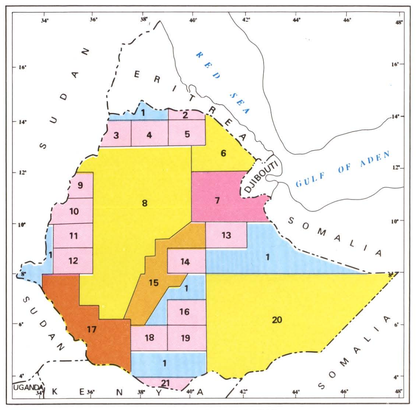
GEOLOGICAL MAP OF ETHIOPIA

Scale 1:2,000,000

20 10 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 Kilometers

20 10 0 20 40 60 80 100 120 140 160 180 200 Statute Miles



MAIN SOURCES OF COMPILATION

1. **Geological Map of Ethiopia,** 1:2,000,000. Compiled by V.Kazmin (UN) 1972, MME.
2. **Geological Map of Adigrat Sheet (ND 37-7),** 1:250,000. Compilation by C.R. Garland (1972) Recompilation with ERTS data by V. Kazmin (1976) EIGS.
3. **Geological Map of Adiametsi Sheet (ND 37-8),** 1:250,000. Geology and compilation by Abera Aguma and Girma Kebede (1974-1976) EIGS.
4. **Geological Map of Adiarkay Sheet (ND 37-10),** 1:250,000. Preliminary compilation by Tesgaye Hailu (1975) EIGS.
5. **Geological Map of Mekele Sheet (ND 37-11),** 1:250,000. Geology and compilation by Y. Arkin et.al. (1968-1971). EIGS.
6. **Geological Map of the Danakil Depression (Northern Afar, Ethiopia)** 1:50,000 CNR-CNRS (1973).
7. **Geological Map of Central and Southern Afar (Ethiopia and Djibouti),** 1:500,000 CNR-CNRS (1975).
8. **Geological Map of Ethiopia and Somalia** 1:2,000,000 by Merla Gt., Abate E., Conti P., Segart M., Tacconi P. (1973)
9. **Geological Map of Abu Ramla Sheet (NC 36-4, NC 36-8)** 1:250,000. Compiled by Alemayehu Gudaya (1989) Unpublished, EIGS.
10. **Geological Map of Kurmuk Ascsa Sheet (NC 36-7 & NC 36-8)** 1:250,000. Compilation by Mengesha Tefera (1990) Unpublished, EIGS.
11. **Geological Map of Gimbi Sheet (NC 36-12)** 1:250,000. Preliminary draft compilation by Amenti Abraham (1984), Unpublished, EIGS.
12. (a) **Geological Map of Gore Sheet (NC 36-16)** 1:250,000. Compilation by Mengesha Tefera and Seife M.Berhe (1987). EIGS.
    (b) **Geology of the Gore-Gambela Geotraverse Area, Western Ethiopia** 1:100 000. Compiled by J.M. Moore, Teklewold Ayalew and J.M. Morgan, 1989.
13. **Geological Map of Dire Dawa Sheet (NC 37-12)** 1:250,000. Compiled by Seife M.Berhe (1978). EIGS.
14. **Geological Map of Nazret Sheet (NC 37-15)** 1:250,000. Compiled by Seife M.Berhe and V. kazmin, UN supervising Geologist (1978). EIGS.
15. **Geological Map of the Ethiopian Rift** 1:500,000. Compiled by V. kazmin and Seife M.Berhe (1981). Unpublished, EIGS.
16. **Geological Map Goba Sheet (NB 37-7)** 1:250,000. Preliminary compilation by Belay Desta (1985), Unpublished, EIGS.
17. **Geological Map of the Omo River Area** 1:500,000. Geological compilation by A. Davidson (1983).
18. **Geological Map of Agere Mariam Sheet (NB 37-11)** 1:250,000. Compiled by Woldegabriel Genzebu, Nassir Hassen and Tesfaye Yemane,(1990). Unpublished, EIGS.
19. **Geological Map of Negele Sheet (NB 37-10)** 1:250,000. Preliminary compilation by Tilahun Balcha (1983), Unpublished, EIGS.
20. **Geological Map of the Ogaden and surrounding area** 1:1,000,000. Compiled by BEICIP (1985).
21. **Geological Map of Sololo (NA 37-2) and Moyale (NA 37-3) Sheets** 1:500,000. Preliminary compilation by G.Sabolovskiy, Geology by Regional Geology Department and Bulbul Hagere Mariam Project (1990), EIGS.

