Geological Field Report

2016-17
Conducted In Jaipur

Presented By:

Sartaj Ahmad Faizi

B.Sc. (Hons) Geology (Final), 2014GLB116

GE1752

Under the Supervision of:

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Acknowledgement

It is a matter of great pleasure for me to present this report on the field work conducted in and around Jaipur, the capital city of Rajasthan, India. I am very thankful to 'Allah' that he made me a part of this great event and it is my deep expression of gratitude towards my all the faculty members for their worthy guidance and cordial support.

I am very thankful to Prof. L.A.K. Rao (Chairman, Department of Geology, AMU) for his enthusiastic encouragement and support, and Prof. Shahid Farooq, Prof. Akram Javed, Dr. Taqveem Ali Khan and Dr. Yunus Ali P to guide and enlight me with their deep knowledge throughout the training to accomplish the field work successfully.

I also want to thank the G.S.I. officers including Dr. Anwar Rais, Dr. I.R. Kirmani, Dr. Raghav, and Dr. Iqbal for giving us their valuable time and sharing with us their knowledge, field experience and boost us to carry geology further in our career.

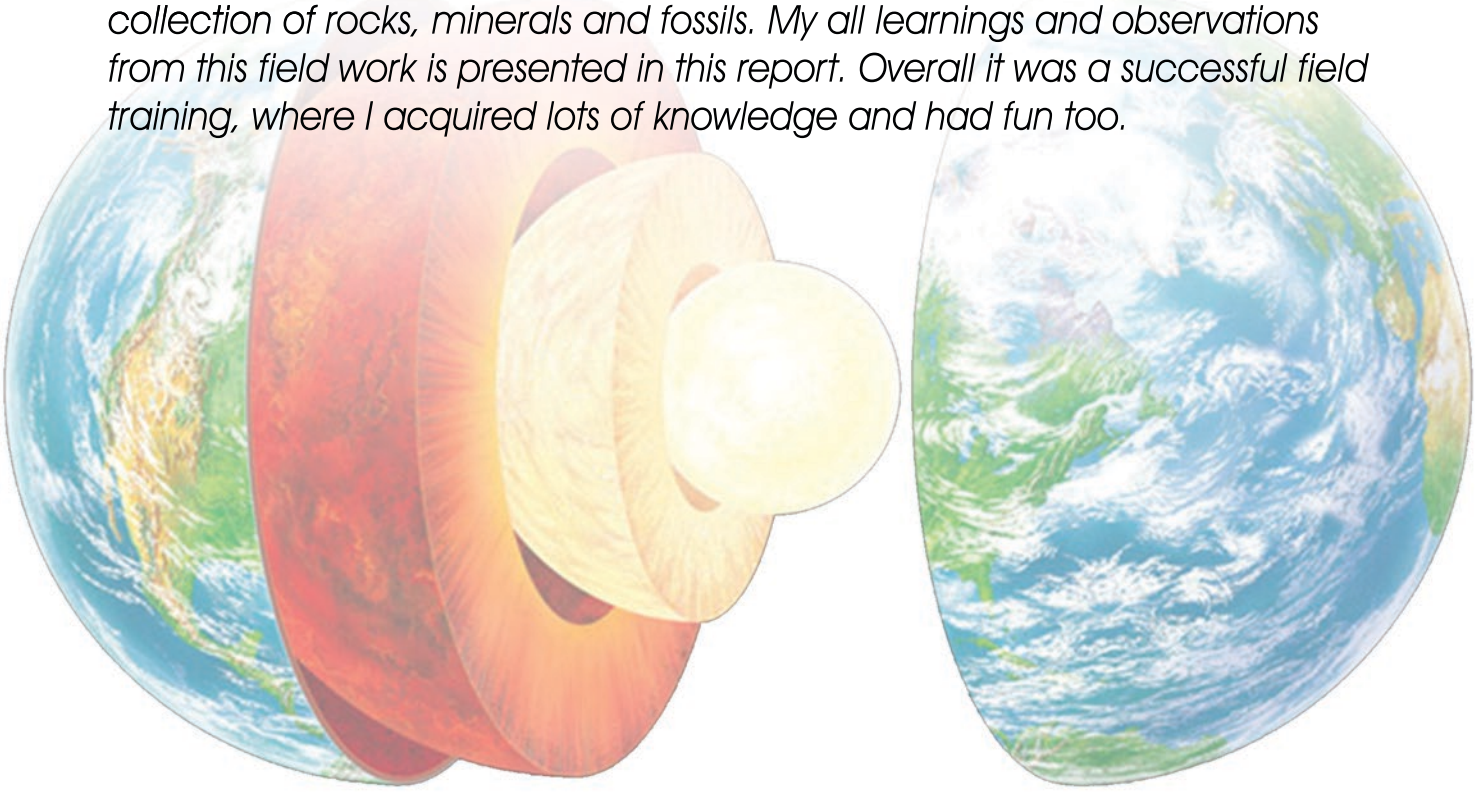
It was a tour, full of knowledge. It expanded our spectrum of understanding the subject matter of Geology. I want to thank my peers who boosted me to perform well. At last but not the least I also want to thank the whole team including Non-Teaching Staffs, the management of Muslim Musafir-khana where we camped and the transporting agencies. The role of each of them was inevitable for making this training successful.

Sartaj Ahmad Faizi
B.Sc. (Hons) Geology
2014GLB116

Introduction

Field work is one of the important integral part of geology. I must say that it broadens the mind and helps to understand geology comfortably. Generally in field work a geologist collects geological samples and field data which is then analyzed in the laboratory of the geological departments. These departments relate these data to resource studies like petrology, stratigraphy, structural geology, palaeontology, etc. Aftrer all the geological steps the ultimate goal is to understand the earth's history and understand the processes that occur on and beneath the Earth's surface. Whereas field training conducted for bachelor students of geology helps them to understand the geology of the real world which has been taught in the classrooms. Hence, In the academic session of final year of B.Sc. (hons) Geology in Aligarh Muslim University, the students are facilated with this well organized field training event.

Our visit for field work training was in Jaipur. It was a program of one week from 18th to 24th of Feb. Our camp was at Muslim Musafir Khana in the city of Jaipur. We visited at different spots of Jaipur to study outcrops of rock and understand the geology. The data and samples of rock were collected from these spots. Our program also included a one day visit to GSI, Western Region where I learned different laboratory works and saw a huge collection of rocks, minerals and fossils. My all learnings and observations from this field work is presented in this report. Overall it was a successful field training, where I acquired lots of knowledge and had fun too.



Aims and objectives

The purpose of the Geological Field Training is to provide an opportunity to B.Sc. final year students for an alternative learning experience, which enhance the information that is being taught inside the classroom. It also has the aim to provide a point of relevance, and understand the theoretical knowledge of geology in the real world.

This field training program is primarily to learn various aspects of geological field studies not only just by the classical methods but also by the use of modern techniques such as Global Positioning System (GPS) which helps in digital mapping with location and altitude.

The secondary objective is to study the details of geology, lithology after observing geological structures in Jaipur where rocks of Delhi Supergroup are exposed, also collect the samples, record the location and construct geological maps.

The training also included analysis of drainage patterns and depositional environment of sediments. It also focused on the type of rocks exposed and interpretation of their mode of formation, lithology and repetition of lithology.

Data and instruments used:

- Toposheets of the region of investigation
- Geological map
- Global positioning system (gps)
- Brunton compass
- Geological hammer
- Internet resources
- Pencil, pen, field diary
- Drawing materials
- Haversack

The Tour Timeline

18-02-2017 : Departed from Aligarh at around 11:00 a.m. and reached Muslim Musafirkhana, Jaipur at around 07:00 p.m.

19-02-2017 : Field work at 1.5kms from Jaigarh Fort

20-02-2017 : Field work at Kanak Vrindavan Ghati

21-02-2017 : Visit to G.S.I. Western Region, Jaipur

22-02-2017 : Field work at Todi, Ramzanipura, Jagatpur, Jaipur

23-02-2017 : Field work at Near Kanota Nayala road, Kuthara kalan, Jaipur

24-02-2017 : Departed from Field Training Camp at around 09:00 a.m. and reached back Aligarh at around 04:15 p.m.

Study Area

Jaipur *is the capital and largest city (in terms of size) of Rajasthan, India. It was founded on 18 November 1726 by Maharaja Jai Singh II, the ruler of Amer after whom the city is named. As from census 2011, the city has a population of 3.1 million, making it the tenth most populous city in the country. Jaipur is also known as the Pink City of India.*

It is located 260 km (162 miles) from the Indian capital New Delhi, Jaipur forms a part of the west Golden Triangle tourist circuit along with Agra (240 km, 149 mi). Jaipur is a popular tourist destination in India and serves as a gateway to other tourist destinations in Rajasthan such as Jodhpur (348 km, 216 mi), Jaisalmer (571 km, 355 mi) Udaipur (421 km, 262 mi) and Mount Abu (520 km, 323 mi).

