GEOLOGICAL FIELD MAPPING

FIELD OBSERVATIONS AT BAGALKOT, KARNATAKA.

BY SIMRAN GAONKAR

SEAT NO. 22P0450024

MSC PART 1

GOA UNIVERSITY.

Dr. Anthony Viegas
Vice Dean (Academic),
School of Earth, Ocean
& Atmospheric Sciences,
Goa University

GEOLOGICAL FIELD MAPPING

FIELD OBSERVATIONS AT BAGALKOT, KARNATAKA.

BY SIMRAN GAONKAR

MSC PART 1

GOA UNIVERSITY.

Index

Spot 3
- Day 7
  Spot 1
  Spot 2
  Spot 3
  Spot 4
  Spot 5
  Spot 6
- Day 8
  Spot 1
  Spot 2
  Spot 3
  Spot 4
  Spot 5
- Day 9
  Spot 1
  Spot 2
- Day 10
  Spot 1
  Spot 2

ACKNOWLEDGEMENT

I am grateful to Dr Anthony Viegas, Professor Nicole sequira, professor poornima sawant and all other faculties of earth science department, Goa University. Because of them this field trip could not be possible and Also I appreciate the help received from the laboratory assistant Ms. Heena for providing material required for the field trip .I would like to express my gratitude towards my classmates for Helping me during these 10 days and giving me an update of what Happening. Also, I would like to thanks my family member for their support, Constant words of encouragements and also financial support.

INTRODUCTION

Our department of applied geology, Goa university had organised 10 days of field trip to Bagalkote Karnataka. This field trip is a part of our master's programme and is essential for a geology student to become great in field related work. For this to be happen we were meant to take various geological equipment which is clinometer compass and Brunton compass to take structural data like strike direction, dip direction, dip amount etc, hand lens for mineral identification, toposheet to have an idea where we are, and hammer to break the rock sample. The area which we were studying as a kaladgi basin. We basically visited several places took the structural date, started to interpret, like what is this lithology, where it should be placed on the stratigraphical column of kaladgi basin, how it was formed, what lead to its current situation, what is the rock, what is the environment of deposition and so on. The goal of the work is to establish the stratigraphic sequence, dating formations, recognizing structures, with the help of field data that was gathered, we had enough information to know about, its depositional environment, contains the description of the stratigraphy, structures and they are both used to reconstruct the geological evolution of the area during a certain time interval. we also had to face challenges like to enter places where the area is filled with thorny plants, cramped space, finding in situ rock bed, climbing down along moderate to steep slope.

GEOLOGY OF KARNATAKA

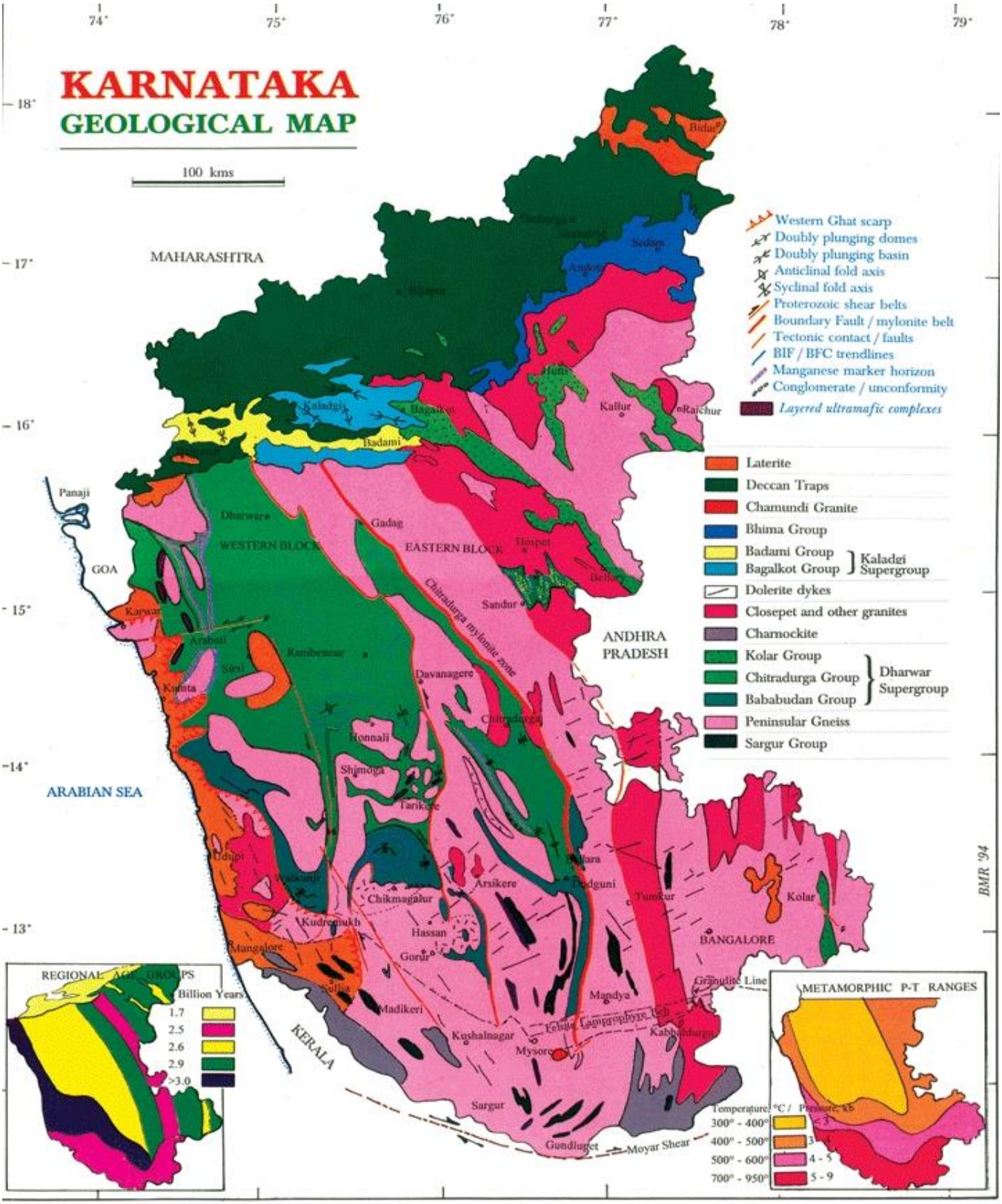
Karnataka forming a part of the Indian Shield is constituted of rock Formations ranging in age from 3300 m.y. to 5 m.y. Barring a narrow Coastal strip of about 5000 sq.km of Tertiary and Quaternary sediments And another 31,250 sq.km of Deccan basalts, the remaining area is Dominated by Archaean-Proterozoic rocks. Mysore Plateau, Geologically constituted of Dharwar Craton comprises of greenstone granite belts, gneisses and granulites. Greenstone belts essentially Consist of meta-volcano sedimentary sequences, surrounded and Dissected by Peninsular Gneiss. At the southern end of the craton these Give way to granulite suite of rocks. The craton preserves a billion-year Orogenic history from 3400 m.a. to 2400 m.a. Epi-cratonic or intracratonic sedimentary basins called Purana Basins occupy the northern Segment of the craton whose northern part in turn is concealed by Deccan basalts. Thus, younging of litho-sequence from south to north Is evident. Generalised regional lithostratigraphy worked out for Karnataka, is presented below, followed by a brief description of major Groups. Stratigraphy and lithology.