LEGEND

QUATERNARY

QUATERNARY UNDIFFERENTIATED

- Q — Alluvial and lacustrine deposits: sand, silt, clay, diatomite, limestone and beach sand.
- Qb, Qb$_1$ — Basalt flows, spatter cones and hyaloclastites a) Transitional type between alkaline and tholeiitic. b) Alkaline olivine basalt.
- Qbt — Plateau basalt : Alkaline basalt and trachyte.
- Qr — Rhyolitic volcanic centers, obsidian pitchstone, pumice, ignimbrite, tuff, subordinate trachytic flows (predominantly peralkaline in composition).
- Qg — Ghinir Formation : Rhyolite with subordinate basalt.

HOLOCENE

- Qh — Undifferentiated alluvial, lacustrine and beach sediments.
- Qbt — Hawaiite,mugearite, trachyte, andesine basalt and ferrobasalt.

PLEISTOCENE

- Qp — Alluvial, lacustrine and marine sediments: Conglomerate, sand, clay, reef, limestone, marl and gypsum.
- Qd — Dino Formation :Ignimbrite, tuff, coarse pumice, waterlain pyroclastic rocks with rare intercalations of lacustrine sediments.

NEOGENE

PLIOCENE-PLEISTOCENE

- NQtb — Bishoftu Formation : Alkaline basalt and trachyte.
- NQ — Undivided lacustrine and Fluvial sediments: Sand, silt gravel, conglomerate (Omo Group and Hadar Formation).

MIOCENE-PLIOCENE

- Nb — Mursi and Bofa Basalts : Alkaline basalt
- Ntb, Nc — Chilalo Formation (Upper part): Alkaline basalt Chilalo Formation (Lower part): Trachyte, trachy-basalt, peralkaline rhyolite with subordinate alkaline basalt.
- Nrs — Danakil Group (Red Series) : Conglomerate, sandstone, siltstone with intercalated submarine basalt flows and lacustrine sediments of the Chorora Formation.
- Nn — Nazret Series : Ignimbrites, unwelded tuffs, ash flows, rhyolitic flows, domes and trachyte.
- Na — Afar Series : Mildly alkaline basalts with subordinate alkaline and peralkaline silicics (rhyolitic dome and flows and ignimbrites).

LATE MIOCENE

- Ndaha — Dalaha Formation: Fissural basalts and hawaiites with some intercalated detrital and lacustrine sediments, with rhyolitic flows and ignimbrites in the upper part.
- Ntt — Tulu Wolel Trachytes : Trachyte with subordinate basalt.

MIDDLE-MIOCENE

- Nmt — Tarmaber-Megezez Formation : Transitional and alkaline basalt
- Nmr — Mabla and Arba Guracha Formation : Rhyolitic domes, flows and pyroclastic rocks of dominantly peralkaline composition with subordinate trachyte and basalt flows interstratified at the base.
- Nts — Teltele and Surma Basalts: Flood basalts.
- Nad — Adwa Formation : Tracyte and phonolite plugs.

PALEOGENE

OLIGOCENE-MIOCENE

- PNtb — Tarmaber Gussa Formation : Alkaline to transitional basalts often forming shield volcanoes,with minor trachyte and phonolite flows.
- PNa — Alaje Formation : Transitional and subalkaline basalts with minor rhyolite and trachyte eruptives.
- PNak — Makonnen Basalts : Flood basalts, commonly directly overlying the chrystalline basment.
- PNab — Arsi and Bale Basalts : Flood basalts often connected to volcanic edifices, silicic near the upper part.

MIDDLE-LATE OLIGOCENE

- P$_2$a — Aiba Basalts : Flood basalts with rare basic tuffs.

LATE EOCENE-LATE OLIGOCENE

- Pz — Jimma Volicanics(Upper part):Rhyolite and trachyte flows and tuff with minor basalt
- Pb — Jimma Volcanics (Lower part):flood basalt with minor salic flows.

EOCENE

- P$_2$a$_2$ — Ashangi Formation : Deeply weathered alkaline and transitional basalt flows with rare intercalations of tuff, often tilted (includes Akobo Basalts of SW Ethiopia).
- Pk — Karkar Formation : Middle-Late Eocene limestone with marly intecalations.
- Pt — Taleh Formation : Early-Middle Eocene: Anhydrite, gypsum, dolomite and clay.
- Pa — Auradu Formation : Late Paleocene- Early Eocene limestone.
- Pj — Jessoma Formation : Late Cretaceous-Paleocene sandstone.

CRETACEOUS

CRETACEOUS

- Ka — Amba Aradom Fromation : Sandstone, conglomerate and shale.
- Kb — Belet Uen Formation : Late Cretaceous (Cenomanian-Turonian) limestone with some sandstone and shale.
- Kf — Ferfer Formation : Albian-Cenomanian shale,dolomite and anhydrite.
- Km — Mustahil Formation : Aptian-Albian limestone, marl and sandstone.
- Kg$_2$, Kg$_1$ — Korahe Formation (Main Gypsum Formation):(Neocomian/Barremian) Upper Korahe (Kg$_2$) gypsum, shale, dolomite and anhydrite intercalation Lower Korahe (KG$_1$) shale and limestone with basal sandstone.

