SOMALIA DEMOCRATIC REPUBLIC

Executive Summary

The politics of the Somalia Democratic Republic are more complicated than the geology and possibly higher risk than the hydrocarbon potential. At this time, early 2002, there is no internationally recognized government representing the Somalia Democratic Republic. Indeed, segments of the country have declared separate independence. The northeast corner, sometimes referred to as The Horn of Africa, has declared itself Puntland and independent. The former British Somaliland has declared independence as Somaliland. The southern area, including the capital of Mogadishu, is shown on maps as the Southern Region.

Interested parties can make contact, via Djibouti or Kenya, and negotiations for petroleum exploration could be arranged in England, France or Italy.

Tectonically, the geology of Somalia is affected by the following events:

1) Rifting of Gondwana during the Late Carboniferous to Early Jurassic, forming basins filled with Karoo continental clastic sediments, and leading to deposition of an Early Jurassic salt basin between KenyaSomalia and Madagascar;
2) Separation of Gondwana into western (South America-Africa-Arabia) and eastern (India-Seychelles-Madagascar-Australia-Antarctica) super-plates beginning in the Middle Jurassic and continuing into the Early Cretaceous;
3) Late Jurassic rifting forming graben and half-graben basins in northern Somalia;
4) Initial rifting and sag during the Oligocene and separation and introduction of oceanic crust during the Miocene between Somalia to the south and the Arabian plate to the north, creating the Gulf of Oman.

Mesozoic and Tertiary sediments covered and filled the Karoo-age basins onshore and along the continental margins.

Prospective onshore basins include the Lamu Embayment to the south, the Mandera Basin to the southwest, the Ogaden and Mudugh Basins of central Somalia, and the Jurassic rift basins in northern Somalia. The offshore Mesozoic-Tertiary portion of the Lamu Embayment, the Coastal and offshore portion of the Mudugh Basin are considered prospective, as well as the Mesozoic-Tertiary depocenters of the Berbera-Raguda-Bosaso Basins of the Gulf of Aden.

Much of Somalia's favorable exploration area is held under force majeure; however, good exploration plays remain available in the onshore Lamu Embayment, the central Mudugh Basin, and possibly the west end of the

Jurassic Nogal Rift Basin. The Gulf of Aden Mesozoic-Tertiary basins remain open and available as does the deepwater of eastern offshore Somalia.

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History of Exploration

Although an active oil seep at Dagah Shabel has been known since 1912, petroleum exploration was not initiated in Somalia until the mid-1950s beginning with the spudding of the Sagaleh-1 by Mineraria Somalia (AGIP) in January 1956. Approximately 24 exploratory wells were drilled in the 1950s, 27 in the 1960s, 5 in the 1970s, 12 in the 1980s, and only 3 in 1990. No wells have been drilled in Somalia since 1990.

There are no known producing oil or gas fields in Somalia; however, Conoco is believed to have a tentative discovery at the Nogal-1 which blew out and was abandoned in 1990. Also, Sinclair declared the Agfoi-1 a shutin non-commercial gas well in 1961 and the nearby Coriole-1 is indicated as a shutin oil well (Petroconsultants, 1990). The majority of the approximately 60 exploration wells drilled in Somalia had dead oil stains and minor gas shows. An abundance of fresh water was also encountered in many of the wells.

Although much of the onshore and offshore is licensed, the licenses are in force majeure since the collapse of the Siad Barre government in 1990 and more than a decade of anarchy. The offshore is sparsely drilled and none of the wells are in deep water. The offshore wells include two by Shell off Bosaso in the Gulf of Aden; four offshore the northeast tip of Somalia, one each by AGIP and Occidental, and two by ELF; two offshore the Mudugh Basin, one each by AGIP and Esso. Eight wells total for an offshore extending for more than 2,700 kms averages only one well about every 340 kms. The offshore is virtually unexplored.

There is an unconfirmed report that TotalFinaElf, in early 2001, may have licensed the southern Somalia portion of the offshore Jurassic salt basin extending north from the Kenya offshore.

Recent developments suggest Somalia may become three separate nations. The northeastern Horn of Africa terms itself Puntland and declared independence in 1998. The former British Somaliland to the northwest held a plebiscite in May 2001 to ratify its independence and established Hargeisa as its capital. Figure So-1 shows the approximate boundaries adopted by Somaliland and Puntland and the remaining southern segment of Somalia termed the Southern Region; also, the license areas as of 1990 plus the general area believed to have been recently licensed by TotalFinaElf.

Exploration Wells Drilled Onshore and Offshore* Somalia

Well	Year	Total Depth	Operator	Results
Sagaleh-1	1956	10,721'	AGIP	P&A with traces bitumen
Gira-1	1957	12,764'	Sinclair	P&A
Obbia-1	1957	16,023'	Sinclair	P&A
Faro Hills-1	1957	5,373'	Amerada	P&A with shows
Bur Dab-1	1958	3,260'	Amerada	P&A
Cotton-1	1957-1958	10,867'	AGIP	P&A with dead oil stains and gas shows
Las Anod-1	1957	5,460'	Amerada	P&A
Marai Ascia-1	1958	13,488'	Sinclair	P&A
Burhisso-1	1958	5,090'	Amerada	P&A with dead oil stain
Yaguri-1	1958	4,728'	Amerada	P&A
Merca-1	1958-1959	13,118'	Sinclair	P&A with dead oil stains and gas shows
Dagah Shabel-1	1958-1959	4,500'	Stanvac	P&A with good oil and gas shows, rec. 33-35° oil on test
Buran-1	1957-1958	7,994'	Amerada	P&A
Dagah Shabel-2	1959	4,768'	Stanvac	P&A with heavy and dead oil in cores
Darin-1	1958-1959	9,806'	AGIP	P&A with dead oil and gas shows
Dagah Shabel-3	1959	4,952'	Stanvac	P&A with minor shows
Hordio-1	1959-1960	11,198'	AGIP	P&A, no shows
Berbera-1	1959	2,530'	BP	P&A strat. test
Zeila 1-4	1960	1,413'	BP	P&A strat. tests
Bio Dader-1	1959-1960	4,842'	Stanvac	P&A with oil shows
Duddumai-1	1959-1960	11,090'	Sinclair	P&A with dead oil
Coriole-1	1960-1961	11, 543'	Sinclair	P&A, rec. 44°API oil, and gas with condensate
Dobei-1	1961	6,991'	Sinclair	P&A with dead oil
Dobei-2	1961	12,565'	Sinclair	P&A with shows

El Hamurre-1	1961-1962	11,711'	Sinclair	P&A with shows
En Dibirre-1	1962	11,798'	Sinclair	P&A with shows
Brava-1	1962-1963	12,500'	Sinclair	P&A
Dusa Mareb-1	1962	6,785'	Mobil	P&A strat.test
Dusa Mareb-2	1962	6,950'	Mobil	P&A strat. test
Gaicaio-1, 1-A	1962-1963	2,236'	Mobil	P&A, lost hole
Galcaio-2	1963	7,000'	Mobil	P&A, minor show
Idole-1	1963	7,004'	Mobil	P&A strat. test
Oddo Alimo-1	1964	14,648'	Sinclair	P&A, gas shows
Bulo Burti-1	1963	7, 010'	Mobil	P&A strat. test
Giamama-1	1964-1965	13,537'	Sinclair	P&A, oil and gas shows
Lach Dera-1	1965	9,405'	Gulf	P&A, minor gas
Lach Bissigh-1	1965	10,110'	Gulf	P&A, minor gas
Coriole-2	1965	13,349'	Sinclair	P&A, minor gas
Afgoi-1	1965-1966	13,661'	Sinclair	Shut in non commercial gas well
Gal Tardo-1	1967	8,000'	Sinclair	P&A
Uarsciek-1	1967-1968	13,464'	Sinclair	P&A, gas shows
Bir Addo-1	1968	8,542'	Sinclair	P&A
Das Uen-1	1968-1969	10,657'	Hammar	P&A
Gheferso-1	1969	7,161'	Hammar	P&A
Hol-1	1972-1973	13,258'	Burmah	P&A, tr. Gas
DSDP-231	1974	WD 1,916' TD 7,090'	DSDP	P&A research well
*Hafun Offshore-1	1974	4,573'	ELF	P&A
Hafun Terrestre (HAT-1)	1975	8,375'	ELF	P&A
*Gardafui-1	1975-1976	11,023'	ELF	P&A, minor gas
*Garad Mare-1	1977	12,864'	AGIP	P&A, tr. gas
El Cabobe-1	1980	14,528'	Arco	P&A, tr. gas
Kudha-1	1981-1982	16,310'	Deutsche Texaco	P&A, minor gas
Obbe-1	1982	15,960'	Deutsche Texaco	P&A
*Meregh-1	1982	14,100'	Esso	P&A
El Bur-1	1984	8,600'	Arco	P&A

*Dab Qua-1	1984	10,365'	Shell	P&A, minor oil shows
Afgoi-2	1984-1985	13,761'	MMWR	P&A, minor gas shows
*Bandar-Harshau-1	1984-1985	8,216'	Shell	P&A, minor HC shows
*Ras Binnah-1 X	1984-1985	8,022'	AGIP	P&A
Afgoi-3	1985	14,300'	MMWR	P&A, minor gas shows
*Gumbah-1	1986-1987	11,680'	Occidental	P&A, minor gas shows
Juba-1	1988	10,680'	Shell	P&A, minor gas shows
Nogal-1	1990	10,736'	Conoco	P&A, good oil and gas shows, well blew out, abandoned
Kalis-1	1990	9,670'	Conoco	P&A, good oil and gas shows
Heemaal-1	1990	12,672'	Chevron	P&A

Tectonics

By Early Paleozoic time, the Gondwana continent was fully formed and predominantly sited in the Southern Hemisphere. Its surface consisted of a peneplained igneous/metamorphic complex overlain by terrigenous sediments of variable thickness.

The Gondwana continent was split into segments by rifling during the Late Carboniferous to Early Jurassic resulting in thick accumulations of basically continental clastics termed Karoo (Figure So-2). These rifts were the precursors to the ultimate breakup and separation of Gondwana. Many of these precursor rifts aborted prior to invasion by basalts and initiated the major basins found in East Africa today. Those that formed in what is now the interior of the continental masses are considered failed arms or intracontinental basins. It is believed that a major rift developed along what is today the East Africa coastal margin and that subsequent rifting activity led to the separation of the continent and introduction of oceanic basalt (Bosellini,1989; Harms and Brady, 1989; Du Toit and others, 1997).

Those dents in the earth's crust that we call basins were poorly defined in the early literature and were called many different names. For Somalia, Figures So-3 (Total Sediment Fill) and So-4 (Tectonic Features) are an attempt to simplify. The thickness of sediments defines the basins and consequently, the targets for petroleum exploration. Those basins believed to have a Karoo rifting origin include 1) the Lamu Embayment, and 2) Mandera Basin in southern Somalia (Figure So-5), and; 3) Ogaden Basin in eastern Ethiopia into west central Somalia. Also, the coastal basins from the Kenya border northeast to the tip of Somalia, i.e., 4) Coastal Basin (Figure So-6), 5) Mudugh Basin (Figure So-7), 6) Hafun Margin and 7) Northeast Tip Basin. The eastern end of Socotra Island is also a downthrown Karoo remnant. Each of these basins is believed to have originated during the Late Carboniferous-Early Jurassic rifting episode and to contain Karoo sediments.

Separation of Gondwana into two super-plates (South America-Africa-Arabia to the west and India-Seychelles-Madagascar-Australia-Antarctica to the east) began in the Middle Jurassic. The exact amount of rift, normal fault expansion, and thinning of the continental crust is unknown, but it is believed the initial introduction of oceanic crust occurred in the Middle Jurassic at about 154 Ma. The separation movement was left-lateral with the South America-Africa-Arabia plate moving north relative to the India-Seychelles-Madagascar-Australia-Antarctica plate. This left-lateral movement continued through the last identified magnetic anomaly, Early Cretaceous M10 (120 Ma), in the Somali Basin. The separating transform developed into the Davie Ridge. Northeastern Kenya, eastern Somalia, and northwestern Madagascar-western Seychelles are conjugate passive margins. Ongoing sag of the intracontinental Karoo basins and invasion by marine waters led to the deposition of transitional-to-marine Middle Jurassic-Cretaceous-Tertiary sediments.

The Bur Acaba High (Figure So-4) is exposed over an area roughly 100x200 kms. The positive originated as a horst in Permian-Triassic time and has remained a high to present. Another prominent tectonic feature is the El Hamurre Trend or Escarpment (Figure So-8) forming the northern border of the Mudugh Basin. El Hamurre forms a broad zone of uplift and erosional truncation of Upper Jurassic strata trending southeast from the Ogaden Basin.

The Jurassic rifting episode that created the northwest-southeast trending petroliferous rift basins in Yemen created similar basins in northern Somalia: 1) Nogal Rift Basin, 2) E[Mado-Darror-Gumbah Basin(s), and 3) Daban or Dagah Shabel Basin (Figure So-9). These basins are known to contain good Jurassic source rocks and younger reservoir rocks and should be good exploration targets.

Early Tertiary Oligocene rifting and Miocene separation between northern Somalia and southern Yemen created the Gulf of Aden and led to the depocenters forming the 1) Berbara-Raguda and 2) Bosaso Basins. A pre-drift fit matches the Berbera-Raguda Basin of Somalia to the Aden-Abyan Basin of Yemen and the Bosaso Basin to the Sayhut Basin. Prospectivity of these basins is probably limited to the Mesozoic-Tertiary sediments.

Stratigraphy

Karoo continental clastics, Late Carboniferous to Early Jurassic (Figure So-10), comprise the oldest, and in some basins, the thickest package of sediments. Karoo-equivalent sediment is believed to occur in the interior 1) Lamu Embayment of Kenya and Somalia, 2) Mandera Basin, 3) Ogaden Basin, and 4) Madugh Basin, as well as the coastal offshore from Kenya to the northeast tip of Somalia and eastern Socotra. In the Ogaden Basin of Ethiopia and west central Somalia, the Karoo is divided into a lower alluvial fan Calub Member, a middle lacustrine Bokh Shale Member, and an upper fluvial sandy Gumboro Member.

Post-Karoo sag resulted in invasion of marine waters from the northern Tethys Sea, probably beginning in the late Triassic but certainly by Early Jurassic time. The incursion of the salty water into a shallow restricted zone led to the deposition of thick Lower Jurassic salt. This salt basin has since been separated through the rifting/drifting process leaving a remnant salt basin offshore eastern Kenya-Somalia extending from the Lamu Embayment through the Somalia Coastal Basin and a complementary salt basin offshore northeastern Madagascar in the Majunga Basin. The salt is documented by Rabinowitz and others (1982) and defined and illustrated by Coffin and Rabinowitz (1988), Bosellini, 1989 (Figures So-11 and So-12), and Du Toit and others, 1997 (Figure So-13).

