GEOLOGICAL

FIELD TRIP REPORT

OF BAGALKOT,

KARNATAKA.

BY

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(Roll Number – 22P045002O)

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ABSTRACT

The Report focuses about the geological study area of the Field Trip at Bagalkot, Karnataka.The Bagalkot District lies in the north-Central part of the Karnataka. The District is surrounded by the Belgaum district to the west, Bijapur district and Kalaburagi district to the nrth and northeast, Raichur district to the east and koppal district, Gadag district and Dharwar district to thesouth-east, south and south-west respectively. The Bhagalkot District covers an area around 6593 Km2 and at the approximate elevation of 524m. It is densely populated and most of the land is under cultivation.This region experiences tropical monsoon type climate, during summer season with the extreme hot and a wider period for the monsoon. It has hot and dry climatic condition. Eastward draining perennial rivers and their tributaries drain this region. River Krishna flows along the northern boundary of this basin. Ghatprabha and Malprabha are its right bank tributaries, which drain the Kaladgi Basin. In addition, the upper reaches of the left bank tributaries of the river Tungabhadra have their sources in the southwestern parts of this region.The work carried out was sampling the rock, measuring attitude and trend of the outcrops. All these observations were carried out to establish stratigraphic sequence of the field area, to deduce the geological history of the area, to recognise deformational structures and to classify the rocks present in the area.

The Indian State of Karnataka is located between 11°30' North and 18°30' North latitudes and between 74° East and 78°30' East longitude.It is situated on a tableland where the Western Ghats and Eastern Ghats converge into the complex, in the western part of the Deccan Peninsular region of India. The State is bounded by Maharashtra and Goa States in the north and northwest; by the Lakshadweep Sea in the west; by Kerala in the south-west and Tamil Nadu in the south and south-east, Andhra Pradesh in the south-east and east and Telangana in the north-east. Karnataka extends to about 850 km (530 mi) from north to south and about 450 km (280 mi) from east to west.

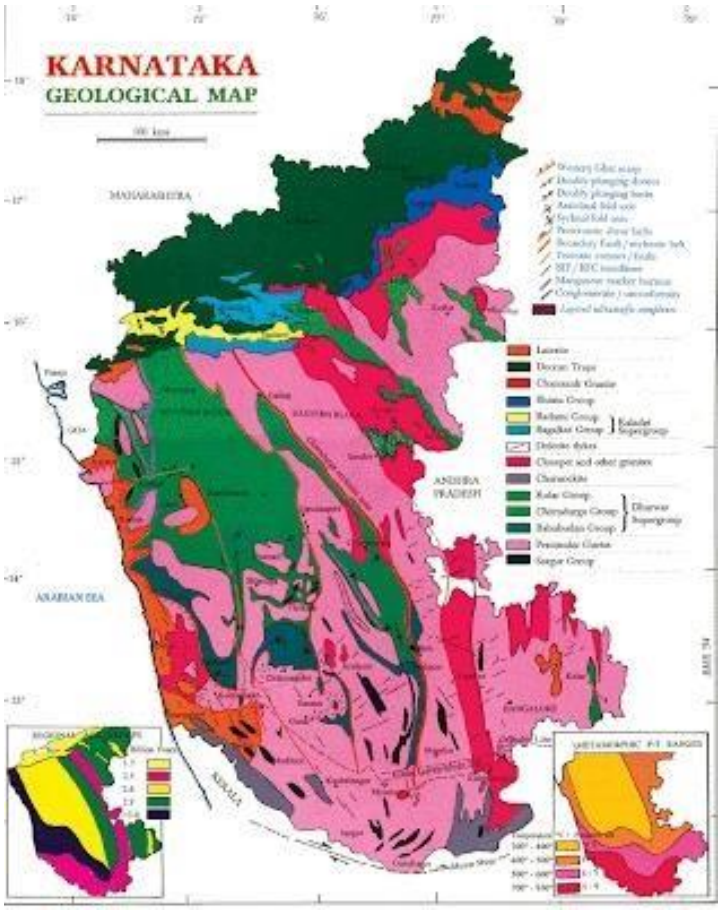

Fig 1 GEOLOGICAL MAP OF KARNATAKA

Karnataka is situated in the Deccan Plateau and is bordered by the Arabian Sea to the west, Goa to the northwest, Maharashtra to the north, Andhra Pradesh to the southeast and east, Telangana to the east, Tamil Nadu to the south and southeast, and Kerala to the southwest. It is situated at the angle where the Western Ghats and Eastern Ghats of South India converge into the Nilgiri hills. The highest point in Karnataka

is the Mullayanagiri hill in Chikkamagaluru district which has an altitude of 1,929 metres (6,329 ft) above sea level.

