Field report- Bagalkot region

GOA UNIVERSITY
गोंय विद्यापीठ

Department of SEOAS

Name: Mohammad Kaif jamkhandi

Subject: Masters in Applied Geology

Part 2

Field Report on kaladgi-badami basin

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Content

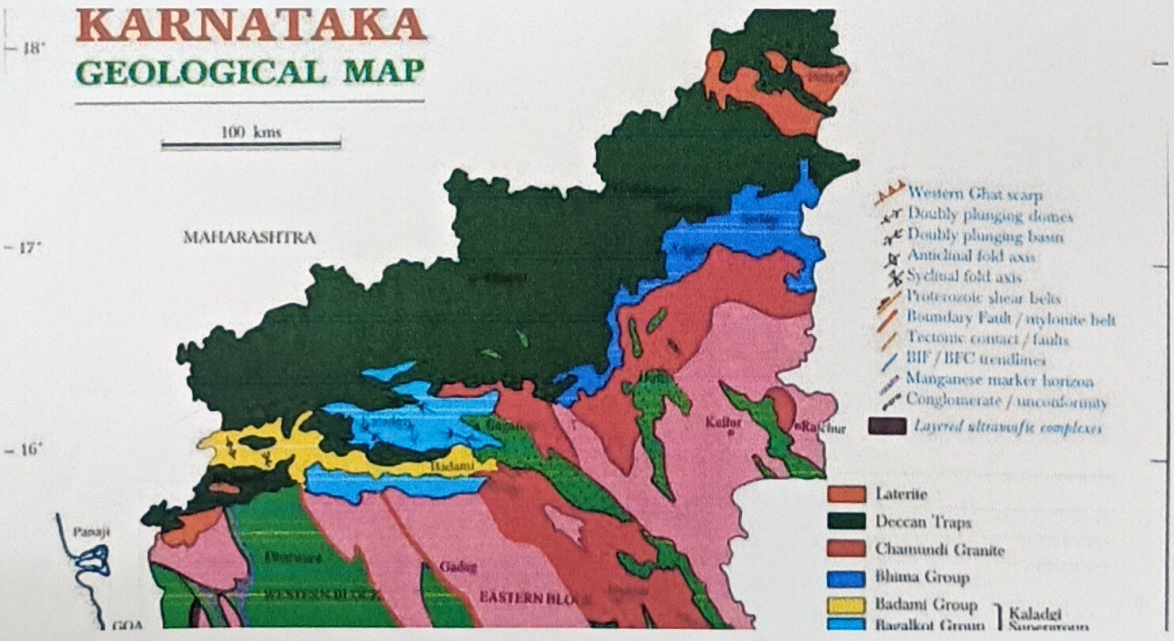
Acknowledgement

At every step, a geologist has to encounter Earth and Geology, rather be it at a construction site, a research project or personal hobby, which he has to decipher. So, it proves the importance of putting efforts in learning every little aspect of geological significance throughout the journey as a geology student. The trip was really fruitful to us, and certainly we got a lot of scientific knowledge about the Earth. I am very grateful to our lecturers Dr. Anthony veigas, Dr. Nicole Sequira and Dr. Poornima Sawant for sharing their geological field knowledge and cooperating with us during the field visit and helped make this possible. I would like to thank all our friends and other groups who cooperated kindly in team work. I would also like to thank my parents for providing financial and moral support for the long-distance trip.At last, I would like to my sincere gratitude to our college, Earth Science Department of Goa University.