The post-Karoo sag also led to widespread deposition of the Jurassic Adigrat Sandstone (Figure So-14A), continental in most areas, transitional in a few, and with marine equivalent Al Mado Fm. in the Berbera area. The continental equivalent in Yemen is the Kohlan Fm. The Adigrat lies unconformably on basement in many areas and is considered a prime reservoir rock.

The top of the Adigrat marks the beginning of marine transgression in the Ogaden Basin. The Ethiopians identify a Transitional Unit overlying the Adigrat and underlying the marine Hamanlei Formation. The stratigraphy of onshore Somalia essentially parallels that of the Ogaden Basin of Ethiopia. The Adigrat is overlain by the increasingly marine Hamanlei Fm. consisting of shallow platform carbonates. Bosselini (1989) proposed calling this basinal facies the Meregh Fm. after the Meregh-1 well where it is over 2,500 m. thick. Deepening water deposited the source rock calcareous shales of the MiddleUpper Jurassic Uarandab Fm (Figure So-14B). Late Jurassic uplift accompanied by shallowing water, the beginning of marine regression, saw the Gabredarre Fm. shallow water carbonates cover the Uarandab. An Early Cretaceous evaporitic sequence, the Gorrahei in the Ogaden Basin and the Main Gypsum (Figure So-14C) in the rest of Somalia, covered the shallow water carbonates. The Albian-Maastrichtian Gira Fm. (Figure So-14D), carbonates to shales, completed the Mesozoic depostion.

In central Somalia, the Middle-Upper Cretaceous succession consists of three units from bottom to top: Mustahil Fm. fossiliferous marlstone-limestone, Fer Fer Fm. evaporites, and the Belet Uen Fm. subtidal, burrowed, thick-bedded micritic limestone. The same units are identified in the Ogaden Basin of Ethiopia to the west.

In northern Somalia, east of latitude 47° E., both shallow and deepwater facies are represented. The shallow water Mustahil Fm. facies is represented, but an unnamed deep water facies of dark pelagic shale occurs only near the northeastern most tip of Somalia. West of latitude 47° E., the Paleocene Jesomma/Yesomma Sandstone Figure So-14E) lies directly on Jurassic or older rocks.

The Jesomma sequence is unconformity bounded over northern Somalia, Yemen and Ethiopia (Bosellini, 1989). Four facies are identified: 1) fluviatile, 2) marginal, shallow marine shale-sandstone-carbonate, 3) shallow water carbonate, and 4) deep water claystone-shale. To the south, the Jesomma becomes a deltaic-marine sandy facies.

The Jesomma overlies unconformably progressively older formations from south to north.

A late Paleocene or early Eocene marine transgression during a period of tectonic quiet covered the Jesomma Fm., depositing the shallow water Auradu Limestone (Figure So-14F) over northeastern and central Somalia. The Auradu is recognized in the Ogden Basin of Ethiopia and tested oil in the offshore Sayhut Basin of Yemen.

Middle Eocene Taleh Fm. (Figure So-14G) anhydrites overlie the Auradu Limestone in the north. The anhydrite grades to a marginal dolomitic band of reefs and high-energy deposits to the east and northeast and to carbonate shelf to the south, separating the evaporitic facies from the deeper sea basinal deposits. The basinal clay and shale facies is termed the Obbia Fm.

The marine area was much reduced at the end of the Eocene, covering only the northeastern sector of Somalia and depositing the Karkar Fm. fossiliferous limestones (Figure So-14H). The limestones grade to terrestrial deposits along the margins.

There is no evidence of Early-Middle Oligocene in Somalia other than volcanics (Figure So-14I). The Upper Oligocene-Miocene sequence appears continuous (Figure So-14J). North of the El Hamurre Trend, the Oligocene-Miocene facies changes from terrestrial to lagoonal to shelfal to bathyal as one goes seaward. South of the El Hamurre Trend, the sediments are purely marine and consist of the Oligocene-Miocene Somal Fm, shallow water carbonates and the Miocene

Merca Fm. regressive and transitional interbedded shallow marine and continental sandstone, claystone and sandy limestone. There is also a basinal facies penetrated in the Garad Mare-1 well. Farther south, around El Cabobe-1, there is a carbonate platform located on a nose. Farther south, around Mogadishu, a delta and deep sea fan developed.

Oligocene-Miocene along the Gulf of Aden in Somalia consists of deltaic and lacustrine sediments (Abbate and others, 1988). In the Darror Graben, the Oligocene-Miocene occurs as lagoonal and transitional sediments.
Pliocene-Pleistocene continental deposits are found in some of the interior depressions and exist as transitional sediments along the coast.

Reservoir

AI *Mado-Darror-Gumbah Grabens*

The primary reservoir target is the Adigrat Sandstone; however, gas was recovered in the Darin-1 from carbonates immediately above the Adigrat. There is also a possibility of the presence of Karoo clastics in an older graben.

Berbera-Raguda Basin

Cretaceous Nubian-equivalent sandstones are reported in adjacent onshore outcrop (Harms and Brady, 1989); however, Tertiary carbonates are possible reservoir rocks.

Bosaso Basin

Shell's Dab Qua-1 and Bandar Harshau-1 are the only wells drilled within the Bosaso Basin. It is believed Shell was chasing the Lower Tertiary Auradu Limestone that produced oil from the opposing Sayhut Basin of Yemen. The only show was from a sub-halite Oligocene to mid-Miocene sandstone in Bandar Harshau-1.

Coastal *and Mudugh Basins*

The Upper Triassic-Lower Jurassic Adigrat Sandstone, a proven reservoir in Ethiopia, is expected to extend into the Mudugh Basin and possibly the Coastal Basin.

Middle-Upper Hamanlei Jurassic carbonates may contain porous intervals.

Upper Cretaceous sandstones with high porosities are anticipated within the Coastal and Mudugh Basins.

Tertiary deltaic complexes are expected to contain porous sandstones.

Paleocene sands tested gas at Agfoi-1, but two offsetting wells were unsuccessful; nevertheless, the Paleocene has proven potential as a reservoir.

Vuggy Eocene carbonates exhibited porosity and tested saltwater and two barrels of 44°API oil in the Coriole-1, and porosity was noted in the Giamama-1 well.
Good quality reservoir sands occur in the Eocene of Merca-1 and Uarsciek-l.

Daban-Dagah Shabel Basin

Nubian sandstones are well developed in the Daban-Dagah Shabel Basin.

Hafun Margin

Karoo fill with good sandstone reservoirs may be present in the subsurface.

Good Cretaceous sandstones with fair porosity were present in wells drilled; however, there were no shows.

Lamu Embayment

The Karoo sandstones are believed to floor the Lamu Embayment and be a source of reservoir rock.

Jurasssic oolitic limestones are expected to provide porous reservoir section.

Cretaceous fluvial and marine sandstones will provide reservoir rock within the Lamu Embayment.

Paleocene-Eocene deltaic and shallow marine sands, sourced from the Bur Acaba High, are expected to be of interest as potential reservoir rock.

Mandera Basin

Karoo sandstones are productive in the Ogaden Basin to the north and should be adequate reservoir section within the Mandera Basin.

The Lower-Upper Jurassic carbonates have porous oolitic intervals and vuggy porosity in karst zones and have potential for reefal buildups.

The Lower Cretaceous Ambar Sandstone, fluvio-deltaic, should provide good reservoir intervals.

Nogal Rift Basin

Cretaceous and Jurassic rocks are expected to provide suitable reservoir section within the Nogal Rift Basin. The Upper Cretaceous Gira and Jessoma sandstones, the Jurassic Upper Hamanlei carbonates and the basal Jurassic Adigrat Sandstone will be the primary targets.

Northeast Tip Basin

Little is known of the onshore because of difficulty of access; however, Eocene carbonates blanket the area and, if buried deeply enough, should be investigated because of the oil recovered from equivalent carbonates across the Gulf of Aden in the Sayhut Basin. Nothing is known of the section beneath the Eocene.

Ogaden Basin

The Calub Sandstone Member of the Karoo overlies basement and has average porosity of 12%. The Calub sandstone is a proven gas reservoir at the Calub Field in Ethiopia.

The Upper Triassic-Lower Jurassic Adigrat Sandstone has an average porosity of 11% and is a proven gas reservoir at the Calub Field in Ethiopia.

The Lower-Middle Jurassic Hamanlei Fm. carbonates exhibit porosity within oolitic and dolomitized zones, as well as fractures adjacent to faults.

The Upper Jurassic Gabredarre Fm. carbonates have porous zones similar to those in the Hamanlei Fm. below.

Source Rock

Al Mado-Darror-Gumbah Grabens

Source rocks within the Darror Graben are believed to include dark gray fissile shales from the Triassic-Jurassic Adigrat, carbonaceous shales from the Upper Cretaceous Gira and Jessoma Fms. marginal marine facies and from the Eocene Taleh evaporites. Geochemical analyses reported by Harms and Brady (1989) indicate good-to-excellent oil potential but immature samples. Deeper burial could lead to hydrocarbon generation and migration.

Berbera-Raguda Basin

Harms and Brady (1989) referred to the area of the westernmost Berbera-Raguda Basin as "Guban." They reported samples from Jurassic Gahodleh and Daghani shales in the Bihendula area to have fair-to-good oil source potential and to be marginally mature. They did not show the locations sampled.

Bosaso Basin

A Miocene shale sample from the Shell Bandar Harshau-1 is a potential oil and gas source, though immature. A sample of Jesomma shale from the same well is a potential hydrocarbon source, but overmature (Harms and Brady, 1989).

Coastal and Mudugh Basins

The Karoo Bokh Shale Member is a proven gas source rock to the west in the Ogaden Basin. The oil source Upper Jurassic Uarandab Shale generates liquid hydrocarbons in the Ogaden Basin and extends into the Coastal and Mudugh Basins.

Gas prone source rocks are expected within the Upper Cretaceous clastics.

Paleocene-Eocene deltaic shales are considered valid source rocks in the Lamu Basin to the south and are expected to occur along the coastal basins to the northeast.

Daban-Dagah Shabel Basin

Jurassic calcareous shales from the Dagah Shabel-2 and -3 indicated fair-to-good source for condensate and gas and good oil source.

An Eocene-Oligocene outcrop sample of lignite from the lower Daban is an immature gas source.

Hafun Margin

Harms and Brady (1989) report Source rock quality of all the penetrated section is very poor."

Lamu Embayment

Potential source rocks occur within the Maji ya Chumvi Fm., equivalent to the Bokh Shale of the Ogaden Basin, organic-rich shales of the Liassic, and the Middle and Upper Jurassic marine carbonates.

Cretaceous lacustrine and marine organic-rich shales are recorded from the Lamu Embayment.

Paleocene-Eocene marginal-to-deltaic shales are source-rich in the Somalia and Kenya portions of the Lamu Embeyment.

Mandera Basin

The Elgal Shale, a lateral equivalent to the Bokh Shale of the Ogaden Basin, is organic-rich but overmature where encountered in the Mandera Basin.
Upper Jurassic shales are expected to be the primary source rock within the Mandera Basin.

Nogal Rift Basin

Source rocks within the Nogal Valley-Rift include dark gray fissile shales of the Triassic-Jurassic Adigrat Fm., carbonaceous shales from the Upper Cretaceous Jessoma marginal marine facies, and from Eocene Taleh evaporites. Geochemical analyses reported by Harms and Brady (1989) indicate good-to-excellent oil potential plus gas potential from Hamanlei and Jessoma intervals.

The Jessoma is considered the proven and primary source rock for the Nogal Rift.

Northeast Tip Basin

Harms and Brady (1989) report "wells had no significant shows and source rock quality of all the penetrated section is very poor."

Ogaden Basin

The Bokh Shale Member of the Karoo is the source for gas and condensate at the Calub Field in Ethiopia. It is considered overmature in the deeper parts of the Ogaden Basin.

The Upper Jurassic Uarandab shale is a mixture of Types 11 and lit organic matter, attains oil maturity where deeply buried, and is considered the source of the Genale River oil seep.

Potential source rock is developed within the Transitional Unit above the Adigrat and overlying Hamanlei, as well as within the anhydrite-rich beds of the Hamanlei Fm. itself.

Seal

Al Mado-Darror-Gumbah Grabens

The Darin-1, drilled in the Darror Graben, contained numerous seals: Eocene Taleh evaporites, Jessoma and Gira shale, Upper Hamanlei shale, and evaporites within the Jurassic carbonate section above the Adigrat.

Berbera-Raguda Basin

The Berbera-1, a stratigraphic test drilled by British Petroleum, penetrated only Tertiary sediments. The section contained clays and volcanic layers capable of acting as seals.

The Biyo Dader-1, Stanvac, penetrated Jurassic Daghani and Gahodleh shales capable of sealing underlying hydrocarbons.

Bosaso Basin

Eocene-Miocene shales and evaporites, as well as Cretaceous shales, form good seals in the offshore. Tight carbonates of the Jurassic Hamanlei are also effective seals.
Coastal and Mudugh Basins

Effective shale seals within the Karoo Bokh Shale and Upper Jurassic Uarandab of the Ogaden Basin will extend into the Mudugh and Coastal Basins of Somalia.

Interbedded shales of the Upper Cretaceous and Lower Tertiary are recorded in existing wells drilled in the Coastal and Mudugh Basins.

Daban-Dagah Shabel Basin

Jurassic Daghani and Gahodleh Shales will serve as seals in the Daban-Dagah Shabel Basin.

Hafun Margin

The Sagaleh-1 and Cotton-1, with total depths of 10,722' and 10,887' respectively, penetrated an almost entirely carbonate section from Upper Eocene Karkar at the top until the wells reached the Adigrat Sandstone at total depth. Seals would have to be tight limestones and shale within the Jessoma interval plus minor evaporites in the Upper Hamanlei.

Lamu Embayment

Upper Jurassic shales and interbedded Cretaceous and Lower Tertiary shales are expected to provide effective seals throughout the Lamu Embayment.

Coastal and Mudugh Basins

Effective seals are expected to be the shales of the Karoo Bokh Shale Member, Upper Jurassic Uarandab Shale, Upper Cretaceous clastic sequence, and interbeds within the Lower Tertiary.

Mandera Basin
The Karoo Bokh Shale Member equivalent, the Elgal Shale, will seal any Karoo basal sand section and Upper Jurassic shales will provide seal to intervening reservoir rocks.