PHYSIOGRAPHY OF KARNATAKA

Karnataka can be divided into three well defined geomorphic regions Viz., (1) the coastal plains on the west bordering the Arabian Sea, (2) The Malnad or mountainous region comprising the Western Ghat and (3) the plateau region on the east. The coast line is straight and is about 400 km long. The coastal plains rarely exceed 30 km in width. To the East of the coastal plain, the Western Ghats forming the sub-continental Water divide rise precipitously in a series of scarps and terraces Towering more than 1000 m above m.s.l. within a short distance from The coastal plain. The Western Ghats trend NNW-SSE parallel to the West coast and have an average width of about 40 km. They are dotted With high peaks, viz., Kudremukh (1884 m) and Mulaingiri (1912 m) In the Bababudan hills. The Western Ghats grade into the plateau region towards east. This Plateau is the southern extension of the Deccan Plateau with an average Elevation of about 650 m with a series of narrow, linear ridges and hill Ranges of schistose rocks and bouldery granitoid hills. The state is Drained by three major easterly flowing river systems. These are : (1) Manjira River of the Godavari basin in the north, (2) Krishna with its Tributaries, Tungabhadra, Ghataprabha, Malaprabha, Bhima and Vedavati draining the northern and central part and (3) Cauvery with

Its tributaries, Kabini, Hemavathi, Simsha and Arkavati draining the Southern part. Besides the easterly flowing river systems, there are Several westerly flowing streams with short, straight and steep courses. The most prominent of them are: Kalinadi, Sharavati and Netravati. Most of the river courses are principally aligned in two directions: (1) ENE-WSW to WNW-ESE, (ii) north-

south to NNW-SSE and Correspond to the major lineaments, faults, shear zones and joints. Many of the major rivers, particularly the west flowing rivers and some Sections of all the east flowing rivers have straight courses and sharp Turns suggestive of strong structural control on the drainage pattern. There are a number of rapids, cascades and waterfalls along the major Rivers. The well-known among them, are the Jog Falls on the Sharavati River and the Sivasamudram Falls on the Cauvery River. The state Experiences humid Tropical to Semi – Arid climate for most part of the Year. The annual rainfall is about 300 to 500 cm in the coastal plains And the Western Ghats and about 80 cm on the eastern plateau. The Western Ghats are thickly forested. The plateau is generally devoid of Dense forest.



KALADGI BASIN

The Proterozoic Kaladgi–Badami and Bhima basins are intra-cratonic Basins occurring over the Archaean Dharwar craton. The Kaladgi–Badami Basin contains arenites, shales and carbonates with minor Cherts and conglomerates deposited in continental, transitional and Shallow-marine environments presumably during the late Palaeoproterozoic/Mesoproterozoic to Neoproterozoic. The lower part Of the succession (Bagalkot Group) is deformed into east–westtrending elongated doubly plunging synclines and anticlines. The upper Part of the succession (Badami Group) is undeformed and Unconformably overlies the lower part. The evolution of the Kaladgi–Badami Basin was controlled by movements along east–west-trending Normal faults under an extensional stress regime. The Bhima Basin Hosts mainly limestones with subordinate arenites and shales deposited In fluvial, deltaic and tidal flat environments possibly during the Neoproterozoic. These sediments are undeformed except along faults With significant strike-slip components.

The Bagalkot Group displays variable deformation in different sectors Of the basin. Along the basin-fringes (along the Saundatti–Ramdurg–Badami tract in the south and the Jamkhandi–Bilgi sector in the north), Gentle monoclinal folding and local deformation along faults has been Recorded. These margins have suffered homogeneous strain-flattening, Probably under the influence of gravity-related subsidence of the basin floor. Boundary-parallel normal faults (essentially trending E–W) that Can be traced to the basement of the sediments, suggest a causal linkage Between hem and the growth of the basin. In the central parts, Particularly north of the Shirur Shear, the sediments display tight Isoclinal (often doubly plunging and locally recumbent or overturned) Folds around Yadwad, Lokapur and Bagalkot (Awati and Kalaswad 1978; Nair and Raju 1987; Mukherjee et al. 2016). The sub-vertical Axial planes trend in the WNW–ESE direction; coaxial with a series of WNW–ESE trending shear zones/faults.

Table 1.1: *Lithostratigraphy of the Kaladgi–Badami Basin*

Supergroup	Group	Subgroup	Formation	Member	Thickness (m)	Sedimentary structures	Sedimentary environment
Kaladgi	Badami		Katageri	Konkankoppa Limestone	85	Profuse cross-bedding (tabular, trough and tangential), ripple marks, graded bedding, parting lineation, sandstone dykes and convolute lamination in Cave-Temple Arenite	Dominantly fluvial with subordinate lacustrine (Jayaprakash 2007; Mukhopadhyay *et al.* 2013)
				Halkurki Shale	67		
				Belikhindi Arenite	39		
			Kerur	Halgeri Shale	3		
				Cave-Temple Arenite	89		
				Kendur Conglomerate	3		
	---------- Angular unconformity ----------						
	Bagalkot	Simikeri	Hoskatti	Argillite	695	Cross-bedding (trough and tabular) and ripple marks (symmetrical and asymmetrical) in Muchkundi Quartzite	High-energy beach deposits grading upwards to tidal flats (Kale & Phansalkar 1991) with minor fluvial deposits (terrestrial fan; Jayaprakash 2007). Dominantly fluvial in the lower part of the Muchkundi Quartzite (Mukhopadhyay *et al.* 2013).
			Arlikatti	Lakshanhatti Dolomite	87		
				Kerkalmatti Ferruginous Member	42		
				Neralkeri Chert	39		
				Govindkoppa Argillite	80		
			Kundargi	Muchkundi Quartzite	182		
				Bevinmatti Conglomerate	15		
		---------- Disconformity ----------					
		Lokapur	Yadhalli	Argillite	58	Small- and large-scale cross-bedding (trough and tabular, at places herringbone type), symmetrical and asymmetrical ripple marks, mud and shrinkage cracks, graded bedding, crude parting lineation, rain prints and load casts in Saundatti Quartzite. Erosional parting surfaces and mud cracks in Manoli Argillite (Jayaprakash *et al.* 1987; George 1999; Jayaprakash 2007)	Transgressive beach and intertidal suite with minor fluvial deposits (terrestrial scree and fan deposits grading down slope into braided river sediments) at the base, grading upwards to cycles of alternating carbonate and muddy tidal flat deposits (Kale & Phansalkar 1991; Kale *et al.* 1996; Bose *et al.* 2008).
			Muddapur	Bamanbudni Dolomite	402		
				Petlur Limestone	121		
				Jalikatti Argillite	43		
			Yendigere	Nagnapur Dolomite	93		
				Chikkashellikere Limestone	883		
				Hebbal Argillite	166		
			Yargatti	Chitrabhanukot Dolomite	218		
				Muttalgeri Argillite	502		
			Malaprabha	Mahakut Chert	133		
				Manoli Argillite	61		
			Ramdurg	Saundatti Quartzite	383		
				Salgundi Conglomerate	31		
---------- Non-conformity ----------							
Archaean granitoids, gneisses and greenstone belt metavolcanic and metasedimentary rocks							