Area of Jaipur: *484.64 square km (187.12 sq. miles)*

Average elevation: *431 meters (1,414 feet)*

Total Population: *3,046,189*

Population Density: *6,300/sq. km. (16,000/sq. miles)*

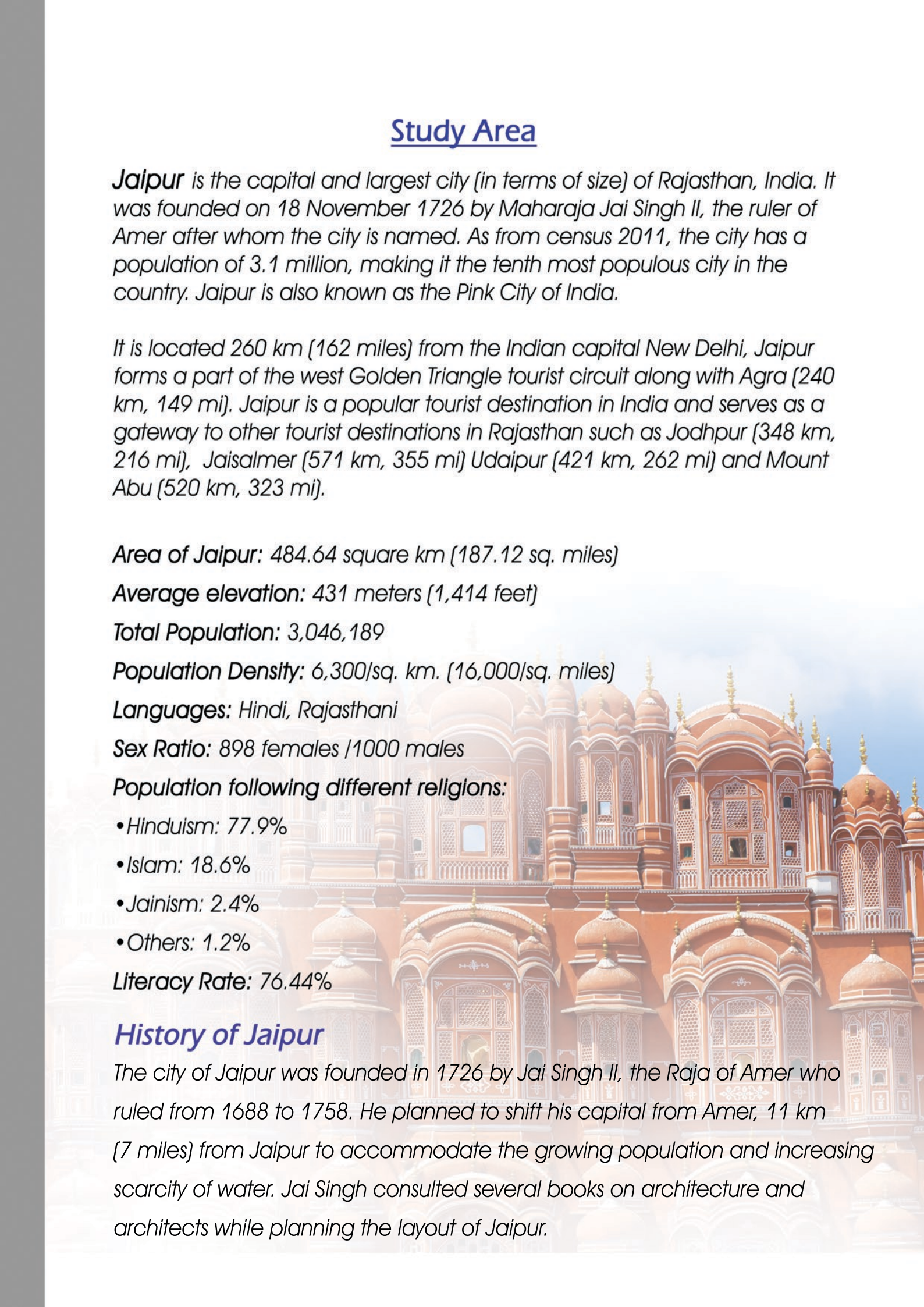
Languages: *Hindi, Rajasthani*

Sex Ratio: *898 females /1000 males*

Population following different religions:

- *Hinduism: 77.9%*
- *Islam: 18.6%*
- *Jainism: 2.4%*
- *Others: 1.2%*

Literacy Rate: *76.44%*



History of Jaipur

The city of Jaipur was founded in 1726 by Jai Singh II, the Raja of Amer who ruled from 1688 to 1758. He planned to shift his capital from Amer, 11 km (7 miles) from Jaipur to accommodate the growing population and increasing scarcity of water. Jai Singh consulted several books on architecture and architects while planning the layout of Jaipur.


Amer Fort, Jaipur

Under the architectural guidance of Vidyadhar Bhattacharya, Jaipur was planned based on the principles of 'Vastu Shastra' and 'Shilpa Shastra.' The construction of the city began in 1726 and took four years to complete the major roads, offices and palaces. The city was divided into nine blocks, two of which contained the state buildings and palaces, with the remaining seven allotted to the public. Huge ramparts were built, pierced by seven fortified gates.

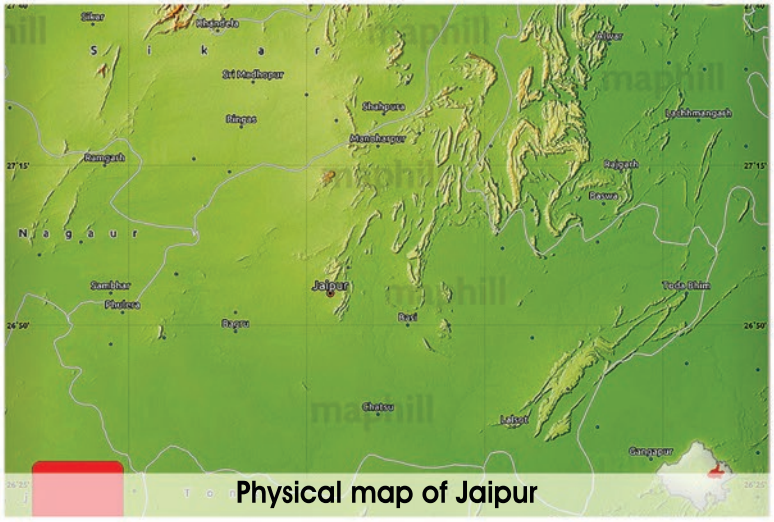
During the rule of Sawai Ram Singh, the city was painted pink to welcome the Prince of Wales, later Edward VII, in 1876. Many of the avenues remained painted in pink, giving Jaipur a distinctive appearance and the epithet Pink city. In the 19th century, the city grew rapidly and by 1900 it had a population of 1,60,000.


Hawa Mahal, Jaipur

The wide boulevards were paved and its chief industries were the working of metals and marble, fostered by a school of art founded in 1868. The city had three colleges, including a Sanskrit college (1865) and a girls' school (1867) opened during the reign of the Maharaja Ram Singh II.

Geology of Jaipur

The beautiful city of Jaipur is situated in the northern part of the Aravalli Mountain ranges (also known as the Aravalli-Delhi Orogenic Belt) which feature a horst-like



Physical map of Jaipur

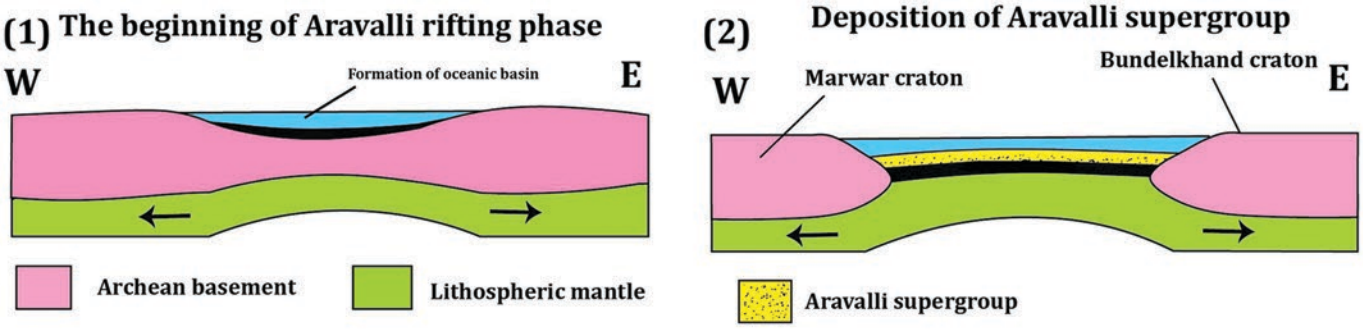
structure, consisting of a series of Proterozoic rocks that are intensely deformed and metamorphosed. The Aravalli Mountains consist of the Aravalli and Delhi fold belts, and are collectively known as the Aravalli-Delhi orogenic belt. The Aravalli-Delhi Orogenic Belt trends in a northeast-southwest direction and has a length of 700 km. Width varies from about 150 km in the south to about 40 km in the north. Beginning in Palanpur near Ahmedabad in Gujarat, the Belt extends through Rajasthan, Haryana and Delhi. The northern end of the Aravalli Range is the famous Delhi Ridge which traverses through south Delhi and terminates in the Raisina Hill in Central Delhi. Three main subdivisions of rocks constitute the stratigraphy of the mountain range:

The lowermost unit comprising the Aravallis is the Bhilwara Gneissic Complex of Archaean age, over which lie the Aravalli Supergroup followed by the Delhi Supergroup. The northern part of the mountain range, which is exposed in and around Jaipur, only consists of the Delhi Supergroup, also known as the North Delhi Fold Belt. Rocks of the Delhi Supergroup overlie the Aravalli Supergroup with a distinct unconformity. On the southern side, however, both the Aravalli and Delhi supergroups are present. The mountain range is bounded by the Eastern and Western marginal faults, where the former is also termed as the Great Boundary Fault.

