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DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

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

GEOLOGY OF THE NORTHWESTERN HIJAZ QUADRANGLE, KINGDOM OF SAUDI ARABIA

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خريطة جيولوجية للوجه الحجاز الشمالي الغربي بالمملكة العربية السعودية

وضع
جلين براون وروي جاكسون وريتشارد بوغ وإدوارد البورج

Prepared by the U. S. Geological Survey and the Arabian American Oil Company under the joint sponsorship of the Kingdom of Saudi Arabia and the U.S. Department of State.

Lambert conformal conic projection, standard parallels 37° and 33°

For sale by U. S. Geological Survey, price $1.00

GEOLOGIC EXPLANATION

QUATERNARY

Eolian sand
Mostly mobile

Sabkhah deposits
Silt, clay, and muddy sand, commonly saline, underlying coastal and inland playas

Gravel, sand, silt, and clay, undifferentiated
Wadi alluvium and coastal saline mud flats; includes Recent colluvial fans and slightly elevated (less than 3 meters) coralline limestone

Silt and associated fine sediments
Includes caliche-like and gypsiferous deposits in undrained depressions

Gravel
Log deposits, mostly quartz pebbles

Terrace deposits
Dissected alluvial fans, terraced wadi alluvium, and coralline limestone elevated in benches at 3, 21, and 30 meters along the Red Sea coast and on offshore islands

Pleistocene

Alluvial clastic deposits
Not related directly to present drainage; form elevated rim-ridges along the inland edge of the Red Sea coastal plain. Composed of volcanic-type conglomerate, marl, and tuffaceous sandstone

Miocene and Pliocene(?)

Basalt and andesite
Mostly flower eruptions ranging in age from late Tertiary to Recent; many are olivine-rich

Miocene

Raghama(?) formation
Gypsum, sandstone, limestone, and calcareous conglomerate with Miocene Ostrea crassissima Lamarck in clastic beds and Miocene reef corals northeast of Yanbu'. A few hundred meters thick in outcrop but probably several thousand meters thick in an composite series within Red Sea rift valley

TERTIARY

Igneous plug intruded in the Tabuk formation

ORDOVICIAN, SILURIAN AND DEVONIAN

Tabuk formation
Sandstone, siltstone, and shale. Basal member is red, green, purple-gray, locally calcareous shale and calcareous fine sandstone; Early Ordovician graptolite Didymograptus protobifidus Elles in basal shale member. An overlying massive medium to coarse-grained, crossbedded sandstone member discordantly overlaps the basal shale member in long tongues perpendicular to the strike and in turn underlies a shale member which is basal to a thick series of sandstone and siltstone of Late Ordovician, Silurian, and Early Devonian age. The sandstone characteristically contains borings or tracks of Scolithus (Tigillites), which cross bedding planes. Index mineral is authigenic anatase

CAMBRIAN AND ORDOVICIAN

Ram and Umm Sahm sandstones, undivided
Massive, crossbedded sandstone, continental in the lower part, marine in the upper part, locally containing short lenses of purple shale and associated tracks of Cruziana cf. C. furcifera and Cruziana hubert of probable Early Ordovician (Arenig) age which overlie bedding planes in the uppermost portions. In the vicinity of Harrat al 'Unayrig lenses and nodules of secondary chert, hydrated iron, and manganese oxide are common. The upper part of these sandstone beds weathers in pinnacles and spires (Umm Sahm Terrane); below, a massive cliff-forming coarse eolian crossbedded continental sandstone (Ram terrane) weathers white, buff, or red with some desert patina; intricately jointed, forming boxes and stacks with vertical and overhanging walls in the upper part. The joint pattern on aerial photographs separates the sandstones from underlying and overlying beds. Index mineral is tourmaline with euhedrigenic(?) terminations. May be equivalent in part to the Saq sandstone of the Wadi ar Rimah quadrangle, Map I-206 A

Quweira sandstone
Yellow or buff thin-bedded medium grained crossbedded sandstone containing pebbles of citrine, translucent, and milky quartz. May be equivalent in part to the Saq sandstone of the Wadi ar Rimah quadrangle, Map I-206 A

