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وزارة البترول والثروة المعدنية
KINGDOM OF SAUDI ARABIA
MINISTRY OF PETROLEUM AND MINERAL RESOURCES

GEOLOGY OF THE WADI AR RIMAH QUADRANGLE, KINGDOM OF SAUDI ARABIA

By
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خريطة جيولوجية للوحة وادي الرمة بالمملكة العربية السعودية

وضع
ريتشارد بـ. مكامب وليون ف. رامـيرز وجلين ف. براون وآرثر ب. بوكاك

أبحاث جيولوجية مختلفة
خريطة رقم I-٢٠٦ A
MISCELLANEOUS GEOLOGIC INVESTIGATIONS
MAP I-206 A

GEOLOGIC EXPLANATION

QUATERNARY

Eolian sand (Qes)
Mostly mobile (see legend for description of sand terrain types)

Sabkhah deposits (Qsb)
Silt, clay, and muddy sand, commonly saline; underlies coastal and inland playas

Silt and gravel (Qs, Qg; Qu)
Silt and associated fine sediments including caliche-like and gypsiferous deposits in undrained depressions, Qs; gravel composed chiefly of limestone and other rocks of local origin, includes older gravel in some areas, Qg; unconsolidated surficial deposits of silt, sand, and gravel, may include unrecognized equivalents of other units of Quaternary age, Qu

Volcanic ash and cinder cones (Qa)

Basalt (Qb)
Olivine rich, vesicular

Gravel (Qg$_c$)
Quartz gravel as sheets and trains with varying proportions of limestone and basement complex pebbles; for the most part probably near its original relative elevation

Calcareous duricrust (Qdc)
Superficial mantle of red brown, gray, tan, and yellow, usually hard, sandy limestone, often containing imbedded fragments of underlying rocks; varies in thickness from a few centimeters to three or four meters. Coarse frosted quartz sand grains are usually present, also occasional fresh water mollusks. Commonly completely masks underlying rocks with a resistant cuirpace on extensive topographic surfaces often unrelated to structure of underlying rocks.
Subdivisions of duricrust:
Qdc$_1$, *smooth surface of duricrust gravel.*
Qdc$_2$, *smooth surface of Qdc, mixed with other limestone, chert and basement complex gravel*

TERTIARY

Gravel (Tg)
Mostly well-rounded white quartz pebbles

Sandstone, marl, and limestone (Tsm)
Red, brown, and gray marly sandstone, sandy marl, and sandy limestone. Undifferentiated lateral equivalents of the Hadrukt, Dam, and Hofuf formations of the Northern Tawuq and Western Persian Gulf quadrangles

Umm er Radhuma formation (Tu)
Cream, tan, and gray limestone, dolomitic limestones and dolomite

Aruma formation (Ka)
Gray, tan and cream limestone with subordinate dolomite and clay; yellowish-tan and brown, calcareous shale, clayey dolomite, and limestone unit at top. Of Campanian(?) and Maestrichtian age

Wasi'a formation (Kw)
Buff and gray, crossbedded quartz sandstone with dispersed quartz pebbles, overlain by variegated sandy shale with cream and tan, chalky, impure limestone; of Cenomanian age. Discontinuously exposed basal beds north of Qibo are red, white and purple lateritic clay and bauxite. Near Qibo and northward two distinctive golden brown limestone beds occur in middle part

Jubaila limestone (Jj)
Brown weathering dolomite and dolomitic calcarenitic limestone

Hanifa formation (Jh)
Brown and buff, partly oolitic thin-bedded calcarenite, locally with abundant colonial corals

Tuwaiq Mountain limestone (Jtm)
Cream and gray, massive, compact limestone. Near Qibo olive-brown and gray shale and impure limestone with a brown, crystalline dolomite at the top. Of Callovian age

Dhruma formation (Jd)
Brown, tan, and olive shale with subordinate interbeds of oquinoidal limestone, impure limestone, and calcarenite; buff, brown, and red quartz sandstone, partially ferruginous and calcareous

Marrat formation (Jm)
Golden-brown to tan limestone and tan to brown, fine grained sandstone

Minjur sandstone (J'km)
Buff, massive, usually crossbedded sandstone with some layers containing abundant quartz pebbles; varicolored shale, sandy shale, and shaly sandstone in several irregular zones; minor zones of black to brown ironstone at several horizons

Jilh formation (Tj)
Sandstone, siltstone, ferruginous and gypsiferous shale; yellow to golden-brown locally sandy limestone and dolomite. North of Wadi ar Rimah, bedded gypsum and red to brown arenaceous oolite and oolitic sandstone at upper and uppermost parts