Nogal Rift Basin

The Nogal Valley Rift stratigraphic section exhibits Quaternary clastics and evaporites over Tertiary shelf carbonates and evaporites in turn overlying Cretaceous and Jurassic carbonates and clastic sediments. The lower Jurassic Adigrat Sandstone rests unconformably on Precambrian.

The Quaternary, Tertiary, and Cretaceous Neocomian evaporites are good seal agents. Shale within the lower Oligocene, Cretaceous Jessoma and Jurassic Uarandab are also effective regional seals.

Northeast Tip Basin

The Ras Binnah-1, drilled offshore the Northeast Tip of Somalia, penetrated clays, shales and marls for the first 7428'. The Gumbah-1 penetrated a similar section for the first 8,227'. No other seal is required.

Ogaden Basin

The shales within the Karoo Bokh Shale and the Jurassic Uarandab Fm. are known to provide effective seals at the Calub Field in Ethiopia.

Anhydrite layers within the Lower Cretaceous Gorrahei Fm. will seal older reservoir sections.

Traps

Al Mado-Darror-Gumbah Grabens

Anticlines such as at the Darin-1 location and faults associated with rifting are expected to be encountered within the rift-generated grabens.

Berbera-Raguda Basin

Existing seismic indicates faulting and resultant traps. The Biyo Dader-1 was drilled by Stanvac on a northwest trending anticline.

Bosaso Basin

Shell's Dab Qua-1 was drilled on an ENE-WSW trending fault-bound structure. The Shell Bandar Harshau-1 was drilled on a northeast-trending anticline broken by east-trending faults.

Coastal and Mudugh Basins

Faults and drape within the Karoo will form traps. Faults, carbonate buildups and reefs may serve as traps within Jurassic carbonate intervals. Fault traps are expected within the Upper Cretaceous and Lower Tertiary intervals.

Daban-Dagah Shabel Basin

The Dagah Shabel-1 was located on the highest point of a fault block adjacent to an oil seep.

Hafun Margin

The only two wells drilled along the Hafun Margin, the Sagaleh-1 and the Cotton-1, were both on anticlinal folds.

Lamu Embayment

Jurassic salt diapirs and pillow structures will form structural traps within the confines of the mobil salt of the Early Jurassic salt basin extending along the coast from Kenya north into Somalia. Toe-thrust zones should also be expected.

Faults and anticlinal folds within the Cretaceous and Tertiary deltaic sequences should be expected to trap hydrocarbons in the Lamu Embayment.

Mandera Basin

Faults traps and drape over fault blocks are expected in the Mandera Basin, similar to those in the Ogaden Basin to the north.

Hydrocarbon accumulations may develop via fault traps or stratigraphic entrapment in Jurasssic reefs, carbonate buildups or oolite layers.

Nogal Rift Basin

Anticlinal folds and rotated fault traps associated with rifting are expected within the Nogal Rift. Tilted fault blocks with younger sediments draped over the fault blocks and rollover on the downthrown side of faults are common in the Nogal Rift.

Northeast Tip Basin

Piano-keys tectonics in the area is described by Harms and Brady (1989); therefore, one should expect tilted fault blocks and a horst and graben structural complex with resultant fault traps and drape over horst blocks.

Ogaden Basin

Faults and drape over fault blocks form the trap at the Calub Field in Ethiopia. Faults and stratigraphic traps, reefs and karstified carbonate buildups are expected within the Jurassic carbonates.

Plays and Leads

Approximately 60 exploration wells have been drilled to date in Somalia. Of these, only eight were drilled offshore. None have discovered commercial quantities of hydrocarbons. A review of the exploration wells reveals numerous gas shows and shows of dead oil. There is evidence of flushing by fresh water in many of the porous intervals. Overall, these are very discouraging results.

However, one must note that 60 wells over an area only slightly smaller than the state of Texas is not much exploration.

Good plays remain available onshore and offshore (Figure So-15). Onshore, the sparsely explored Lamu Embayment to the south with sediments to nine kms thick and containing good source and reservoir rocks remains unleased, as well as the unexplored carbonate bank play extending over 100 kms^2 onshore the Mudugh Basin of central Somalia. The Jurassic rifts of onshore northern Somalia cannot be said to have been adequately explored and there appears to be a western extension of the Nogal Rift onto an open block that includes the capital of Hargeisa in Somaliland. The offshore Gulf of Aden depocenters of the combined Berbera-Raguda-Bosaso Basins (Figure So-16) have definite potential and are also available.

The eight offshore wells have all been drilled in relatively shallow water and it must be pointed out that the vast majority of giant oil discoveries offshore Brazil and along the West African coast have been in deep to ultra-deep water. It is a certainty that clastic reservoirs, deep sea fans and turbidites, clean up off the shelf edge into deeper water and exhibit greater porosity and deliverability than the shallower water discoveries. Perhaps the deep water will ultimately prove to be where Somalia's oil awaits the drill.

Al Mado-Darror-Gumbah Grabens

The Adigrat sandstone, based on present control, is 2,000-3,000 feet thick and grades upward into a dolomitic limestone with interbedded sandstone and evaporites similar to the Transition Zone of the Ethiopian Ogaden Basin. The carbonate interval produced gas in the Darin-1 well.

The Adigrat is the primary play and the possibility of deeper Karoo is possible. Karoo and possibly Jurassic fill may have potential in the eastern Gumbah Graben.
Berbera-Raguda Basin

The offshore Berbera-Raguda depocenter is expected to host Cretaceous sandstones and Lower Tertiary limestone, oil-bearing in the Sayhut Basin offshore Yemen, above Jurassic source rock. The western onshore portion of the basin was drilled by BP in stratigraphic tests that encountered volcanics at shallow depths. Older seismic in the western offshore segment indicates a relatively featureless section. The prospective area will lie in the eastern part of the basin.

Harms and Brady (1989) state the onshore portion of the Raguda Basin has two seconds of sedimentary section and in addition may contain additional Jurassic rifts. There are no definitive data to support the concept.
Bosaso Basin

The primary play is considered the pre-rift Paleocene Auradu limestone, oil productive in the Sayhut Basin across the Gulf of Aden offshore Yemen.

Shell's Bandar Harshau-1 had oil shows in Oligocene-Miocene sandstones.
Coastal Basin

Significant gas was recovered from Upper Cretaceous-Paleocene sands by the Agfoi-1 testing 4.4 MMCFGD and 42 BCPD through a 1/4 inch choke. The reservoir depleted during testing and follow-up wells, the Agfoi-2 and -3, were unsuccessful. Nevertheless, good quality reservoir sandstones were noted in the offsetting Merca-1 and Uarsciek-1 wells.

The Duddumai fault zone is expected to provide numerous fault-associated traps. There is no record of oil-prone source rocks to date; however, drilling deeper in a position further offshore might reveal oil-prone and mature source rock.

Daban-Dagah Shabel Basin

The Daban-Dagah Shabel Basin remains attractive despite the unsuccessful Dagah Shabel wells and Biyo Dader-1. The basin contains favorable oil-prone Jurassic source rock and excellent Cretaceous and younger Nubian sandstone reservoir with younger Tertiary regionally sealing shale beds.

Future exploration might focus on mapping the most favorable source rock and locating adjacent porous Nubian sandstone in trap situations.

Hafun Margin

Existing wells had no shows and source rock quality of penetrated section is very poor.

Lamu Embayment

The Lamu Embayment may well have the most potential for commercially significant hydrocarbons in Somalia, as the ingredients are present. There is a very thick Tertiary section with excellent clastic reservoir beds being sourced from the Bur Acaba High and swept into the Lamu depocenter as alluvial fans and deltas.

The Paleocene-Middle Eocene-Oligocene is reported to contain excellent oilprone lignitic beds with TOC to 30%. Thickness of overlying younger Tertiary should be adequate to provide maturity.

The underlying Lower Jurassic mobil salt section, present in the offshore and along a coastal strip onshore, will provide structure via diapirs, pillows and toethrusts.
The downthrown side of the Brava fault zone, flanking the Lamu Embayment to the north, should provide tilted fault blocks, drape over faults, and possibly growth faults accompanied by rollover of younger sediments into the faults.

The area is under-explored and data-poor.

Mandera Basin

The Karoo beds of the Mandera Basin are similar to those found productive at Calub Field in the Ethiopian Ogaden Basin to the north; therefore, the Karoo sandstones, the Calub and Gumboro Members, must be considered gas prospective.

Three samples of Middle Hamanlei from the Juba-1 in the Mandera Basin tested good-to-excellent, Type 11 oil-prone source rock prior to becoming post-mature (Harms and Brady, 1989).

There are two mapped anticlinal trends present in the Mandera Basin, the Garbaharre and Sengif anticlines. Each extends for over 100 kms but the width of each is only a few kms.

A high-risk but viable play is fractured Hamanlei carbonates on the crests of these anticlinal trends.

Mudugh Basin

There is a play extending along a coast-parallel strikeline running through the El Bur-1 and En Dibirre-1 wells of the Mudugh Basin. The Neocomian Main Gypsum of the western Mudugh Basin passes eastward from shallow evaporitic sebkha to deeper water organic-rich mud, dolomite and evaporites to a carbonate platform edge and then to a deeper water basinal facies. The play lies along the carbonate platform edge.

Good oil-prone source rocks are present in the En Dibirre-1 and good quality carbonate reservoir rocks are present in the El Bur-1 located on the platform margin. The edge of the platform was probably raised hosting carbonate shoals and reefal buildups. The thick carbonate facies of the platform margin is expected to exhibit porous winnowed grainstones. Intermittent lowering of sea level, or elevation of the carbonate platform, developed vadose and karst porosity. The elevated platform margin caused restricted circulation in the muddy landward part of the basin developing anoxic source beds.

The Aptian Mustahil transgression deposited marl and shale over the Neocomian carbonates, providing a regional seal.

A seismic program located along the platform margin should reveal numerous prospective highs.

Nogal Rift Basin

At the present, Conoco holds the leases, in force majeure, over the Nogal Rift and much of the Nogal Valley to the west of the Rift. There appears to be a westward extension of the Nogal Rift extending onto an open block including the city of Hargeisa. The sediments appear to be deeper and thicker to the west and possibly more prospective, although there is more seismic coverage to the east. Indeed, Conoco has defined seismically numerous drillable prospects in Block 28.

Two wells were drilled in the Nogal Rift Block 28 -- the Nogal-1 which encountered overpressured Upper Cretaceous Gumburu Fm. and lost the hole; and the Kalis-1 which found Adigrat resting on basement. The wells proved two reservoirs, the Gumburu and Jesomma sandstones.

Future exploration will be to drill Lower Cretaceous-Jurassic section in a normally pressured area, possibly along the flanks of the rift. Additionally, it is believed the reservoir quality will improve to the west, therefore the focus will move westward, possibly into Block 27.

In addition to the Lower Cretaceous-Upper Jurassic sands, the possibility remains that older, deeper rift section remains to be discovered.

Northeast Tip Basin

Flat lying Eocene limestone blankets the onshore and there is no data for the pre-Eocene. Offshore wells had very thick shale section in the upper several thousand feet, there were no shows, and source rock was uniformly poor.

Ogaden Basin

Little is known of the Somalia sector of the Ogaden Basin. The Karoo and Adigrat are gas productive at the Calub Field in Ethiopia and must be considered as viable plays in western Somalia. In addition, the Hilala-1 in Ethiopia tested live oil from the Hamanlei Fm. and also has potential.

Summary of Contract Terms

There is no current Model Contract and no new contracts have been issued since the late 1980s-early 1990s, with the possible exception of the unconfirmed TotalFinaElf offshore lease in late 2001; however, for what it is worth, the general terms of two early Oil Exploration Permits are given below:

OIL EXPLORATION PERMIT (OEP) --- 1973

Term

A. Two years with option to extend for three periods of one year each under an Oil Prospecting Permit (OPP);

B. Have right to convert to Oil Mining Lease (OML) in event of commercial discovery.

Relinquishment

None stated.

Minimum Expenditure

A. For each of first two years, $300,000;

B. Under OPP, $500,000 per annum and obligation to drill a well to 5,000 feet.

Royalty

Oil 15%;

Gas 12 1/2%.

Rental

OEP $3.50 per square mile per annum;

OPP $30.00 per square mile per annum.

Government Participation

None. Taxes

Income tax 50%. Bonuses

None stated.

OIL EXPLORATION PERMIT (OEP) -- 1982

Term

A. Two years with option to extend for three periods of one year each under an Oil Prospecting Permit (OPP);

B. Have right to convert to Oil Mining Lease (OML) in event of commercial discovery.

Relinquishment

20% of original area at end of second year.

Minimum expenditure

A. Under OEP, $130.00 per square mile per annum;

B. Under OPP, $5,000.00 per annum per permit and commitment to drill a well to a minimum 10,000 feet.

Royalty

Oil 20%;

Gas 12 1/2 %.

Rental

Not stated.

Training

OEP $25,000 per annum;

OPP $25,000 per annum;

OML $60,000 perannum.

Taxes

Income Tax 30%;

Production Tax 5%;

Net Profits Tax Negotiable.

Background Note
(U. S. Department of State)

General

The Somalia Democratic Republic covers 637,660 kms^2 (246,200 $miles^2$). The capital is Mogadishu. There were 7,347,554 Somalis in 1995. The population is approximately 85% Somali and 15% Bantu and Arabs. The vast majority are Muslim. Currency is in Somalia shillings.

Somali is the official language. Arabic, Italian and English are also spoken in some areas.

Somalia has no government at this time. Unofficially, the northern part of Somalia that once was British Somaliland has declared itself Somaliland and independent; the northeast corner of Somalia has declared independence as a state named Puntland. Somaliland and Puntland have overlapping boundary claims (Figure So-1). The southern part, once referred to as Italian Somalia and currently as the Southern Region, is ruled by various warlords and there is no consensus government.

Somalia is located in the Horn of Africa and is bordered on the northwest by Djibouti, on the west by Ethiopia, and on the south by Kenya. To the north lies the Gulf of Aden with Yemen on the opposing coast. Off the northeast tip of Somalia lies the island of Socotra, territory of Yemen. To the east is the Indian Ocean. The country is principally desert with the central and southern part having an average elevation of 180 meters (600 feet). The northern part is hilly with elevations to 2,100 meters (7,000 feet) above sea level. The Somalia coastline extends for 2,720 kms along the Gulf of Aden and Indian Ocean. The Juba and Shebelle Rivers head in Ethiopia and flow eastward across Somalia. The Juba reaches the Indian Ocean, the Shebelle does not. Major climatic factors are a year-round hot climate, seasonal monsoon rains, and irregular rainfall with recurring droughts.