Geology and stratigraphy

Kaladgi Supergroup of rocks are exposed over an area of 8,300 km2 in North Karnataka defining an E-W trending irregular shape of Kaladgi Basin.They are comparatively least disturbed shallow marine sediments, deposited over the eroded basement of rocks of gneisses schist and granites of Archaean age. The original classification scheme by Foote (1876) has undergone several modifications. Jayaprakash et al. (1987) and it is divided it into the lower Bagalkot and upper Badami Groups.The former was divided into the Lokapur and the Simikeri Subgroups on the basis of succession of strata and an intervening disconformity between them.

With accordance to the status of the Supergroup sequence, Badami Group overlies both the sediments of the Bagalkot Group as well as basement granitoids with a distinct angular unconformity and is marked by the presence of conglomerate horizon.This Group includes two formations, i.e. Kerur Formation and Katageri Formation.Kerur Formation consists of three members, viz. Kendur conglomerate,Cave Temple arenite and Halgeri shale. Type exposures of Badami Group are seen on either side of Badami town forming a chain of picturesque landscape extending from Gajendragad in the east to Gotak in the west. In the study area Kerur Formation with its lower two members, namely Kendur conglomerate and Cave Temple arenite rest unconformably over the basement rocks consisting of quartz-chlorite-sericite schist/meta-basic rock of Chitradurga Group.

They comprise coarser clastics of conglomerate and arenite trending EW with 10° to 20° dip towards North. The stratigraphic sequence .Here the unconformity surface is obscured by thick soil cover and a thin veneer of Deccan basalt towards south, studies have identified three litho units, with distinct lithological characters. They are lower conglomerate and quartz arenite, A thin unit of basal arenite sandwiched between lower conglomerate and schistose basement rocks is encountered only in the boreholes.

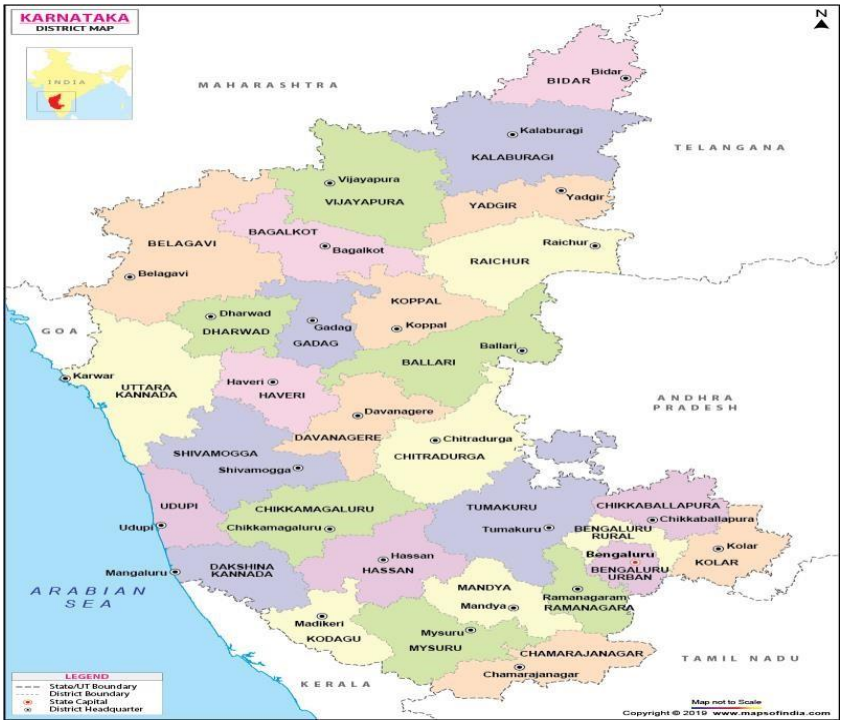

Fig 2:Map of Karnataka

Fig 3:Lithostratigraphy of the Kaladgi Supergroup (after Jayaprakash et al., 1987

