SCHOOL OF EARTH, OCEAN AND ATMOSPHERIC SCIENCES

GOA UNIVERSITY

Exam: Roll No: 09

LABORATORY CERTIFICATE

This is to certify that Mr. /Ms. Jyoti Vishwakarma has satisfactorily completed the course of practical for M.Sc in Applied Geology.

Experiments conducted are pertaining to paper GLC-122.

Practicals prescribed by the University for M.Sc Applied Geology, Part-II class, during the academic year 2022-2023.

DEAN
SEOAS

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Goa - 403 206.

FIELD TRIP REPORT

Submitted to

GOA UNIVERSITY

University road, Taleigao, Goa 403206

(Duration: 21st January to 31st January 2023)

For completion of Field Trip Report

Jyoti Vishwakarma

(MSc. Applied Geology Part – II)

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GEOLOGY OF INDIA

The geology of India is diverse. Different regions of India contain rocks belonging to different geologic periods, dating as far back as the Eoarchean Era. Some of the rocks are very deformed and altered. Other deposits include recently deposited alluvium that has yet to undergo diagenesis. Mineral deposits of great variety are found in the Indian subcontinent in huge quantities. Even India's fossil record is impressive in which stromatolites, invertebrates, vertebrates and plant fossils are included. India's geographical land area can be classified into the Deccan Traps ,Gondwana and Vindhyan. The Deccan Traps covers almost all of Maharashtra, apart from Gujarat, Karnataka, MadhyaPradesh and Andhra Pradesh marginally. During its journey northward after breaking off from the rest of Gondwana, the Indian Plate passed over a geologic hotspot, the Réunion hotspot, which caused extensive melting underneath the Indian Craton. The melting broke through the surface of the craton in a massive flood basalt event, creating the DeccanTraps. It is also thought that the Reunion hotspot caused the separation of Madagascar and India. The Gondwana and Vindhyan include within its fold parts of Madhya Pradesh, Chhattisgarh, Odisha, Bihar, Jharkhand, West Bengal, Andhra Pradesh, Maharashtra, Jammu and Kashmir, Punjab, Himachal Pradesh, Rajasthan and Uttarakhand. The Gondwana sediments form a unique sequence of fluviatile rocks deposited in Permo-Carboniferous time. The Damodar and Son river valleys and Rajmahal hills in eastern India Contain a record of the Gondwana rocks. The Indian Craton was once part of the supercontinent of Pangaea. At that time, what is now India's south west coast was attached to Madagascar and southern Africa, and what is now its east coast was attached to Australia. During the Jurassic Period about 160Ma (ICS 2004), rifting caused Pangaea to break apart into two supercontinents, Namely Gondwana (tothesouth) and Laurasia (to the north). The Indian Craton remained attached to Gondwana, until the super continent began to drift apart about in the early Cretaceous, about 125 million 5 years ago (ICS2004). The Indian Plate

then drifted northward towards the Eurasian Plate, at a pace that is the fastest known movement of any plate. It is generally believed that the Indian Plate separated from Madagascar About 90 Million years ago (ICS2004), however some biogeographical and geological evidence suggests that the connection between Madagascar and Africa was retained at the time when the Indian Plate collided with the Eurasian Plate about 50 Million years ago (ICS2004). This orogeny, which is continuing today, is related to closure of the Tethys Ocean. The closure of this ocean which created the Alps in Europe and the Caucasus range in western Asia, created the Himalayan Mountains and the Tibetan Plateau in South Asia. The current orogenic event is causing parts of the Asian continent to deform westward and Eastward on either side of the orogen. Concurrently with this collision, The Indian Plates utured onto the adjacent Australian Plate, for minga new larger plate, the IndoAustralian Plate. The earliest phase of tectonic evolution was marked by the cooling and Solidification of the upper crust of the earth's surface in the Archaean Era (prior to 2.5 billion years) which is represented by the exposure of gneisses and granites especially on the Peninsula. These form the core of the Indian Craton. The Aravalli Range is the remnant of an early Proterozoic orogeny called the Aravali-Delhi Orogen that joined the two older segments that make up the Indian Craton. It extends approximately 500 kilometers (311mi) from its northern end to isolated hills and rocky ridges into Haryana, ending near Delhi. Early Paleozoic rocks are found in the Himalayas and consist of southerly derived sediment eroded from the crystalline craton and deposited on the Indian platform. During the Jurassic, as Pangea began to drift apart, large grabens formed in central India filling with Upper Jurassic and Lower Cretaceous sandstones and conglomerates. By the Late Cretaceous India had separated from Australia and Africa and was moving northward towards Asia. At this time, prior to the Deccan eruptions, uplift in southern India resulted in sedimentation in the adjacent Indian Ocean. Exposures of these rocks occur along the south Indian coastal Pondicherry and in Tamil Nadu. At the close of the Mesozoic one of the