History

Early history traces the development of the Somali people to an Arab sultanate, founded in the seventh century A. D. by immigrants from Yemen. During the 15 and 16th centuries, Portuguese traders landed in present Somali territory and ruled several coastal towns. The sultan of Zanzibar subsequently took control of these towns and their surrounding territory.

Somalia's modern history began in the late 19th century, when various European powers began to trade and establish themselves in the area. The British East India Company's desire for unrestricted harbor facilities led to the conclusion of treaties with the sultan of Tajura as early as 1840; however, it was not until 1886 that the British gained control over northern Somalia through treaties with various Somali chiefs who were guaranteed British protection. British objectives cantered on safeguarding trade links to the east and securing local sources of food and provisions. The boundary between Ethiopia and British Somaliland was established in 1897 through treaty negotiations between British negotiators and King Menelik of Ethiopia.

During the first two decades of this century, British rule was challenged through persistent attacks led by Islamic nationalist leader Mohamed Abdullah. A long series of intermittent engagements and truces ended in 1920 when British warplanes bombed Abdullah's stronghold at Taleex. Abdullah was defeated as much by rival Somali factions as by British forces, but remains a national hero.

In 1885, Italy obtained commercial advantages in the area from the sultan of Zanzibar and in 1889 concluded agreements with the sultans of Obbia and Caluula, who placed their territories under Italy's protection. Between 1897 and 1908, Italy made agreements with the Ethiopians and the British that marked the boundaries of Italian Somaliland. The Italian government assumed direct administration, giving the territory colonial status.

Italian occupation gradually extended inland. In 1924, the Jubaland Province of Kenya, including the town and port of Kismayo, was ceded to Italy by the United Kingdom. The subjugation and occupation of the independent sultanates of Obbia and Mijertein, begun in 1925, were completed in 1927. In the late 1920s, Italian and Somali influence expanded into the Ogaden region of eastern Ethiopia. Continuing incursions climaxed in 1935 when Italian troops launched an offensive that led to the capture of Addis Ababa and the Italian annexation of Ethiopia in 1936.

Following Italy's declaration of war on the United Kingdom in June 1940, Italian troops overran British Somaliland and drove out the British garrison. In 1941, British forces began operations against the Italian East African Empire and quickly brought the greater part of the Italian Somaliland under British control. From 1941 to 1950, while Somalia was under British military administration, transition toward self-government was begun through the establishment of local courts, planning committees, and the Protectorate Advisory Council. In 1948 Britain turned the Ogaden and neighboring Somali territories over to Ethiopia.

In the 1947 peace treaty, Italy renounced all rights and titles to Italian Somaliland. In accordance with treaty stipulations, in 1948, the Four Powers referred the question of disposal of former Italian colonies to the UN General Assembly. In November 1949, the General Assembly adopted a resolution recommending that Italian Somaliland be placed under an international trusteeship system for 10 years, with Italy as the administering authority, followed by independence for Italian Somaliland. In 1959, at the request of the Somali

Government, the UN General Assembly advanced the date of independence from 2 December to 1 July 1960.

Rapid progress toward self-government was being made in British Somaliland. Elections for the Legislative Assembly were held in February 1960, and one of the first acts of the new legislature was to request that the United Kingdom grant the area independence so that it could be united with Italian Somaliland when the latter became independent. The protectorate became independent on 26 June 1960; five days later, on 1 July, it joined Italian Somaliland to form the Somali Republic.

In June 1961, Somalia adopted its first national constitution in a countrywide referendum, which provided for a democratic state with a parliamentary form of government based on European models. During the early post-independence period, political parties reflected clan loyalties and brought a basic split between the regional interests of the former British-controlled north and the Italiancontrolled south. There also was substantial conflict between pro-Arab, panSomali militants intent on national unification with the Somali-inhabited territories in Ethiopia and Kenya and the modernists who wished to give priority to social and economic development and improving relations with other African countries. Gradually, the Somali Youth League, formed under British auspices in 1943, assumed a dominant position and succeeded in cutting across regional and clan loyalties. Under the leadership of Mohamed Ibrahim Egal, prime minister from 1967 to 1969, Somalia greatly improved its relations with Kenya and Ethiopia. The process of party-based constitutional democracy came to an abrupt end, however, on 21 October 1969, when the army and police, led by Maj. Gen. Mohamed Siad Barre, seized power in a bloodless coup.

Following the coup, executive and legislative power was vested in a 20-member Supreme Revolutionary Council (SRC) headed by Maj. Gen. Siad Barre as president. The SRC pursued a course of scientific socialism that reflected both ideological and economic independence on the Soviet Union. The government instituted a national security service, centralized control over information, and initiated a number of development projects. The most impressive success was a crash program that introduced an orthography for the Somali language and brought literacy to a large percentage of the population.

The SRC became increasingly radical in foreign affairs, and in 1974, Somalia and the Soviet Union concluded a treaty of friendship and cooperation. As early as 1972, tensions began increasing along the Somali-Ethiopia border. In the mid-1970s, the Western Somali Liberation Front (WSLF) began guerrilla operations in the Ogaden region of Ethiopia. Fighting increased, and in July 1977, the Somali National Army (SNA) crossed into the Ogaden to support the insurgents. The SNA moved quickly toward Harer, Jijiga, and Dire Dawa, the principal cities of the region. Subsequently, the Soviet Union, Somalia's most important source of arms, embargoed weapons shipments to Somalia. The Soviets switched their full support to Ethiopia, with massive infusions of Soviet arms and 10,000-15,000 Cuban troops. In November 1977, President Siad Barre expelled all Soviet advisers and abrogated the friendship agreement with the U.S.S.R. In March 1978, Somalia forces retreated into Somalia; however, the WLSF continues to carry out sporadic but greatly reduced guerrilla activity in the Ogaden.

Following the 1977 Ogaden war, President Siad Barre looked to the West for international support, military equipment, and economic aid. The United States and other Western countries were reluctant to provide arms because of the Somali Government's support for insurgency in Ethiopia. In 1978, the United States reopened the U. S. Agency for International Development mission in Somalia. Two years later, an agreement was concluded that gave U. S. forces access to military facilities in Somalia. In the summer of 1982, Ethiopian forces invaded Somalia along the central border and the United States provided two emergency airlifts to help Somalia defend its territorial integrity.

From 1982 to 1990 the United States viewed Somalia as a partner in defense. Somali officers of the National Armed Forces were trained in U. S. military schools in civilian as well as military subjects. Within Somalia, Siad Barre's regime became increasingly a victim of insurgencies in the northeast and northwest, whose aim was to overthrow his government. By 1988, Siad Barre was openly at war with sectors of his nation. At the President 's order, aircraft from the Somali National Air Force bombed the cities in the northwest province, attacking civilian as well as insurgent targets. The warfare in the northwest sped up the decay already evident elsewhere in the republic. Economic crisis brought on by the cast of the anti-insurgency caused further hardship as Siad Barre and his cronies looted the national treasury.

By 1990, little remained of the Somali Republic. The insurgency in the northwest was largely successful. The army dissolved into competing armed groups loyal to former commanders or clan-tribal leaders. The economy was in shambles, and hundreds of thousands of Somalis fled their homes. In 1991, Siad Barre and forces loyal to him fled the capital; he died in exile in Nigeria.

In 1992, responding to political chaos and death in Somalia, the United States and other nations launched Operation Restore Hope. Led by the United Task Force (UNITAF), the operation was designed to create an environment in which assistance could be delivered to Somalis suffering from the effects of dual catastrophes --- one man-made and one natural. UNITAF was followed by the United Nations Operation in Somalia. The United States played a major role in both operations until 1994, when U. S. forces withdrew after a pitched gun battle with Somali gunmen that left 18 Americans dead and hundreds of Somalis dead or wounded.

Since 1994, various Somali factions have sought to control the national territory and have fought small wars with one another. Hussein Aideed, and Ali Mahdi

Mohamed, leaders of such factions, both claimed executive power in a new government based in Mogadishu. Mohamed Ibrahim Egal, first President of Somalia, was selected by elders as President of Somaliland which is made up of the former northwest provinces of the republic. Hargeisa is the capital city of Somaliland. As many as 30 other factions vie for some degree of authority in the country.

Effect of mediation of the Somali internal dispute, spearheaded by Ethiopia, has been unsuccessful to date.

Economy

Somalia's economy is pastoral and agricultural, with livestock -- camels, cattle, sheep and goats --- representing the main wealth. Farming is generally limited to the coastal districts and along the Juba and Shebelle River valleys. Banana plantations in the south are relatively successful.

A small fishing industry exists in the north where tuna, shark and other warmwater fish are caught. Aromatic woods -- frankincense and myrrh --also contribute to the country's exports. Minerals, including petroleum, are found but none have been exploited. Several international oil companies hold licenses from the former government; licenses currently in force majeure.

There are no railways in Somalia; internal transportation is by vehicle. The national road system comprises 14,400 kms (9,000 miles) of roads that include 2,400 kms of all-weather roads. The majority of the roads in southern Somalia were built by the Italians in the early 1930s in preparation for attacks on Ethiopia and British Somaliland.

The European Community and the World Bank jointly financed construction of a deepwater port at Mogadishu. The Soviet Union improved Somalia's deepwater port at Berbera, Gulf of Aden, in 1969. Facilities at Berbera were improved by a U. S. military program completed in 1985. During the 1990s the United States renovated a deepwater port at Kismayo that serves the Juba River basin and the banana export industry. Smaller ports are located at Merca, Brava, and Bossaso.
The internal telecommunications system is non-existent. Radiotelephone service is available to Aden, Zanzibar, Nairobi, Rome and London. Radio broadcasting stations operate at Mogadishu and Hargeisa with programs in Somali, English, Italian, Arabic and Swahili.

Foreign Relations

Somalia has followed a policy of nonalignment since independence. It has received economic assistance from the United States, Italy, and the Federal Republic of Germany, as well as from the Soviet Union and China.

A goal of Somali nationalism is to unite other Somali-inhabited territories with the republic. This issue has been a major cause of past crises between Somalia and Ethiopia, Kenya and Djibouti.

In 1963, Somalia severed diplomatic relations with the United Kingdom for a period following dispute over Kenya's northeastern region, an area inhabited mainly by Somalis. Somalia urged self-determination for the people of the area, while Kenya refused to consider any steps that might threaten its territorial integrity. Related problems have arisen from the boundary with Ethiopia and the large-scale migrations of Somali nomads between Ethiopia and Somalia. In the aftermath of the 1977-1978 war with Ethiopia, the government of Somalia continued to call for self-determination for ethnic Somalis living in the Ogaden region of eastern Ethiopia.

Since the fall of the Siad Barre regime, Somali foreign policy, such as it is, has centered on winning international support for various plans for national reconciliation.

USA --- Somalia Relations

U. S. diplomatic relations with Somali were interrupted by the fall of the Siad Barre government and the razing of the U. S. embassy in Mogadishu in 1991.

Contacts

USA --- U. S. contacts with Somalia are maintained by the U. S. embassy in Nairobi, Kenya.

Somalia --- The Somali Democratic Republic has no diplomatic representation in the United States or abroad. There is no Ambassador to the United Nations.

The International Petroleum Encyclopedia (2001) lists the following:

Ministry of Mineral Resources and Water
Government of Somalia
Box 774
Mogadishu, Southern Region
Somalia

National Petroleum Agency
Box 573
Mogadishu, Southern Region
Somalia
Tel 252-20747 120561

"Puntland" offers a Web site of the Somali National Educational Trust at snet.click2site.com.

The "Somaliland Republic" Web site is *Somalilandnetcom.*

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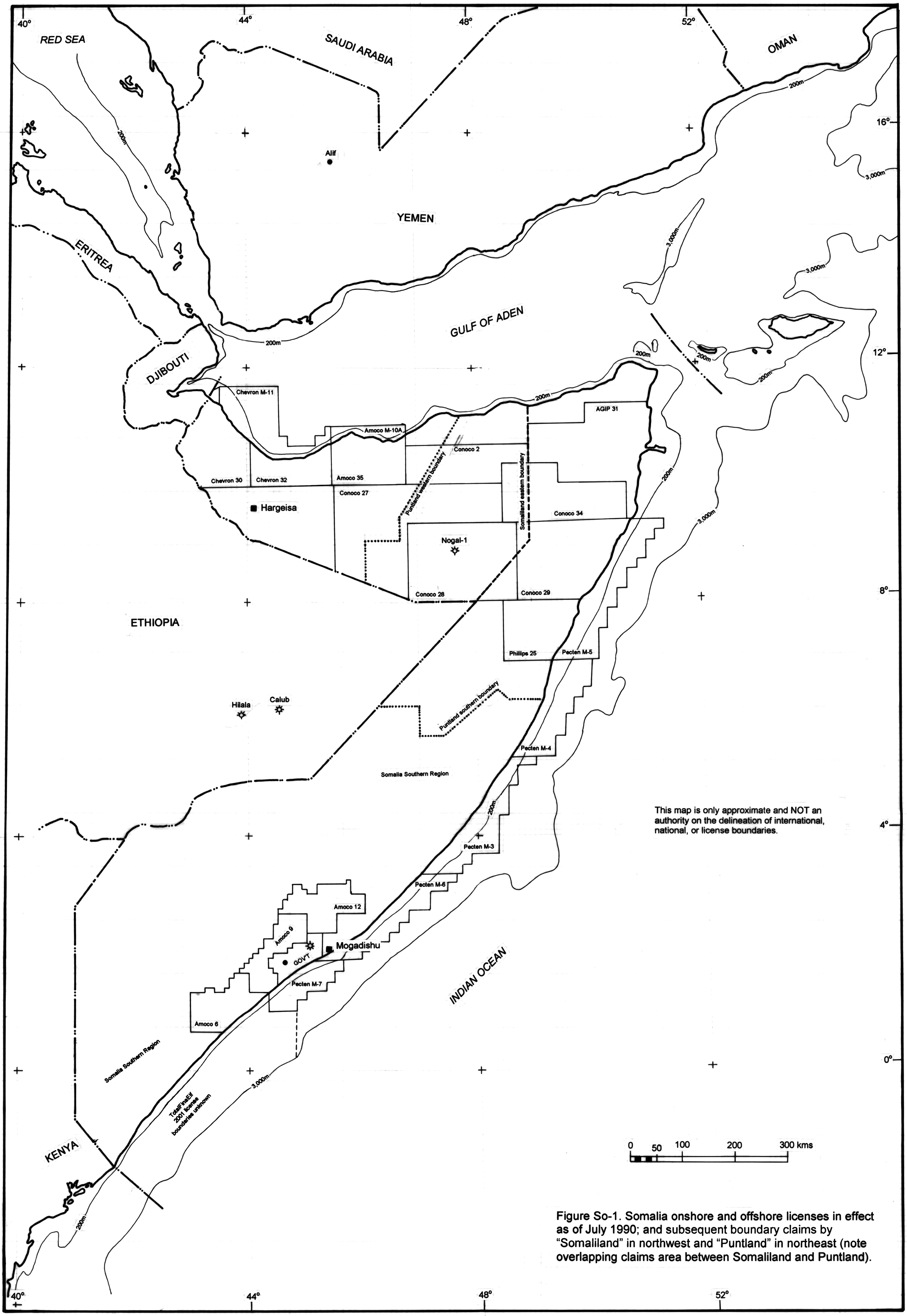


Figure So-1. Somalia onshore and offshore licenses in effect as of July 1990; and subsequent boundary claims by "Somaliland" in northwest and "Puntland" in northeast (note overlapping claims area between Somaliland and Puntland).