After Jayaprakash *et al.* (1987), Jayaprakash (2007).

FIELD TRIP OBSERVATIONS

BAGALKOT, KARNATAKA

10 DEC TO 19 DEC

Day 1 – 10 dec 2022.

SPOT 1

The spot is just after chamra airport.The name of the area is karadigudda. It is 820 meter from mean sea level (msl). The rock found here is Bevinmatti conglomerate belonging to kundargi formation of simikeri from From kaladgi basin of badami group. It is a paraconglomerate having 60 to 70% clast.the trend of the ridge is NW-SE ie. N120°.the size of the clast(quartz) in conglomerate is approx 1.5 cm. As we go at higher elevation in the same area, the clast size goes on decreasing. There were quartz clast were 0.2 to

0.5 cm. Some clast were angular and others were spherical. There is banding seen in lower elevation, conglomerate is matrix supported, having Ferruginous matrix and banding is also seen as we go higher in elevation, the conglomerate here is clast supported having Siliceous matrix. The thickness of bands is in mm and some in cm. There is exposure of alternate bands of

Ferruginous and Siliceous layers. This determines climate change. Also there is change in depositional environment.

Strike- N140° dipping northeast and the dip amount is 26.

SPOT 2

15°52’16” N, 74°37’4” E

The rock shows spheroidal weathering and exfoliation. the rock is basalt. There are many vesicles and fractures. The minerals in the rock cannot be identified because they are very fine and have undergone chemical weathering. It is deccan trap and there is presence of a non conformity.

Day 2- 11 dec 2022.

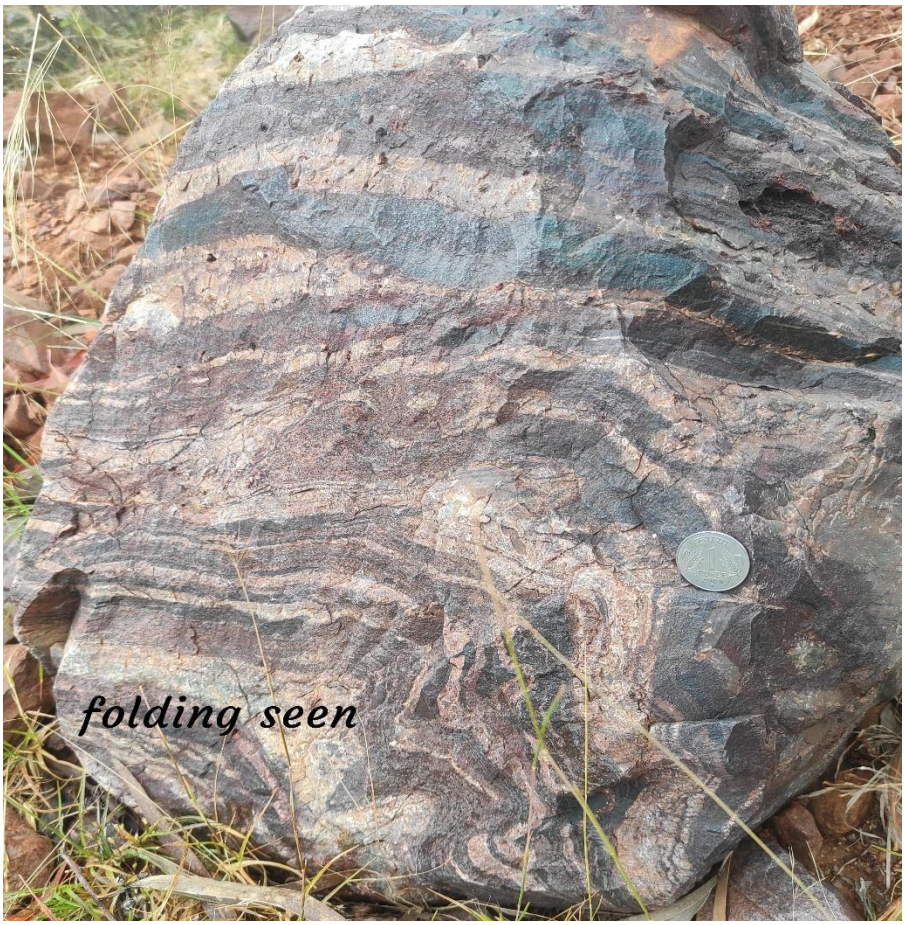
SPOT 1

16°5’31” N, 75°52’6” E

We went from kamatgi to ramtal. The rock found here belong to hungund schist belt, which is basement of kaladgi supergroup. It consist of metavolcanics , ultramafics, metamorphosed rocks, metasediments with acid volcanics and Greywackes with BIF. There were bands of ferruginous and dark minerals. Folding was also observed in the insitu rock.

SPOT 2

1-2 metre away from spot 1. The rock shows effervescence to HCl, this indicates that there is presence of $CaCO_3$ deposits. There are Crenulations seen. There is class 3 folds and also there is class 1B folds. Crenulation



hinge lineation displays lineation. XY is the foliation plane and YZ is the lineation plane. Also there are microfaults. Warping is seen near faults.

SPOT 3

It is 10 metre away from spot 2. The rock present is phyllite having a steep surface dipping NE.

Strike-163° dipping NE and dip amount is 76.

Strike-166° dipping NE and dip amount is 67.

There is also a slight curvature which is shallower dipping on the other side ie. SW

strike-143° dipping SW and dip amount is 40.

