Geology of the Suswa Region, Kenya

GEOLOGIC HISTORY

PLEISTOCENE:
Kedong Flood (100 ka): sand and fine gravel that covers the Ol Tepesi plain to the south. Evidence for a flood is given by Baker & Mitchell (1976), and the source was likely the sudden emptying of a lake that filled the Kedong Basin in the map area.

Suswa (0.1 - 240 ka): trachyte & trachyphonolite shield volcano with some recent eruptive material still unvegetated. The post-caldera lava cone Ol Doinyo Onyoke/Nyukie marks the overall summit at 2356m.

SQv: Reworked pyroclastic material
S9: Recent phonolite lava
S8: Late, post caldera phonolite lavas
S7: Post caldera pyroclastics and phonolites
S6: Early post caldera phonolite lava flows (0.1 +/- 0.01 Ma)
S5: Enkorika fissure trachyte flows and domes
S4: Western Pumice Group; trachyte pumice lapilli fall tuffs
S3: Ring Feeder Group; trachyte agglutinate flows and phonolite
S2: Syncaldera pyroclastics; trachyte, carbonatites, trachybasalts
S1: Precaldera lava shield trachytes

Longonot (0.2 - 400 ka): trachyte stratovolcano and associated deposits. Materials exposed in this map section are comprised of the Longonot Ash Member (3.3 ka) and Lower Trachyte (5.6-3.3 ka). The trachyte lavas were related to cone building, and the airfall tuffs were produced by summit crater formation (Clarke et al. 1990).

Akira Pumice (5-18 ka): trachytic pumice and ash beds created by plinian eruptions at Longonot. Composed of 5 Members, both fall and surge deposits are recognized (Clarke et al. 1990).

Kedong Valley Tuff (20-40 ka): trachytic ignimbrites and associated fall deposits created by caldera formation at Longonot. There are at least 5 ignimbrite units, each with a red-brown weathered top. In some regions the pyroclastic glass and pumice has been replaced by calcite (Clarke et al. 1990).

Akira Basalt: benmoreite and mugearite lava flows with pyroclastic, scoria, and spatter cones (Clarke et al. 1990). Youngest cone is unvegetated and may only be a few hundred years old (Macdonald et al. 2008).

Tandamara Trachyte: welded pyroclastics and some lavas (or rheomorphic ignmibrites) associated with the local elevation highs of Tandamara (Olomoroj) and Lolkidongoe (Clarke et al. 1990). Geographically associated with the Lolonito and Akira Basalts (Macdonald et al. 2008).

Lolonito Basalt (<0.45 Ma): vesicular basalt and trachybasalt, this is a possible earlier phase of the Akira Basalt (Macdonald et al. 2008).

Barajai Trachyte: (0.37-0.41 Ma) five aphyric trachyte flows distinguished from the Plateau Trachytes by Baker et. al (1988) based on element ratios; otherwise they are indistinguishable in hand sample. May be earliest eruptive products from Suswa. The mapped areas have been tentatively located around the Barajai Gorge based on the written description of extent in Baker et. al (1988).

Maiella Pumice: trachyte and possible panterllerite pumice and ash fall deposits. Probably plinian eruption products from centers of the Olkaria Complex to the north (Clarke et al. 1990).

Mau Ashes (est. 0.6 Ma): comendite pyroclastics that blanket a large portion of the western rift flank. These ashes are particularly well exposed where the Ewaso Ngiro river cuts through the rift escarpments (Crossley and Knight 1981).

Mosiro Basalt (0.6 Ma): transitional basalt with rare plagioclase phenocrysts up to 1.5cm length. Fissural eruption from/near the Mosiro fault (Crossley and Knight 1981).

Plateau/MagadiTrachyte: (0.8-1.4 Ma) peralkaline flood trachyte that is very prominent between Suswa and Lake Natron in Tanzania. One of several expansive "flood trachytes" that cover the rift floor.

Ol Tepesi Basalts (1.4-1.65 Ma) and Benmoreites (1.42Ma): these two formations were distinguished by Baker & Mitchell (1976) from the Ol Keju Nero and Singaraini basalts based on age. The benmoreite flow is at least 150m thick and features distinctive tabular and rhombic feldspar phenocrysts in a granular matrix.

N. Kordjya Trachyte: (1.45-1.7 Ma) intercalated with upper members of the Kordjya Basalt and has surface textures resembling the Ewaso Ngiro Trachyte. Has abundant phenocrysts up to 2 cm in size. Previously mapped by Baker (1958) as Orthophyre Trachyte.

Mosiro Trachyte (1.9 - 2.3 Ma): comenditic trachytes with radial feldspar clusters (glomeroporphyritic texture). Similarities with the Limuru Trachytes in texture, age, and geochemistry, led Baker et al. (1988) to correlate these formations.

Ewaso Ngiro Trachyte (2-2.2 Ma): peraluminous trachyte with abundant phenocrysts up to 2 cm. This trachyte was erupted as a single thick flow against the Lengitoto fault scarp which it locally overtopped. This flow was previously mapped by Baker (1958) as "Orthophyre trachyte".