Age	Group	Sub-group	Formation	Member	Thickness in meter
Neoproterozoic	Badami Group		Katageri Formation	Konkankoppa Limestone Halkurki Shale Belikhindi Arenite	85 69 39
			Kerur Formation	Halgeri Shale Cave Temple Arenite Kendur Conglomerate	3 89 3
~~Angular Unconformity~~~~~~~~~~~~~~~~~~~~					
		Semiri Sub-group	Hoskatti Formation	Mallapur Intrusive Dadanhatti Argillite	76 95
			Arlikatti Formation	Lakshnhatti Dolomite Keralmatti Hematite Schist Niralkeri Chert-breccia	87 42 39
			Kundargi Formation	Govindkoppa Argillite Muchkundi Quartzite Bevinmatti Conglomerate	80 182 15
~~Disconformity~~~~~~~~~~~~~~~~~~~~					
Paleo-Mesoproterozoic	Bagalkot Group	Lokapur Sub-group	Yadhalli Formation	Argillite	58
			Muddapur Formation	Bamanbudnal Dolomite Petlur Limestone Jalikatti Argillite	402 121 43
			Yendigeri Formation	Naganur Dolomite Chiksellikere Limestone Hebbal Argillite	93 93 166
			Yargatti Formation	Chitrabhanukot Dolomite Muttalgeri Argillite Mahakut chert-breccia	218 502 133
			Ramdurg Formation	Manoli Argillite Saundatti Quartzite Salgundi Conglomerate	61 383 31
	~~Nonconformity~~~~~~~~~~~~~~~~~~~~				
Archaean	Granitoids, gneisses and metasediments				

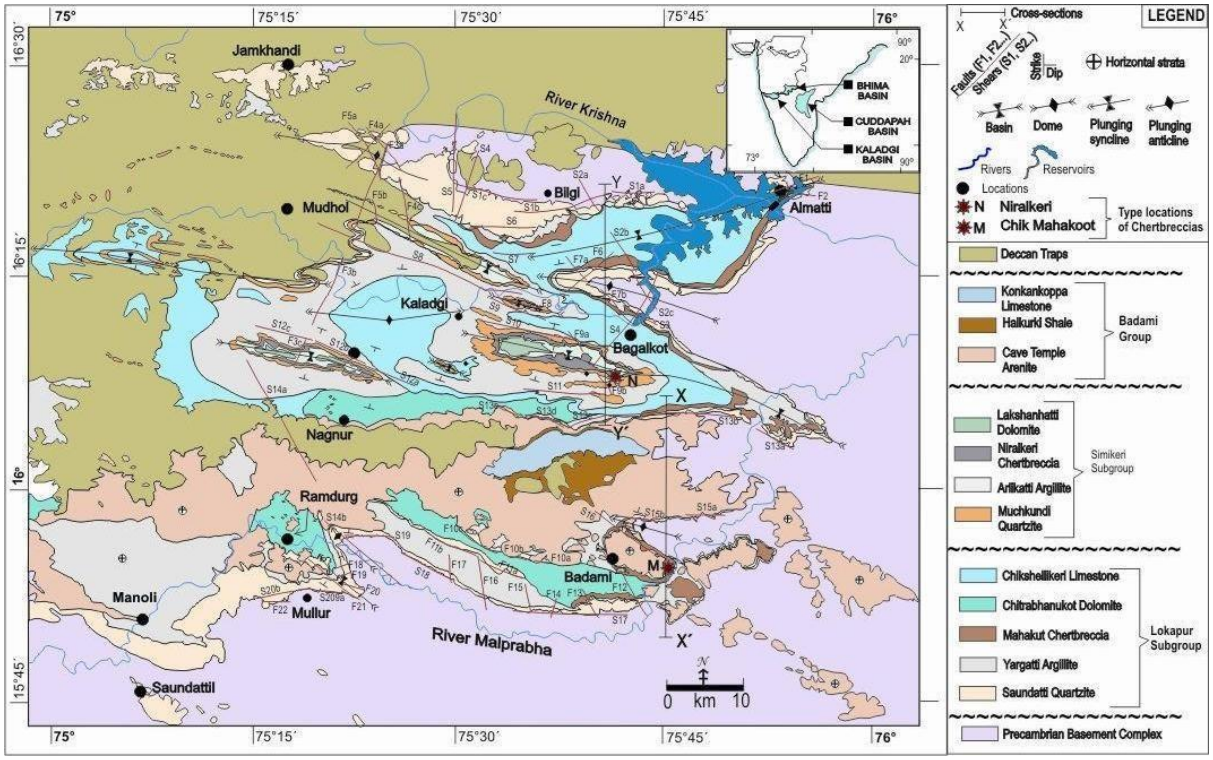

Fig 4 GEOLOGICAL MAP OF BAGALKOT

DAY 1

Date :10/12/2021

Approach:On 10 December 2022,we left around 9am from Kadamba Bus, Panjim bus stand from there we headed to Belgaum the journey was so nice through the road by enjoying the nature,A local bus hired for entire Karnataka journey the journey on that bus was a new experience in my life. On the way to Bagalkot we stopped at few spot observe and study the lithology.