The rock is foliated. There was a plunging fold present. The plunging is in the trend is N333 and plunge on dip surface is 10.

The readings on limb of fold is –

Strike- N321° and the dip amount is 36.

Strike- N150° and the dip amount is 35.

Strike- N114° and the dip amount is 50.

SPOT 4

The rock found here is BHQ. There are 2 events of folding seen. Axial plane on one fold is parallel to the layer, Sn parallel to axial plane. Sn+1 is the intrafolial plane, Sn is the fold. It has a spaced fabric.

SPOT 5

The height of the rock exposure from msl is 600 m. On toposheet it is located at 47P16.The rock present here is conglomerate with BHQ and it belongs to kaladgi basin. imbrication is seen in BHQ. it is salgundi conglomerate. the

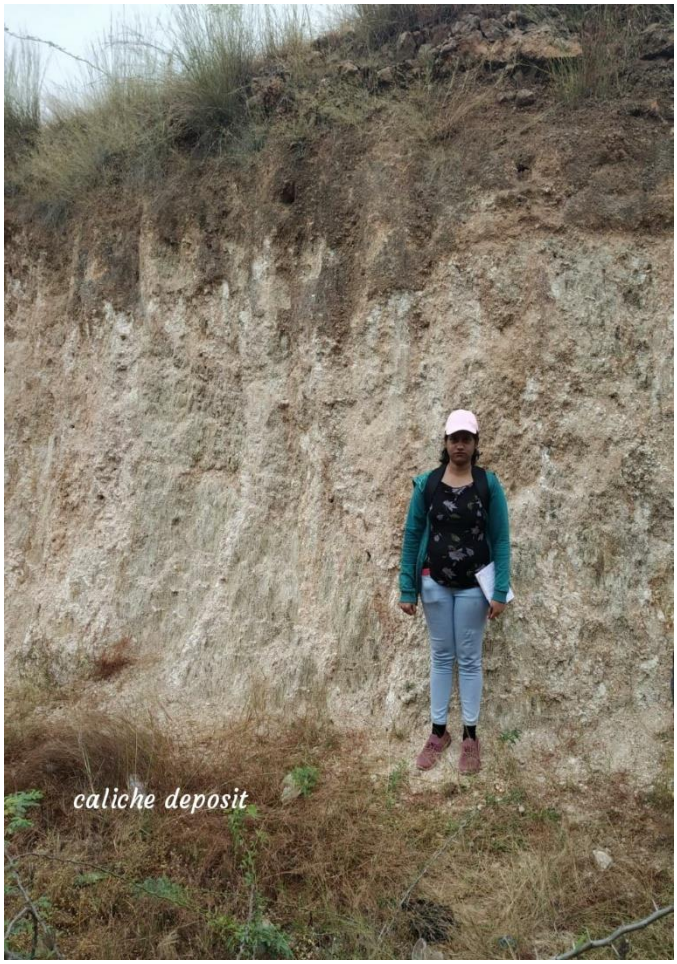
clast size is 5 to 7 cm but it may vary in size. the clast contains jasper, quartzite, BHQ. There are many fractures present. Unconformity is seen between hungund schist belt and salgundi conglomerate. There is a river malaprabha which has a meandering course.

SPOT 6

The rock exposed is ferruginous quartzite. It is exposed on the road cut section. It shows cross bedding and it is inclined. On the opposite side of the road we see same rock exposure which is moderately dipping. The trend is N301° dipping 36°NE and the amount of dip is 36.

SPOT 7

There is a cut section of caliche deposit. It shows effervescence. The mineral composition may be gypsum, quartz, clay, iron, chlorite, epidote to feldspar intermediate mineral, hemorphous $CaCO_3$, and amorphous $CaCO_3$. The rock is formed from metasediments. It is a dry formation having many thorny bushes.



SPOT 8

16°4’50” N, 75°52’11” E

It is 500 metres away from spot 7. The rock present is a ferruginous phyllite.

Strike- N335° dipping SW and dip amount is 62.

Strike- N350° dipping NW and dip amount is 64.

As we move forward, BHQ is seen which is steeply dipping almost vertical. It has many fractures. XY is the foliation plane. There is 1 set of cleavage. Folding is observed. There is intrafolial folds and warping of intrafolial folds. The hinge intersection readings are-

Strike- N270° dipping NE and dip amount is 14.

The plane readings at the end point of this exposure ie. If seen from the road then readings are taken at the right end of the rock exposure are-

Strike- N345° dipping NE and the dip amount is 79.

Strike- N330° dipping NE and the dip amount is 88.

The fold readings are-

Strike- N220° dipping NW and amount of dip is 34.

Strike- N306° dipping NE and amount of dip is 40.

Strike- N320° dipping NE and amount of dip is 74.

The age gap between day 1 and day 2 is 500 million years.

Day 3 – 12 dec 2022

SPOT 1

15°44’23” N , 75°22’27” E

The name of the village is Nargund. The rock found here is BHQ which is ferruginous.

Strike- N240° dipping due SW.

Foliation is seen. The foliation readings are as follows-

strike- N148° dipping SW and amount of dip is 76.

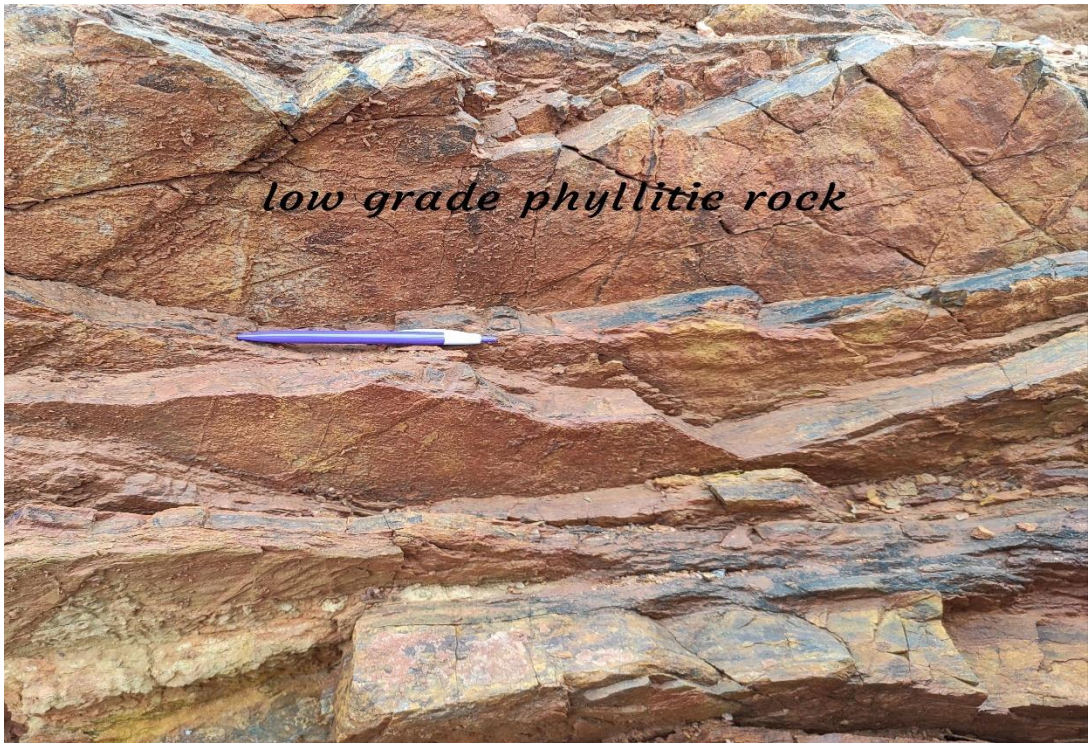
Strike- N150° dipping SW and amount of dip is 76.