INTRODUCTION

Introduction to geology of karnataka

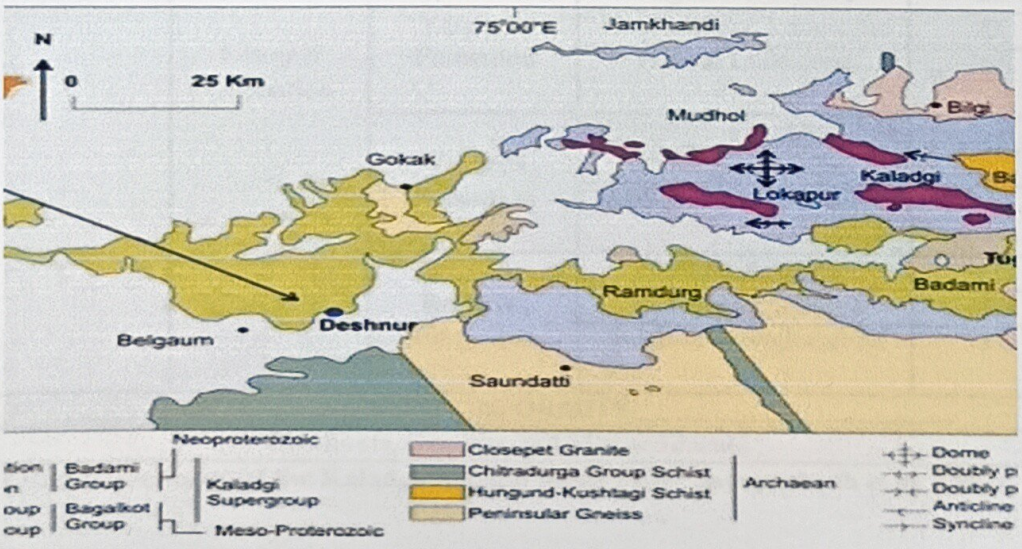
Geology of Karnataka is a fascinating subject. Oldest rocks exposed in Gorur area, Hassan district,Karnataka date back to about 3300 million years. The Precambrian craton of Karnataka is made up of western and eastern segments. The Precambrians of Karnataka have been divided into older Sargur supracrustals (about 3300- to 3000-million-year-old) and younger Dharwar supracrustals (about 3000- to 2600-million-year-old. The Dharwar supracrustals Supergroup has been further divided into older Bababudan Group (ca.3000 to 2700 million years) and younger Chitradurga Group (ca.2700 to 2500 million years). The schist belts of the Eastern craton, like Kolar, Hutti, Sandur etc., appear to be approximately equivalent to the Chitradurga Group.The Karnataka craton has been extensively intruded by granites and granitoids of the ca. age 2600 to 2500 million years. The eastern Karnataka abounds in these granites and granitoids. The northern part of Karnataka is made up of Kaladgi and Badami and Bhima Group of sediments, approximately of Proterozoic age. Further north the terrain is covered by extensive volcanic flows known as Deccan traps of Cretaceous -Tertiary age.



The state is drained by three major easterly flowing river systems, Manjira River of the Godavari basin in the north, Krishna draining the northern and central part and Cauvery draining the southern part.Most of the river courses are principally aligned in two directions, ENE-WSW to WNW-ESE and north-south to NNW-SSE, and corresponds 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.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.

Introduction to Geology of kaladgi basin

The Kaladgi basin is located in the northern fringes of the Dharwar Craton of South India. It is comparable to other Proterozoic 'Purana Basins' of Peninsular India in its shallow marine, pericratonic sedimentary sequences. It is the only Purana Basin that displays stronger deformation in its central parts than along the fringes. This deformation is restricted to the sedimentary succession of the Mesoproterozoic Bagalkot Group and is not observed in the younger Badami Group. Besides the axial zone post-depositional deformation and associated lower greenschist facies / anchi-zone metamorphism, the sediments of the Bagalkot Group also contain a significant record of syn-sedimentary deformation. These sediments display lateral and vertical sedimentological facies changes, well-exposed lithological contacts, as well as structural geological features. The Kaladgi basin is exposed between the longitudes 73^0 E and 76^0 E and the latitudes of 15^{0}30'N to 17^0 N. The contiguous exposures of these sediments, occurring in parts of the Belgaum, Bijapur and Bagalkot districts of Karnataka, from Almatti in the east to Ajra in the 8 west, across a distance of about 100 km in the E-W directions are commonly termed as the 'main basin'. Outliers of these sediments capping the Archean crystalline basement are scattered south of the main basin around Saundatti, Gajendragad and Nargund. Inliers of these sediments within the Deccan Traps are present near Jamkhandi in Bagalkot district of Karnataka, Kallamavdi in Kolhapur district and small isolated patchy exposures at Phonda, Malvan and Kankavli of Sindhudurg district of Maharashtra. Belguam, Bijapur, Hubli and Dharwar are major urban centres in this region with significant industrial and economic activities. Bagalkot is the largest town within this basin, followed in size by Saundatti, Gokak and Badami. Jamkhandi, Lokapur, Mudhol, Nargund, Ramdurg and Yargatti are smaller towns.



