

EXPLANATORY NOTES

The Gahkuch-Roshan quadrangle (42-H/12) of the Geological Map 1:50,000 scale lies within the Ghizer District of Northern Areas of Pakistan. It lies some 70 km west of Gilgit on Chitral-Gilgit road. The area has dry and cold climatic conditions. It consists of rigid mountainous terrain forming deep gorges. Structurally the area is a part of Kohistan island arc sequence lying adjacent to the south of Main Karakoram Thrust (MKT). Most of the southern part of the quadrangle is covered by intrusive rocks, predominantly granodiorite volcanic and meta sedimentary rocks are well exposed in the northern part. Owing to the presence of the collision boundary between the Asiatic mass and island arc, the rocks of the project area are severely disturbed. Previous knowledge of the area is due to the pioneer work of Ivanac et al. (1956), Abu Bakr (1965) & Tahirkhali (1979) and Khan, N. A., et al. (1988).

CRETO-TERTIARY

GILGIT FORMATION
A small body of schists/gneisses of the Gilgit formation (Kgf) is exposed in the upper reaches of Roshan gah and Gulmat gah. In the Roshan gah area it is well exposed and composed of schists, gneisses and interlayered with quartzite bands. Lit per lit structure and Pylgmatic folding are prominent in this area. This meta sedimentary body is extending nearly NE-S-W direction. Most of it is covered with recent deposits. These rocks are intruded profusely by granodiorite and granite in Roshan gah area. A small exposure of the Gilgit formation is found in Gulmat gah also.

A mixed assemblage of meta-volcano-sedimentary rocks belonging to the Greenstone Complex are confined in the northern part of the quadrangle. This unit is well exposed in Roshan, Haim and Haton areas. Andesite and marble dominate the rock assemblage in Roshan area. Turf, agglomerate, quartzite and slate are minor units associated with andesite and marble. The andesite (Kgcv) is mostly porphyritic with phenocrysts of plagioclase. The quartzite (Tkqd) and chlorite in the rocks has given green tone to the complex. Thick marble (Kgc) exposures are present in Roshan gah and Saro gah and are inter layered with volcanic bands. Marble bands are white, with light brown linings, weathers to a yellowish brown colour and are saccharoidal. The thickness of marble body varies up to 500 m. A few bands up to 10 m thick of white marble are present in both localities. A small unit of meta sediments (Kgs), such as quartzite, meta chert, slate interlayered with andesite is over lie on the marble exposure in Roshan and Saro gah. These meta sediments are over lain by volcanic rocks, predominantly andesite in composition with a few bands of tuff. Contact zone of volcanic rocks with diorite is profusely intruded by small dioritic bodies.

Rocks of Greenstone Complex are also found in Haim, Gahkuch gah and Den gah in form of screens and xenoliths. In the west of Haton village volcanic rock of andesitic in composition is well exposed. Chlorite and epidote are well developed along joint planes.

KOHIKAST INTRUSIVES

Intrusive rocks of Kohistan Batholith are well exposed in 3/4 part of the investigated area. These intrusive rocks comprise of diorite, granodiorite, granite, hornblende pegmatite, acid pegmatites, apatite and quartz veins. All these rocks are present in form of batholith, apophyses, stocks and veins through out the project area but upper reaches of most of the naia are composed of granodiorite and granite.

A mixed zone (Tkmg) composed of predominantly fine grained diorite and minor granodiorite with xenoliths and screens of volcanics and metasediments in varying proportions is exposed in Roshan gah, Gahkuch gah, Dari gah and Haim gah as well as small exposures in between Haim and Hapur along Gupis-Gilgit road. A small body of mafic rocks (Tkm) consists of gabbro, hornblende and amphibolite is exposed in the upper reaches of Gulmat gah. Fine to medium grained diorite (Tkdg) is well exposed in the upper reaches of Roshan gah, Gulmat gah, Diorite of Gasomal in Roshan gah, Yangal gah, Haim gah and near the mouth of Gahkuch gah has a large number of xenoliths and screens of meta sediments and volcanics. Texture and mineral composition vary from place to place due to abundance of xenoliths and hybridization of small xenoliths. Granodiorite (Tkgr) is the most abundant rock types in the mapped area forming high peaks and ridges with steep slopes. The granodiorite is grey with various shades, weathers pale grey to brown. It is medium grained, coarser at some localities and fine grained near the margins. This rock is hypidiomorphic granular, mostly none-foliated and massive. It is composed of quartz, orthoclase, plagioclase, biotite and hornblende. Opaque minerals with apatite and sphene are evident in the rock. Secondary minerals are epidote and chlorite. Granite (Tkg) is also exposed in the form of batholith, stocks and veins through out the project area. A big batholith body is exposed in the upper reaches of Yangal gah and Hapur gah. It is normally medium to coarse grained. At certain places it becomes porphyritic and feldspar crystals are found as phenocrysts. It is composed of quartz, feldspar, biotite with a few crystals of hornblende. Some other big bodies of granite are exposed in the upper reaches of Gulmat gah, Roshan gah and on the left bank of Gilgit River opposite Roshan village. Mostly these granitic bodies are medium grained, equigranular, subporphyritic and hypidiomorphic. Mineral constituents are quartz, K-feldspar, albite and biotite. The biotite has limonite and zircon inclusions. Apatite and sphene are the common accessory minerals. Acidic pegmatites, apatite and quartz veins are found in small numbers throughout the project area. Pegmatites are simple and composed of quartz, K-feldspar, plagioclase, muscovite and biotite. Diorite dykes are common in the Roshan gah area in diorite body. A small body of hornblende/amphibolite is exposed in the area between Saro Hara and Darell Hara along Gulmat gah surrounded by meta sediments.

