GOA UNIVERSITY

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AGTC-408

GEOLOGY FIELD REPORT

BAGALKOT, KARNATAKA

Submitted by:

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M.Sc. Part-I

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INTRODUCTION

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.

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 E-W 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

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

Age	Group	Subgroup	Formation	Member	Thickness (m)
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					
Paleo-Mesoproterozoic		Semiri Subgroup	Hoskatti Formation	Mallapur Intrusive Dadanhatti Argillite	7 695
			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				
	Bagalkot Group	Lokapur Subgroup	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				

DAY 1

Date – 10/12/2022

Approach: We left for the field work on 10th of december at 9am by Kadamba Bus from the Panjim Bus stand and we headed to Belgaum. On reaching to Belgaum, we continued our field work with the bus that we had hired for the further journey. On the way to Bagalkot we stopped at 2 spots to observe and study the lithology.

Spot 1:

Location: Karigudda

Lat: 15˚52'37'' N

Long: 74˚41'49''E

The exposure is on the left side of the road which is a ridge. The area is moderately vegetated. The rock seen here is conglomerate which is called the Bevinmatti conglomerate which is a part of Kundangiri formation of Semikeri Subgroup. As we move from the base to the top, the size of the clast decreases. The clast size at the base was aropung 1-5cm and at the top was 0.4-0.7cm. the clasts are of quartz and feldspar composition. At the base, the rock is more siliceous and as we go up, it becomes ferrugenous.

Fig 1(a): Conglomerate found at the base with larger clast size.

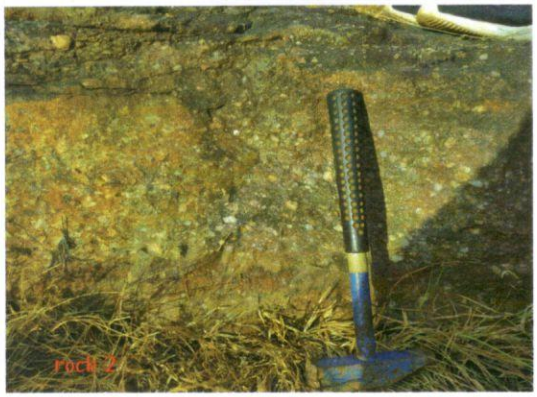

Fig1(b): conglomerate at the top with comparatively smaller clast size (hammer kept as scale).

Spot2:

Location: 4-5km from spot 1.

Lat: 15˚52'37''N
Long:74˚49'49''E

The next spot was just a few kms away gfrom the 1st spot on the right side of t5he highway and on a turn. Vegetation was same as that of earlier spot. The rock seen was also a conglomerate with a cobble size clast which are of basaltic composition which shows spheroidal weathering (exfoliation). The clast maybe of the Deccan traps.

Fig 1 (c): Spheroidal weathering of coble sized basalt clast.

Day 2:

Date:-11/12/22

Spot 1:
Location: Ramthal

Lat: 16°25'78''N
Long: 75°50'88''E

The basement is Hungund Schist belt made up of ultramafics, metavolcanics, metsediments with some acid volcanics and greywackes with BIFs and conglomerates. Competent layers which are of quartzite are forming class 1B type folds and incompetent ferruginous layer is forming class 3 folds. Phyllite are steeply dipping due NE.
The structural data is as follows:

Strike	133	152	148	157
Dip	76	39	20	70

Fig2(a): phyllite

Fig2(b): herringbone

Spot 2:
Lat: 16˚05'09''
Long:75˚52'30''

An exposure near the road was observed which was white in colour and was overlain by brown debris, the deposit showed effervescences on pouring of HCl acid indicating the presence of $CaCO_3$. The outcrop had caliche deposits.

Fig2(c): Caliche deposit

Day 3:

Date-12/12/22

Spot 1:
Location: Nargund

Lat:15°44'23''N
Long: 75°22'28''E

The location did not have much vegetation and it was maintained under government guidance. The rock that we observed was metamorphosed phyllite intercalated with BIF where there is a presence of foliation plane , reading along which was taken which are as follows:

Strike direction	Dip direction	Amount of Dip
150	SW	76
148	SW	79
168	SW	85

There was a quartz vein which intruded the weakly metamorphosed rock. Broad warp foliation could be seen.