Lithostratigraphy of Kaladgi-badami basin

Group	Subgroup	Formation	Member	Thickness in metres
Badami Group (286 m)		Katageri Formation	Konkankappa Limestone	85
			Halkurki Shale	67
			Belikhindi Arenite	39
		Keru Formation	Halgeri Shale	3
			Cave Temple Arenites	89
			Kendur Conglomerate	3
----------ANGULAR UNCONFORMITY----------				
Bagalkot Group (3451m)	Simikeri Subgroup	Hoskatti Formation	Molapur Intrusive	7
			Dadanhatti Argillite	695
		Arlikatti Formation	Lakshnhatti Dolomite	87
			Keralmatti Hematite Schist	42
			Niralkeri Chert-Breccia	39
		Kundargi Formation	Govindkoppa Argillite	80
			Muchkundi Quartzite	182
			Bevinmatti Conglomerate	15
----------DISCONFORMITY----------				
	Lokapur Formation	Muddapur Formation	Bamanbudnal Dolomite	402
			Petlur Limestone	121
			Jalikatti Formation	43
		Yendigeri Formation	Naganur Dolomite	93
			Chiksellikere Limestone	93
			Hebbal Limestone	166
		Yargatti Formation	Chitrabhanukot Dolomite	218
			Muttalgeri Argillite	502
			Mahakut Chert-Breccia	133
		Ramdurg Formation	Manoli Argillite	61
			Saundatti Quartzite	383
			Salgundi Conglomerate	31
----------NONCONFORMITY----------				
Granitoids, Gneisses and Metasediments				

Lithostratigraphy of the Kaladgi-Badami Basin (after Jayaprakash et al. 1987)

Field Observation

Day 1 10/12/2022

(Location 1 N15o52'55.0 , 74o41'41.8''E)

The area is a semi-arid region with a gentle slope the rock is exposed on the slope with a trend of N280o, the vegetation in this region consists of tony bushes, grass, and shrubs. the exposed outcrop is on the roadside. The clast in the rock in fig:1 is 1.5 cm and the composition of the clast is milky quartz, the matrix is about 60% to 70%. In Fig.2 the conglomerate rock 2mt above the fig1 rock, conglomerate consists of a 2-2.7cm clast of feldspar and quartz and consist of a ferruginous layer. From the observation done on the field the clast size increase from down to the top of the ridge and as we move on top the matrix percentage changes along with the composition of the matrix changes from silicic to ferruginous.

Fig.no:01

Fig.no:02

Location 2 N15o52'37.3'' , 74o41'49.1''E

There was weathered clayey outcrop exposed on the foothill beside the road right side of the turn) There was basalt with a secondary mineral known as amygdales and the basalt shows spheroidal weathering shown in Fig.no:03. the outcrop also had many fractures, the basalt is a part of decan trap and is 66ma years old.

11/12/2022 Ramthal

Day 2 (Location 1 N16o05'09.4" , 75o52'30.2"E)

The rocks are exposed on the slope of the hill, the slope is moderate, the vegetation was the same as in location 1, and the area is the basement of Kaladgi, the rocks outcrop exposed are Metasediment, greywackes, BIF, mega volcanoes, and ultramafic. all this belongs to the Hunkung schist belt. The age of these rocks is mostly archean.The outcrop shown in fig.03 is the boundary of BIF and calcium deposit. Calcium deposit was confirmed by adding a few drops of acids which led to the effervescence. In fig.04 the rock which was not In situ showed folded structure and was identified as class 2 fold because of the thickness of the fold changes along the limbs.

There were bolder of Salgundi conglomerate which consists of Jasper grain 4.5 cm in size and BIF 13cm to 17cm in size the grains/clast show imbrication indicating paleocurrent direction

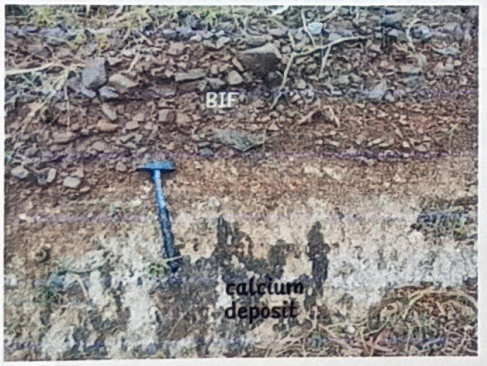


Fig.03

Fig.04

Location 2 :- N 16o04'52.6" , 75o52'30.3" E

An exposed outcrop near the road the outcrop is off-white in color and was overlain by brown debris the calcic deposit showed effervescences on pouring of HCL acid indicating the presence of CaC03.

