

**REGIONAL TRAINING ON RADIATION PROTECTION AND
MONITORING IN UPC, RAF3007 PROJECT, Swakopmund,
Namibia, 17-21 August 2009**

***URANIUM MINING-RELATED ACTIVITIES IN
ETHIOPIA***

By

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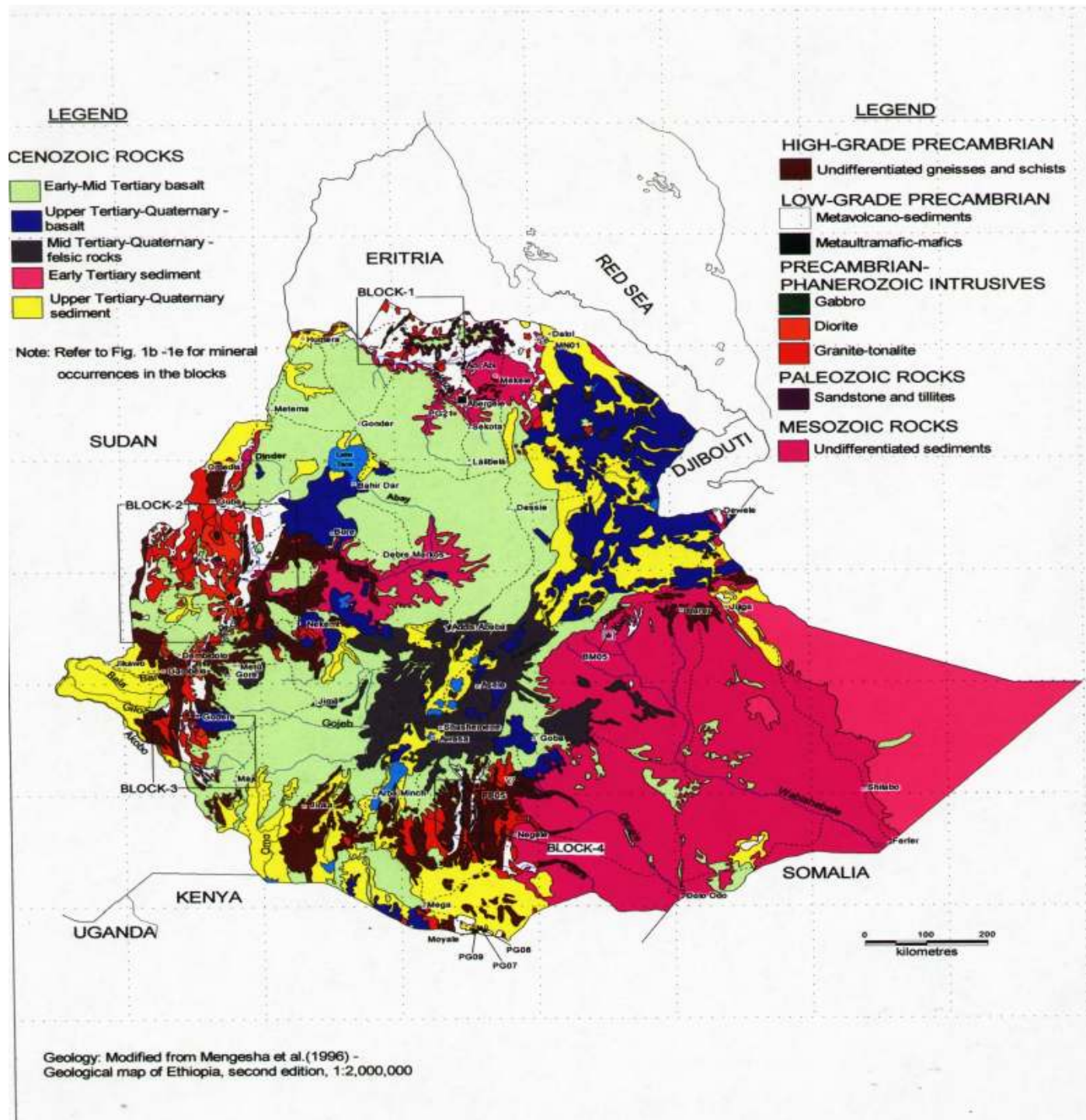
INTRODUCTION

Location: 3°-15°N and 33°-48°E
Coverage: 1.13x10⁶ km²
Population: ~80x10⁶
Economy: ALID policy, GDP growing at the rate of 10%, major contribution

- Comes from Agricultural sector
- Other industry based economic sectors are significantly growing. Major and significant efforts are being made in the mining sector as well.
- In the mining – sector, Private sectors are currently taking part an important role.