Whereas the precise evolutionary processes culminating in the uplift of the Aravalli Mountain Range remains poorly understood, it is generally agreed that primary mechanism for development of the mountain range is the collision between the Bundelkhand and Marwar cratons.

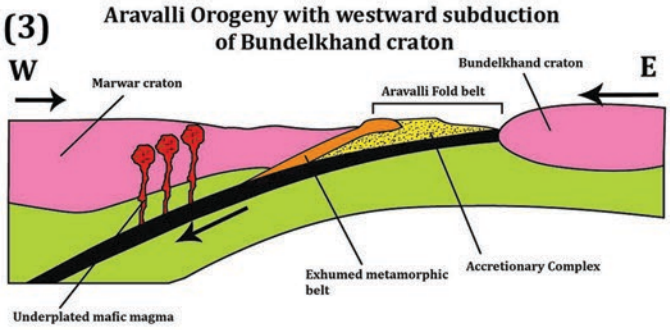
Geological Evolution:

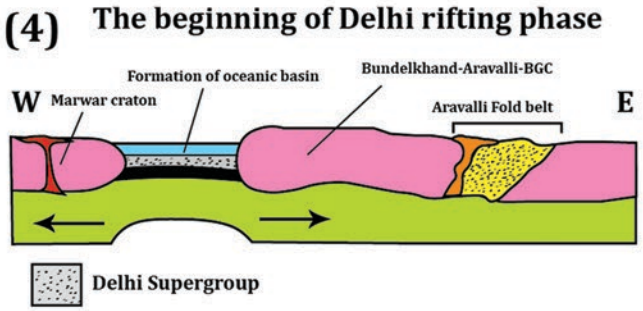
The site of the Aravalli Mountains bears evidence of repeated phases of crustal rifting, development of rift basins, generation of oceanic troughs, deposition of various sedimentary facies in different tectonic settings and emplacement of various kinds of acidic and basic igneous rocks. During the Paleoproterozoic Era (~2500 Ma), the opening of Aravalli oceanic basin separated the eastern Bundelkhand craton and the western Marwar craton. Sedimentation of the Aravalli Supergroup took place in this basin simultaneously with subsidence of the Aravalli Basin and basic magmatism. The sedimentation was followed by an end of rifting and onset of a compressional phase during which the eastern Bundelkhand Craton subducted beneath the western Marwar Craton. Continued compression resulted in the development of an island arc between the two cratons. Further compression led to a steepening of the subduction zone and collision of the two cratons, leading to uplift of the Aravalli Supergroup at around 1800 Ma. In the last stage of convergence, the thrust fault further steepened and the colliding blocks eventually become sutured. The suture zone is marked by the Great Boundary Fault.

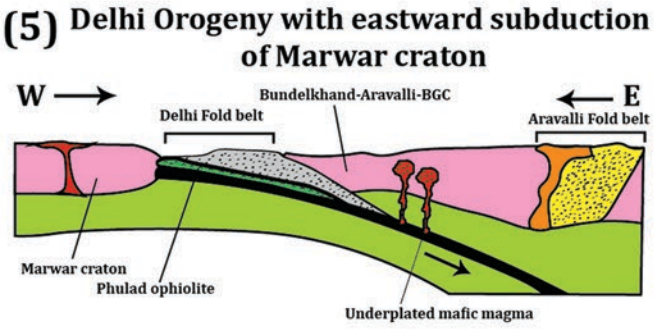


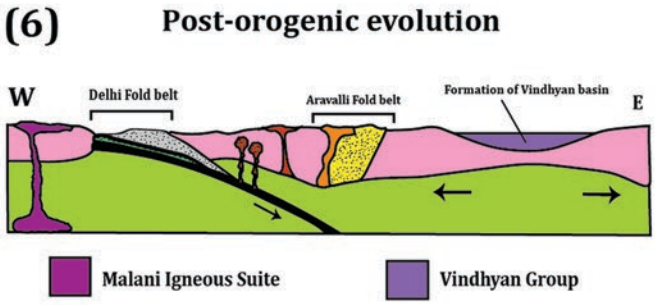
During the Mesoproterozoic Era (~1600 Ma), another rifting phase began. This rifting separated the Bundelkhand-Aravalli craton on the east from the Marwar craton on the west. This basin received the Delhi Supergroup sediments. The Delhi Supergroup of rocks thus occur on the western side of the Aravalli-Delhi Orogenic Belt. The compressional phase that followed the Delhi Supergroup sedimentation led to eastward subduction of the western Marwar craton. Continuous subduction of the western block might have created another island arc, and similar to the

Aravalli orogeny, further collision between the two blocks with island arc in between gave rise to the development of the Delhi orogeny around 1100 Ma. The suture zone between the two cratons is marked by the Western Marginal Fault and the emplacement of the Phulad Ophiolite Suite in the region. Rocks exposed in and around Jaipur belong to the Delhi Supergroup.









The Delhi Supergroup:

Rock units comprising the Delhi Supergroup lie over those of the Aravalli Supergroup with a distinct unconformity. This Delhi Supergroup consists of two main types of rocks: a thick sequence of volcanic rocks that is of continental affinity; and sedimentary rocks that represent fluvial and shallow marine to deep marine depositional environments. The depositional age of these sequences is approximately from 1.7 to 1.5 Ga.

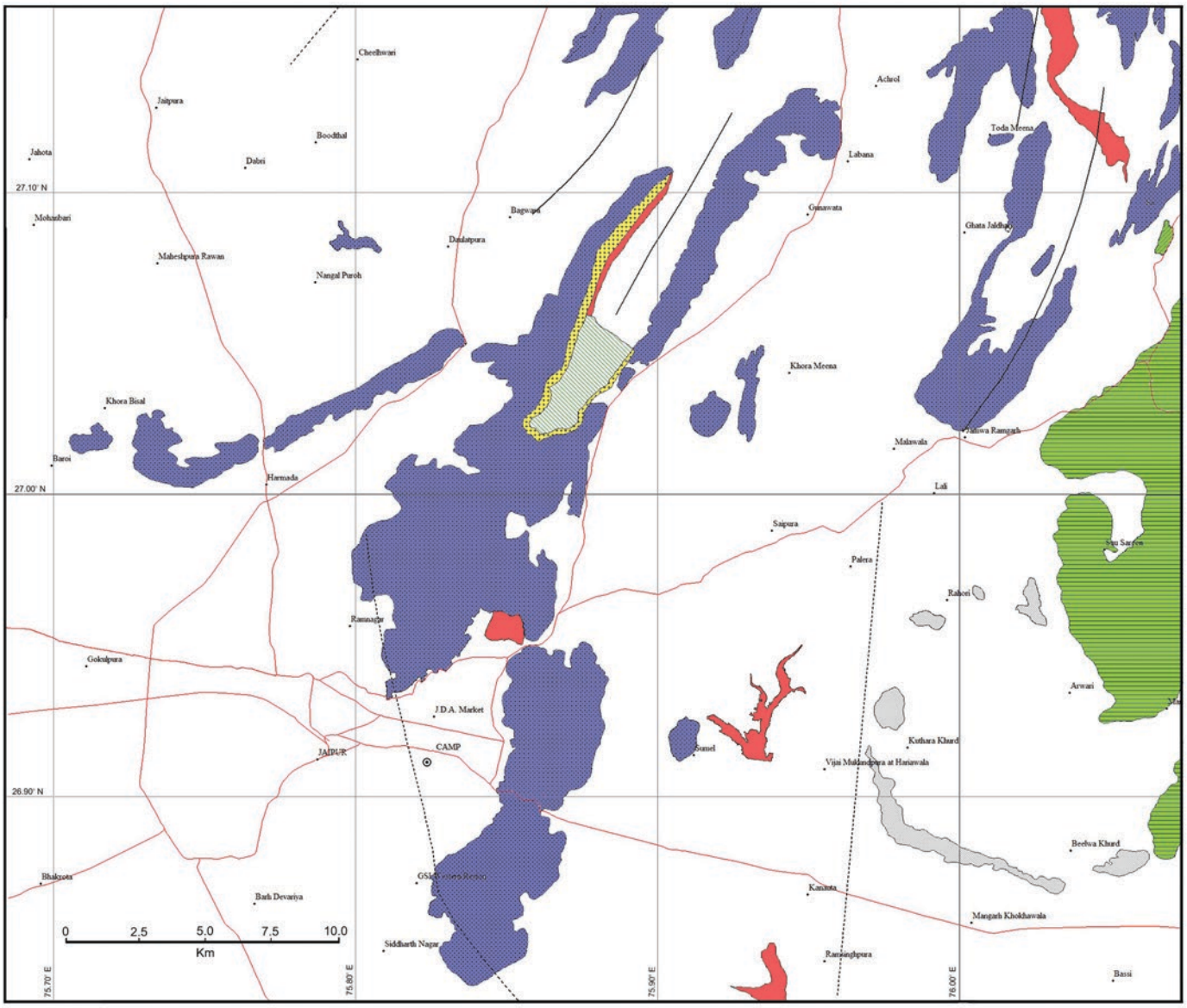
In and around Jaipur, the Delhi Supergroup is classified into three groups:

The Ajabgarh Group (Upper) – Dominated by phosphatic carbonate rocks, mafic volcanics, pelitic rocks and volcano-clastic sediments.

The Alwar Group (Middle) – Consisting of arenaceous and mafic volvanic rocks.