Day 3 12/12/2022

Location 1 ;- N15044'23" , 75022'28"E

The outcrop is just below the ridge in somapur. the outcrop exposed is Phyllite intercalated with BIF where there is the presence of a foliation plane .reading along the foliation plane was taken along the outcrop.

Strike	Dip direction	Dip amount
149	SW	75
150	SW	78
168	SW	85

The change in the strike indicated that there is a broad wop in the foliation plane. in fig 05, the foliation plane is the Sn and can be identified easily, the horizontal line which is the spaced fabric is the Sn+1 and because of Sn+1, the Sn is getting wrapped. there is intrafolial fold which is Sn-1 its allergy got deformed and is rare to identify. There is also a quartz vein (fig 0which is parallel to the foliation plane, as the rock was getting deformed same time the quartz vein was intruded.

Fig.no 06

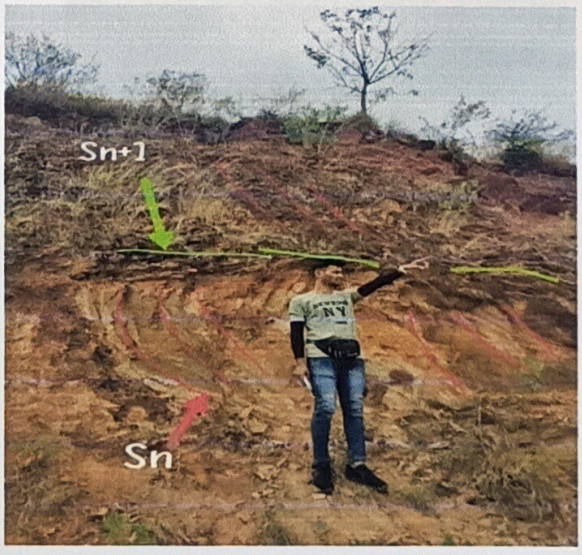


Fig.no 05 (Hand direction is North)

There was an angular unconformity and below there is the steeper plane, the soil was formed here during recent times or there might be a horizontal bed that was fully weathered.

We moved to the upper part of the ridge. There were total 9 windmills with No vegetation the rock type changed to quartzite which was reddish in color indicating that the parent rock was ferruginous sandstone seen in Fig 07 Also, the presence of a joint plane was observed along with sedimentary structures like ripple marks and herringbone structures. The bedding plane reading are:-

Fig.07

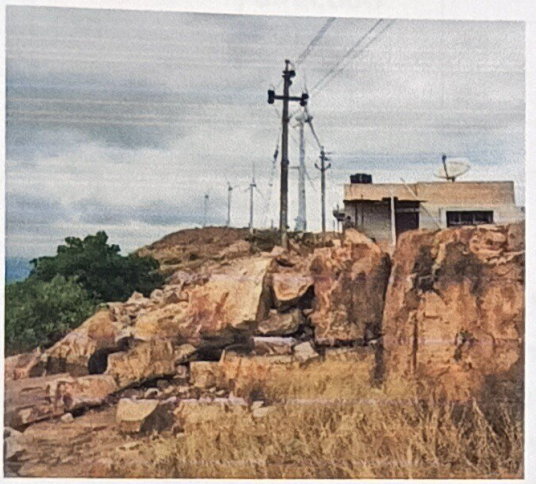


Fig.08 (Windmills : 9 megawatt)

Bedding plane readings of red Quartzite (Fig.07)