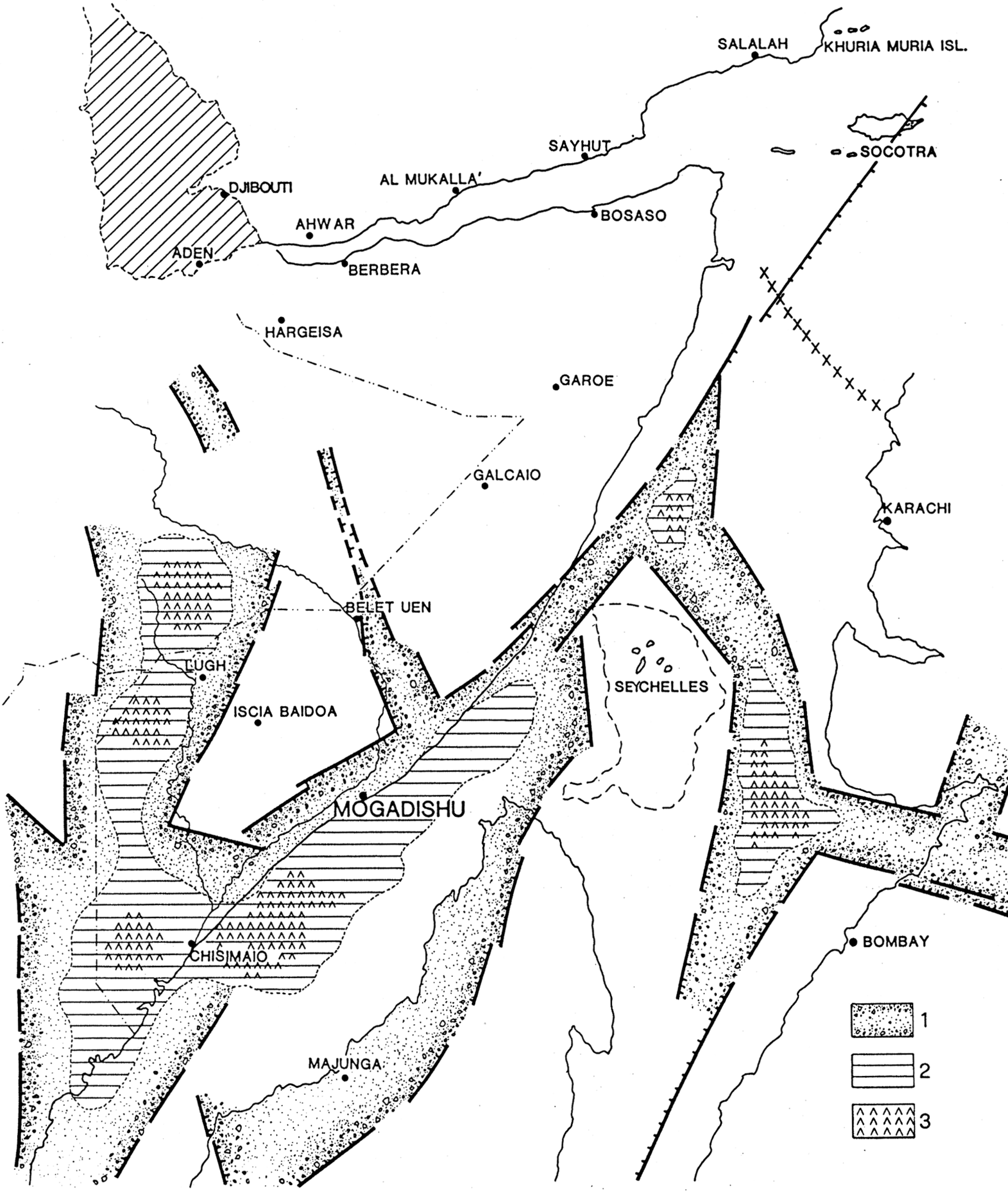


Figure So-2. The Karoo rift system in East Africa, Madagascar, Socotra, and India. Only major rifts are shown (*after* Bosellini, 1989). Explanation: 1) intermontane clastics; 2) water bodies, mainly lacustrine; 3) evaporites.

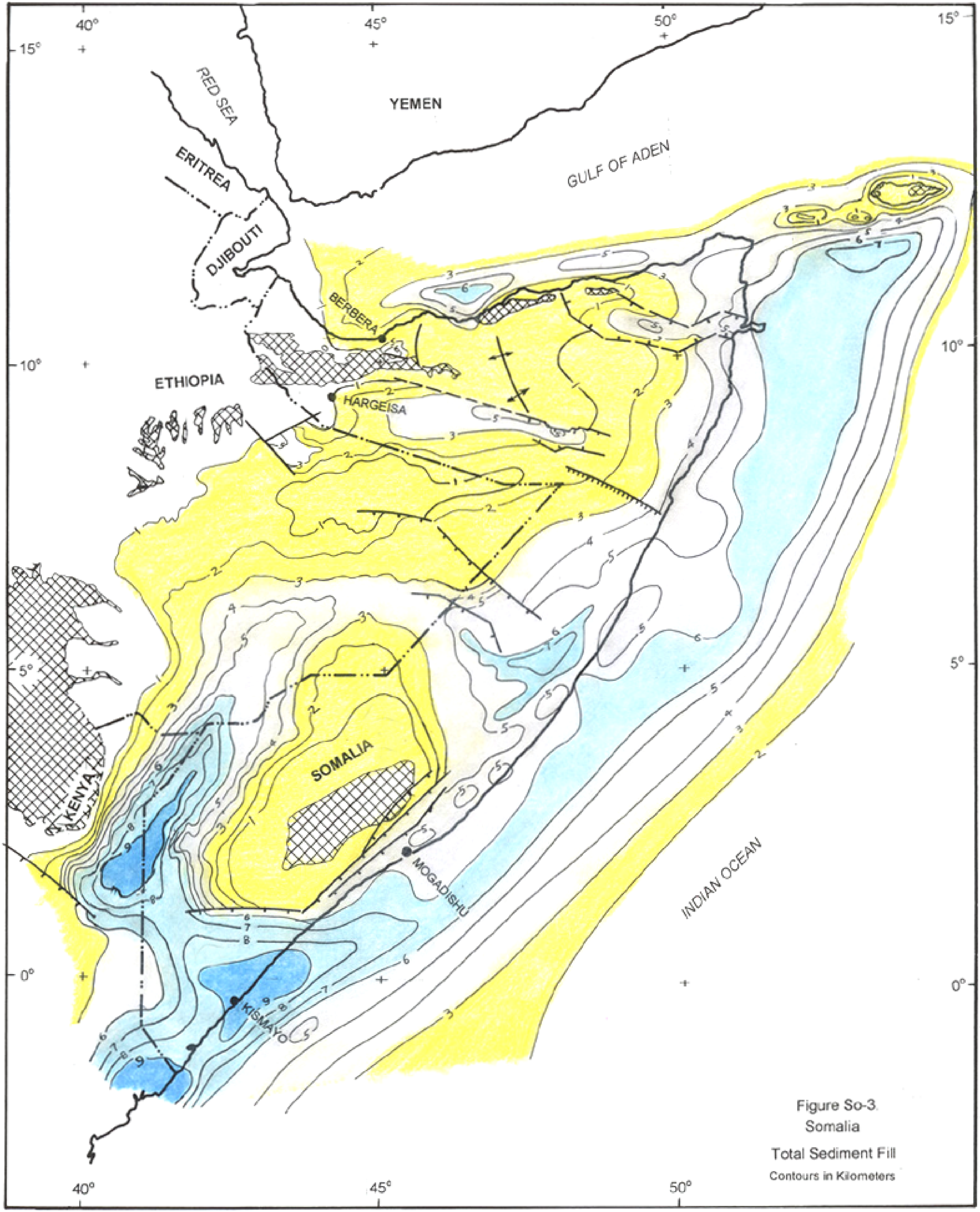


Figure So-3
Somalia
Total Sediment Fill
Contours in Kilometers

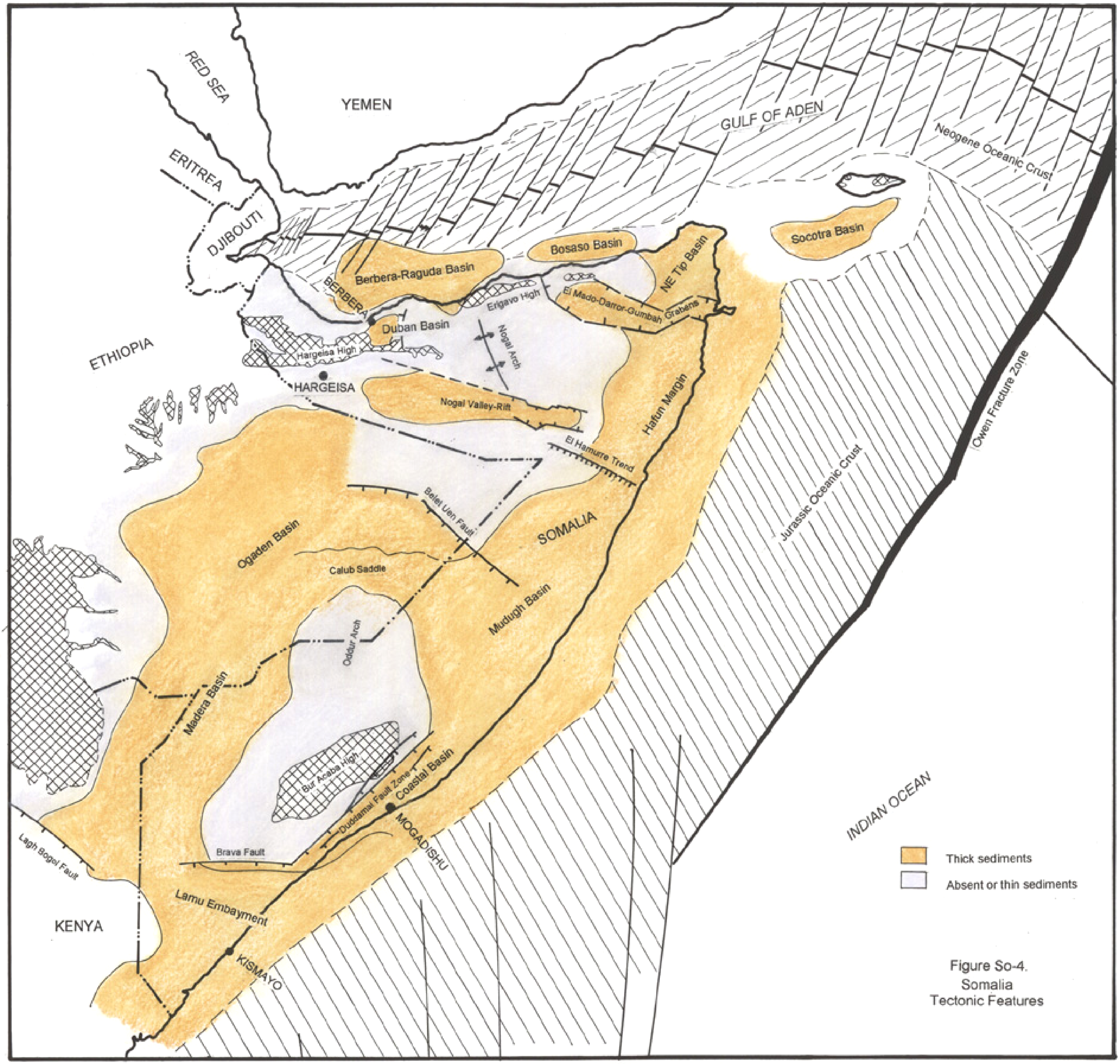


Figure So-4.
Somalia
Tectonic Features

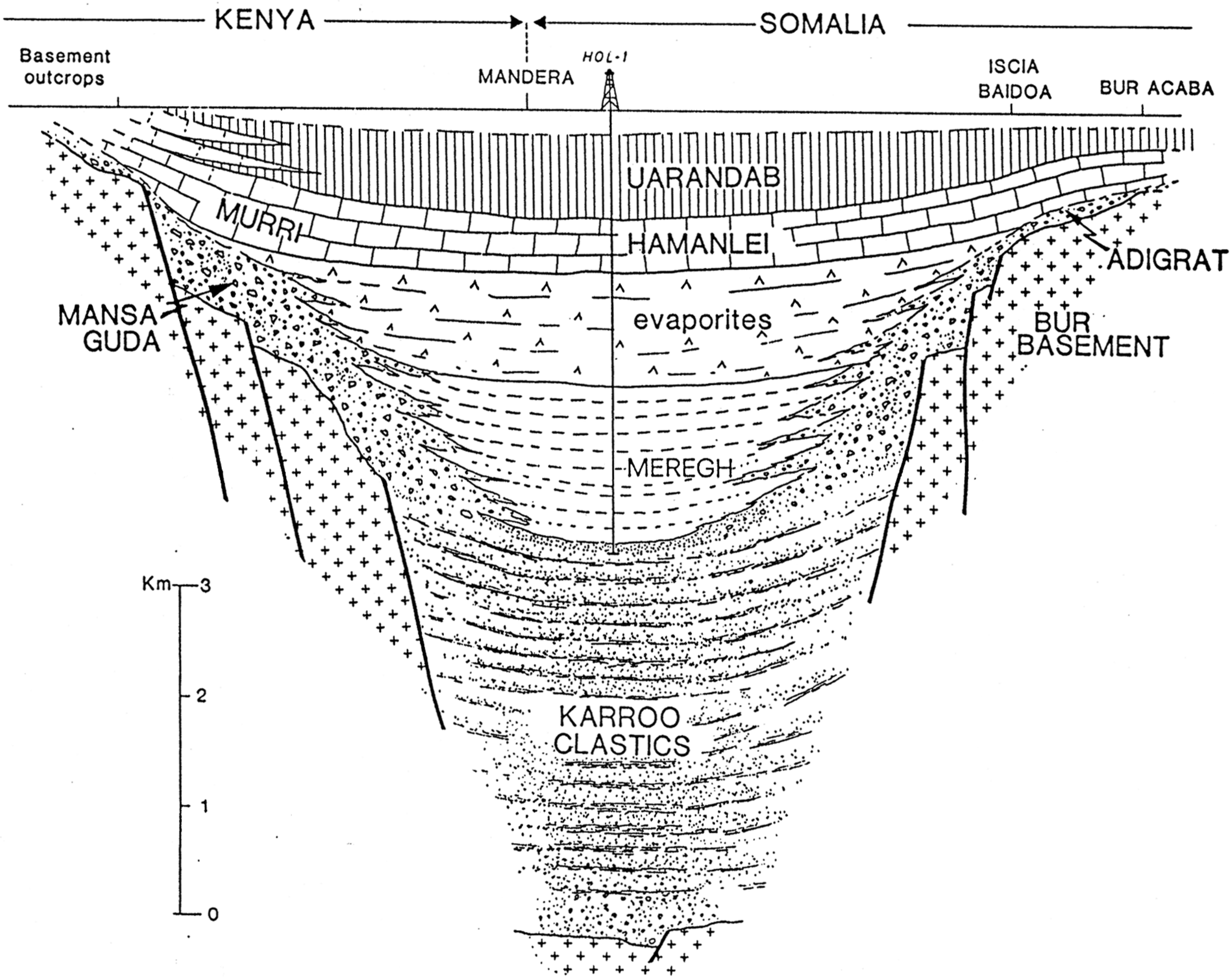


Figure So-5. Cross-section of the Mandera Basin, interpreted as an aborted Karoo rift, *from* Bosselini (1989).