History of Mineral resource exploration

- Systematic exploration began is 1968
- Since then, mineral resources developed, identified or indicated include several industrial minerals, precious metals, rare metals, base metals and indications of radioactive minerals and fossil fuels-oil and gas, and geothermal energy resources.



RADIOACTIVE MINERALS

- Reconnaissance airborne (carborne) survey in 1954 – 1964 by Towle (USAEC)
- Although many localities were indicated as U-bearing, their locations were not specifically recorded
- Systemic Rad – Survey
 - Wollega & Sidamo – UNDP – 1970
 - Megado & Adola (Sidamo) – UNDP – 1993/94
 - Metekel (NW Ethiopia) – 2000
 - Recent U – focused ground survey by GSE in selected areas of southern and northwestern Ethiopia.

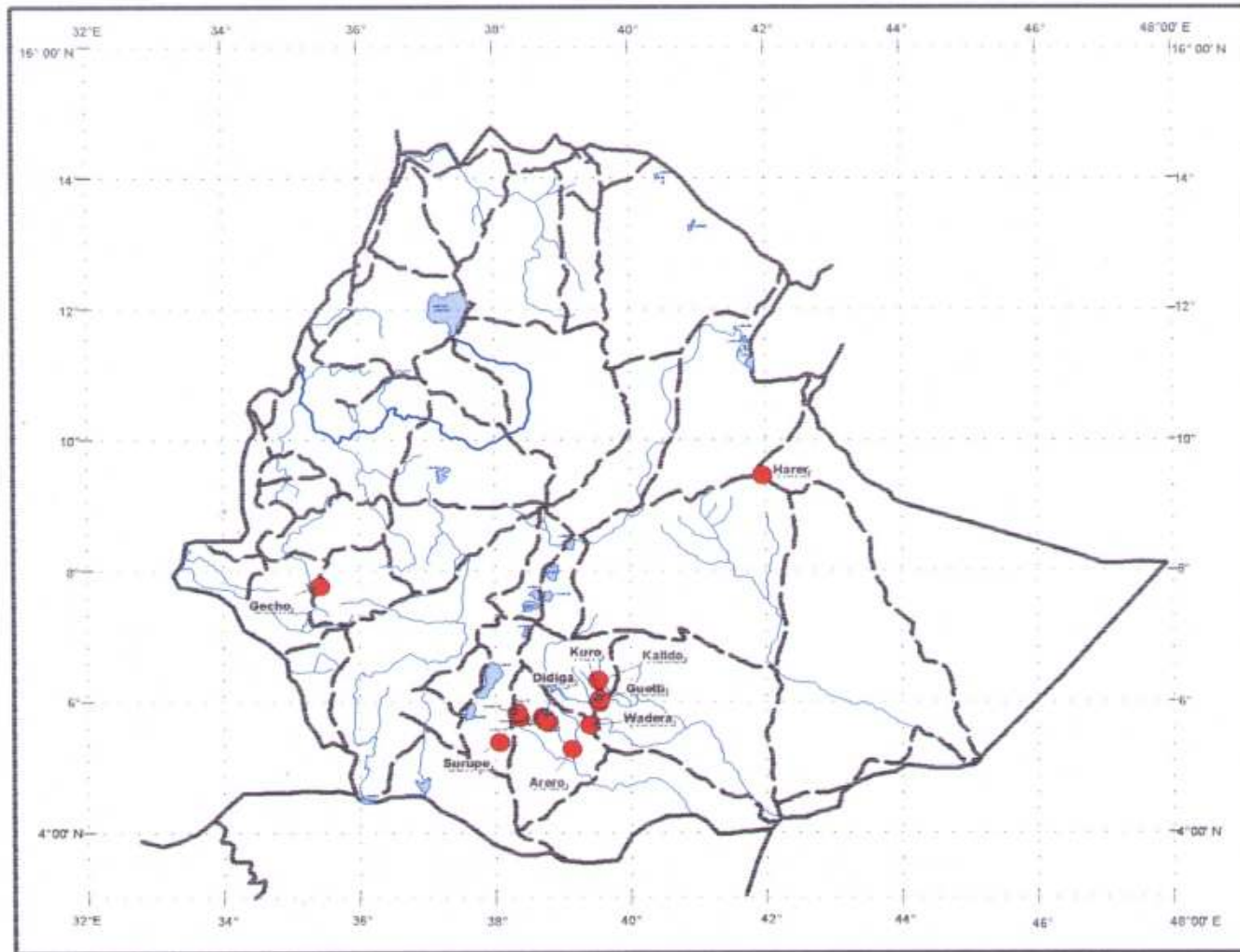
Findings

Targets explored or recommended or reported so far can be categorized

- Uranium-bearing minerals (samarskite, niobates and euxenite) in pegmatites e.g. Errer Valley, Zembaba and Didiga.
- Accessory minerals, mainly xenotime in pegmatites and metasediments.
- Ore-bearing minerals as carnotite in silicified wood, Harar

- Topographic anomalies over granites, Awata N3-anomaly, kibremengest N5-anomaly
- Formational anomalies related to lithological contrasts
- Anomalies related to over burden, Arero (Sidamo)
- Alteration zones (?) in gneissic rock Gecha area, Ilubabor

Radioactive Mineral Anomalies and Occurrences



LEGEND




-  Uranium sample location
-  Town
-  River
- 

Table 1 Radioactive anomalies or occurrences. Refer to their location in

Target name	Location coordinate	Detection Method	Radio Active source	Identified Minerals
Error valley, Harar	Not specific, at scattered places	Scintillometer	Black sand 8-10 times background	Smarskite
Gobeli river, Harar	Not specific, at spots	Scintillometer	Bleached granite 30 times background	Needle-shaped minerals (?)