Limuru Trachyte and pantellerite (1.94 - 2.64 Ma): contains characteristically clustered groups of K-feldspar phenocrysts, tends to form bouldery outcrops, and grades upwards into pantellerite (Baker and Mitchell 1976). These were erupted as a series of conformable flows with reverse polarity, that overtopped the escarpment to the east. A thickness of 400m is exposed in the eastern rift escarpments (Baker et al. 1988).

MIOCENE
Lengitoto Trachyte: (5.0-6.9 Ma) peralkaline, comenditic, trachytes erupted onto the floor of the early rift (Crossley & Knight 1981). Samples indicate normal magnetic polarity (Crossley 1979).

BASEMENT SYSTEM:
Metamorphic rocks are not exposed in this map area.

Above: Location of presented geologic map (grey-square) in relation to the major rift bounding faults and Lake Turkana.

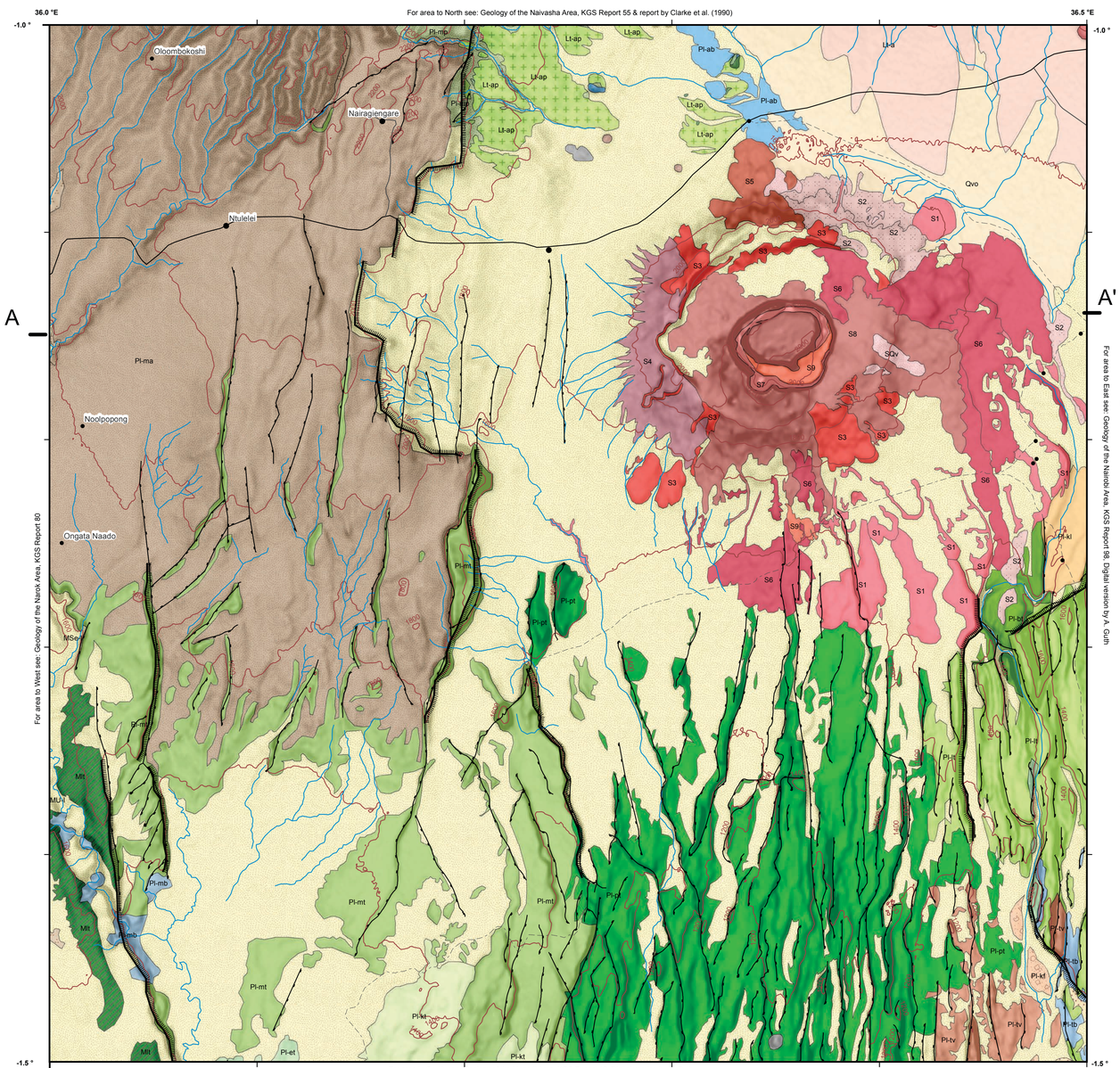
Cross Section Legend

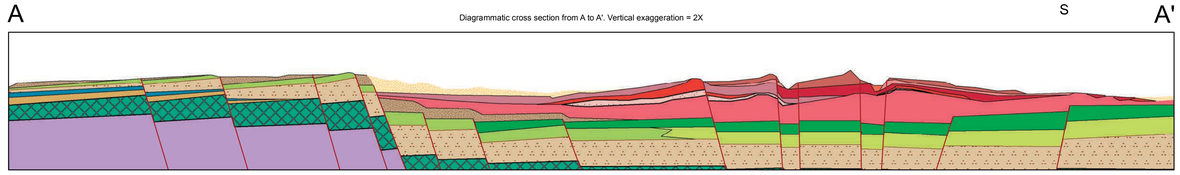
- Ash, soil, lake beds
- Mau Ash

Suswa Volcanics
- S9
- S8
- S7
- S6
- S4
- S3
- S2
- S1

Plateau Trachytes
- Magadi Trachyte
- Limuru Trachyte
- Mosiro Trachyte

Sub-Plateau
- Kinangop Tuff
- Basalt
- Ashes
- Miocene Phonolites
- Basement





Legend

Sediments

Holocene-Upper Pleistocene
- Qvs Volcanic soils
- Qvo Volcanic Outwash,
- Alluvial fan
- Pl-kl Kedong Lake
- Lacustrine Sediments
- Kedong Flood

Volcanics

Pleistocene (Upper)
- Pl-cv Cinder cones

Pleistocene (Ionian)
- Pl-ab Akira Pumice
- Pl-ab Akira Basalt
- Pl-lb Lolonito Basalt
- Pl-kvt Kedong Valley Tuff
- Pl-bt Barajai Trachyte
- Pl-tat Tandamara Trachyte
- Pl-mp Maiella Pumice
- Pl-ma Mau Ashes
- Pl-mb Mosiro Basalt

Longonot
- Lt-t Longonot
- Lt-a Ashes & Pumice

Suswa
- S1
- S2
- S3
- S4
- S5
- S6
- S7
- S8
- S9
- SQv Reworked Ash
- Scoria cones

Pleistocene (Calabrian)
- Pl-gt Gesumeti Trachyte
- Pl-gt Magadi Trachyte
- Pl-tv Tepesi Benmoreite
- Pl-tb Tepesi Basalt
- Pl-tv Limuru Pantellerite
- Pl-kt North Kordjya

Pleistocene (Gelasian)
- Pl-mt Mosiro Trachyte
- Pl-et Ewaso Ngiro Trachyte
- Pl-lut Limuru Trachyte

Pliocene
- Mau Tuffs

Miocene