Spot 1:

Location: Karidigudda , near Soman Airport)
Lat : 15°52'37"N
Long: 74°41'49"E

The rock beds are exposed over a hill with a moderate slope and are extensively physically weathered. The rocks at the base are texturally clastic with the spherical grain morphology and compositionally constituting with the minerals quartz and jasper.The rock is identified as a Bevinmatti conglomerate. Bevinmatti conglomerate marks the disconformity between the Lokapur Subgroup and the Simikeri subgroup of the Bagalkot Group of the kaladgi formation.It is observed that the size of the clast of the conglomerate increases as one traverse from down to up of the slope and also the grade from clast supported to the matrix supported increases towards upwards. Conglomerate exhibiting graded bedding structure (Fig.) At the upper part of the slope,
Bevinmatti conglomerate is grading into the Muchkundi Quartzite of Kundargi Formation of the Simikeri Subgroup

Fig.3 A)Siliceous conglomerate,2 rupee coin as a reference.
(B) Graded bedding is prominently seen,15 cm scale as a reference.

Spot 2:

Location: Karadiguddi (5-6 kms from spot 1) at the highway

Lat: N15°52'37"N
Long: 74°49'49"E

The rocks at the exposed site have undergone through spheroidal type of weathering and exhibits exfoliation. These rocks are igneous rocks which are texturally fine grain, equigranular, holocrystalline and structurally vesicular but very small amount of the vesicles are filled by the secondary mineral zeolites and shows Amygdaloidal structure.

Colour index is Melanocratic. The rock is classified as mafic volcanic igneous rock and named as Basalts. These Basaltic lava flows usually known as the Deccan traps of
Sahyadri group of cretaceous-Eocene age. (Kale, 2020). At this site the Basalts are surrounded by the older rock beds i.e. Deccan traps are being surrounded by the kaladgi basin forming the outlier structure.

Fig 4.Spheroidal weathering of basalt, a pen as a reference.

Day 2

Date :11/12/2022

Spot 1

Location:Ramthal

Lat:16°25'78"N Long:
75°50'88" E

The basement here is Hungund Schist belt of Archean age consist of metavolcanic with ultramafic metamorphosed, metasediments with some acid volcanic, greywackes with BIF and conglomerate. Competent layers that is of quartzite are forming class 1B type of folds and incompetent ferrugenous layer is forming class 3 folds. Crenulation hinge lineation and microfaults are also present. Phyllite are also present, but they are steeply dipping due NE. Structural data is as follows;

Strike Direction	Amount of Dip	Dip direction
N163°	76°	NE
N166°	67°	NE

The BHQ and phyllite show folding. S_n & S_{n+1} are visible,Sn is parallel to the axial plane and Sn+1 is the Intrafolial fabric Intrafolial folds are present in BHQ indicating two events of folding.Taking a plunge was difficult for these folds.

Spot 2

Location: 5 m away from spot 1

Conglomerates are exposed above the basement rock of BHQ and phyllite and clast were of BHQ the clast size vary from 10-17 cm in length and approximately 9cm in width.

Fig 6:cross section of A thick layer of conglomerate,20cm notebook as a reference.

Spot 3

Location

Lat: 16˚14’54’’ N

Long:75˚39’45"E

Ferrugenous quartzite are present on either side of the road having a strike direction of N301° and moderate amount of dip of 36 ° due NE. These are Saundatti quartzites. Structural data is as follows;

Strike Direction	Amount of Dip	Dip Direction
N301°	36°	NE
N285°	36°	NE

Spot 4
Location: 200 m away from spot 1

Lat:16°75'86"N
Long:75°62'60" E

The exposed rock is a sedimentary rock that is a hardened natural cement of calcium carbonate that has binded other minerals such as quartz and pebble. This is a Caliche and this unconsolidated rock is due to the leaching of the overlying rocks.

Spot 5
Location:500m away from spot 4

Lat: 16°4’53” N
Long:75°52’29”E

Exposure of BHQ and phyllite are present. BHQ beds were inclined and qere dipping due NE in most of the place at one place the direction of dip changed

to SW ,data of same is plotted on stereonet.BHQ also shows intrafolial folds and there is presence of slumping taking place in phyllite due to removal of overburden.

