Banded Gneissic Complex 2nd Contd. presentation

By

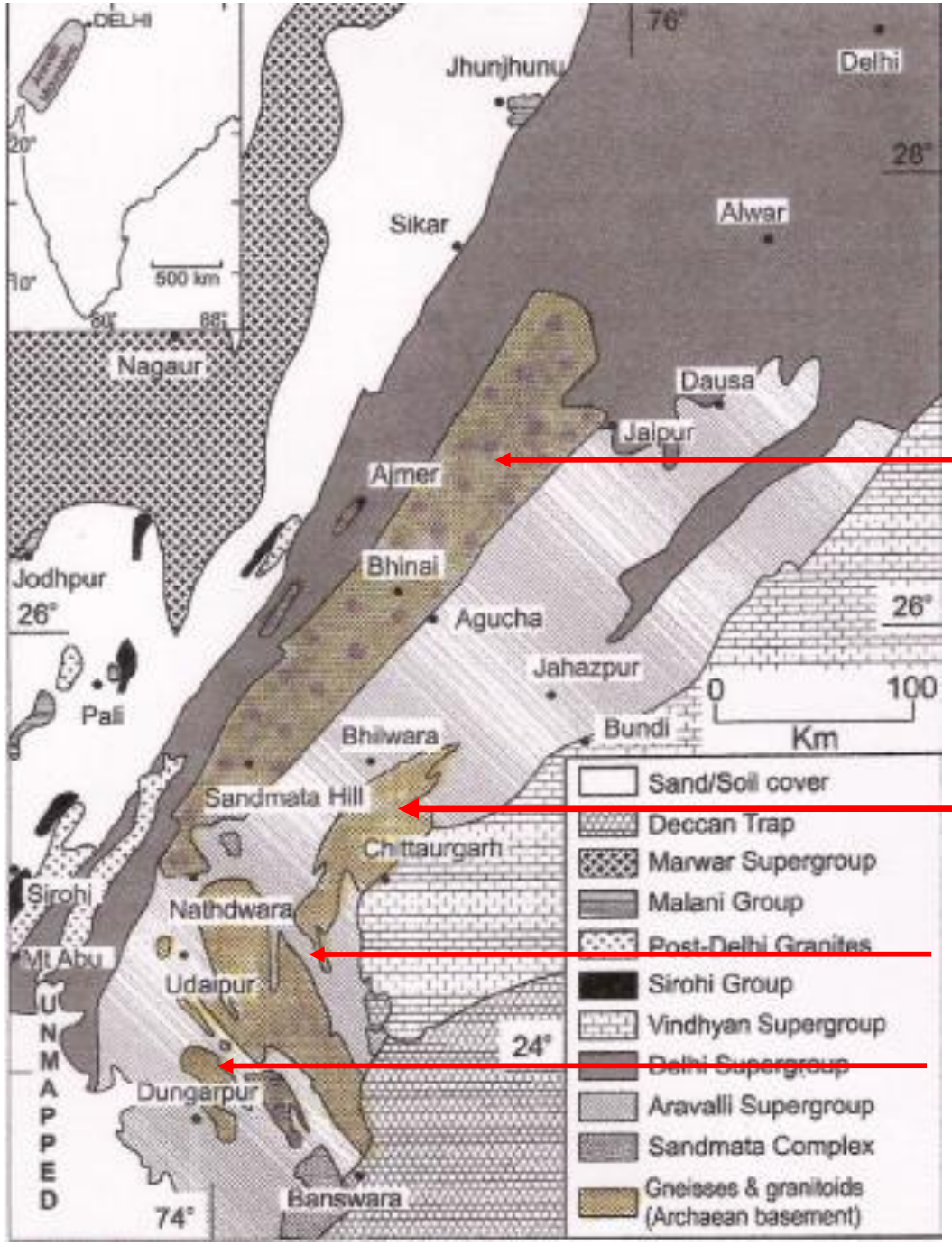
Dr. Ritesh Purohit

Banded Gneissic Complex

- The description involves:

1. Distribution
2. Classification
3. Lithology
4. Intrusives

- Most of these are covered in first part of presentation. Some additional Information is added further.