Strike- N160° dipping SW and amount of dip is 76.

Strike- N168° dipping SW and amount of dip is 70.

There is a quartz vein parallel to foliation Which was intrusive at same time during BIF formation.

There was presence of phyllitic rock which belongs to low grade metamorphic rock of green schist facies. Quartz vein may have intruded later. There might



be deformation of rock and then the quartz vein was intruded. Lots of fluids were synchronous with deformation then quartz vein might have formed. The rock is Metapelitic ie. When sedimentary rock metamorphosis. Warping is also seen. There is a horizontal shear zone which is the reason for different strike readings. There are also joints present. The rock consist of proterozoic clastic sediments. It gives effervescence to Hcl. It is a phyllite Intercalated with BIF. Sn is the foliation which is most penetrative. Sn+1 is a spaced fabric where warping is seen ie. Shear zone plane. And Sn+2 is the new foliation seen. There is warping of earlier fabric w.r.t older fabric. There is no SC fabric. Sn-1 is the earlier foliation seen only in few places in the form of intrafolial fold. 1.5 cm is the width of quartz vein.

Strike- N155° dipping SW and amount of dip is 84.

Angular unconformity is observed. There layer of soil which is fine grain and weathered. The soil may have been formed at recent times or it may be a horizontal bed which is weathered that it looks like soil. Recent deposits can be formed if it deposited from higher elevation and then they got aaccumulated. It is not a part of kaladgi proterozoic deposits. No graded bedding. Quartz vein is vertical or steeply dipping and then it turns horizontal or shallow dipping. It may be a erosional surface or slumping. Clay , chlorite and other low grade minerals may be susceptible to weathering due to fluids. Foliation is observed, where Sn foliation is curving and quartz vein is folded.

The foliation readings are as follows-

Strike- N145° dipping SW and dip amount is 65.

Strike- N150° dipping SW and dip amount is 46.

Strike- N150° dipping SW and dip amount is 84.

SPOT 2

15°44’23”N , 75°22’25”E .

We climbed Nargund hill, Nargund lake was also seen. At the top of ridge also called Nargund ridge we saw wind mills used for many purposes like electricity generation. Then we saw the rock quartzite having joints.

1’st joint set- the trend is N297°

2’nd joint set- the trend is N235°

The trend of quartzite is 174° dipping South.

The quartzite shows ripple marks, Herringbone structure and also many potholes are seen. These quartzites are the kaladgi basin rocks.

Day 4- 13 dec 2022

SPOT 1

16°0’47” N , 75°53’04”E.

The name of the area is Aihole. The rock exposure is 1km away from famous heritage site. It is a road side exposure. The rocks on one side are inclined and on the other side it is horizontal. There are breccia and conglomerate present. The place is badami. The inclined rock belongs to Bagalkot group and the horizontal rock belongs to badami group which is seperated by an angular unconformity.

The readings on inclined surface which belongs to bagalkot rocks.

Strike-125° dipping SSW and dip amount is 38.

Strike-118° dipping SSW and dip amount is 35.

Strike-116° dipping SW and dip amount is 37.

Strike-124° dipping SSW and dip amount is 35.

It is a expansive outcrop at the south side of the road. there is exposure of pinkish quartzite with Intercalation of BIF clast. There are many

Intraformational conglomerate and breccia present. They strikes N120° and dips moderately N38°.The clast present is quartz, jasper, BHQ, and chert. The size of clast vary. Quartz having size 2-3 cm and chert having clast size 6 to 7 cm. There is a ferruginous quartzite present having cross bedding and has laminations ie. Layers of white and red layers are seen. The breccia has bigger clast size wheras conglomerate has smaller clast size. The layered clast is the BIF which is elongated with angular clast since they break along plane. Jasper, quartz are the rounded clast.

SPOT 2

16°0’50”N, 75°53’7”E .

This is the the rock exposure on the north side of the rock. The rock exposed here is horizontal to sub horizontal. It belongs to badami group of rocks.

SPOT 3

16°5’34”N , 75°46’57”E.

The name of the area is shirur. There is 1 thrust fault, rest mat be normal faults. The faults are shallow dipping. Striations are present on fault plane. There are Slickenslides. No conjugate joints seen. There is a secondary mineral precipitation. The reverse fault follows andersons theory of faulting. The rock present is Intraformational conglomerate. Thera are no fault indicators next to breccia since high shear stress is required for faulting. Lineation is observed.

Strike- N111° dipping N and dip amount is 60.

The fault plane reading is 88°N.

Surface lineation is seen on fault plane. And there are orthogonal joints present.

The joint set reading is for joint set 1 it is 150°N and for joint set 2 it is 125°N

Day 5- 14 dec 2022

SPOT 1

16°3’22”N, 75°56’43”E.

The place name is amingad. The rock exposure is granite. It is coarse grained having composition of quartz, alkali feldspar, biotite, hornblende. On left side there is unaltered granite and on the right side there is a shear zone so there may be alteration.

Joint set readings.

Strike-201°N dipping 116°E ie. ESE and the dip amount is 33.

There is a shear plane and the mineral clast on the right side is aligned in the direction SSE. There is a xenolith in the granite which may be some magic mineral. The clast size increases from bottom to the top. The length of xenolith is approx. 10.5 cm and the width is approx. 7 cm and the xenolith is angular in shape. It is a accidental xenolith.

SPOT 2

As we climb up we see conglomerate Intercalated with quartzite. And the clast is more rich in BIF.

Strike- 129°N dipping NE and dip amount is 19.

Strike- 125°N dipping NE and dip amount is 14.

As we climb higher we may get argillite Or breccia.