CAMBRIAN

Siq sandstone
Moderate bedded to massive dark red sandstone forming cliffs at Sha'ib as Siq above crystalline rocks; locally conglomeratic with pebbles from underlying Precambrian complex. Weathers to smooth upper surface which contrast sharply with overlying jointed and ragged terrane of Quweira or Ram sandstones. May be equivalent in part to the Saq sandstone of the Wadi ar Rimah quadrangle, Map I-206 A

PRECAMBRIAN PALEOZOIC

NONCONFORMITY

Rhyolite and phonolite(?)
Fine-grained hypabyssal intrusive rocks cutting Shammar rhyolite

Dikes of rhyolite, diabase, and andesite
Includes some aplite and pegmatite

Granite
Massive light-colored calc-alkalic granite devoid of dikes; in large discordant stocks and batholiths at Jibal Bidiyah, Harb, and Dibdibah

Sedimentary rocks interbedded with and overlying the Shammar rhyolite
Thin-bedded cherty dolomitic limestone, conglomeratic, and slate east of Al 'Ula. In the vicinity of Al Wajh the Shammar sediments are tuffaceous and the conglomerate is more than 1000 meters thick. The conglomerate includes pebbles of fine red granite and rhyolite, quartz, graywacke, diorite, diabase, quartzite, and phyllite; interstitial material is chloritic

Shammar rhyolite
Flows of rhyolite, dacite, and andesite; agglomerate and tuff. Amygdaloidal and porphyritic, red and green, somewhat metamorphosed but commonly dipping at steep angles

Granite or syenite
Red or pink, somewhat metamorphosed, alkalic to peralkalic; generally in circular plugs, stocks, and ring dikes. Commonly contains accessory fluorite, riebeckite and aegirine

Diorite
Brecciated, highly altered plutonic rock which appears to intrude the Halaban andesite

Hadiyah slate
Green and maroon slate, ripple-marked in upper beds; lower beds are arkosic fine-grained sandstone and conglomerate; may be the equivalent of the Murdama formation further southeast

Halaban andesite
Fine-grained, generally somewhat metamorphosed andesite; subordinate rhyolite, dacite, and welded tuff. Some red tuffaceous slate is interbedded in lower part

Granite
Red, salmon, and pink, calc-alkalic, occuring as discordant large scale intrusives; generally massive but tends to be porphyritic with large microcline or orthoclase crystals in border facies

Granite and granite gneiss
Gray, medium-grained, hornblende-allkite, syntectonic type; strain shadows in quartz, many inclusions and xenoliths; tends to weather into cores and pockets

Ultramafic rocks and gabbro
Mostly serpentinite derived from dunite, pyroxenite, and diallage; minor magnetite, chromite, and orthotite; ub, ultramafic; gb, gabbro

Diorite and granodiorite
Gray to black, often gneissic; includes edamellite and monzonite; syntectonic with many inclusions and xenoliths; tends to weather into cores and pockets; di, diorite; gg, granodiorite

Greenstone
Andesite, diabase, slate, and conglomerate; structure obscure, sheeted in places, local pillow structure, amygdaloidal, fine-grained almost glassy to porphyritic, reddish brown to black. Conglomerate contains pebbles of argillite and slate

Silasia formation
Slate, shale, and schist, fine-grained grey and mauve, locally sandy and containing thin lenses of gray limestone and marble; arkose, arkosic sandstone, and conglomerate in lower part. Upper portion includes abundant jasper interbedded in a typical Precambrian iron formation of hematite, jaspilite, and limestone

Schist
Sericite and chloritic; less actinolite, tremalite, and coarse biotite-hornblende-quartz; and considerably less calcareous, graphitic, and pyrite-bearing. Schists largely confined to wrench fault zones and most likely of widely different ages

Amphibolite and hornblende schist
Mostly as roof pendants on older granites

Contact, showing dip
Dashed where approximately located, queried where probable

Fault, showing dip
Dashed where approximately located, dotted where concealed, queried where probable