Fig 3(a): Quartz vein

Spot 2:

Location: it was 50m away from the spot 1.
There is an unconformity which was observed of recent age. A layer of pebble sized clasts are a part of recent formation.
There are 3 deformation fabrics present at this spot:
Sn-1 : present at few places which is closed to obliterated
Sn : penetrative
Sn+1 : spaced fabric

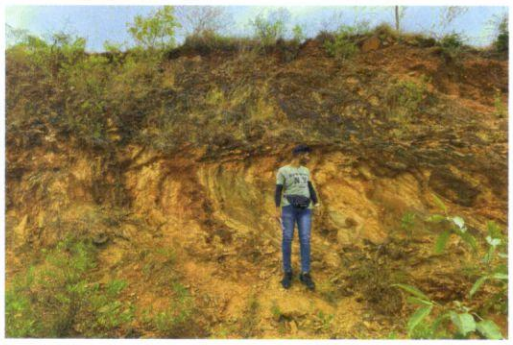

Fig 3(b): showing 3 deformation fabrics

Spot 3:
It was 600m above sea level. The outcrop was massive of about 60m and it exposed numerous joint sets (conjugate and orthogonal joint sets). The rock exposed was quartzite. Herringbone structures were also present.

Fig 3(c): joints

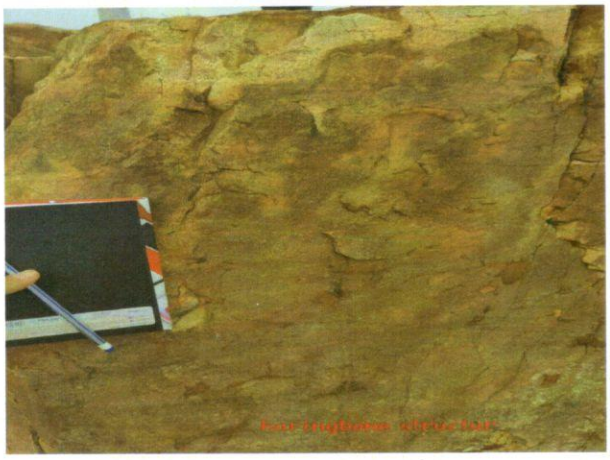

Fig 3(d): herringbone structure

Day 4:

Date-13/12/22

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

Lat: 16°1'48''N
Long:75°53'5''E

On the southern side of the road, the rocks are inclined and they belong to the Badami Group and on the northern side of the road, the beds are horizontal and the exposure is massive which is a part of Bagalkot group. The northern and the southern sides are marked by the Badami-Bagalkote angular uncon. The rock could be named as quartzite. The length of exposure was around 40m and width of around 15m. the quartzites have well defined bedding planes dipping SW by 38°. Cross bedding and colour lamination of red was also seen.

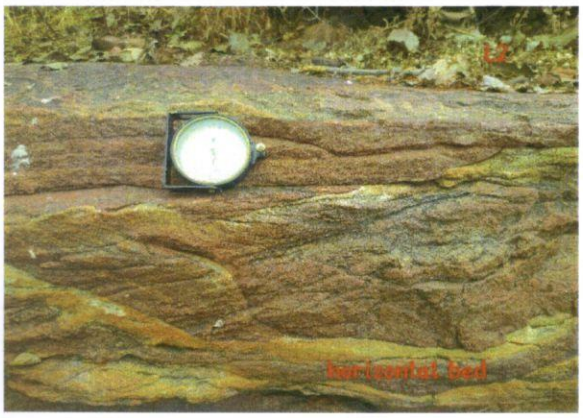

Fig.4(a)

Spot 2:
We visited the Heritage temple built in the early 8th century. The entire temple is made of sandstone.