greatest volcanic eruptions in earth's history occurred, the Deccan lava flows. Covering more than 500,000 square kilometers (193,051 sq mi) area, the sea marks the final break from Gondwana.

GEOLOGY OF GUJARAT

Geomorphologically, the State can be divided into three distinct divisions, viz.: a) Gujarat-Mainland.

b) Saurashtra-Kathiawar Peninsula.

c) Kutch Peninsula.

a) Gujarat-Mainland: The well-known agriculturally rich alluvial basin of Gujarat rises from the estuarine tracts between Narmada and Tapi rivers and extends 250 miles (402 km) northwards merging into the desert plains of Rajasthan and the Rann of Kutch. It is roughly 75 miles (121 km) wide. The eastern border of the basin is bounded by Aravali, Vindhya, Satpura, and Sahyadri hill ranges. The topography of the land is obviously controlled by the geological formations. The eastern part of the south Gujarat bordering the alluvial tract has a typical Deccan trap scenery up to Narmada valley. The hills are formed by circumdenudation leaving a wide plateau at top, and a step-like feature because of horizontal lava-flows and their differential weathering.

b) Saurashtra-Kathiawar Peninsula: The Saurashtra is bounded by Gujarat plains in the East and NE, by gulf of Kutch and Little Rann on the north, and on the SE by the Gulf of Cambay. The Arabian Sea borders the entire southern seaboard. The Central part of the region forms an elevated table land, from where most of the rivers rise and flow radially. The terrain generally slopes gently towards the peninsular margin to merge into the coastal plains and the great alluvial tract stretches to NE and east. The sedimentary rocks along the coast from almost a low flat country.

c) Kutch Peninsula: The mainland of Kutch is isolated by the Great Rann of the north and east, Little Rann on the SE, Gulf of Kutch on the south and rest by the Arabian Sea. The central portion of Kutch 7 forms a table-land sloping on all sides, the shape of the region is like a tortoise

and hence the name. In general, there are three hill ranges, trending almost east-west. North-flowing rivers disappear in the Rann; others join the sea. The Banni is formed by sediments deposited by the northern border of the mainland and is composed of fairly good soil. The Rann is a dry bed of the remnant of an arm of the sea, which formally connected the Narmada rift with Sind and separated Kutch from the mainland.

