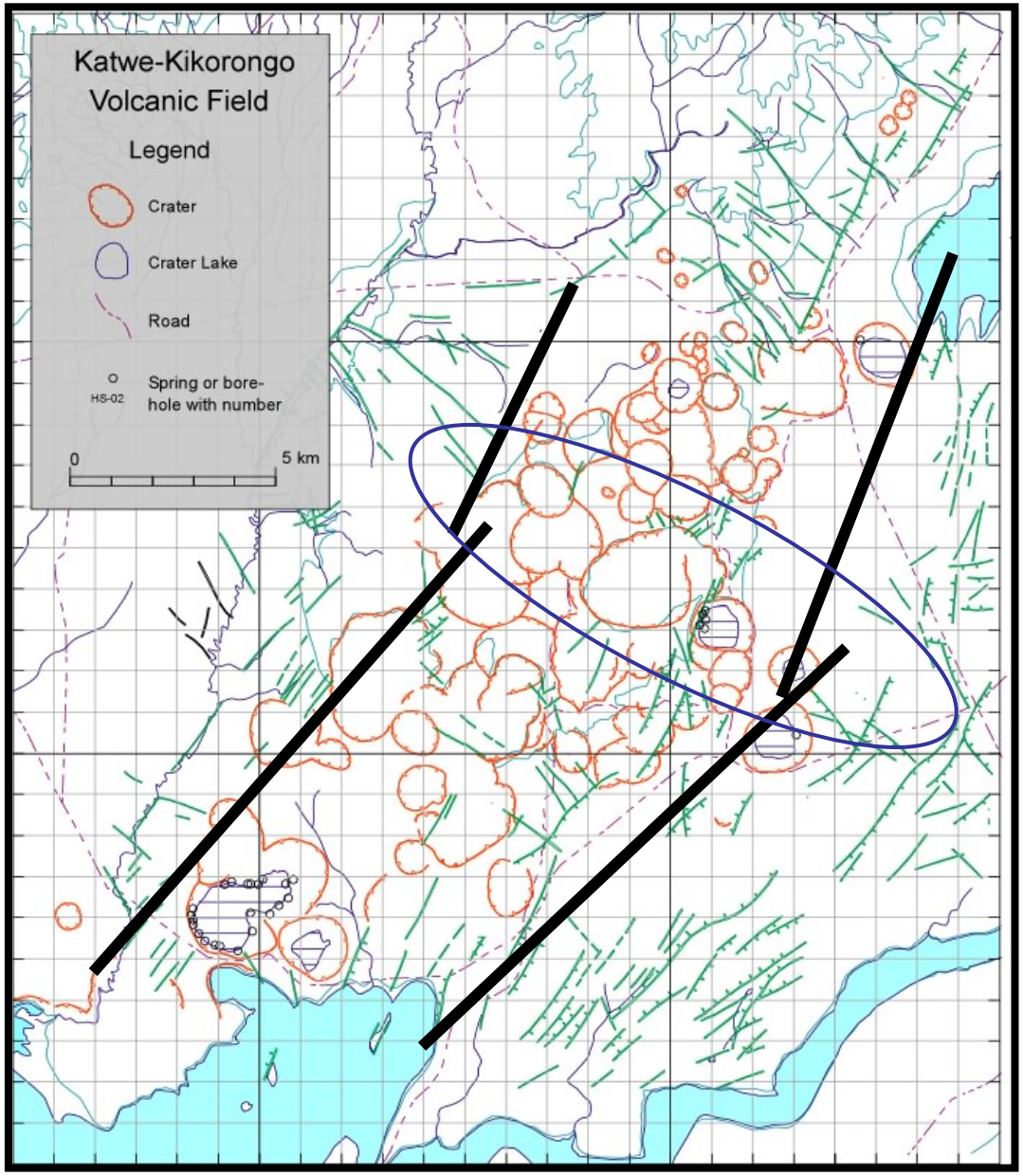
- Katwe-Kikorongo (K-K) - Volcanic field SE of Rwenzori massif
- 78 randomly distributed craters, 7 have water
- Deposited on Pleistocene sedts (Kaiso beds) &
- Precambrian rks of Toro system (mica, chlorite schists, quartzites, amphibolites & gneisses) – western side
- On eastern side, sedts are underlain by Karagwe-Ankolean (K-A) met. rks
- Part of eastern side is covered by Bunyaruguru Volcanics (tuffs with K-A rk fragts)



Katwe Geology Contd.