Hinge data is as follows:

Strike Direction	Amount of Dip	Dip Direction
N40°(left limb)	34°	NW
N306°(Hinge)	40°	NE
N320°(right limb)	74°	NE

Structural data of Beds of BHQ is as follows;

Strike Direction	Amount of Dip	Dip Direction
N334°	78°	NE
N326°	80°	NE
N332°	86°	NE
N338°	80°	SW
N325°	65°	NE
N315°	85°	NE

Fig : Intrafolial folds in BHQ

DAY 3

Date:12/12/2022

Spot 1:
Location:Nargund

Lat: 15°44’23”N
Long: 75°22’28”E

The rock seen are phyllite intercalated with BHQ. It is a metamorphic rock which can be inferred due to presence of foliation and alignment of minerals due to amount of stress present. Low grade metamorphism has taken place.
As we take reading from left to right there is some variations in the amount of dip.Quartz veins are parallel to foliation plane, formed before or same time of the formation of rock,or formed when deformation of the rock took place (synchronus).If the quarts is intruding in one direction, then there should be presence of fold.Shear zone is present, wherein warping has taken place just outside the shear zone. S_n fabric is present sub vertically, S_{n+1} fabric is present almost horizontal and is a spaced fabric and S_{n-1} fabric is also inclined and are not penetrative at all,oblitarated and bit curved. Within the shear zone there is alignment of minerals. Pinch and swell is also noticed in a pellatic layer of quartz. The quartz vein is of thickness of 0.8cm and shows Sinistral faulting The structural data is as follows:

Strike Direction	Amount of Dip	Dip Direction
N168°	85°	SW
N174°	84°	SW
N160°	76°	SW

Fig ;

Spot 2

Location: 20 m away from spot 1 in left direction

A thick bed of conglomerate is seen in the upper part of the cross section and just below is there are quartz vein and below that there are inclined beds. This conglomerate indicates an angular unconformity. These deposition are recent and not of Proterozoic age. Quartz vein approaches to be horizontal as we move upward in the cross section. Having structural data of ;

Strike Direction	Amount of Dip	Dip Direction
N153°	85°	SW
N150°	84°	SW

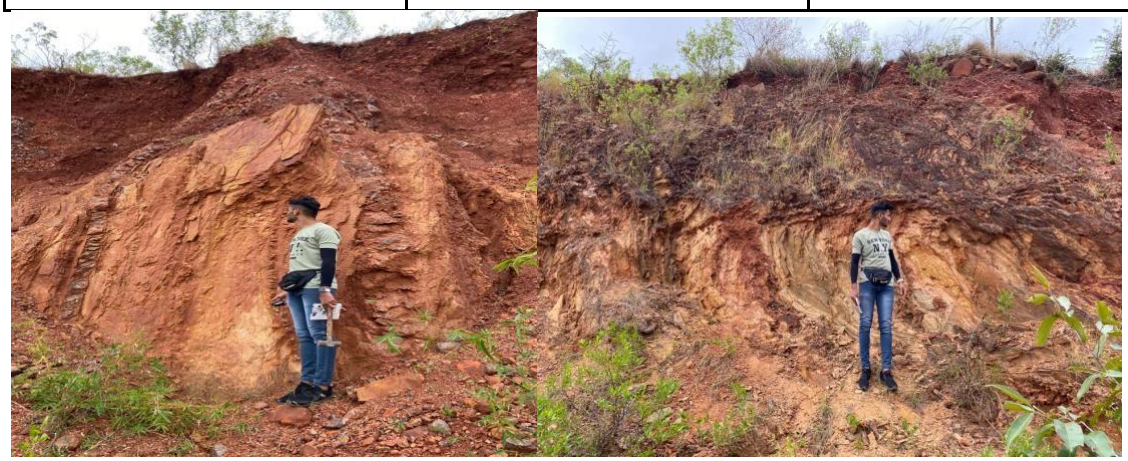

Fig ;Cross section of conglomerate layer ;reference man standing facing to North

Spot 3 Location:

Lat:
Long:

The rock exposed here are ferrugenous quartzite wherein siliceous grain is fused in ferrugenous matrix and the grain size is fine. These quartzite exhibits conjugate joint set trending in N225° and N252° and orthogonal joints too having a trend of N250° & N161°.It also shows herring bone structure.There is a presence of a ridge wherein as we move away from the ridge older sequence of beds are encountered indicating and inlier.