SPOT 3

16°04’08”N , 76°03’03”E

The rock belongs to hungund schist belt. The BIF iron concentration is more. It is 809 metres above msl. It is present behind high school, near social welfare department. The rock here is phyllite.

Readings on front side

Strike- 130°N dipping NE and dip amount is 65.

Strike- 331°N dipping NE and dip amount is 59.

Reading on top region

Strike- 310°N dipping NNE and dip amount is 90.

As we go from bottom to top the dip changes. It is shallow dipping at bottom and steeply dipping almost vertical at the top. So this indicates there is folding and bedding plane represent fold limb. Quartz vein is Overcutting.

Strike- 143°N dip amount is 85.

Strike- 140°N dip amount is 85.

There is a intrafolial lens structure which is overprinted by penetrating fabric. There is shear lenses preserved structure of basement rock. Sn Is the schist belt, intrafolial fold is the sn-1. There is a decrease of dip of hundund schist belt and increase in dip of kaladgi intrafolial fold. The joint set is perpendicular to the schist belt. There is a foliation plane seen along with presence of shear or a fault. White and black layer shows an offset and has a brecciated surface which is indicator of a fault.There is a fold lens seen and bedding plane is the fold limb.

Day 6 – 15 dec 2022

SPOT 1

16°20’26” N, 75°36’41”E

The name of the area is bilagi. The rock present is grey granite, which is of coarse grain size having composition of quartz, feldspar, biotite and it is Leucocratic. There is xenolith present. Also Pegmatite veins with high feldspar content is also seen. The Pegmatite vein has composition of quartz, feldspar and hornblende. The granite and hornblende vary in size.

The vein readings are -

1) N62°E
2) N55°E
3) N62°E

The xenolith components cannot be identified, since it is very fine grain bt it may be some mafic mineral. The composition of xenolith is pyroxene and hornblende. The xenolith has length of 32 cm and width of 21 cm. It is an accidental xenolith. There are joints present. The joint set readings are –

1) N80°E
2) N64°E

Sheeted joints are seen. There are many potholes. The location shows Exposure of basement granite overlain by more of badami rocks. There is clospet granite. The essential minerals are quartz , feldspar and accessory mineral is hornblende, biotite. The granite is greyish in colour. There are some exfoliation joints. The readings of vein on another rock exposure is –

1) N211°
2) N205°

The vein curves further.There is a domical structure and veins on both side. There is weathering and erosion on the surface. There are cross cutting veins observed. The joint reading on this rock is N135°. grey granite has low alkali feldspar than quartz and has plagioclase that is na rich. The pink Pegmatite has more than 60% of alkali feldspar. There might be some pink mineral (Orthoclase), there is no alignment of minerals. There is Recrystallization in granite , so it means that the granite is deformed. The Pegmatite is not

deformed. The mafic mineral are less, so difficult to see foliation. The

Pegmatite is intrusive in granite. There are joints and faults in granite.

The geologic history – there was granite deposition followed by Recrystallization. Then a Pegmatite vein intruded And then there was faulting which affects the rock and veins. There is Recrystallization but there is no change in mineral composition. Some xenoliths are elongated. There is orientation also observed. The trend of xenolith is N73°.the white colour mineral(quartz) is restricted to elongated xenolith. The fault has dextral shear sense. There are parallel joints seen. The thickness of the vein is 17 cm.the xenolith has black mineral(hornblende) which is elongated and White mineral(quartz) is not elongated.

There are 3 types of xenoliths present

1.the one where hornblende is alligned surrounding the quartz crystal

2.the granitic material present in xenolith. It is also called as restite xenolith.

3.xenolith within a xenolith. It has a ring structur . the trend is 76°N .

SPOT 2

16°20’14”N , 75°36’43.8”E

The area is bilagi , it is 200 meter from spot 1. The trend of the plane is

Strike- 40°N dipping SSE and dip amount is 12.

It is a sedimentary rock ie. Quartzite. The bedding plane readings are

Strike- 75°N dipping S and dip amount is 5.

Strike- 90°N dipping S and dip amount is 10.

Strike- 76°N dipping SSE and dip amount is 9.

Strike- 72°N dipping SSE and dip amount is 11.

The joint trends in the direction 76°N . This is a quarry area. The rock exposed is quartzite. It is opposite to mahadev temple. There is layering in rock. So bedding is observed.

SPOT 3

The rock exposure is behind government high grade college. There is a

Intraformational conglomerate seen. Graded bedding is observed. Clast in conglomerate are large. It is a syndepositional sedimentary structure. There are pink and buff colour layers showing cross bedding. The composition of the rock is quartzitic . It is an oligomictic conglomerate. The clast size is approximately 7 to 9 cm in size.

Day 7- 16 dec 2022

SPOT 1

16°5’22” N, 75°48’21”E.

The area of rock exposure is budanagad. It is a road side exposure. The rock found here was jointed and fractured. The rock is quartzite which is inclined. The joint set are perpendicular to the bedding plane. There are 2 joint sets. The joint readings are -

1. N36°
2. N220°

The rock is highly fractured. There may be offset/fault which are difficult to observe. The strike is similar but dip is different for joint set on different planes. There are many veins present. The trend of quartz vein is N55° . The vein is 8 cm to 15 cm. The vein can be as small as 1 cm too. There are various vein set. Some veins are cross cutting. there is an Orthogonal vein set. There are various vein structure. Some are coarse or elongated mineral, looks like teeth and the growth of the mineral. The elongation is perpendicular to the wall that is called as comb structure. Cross bedding is observed. The rock may be formed by Hydrothermal solution. There is continuation of fault zones. It is a brecciated rock/ fractured rock. The fault present at this location is continuity of shirur fault zone. There are some veins formed by extension called the gash vein. And there is a vein formed by interlocking called the comb texture. The comb structure vein is trend in N42°. There are some vein set and one of the vein has 12 cm offset. The vein set readings are

For vein set 1- 1) N46° and 2) N49°

For vein set 2- 1) N131° and 2) N136°

There are total 11 veins seen which vary in thickness.

SPOT 2

N 16°5’10”, E 75°48’48”.

This region is 200 m away from spot 1. The rock is granite. The granite is deformed and it is insitu rock so No readings can be taken.

SPOT 3

N16°5’7” , E75°48’47”

This spot is few metres away from spot 2 . The rock here is a weathered granite. There is quartz vein present. The thickness of quartz vein varies. Some veins are curving. Joints are also seen. The quartz vein intrudes the joints. The joint trends in the direction N310° dipping NNE and dip amount is 70 . The foliation plane reading is-

Strike- 270°N dipping N and dip amount is 43.

There is offset seen in one vein due to intrusion of another vein. There is a dextral shear sense. The thickness of the vein vary approximately 1 to 1.5 cm and 3 cm to 4cm. There is Crenulation seen.