The Raialo Group (Lower) - Consists predominantly of mafic volcanic and carbonate rocks.

Geological Map of the area around Jaipur, Rajasthan



Alluvium and aeolian sand - Quarternary

Impure marble, amphibole, quartzite

Massive quartzite, locally feldspathic, gritty

Schist

Schist, phyllite, flaggy quartzite, minor marble

Conglomerate and gritty quartzite with basic flows at places

Quartzite

--- Ajabgarh Group

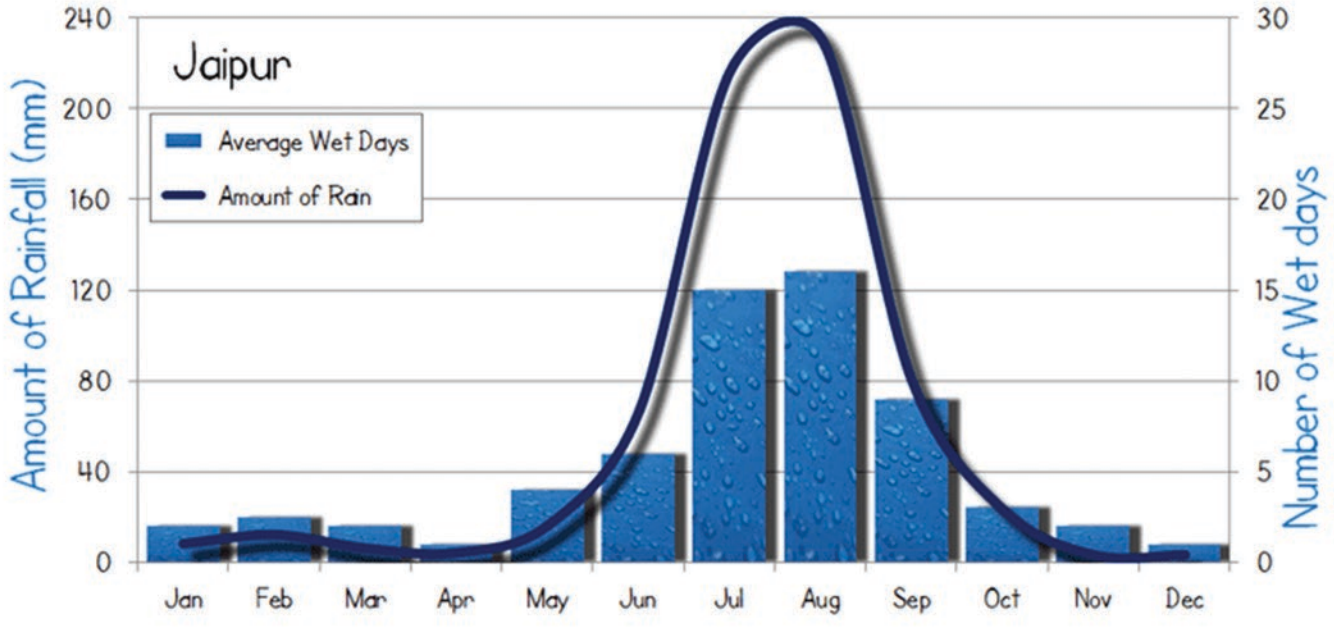
Alwar Group

S Farooq
Department of Geology, AMU Aligarh

Climate and rainfall of Jaipur


Desert Climate

Jaipur lies on a borderline between a hot desert climate and a hot semi-arid climate under the Köppen climate classification "BWh/BSh", receiving over 650mm (26 in) of rainfall annually but most rains occur in the monsoon months between June and September. Temperatures remain relatively high during summer from April to early July having average daily temperatures of around between 30 °C. During the monsoon there are frequent, heavy rains and thunderstorms, but flooding is not common. The winter months of November to February are mild and pleasant, with average temperatures ranging from 10–15 °C.



Economy of Jaipur

In addition to its role as the provincial capital, educational, and administrative centre, the economy of Jaipur is fuelled by tourism, gemstone cutting, the manufacture of jewellery and luxury textiles, and information technology. Three major trade promotion organisations have their offices in Jaipur. These are:

Federation of Indian Chambers of Commerce & Industry, (FICCI) the PHD Chamber of Commerce and Industry (PHDCCI) and the Confederation of Indian Industry (CII) which has its regional offices here. In 2008, Jaipur was ranked 31 among the 50 Emerging Global Outsourcing cities. Jaipur Stock Exchange is one of the regional stock exchanges in India and was founded in 1989. Jaipur is a major hub for arts and crafts. It has many traditional shops selling antiques, jewellery, handicrafts, gems, bangles, pottery, carpets, textiles, leather and metal products. Jaipur is one of India's largest manufacturers of hand-knotted rugs. Jaipur leg, a rubber-based prosthetic leg for people with below-knee amputations, was designed and is produced in Jaipur.

Gemstone Cutting and polishing,Jaipur

Black marble which receives good polish had been used in constructing some of the historical buildings and monuments of Delhi and Agra and is available in the mines in Jaipur district.

Minerals found in Jaipur are Calcite, China Clay, Copper, Dolomite, feldspar, Garnet, Limestone, Marble, Ochre, Quartz/silica sand, Rock phosphate, talc/steatite/soapstone, Granite.

Quartzite, Delhi Supergroup; Location-Jaipur

Day 1: Field work

Date: 19-02-2017

Time: 11:10 am

Site 1:

1.5 km from Jaigarh Fort

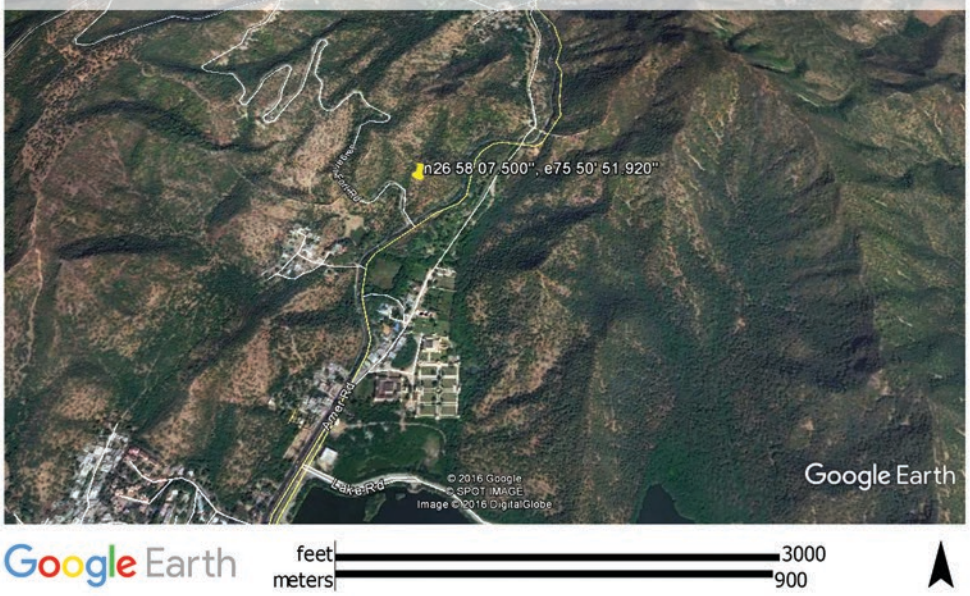
Latitude-

N 26° 58′ 07.500′

Longitude-

E 75° 50′ 51.920″

Satellite view of Site 1



The area is consisting of outcrop of Quartzite rock of sedimentary origin, with igneous intrusions in form of sills. The drainage pattern of the area is parallel to dendritic. Intrusions of Quartz vein are also present.

Readings of dip and strike of different Locations of the same site-

Reading 1: *(Near the base of the hill)*

Accuracy *– 10 feet*

Latitude- *N 26° 58' 5.24″,* ***Longitude-*** *E 75° 50' 50.89″*

Strike- *N255°,* ***Dip-*** *7°NW*

Figure:

The lower bed is of Quartzite and the upper bed is of igneous intrusions

Reading 2:

Accuracy – 10 feet

Latitude- N 26° 58′ 07.510″ , Longitude- E 75° 50′ 51.930″

Strike- N247°, Dip- 8°NW

Reading 3:

Accuracy- 13 feet

Latitude- N 26° 58′ 07.4″, Longitude- E 075° 50′ 54.5″

Strike- N268°, Dip- 10°NW

Figure:
Quartz vein in between Quartzite rock.

