

## **Crustal architecture and mineral deposits of northeast Africa**

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This review considers the geological history, crustal architecture and geological resources of Africa north of the Equator and east of 24 degrees, including Egypt, Sudan, Eritrea, Ethiopia, Djibouti, Somalia, South Sudan, northern Kenya and Uganda, northernmost DRC and easternmost CAR.

The major crustal terranes of this area are the Congo craton and the Sahara metacraton, with the Central African fold belt or Oubanguides between them, and the East African orogenic belt to the east composed of the accreted island arcs of the Arabian-Nubian Shield and an elongated microcontinental fragment named Azania. This assembly occurred during the second half of the Neoproterozoic as part of the construction of Gondwana and was in place by about 540Mya. Stresses arising from the assembly gave rise to major strike-slip shear zones with dominantly northwest or northeast trends across the region. Rifting of the supercontinent started in the Permo-Triassic (Karoo) and led to progressive breakup of Gondwana along the Indian Ocean coast during the Jurassic. Later episodes of rifting in NE Africa created the Cretaceous to Lower Tertiary oil basins of Sudan and Kenya and the Miocene to recent East African rift system.

The basement geology of much of NE Africa, especially the western part, is poorly known because of extensive sedimentary cover, remote terrain, poor infrastructure, lack of investment in primary mapping and security risks. Notably, almost no mapping has been conducted in South Sudan, which lies astride crucial boundaries between several of the terranes but has suffered almost continuous unrest since decolonisation in 1956. Efforts are under way to instigate a geophysical and geochemical mapping programme of this crucial region.

The key known mineral and energy deposit types of the region, clockwise from North, are:

- Orogenic vein gold in the East African orogen
- VMS in the accreted terranes of the Arabian Nubian belt
- Neoproterozoic porphyry and epithermal copper and gold deposits
- Contemporaneous sulphide muds in the Red Sea rift
- Evaporites in the Rift Valley (potash, lithium)
- Low-sulphidation epithermal gold systems in the EA Rift, Djibouti to the Afar
- Geothermal resources in the EA Rift
- Oil and gas in the Cretaceous/Lower Tertiary rifts and EA Rift
- Nickel and chrome in ophiolites within the East African orogen
- Gold in the end-Mesoproterozoic Madi group of Uganda / South Sudan
- Archaean greenstone gold and diamonds in the Congo craton
- Cu-Au-Ag-U mineralization of possible IOCG type at Hofrat en Nahas in the Oubanguides