LITHOSTRATIGRAPHIC TABLE

Group	System	Rock Type	Localities	Age in millions of years
Quaternary	Recent and subrecent	Alluvium, Blown sand, Silts of Rann and Banni, Tidal flats and raised beaches.	Alluvial plains of Gujarat, Rann, Banni & Coastal deposits.	0.01
	Pleistocene	Miliolites	(i) Saurashtra coast from Gopnath northwards extending beyond Porbandar. (ii) Kutch area.	1
Tertiary or Kainozoic	Pliocene	Dwarka beds, Manchhar beds, Gypsiferous clays and sandy foraminiferal limestones.	Dwarka, Okha, Piram Island, Kutch.	12
	Miocene	Gaj beds-Highly fossiliferous clays and limestones. Agate Bearing conglomerates. Kand formations.	Saurashtra coast, Kutch	25
	Oligocene	Tarkeshwar clays.	Tarkeshwar (District:Surat) and Kutch.	40
	Eocene	Nummulitic limestones and clays.	Tarkeshwar area and Kutch.	60
Secondary or Mesozoic.	Cretaceous Eocene	Deccan traps with inter trappeans.	Parts of Sabarkantha, Panchmahals, Baroda, Broach, Surat and major part of Bulsar and Dangs Districts. Major part of Saurashtra and small part of Kutch.	
	Cretaceous	Himatnagar sandstones, Lameta (limestones). Bagh beds. Songir sandstones, Nimar sandstones,Wadhavan sandstone (Infratrappeans), Bhuj and Umia series sandstones	Himatnagar, Kapadvanj, Balasinor, Parabia, Dohad, Gabat, Narmada valley, Songir.Near pavagadh. Wadhavan,Dhrangadhra,Bhuj etc.	110
	Jurassic	Katrol series, Chari series, Patcham series (sand-stones, shales and limestones).	Kutch.	150
	Purana (Algonkian & Part of Cambrian)	Erinpura granite (Post-Delhi).	Palanpur, Danta, Idar, Modasa, Taranga, Dharoi, Virpur, Wanakbori, Godhra, etc.	1500
		Delhi System-Alwar quartzites, schists, and calc-gneisses, calcschists of Ajabgarh series.	Parts of Sabarkantha and Banaskantha, and Mehsana Districts.	
Archaean or Azoic		Aravali System-Micaschists, Phyllites, quartzites, etc.	Sabarkantha, Panchmahals, Baroda, Banaskantha.	4000
		Banded gneissic complex.	Baroda District.	

GEPLOGY OF RAJASTHAN

Rajasthan is located in the north-western part of India between Latitude 23°03'-30°12' N and Longitude 69°29'- 78°17'E. It is the largest State in the country with an area of 342, 239 sq. km., encompassing about 11% of the total geographical area of the country.

Rajasthan's geographical area is marked with diversity of land type and is characterized by sand dunes, fertile plains, rocky undulating land and some forested regions. The Aravalli range is considered as the oldest in the world and runs diagonally across the State. Almost two-third State is enveloped by the Thar Desert with arid and semi-arid climatic conditions. There are 33 districts in the State. The population of Rajasthan is about 7.23 crore. Out of the total State area of 342,239 sq km., forest area covers 32,744.4 sq. km. (i.e. 9.57% of total land), markedly the area under mining leases/licenses is approximately 1,846 sq km which is only 0.54 % of total land cover of the State.

Every facet of Rajasthan is unique and fascinating. So is its geology. In terms of age, its rocks range from one of the oldest (more than 3,500 million years) to recent, displaying a wide diversity of mineral deposits. Mining and smelting of base metal deposits are also amongst the oldest in world dating back to more than 2,500 years (about 500 BC). The Zinc-Lead-Silver mines in Rajasthan date back to ancient time, exploiting both shallow oxidised ores and sulphides. Trench, shallow mining, opencast and deep mining extending to over 250 m depth had been identified and use of metal tools and extensive fire setting were prevalent in those days. Metallic Zinc was extracted at an industrial scale from the early 13th to the late 18th century. Metallurgical waste found included Lead slag, litharge from Silver refining and Copper slag.

