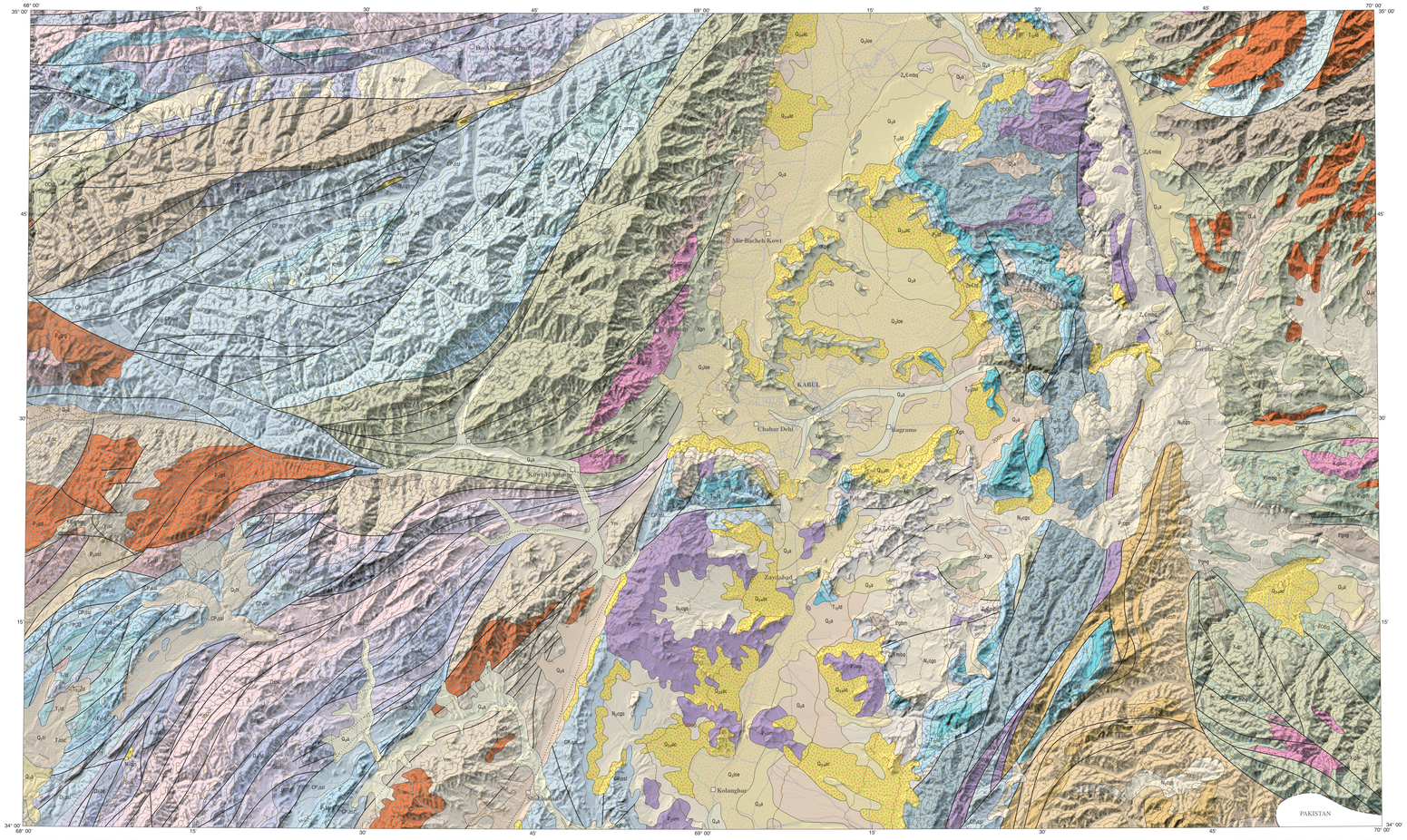
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

AFGHAN GEOLOGICAL SURVEY
Prepared in cooperation with the U.S. Geological Survey and the Afghanistan Geodesy and Cartography Head Office
Under the auspices of the U.S. Agency for International Development and the U.S. Trade and Development Agency