Sandmata Complex
(BGC II of B C Gupta)

Berach Granite

Mavli block of Archaean basement

Sarara Inlier

(BGC I of B C Gupta)

Distribution:

- 1. East of Udaipur: extends from north of Mavli to south of Pipalkhunt
- 2. A Proterozoic Carbonatite body is lying within this BGC as an intrusive, near village Newania.
- 3 On western flank several Inlier bodies are located as dismembered bodies like Sarara Inlier, Punali Inlier, Kherwara Inlier, Bagdunda Inlier
- 4. Around Chittorgarh also these rocks are distributed named as Berach Granite.
- Another important reconstituted basement called as Sandmata Complex lies from Rajsamand to north of Ajmer.

Lithology

- BGC-I or Mewar Gneissic Complex around Udaipur has following lithologies:
- 1. Biotite Gneiss: Tonalite Trondjhemite to Granodiorite composition intruded by leuco-granitoids and pink granites. More then one generation of gneiss are reportedly seen complexly folded.
- 2. Intrusions of pegmatites and Trondjhemite veins are also seen.
- 3. Mineralogically: Quartz, Microcline and Plagioclase are dominant besides biotite, chlorite, muscovite, hornblende and garnet. Minor Minerals include tourmaline, zircon, sphene, apatite, epidote and zoisite.
- 4 Oldest Age reported is 3.28 Ga from Jhamarkotra Gneiss.

Geochronological framework of the BGC

Age (Ma)	Methods used	Events
2450 ± 8	Single zircon	Berach Granite
2505 ± 4	Single zircon	Vali River Granite (Jagat)
2532 ± 5	Single zircon	Pink Granite Untala
2562 ± 6	Single zircon	Ahar River Granite
2620 ± 5	Single zircon	Gingla Granite
2658 ± 5	Single zircon	Jagat Granite
2666 ± 6	Single zircon	Untala Tropndhjemite gneiss
2828 ± 46	Sm/Nd isochron age	Mafic dykes/sills in
2887 ± 5	Single zircon	Banded TTG gneiss Jagat
2890 Ma	Single zircon	Gneiss at Masuda, Ajmer
~2905 Ma	Single zircon	Banded Gneiss, Rajsamand
~ 3230	Single zircon	Trondhjemite
3281 ± 3	Single zircon	Age of igneous protolith
3307 ± 65	Sm/Nd isochron age	Jhamarkotra Gneiss

Lithology contd.

- Amphibolite: 3 types of amphibolites are reported-
- 1. Occurring as small enclaves of irregular shape and size within gneisses and granitoids. Detached boudin like bodies, metamorphosed tholeiitic basalts
- 2. Linear and large bodies with complex outcrop pattern due to superposed folding. Show intrusive relationship with gneisses.
- 3. Actinolite bearing amphibolites with undeformed metabasalts may be of the younger Aravalli Orogeny
-

Metasediments:

- 1. Quartzite: A large body is present near Rakhiawal, Mavli, intruded by 2.9 Ga old Amphibolite. 90% Quartz, and sericite Mica, fuchsite quartzite, presence of cross-bedding, recrystallized fabric
- 2. Marbles and Calc-silicates: Coarsely Crystalline, low Mg marble with minor impurities. Calc-silicates are impure metamorphosed limestone
- 3. Ironstone Formation: Scattered unmappable bodies of smaller dimensions, Banded Magnetite Quartzite (BMQ), Quartz-Magnetite-Grunerite (QMG)
- 4. Mica Schists: Poorly exposed, irregular enclaves, pelitic to psammopelitic. Quartz, Muscovite, Biotite and Garnet. Chlorite and Chloritoids occur as retrogressive minerals
- Intrusive Ultramafics: Tremolite-Actinolite, talc-antigorite with secondary carbonate

Granitoids: 4 significant bodies

- 1. Untala Granite: Dominantly pink, coarse grained K-feldspar, includes patches of gneisses, adamellite to granodiorite to tonalite in composition. Fresh megacrysts of Plagioclase exhibit myrmekitic texture. Microcline, Biotite, Chlorite, epidote, zoisite, apatite, sphene. Shows undeformed character, youngest phase in BGC.
- 2. Gingla Granite: Lying under Jaisamand Lake, Medium Grained, porphyritic. Quartz, Feldspar-plagioclase and microcline. Granoditorite to Trondjhemite. Inclusions of amphibolites and gneiss. Contact with gneiss is gradational, shows presence of cryptic relicts of gneissic foliation.