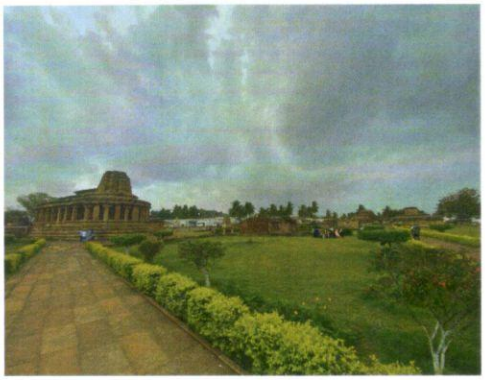

fig 4(b): heritage temple

Day 5:

Date-14/12/22

Spot 1:

Location: Rakkasagi
Lat: 16°3'22''N
Long: 75°57'7''E

The outcrop that we observed here was granite which was coarse grained and pinkish in color and has minerals such as quartz and feldspar (closepet granite). There was a xenolith present in the granite which was 6-7cm. the rock had not gone under any deformation.

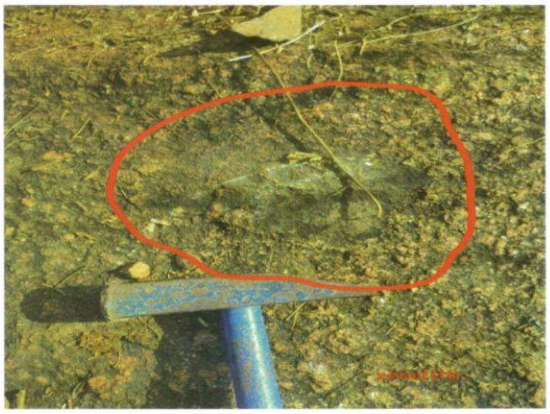

Fig.5(a): xenolith present.

At some distance there was the same granite present which showed alignment of mineral grains along with joint sets with trend of 145° and joint sets at N17°

Spot 2:

Lat: 16°3'32''
Long: 75°56'55''E

While climbing the hill, we found a contact of conglomerate intercalated with quartz clast and rich with BIF.

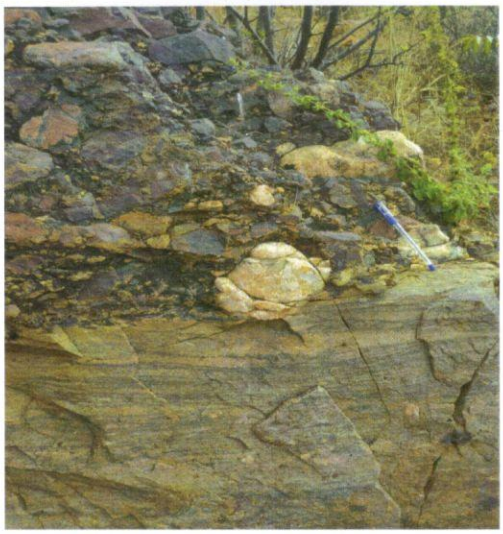
Fig.5 (b): contact of conglomerate.

Spot 3:

Location: Adarsha mahavidyala (behind the school)

Lat: 16˚4'8''N
Long:76˚3'33''E

This exposure was exposed behind a school which had phyllite and BIF present which had iron content more than Ramthal.

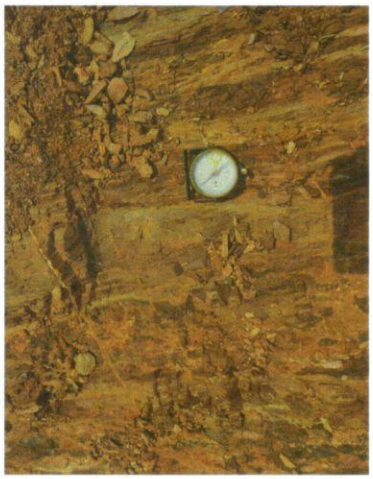
Fig.5(c): foliation plane

Reading of foliation plane:

Strike direction	Dip direction	Amount of dip
125˚	NNE	73
118˚	NNE	82

Quartz vein was cross cutting the rock indicating that it is younger than the rock.

Fig 5(d): quartz vein cross cutting.