Reading 4: (At the top of the hill)

Accuracy – 10 feet

Latitude- N 26° 58' 5.91″, Longitude- E 75° 50' 52.45″

Strike- N262°, Dip- 6°NW

Reading 5:

Accuracy – 10 feet

Latitude- N 26° 58′ 06.99″, Longitude- E 075° 50′ 54.54″

Strike- N260°, Dip- 8°NW

Site 2:

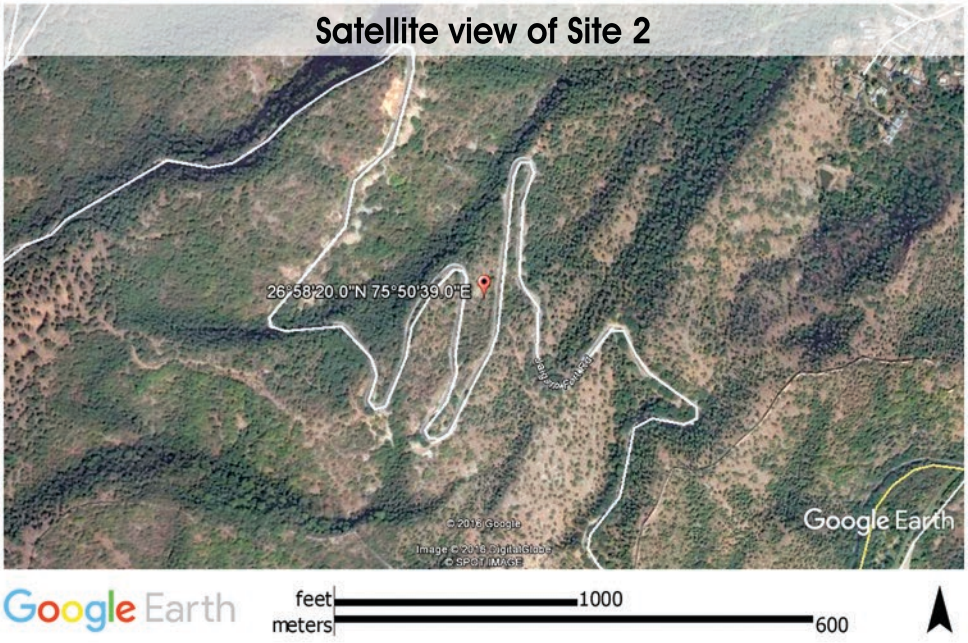
3 km from Jaigarh Fort

Latitude-

N 26° 58′ 20″

Longitude-

N 26° 58′ 20″



The characteristics of rocks in this site are very coarse grained, massive, hard and compact. They are Quartzite of sedimentary origin. The structures found in them are Parallel joints, cross joints, symmetrical ripple marks, trough cross- bedding. Intrusions of Quartz vein are also present.

Readings of dip and strike of different Locations of the same site-

Reading 1:

Accuracy- *13 feet*

Latitude- *N 26° 58' 18.67″,* ***Longitude-*** *E 75° 50' 39.42″*

Strike- *N 19°,* ***Dip-*** *40° SE*

Figure:
Ripple marks (Sedimentary structures)

Reading 2:

Accuracy - 10 feet

Latitude- *N 26° 58' 18.44" ,* ***Longitude-*** *E 75° 50' 39.42"*

Strike- *N 27°,* ***Dip-*** *31° SE*

Figure:
Parallel fractures and cross joints are present in quartzite rock.

Figure:
Quartz vein present in quartzite rock.

Reading 3:

Accuracy- 13 feet

.atitude- *N 26° 58' 12.96",* ***Longitude-*** *E 75° 50' 41.74"*

Strike- *N 22°,* ***Dip-*** *33° SE*

Day 2: Field work

Date: 20-02-2017

Time: 10: 55 am

Site 1:

Kanak Ghati (Valley)

Latitude-

N 26° 58′ 14.96″

Longitude-

E 75° 51′ 3.26″

Satellite view of Site 1

Here the rocks of Delhi Super Group are exposed forming a valley bounded by Cuesta from both sides with their steeper slope towards the valley. The ridges are continuous, highest point attaining with the height of 603m. The valley floor is covered with alluvial matter, the rocks are highly weathered which also contains the vegetation cover. The slope is moderate to steep. The drainage pattern are parallel, radial, dendritic type.

Readings of dip and strike of different Locations of the same site-

Reading 1:

Accuracy *– 10 feet*

Latitude- *N 26°58'18.20", **Longitude-** E 75°51'3.64"*

Strike- *N170°, **Dip-** 22° W*

Figure:

The rocks are unconsolidated, Breccia at large scale.

Reading 2:

Accuracy – 10 feet

Latitude- N 26°58'19.03", **Longitude-** E 75°51'3.61"

Strike- N173°, **Dip-** 18° W

Site 2:

Opposite of Sankat Mochan Hanuman Mandir

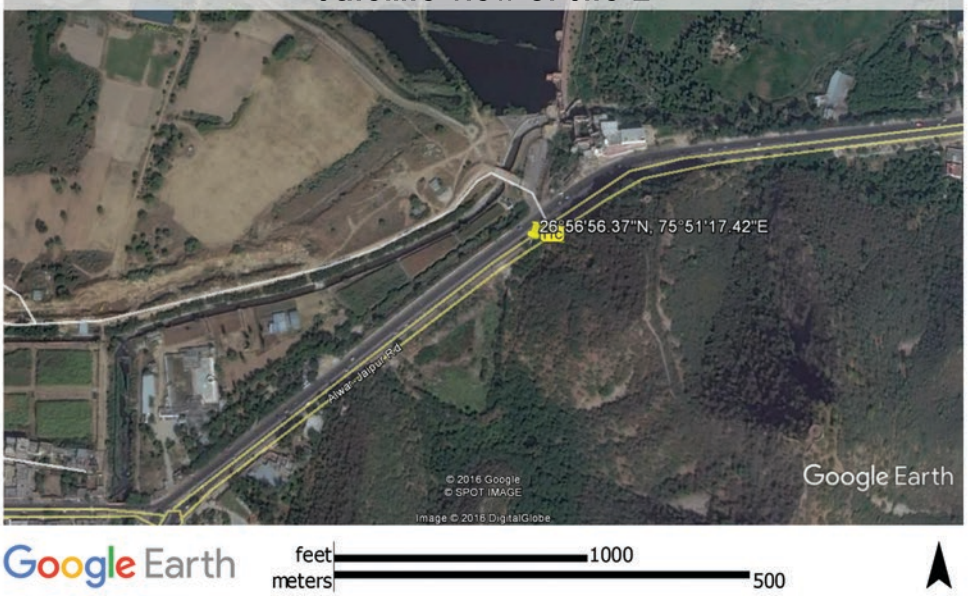
Latitude-

N 26°56'56.37"

Longitude-

E 75°51'17.42"

Satellite view of Site 2



The rocks are compact, hard and massive, outcrop of quartzite.

Readings of dip and strike of different Locations of the same site-

Reading 1:

Accuracy – 10 feet

Latitude- N 26° 56' 56.67", **Longitude-** E 75° 51' 17.80"

Strike- N4°E , **Dip-** 45°NW

Reading 2:

Accuracy – 10 feet

Latitude- N 26° 56' 56.28", **Longitude-** E 75° 51' 17.05"

Strike- N6°E , **Dip-** 43°NW

Site 3:

Road side of NH248, near Jal Mahal, Amer

Latitude-

N 26° 57' 47.45"

Longitude-

E 75° 52' 3.71"

Satellite view of Site 3

The rocks are Quartzite which are highly broken and contains moisture. The Quartzite has got metamorphosed, Schist and Phyllite are present. The colour is red due high iron content. The lower parts of the rock consist of large amount of Quartz.

Figure:

Quartz vein in between metamorphosed Quartzite.

DAY 3: VISIT TO GSI, WESTERN REGION

Date: 21-02-2017

Time: 11:00 am

The Geological Survey of India (GSI), established in 1851, is a government organisation in India which is an office attached to the Ministry of Mines of Union Government of India for conducting geological surveys and studies. It is one of the oldest of such organisations in the world and the second oldest survey in the country. The GSI is the prime provider of basic earth science information to the government, industry and the general public, as well as responsive participant in international geoscientific fora, the vibrant steel, coal, metals, cement and power industries.

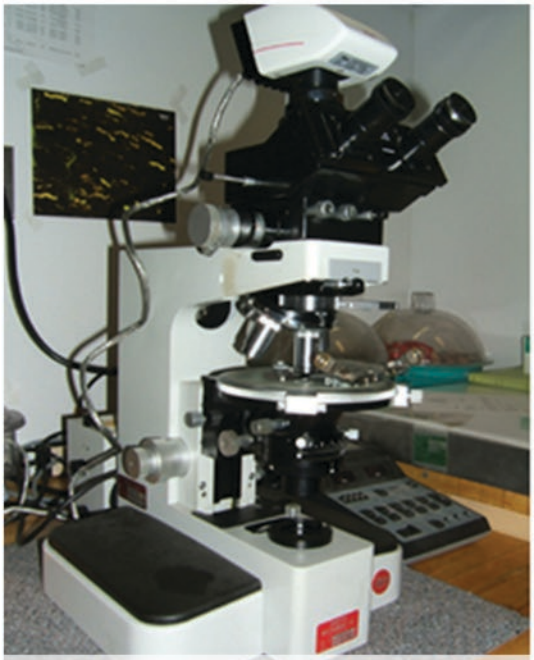
We reached Geological Survey of India, Western Region, Jaipur at around 11:00 a.m. We were warmly welcomed by the GSI officials, and then we were divided into three groups to visit the whole campus. I was a member of Group-B, headed by Syed Adil Hussain. We were guided by Mr. Krishn Kumar, Senior Geologist, GSI, Jaipur.

A group photograph of students and teachers of AMU, and the GSI officers at GSI.

We all students, our university teachers and the GSI officers, had a group photograph at end of the visit.

Petrology lab

First, we went to Petrology lab, there Mr. Amit Awasthi, Senior Geologist, GSI, Jaipur showed us LeicaQ5501W Microscope and samples of various igneous, sedimentary and metamorphic rocks. He also showed us thin polished section of metals and some opaque minerals.