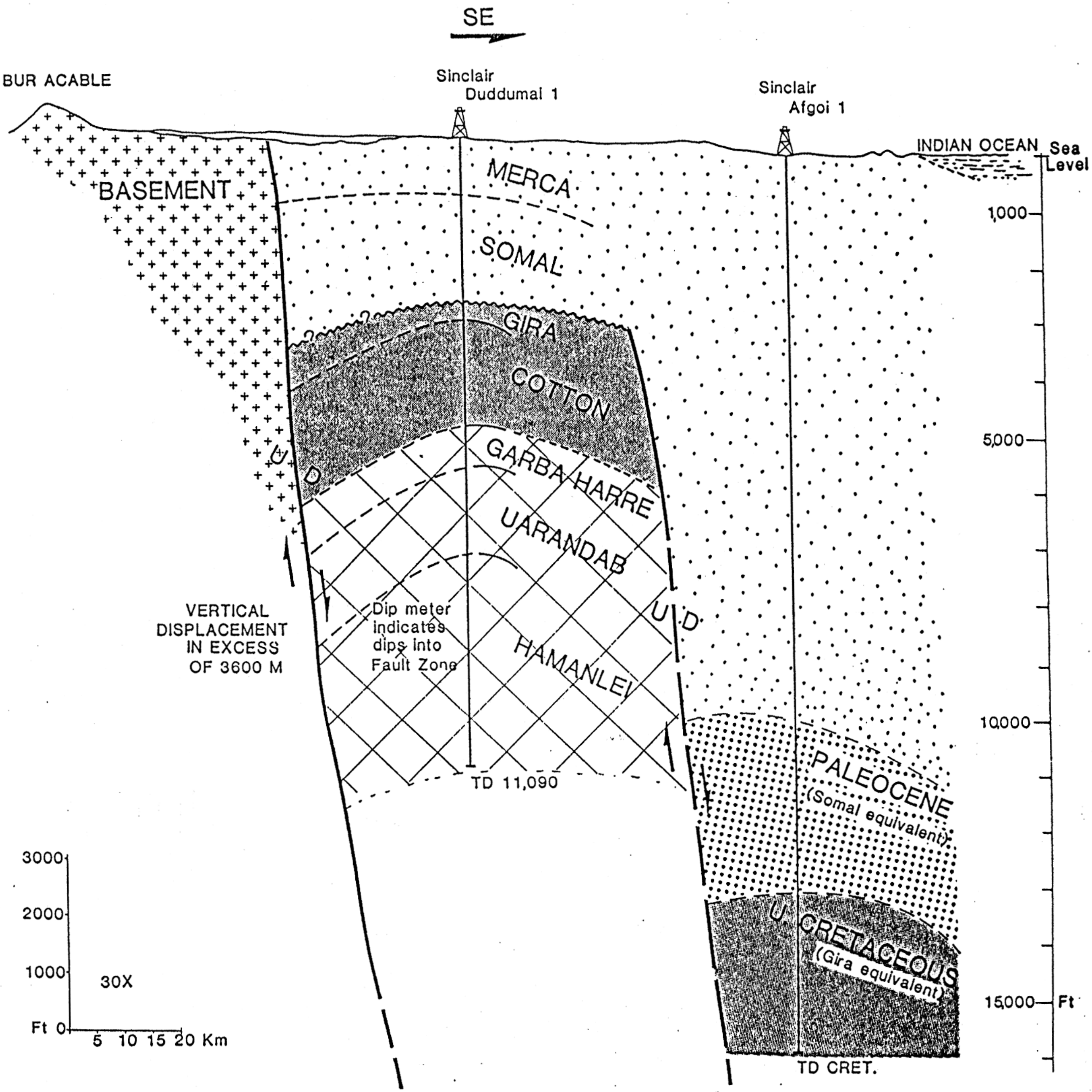


Figure So-6. The Duddumai fault zone of the Coastal Basin (redrawn from Scebel Oil Company unpublished report, 1967), *from* Bosselini (1989).

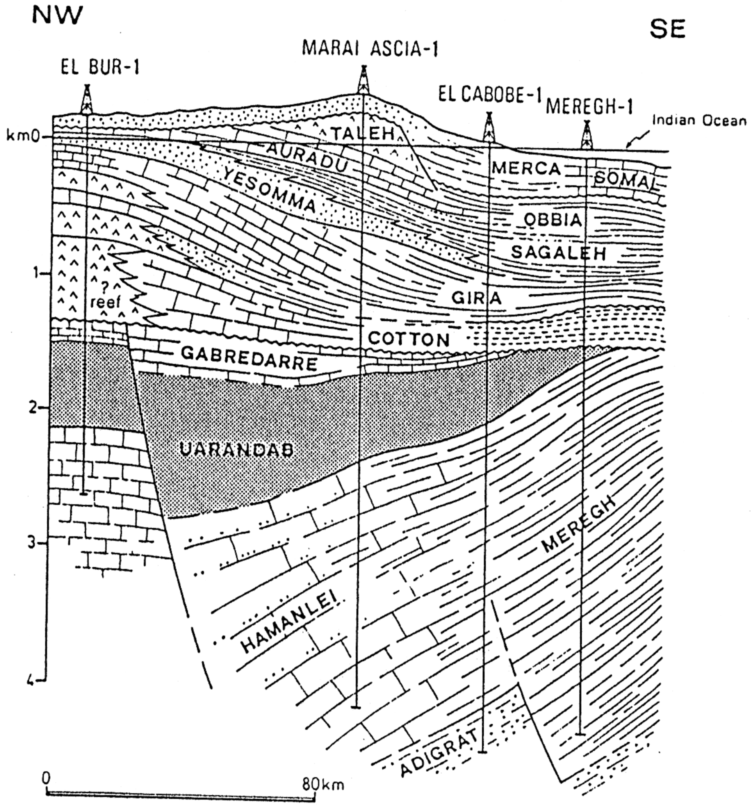


Figure So-7. Cross section of the Mudugh Basin showing the faulted Jurassic Section overlain by the Cretaceous-Tertiary prograding succession, *from* Bosselini (1989).

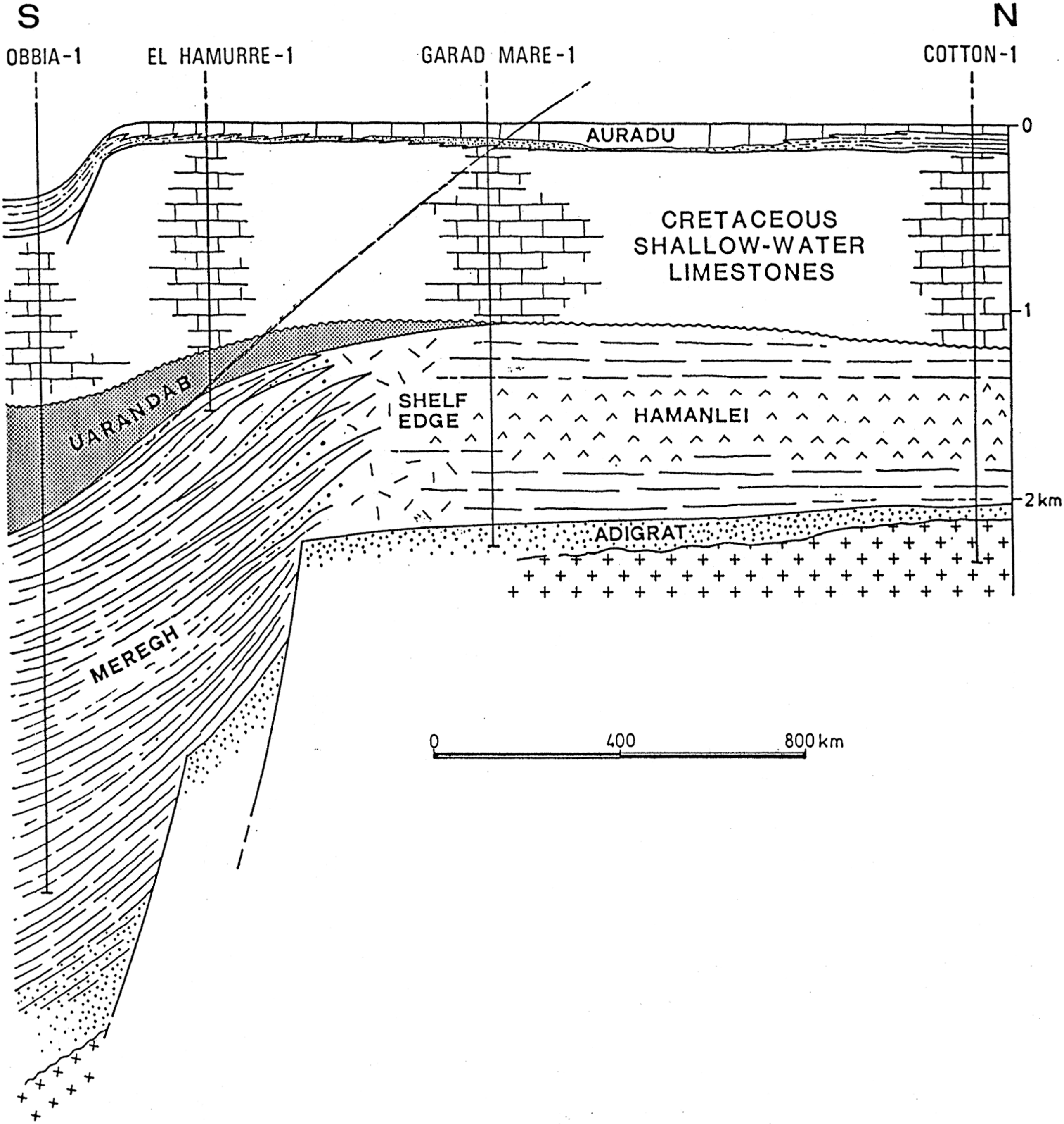


Figure So-8. Stratigraphic cross-section showing the El Hamurre Trend (escarpment), a persistent paleogeographic and structural feature, formed after the separation of Madagascar from Africa, *from* Bosselini (1989).

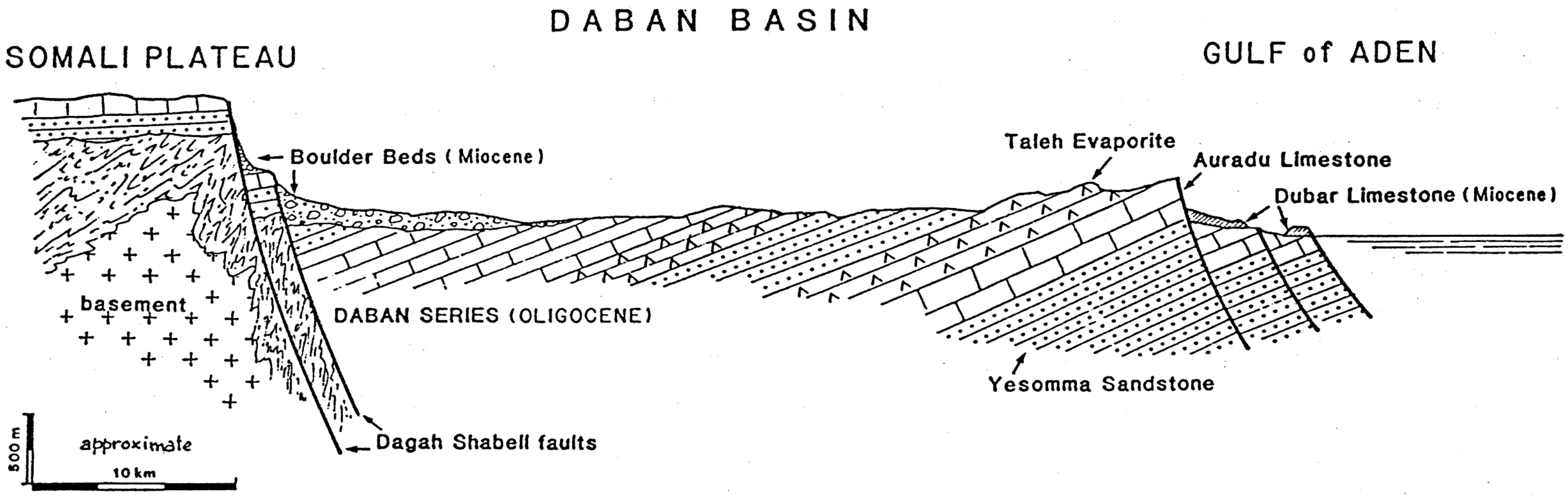


Figure So-9. Schematic cross-section of the Daban Basin, a tilted fault-block supporting an impressive thickness of fluvial and lacustrine sediments, *from* Bosselini (1989).