Sudair shale and Khuff formation (Ps; Pk)
Ps, Sudair shale: Red and green gypsiferous shale and massive gypsum, and red-brown sandstone; thin dolomite beds at several horizons.
Pk, Khuff formation: Tan and gray limestone, interbedded argillaceous limestone, dolomite, marl, gypsiferous clay and gypsum. Locally, varicolored shale and sandstone with fossil wood at base.
Ps?, Sudair shale and Khuff formations, undivided: Gypsum interbedded with brown and olive shale, and subordinate beds of calcarenitic limestone and calcarenite; local exposures of massive, black weathering conglomeratic quartz sandstone. Surficial cover of coarse limestone and quartz gravel not mapped

Jauf(?) formation (Dj)
White to tan micaceous sandstone with gray-green micaceous shale and tan siltstone. Thin basal bed of reddish-brown dolomite; maroon limestone at top

Tabuk formation (DSOt)
Red to pink, light gray and brown, buff, partly micaceous and silty sandstone in three separate units, in part crossbedded and with abundant Scolithus (Tigillites); locally gypsiferous and salciferous. Three blue-gray, olive-brown, olive-green, purple and varicolored, partly micaceous, silty and sandy shale members occur between the sandstone units; one at base. Brown to tan sandstone, DSOt$_1$, transgress the lower and middle parts of the formation

Saq sandstone (OCs)
Red and tan sandstone; white to light brown, black-weathering crossbedded sandstone with thin quartz conglomerate lenses in upper part. Includes a zone of several thin layers of white, red-dish-brown, and brick-red shale

Dikes of rhyolite, diabase, and andesite

Rhyolite, trachyte, and phonolite breccia in plugs (rtp)

Shammar rhyolite (sr)
Flows, welded tuffs, and breccia; includes some fine-grained porphyritic red granite and many dikes

Granite (gp)
Red and pink granite. Tends to be peralkaline in late kinematic type structures

Diorite (di)
Medium to coarse grained; some gabbro-like intrusives as satellites to the slightly younger granite, gp

Farida marble (fm)
Tan, gray and black, detrital; pebbly, cherty, and crushedded in lower part, folded and thrust. About 100 meters thick; generally occurs in wrench fault zones

Schist (scf)
Largely sericite and chlorite schist in fault zone

Hibshi formation (hi)
Conglomerate of pebbles and boulders of gray granite, fine-grained igneous rocks, red ripple-marked slate or shale, wacke, and arkose; welded agglomerate at top; possibly equivalent of Fatima and Abla formations of Southern Hijaz quadrangle. Type locality at Jebal Hibshi where exposure is 750 meters thick

Granite (gm)
Gray biotite-hornblende granite. At places includes a red phase which may be younger

Murdama formation (mu)
Slate, schist, conglomerate, and phyllite. Commonly schistose; often calcareous

Diorite and quartz diorite (hd)
Sheared, epidotized often a hornblende-plagioclase rock resembling the epidiorite of Egypt; may in places be an intrusive phase of the Halaban andesite

Halaban formation (ha; hc)
ha, fine-grained felsitic andesite, agglomerate and conglomerate composed of andesite pebbles in the upper part. hc, interbedded marble, wacke, quartzite, conglomerate, phyllite, slate, and rhyolite

Sericite and chlorite schist (sc)
Of sedimentary origin. Includes numerous white quartz lenses; quartz-albite type common

Gneissic granite (gn)
Gneissic gray granite; sheared. Synkinematic type with numerous inclusions. Includes subordinate younger granites

Amphibolite (am)
As xenoliths on granite batholiths; often schistose and forming ring structures

Trend lines
Showing lineation in basement rocks

Geologic contact
Dashed where approximately located; short dashed where indefinite

Fault or shear zone, showing dip
Dashed where approximately located; dotted where concealed

Thrust fault
Teeth on upper plate

Strike and dip of beds

Strike and dip of foliation

Rubidium-strontium and potassium-argon ages, in millions of years
As determined by L. T. Aldrich, Carnegie Institution of Washington

QUATERNARY — TERTIARY (Miocene and Pliocene; Paleocene and Eocene) — CRETACEOUS (Upper Cretaceous) — JURASSIC (Upper Jurassic; Middle Jurassic; Lower Jurassic) — TRIASSIC OR JURASSIC — TRIASSIC — PERMIAN OR TRIASSIC — PERMIAN — DEVONIAN — ORDOVICIAN, SILURIAN AND DEVONIAN — CAMBRIAN AND ORDOVICIAN — PRECAMBRIAN OR PALEOZOIC — PRECAMBRIAN

MAP LEGEND

POPULATED PLACES
- City or town
- Village
- Village, name not given
- Fort, usually ruins

TRANSPORTATION
- Major road, unpaved
- Secondary road
- Road of questionable permanency
- Trail
- Landing field

HYDROGRAPHIC FEATURES
Only isolated wells are shown
- Dug well
- Drilled water well
- Underground water conduit
- Intermittent stream
- Sabkhah
- Khabra and wadi floor

HYPSOGRAPHIC FEATURES
- Generalized relief

Sand
Dense stipple represents mobile sand cover consisting primarily of dunes, linear ridges, and other individual sand forms, that are shown where map scale permits; moderately dense stipple represents more stabilized continuous sand cover; open stipple represents discontinuous sand cover.