Today Rajasthan is considered as a museum of minerals, both metallic and non-metallic including renowned building stones. It has a vantage position in having significant resources of radioactive minerals, Lignite, Petroleum and Natural Gas. Rajasthan is the richest state in terms of availability and variety of minerals in the country and produces about 57 different minerals. Rajasthan is the sole producer of lead & zinc ores, selenite and wollastonite. Rajasthan was the sole producer of garnet (gem) till 2004-05. Almost entire production of calcite, natural gypsum and silver in the country comes from Rajasthan. The State is a major producer of ball clay, calcite, clay, copper ore/conc., feldspar, fireclay, limestone, ochre, phosphorite/rock phosphate and steatite. The State is also an important producer of marble, granite, sandstone & Kota stone of various shades. Makrana area is the world famous centre for marble mining. The State possesses substantial share of the total resources of potash (94%), lead & zinc ore (89%), wollastonite (88%), silver ore (88%), gypsum (82%), ochre (81%), bentonite (75%), fuller's earth (74%), diatomite (72%), feldspar (66%), marble (63%), asbestos (61%), copper ore (54%), calcite (50%), talc/steatite/soapstone (49%), ball clay (38%), rock phosphate (31%), fluorite (29%), and tungsten (27%). The State contributed about 12% to the total value of mineral production in the country and occupied second position among the States in 2014-15. It was the sole producer of lead and zinc ores and concentrate, selenite and wollastonite. Almost entire production of silver in the country was also reported from the State during 2014-15. Rajasthan was the leading producer of gypsum accounting for 99%, calcite 96%, phosphorite 95%, ball clay 92%, ochre 89%, talc/soapstone/steatite 82%, fireclay 36% and limestone 21% of the total production of respective minerals in the country. Besides, it was the second leading producer of copper concentrates contributing 41%, petroleum (crude) 24% and kaolin 16% of the nation’s output for the year 2014-15 (IBM Year Book, 2015).

Day - 1

LOTHAL

22/01/2023

Lat: 22’ 31’ 81” N

Log: 72’ 14’ 53”

The archaeological remains of the Harappa port-town of Lothal is located along the Bhogava river, a tributary of Sabarmati, in the Gulf of Khambhat. Measuring about 7 HA, Lothals thick (12-21 meter) peripheral walls were designed to withstand the repeated tidal flood, which probably resulted in the bringing the city to an end. Within the quadrangular fortified layout, Lothal has two primary zones – the upper and the lower town. The citadel or the upper town is located in the southeastern corner and is demarcated by platforms of mud-brick of 4 meters in height instead of a fortification wall. Within the citadel are wide streets, drains and rows of bathing platforms, suggesting a planned layout. In this enclosure is a large structure, identified as a warehouse with a square platform and whose partly charred walls retain the impression of sealings, which were probably tied together, awaiting export. The remains of the lower town suggest that the area had a bead-making factory. In close proximity to the enclosure identified as a warehouse, along the eastern side where a wharf-like platform, is a basin measuring 217 m long and 26 meters in width, identified as a tidal dock-yard. At the north and southern end of the base are identified an inlet and an outlet which would have aided in maintaining the adequate water level to facilitate sailing. Stone anchors, marine shells and seals possibly belonging to the Persian Gulf corroborate the use of this basin as a dockyard where boats would have been sailed upstream from the Gulf of Cambay during high tide.

Images of habitat of Harappan culture.

Well used in Harappan time (Lothal)

The area of the regular activity

Day 2

23/01/2023

Location 1: Amritavarshini Vav

Lat: 23.02.495°N

Long: 72.59.72°E

In the morning we went to the Amritavarshini Vav, which is also known as Panchkuva Stepwell or Katkhuni Vav, is a stepwell near the Panchkuva Darwaja in Ahmedabad, Gujarat, India.HistoryPanchkuva, literally five wells, area derived its name the five wells in the area. Amritavarshini vav was completed in 1723 as per Devanagari and Persian inscription (Vikram Samvat 1779/A.H. 1135) in the stepwell. It was built by Raghunathdas, diwan to Haidar Quli Khan, who was the governor of Gujarat during his stay in the city in 1721–1722 for charitable purpose.ArchitectureSparsely ornamented, Amriavarshini Vav is notable for its L-shaped plan and has simple design. It has three storeys and is more than 50 feet deep. Then we went to see JHOOLTA MINANARA Also known as the Shaking Minarets, they are playful but with a whir of quivering mystery. They have left the best of architects and pioneering design engineers intrigued and in unresolvable wonder. What they cannot unravel is when one minaret is shaken the other begins to vibrate, though the connecting passage between the two remains vibration-free; what causes this vibration is unknown. There are two well-known pairs of Shaking Minarets in Ahmedabad, one located opposite the Sarangpur Darwaja and the other near the Kalupur Railway Station Area. The one near Sarangpur Darwaja is within the vicinity of the Sidi Bashir Mosque built in 1452 AD by Sidi Bashir, a slave of Sultan Ahmed Shah. They are three storeys tall with carved balconies where visitors were once allowed to climb all the way up. The other set of minarets near the Railway Station is taller in height.