USGS OPEN-FILE REPORT 2005-1107-A
AGS OPEN-FILE REPORT (509/510) 2005-1107-A
USGS Afghanistan Project Product No. 005



Base from Shuttle Radar Topography Mission (SRTM) 85-meter digital data
Cultural data from digital files from AIMS Web site (http://www.aims.org.af)
Projection: Universal Transverse Mercator, zone 42; WGS 84 Datum

SCALE 1:250 000
5 0 5 10 15 20 25 30 35 40 KILOMETERS
5 0 5 10 15 20 MILES
CONTOUR INTERVAL 100 METERS

Any use of trade, product, or firm names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

GEOLOGIC MAP OF QUADRANGLE 3468, CHAK WARDAK-SYAHGERD (509) AND KABUL (510) QUADRANGLES, AFGHANISTAN

Compiled by
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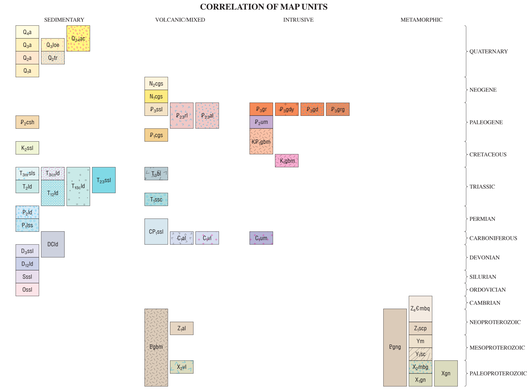
2005

CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

Qa — **Conglomerate and sandstone (Holocene)**—Alluvium: shingly and detrital sediments, gravel, sand more abundant than silt and clay

Qa,alc — **Fan alluvium and colluvium (Holocene and late Pleistocene)**—Fan alluvium and colluvium: shingly and detrital sediments, gravel, sand, clay

Qa — **Conglomerate and sandstone (late Pleistocene)**—Alluvium: shingly and detrital sediments, gravel, sand more abundant than silt and clay

Q,loe — **Loess (late Pleistocene)**—Loess more abundant than sand, clay

Qa — **Conglomerate and sandstone (middle Pleistocene)**—Alluvium: shingly and detrital sediments, gravel, sand more abundant than silt and clay

Q,tr — **Travertine (middle Pleistocene)**—Travertine

Qa — **Conglomerate and sandstone (early Pleistocene)**—Alluvium: shingly and detrital sediments, gravel, sand more abundant than silt and clay

N,cgs — **Conglomerate and sandstone (Pliocene)**—Gray conglomerate, grit, sandstone more abundant than siltstone, clay, limestone, marl; gypsum, salt; acid to mafic volcanic rocks

N,cgs — **Conglomerate and sandstone (Miocene)**—Red conglomerate, sandstone more abundant than siltstone, clay; acid and mafic volcanic rocks; limestone, marl; olivine basalt, trachybasalt, andesitic basalt (Taywara Series)

P,gr — **Granite (Oligocene)**—Granite (Phase III)

P,gd/q — **Granodiorite and granosyenite (Oligocene)**—Granodiorite, alaskite, granosyenite more abundant than granite (Phase II)

P,gd — **Granodiorite (Oligocene)**—Granodiorite (Phase I)

P,gr/q — **Granite and granodiorite (Oligocene)**—Granite, granite porphyry, granodiorite more abundant than quartz syenite, granosyenite

P,sst — **Sandstone and siltstone (Oligocene)**—Sandstone, siltstone more abundant than clay, conglomerate, limestone, marl; acid and mafic volcanic rocks

P,r/f — **Rhyolite lava (Oligocene and Eocene)**—Basaltic andesite, basalt, trachyte, dacite, rhyolite, ignimbrite, tuff; conglomerate, sandstone, siltstone, limestone

P,a/f — **Andesite lava (Oligocene and Eocene)**—Basaltic andesite, basalt, trachyte, dacite, rhyolite, ignimbrite, tuff; conglomerate, sandstone, siltstone, limestone

P,um — **Ultramafic intrusions (Eocene)**—Dunite, peridotite, serpentinite

P,cs/s — **Clay and shale (Eocene)**—Clay, shale, siltstone more abundant than sandstone, limestone, marl, gypsum, conglomerate

