وزارة الداخلية
مصلحة المساحة الجيولوجية الامريكية
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

أبحاث جيولوجية مختلفة
خريطة رقم ٢٠٥A - I
MISCELLANEOUS GEOLOGIC INVESTIGATIONS
MAP I-205 A

GEOLOGIC EXPLANATION

التفسير الجيولوجي

QUATERNARY

Qes — Eolian sand
Mostly mobile

Qk — Sabkhah and khabra deposits
Silt, clay, and muddy sand, commonly saline. In terminal basins. Qk, khabra deposits

Qu — Gravel, sand, silt, and clay
Includes bolson deposits; and alluvium along wadis

Qt — Terrace alluvium
Gravel, sand, and silt deposited as much as 15 meters above Wādī ar Rimah and its tributaries

TERTIARY AND QUATERNARY

QTb — Basalt and andesite
Basic flows with phenocrysts of olivine and labradorite; commonly amygdaloidal; amygdules of epidote, chlorite, calcite and zeolites

TERTIARY

Tb — Basalt and andesite
Eroded volcanic flows, probably same age as older portions of the above QTb

Tsg — Gravel
Conglomeratic or gravel at base, fine gray sandstone and marl in upper part; may include lacustrine deposits

UNCONFORMITY

DEVONIAN, ORDOVICIAN AND SILURIAN

DSOt — Tabuk formation
Sandstone, fine to medium, siltstone and shale. Shale is olive green to gray, silty, sandy, locally calcareous and containing the early Ordovician graptolite Didymograptus protobifidus Elles in the basal shale member. Sandstone and siltstone are brown to tan and buff, weathering black, mostly medium-grained and bedded. Sandstone is massively crossbedded and coarser-grained in Jebels Tawal and Humaima. Most exposures are on the slopes of isolated jebels and only the lowermost portion of the formation crops out on I-205

CAMBRIAN(?) AND ORDOVICIAN

O€s — Saq sandstone
White, tan and buff, friable, frosted, massively crossbedded in the lower portion of measured sections, weathering brown and iron cemented near crystalline basement contact; locally conglomeratic with pebbles of quartz and basement crystalline rocks. Thin olive and red shale lenses in upper portion are associated with Cruziana cf C. furcifera and Cruziana huberi trails

O€ru — Ram and Um Sahm sandstones undivided
White and yellow sandstone, medium-grained with quartz granules, pebbles, and iron concretions. Weathers with many small pinnacles in upper portion where shale lenses appear as crescent-shaped dark areas on aerial photographs and associated with Cruziana cf C. furcifera and Cruziana huberi trails; weathers in intricately jointed, rhomboidal pattern on aerial photographs in lower portion. May be equivalent in part to the Saq sandstone of the Wadi ar Rimah quadrangle, Map I-206A.

CAMBRIAN

€s — Siq sandstone
Moderately bedded tan and white sandstone locally crossbedded and conglomeratic with pebbles of quartz and metamorphic and igneous rocks of the basement complex. Some bedded sandstone resting on the crystalline rocks may be equivalent to basal Saq sandstone as mapped on I-206A. Outliers east and south of the Ḩarrat Ithnayn and Khaybar are believed to be Siq sandstone which disappears beneath the northwestern edge of the lava fields and reappears as inliers

NONCONFORMITY

Dikes, mostly rhyolite or diabase

PRECAMBRIAN OR PALEOZOIC

rtp — Acid igneous plugs or volcanic necks
Breccia, rhyolite, and phonolite; includes some red granite which in places cuts the Shammar rhyolite

sr — Shammar rhyolite
Flows, tuffs and breccias, some welded; horizontal to gently folded. Red and green tuffaceous slate or shale interbedded in flows and agglomerate

gp — Granite
Granite, red or pink, alkalic to peralkalic, generally in circular plugs, stocks, and ring dikes; more abundant accessory minerals are zenotime, thorite, and fluorite; unmetamorphosed, sheared in places near major wrench faults. Isotopic age 535± m.y.