Day 2

23/01/2023

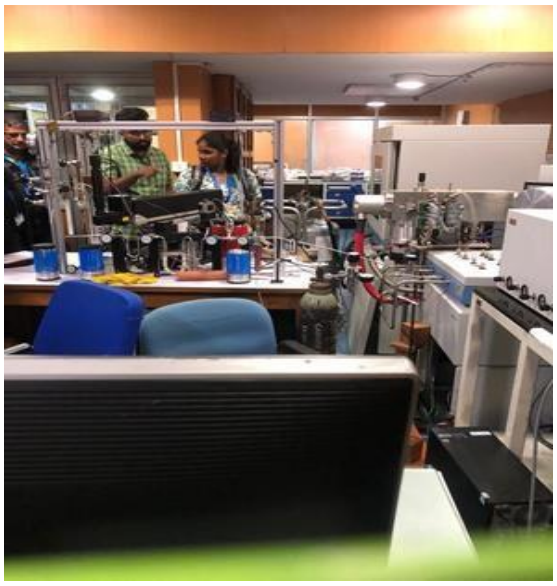
Location 2: Physical Research Laboratory

Lat: 23.03.56° N

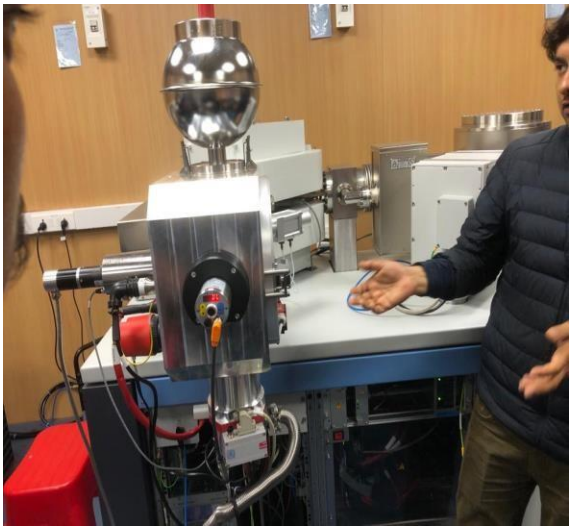
Long: 72.5435° E

The Physical Research Laboratory (PRL), Gujarat is a premier research institute engaged in basic research in the areas of Astronomy and Astrophysics, Solar Physics, Planetary Science and Exploration, Space and Atmospheric Sciences, Geosciences, Theoretical Physics, Atomic, Molecular and Optical Physics and Astro-chemistry. The PRL is actively participating in planetary exploration programmes. Studies of stellar and solar astronomy are conducted from the Infra-red Observatory at Mt. Abu, and a lake site Solar Observatory in Udaipur, respectively. Another campus at Thaltej, Ahmedabad, hosts the planetary exploration (PLANEX) programme.

There are seven divisions of laboratories. We saw five labs in PRL in that first we went to see MCICPMS (Multicollector-Inductively Coupled Plasma Mass Spectrometer) which is an instrument that measures isotopic ratios that are used in geochemistry, geochronology, and cosmochemistry. After that we moved to the ICP MS section which gives the high resolution result which is used as a trace element in water provision of nitrogen, then moved to TIMS lab (Thermal Ionization Mass Spectrometer) heat. Then we went to another lab where we saw IRMS in which we understood how the samples are converted to gas, an elemental analyzer that converts samples to gas. Then moved to AMS (Accelerator Mass Spectrometer) which separates a rare radioisotope from stable isotopes and molecular ions of the same mass using a variety of standard nuclear physics techniques. Then at last we saw the old glass system for preparation of sample for carbon dating eg. Graphite.