QUATERNARY

The moraines (Qm) are wide spread in Roshan and Haim areas. They consist of loose silty clay, pebbly material inter mixed with cobbles and boulders derived from meta-volcano sediments and igneous rocks. They are poorly sorted and randomly oriented. The thickness is noted up to 100 m in these areas. Alluvial fan deposits (Qaf) are well exposed in Gahkuch, Haim, Musko areas. They include gravel accumulating as fans at the present day and in earlier times. These deposits also include ill sorted gravel. Terraces (Qt) are exposed along the Gilgit river in Haim, Sumar and Musko areas. Terraces material consists of loose silty sand and clay intermixed with gravel and boulders. They are poorly sorted and show graded bedding at a few places. The gravel alluvium (Qa) of present day river and stream courses in wide spread in the area of confluence of river Gilgit and river Ishkuman. Huge scree deposits (Qs) are formed along the slopes of different exposures. At certain places in naia valleys nearly all the slopes are covered with scree. Especially those areas where acidic rocks are exposed scree deposits are composed of predominantly boulder size material.

GEOLOGICAL HISTORY

The oldest rock unit exposed in the project area is the Gilgit formation which is composed of mainly gneisses and schists of meta sedimentary origin. They include both meta pelites as well as meta saminites, commonly interstratified at regular intervals. The rocks of the Gilgit formation show evidence of regional metamorphism upto sillimanite grade (Khan T. et al. 1994). The Gilgit formation has been over lain by meta-volcanic and meta sediments of the Greenstone complex which has been profusely intruded by acidic rocks of Kohistan batholith. During this time period (Cretaceous) volcanic activity gave rise to tuff-agglomerate lava flows, coupled by the flysch type marine sediments which were laid down in the Tethys on the northern periphery of the Kohistan Island Arc. This volcanic rocks of Cretaceous age possibly marks the end of the great volcanic activity which gave rise to the Greenstone complex.

The magmatic rocks of acidic to intermediate composition like Kohistan batholith intruded the Kohistan terrane in multiple phases accompanied with both felsic and mafic dykes and pegmatites ranging in age from 102 Ma to 20 Ma (Patterson and Wendley 1985). The 102 Ma granitic rocks are deformed from trondhjemite. The 85-60 Ma granitic rocks are partly deformed whereas the 30 Ma old pegmatites and granites are undeformed. The oldest plutonic rocks are grouped into stage-I whereas the rest in stage-II and stage-III plutons. (Patterson et al. 1993).

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LEGEND

- QUATERNARY**
- Qs Scree / Talus
 - Qa Gravel Alluvium / River bed deposits.
 - Qaf Q1 Alluvial fan deposits / Terraces
 - Qm Morain

KOHIKAST INTRUSIVES

- Tkgr Granite
- Tkgrd Granodiorite
- Tkd Diorite
- Tkm Mafic rock (Hornblende + Gabbro)
- Tkmg Mixed zone (Diorite + Volcanic + Granodiorite + Meta-sediments)

GREENSTONE COMPLEX

- Kgcm Marble
- Kgcs Meta-sediments + Volcanics
- Kgc v Volcanics (Predominantly andesite with minor basalt, rhyolite, tuff & agglomerate)