Advance Petrology Microscope

XRD Machine

XRD lab

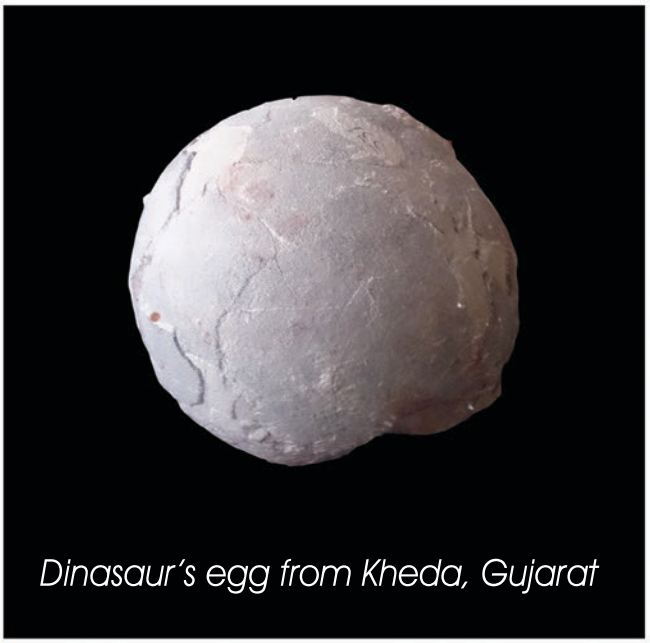
Dr. Lavlaish Singh, Senior Geologist, GSI, Jaipur; taught us about the process of X-ray powder diffraction (XRD) which is a rapid analytical technique primarily used for phase identification of a crystalline material and can provide information on unit cell dimensions. The analyzed material is finely ground, homogenized, and average bulk composition is determined. The formula used is $n\lambda = 2d\sin\theta$.

Palaeontology lab

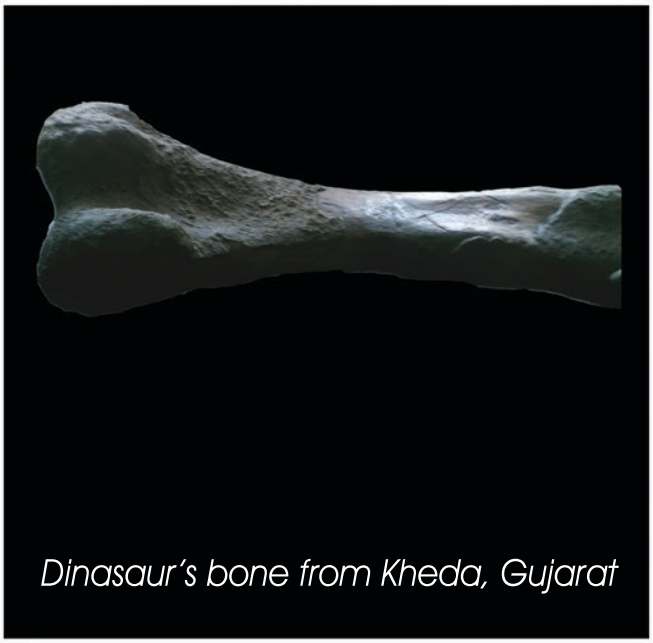
Then we headed to Palaeontology Lab, were Mr. Kumar showed us many Mega Fossils of the region. We saw the specimens of Stromatolites, cast of Brachiopoda and Pelecypoda from Aravalli, Fossil Wood from Lathi, Dinasaurs bones and eggs

eggs from Kheda(Gujarat) Ediachara from Marwar, Trilobite from Himalaya, Ammonoidea moulds, Foraminifera, Belemnites(Jurassic-Cretaceous), Gastropoda, heterodont camel jaw, Dinasaurs vertebral column. We also studied some annelids of Eocene age, Ptilophyllum (early cretaceous), Crab from Kutch, carnivorous Megalosaurs (Cretaceous) and some Pseudofossils formed by Manganese Leaching.

Some Specimens from Palaeontology lab:



Dinasaur's egg from Kheda, Gujarat



Dinasaur's bone from Kheda, Gujarat

Ptillophylum

Gastropoda

Micropalaeontology lab

Mr. D. Bhattacharya, Junior Geologist, GSI, Jaipur headed us to the Micro Palaeontology Lab; where he taught us the whole process involving scrap section, masseration, sieving, sorting, analyzing thin section under microscope and lithologging. He also showed us Bentonytic clay and different types of mesh.

Foraminifera

Museum

Geological Survey of India, Western Region, has its Regional Geological Museum at its premises in 15-16 Jhalana Institutional area, Jaipur, which is regularly maintained and constantly upgraded.

The museum at Jaipur exhibits rare and typical samples of fossil wood, dinosaurian remains and marine fossils of geological significance. The museum is frequently visited by the various institutes and different professional organizations.

Inner view of the museum at GSI, Western Region, Jaipur

In addition a Rock Garden is also maintained in the GSI office premises at Jaipur. The rock garden is virtually representating the presence and discovery of fossils, minerals and rocks at different location of the state of Rajasthan and Gujarat.

The map of rock garden at GSI, Jaipur:

GSI Office, Jaipur

Day 4: Field work

Date: 22-02-2017

Time: 11:00 am

Site -

Todi, Ramzanipura, Jagatpur, Jaipur

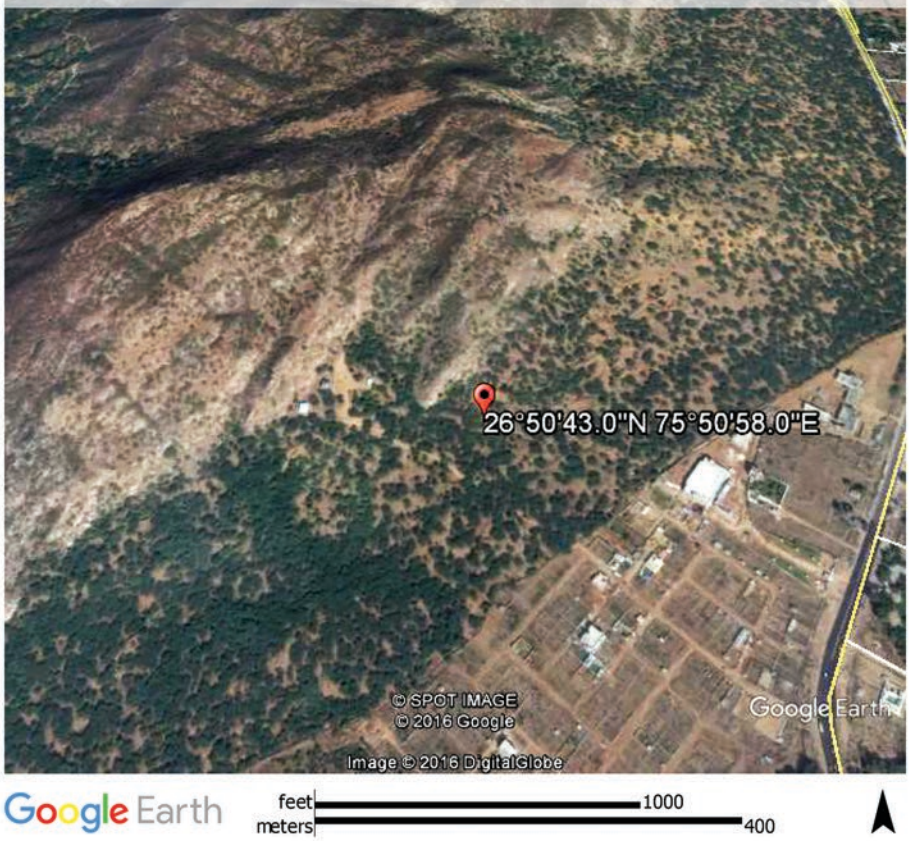
Latitude-

N 26° 50′ 43″

Longitude-

E 75° 50′ 58″

Satellite view of the site



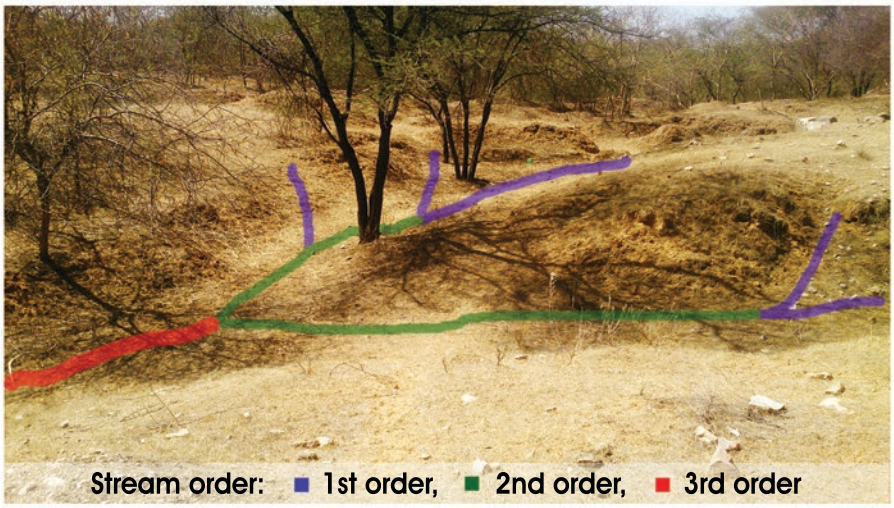
The topography of the area consists of a series of ridges attaining a maximum elevation of 603m. These ridges act as a hindrance to Aeolian transport and led to the deposition of load carried by wind in the form of Sand Dunes and Loess. Later due to growth of some vegetation on older sand dunes, they became Stabilized Sand Dunes. The water accumulated over the ridges due to rainfall, began flowing downwards making their way through these stabilized sand dunes and led to the development of dendritic and parallel stream channels. The drainage system is composed of first, second and third order streams which can be easily observed in these stabilized sand dunes. Younger Loess deposits are yellow coloured flat deposition of silt sized particles with very little vegetation. Elevation of younger loess deposits is greater than older stabilized sand dunes.