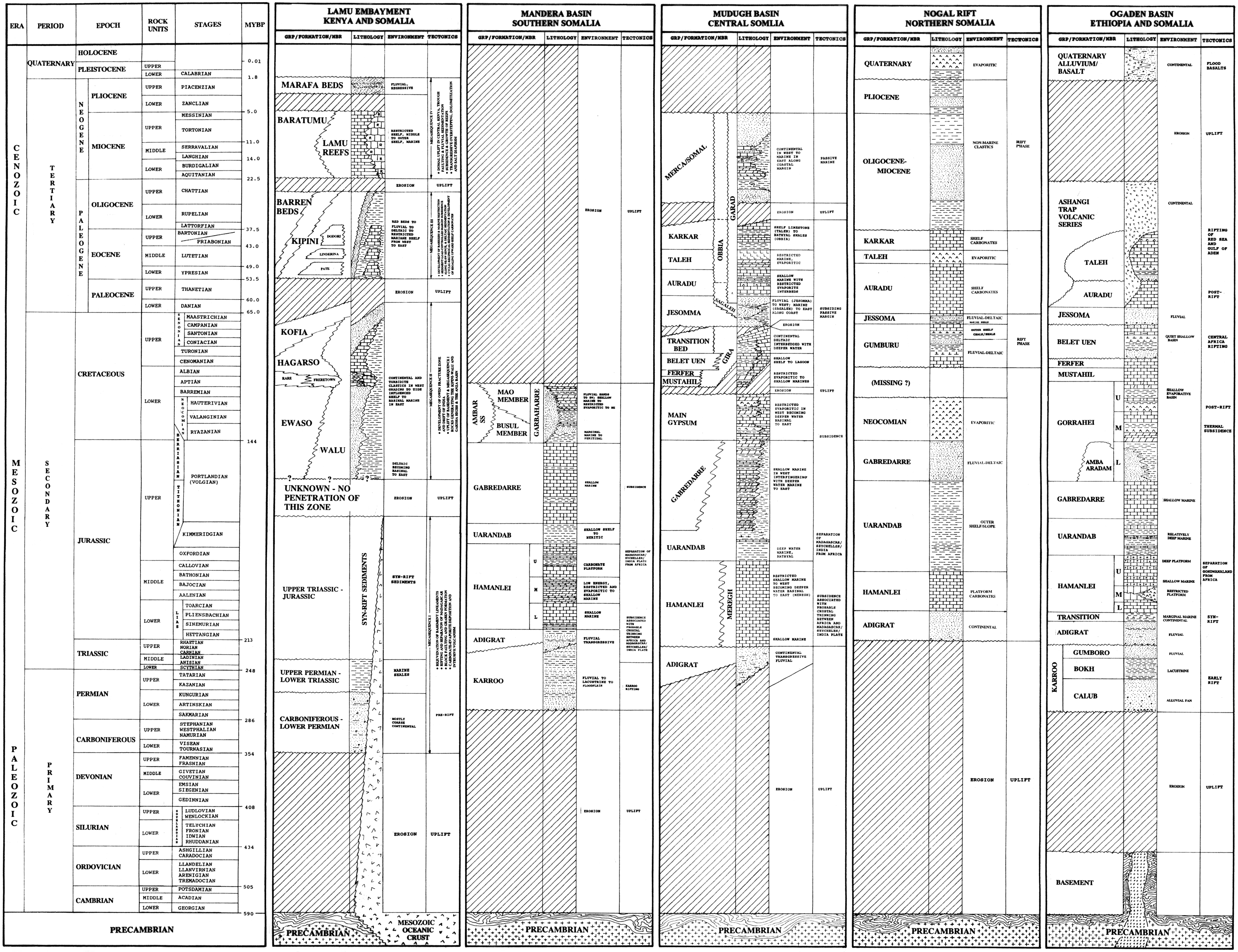


Figure So-10. Stratigraphic charts for southern, central, and northern Somalia.

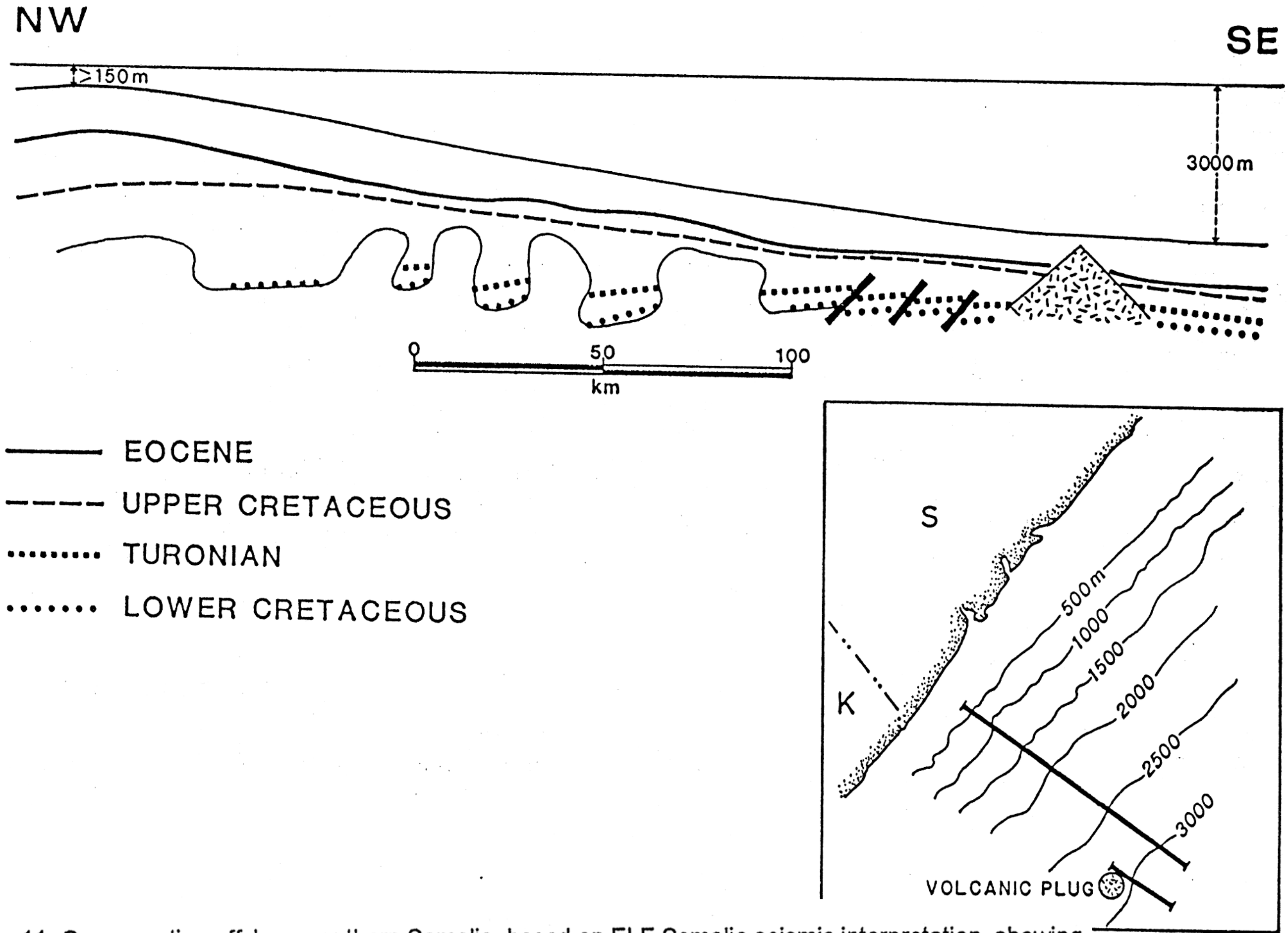


Figure So-11. Cross-section offshore southern Somalia, based on ELF Somalie seismic interpretation, showing the occurrence of diapirs and a volcanic plug (ELF Somalie unpublished report, 1978), *from* Bosselini (1989).

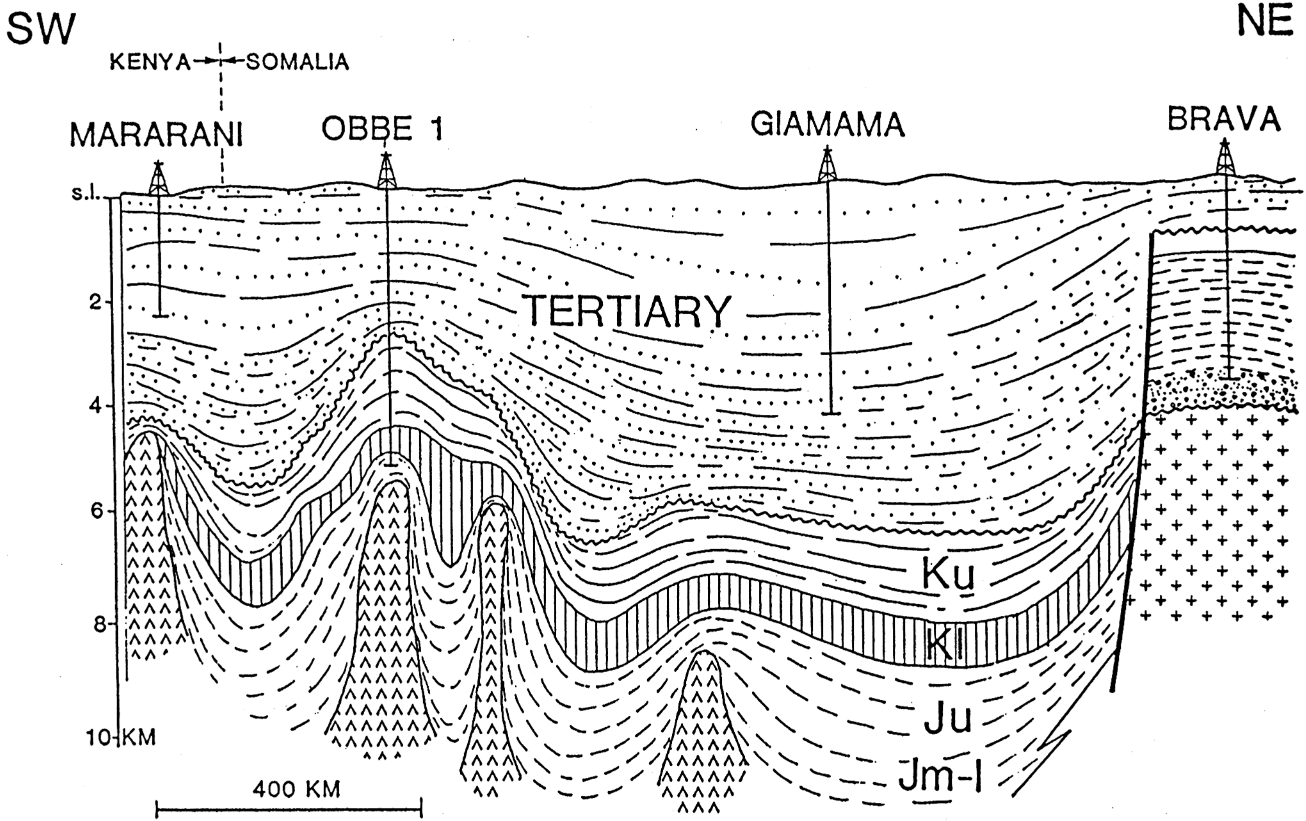


Figure So-12. Cross-section of the Lamu Embayment, based on a seismic interpretation by Worldwide Consultants, showing diapirs of Jurassic salt, *from* Bosselini (1989).

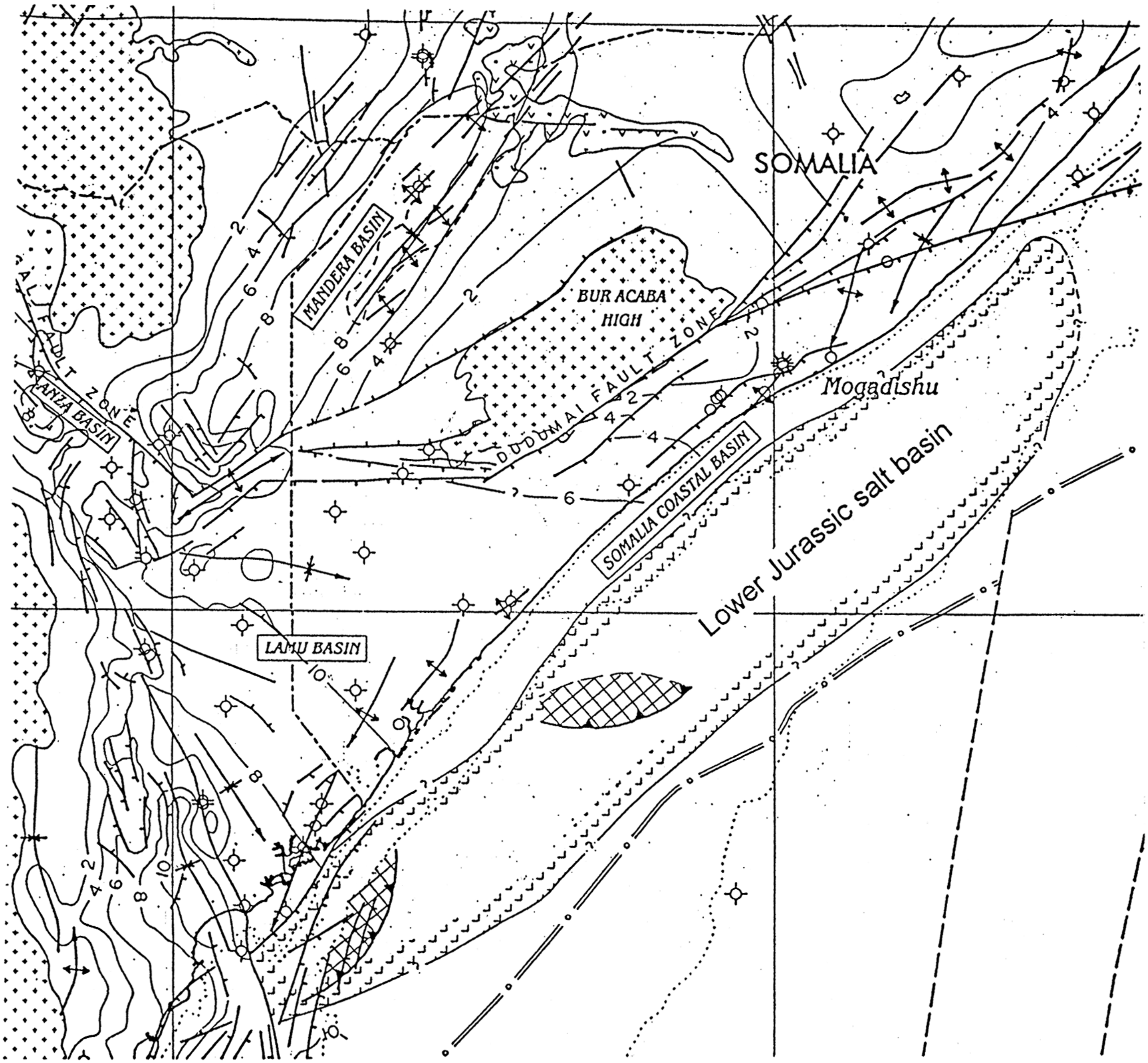


Figure So-13. Lower Jurassic salt basin offshore Somalia-Kenya, *from* Du Toit and others, 1997, enclosure 1.