- Berach Granite:

  Variety of textures, coarse porphyritic to highly foliated gneisses, greenish-grey gneiss. Presence of quartz, feldspar, biotite and epidote, actinolite, chlorite.

- Ahar River Granite:

  Massive Coarse to fine grained, greyish-green leucogranitoid with inclusions of amphibolite and metasedimentary rocks (outliers of the Aravalli Supergroup). Post-crystalline deformation with number of ductile shear zones. Development of stretching cracks, growth of fibrous grains, alterations to sericite and chlorite etc.

Neewania Carbonatite

- Important because of radioactivity and preence of pyrochlore
- NW-SE trending ridge in Untala Granite, 2km by 0.5 km
- Funnel shaped body with E-W plunging axis
- Rauhaugite, Beforsite, Rodberg, Sovite and lapilli are the variants
- Significant REE with LREE enrichment in progression from magnesio to ferro Sovite variants
- Isochron age of ~2275 Ma for dolomitic carbonatite and ~1575 Ma age for ankerite carbonatites.

Sandmata Complex: TTR basement

- From north of Nathadwara to north of Ajmer in NE-SW trend
- Sandmata Hill is north of Devgarh in Rajsamand district
- Tectonothermal reconstitution indicated by:
- 1. Intrusion of Darwal Granite at ~1840 Ma (Choudhary, 1984)
- 2. Intrusion of Amet Granite at ~ 1800 Ma (Choudhary, 1984)
- 3. Anjana Granite (Devgarh) at ~1650 Ma (Wiedenbeck et al., 1996).
- The above three reconstitution indicates remobilization in southern terranes of Sandmata Complex.
- In northern sector from north of Rajsamand to south of Jaipur Granulites caused reconstitution. Time slot of granulite exhumation is between ~1725 – 1625 Ma

Lithology of Sandmata Complex:

- Two broad categories of High Grade metamorphic rocks:
- 1. Gneissic Association (Amphibolite facies)
- 2. Granulite Association
- Gneisses: Contains Biotite Gneiss (TTG composition), Amphibolites and Metasediments
- Biotite Gneiss has complex deformation, recrystallized quartz, feldspar and biotite, intrusion of veins of pegmatites. Mica-schists are occurring within biotite gneiss which have been described as restites from which granitic composition has drained out. Partial melting has resulted into formation of migmatites forming at temp of 650^0 and pressure 6-7Kb. Also present are fuchsite quartzite, marbles and calc-silicates. Amphibolites are present commonly.

Granulites Association:

- Comprising Charnockite, mafic granulite, pelitic granulite, intrusive norite and metanorite dykes.
- Shear zone bounded discontinuous bodies of variable dimension which are tectonically emplaced through exhumation processes into gnessic association of rocks
- Largely massive in outcrops with dominant migmatization due to partial melting.
- Pelitic, psammopelitic and calc-silicate paragneisses, quartzo-feldspathic granulites, Charnockite enderbite suite and leptynites, two pyroxene granulites and norites
- Basic granulites with low silica, high iron content and low FeO/MgO

Mafic Granulites

- Three Types:
- 1. Norite Intrusives into the other granulites, basaltic in nature
- 2. Metanorite: Coarse grained, metamorphic fabric and occur as enclaves in felsic granulites
- 3. Two-pyroxene Granulites: Containing Clino and Ortho pyroxene both along with amphibolites, ilmenite, plagioclase and garnet

Quartzo-feldpathic Granulites

- Cahrnockite-enderbite association
- Coarse grained massive rocks
- Contain Quartz, feldspar, hypersthene, hornblende, garnet and biotite
- Total absence of alumino-silicate minerals.
- Composition varies from granitic to tonalitic
- Banded rocks with alternating leucocratic silica bands and rusty brown feldspathic bands. Comparable to Khondalites
- High PT conditions followed by retrogressive metamorphism
- Calc-silicate granulites are rare in occurence