SPOT 1

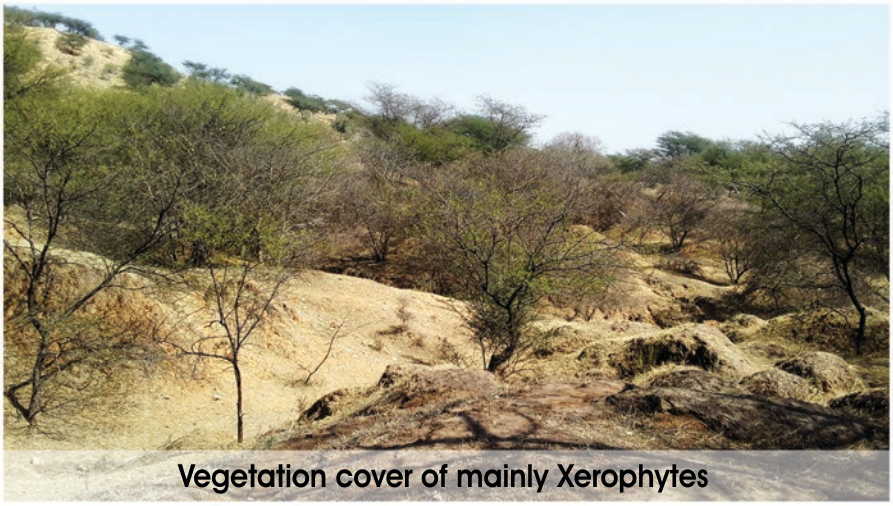
Latitude: N26°50'43"

Longitude: E75°50'59"

Presence of Stabilized Sand Dunes with horny vegetation cover and containing first and second order streams.



Since bedding planes are not exposed, it is difficult to measure strike and dip.


Vegetation cover of mainly Xerophytes

SPOT 2

Latitude: N26°50'54"

Longitude: E75°51'07"

Younger Loess Deposit consisting of yellow silt sized grains with very little vegetation (mainly xerophytes).

SPOT 3

Latitude: N26°50'40.96"

Longitude: E75°50'42.38"

Herer a large outcrop of quartzite is present. It attaining the height of around 600m.


Gritty Quartzite

Day 5: Field work

Date: 23-02-2017

Time: 9: 30 am

Site -

Kuthara Kalan, near Kanota Nayala road, Jaipur

Latitude-

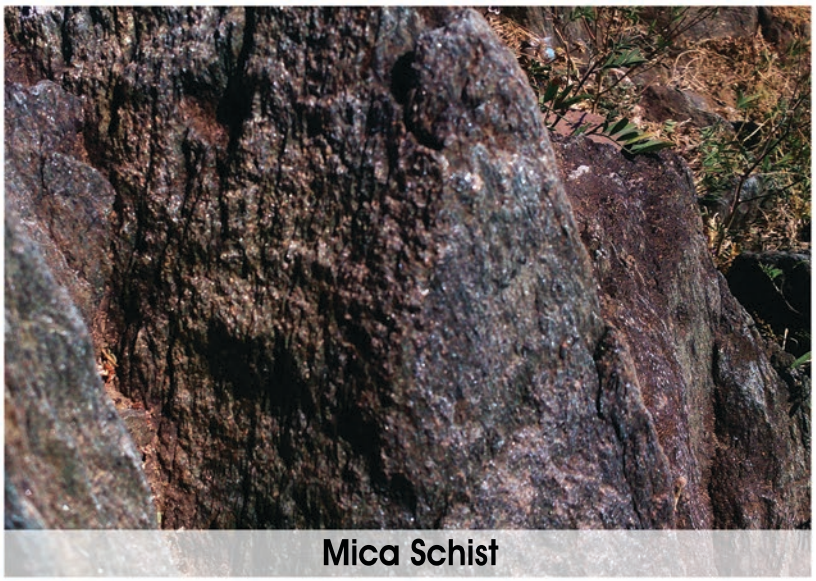
N26°55'26.31"

Longitude-

E 75°58'45.36"

Satellite view of the site

Details of location: The hill is composed of different types of rocks. As we go from bottom of the hill towards its top, there is a drastic change in the lithology.



Mica Schist

At bottom, the rock is mainly Mica Schist; highly weathered and covered with sediments. The mica schist is thinly laminated containing sufficient amount mica. Crenulations cleavage is present which indicates shear zone.

As we climb a little higher on the hill, we get Dolerite Dyke containing Amphibole Dolerite. The grains of this dyke are very massive, dark and coarse containing lots of mica. The dyke also contains Quartz Vein (1-5mm thick). The strike direction of the dolerite dyke is N15°E.

Dolerite Dyke

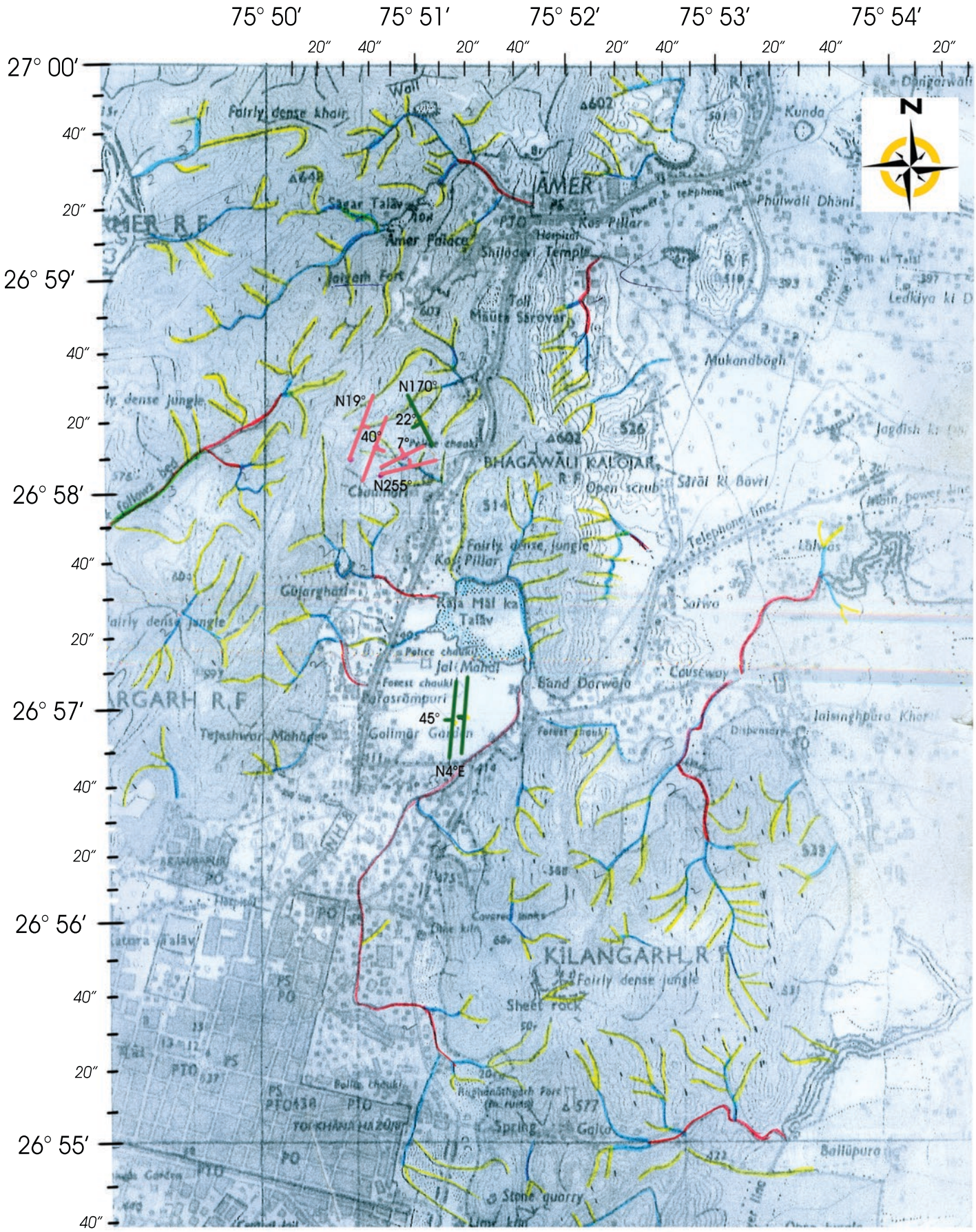
Mylonized Quartzite

And the near by area is surrounded by Quartzites which has got mylonized at different places. As we climb further, we get another schist horizon. This is also Mica Schist, thinly laminated containing large amount of mica; mainly serrucite which imparts yellow to grey colour to the rock. Serrucite has white shiny streak. In this schist horizon foliations are not well developed. This layer also contains Quartz Vein (1-3.5cms thick).