Types of sand terrain
Transverse. *Predominantly simple and compound barchan dunes in areas of more mobile sand, and/or simple rounded ridges, both oriented transverse to the prevailing wind direction.*
Longitudinal. *Primarily dikhkah and various types of undulating sand sheets, in general characterized by elongation of the individual topographic forms parallel to the prevailing wind direction, often partially stabilized by sparse vegetation.*
'Urūq. *Various forms of long, nearly parallel, sharp crested narrow sand ridges and dune chains separated by broad sand valleys usually including elements of type I sand terrain. These are the resultant of a system of two dominant wind directions and are identical to the sayf dunes of North Africa.*
"Sand mountains." *Dominated by large sand massifs commonly cresting 30 to 300 meters above the substratum, often with superimposed dune patterns consisting of various types of complex barchans. Common forms are giant barchans spanning several kilometers from horn to horn; giant bisymmidal and pyramidal sand peaks as well as other less common peak forms; and giant oval to elongate sand mounds.*

MISCELLANEOUS FEATURES
- Spot elevation
- Birkah, usually ruins
- Mine

GLOSSARY

Abraq	Rocky hill with sand on slopes
'Ayn	Spring, solution pit or well
Birkah(t); diminutive, Buraykah(t)	Cistern
Bi'r	Dug well
Darb	Road or trail
Dīr	Hill, usually smaller than a Jabal
Faydah(t)	Closed basin with firm, flat, vegetation-covered mud surface, occasionally rocky and sandy
Harrah(t)	Lava flow and volcanic debris
'Irq; dim., 'Uraqy; pl., 'Urūq	Long linear sand ridge
Jabal; pl., Jibāl	Hill or mountain
Jāl	Rocky escarpment, low cliff or side of a valley
Khabb	Narrow bands of plains between 'irq, commonly without rock outcrop
Khabrā, Khabrā', Khabrah(t)	Closed basin with firm, flat mud and silt surface, commonly barren and lacking vegetation
Khashm; pl., Khushūm	Headland or promontory along a cliff or mountain front
Mishash	Shallow hand-dug well
Nafūd (Nefud)	Large area of sand dune
Qā'	Depressed plain
Qalīb	Well, spring
Qasr	Fort, palace, or castle
Sabkhah(t)	Silt, clay, and sand flats, often with saline incrustations
Shā'ib	Same as wādī
Wādī	Valley or dry water course

SOURCES OF BASE COMPILATION

A, Compilation and topographic representation by the Arabian American Oil Company from adjusted vertical aerial photographic surveys, 1956, supplemented by land surface surveys. Topographic representation by E. L. Elberg and L. F. Ramirez. B, Compilation and topographic representation by the Topographic Division, U. S. Geological Survey, primarily from controlled trimetrogon photography; later corrected to vertical aerial photography of 1956. Translation, transliteration, calligraphy and Arabic typography by Simon H. Kfoury, Charles D. Matthews and Michel H. Kfoury.

A few place names have been taken from Alois Musil, K. S. Twitchell and H. St. J. B. Philby.

SOURCES OF GEOLOGIC COMPILATION

Geologic mapping by the Arabian American Oil Company, compiled by R. A. Bramkamp and L. F. Ramirez, based on field surveys by: A, A. F. Pocock and others; B, D. A. Holm, A. F. Pocock and others; C, Max Steineke, A. F. Pocock and others; and D, Max Steineke, W. H. Reiss and others. Corroborative field surveys by N.M. Layne Jr. and others. Photogeological study was used in compilation to supplement ground surveys.
Geologic mapping by the U. S. Geological Survey, E, based on field survey supplemented by photo interpretation by G. F. Brown. Translation of the geologic explanation edited by Harold W. Glidden, U.S. Department of State.

This map printed in two sheets; Sheet A, geology and geography combined; Sheet B, geography only. Available at the Ministry of Petroleum and Mineral Resources, Jiddah and Ad Dammām, Saudi Arabia, and at the U.S. Geological Survey, Washington, D.C., U. S. A.

INDEX MAP OF ARABIAN PENINSULA

Scale 1:500 000

1963 A.D.
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Lambert conformal conic projection; standard parallels 17° and 33°

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