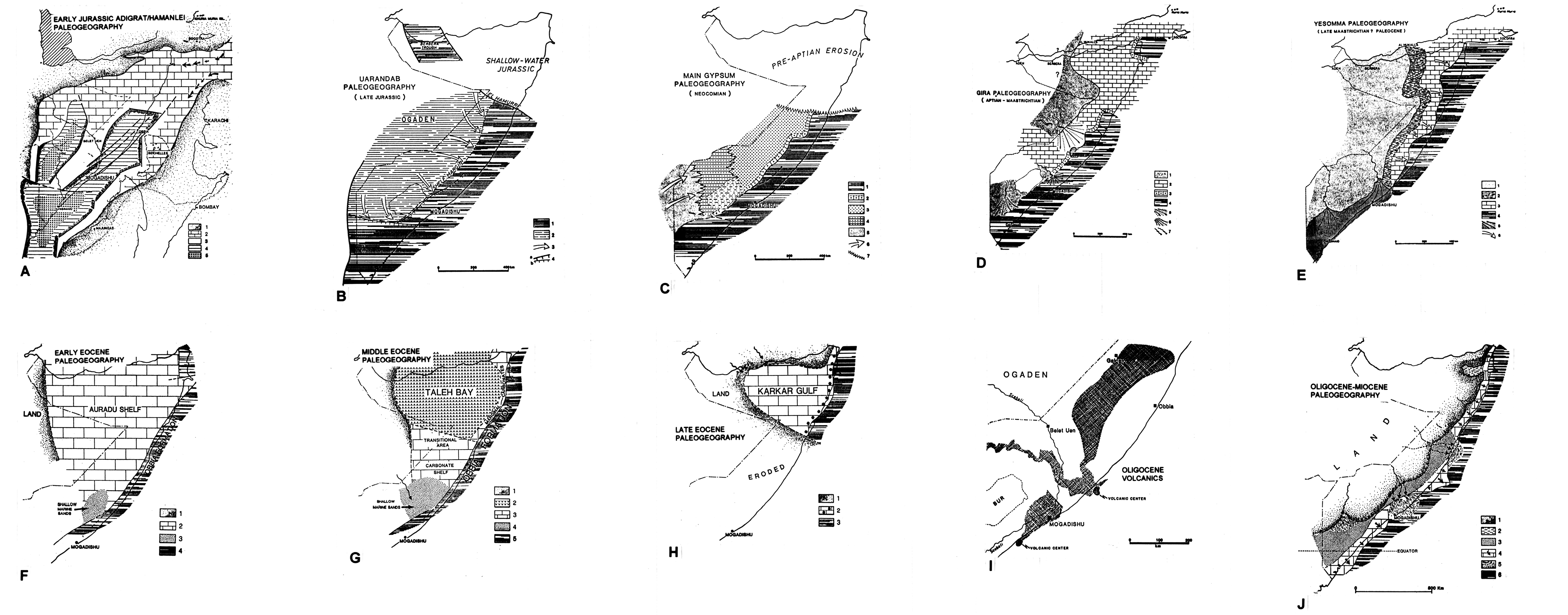


Figure So-14. Paleogeology of Somalia, *from* Bosellini (1989).

A. Somalia and adjacent Gondwana blocks during Late Liassic, after the transgression which flooded the Karoo rifts. 1. Terrestrial sediments, mainly alluvial Adigrat Sandstone; 2. shallow-water carbonates and evaporites of the Hamanlei Fm.; 3. high-energy carbonate sediments at platform edges; 4. basinal sediments; 5. evaporites.

B. Somalia during Late Jurassic, after the separation of Africa-Madagascar. The segment of continental margin which was formerly adjacent to Madagascar-Seychelles foundered suddenly and the shallow water carbonates of the Hamanlei Fm. were replaced by open marine sediments of the Uarandab Fm. The sag thus formed was bounded to the north by the El Hamurre Trend and to the west by the margins of the Lamu and Mandera Basins. The Berbera Trough was also formed during this time. 1. Deep water basinal shale; 2. open marine, shelf marlstone and shale; 3. progradation of Gabredarre shallow-water carbonate system; 4. structural margins: a, active; b, buried.

C. Somalia during the Neocomian. 1. Basinal mudstone and shale; 2. shelf margin carbonates; 3. Main Gypsum; 4. Gabredarre Fm. carbonates, evaporites, shale and sandstone; 5. Ambar Sandstone: fluviatile system; 6. paleocurrent direction; 7. erosional boundary.

D. Somalia during Middle Cretaceous. 1. Pediment and fluvial sandstones; 2. shallow-water carbonates; 3. marginal, high energy carbonates; 4. deep-water mudstone and shale Gila Fm.; 5. deltaic and transitional facies; 6. deep-water turbidite fan; 7. paths of gravity-displaced skeletal grainstones.

E. Somalia during Late Maastrichtian-Paleocene Yesomma time. 1. Pediment and fluvial sandstone (Yesomma Sandstone); 2. marginal belt of shale, sandstone and carbonate;local lignite deposits; 3. shallow-water carbonates; 4. deep-water claystone and shale; 5. paleodeltaic areas; 6. trends of carbonate progradation.

F. Northern Somalia during Early Eocene, showing the vast carbonate shelf established after the Auradu transgression. 1. Fluvial and littoral sandstone; 2. shallow-water Auradu Limestone; 3. shallow-water marine sandstones; 4. Obbia Fm. clay and shale.

G. Northern Somalia during Middle Eocene showing the shallow and evaporitic Taleh bay. 1.Fluvial and littoral sandstones; 2. evaporites, marls, shales and limestones of Taleh Fm.; 3. shallow-water carbonates; 4. shallow marine sandstones; 5. Obbia Fm. clay and shale.

H. Northern Somalia during Late Eocene showing the reduced marine depositional area with respect to Early-Middle Eocene times. 1. Alluvial and deltaic succession; 2. shallow-water carbonates Karkar Fm and marginal high-energy belt of reefs and buildups; 3. Obbia Fm clay and shale.

I. Distribution of Oligocene volcanics in central Somalia, based on well control and aeromagnetic surveys by Esso and ELF.

J. Indian Ocean margin of Somalia in Oligocene-Miocene. 1. Terrestrial sediments; 2. lagoonal sediments; 3. deltaic and shelf clastics; 4. carbonate platforms; 5. deep-sea fan; 6. deep-water mudstone and shale.

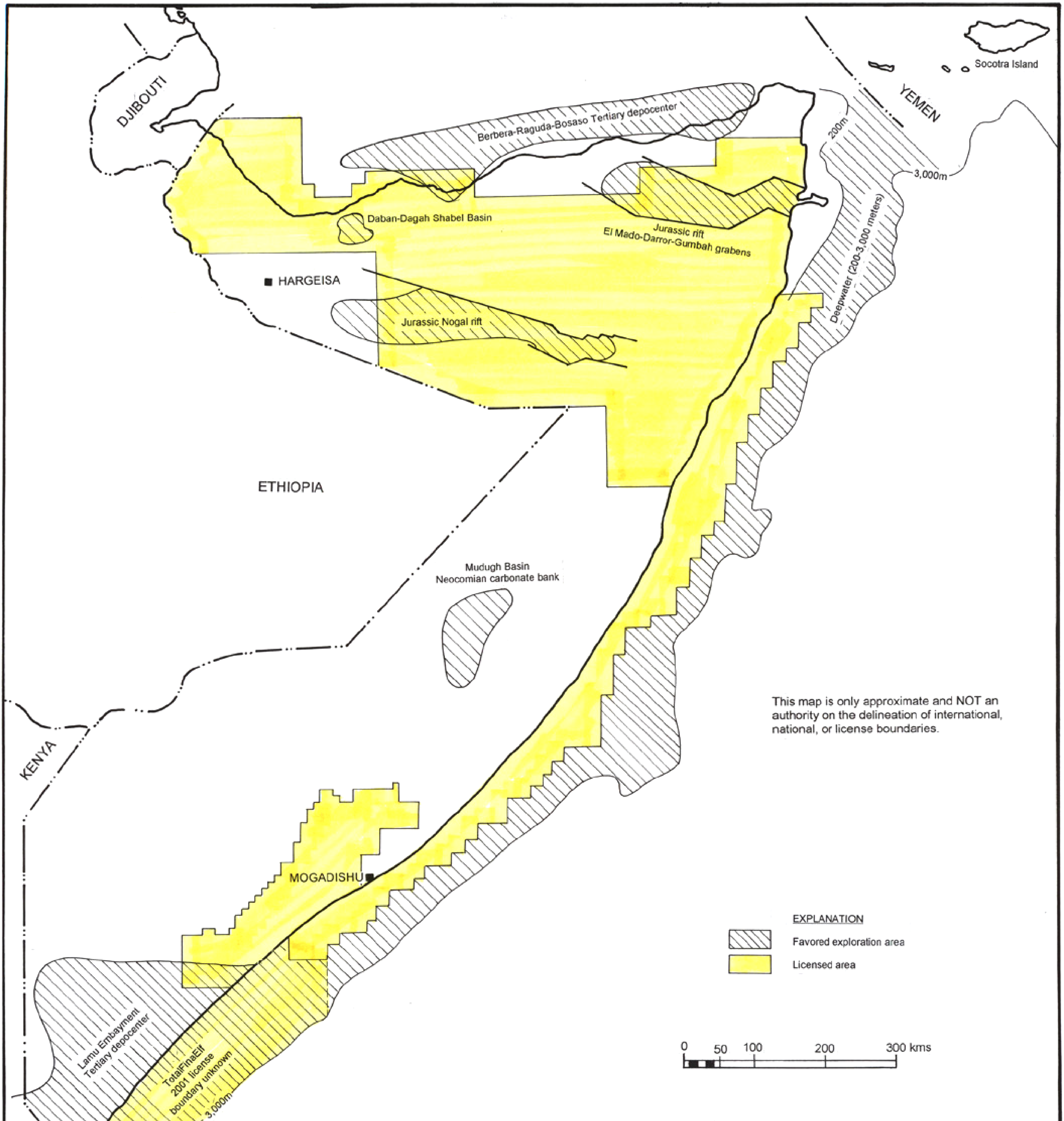
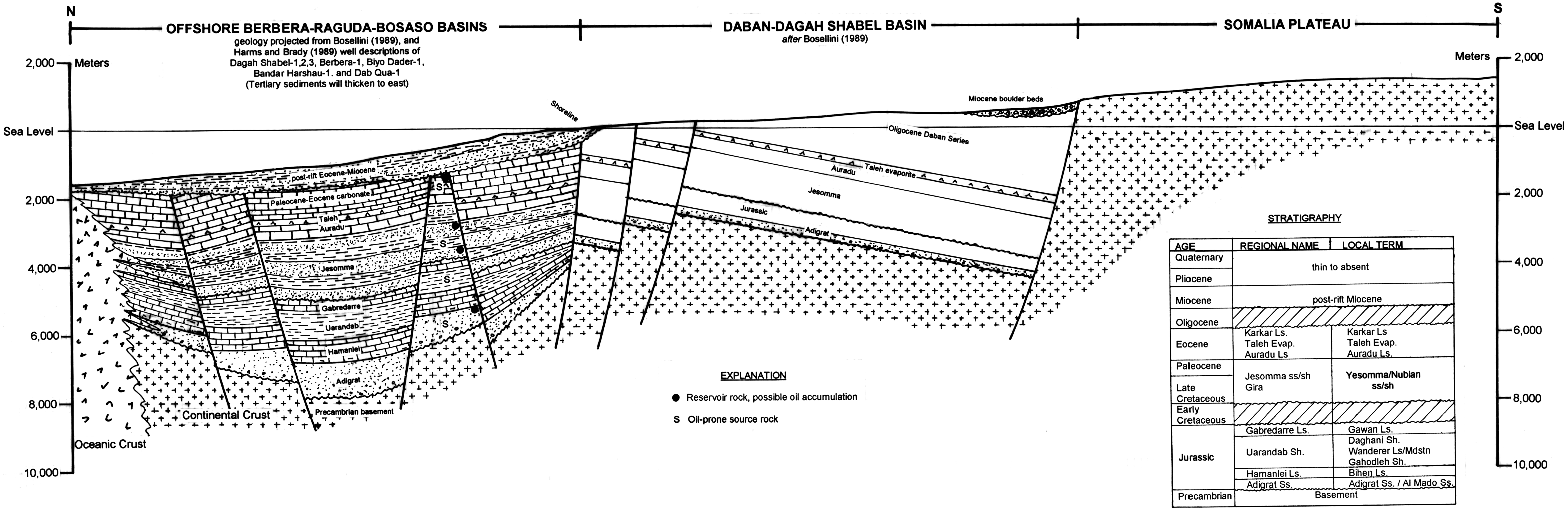


Figure So-15. Favored exploration play areas of Somalia and areas currently held under *force majeure;* and offshore area believed licensed by TotalFinaElf in late 2001.



AGE	REGIONAL NAME	LOCAL TERM
Quaternary	thin to absent	
Pliocene		
Miocene	post-rift Miocene	
Oligocene		
Eocene	Karkar Ls. Taleh Evap. Auradu Ls	Karkar Ls Taleh Evap. Auradu Ls.
Paleocene	Jesomma ss/sh Gira	**Yesomma/Nubian ss/sh**
Late Cretaceous		
Early Cretaceous		
Jurassic	Gabredarre Ls.	Gawan Ls.
	Uarandab Sh.	Daghani Sh. Wanderer Ls/Mdstn Gahodleh Sh.
	Hamanlei Ls.	Bihen Ls.
	Adigrat Ss.	Adigrat Ss. / Al Mado Ss.
Precambrian	Basement	

Figure So-16. Schematic cross section intended to show the general age and lithology expected offshore northern Somalia in the Gulf of Aden. The Tertiary section is expected to thicken from west to east. The geologic section is interpreted from onshore geology; the structuring and traps are hypothetical.