Then comes a layer of Sedimentary Quartzite. There is a Recumbent Fold present in this layer. Quartz Vein present in this layer is relatively very thick (10-15cms thick).

Above this layer, there is a thick layer of Phyllite or low grade metamorphic rock. This shows that different grades of metamorphism has occurred. At the top of the there is massive Sedimentary Quartzite having very coarse grains.

Topo-sheet of the study area (1)

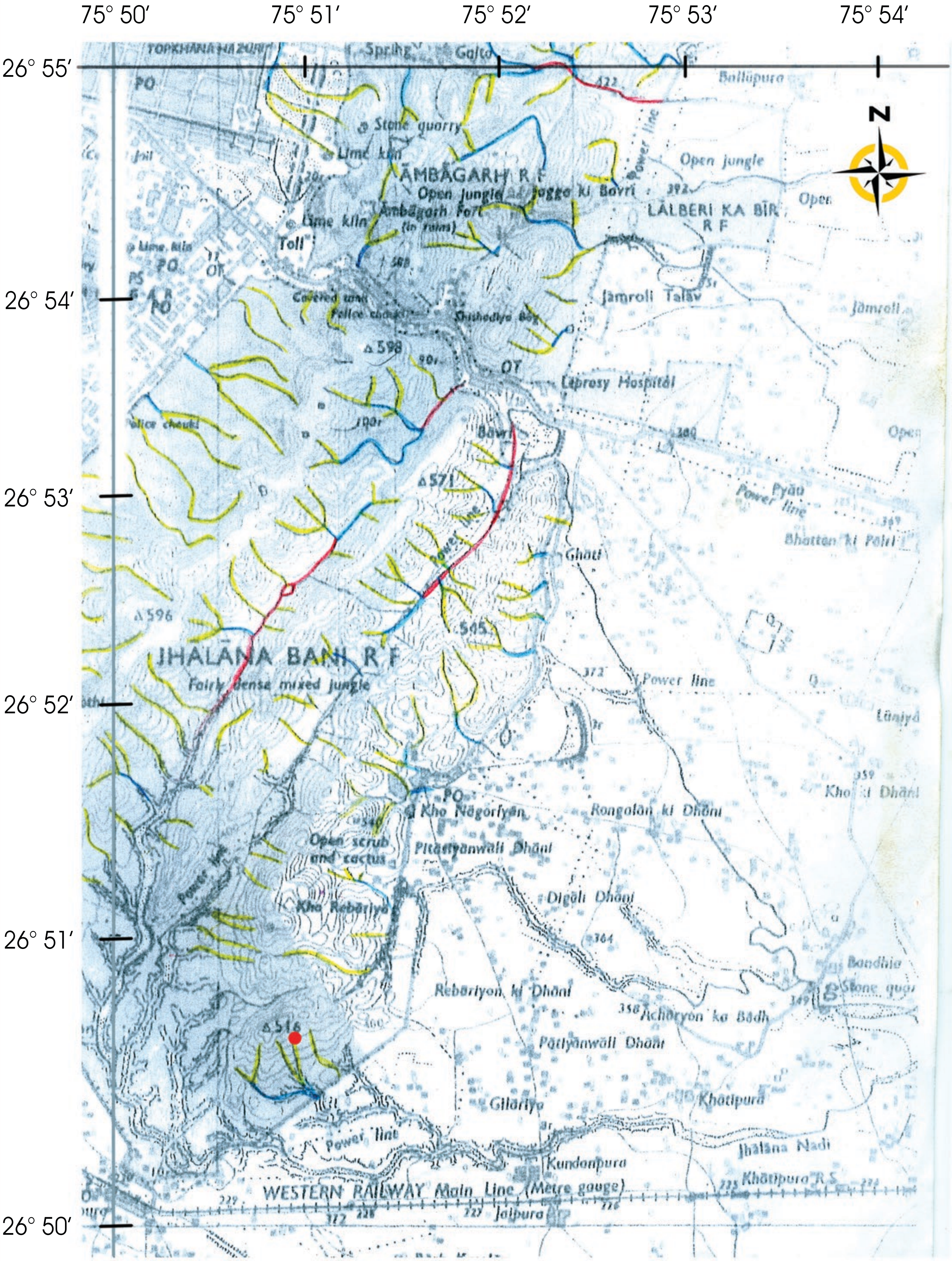


The drainage pattern is generally of dendritic and parallel type.

Strike and dip direction measured in: Day 1

Day 2

Topo-sheet of the study area (2)



The drainage pattern is generally of parallel and sub-dendritic type. The strike and dip information was difficult to measure as bedding planes are naturally altered.

Interpretations

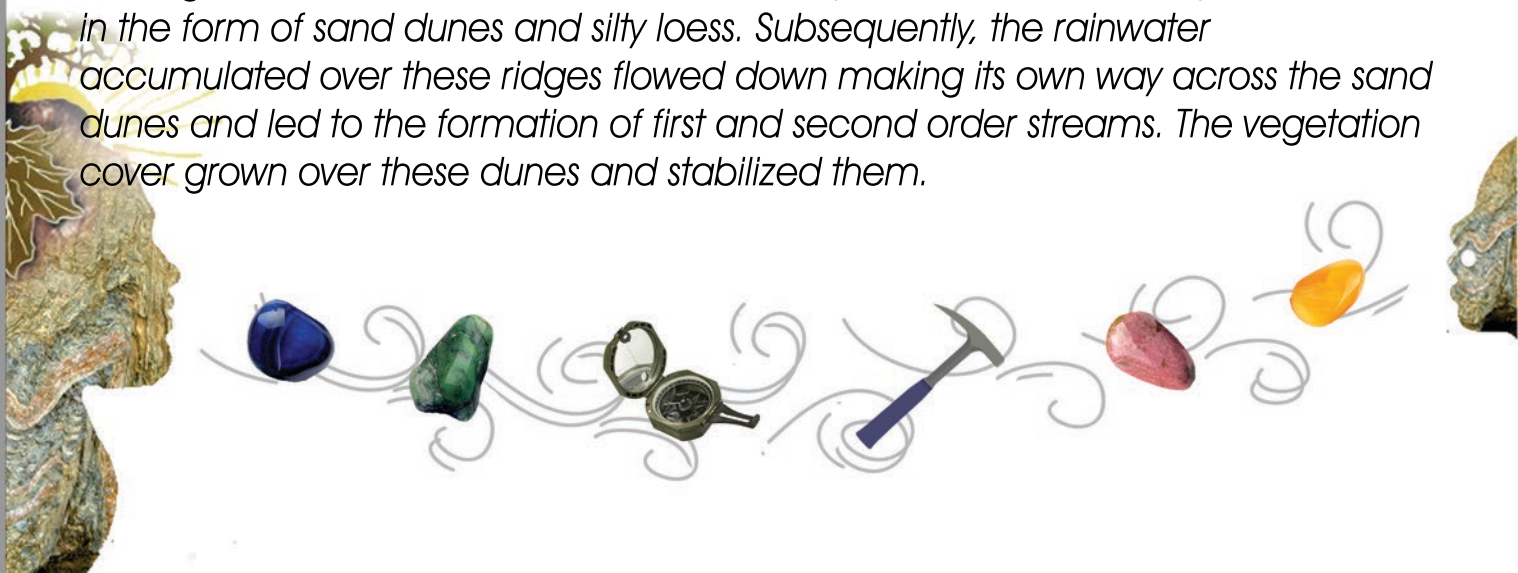
Geological Field Training made me familiar with the subject practically and helped me to correlate with the knowledge that I gained in the classroom. I came across various geological features, different types of rocks, sedimentary structures and different types of landforms. I tried to identify all these features and interpret their processes of formation. I felt it is important to pen down the observations that I made in the field and interpretations that came out of them.

The city of Jaipur is situated in a basin and surrounded by ridges and hills from all sides. The rocks present in these ridges belong to Delhi Super Group, Alwar Group. These ridges ranging in elevation of 400-700ms mainly consist of Sedimentary Quartzites along with some Mica Schist, Phyllite and numerous Quartz Veins. The sedimentary quartzites are formed by deposition under Marine Environment. The presence of Primary Sedimentary Structures like symmetrical ripple marks, asymmetrical ripple marks and cross bedding gave some idea about Palaeocurrent and initial slopes.

The presence of Mica Schist and Phyllite suggest shearing. Since Jaipur is located between Marwar and Bundelkhand craton. The relative motion of these two cratons along their margin might be the cause of intense shearing in this zone, leading to the formation of Schist and Phyllite.

The presence of numerous Quartz Veins can be viewed as of formation of large number of fractures and joints due to shearing and weathering which subsequently filled up by Hydrothermal Fluids. This hot fluid coming from beneath led to the deposition of Quartz along these fractures and joints forming a number of Quartz Vein.

At one location (3kms from Jagatpura) on fourth day of my field training I also observed Stabilized Sand Dunes characterized by the presence of first and second order streams and Younger Loess Deposits at the base of tall ridges.The tall ridges act as a hindrance to Aeolian Transport and thus wind deposits its load in the form of sand dunes and silty loess. Subsequently, the rainwater accumulated over these ridges flowed down making its own way across the sand dunes and led to the formation of first and second order streams. The vegetation cover grown over these dunes and stabilized them.



References

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Prof. Shahid Farooq (website)	*http://www.geol-amu.org/notes/index.htm*
Museum	*http://museum.gsi.gov.in*
Wikipedia	*https://en.wikipedia.org*
Officials of GSI