P,cgs — **Conglomerate and sandstone (Paleocene)**—Conglomerate, sandstone more abundant than siltstone, limestone, shale; mafic volcanic rocks

K?,gb/m — **Gabbro and monzonite (Paleocene and Late Cretaceous)**—Gabbro, monzonite more abundant than diorite, granite, granosyenite, syenite porphyry, syenite

K,sst — **Sandstone and siltstone (Late Cretaceous)**—Limestone (Middle Afghanistan); redstone, siltstone, conglomerate (Khalrud tectonic zone)

K,gb/m — **Gabbro and monzonite (Early Cretaceous)**—Gabbro, monzonite more abundant than diorite, granodiorite

T,bR — **Basalt lava (Late Triassic)**—Shale more abundant than phyllite, andesite to basalt (greenstone altered), limestone (Kotagai Series)

T,ss/ls — **Siltstone and sandstone (Late Triassic (Norian and Rhaetian))**—Siltstone, sandstone more abundant than shale, conglomerate

T,ss/ls — **Limestone and dolomite (Late Triassic (Carnian and Norian))**—Limestone, dolomite

T,ss/sst — **Sandstone and siltstone (Late and Middle Triassic)**—Limestone, dolomite, marl (Kabul Massif and Kunar tectonic zone)

T,ld — **Limestone and dolomite (Middle Triassic)**—Limestone, dolomite

T,ss/ld — **Limestone and dolomite (Late Triassic (Carnian) and Early Triassic)**— Limestone, dolomite more abundant than conglomerate, chert, marl

T,s/ld — **Limestone and dolomite (Middle and Early Triassic)**—Limestone, dolomite, marl

T,cgs,c — **Sandstone and conglomerate (Early Triassic)**—Variegated sandstone, gravelstone, conglomerate, chert, rhyolite and basalt volcanic rocks

P,ld — **Limestone and dolomite (Late Permian)**—Limestone, dolomite more abundant than marl, conglomerate, sandstone, siltstone, shale, bauxite and bauxite-bearing rocks

P,ss/s — **Limestone and sandstone (Early Permian)**—Color indicates Ulak and Kuberghandian horizons; limestone and sandstone more abundant than siltstone, conglomerate. Pattern and color indicate Karachatyr horizon; limestone and sandstone more abundant than siltstone, argillite, slate

CP,sst — **Sandstone and siltstone (Early Permian and Carboniferous)**—Sandstone and siltstone more abundant than slate, andesite to basalt volcanic rocks

C,um — **Ultramafic intrusions (Early Carboniferous)**—Dunite, peridotite, serpentinite

C,a/f — **Andesite lava (Early Carboniferous)**—Rhyolite to basalt volcanic rocks more abundant than limestone, slate, sandstone, conglomerate

C,r/f — **Lava (Early Carboniferous)**—Rhyolite to basalt volcanic rocks more abundant than limestone, slate, sandstone, conglomerate

DCls — **Limestone and dolomite (Early Carboniferous and Late Devonian)**— Limestone and dolomite more abundant than marl, schist

D,sst — **Sandstone and siltstone (Late Devonian)**—Sandstone and siltstone more abundant than limestone

D,s/ld — **Limestone and dolomite (Middle and Early Devonian)**—Limestone and dolomite more abundant than sandstone, siltstone

Ssst — **Sandstone and siltstone (Silurian)**—Sandstone, siltstone, shale

Ossl — **Sandstone and siltstone (Ordovician)**—Sandstone and siltstone more abundant than shale (Logar and Argandab tectonic zones); limestone, sandstone, siltstone, shale (Middle Afghanistan)

Z,€mbq — **Marble and quartzite (Cambrian (Edicarian) and Neoproterozoic)**—Marble, quartzite, metasandstone, mica schist

Z,sch — **Schist and phyllite (early Neoproterozoic)**—Greenschist and phyllite derived from slate, schist, sandstone more abundant than metacarbonates (marble, dolomite, chert) and metavolcanic rocks