PRECAMBRIAN

fa / hi — Fatima and Hibshi formations
fa, Fatima formation; red and purple arkosic sandstone, slate, siltstone, tuffaceous wacke, and thin-bedded marmorized limestone containing stromatolitic structures
hi, Hibshi formation; conglomerate of pebbles and boulders of gray granite, andesite, felsite, red ripple-marked slate or shale, wacke, and arkose; includes conglomerates of indeterminate age

gm — Granite
Red and gray alkalic, commonly sheared, locally gneissic from replacement of metamorphosed sediments

mu — Murdama formation
Slate, commonly calcareous; phyllite, quartzite; siliceous graywacke; and conglomerate containing pebbles of metamorphosed sediments and fine-grained flow rocks

gb — Gabbro, gabbro-porphyry, and diabase
Probably intrusive phase of Halaban formation

hc / ha — Haliban formation
hc, sedimentary rocks: gray, white, and tan marble; wacke; red and gray slate; thick conglomerate at top. Beds are extensively epidotized. Some thin-bedded marble or limestone and chert included here may be younger. m, larger lenses of marble
ha, andesite; includes trachyte, some rhyolite, and phonolite; fine grained, low-ranked metamorphism. s, serpentinized areas, stringers of magnetite common, asbestos rare

NONCONFORMITY

gr — Granite
Calc-alkalic, generally hornblende bearing; often forms massive bornhardts. Possible isotopic age, 700-750 m.y.

qd — Quartz diorite or diorite
Includes some hornblende-feldspar rock resembling the epidiorite of Egypt

gg / gn — Granite and granodiorite
Synkinematic; may be coordinate with granodiorite, dg, but separated from granodiorite by wrench fault zones

dg — Granodiorite
Synkinematic; includes adamellite. Isotopic age about 1,000 m.y.

fh — Diorite
Hornblende-feldspar contact or xenolithic rocks, appear dark on aerial photographs

gd — Andesite and diabase
Metamorphosed and often schistose. Includes some devitrified rhyolite and epidiorite; commonly impregnated with granite and cut by dike swarms of rhyolite and diabase or basalt

gs — Chlorite schist
Schist of indeterminate age but derived mostly from basic igneous flow rocks

sc — Sericite-chlorite schist
Schist of indeterminate age but common along wrench fault zones; derived from sediments and basic flow rocks

Trend lines
Showing lineation in basement rocks

Geologic contact
Dashed where approximately located

Fault or shear zone
Dashed where approximately located

Inferred thrust fault

Strike and dip of foliation

NOTE
Isotopic ages correlated with samples from granites exposed in adjacent quadrangles as determined by L. T. Aldrich, Carnegie Institution of Washington

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 17° and 33°

INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D. C.—10139

MAP LEGEND

اصطلاحات الخريطة

POPULATED PLACES
- City
- Town or village
- Village, name not given
- Ruins
- Fort, usually ruins

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

HYDROGRAPHIC FEATURES
Only isolated wells are shown
- Drilled well
- Dug well
- Birkah, usually ruins
- Intermittent stream
- Sabkhah
- Khabrā
- Water pipeline or tunnel

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

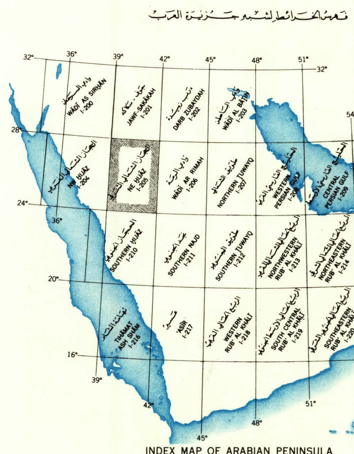
I — Transverse. *Predominantly simple and compound barchan dunes in areas of more mobile sand, and/or simple rounded ridges, both oriented transverse to the prevailing wind direction.*

II — Longitudinal. *Primarily dikākah 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.*

III — '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.*

IV — "Sand mountains." *Dominated by large sand massifs commonly cresting 50 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 bisigmoidal and pyramidal sand peaks as well as other less common peak forms; and giant oval to elongate sand mounds.*

MISCELLANEOUS FEATURES
- Spot elevations in meters
- Mine, prospect, or ancient workings
- Dam



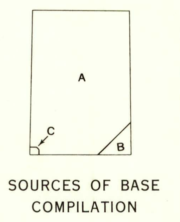
INDEX MAP OF ARABIAN PENINSULA

GLOSSARY

ايضاحات

Abraq	Rocky hill with sand on slopes
'Ayn; pl., 'Uyūn	Spring, solution pit or well
Bi'r; pl., Bi'ār, Abyār	Dug well
Birkah(t)	Cistern
Darb	Road or trail
Ḩarrah(t)	Lava flow and volcanic debris
'Irq; pl., 'Urūq	long linear sand ridge
Jabal; pl., Jibāl	Hill or mountain
Khabb	Narrow bands of plains between 'irq, commonly without rock outcrop
Khabrā	Closed basin with firm, flat mud and silt surface, commonly barren and lacking vegetation
Khashm	Headland or promontory along a cliff or mountain front
Nafūd (Nefud)	Large area of sand dune
Qā'	Depressed plain
Qaşr; diminutive, Quşayr	Fort, palace or castle
Ramlah(t)	Sand area
Rawḑah(t)	Closed basin with firm, flat, vegetation—covered mud surface, occasionally rocky and sandy
Rī'	Passage in a cleft or gap of the mountains
Sabkhah(t)	Silt, clay, and salt flats, often with saline incrustations
Sahlah(t)	Small plain
Sha'īb	Same as wādī
Sudd, (Sad, Sud)	Dam
Wādī, pl., Widyān	Valley or dry water course