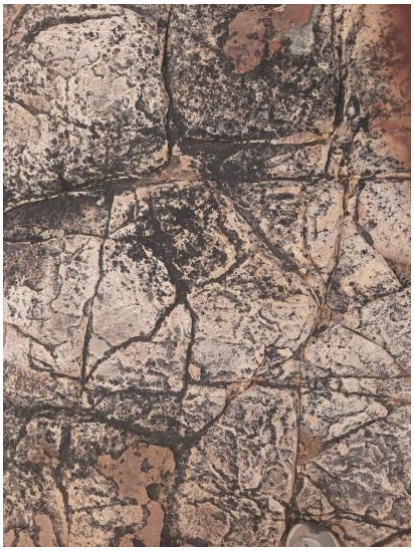

Fig : A) Conjugate joint set **B)** Outcrop of Quartzite.

DAY 4

Date:13/12/2022

Spot 1
Location: Aihole (½km from heritage temple)

Lat: 16°00'49" N
Long: 75°53'05" E

The rocks were on the either side of the road.The quartzites present on right side of the that is southern part as per the magnetic compass were inclined in nature.The rock shows well defined bedding junctions with alternate bands of ferrugenous and siliceous layers. There were intercalation of breccia and conglomerates. The clast size were ranging from coarse to very coarse and the compositionally it was of quartz, cryptocrystalline varieties of quartz.The were 7 intraformational conglomerate and width of it were more than 10cm.Cross bedding structures are prominently visible. Structural data of these inclined bedding junctions;

Strike Direction	Amount of Dip	Dip Direction
N117°	41°	SW
N120°	42°	SW
N125°	36°	SW

Fig A) Quartzite **B)**Intraformational conglomerate. (Scale;Climometer)

Spot 2
Location: The northern side of Spot 1

The region consist of a moderately dipping hill. The rock pink sandstone having lamination of off white and pink layer. The beds are horizontal. The indicates a presence of angular unconformity known as Badami and Bagalkot unconformity.

Spot 1
Location:Ramlingeshwar temple

Lat: 16°5'34"N
Long: 75°46'39"E

This is a moderately inclined hillock. At the base of the hill the exposed rocks are the clast arenaceous rock that is Sandstone which is majority composed of the clast of the coarse grain
sized sand and the ferruginous matrix. The sandstone is well rounded and well sorted. There are two prominent joint sets observed in the sandstones, the joint J1 J 2. It is the observed that the joint sets are perpendicular to each other.From the fault trace is been marked by the slickensides. It is the normal fault where the hanging wall has moved downward with respect to the foot wall.As the

traverse along the hill, it is observed that the grains of the sandstones are fused and turned into a Quartzite i.e Saundatti quartzite.
At the upper part of the hill it observed that the clast in the rocks are angular to sub-angular and Rudaceous in size cemented by the ferruginous matrix.These are the Mahakut Chert Breccia. This are high chert movement transitional breccia. The clast vary in lustre with the concohoidal fracture. is the entire fault zone in the area that has resulted into the angular breaking of the rock that has given rise to the Brecci

Fig : Striations on Quartzite (scale:a hammer)

DAY 5

Date:14/12/2022

Spot 1
Location:Amingad

Lat:16°03'22"N
Long: 75°56'43" E

- A prominent hill with lots of vegetation on it. The grain is coarse which composed of pink feldspar, biotite and quartz. No deformation event has taken place, since they do not show any preferred orientation .The rock contains a xenolith having a mafic mineralogy. The size of the xenolith vary from 8-10 cm. And they are of Archean age can be a part of supracrustal rocks. There are other accessory minerals in the granite like hornblend biotite. The name of the granite is Closepeth granite, it is one of the basement rock for Kaladgi basin.

Fig A) Pink granite (scale- a pen) **B)** Presence of Xenolith in Granite.

Spot 2

Latitude-16°30’32”N
Longitude-75°56’55”E
Location –Sunebhave

The area is a mountain with highest point 667m. The clast are intercalated with Quartzite , the clast consist of BHQ and Quartz but the amount of BHQ in this location is high as compared to Ramthal.
Data on the bedding plane.