PRL Labs images



PRL Labs images

Day 3

24/01/2023

Location 1: Rayoli

Lat N 22° 58’ 14”

Long E 73° 20’ 41”

Ahmedabad – Mahadev Temple

Lithology – Granitoid (Godra Granite)

Tors gray granite coarse grained plagioclase laths observed in the outcrop which exhibit exfoliation weathering. These are compact and massive. The trend of these granitoids is N-S. Large phenocrysts of Feldspar of about 2-5 cm were surrounded by finer matrix mainly composed of biotite and quartz, and orthoclase. At places these euhedral feldspars were aligned in a particular direction which is a characteristic of magmatic flow.

Tors gray granite with Phenocryst

Location 2

Raiyoli Balasinor village

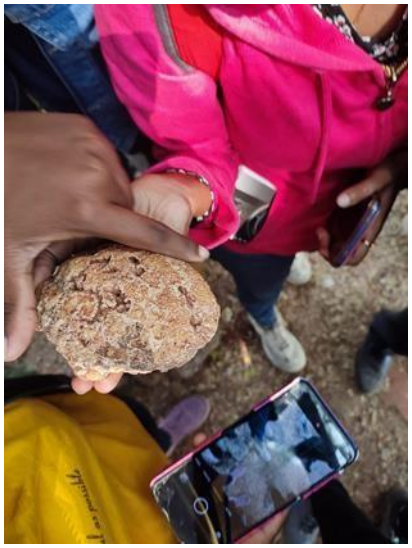
Lat; 22.95.3241 N

Long: 73.33.2550 E

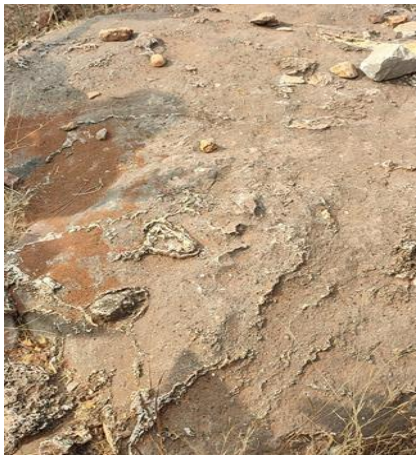
First in the village we saw a conglomerate fine grained matrix which is gray in color and the pebbles are pinkish in color white red look like oligomictic. And we saw the tracer prints of dinosaur eggs and we saw the oval shaped shell structure look like an egg. After that we went to the research area where 75 % of the bone theropod, Sauropod, was found. The spots from where the fossils of dinosaurs are collected were explained by the Dahyabhai Gorabhai Chauhan. Some fossils and spots are shown in the image below.Then we moved to the dinosaur museum which has some history.

In the 1980s Paleontologists accidently came across the fossil remains and bones in the village of Ravioli in Balasinor. Since then, the place has been flooded with researchers and a number of excavations have taken place in the area, the findings of which revealed the fact that there were more than 13 species of dinosaurs that thrived around 65 million years ago. The fossil park here contains life sized statues of those giant creatures and further excavations have found a squat, thick-legged, heavy-bodied carnivorous dinosaur with a crested horn, Rajasaurus Narmadensis, King of Narmada. This creature belonged to the carnivore family of Tyrannosaurus Rex. The large tracts of sedimentary rock layers called the Lameta formation are exposed in this area. The main point of interest in the park is a cluster of 13 barricades that have been put up, not too far from the entrance gate. These enclose rocks embedded with various bone parts of different dinosaurs. With the help of Dr Mohabey, the parts were identified and very informative and helpful boards were put up indicating the original species of dinosaur and the location of that part

in its bone structure, thus allowing the imagination to form a fathomable picture. Ulnas, sternums and vertebrae of Sauropods and Theropods and other such bones are visible and indicated in the cluster of barricades and indicated in the cluster of barricades.