Day 6:

Date- 15/12/22

Spot 1:

Location: Bilgi
Lat: 16˚20'43''N
Long:75˚37'2''
The rock observed was Closepet granite which was weakly foliated. It is the basement which is overlain by Badami rocks. It had felsic acidic minerals like orthoclase, biotite and quartz. The granite exhibited exfoliation joints and pegmatitic veins. Xenoliths were also observed of approximately 30cm. The composition of xenolith is mafic, but less of hornblende. It is medium grained. A rare type of xenolith was also found which was a xenolith within a xenolith which could be of restitic type.

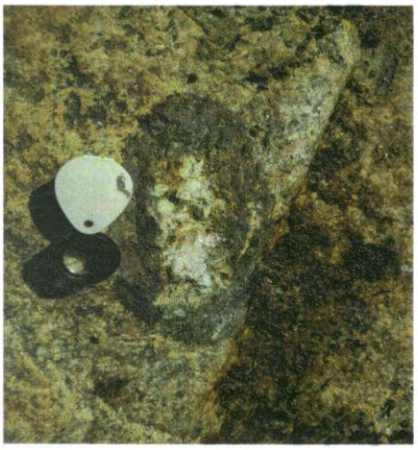
Fig.6 (a): Xenolith within a xenolith

Spot 2:

Location: Quary opposite to Siddeshwar temple
Lat:16˚33'72''
Long: 75˚36'50''

This location was about 100m away from location 1. It was an outcrop which had undergone low grade of metamorphism. It is a metamorphic rock with granulose texture. There are 2 prominent joint sets, one is along the bedding plane and the other one vertical across the bedding plane. The bed are horizontal and shows sedimentary structures like ripple marks and cross bedding.

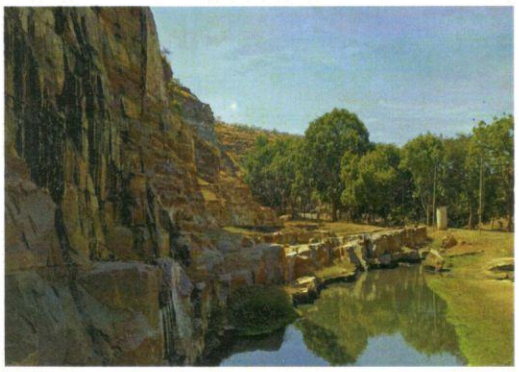

Fig.6(b): Quarry

Day 7:

Date-16/12/22

Spot 1:

Location:Shirur
Lat: 16˚05'47''N
Long :75˚48'7''E

The rock exposed here was highly fractured quartzite, pink in colour and having numerous joint sets- 2m or more in size. 2 sets were prominent, one was parallel to the bedding plane and the other was perpendicular. Orthogonal and conjugate joints were seen. Veins were also present of quartz.

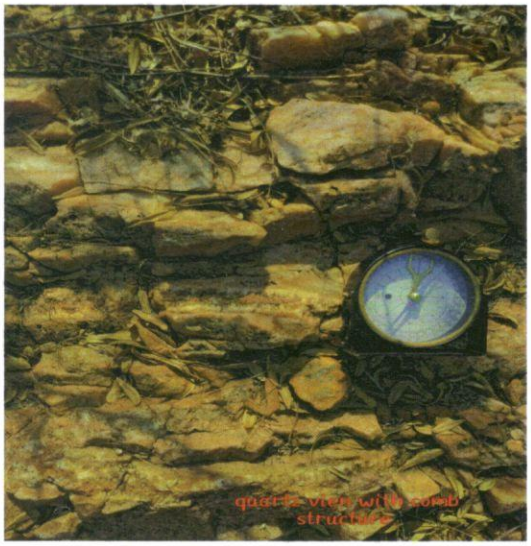

Fig 7(a): highly fractured quartzite.

Spot 2:

This spot was around 50m away from spot 1. There was crosscutting of veins made of quartz. There were many veins present at this location.