Syncline

Strike and dip of foliation

Strike and dip of beds

Trend lines
Showing foliation in crystalline rocks

Iron outcrop
Chromite and asbestos
Gold
Barite
Marble
Sulfur

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

MAP LEGEND

POPULATED PLACES

Town
Village
Village, name not given
Fort (usually ruins)
Ruins

TRANSPORTATION

Abandoned railroad, with station
Major road, paved
Major road, unpaved
Secondary road
Road of questionable permanency
Trail
Landing field

HYDROGRAPHIC FEATURES

Only isolated wells are shown
Drilled well
Dug well
Birkah, (usually ruins)
Intermittent stream
Sabkhah
Khabrā'
Reef

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 sīfūkah and various types of undulating sand; the sīfūkah is 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, mostly parallel, sharp crested narrow sand ridges and dune complexes; the 'urūq of the Jafurah village usually including elements of type I and 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 rising to 200 meters above the substratum, often with superimposed dune forms composed of various types of complex barchans. Common forms are barchan barchans spanning several miles from crest to crest, giant star dunes rising over 300 meters, and peaks as well as other less common peak forms, and giant seif to elongate sand mounds.*

MISCELLANEOUS FEATURES

Water pipeline or aqueduct
Spot elevation in meters
Mine, prospect, or ancient workings
Bathymetric contour in meters

اصطلاحات الخريطة

المناطق المأهولة بالسكان

مدينة
قرية
قرية (سميت هكذا على الخريطة لعدم معرفة اسمها المحلي)
قلعة (عادة أطلال)
آثار، أطلال

طرق المواصلات

سكة حديد متروكة، مع محطة
طريق رئيسية معبدة
طريق رئيسية غير معبدة
طريق ثانوية
طريق غير دائمة
مسلك، درب
المدارج

الأوصاف الهيدروغرافية

الآبار المبينة فقط حيث لا تعم هذه الظاهرة
بئر محفورة
بئر بدون بناء أو تعلية
بركة (عادة أطلال)
مسيلة مائية متقطعة
سبخة
خبرا
شعب

الأوصاف الهيبسوغرافية

التضاريس العامة
الرمال
الكثبان المتحركة بدرجة رئيسية، تعبر الخريطة عن الكثبان والتلال الرملية المركبة والبسيطة والكثبان الهلالية المستديرة، حيث تكون الكثبان موجهة عرضيا بالنسبة للرياح السائدة في المنطقة؛ والكثبان المتحركة بدرجة أقل، حيث تعبر الخريطة عن الكثبان المستقرة جزئيا بالنباتات المتناثرة
أنواع الرمال والتضاريس
العرضية. الكثبان المتحركة بدرجة رئيسية من الكثبان الهلالية المركبة والبسيطة والكثبان الهلالية المستديرة، حيث تكون الكثبان موجهة عرضيا بالنسبة للرياح السائدة في المنطقة؛ و/أو التلال الرملية البسيطة المستديرة، حيث تكون موجهة عرضيا بالنسبة للرياح السائدة في المنطقة
الطولية. تتضمن أشكالا مختلفة من الرمال الطويلة والضيقة والحادة والكثبان الرملية الممتدة، حيث تكون موجهة طوليا بالنسبة للرياح السائدة في المنطقة؛ وتتميز بالاستقرار الجزئي بالنباتات المتناثرة
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'جبال رملية'. تتميز بالكثبان الرملية الكبيرة، حيث يتراوح ارتفاعها فوق الطبقة الأساسية بما يزيد على 200 متر، وتتميز بالكثبان الهلالية المركبة التي تمتد لعدة أميال من قمة إلى قمة، والكثبان الهلالية العملاقة النجمية، والقمم الرملية، وكذلك أشكال القمم الأخرى، والكثبان الرملية الطولية العملاقة. وتتميز الأشكال الشائعة بالكثبان الهلالية المركبة الممتدة، والكثبان الهلالية العملاقة النجمية