The images of Fossils of Dinosaurs



The images of Research area from where fossils are found

The images of Research area from where fossils are found

The images of Research area from where fossils are found

Day 4

25/01/2023

Lat: 23.02.625 N

Long: 72.5782° E
Location: ONGC

Collection system of oil and gas. First we went to the pipeline area which was connected to the 59 wells. Where we learned the process of collecting hydrocarbons (crude oil). In the starting saw the water injection plant which was installed to increase the reservoir pressure, booster gas compression and there were separators such as LP separator, Group separator, and Test Separator and Process plant from pipeline separator which have different work. Such as test separators are used to check the production. There is a control room SCADA to check. There are three tanks named T3, T2, and T1 for holding. Temperature, Pressure checking parameters there is a Chemist lab to check the Gas fluid, oil. To maintain the age of the pipeline they use gas erosion they inject to maintain the pipeline. Booster compression and bath heater for if the crude oil gets cold then it adds (bath heater) to avoid the increase in mobility. Increasing pressure in no of stages. Intercooler fans to maintain temperature and they use lube oil to lubricate the pipeline. After seeing the all methods and process then we went in the office where we saw the software which use in the Ongc that software is SCADA which use in pipeline industry and came to know that around 50-60,000 liter per oil/gas intake. In the office Gas Detection Panel is there for Gas leakage alarm. The Process of that industry like:

Well → Pipeline → Separator → Compressor


OIL AND NATURAL GAS CORPORATION LTD
ONGC
AHMEDABAD ASSET
GGS-MOTERA

ONGC

Day 5 (Udaipur)

Location 1: Jhamarkotra Phosphorite mine

Lat: 24.4778° N

Long: 73.8360° E

On day 6 we went to the Jhamar kotda mine where we were greeted by the mining engineer, sir took us to the mining area and explained the deposition process of phosphate and explained the mining process. Jhamarkotra belongs to the lower Aravalli Proterozoic. Jhamarkotra shows primitive life without life and with life. Jhamarkotra mine of Rajasthan state mine and Minerals Limited

(RSMML) accounted for 88% of the total production in India. Rock phosphate mines at Jhamarkotra of mine are complex deposit. Deposited around 2000 million years ago. Sedimentary deposit and Blue green algae found in that environment. The ore grades are two types low grade and high grade where 5-25 for low grade and 25 above are the cut of grade 3735% high grade`, Appetite 5-11. There was a secondary phosphate deposit which occurred through injection of magma. It has 12-19 % grade (low grade) the flow direction was North West

- South east 450 MSL. Trace technique used to find the flow's direction. We saw (IBB) Industrial Beneficiation Plant, stacker and declaimer and we saw Apatite Secondary phosphate and saw botryoidal structure. We went to D- Block where we saw high grade ore in powdered form 3536%. Single super phosphate (SSP) 35% phosphate, Non Single Super Phosphate 32%, Rajcose 80-85%. It is called BRP powder. Stromatolite structure in low grade phosphate found in between.

Images of the Phosphorite Mine

Stomatolite structure

Botryoidal structure

Location 2: (Jameshwar Mahadev Temple)

Jameshwar Mahadev Temple is a well-known and revered temple located in the city of Udaipur, Rajasthan. This ancient temple is dedicated to Lord Shiva, one of the most important deities in the Hindu religion, and is believed to have been built over 1000 years ago. The temple is known for its unique architecture, beautiful carvings, and the peaceful and serene atmosphere that surrounds it.

Images of Jameshwar Mahadev Temple

Day: 6

Location 1: Near the Berach River, Dagla khera Chauraha. Chittaurgarh.