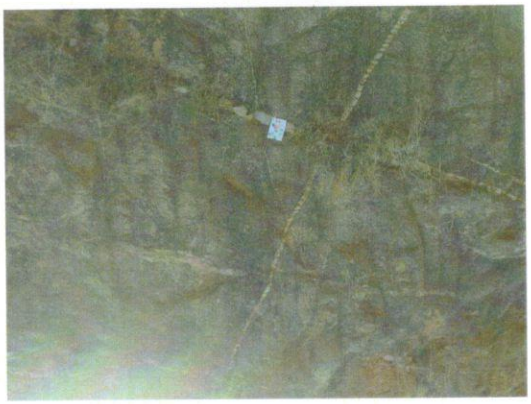

Fig 7(b): quartz veins.

Spot 3:

This spot was 500m from the spot 2 . There was a lot of vegetation around the rock exposure. The rock exposed here is pink granite which was not foliated where as the other rock had schistosity which was the biotite schist. The granite intruded the biotite schist. The granite was rich in hornblende.

Spot 4:

Lat: 16˚02'06''

Long: 75˚45'26''

This spot was next to the highway. The vegetation here was sparse. The exposure was of quartzite and joints and fractures were also observed. Joints were trending N180˚. In the same area we could see white sandstone.

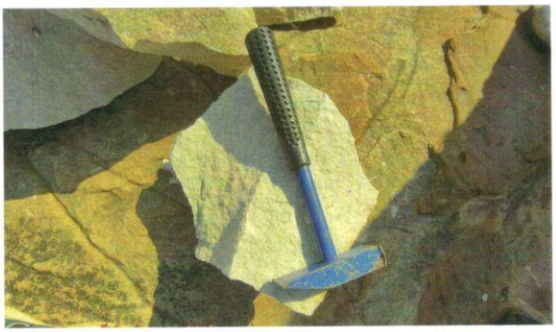

Fig 7 (c): white sandstone

Spot 5:

Location: Niralkeri- around 5km away from previous spot.

Lat: 16˚04'28''

Long: 75˚42'10''

At this outcrop, red coloured phyllites were observed which indicates that they are ferruginous. Folds were present. The beds were dipping in the SSE direction. The data is as follows:

Strike direction	Dip direction	Amount of dip
N85˚	NNW	20˚
N93˚	N	23˚
N103˚	S	19˚
N145˚	S	23˚

Day 8:

Date-17/12/22

Spot 1:

Location : Kagalkom
Lat: 16°6'51''
Long: 75°38'24''

The outcrop observed here is E-W trending of 40-50m and it was a quartz exposure. It was highly fractured and is white in colour. There has been extensive deformation that has taken place. Radial joints were observed and also tensional cracks were seen. Comb structures were also observed. Gash veins present here had a trend of N112°.

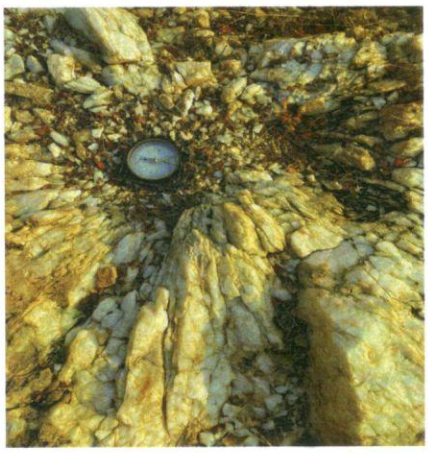

Fig 8(a): radial joints

Fig 8 (b): comb structure

Fig8(c):tensional cracks

Spot 2:

Location : Sulikeri mine

Lat: 16˚6’33’’N

Long:75˚38’47’’E

This location is a dolomite mine having a trend of N102˚

Spot 3:

Location: konkankappa village

Lat : 16˚03’19’’N

Long :75˚38’45’’E

The rock exposed her is konkankappa limestone. The strike and dip data recorded are as follows:

Strike direction	Dip direction	Amount of dip
104˚	SE	4˚
81˚	SE	4˚

Strike direction	Dip direction	Amount of dip
85°	SE	4°
70°	SE	3°

Spot 3:

Lat : 16°01'13''N

Long :75°38'57''E

The exposure here has alternating bands of brown and white which is known as the Halkurki shale.