GILGIT FORMATION

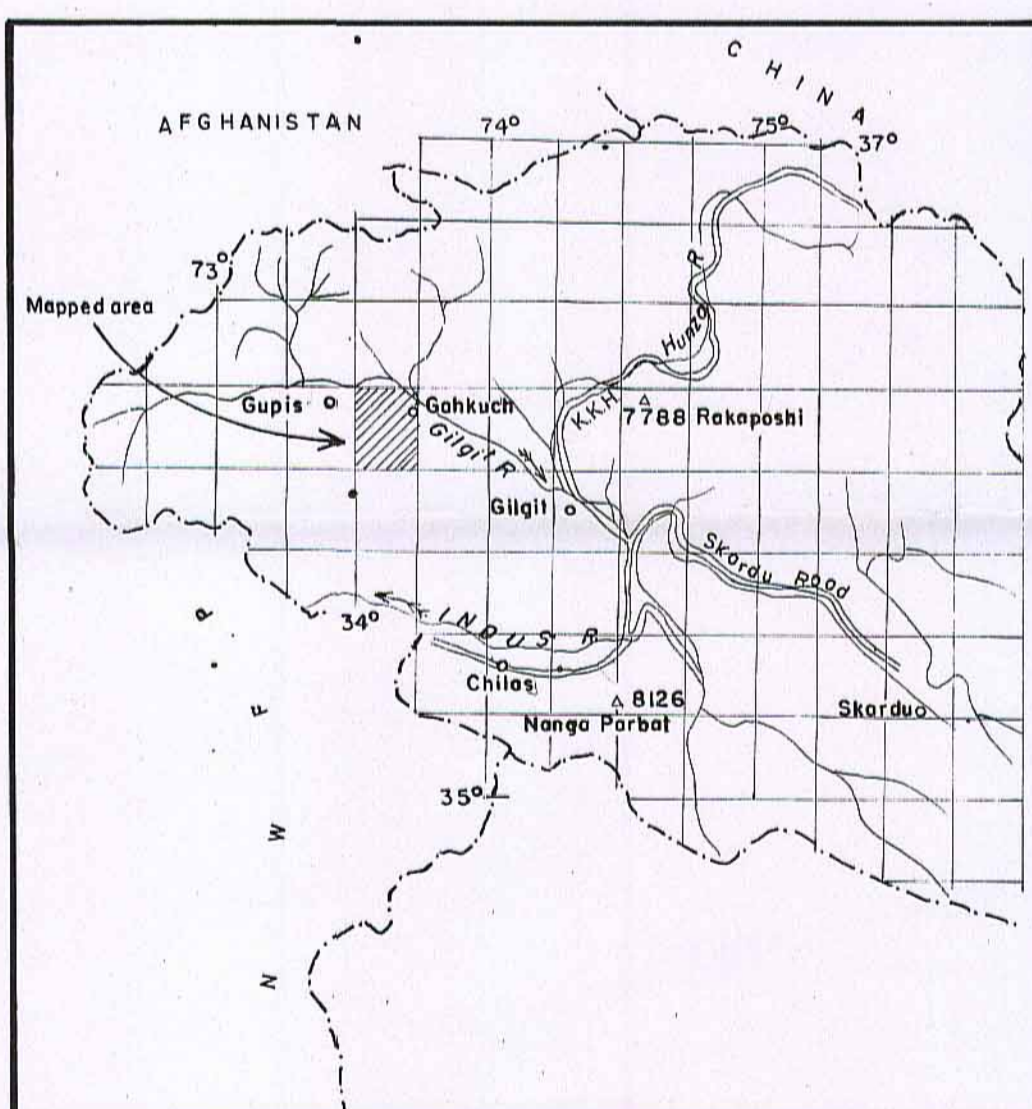
- Kgt Schists + Gneisses

GEOLOGICAL SYMBOLS

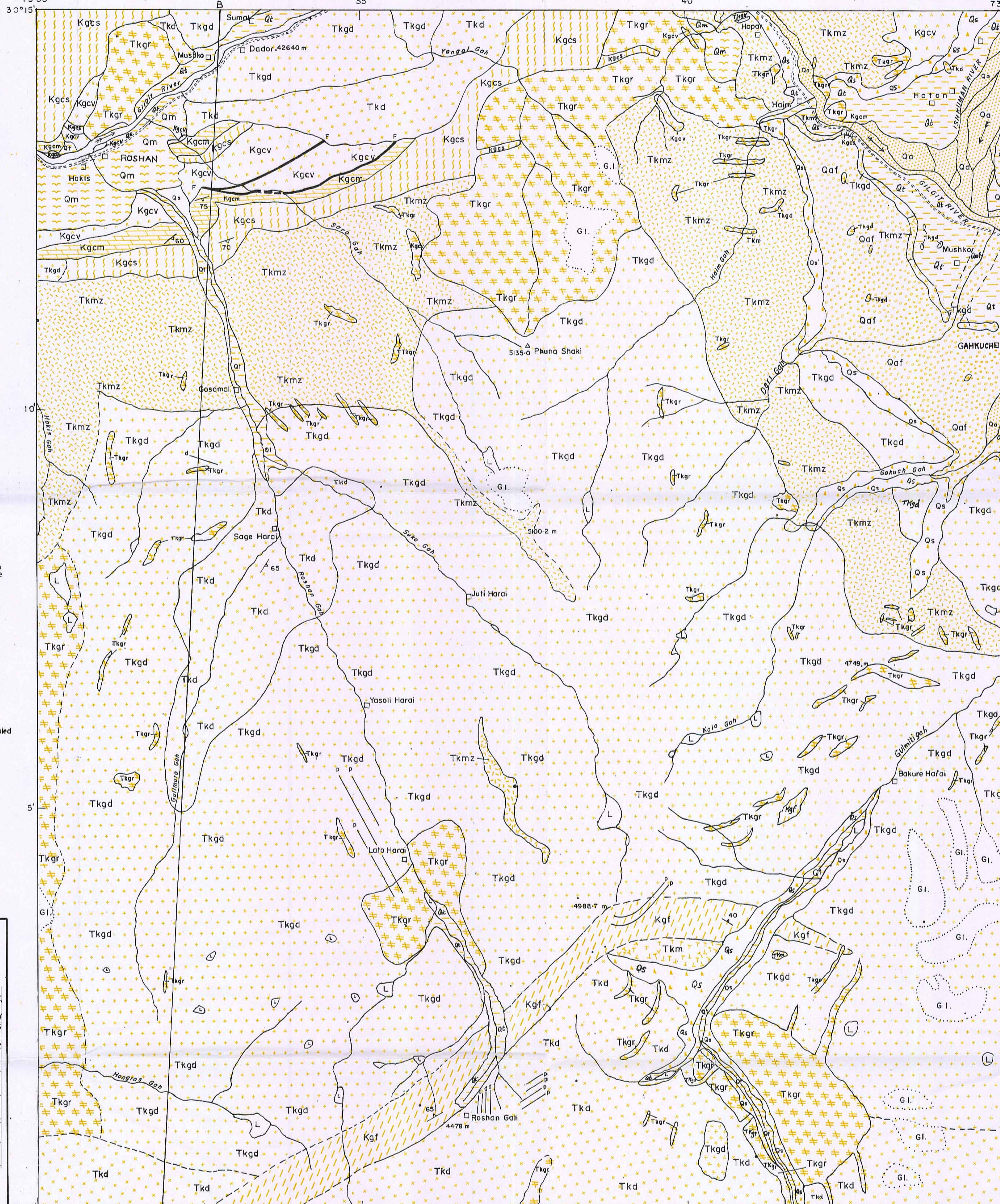
- 65 Strike and dip of the bed and foliation
- Fault
- - - - - Contact-dashed where uncertain or concealed
- A-B Line of section
- P Pegmatite
- D Diorite

NON-GEOLOGICAL SYMBOLS

- G1 Glacier