Harar	Not specific, near the town	Scintillometer & XRF analysis	Pegmatite vein	Yttrium and uranium niobates, magnetite and rutile
Harar district	Unknown	-	Unknown	High grade carnotite in silicified wood
Gecha, village Ilubabor	7⁰48'N & 35⁰21'E	Scintillometer	Altered gneissic rock with values 1000-3000 cpm	-
Harar	9⁰31'12"N & 41⁰ 58'12"E	Airborne (Carborne) radiometric survey	Gneissic and granite terrane	-
Akobo, Kaffa (former name)	Around placer gold operation	Scintillometer	Granite showing 10 ppm uranium	Trace of thorium and uranium minerals (?)
Wadera (N1) Sidamo	5⁰45'41"N & 38⁰45'11"E	Radiometry Instrument not mentioned	Gray-yellowish gray arkosic sandstone, up to 1300 cps	-
Zembaba (N2), Sidamo	5⁰49'58"N & 38⁰43'15"E	Same as above	1.0-1.5m thick pegmatite vein in sandstone with 600-700cps, and lensoid sandstone with unto 1500cps	Yellow stain (carnotite?) in sandstone with 0.04% uranium on analysis

Target name	Location coordinate	Detection Method	Radio Active source	Identified Minerals
Awata river, (N3&N4)	a. 5⁰42'20"N & 38⁰43'21"E b. 5⁰41'11"N & 38⁰46'17"E	Same as above	Combined effects of topography (granite hill) and higher background of quartzite	-
Anomaly N5	5⁰46'02"N & 38⁰41'26"E	Same as above	Higher background and topographic effect of biotite granite	-
Anomaly N6	5⁰44'32"N & 38⁰42'53"E	Same as above	Several spot anomalies (500-600 cps) related to small bodies of granite	Accessory minerals (?)
Anomaly N7	2.5km SE of Arero	Same as above	High spot anomaly up to 1500cps related to thick overburden	-
Genale	4km S of the bridge	Same as above	High background values related to pegmatoid granite	-
Mole –Belcore, Wellega	Near to the confluence of Dabus and Abay revers	Same as above	12-18 times the background in phonolitic plugs	Accessory minerals such as xenotime