Lat: 24’ 54’ 19”

Log: 74’ 37’ 18”

On day 6 in Udaipur we went to Chittaurgarh near the Berach river where we saw the Suket slate of Khorip Group of the Vindhyan super group. The shale is Reddish brown and fine grained and slaty cleavage are seen and some places tightly folded and some places gently folded . In some places there was inclusion of Quartz vein and the folds are Asymmetrical - Symmetry because the bstrikes change as there might be cycles of folding in 1 direction. And we took several readings of the continuity. The readings are as follows:

`1. Strike:N 45’ Dip Direction: N20 Amount of Dip: 58’	`2. Strike:E 50’ Dip Direction: 120 Amount of Dip: 40-42’
`3. Strike:N 42’ Dip Direction: 132SE Amount of Dip: 39-41’	`4. Strike:N 45’ Dip Direction: N135’ Amount of Dip: 65’
`5. Strike:N 44’ Dip Direction: 141SE Amount of Dip: 49’	`6. Strike:N 39’ Dip Direction: 130 Amount of Dip: 51’
`7. Strike:N 47’ Dip Direction: 138 Amount of Dip: 23’	For Fold: Anticline 30’N Syncline 27’N Plunge 20’

Quartz vein Intrusion within the suket slate

Anticline fold in the exposed rock

Symmetrical & Asymmetrical fold

Location 2: Near the Gamberi River, Gandhi Nagar. Chittaurgarh.

Lat: 24’ 52’ 55” N

Log: 74’ 37’ 57”E

Then after the suket slate we went to near the Gamberi River where we saw Limestone exposures the limestone and we took readings of the limestone exposures and they are like:

1. Strike:N 180’ Dip Direction: N 278’ Amount of Dip: 42’	2. Strike:N 178’ Dip Direction: 270 Amount of Dip: 47’
3. Strike:N 174’ Dip Direction: N265 Amount of Dip: 40’	

Day: 7

Location: Rajsamand, Rajasthan

Lat: 25’ 5’ 43” N

Log: 73’ 51’ 37” E

On day 7 we went to the Marble mine where we observed the Marble with a gray deposit. And saw mica chlorite schist, folds seen in the schists and 2 sets of joints and vesicles which were green, white and the serpentine marble are (Saccharoidal).

1. Strike:N 134’ Dip Direction: N 214’ Amount of Dip: 26’	2. Strike:N 136’ Dip Direction: N 223’ Amount of Dip: 28’
3. Strike:N 128’ Dip Direction: N 217’ Amount of Dip: 34’	4. Strike:N 138’ Dip Direction: N 24’ Amount of Dip: 35’

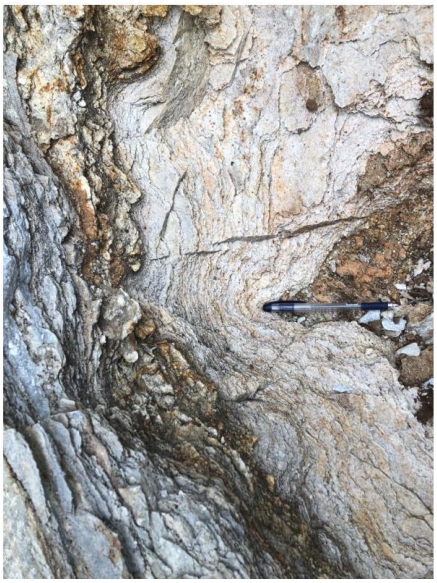


Image of marble Query (fold)

Intrusion of other mineral within the marble

Intrusion of other mineral within the marble

CONCLUSION

Field study in the different parts of the Gujarat, and Rajhasthan such as in Ahmedabad we saw tors grey granite with feldspar phenocryst and in PRL we studied so the different types of spectrometer. Dinosaur Park and their fossils are the imprints of history and evidence of pale environmental behavior. ONGC were a nice experience and practical demonstration of geological knowledge.Then in Rajasthan Udaipur we went to mines like phosphorite mine where we learned the process of mining and gradding low grade, high grade.

The saw suket slate of Khorip Group of the Vindhyan super group. Limestone which with moderate depth. The marble mine where we saw the mica chlorite schist. From the field work we learned so many things such as the process ore grading and got some field experiences which will be helpful in the future.

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