Day 9:

Date -18/12/22

Spot 1:

Lat: 16˚10'4''N
Long: 75˚21'32"E

The rocks exposed here are impure limestone. It was marly limestone as silica was [present. Stromatolites were seen at this location which weren't penetrative and were deformed. They had a trend of N116˚. Shale and limestone were also observed. They were steeply dipping.
Strike and dip data are as follows:

Strike direction	Amount of dip
N118˚	72˚
N120˚	70˚

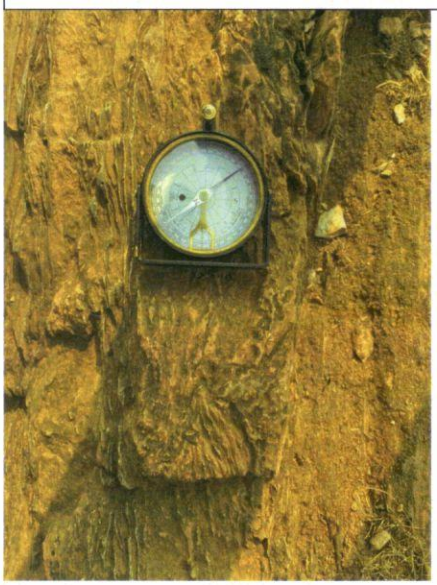

Fig 9 (a): stromatolites

Spot 2:
Rudreshwar temple
Lat : 16˚11'58''N
Long: 75˚18'12''E

Day 10:

Date- 19/12/22

Spot 1:

Location : Almatti Dam

The Lal Bahadur Shastri Dam is also known as Almatti Dam is a multi-purpose hydroelectric project on the Krishna River in North Karnataka, India which was completed in July 2005. The target annual electric output of the dam is 560 MU (or GWh). The Almatti Dam is the main reservoir of the Upper Krishna Irrigation Project; the 290 MW power station is located on the right side of the Almatti Dam. The facility uses vertical Kaplan turbines: five 55MW generators and one 15MW generator. Water is released in to the Narayanpur reservoir after using for power generation to serve the downstream irrigation needs. The irrigation purpose project provides water for industrial purpose, drinking as well as for power generation. The full reservoir level of Almatti dam was originally 160 meters MSL but then the Krishna River conflict between Andhra Pradesh, Karnataka, and Maharashtra was resolved by the Brijesh Kumar Tribunal and the dam was authorized to be raised to the height of 524 meters MSL with nearly 200 TMC gross storage capacity 26 different Radial spillway gates are housed in the Dam.

Spot 2:

Lat :16°20'29"N

Long :75°55'34"E

This location is can be easily reached as it right next to the road. It is a huge body of igneous origin which is migmatite. Its trend recorded

was N306˚, N48˚ and N58˚. Rocks seen here are pink granite, banded gneiss, grey granite and pegmatite vein (coarse grain) being the youngest of all rocks. Minor faults and also xenoliths were seen here. The pegmatite veins found here may not be of the same age.
The pegmatite is the youngest and is made up of quartz and feldspar. White granite is the purest form of granite in the region.

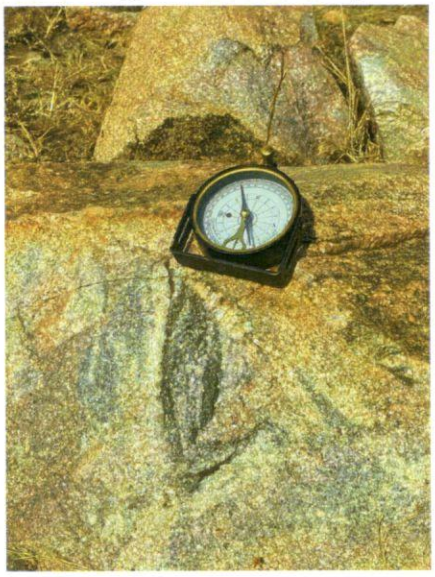

Fig 10 (a): concentration of dark coloured mineral