- K-K volcanics are mainly phreatomagmatic pyloclastic deposits – ash, tuff, lappili & volcanic bombs
  - Xenoliths of basement rks are common
  - basaltic lava flows around Kyemengo & Kitagata craters & occasional ejected lava blocks in tuff around other craters in the field
- Volcanic material pile up to 420m above surrounding sedts.
- Characterized by NE-SW striking faults – Not prominent
- Age (carbon dating) - Pleistocene to Holocene

Katwe – Structural map



Compacted volcanic tuff layers

- Xenolith of basement mafic rk

Shells of snails in volcanic tuffs

Ejected lava block

Amphibolite volcanic bomb

Katwe Surface manifestations contd.

- Hot springs
  - At L. Kitagata
  - Temp: 70.1^{o}C
- Warm springs
  - At L. katwe
  - Temp: 30.2^{o}C

Katwe Surface manifestations contd.

- Travertine deposits - indicate extinct hot springs
  - Occur at L. Katwe (15m high) & L. Kikorongo (big deposit)
- Fumaroles - Likely to have occurred at Nyindo zensi - NW of Kyemengo crater

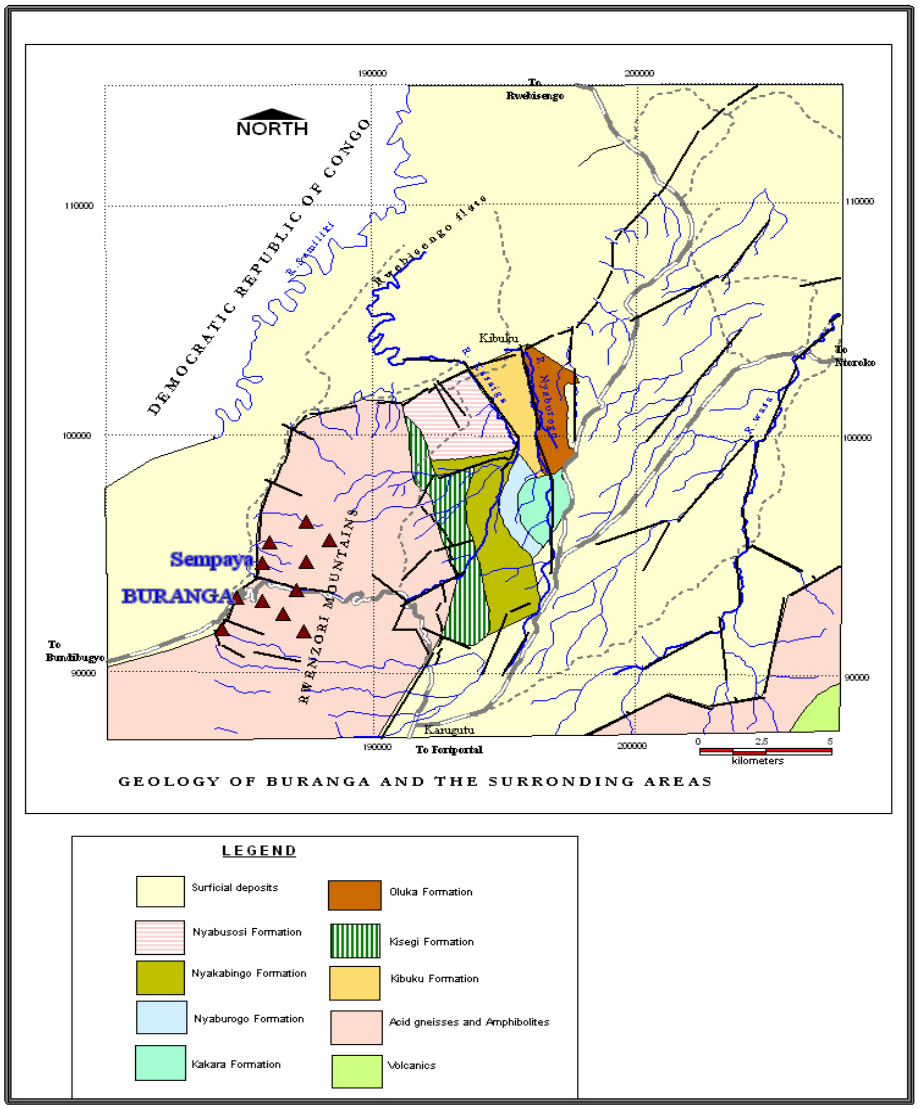
Buranga - Geology

- Located NW of Rwenzori massif at the base of Bwamba escarpment