Target name	Location coordinate	Detection Method	Radio Active source	Identified Minerals
Didiga hills, Sidamo	5^o45'N & 38^o41'24"E	Scintillometer	Accessory minerals in pegmatite hosted by quartzo-feldspathic gneiss, with 8.32% U₃O₅ as analyzed abroad	Euxenite and polycrase
Surupa, Sidamo	5^o24'36"N & 38^o04'12"E	Same as above	4-5 times (125 cps) in metaarkose interbeded with biotitic gneiss	-
Arero, Sidamo	5^o19'48"N & 39^o07'12"E	Same as above	Readings up to 110 cps in pegmatite hosted in pegmatite hosted in quartzo-feldspathic rock	-
a.Werri, b. Kalido, c.Guetti, Bale	a.5^o59'06"N& 39^o31'30"E b.6^o38'N & 39^o30'45"E a.6^o02'29"N& 39^o32'29"E	Radiometry (GAD-b) geological mapping, soil geochemistry and test-trenching	Accessory minerals in pegmatite	Xenotime, anatase, ilmenite

OPTIONS TO ENHANCE U - RESOURCE EXPLORATION & DEVELOPMENT IN ETHIOPIA

- Previous and current exploration detected **insignificant radiometric anomalies** due to variation in **background values** or **accessory minerals** in localized targets. This is an exploration based on **scars and limited information**, as well as **little knowledge**.
- **Capacity – building** to solve challenges of **uranium metallogenic province**.
- Ethiopia strongly urges uranium mineral exploration to **diversify the energy mix**.