- MlT Lengitoto Trachyte

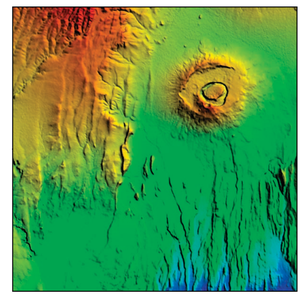
- faults-large
- faults-small
- City
- Town
- Village
- rivers
- 200m-contour
- Road-major
- Road-minor
- Road-track

STRUCTURE
The southern part of the area is cut by numerous "grid faults" that run roughly parallel to each other in a north/south fashion through the center of the rift. These post-date the eruption of the Plateau Trachytes, but generally do not cut the Suswa volcanic pile.

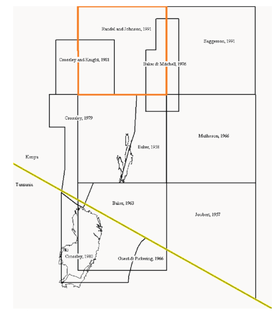
ECONOMIC DEPOSITS
Guano deposits are found in lava-tunnels on Suswa, and the Munyu wa Gicheru deposits (1.65 - 1.96 Ma) on the eastern edge of the Kedong basin (Trauth et al. 2007) have been quarried for diatomite (east of the map area).

WATER RESOURCES
Rivers from the Mau Highlands are generally perennial, as is the Ewaso (Uaso) Ngiro river. The Kedong river is likely seasonal, and the southeast section of this area has poor water supplies. Omenda (2007) reports that the water table in the rift floor is quite deep, possibly over 300 m.

GEOTHERMAL PHENOMENA
Steam jets are associated with Suswa, and this area may have potential for geothermal energy production, as Omenda (2007) suggests temperatures are in excess of 250°C at depth. Biggs et al. (2009) recognized periodic inflation/deflation of several rift volcanoes including Suswa, which is interpreted as the result of an active magmatic system. Elevated carbon dioxide soil gas and an active fumarole are associated with Mt. Margaret, a small trachytic cone just to the east of this map (Clarke et al. 1990).



Colored DEM with hillshade for the mapped region.
Elevation range from 1004 - 2576m (blue - red).



Reference map showing the source maps and their geographic coverage

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Geological Map of the Southern Kenya Rift

contour interval 200m

Location: Suswa, Kenya 36.0 E - 36.5 E, 1.0 S - 1.5 S	A. Guth, J. Wood (2013)
Coordinate System: Geographic WGS84	Michigan Technological University

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