SPOT 4

N16°5’8” , E75°48’48”.

The rock is granite overlain by quartzite. There are large xenoliths present. Also there are many veins present. There is a biotite schist present. This rock exhibits Schistosity. There is foliation seen and the granite intruded into the rock. The foliation reading is-

Strike- N 305° dipping NE and dip amount is 42.

As we go above we found Quartzite which had coarse grain size and there was no weathering. It was an Unaltered rock.

SPOT 5

N16°2’6” , E75°45’26”.

The area is Murudi. The rock found here is conglomerate having clast of BIF, jasper and quartz. The rock shows cross bedding. There is a unlined canal seen with no water. There is sandstone, conglomerate and quartzite. Herringbone structure is seen. The white sandstone belongs to badami rocks and pure sandstone and quartzite are from bagalkot rocks. There is a angular unconformity between them. The rock is formed between syndepositional structure. There are curved joints called as turtle back joints.

SPOT 6

N16°4’28” , E75°42’9”.

The rock is phyllite which is showing folding. The area is kelawadi.

Quarry was also seen.

Day 8- 17 dec 2022

SPOT 1

N16°7’29”, E75°35’46”

The location is kagalgomb which is 10 km from bagalkot. The rock is milky white quartzite. It is white coloured, highly fractured, no cleavage, SiO_2, concoidal fracture, extensional cracks perpendicular to the tensional cracks. Radiating quartz is present. Mineralization of secondary minerals in cracks. There are joints seen trending in N54°.veins are observed in quartz. The width of the vein is approximately 4.5cm. The length of vein is approximately 40 to 50 metre. Quartz got fractured and then veins were filled. The rock exposed on Upper part of shallow hill consist of non foliated, compact mineral, which is less then 0.1 mm grain size. It is translucent mineral which has white, vitreous lustre and most importantly concoidal fracture. There are orthogonal joint sets, joints are there along fractures. As we move up there is foliation seen indicating deformation event. There are hexagonal crystals of quartz seen.

The readings of road side exposure are

1. Strike-92°N dipping SSW and dip amount is 41.
2. Strike-109°N dipping SSW and dip amount is 42.
3. Strike-99°N dipping SSW and dip amount is 33.
4. Strike-105°N dipping SSW and dip amount is 44.
5. Strike-93°N dipping SSW and dip amount is 45.
6. Strike-105°N dipping SSW and dip amount is 46.
7. Strike-94°N dipping SSW and dip amount is 45.
8. Strike-110°N dipping SSW and dip amount is 45.

SPOT 2

N16°6’23” , E75°39’13” .

The is lokapur dolomite mine in sulikeri near badami. The trend is N102°.

SPOT 3

N16°03’19”, E75°38’45”.

The rock exposed here is called as konkankoppa limestone. It gives effervescence to Hcl. The plane readings are –

Strike-96°N dipping SSW and dip amount is 4.

Strike-96°N dipping SSW and dip amount is 1.

Strike-90°N dipping SSW and dip amount is 4.

Strike-110°N dipping SSW and dip amount is 5.

There are many joints observed in the direction N194° . Also potholes are observed.

SPOT 4

N16°1’14” , E75°38’58”.

The exposure is on the road side and the outcrop is expanded along the river side. The rock is halkurki shale which shows lamination. The readings on bedding plane are-

Strike-121°N dipping SSW and dip amount is 35.

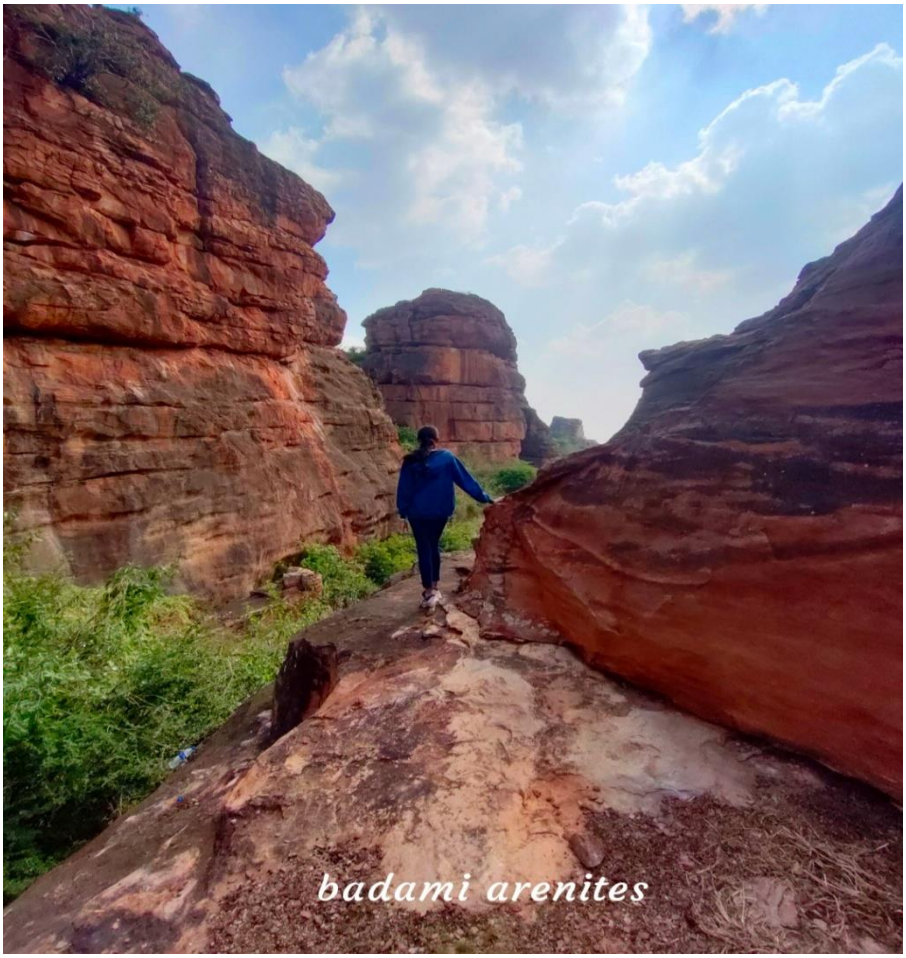
Strike-210°N dipping SSW and dip amount is 5.

Strike-154°N dipping SSW and dip amount is 6.

The shale is made up of clay mineral, Kaolinite, illite, pentonite, montmorilonite and these are too fine to be identified in field. The clay size is 1/256 mm. It is not identified properly even under microscope. Halkurki shales belong to badami group. It is Neoproterozoic in age. Lamination with different colours is seen. There is no metamorphism and it has shallow dipping plane, slaty Cleavage is due to metamorphism. Halkurki shale is also called as argillite. There is a very gentle warp seen.