- River
- Road
- Nala
- Locality
- L Lake
- 5135.0 m Height in metres



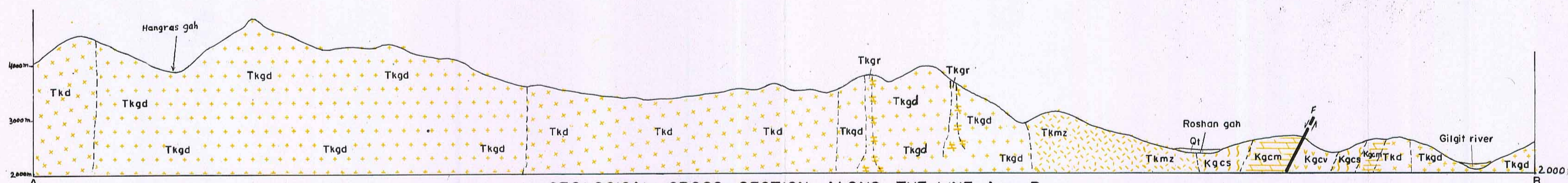
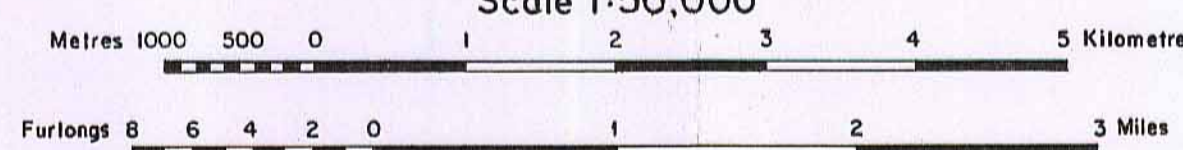
Scale
Kms 50 40 30 10 0
MAP OF NORTHERN AREAS PAKISTAN
SHOWING LOCATION OF MAPPED AREA.



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GEOLOGICAL CROSS-SECTION ALONG THE LINE A—B