JURASSIC

LATE JURASSIC

- Jg — Jg$_2$, Jg$_1$ — Gabredarre Formation : Kimmeridgian-Tithonian; (Jg$_2$) Upper unit and (Jg$_1$) Lower unit; Limestone with shaly and gypsiferous units
- Jag — Agula Formation : Kimmeridgian shale, marl and limestone.
- Ju — Ji — a) Urandab Formation (Ju) : Oxfordian-Kimmeridgian marl and shaly limestone. b) Antalo Formation (Jt) : Limestone.
- Jb — Abay Formation : Middle-Jurassic limestone, shale and gypsum.

EARLY-LATE JURASSIC

- Jh — Hamanlei Formation : Oxfordian limestone and shale.
- Ja — Adigrat Formation : Triassic-Middle Jurassic sandstone.

PROTEROZOIC

LATE PALEOZOIC-TRIASSIC

- Pzt — Enticho Sandstone, Edaga Arbi Glacials, Gura and Gilo Formations: Sandstone, shale, conglomerate and tillite.

LATE PROTEROZOIC

- PR$_3$ — Upper Proterozoic : Undifferentiated.
- PR$_3$s — Shiraro Formation : Sandstone and conglomerate.
- PR$_3$d — Didikama Formation : Slate and dolomite.
- PR$_3$t — Tembien Group : Chlorite, sericite and graphite phyllites, limestone, slate and dolomite.
- PR$_3$ts — Tsaliet Group : Metasandesite, metadacite, metarhyolite, chlorite, sericite and graphite phyllites, green schist, limestone and quartzite.
- PR$_3$tm — Tulu Dimtu Group : Metabasalt, metaandesite, green schist, phyllite, metaconglomerate, quartzite and marble.
- PR$_3$b — Birbir Group : Metabasalt, metaandesite, metarhyolite , phyllite, graphiticschist,marble, quartzite, metaconglomerate, green schist, metasandstone, metachert and amphibolite.
- PR$_3$k — Kajimiti Beds : Metaconglomerate and metasandstone.
- PR$_3$a — Adola Group : Amphibolite, quartzite and graphitic phyllite.

EARLY PROTEROZOIC

- PR$_2$m — Mormora Group : Biotite schist, gneiss, marble and graphitic schist.
- PR$_2$w — Wadera Group : Metasandstone, quartzite, biotite and muscovite schists.

ARCHEAN

- ARb — Baro Group : Biotite,hornblende-biotite, garnet-amphibole, garnet-sillimanite , calc-silicate and muscovite gneisses.
- ARy — Yayello Group : Quartzo-feldspathic gneiss and granulite.
- ARa — Awata Group : Biotite, hornblende, sillimanite -garnet, calc-silicate and quartzofeldspathic gneisses, marble and granulite.
- ARl — Alghe Group : Biotite and hornblende gneisses, granulite and migmatite with minor metasedimentary gneiss.
- ARk — Konso Group : Hornblende, pyroxene, garnet-pyroxene gneisses and amphibolite with minor metasedimentary gneiss.

PRECAMBRIAN AND PHANEROZOIC INTRUSIVE ROCKS

- gt$_4$ — Alkali-granite and syenite.
- gt$_3$ — Post-tectonic granite and syenite.
- gt$_2$ — Late to post-tectonic granite
- Late Proterozoic Ultramafic Rocks : Serpentinite, peridotite dunite and talc schists.
- gt$_2$ — Syn-tectonic granite.
- gt$_1$ — Pre-tectonic and syn- tectonic granite.
- gd/tn — Granodiorite and tonalite.
- gd — Granodiorite
- tn — Tonalite
- dt — Diorite
- gb — Gabbro

OTHER SYMBOLS

- Alluvium, silt, sand, gravel, conglomerate and marine beach deposits.
- Lacustrine Sediments: Silt, clay, diatomite, volcanoclastic sediments with intercalated tuff.
- Marine Deposits: Evaporite,gypsum,rock salt , reef limestone and limestone.
- Geological contact : observed, inferred.
- Faults : observed inferred.
- Fault barb on downthrown side.
- Shield volcano of the Ethiopian Plateau.
- Other major volcanic edifices
- Field of small basaltic vents.
- Caldera
- Basic dykes and sills.
- Major plugs or group of small plugs.
- Syncline : upright, overturned.
- Anticline: Upright, Overturned.
- Synform
- Antiform.

LOCATION MAP



SECOND EDITION, 1996

Compiled by Mengesha Tefera, Tadiwos Chernet and Workineh Haro, Regional Geology Department EIGS, 1990.

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Note: The delineation of international boundaries must not be considered authoritative.

POLYCONIC PROJECTION

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