STRIKE DIRECTION	DI5P DIRECTION	AMOUNT OF DIP
N115°	NNE	20°
N128°	NNE	19°
N116°	NNE	21°

Spot 3

Latitude-16°04’08”N
Longitude-76°03’33”E
Location –

The area is a mountain wich has been cut for the construction of road. The outcrop is a continuation of Hunbhum schist belt. There are alternate beds of phyllite and BHQ. At some places in the out crop we see shear lenses within in this lenses there are inter folial folds.As the schist belt is a basement for the kaladgis the change in the dip of the schist belt will tilt the Kaladgi sequence.

STRIKE DIRECTION	DIP DIRECTION	DIP AMOUNT
N125°	NNE	45°
N129°	NNE	55°

DAY 6

Spot 1

Latitude-16°20’25”N
Longitude-75°36’41”E
Location –Bilgi

The outcrop is a crystalline igneous rock, which is felsic in nature the body also has xenoliths which show a trend of N96°, the xenoliths are angular in nature and show alignment of minerals (Hornblend , Biotite & pyroxene)
The large body is gray granite with quartz and alkali feldspar. The body was intruded by Pegmatic veins. The pegmatite vein shows a fault indication
Tend of fault plane-N129° and has a throw of 10.5cm.

Fig : Xenolith within a Xenolith

SR NO	TREND OF VEINS
1	N62°
2	N45°
3	N52°
4	N62°

Spot 2

Latitude-16°20’14”N
Longitude-75°36’43”E
Location –Bilgi opposite to siddeshwar temple

Lithology – the outcrop shows white and red colour beds, the rock is a quartzite the change in colour is due to the presence of matrix, beds show current bedding and Harinebone
structure.

Strike direction	Dip direction	Amount of dip
N190°	SSE	6°
N114°	SSE	9°
N120°	SSE	10°

Spot 3
Latitude---16°20’29”N
Longitude-75°36’59”E

A dome shape hill with highest elevation of >550m and the outcrop exhibits a sedimentary sequence with a bed of oligomictic conglomerate (clast of quartz). There are graded bedding exposed of 1.2-1.5m thickness. Overlying this sequence is a Quartzite bed.

Strike direction	Dip direction	Amount of dip
N129°	SSW	14°
N135°	SSW	14°
N260°	SSW	10°
N91°	SSW	13°

Day 7 (Date-16/12/22)

Spot -1
Lattitude-16°05’47”N
Longitude-75°48’07

A red colour outcrops with fused grains and don’t show a well defined grain boundary this indicates that the rock has undergone metamorphism. The rock is a Quartzite. The rock had undergone brittle deformation which has created a joint set trending in N47°.the joints are localized in nature. In this joints sets gash veins are formed which trend in N55°.There are two generations of veins Older veins trend in N136° and younger trend in N55°.

Spot -2
Lattitude-16°05’10”N
Longitude-75°48’47”E
Location –

There are boulders of granite which have large porphyroclast of feldspar , the rock also has mafic xenoliths, the boulders are cross cut by gash veins , as the rocks are not insitu so we cannot comment on the age of veins and their trend.

Spot -3
Lattitude-16°05’10”N
Longitude-75°48’47”E
Location –

Lithology – the outcrop is of weathered granite showing alignment of minerals, this indicates that the rock was metamorphosed and the shear sense is given by the foliation.Shear sense looking south.There are 3 generation of veins the youngest one is parallel to the foliation.

Spot -4
Lattitude-16°05’09”N
Longitude-75°48’48”E
Location – 20-25m towards the west

Lithology – It is a restrict zone shown by granite and schistose rock with a coarse gain Hornblend granite in between this two rocks.The trend of the foliation is N210° .The granite is made up of feldspar, quartz and little of accessory minerals . Hornblend granite has large crystals of hornblend
The schistose rock contains mostly mafic minerals like pyroxene , hornblend and biotite.The mafic rock may have undergone partial melting and the felsic composition of the pre-exiting rock may have rose above.

Spot -5
Lattitude-16°02’06”N
Longitude-75°45’26”E
Location – Murdi Karnataka

A vast plane on the east side of the road while going. The beds of conglomerate whit clast of quartz and BHQ , this beds are gently dipping towards northeast, the roads are jointed and the trens is N90° & N126°Along the tunnel section there are sandstone beds

Day-8. (Date-17/12/22)

Spot -1
Lattitude-16°06’45”N
Longitude-75°35’23”E
Location –Kagalkomb

Lithology –the trend of the body is N100°, the body is localized in nature showing radial. joints due to blasting , width of the body is approximately 48m and the body is made up of milky quartz , which is a source for glass industry. This body has undergone brittle deformation therefore it has developed tensional fractures trending in N40°, N38°. To accommodate the tensional forces in the rock there are extensional fractures formed trending in N120°, N132°.In this tensional fractures gash veins are formed.