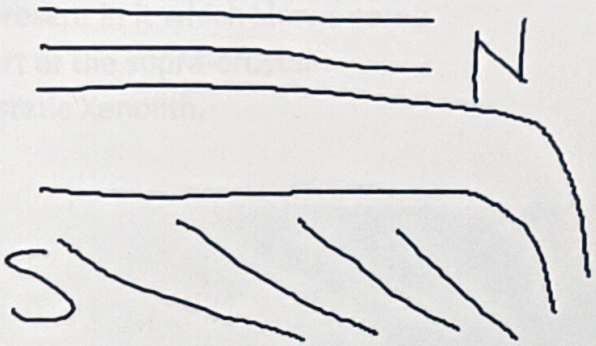
Strike	Dip direction	Dip amount
143	SW	10
133	SW	10
184	SW	06

Day 4 13/12/2022

Location 1: N16°00'49'' E75°53'05''

In the outcrop at the south side of the road in Aiholle there are inclined beds which are massive rocks of pink color, the rock contains clast of quartz, BIF, Chert, Agate, and also intercalation of breccia which also has clast of BIF. The dip of the bed is towards SW and consists of the alternate color of lamination. The structural reading are as follows:-

Strike	Dip direction	Dip amount
120	SW	38
132	SW	43
112	SW	34



On the south side of the Aiholle. It is made up of pinkish colour quartzite, so it is ferrugenous. There are many intrafoliational conglomerate layers. Having bedding planes of strike 112 to 132N dipping the south west direction and the Dip amount is 44. There was one more outcrop of sandstone dipping towards S-W direction which has coarse grains which consists of BIF, chert, Agate.

Day 5 14/12/2022

Location 1;- N 16°3'22" E75°77'7"

The outcrop observed is granite Closepet Granite is pinkish in color, the grain size is coarse grain, and has minerals such as feldspar and quartz, the feldspar is pink in color. the rock had not gone through any deformation so there is no foliation in the rock. The age of the rock is 2.5Ga. there is the presence of xenolith size of the xenolith is 7-5cm and there is a mafic mineral present in it which shows some alignment of minerals. The xenolith can be a part of the supra-crustal basement.these type of xenolith is called as Restetic Xenolith.

Restetic Xenolith

Upper view of location 2

Location 2 :-N 160 3' 32" 750 56' 55" E

There was an outcrop which was a contact and on top there was conglomerate intercalated with quartz clast and is rich is BIF.

Day 8 17/12/2022

Location 1:- N 16° 6' 51" 75° 38' 24" E

The outcrop was 10-12 km from bagalkot and called as Kagalcom exposed quartz on top of the ridge showing a trend of 100, there are some quartz veins showing comb structures formed because of tensional forces, also these viens have some of well-developed crystals.

Location 2:- N16°6' 46" E75° 38' 21"

Just below the ridge exposed are moderately inclined dolomite beds, they have strikes of 103 – 106 and dipping in SW with a dip amount of 44-44.

Location 3:- N 16° 1' 13" 75°38' 57" E

These rock exposed was at halkurki near a bridge which has clayey material $^{1}/_{256}$. They are Neoproterozoic (Badami) which was earlier Abbysal plain towards south. Due to deformation and metamorphism causes slatty cleavage in slate.

DAY 9 18/12/2022

Location 1 lokapur (35km from bagalkot)

Lat: N16°10'4"

Long: E75°21'31°

The outcrop in the lokapur was limestone which had foliation planes trending 116°N. They are interclated rocks. It looks similar to Dolomite. It is steeply dipping whose dip amount is 71 and strike is 119N. There are interclations of silica but more of carbonates. There are stromalites which are not penetrating and appear like a flower shaped (not everyone) because of the deformation we can only see the deformed flower shape. There is a nodular structure and calcite vein.

Location 2 16°07'33" 75°22'58"

The location was of Jalakatti dolomite Quarry. It is 1 km from lokapur town. They were calcite which was perfectly developed with Euhedral crystal faces.

Day 10 19/12/2022

Location 1 N16°33'10" E75°88'80"

Almatti dam visit

The almatti dam is known as UKP upper khrishna project. It is a multipurpose dam used for irrigation, drinking water, Electrical supplies. It contributes 60% to the area irrigation in Karnataka . These project was completed in 2005 and the cost of these project was 50,000 cr. It has 6 turbines each is 15 megawatts. It has 26 operating gates. In flood seasons all the turbines are open. These project was foundation stone laid by Sri Lal bahadur sashtri on 22 June 1964 and Inauguration was done by Dr APJ Abdul kalam.