Z,a/l — **Metavolcanic andesite lava (early Neoproterozoic)**—Greenschist and phyllite derived from slate, schist, sandstone more abundant than metacarbonates (marble, dolomite, chert) and metavolcanic rocks

Ym — **Metamorphic rocks, undivided (Mesoproterozoic)**—Greenschist, gneiss, quartzite, marble, amphibolite (metavolcanic lava and sedimentary rocks)

Y,s/c — **Schist (early Mesoproterozoic)**—Quartz-sericite-carbonate and chlorite-sericite-quartz schist; marble, quartzite, amphibolite

Epg — **Gneiss and granite (Proterozoic)**—Gneiss-granite, granite, plagiogranite

Epgm — **Gabbro and mafic metavolcanics (Proterozoic)**—Gabbro, metadiabase, amphibolite, diorite, plagiogranite

Xgn — **Gneiss (Paleoproterozoic)**—Two-mica, biotite, biotite-amphibole, garnet-biotite, and plagioclase gneiss; migmatite, quartzite, marble, amphibolite

X,mbg — **Marble and gneiss (middle Paleoproterozoic)**—Marble and biotite and garnet-staurolite-biotite gneiss; schist, quartzite, amphibolite

X,v/l — **Metavolcanic lava (middle Paleoproterozoic)**—Marble and biotite and garnet-staurolite-biotite gneiss; schist, quartzite, amphibolite

X,gn — **Gneiss (early Paleoproterozoic)**—Two-mica, biotite, biotite-amphibole, garnet-biotite, garnet-sillimanite-biotite, pyroxene-amphibole, plagioclase, and cordierite gneiss; schist, migmatite, quartzite, marble, amphibolite

EXPLANATION OF MAP SYMBOLS

Contact

Fault—Dashed where approximately located; dotted where concealed

DATA SUMMARY

This map was produced from several larger digital datasets. Topography was derived from Shuttle Radar Topography Mission (SRTM) 85 meter digital data. Gaps in the original dataset were filled with data digitized from contours on 1:200,000-scale Soviet General Staff Sheets (1978–1997). Contours were generated by cubic convolution averaged over four pixels using TNTmips® surface-modeling capabilities. Cultural data were extracted from files downloaded from the Afghanistan Information Management Service (AIMS) Web site (http://www.aims.org.af). The AIMS files were originally derived from maps produced by the Afghanistan Geodesy and Cartography Head Office (AGCHO). Geologic data and the international boundary of Afghanistan were taken directly from Abdullah and Chmyriov (1977).

It is the primary intent of the U.S. Geological Survey (USGS) to present the geologic data in a useful format while making them publicly available. These data represent the state of geologic mapping in Afghanistan as of 2005, although the original map was released in the late 1970s (Abdullah and Chmyriov, 1977). The USGS has made no attempt to modify original geologic map-unit boundaries and faults; however, modifications to map-unit symbology, and minor modifications to map-unit descriptions, have been made to clarify lithostratigraphy and to modernize terminology. The generation of a Correlation of Map Units (CMU) diagram required interpretation of the original data, because no CMU diagram was presented by Abdullah and Chmyriov (1977).

This map is part of a series that includes a geologic map, a topographic map, a Landsat natural-color-image map, and a Landsat false-color-image map for the USGS/AGS (Afghan Geological Survey) quadrangles shown on the index map. The maps for any given quadrangle have the same open-file number but a different letter suffix, namely, -A, -B, -C, and -D for the geologic, topographic, Landsat natural-color, and Landsat false-color maps, respectively. The present map series is to be followed by a second series, in which the geology is reinterpreted on the basis of analysis of remote-sensing data, limited fieldwork, and library research. The second series is to be produced by the USGS in cooperation with the AGS and AGCHO.

REFERENCE CITED

Abdullah, Sh., and Chmyriov, V.M., eds., 1977, Map of mineral resources of Afghanistan: Kabul, Ministry of Mines and Industries of the Democratic Republic of Afghanistan, Department of Geological and Mineral Survey, V/O "Technoexport" USSR, scale 1:500,000.

[1]Geospatial analysis software developed by MicroImages, Inc., Lincoln, NE 68508-2010.