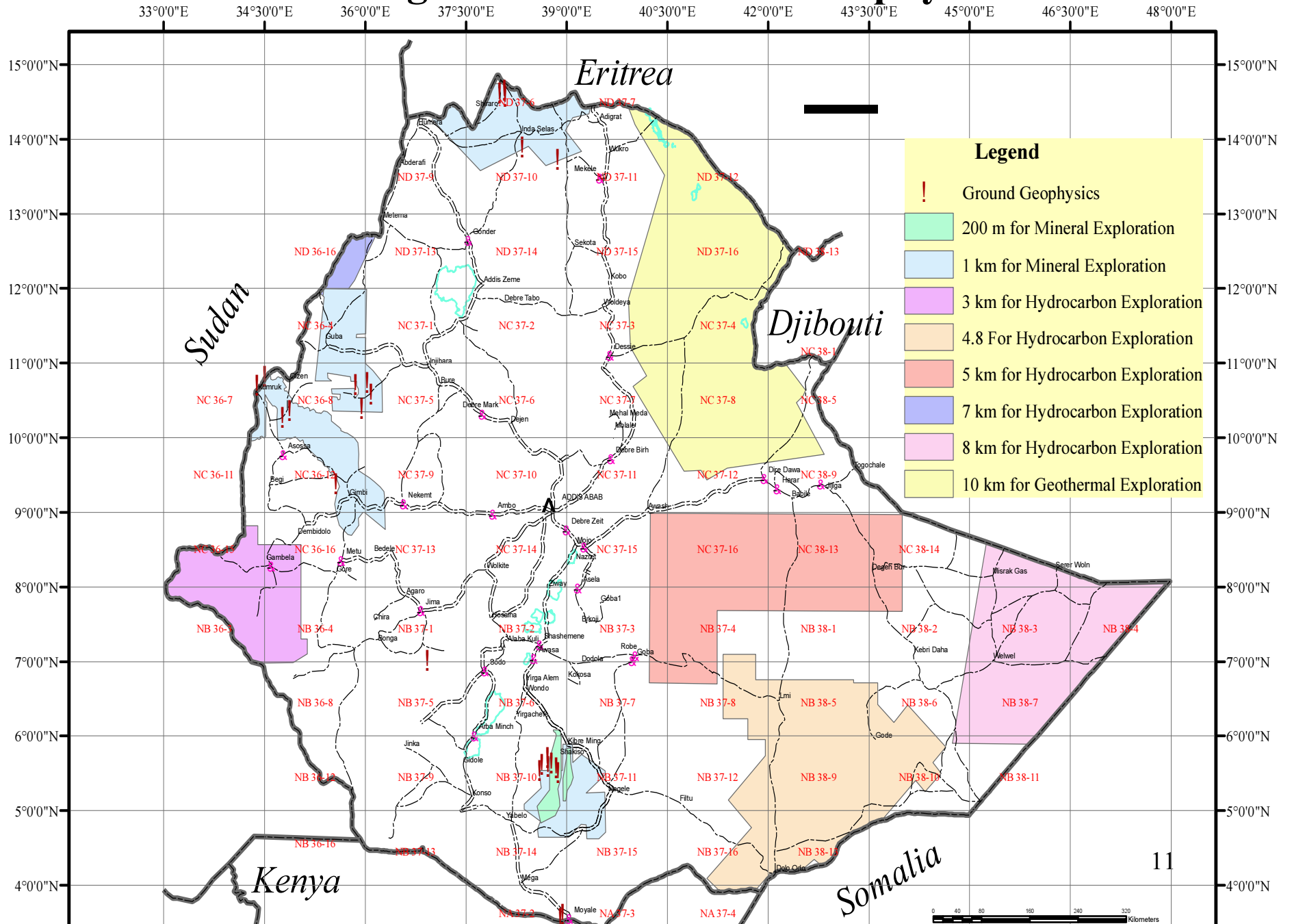
Options

1. **Air borne radiometry – current coverage is very limited, capital – intensive, requires companies involvement.**
2. **Identification of uranium province, mainly U-enriched granitoids, through research-oriented activities to characterize granitoids. This is also capital demanding activity.**
3. **RS – Technology to outline lithostructural domains favorable for U – mineralization and other resources, specific targets to be complemented by air borne geophysics, ground geological and geochemical surveys.**
4. **Radiometric scanning of drill cores so far generated during petroleum and coal exploration for sediment – hosted uranium, including lacustrine sediments within the rift system.**

Initiations of the Ethiopian Government

- The RS Technology (third option) for accelerated mapping in general and mineral resource assessment in particular has been initiated with the Chinese Gov., and MOU has been signed.
- For scanning of favorable geological terrane, a proposal is ready for interested parties.

Regional and Airborne Geophysics



The Type and Distribution of the Main Minerals in Regional States of Ethiopia

Type of Mineral	Regional Distribution	Status
Gold (primary and placer)	TRS, BEN, ORS, SNPRS, GRS, SRS	Legedembi primary gold and the surrounding placer gold is under mining
Platinum	ORS	Yubdo locality, under mining
Iron	ORS	58 Mt at Bikilal 10 Mt at Melka arba
Nickel	ORS	17 Mt at Adola
Tantalum	ORS	Under mining
Copper	ORS , TRS	10 Mt at Keta area
Manganese	AFRS	Over 5,000 ton
Marble	TRS, BEN, ORS	Several billion ton

Cont....

Granite	TNRS, BEN, GRS, ORS	Several billion ton
Phosphate	ORS	180 Mt at Bikilal 87 Mt at Melka Arba
Kaolin	ORS	Bumbwa Wuha under mining 0.3 Mt at Kombolcha
Gypsum	TRS, ORS, AFRS, SRS	Several million ton
Limestone	TRS, AMRS, ORS, SRS	Several billion ton
Sand stone	TRS, AMRS, ORS, SRS	Several billion ton
Silica sand	ORS, AMRS	Under mining at Mugher
Dolomite	ORS	1.4 Mt, at Galleti
Potash	AFRS	160 Mt at Dallol

Salt	AFRS, ORS	Several Million ton at Afdera, under mining
Diatomite	ORS	Over 40 Mt
Bentonite	AFRS, SNPRS,	Over 100 Mt
Coal	ORS, AMRS	40 Mt at Delbimoye 250 Mt at Yayu 20 Mt at Chilga 0.3 Mt at Mush valley
Gemstone	AMRS, ORS, SRS	Mining for opal at N.Showa, other exploration
Geothermal Energy	AFRS, ORS, SNPRS	At Aluto 7.5 MW under development At Dubti 5 MW under development
Petroleum	SRS and other regions	Exploration
Uranium	?	?

THANK YOU