مصادر المجموعات الاساسية

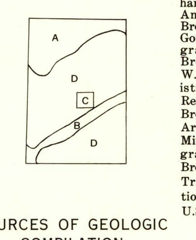


SOURCES OF BASE COMPILATION

A, Compilation from vertical aerial photographs, 1956; B, Compilation from controlled tri-metrogon photography, 1945; C, Compilation from controlled photo mosaics, 1953 Topographic representation by the Topographic Division, U. S. Geological Survey; Sand stippling by Leon F. Ramirez, Arabian American Oil Company.

Place names in the northern portion largely after Alois Musil, 1915; and along the western edge after H. St. Philby.

مصادر المجموعات الجيولوجية



SOURCES OF GEOLOGIC COMPILATION

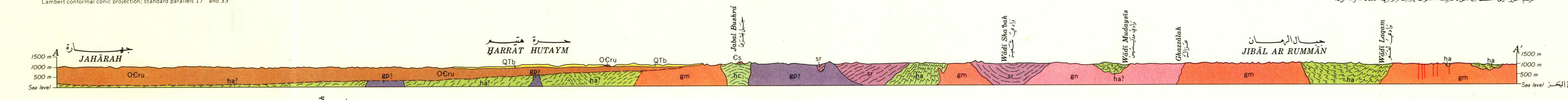
Geologic mapping by: A, N. M. Layne, L. F. Ramirez, R. D. Gierhart, and R. W. Powers, Arabian American Oil Company; B, G. F. Brown based on field work by G. H. Goudarzi and G. F. Brown, petrographic interpretation by Carl Brodel, U. S. Geological Survey; C, W. H. McLean, Saudi Arabian Ministry of Petroleum and Mineral Resources; and D, field work by G. F. Brown and Ahmed Shanti, Saudi Arabian Ministry of Petroleum and Mineral Resources, and aerial photographic interpretation by G. F. Brown, U.S. Geological Survey. Translation of the geologic explanation edited by Harold W. Glidden, U.S. Department of State.

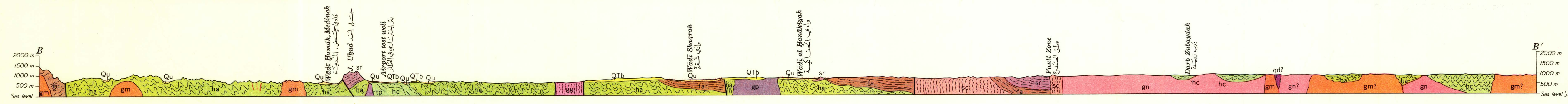
This map printed in two sheets; Sheet A, geology and geography combined; Sheet B, geography only. Available at the Ministry of Petroleum and Mineral Resources, Jiddah and Ad Dammām, Saudi Arabia, and at the U.S. Geological Survey, Washington, D.C., U.S.A.

المقياس ١ : ٥٠٠٠٠٠
Scale 1:500 000

10 0 10 20 30 40 50 Kilometers
10 0 10 20 30 Miles

١٩٦٣ م 1963 A. D.
١٣٨٣ هـ 1383 A. H.





GEOLOGY OF THE NORTHEASTERN HIJAZ QUADRANGLE, KINGDOM OF SAUDI ARABIA

By

Glen F. Brown, Newton Layne, Gus H. Goudarzi, and Wallace H. MacLean

خريطة جيولوجية للوحة الحجاز الشمالي الشرقي بالمملكة العربية السعودية

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

أبحاث جيولوجية مختلفة
خريطة رقم ٢٠٥A - I
MISCELLANEOUS GEOLOGIC INVESTIGATIONS
MAP I-205 A

U. S. GEOLOGICAL SURVEY WASHINGTON OCT 21 1963 LIBRARY
Arabia. Geol. 1:500,000. sheet Northeastern Hijaz, I-205A cop. 1.
G3700 s500 .G438 I-205A cop. 1
M(200) I 205A c. 1
USGS LIBRARY - RESTON 3 1818 00173927 3