SPOT 5

The location is badami. Here we see sandstones having quartz and feldspar. These are Arenaceous sandstone also called as badami arenites. There is presence of bedding, joints and also fractures.



Day 9- 18 dec 2022

SPOT 1

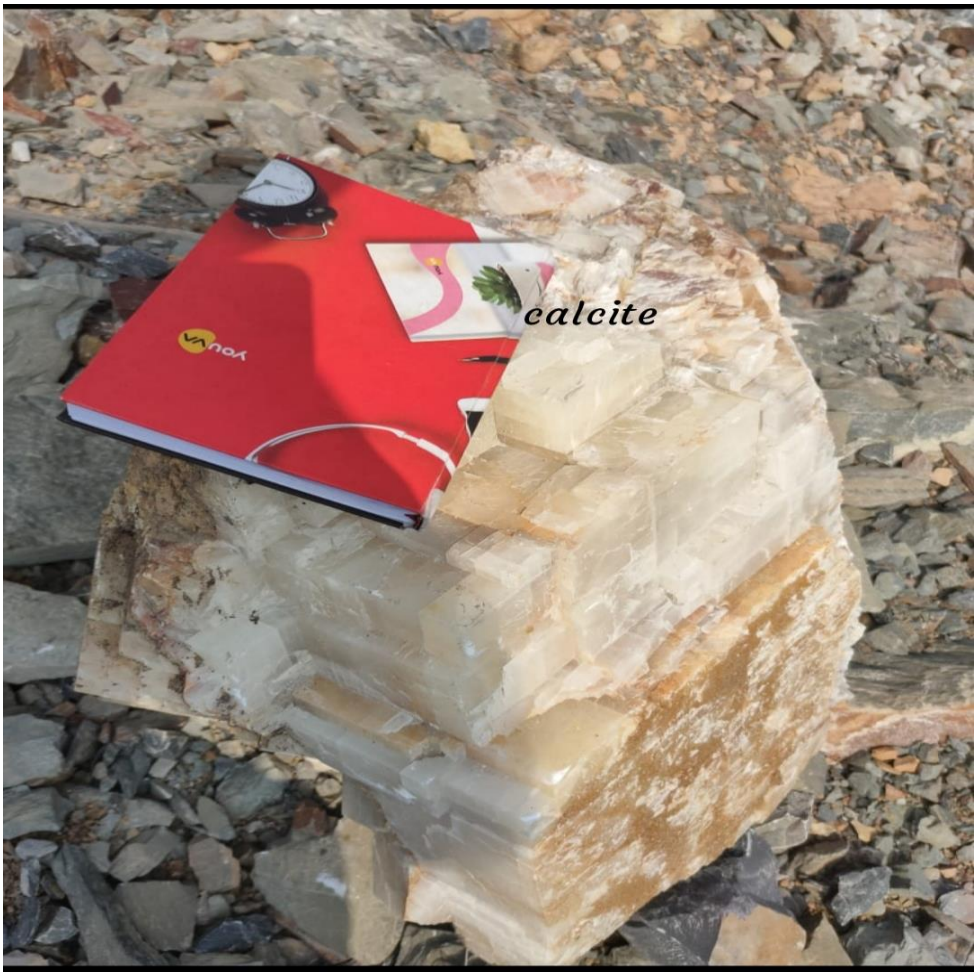
Latlong- 16°10’04” N, 75°21’32” E.

The area name is naganapur. The rock exposure is towards the south side of the road. There is high deformation with penetrative foliation. It is similar to the dolomites of kagalgomb with steeply dipping beds based on the structural data of beds. The rock is dolomite. Calcite was also seen.

Strike-121°N dipping SSW and dip amount is 75.

Strike-120°N dipping SSW and dip amount is 71.

Strike-125°N dipping SSW and dip amount is 71.



SPOT 2

Latlong- 19°09’58” N, 75°23’31”E

limestone mine

It is lokapur limestone mining site. It is in jalikatti which Is 1 km from lokapur . The rock reacts with the HCL and are stromatolitic limestone that are the results of the biogenic activity and the chemical precipitation. These are found in shallow marine basin. The sinusoidal patterns formed because of the depositional feature and these are the bio-stratigraphic Indicators. This is chiksellikere limestone from yendigeri formation of the lokapur subgroup.

Day 10- 19 dec 2022

SPOT 1

Latlong- 16°19’52” N , 75°53’17” E

Almatti dam is a part of upper Krishna project . it is a multi purpose project mainly for irrigation purpose, for drinking and industrial water supply. it is also used for power generation. it includes construction of 2 times in the Krishna river. Almatti is the one dam and narayanpur is this second dam. the reservoir capacity is 123 TMC .water disputes are going between andhra pradesh telangana and karnataka. This dam contributes 60% water to the irrigation of Karnataka. the power generation is 290 megawatt. The dam consists of stoll and embankment, hence it is a mixed dam. the foundation was made in 1964 by Lal bahadur shastri, he started the project and completed in 2000 which was inaugurated by the president Abdul kalam in 2006. when the dam was constructed 180 villages got submerged and 2,00,000 families got rehabilitated but the compensation for the land was given. From 6 turbines water is supplied which gives 50 megawatts each. Lift irrigation is the irrigation where there is water is lifted and moved to the canal. radial gates which are controlled by the power centre. to construct this dam clearance from environmental ministry was taken and also EIA. Catchment area is all ridge point, when water collects to the dam. command is water stored utilised in downstream dam. the first stone was laid in 22 June 1964 .on 15th July all the gates go open till 15th August. height of the river is 519 metres above msl and top of the dam is 528 metres .the area of dam is 487 square kilometre and the budget for the dam was 50,000 crores . 4,00,000 hectare land was used for irrigation . bird conservation was also done . It is a Central Asian flyway migratory route for migratory birds .

Spot 2

Latlong**-** 16°20’28” N, 75°55’34” E.

The area is kashinakunti . The rock is Migmatite. There was melting of TTG gneiss.there are many veins and cross cutting veins are also present. There are 2 joint sets and the trends are 1.N147° and 2.N215°.there was displacement was vein due to intrusion of other vein. faults are also present. There is banded gneiss, pink granite, grey granite, Pegmatite vein, black rock and white granite. The oldest rock is the dark coloured rock, which is of archean age . There are folds present. The initial mafic crest was there. Then

a rock intruded forming mineral segregation layer. Then folding of layers. The white granite then intrudes . The grey granite cuts across all folded gneissic bonding. Then pink granite is intruded. And Pegmatite is the youngest of all. The basement is clospet granite, gneiss and hungund schist belt. And lokapur is the oldest group.