Spot -2
Lattitude-16°07’29”N
Longitude-75°35’46”E
Location –Kagalkomb below spot1.

Lithology – The beds are dipping on the either side of the road , this rocks are made up of dolomite. (Checked by HCl test).The series has a joint trending in N102°.
Data on bedding plane

Strike direction	Dip direction	Amount of dip
N102°	SSW	44°
N104°	SSW	45°
N100°	SSW	45°
N105°	SSW	44°

Spot -3
Lattitude-16°07’29”N
Longitude-75°35’46”E
Location –Sulikuri, Dolomite mine
Lithology- The rock mined is Dolomite; the trend of the mine pit is N100° , the bed shows similar characteristic to spot 2

Spot -4
Lattitude-16°03’19”N
Longitude-75°38’45”E
Location – Below the bridge at Konkankappa village.

Lithology-in the Badami group, Konkankappa limestone is the first formation . The exposed rock shows foliation and is composed of very fine grain minerals. Over the testing the rock with the HCL gives out higher effervescence. It is the Kokankoppa Limestone of the Katageri Formation. Since the bedrock is nearly horizontal it is the part of the Badami Group of rocks.

Strike Direction	Dip Direction	Dip amount
N104°	SSW	5°
N114°	SSW	4°
N106°	SSW	6°

Spot -5
Lattitude-16°01’19”N
Longitude-75°38’58”E
Location –

Lithology- shale is a deep water sedimentary rock with size of 1/256cm, type of clay are identified using XRD.On this location Harkurki Shale is exposed. Along the cannal which is dug. The shale shows a low angle dip .

Spot -6
Lattitude-15°56’18”N
Longitude-75°40’35”E
Location – Badami 1km behind HP petrol pump

The rock is Arenaceous with the framework of sand. It is composed of fine sized sand grains with the ferruginous and siliceous matrix. These are the huge exposure of the Cave Temple Arenites. This could be the result of sinking of the sandstone basin and the continuous deposition of the sandstone beds.

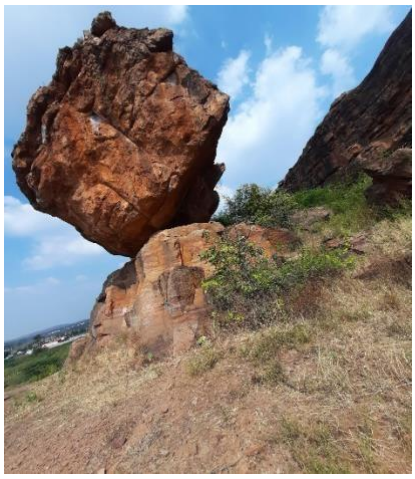

Fig- High exposures of the Temple Cave Arenites

Day-9 Date-18/12/22

Spot -1
Lattitude-16°10’04”N
Longitude-75°21’32”E
Location – Naganpur, on the left side of the road.

Topography-The spot is sparely vegetated, looks like a trace farm area. Lithology-there are intercalation between Limestone &Shale , this beds are steeply dipping. The Limestone beds host marks of Stromatolites; there are two distinct varieties of Stromatolites seen on this location. showed by the data given below.

Strike Direction	Dip Direction	Dip amount
N124°	SSW	72°
N121°	SSW	75°

Day-10 (Date-19/12/22)

Spot – 1
Lattitude-16°19’58”N
Longitude-75°53’09”E Location
–Almatti dam.
The Almatti dam was completed in July 2005, the height of the dam is 160m , having a capacity of 123.08Tmcft.the dam is partially made up of cement and partially of earth material. The foundation is in the basement of Kaladgi. The dam is built in a shallow valley.

Spot -2
Lattitude-16°20’28”N
Longitude-75°55’34”E
Location –

Lithology-In this formation there are 6 types of rocks with their characters are described below as follows

Beds	Characters
Pegmatite	It is the youngest. The rock is made up of feldspar and Quartz.
Pink granite	The rock is rich in Orthoclase feldspar crystals therefore it appears pink.
Grey Granite	It is grey in colour due to presence of mafic minerals
White Granite	Its is the purest granite in the region.
Gneiss	The band of the gneiss show banding, this might be a syntectonic activity as there is no brakeage in the rock.
Dark colour Mafic	It is the oldest rock

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