- Hot springs emerge through sedts of Epi-Kaiso beds & Peneplain gravels which consists of boulders & unsorted scree overlying sands & clays – Kisegi sedts
- Sedts are underlain by Precambrian rks of main rift fault, which strikes 45^{o} & dips $60\text{-}65^{o}$
- Hot springs lie on a line striking 40^{o} parallel to main rift fault – fracture / fault

Buranga - Geology Contd.

- Precambrian rks:
  - Form northern half of Rwenzori massif
  - Consists of migmitites and gneisses
  - Strike 10-30^{o}
  - Have complex joint systems
- Tertiary rks (Miocene age):
  - Epi-Kaiso beds and Peneplain gravels - variable sands & gravels with irregularly distributed boulders containing sub-angular fragts.
  - The above is underlain by fine to medium-grained, poorly consolidated sands & clays, some coated with calcareous material

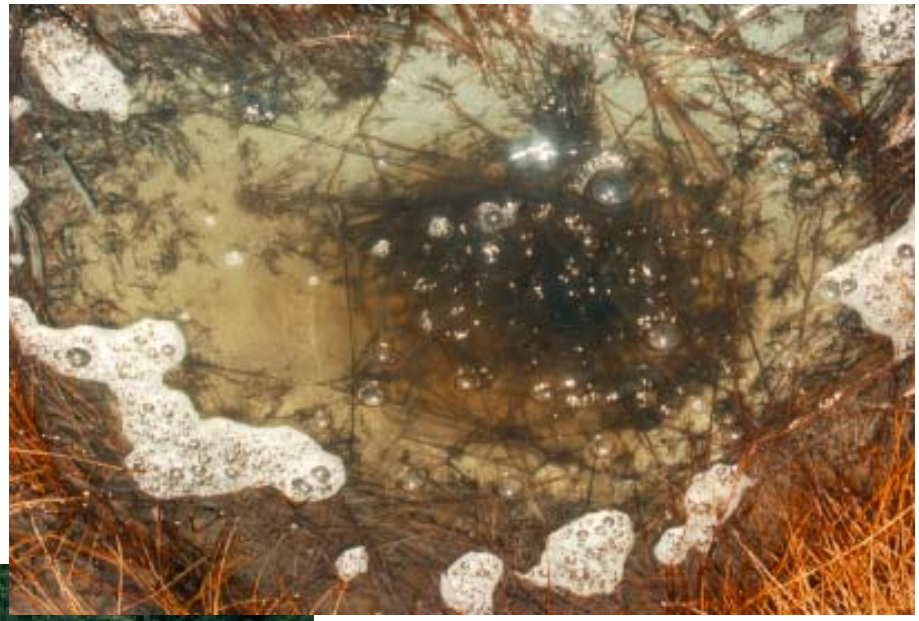
Geology map of Buranga area



Buranga – Geothermal manifestations

- Hot springs
  - Kagoro, Nyansimbe & Mumbuga
  - Max. Temp: 98^{o}C
- Travertine deposits
- Sulphur deposits at Kagoro spring

- New manifestations like hot springs - Nyansimbe




Thank You !