Hello students this is our TY

Paper Course Code GC110 paper title,

Indian stratigraphy

So in this module we will be

seeing Vindhyan supergroup

Their distribution, lithology

stratigraphic sequence.

Structured and economics in part one

outline of this module is introduction

to Vindhyan SuperGroup, distribution,

lithology, and stratigraphic sequence

by end of this module you will be

able to understand the Proterozoic

formation of the Peninsula India

that is the Vindhyan Supergroup

So let's get started

Proterozoic Cratonic basins are nearly flat

lying virtually unmetamorphosed.

And partly deformed portions on

the Peninsula region of India.

These basins formed a significant part

of the preCambrian Shield of India.

They are also known as the Purana

Basin in the Indian Stratigraphy

The word Purana means ancient.

So basically these are the ancient

basins in the Indian Stratigraphy

The Proterozoic basins on the

Indian subcontinental shield.

so are either refer to as

Paleoproterozoic or Meso-Neoproterozoic basins

So let us see what is Vindhyan basin

Vindhyan basin is a Meso-Neoproterozoic basin.

also called as Vindhyanchal Basin

Named after the Vindhyan mountains the

largest Parana basin in the Peninsula,

India.

It is sickle shaped trending East northeast.

Situated on the Bundelkhand craton

on the vast basin

wraps around Bundelkhand granite

and covers an exposed area of

60,000 square kilometers and has

a concealed area of

1,62,000km.sq

Under the Indo Gangetic

alluvial an Deccan traps,

so this is the distribution of the

Vindhyan Basin.

The strata are

exposed in the Son- Narmada valley

Bundelkhand and Rajasthan region.

The Son –Narmada that is the SONA

fault bound the base in the

South and the Great Boundary fault

that is the GBF in the northwest.

So this basin is bounded by.

Two major faults that is the Son –Narmada

fault and the

Great Boundary fault

Geologically,

the Basin extends from Sasaram

in the East to Dholpur in the North,

passing through the Sona Valley,

Bhopal,

Dhar Forest and Chittorgarh and

Sawai Madhopur area.

So this base and has a cross cutting

of different regions geologically.

So let us see the literature

review of a Vindhyan superGroup,

The long history on the studies

of Vindhyan basin commenced from

the work of DH Williams in 1848.

T Oldham in 1856 proposed a

threefold division into Kaimur, Rewa and Bhander.

H.B. Medlicott in 1859

introduced Semri Group for the

sediments underlying the Kaimur

whereas the F. R Mallet in 1869

designated the Semri group as Lower

Vindhyan and distinct from the rest.

That is, the upper Vindhyan and it was then,

It was

realized that each of these group

are important and separate.

Entities altogether,

the stratigraphic scheme that are

currently in used are from

Sastry and Moitra 1984 and Soni et al 1987.

These two are adopted by

Kale and Phansalkar in 1991

so these are the stratigraphy

schemes that we are going to

see and learn to understand.

The Vindhyan supergroup the Vindhyan basin.

So let us see the stratigraphy

The Vindhyan supergroup

can be divided into 2,

that is the lower Vindhyan and

the upper Vindhyan and both this

group composed of sandstone,

shale and carbonates.

And then there are few conglomerate

and volcaniclastic belts within them.

The low Vindhyan is about 1300

to 1100 million years old.

The significant difference between the

lower and the upper Vindhyan is there

type of deposition. the lower Indian.

Is formed by marine.

It has a marine origin consisting of

calcareous and argillaceous sediments,

whereas the upper Vindhyan is fluviatile in

origin and consist of arenaceous rocks.

The entire sequence covers and span

of around 1000 to 600 million years.

That is the upper Vindhyan

The upper and the Lower Vindhyan Super

Group are separated by an unconformity

that is prominent in the North,

but also disappears in the

southern part of the Vindhyangroup.

So this is the geological

distribution map of the Vindhyan.

The Deccan Traps are also relates to

the top most of the Vindhyan group,

discovers major places like indoor

and then Agra is over here.

And just to give you an understanding

of the geological distribution,

this is the entire stratigraphy

of Vindhyan taken from the book

Radhakrishnan and *Vaidyanadan,* the

book titled Geology of India 2010.

So we will be studying each of these

formation or each of these groups in detail.

So in that time I will be talking about or

describing each of these formations.

So let us see the lithology of the.

Lower Vindhyan. The Lower Vindhyan consist

of only one group that is the semri group.

This group,

derived its name from the Semri river

were the formation is well developed

in the Eastern Zone Valley near

Sidhi and around Chittorgarh and

some extent of Bijawar

and Sawai Madhopur

The thickness of this group varies

from 20 to 4345 meters.

This irregularity in the thickness

of this group itself indicates

that the basement is irregular.

so that is the reason for which the

thickness varies from 20 to 4345.

The semri group rest with an

unconformity on the Bundelkhand and Berach

granites as well as on

the Banded Gneissic Complex (BGC) and with

angular unconformity on Bijawar Group.

So if you see the stratigraphy over

here. There is a granite and the Supra

crustal over here and then there is an

angular unconformity or a nonconformity

which marks an unconformity. And above

which the semri group is deposited.

Now this group has a thickness

of about 3000 to 4000 meters.

It is made up of five alternating formations

of shale and carbonates with areas of

sandstone and volcaniclastic units.

So basically it's an alternating

formation of shale and carbonates.

If you can see here there are sandstones,

then limestones, then shales,

then again limestone,

sandstone, limestone shale.

So basically there is a cyclic repetition

of sandstone, shale, limestone,

then again limestone sandstone.

Limestone shale, so this basal

succession consist of conglomerate,

then cross bedded,

ferruginous sandstone, and shales.

So this is the stratigraphic.

Details of the Semri group.

Now the Semri group if you see

over here is again ended up with an

unconformity or a normal contact.

So let us see what is next.

So about the Semri group we have the

upper Vindhyan

We will be studying three different groups.

The first group is the Kaimur Group.

This is named after the Kaimur scarp

It has an conformable.

Contact with the Semri group in

Son Valley and

Chittorgarh and has

an angular unconformity

contact at the Kalinjer Fort.

so if you see here in the last slide

also have mentioned that it is a normal

contact between the Semri and the Kaimur.

So the same way is the lower Vindhyan and

the upper Vindhyan

it has a thickness of about just 400 meters.

So it is very less compared

to the Semri group

It is essentially made up of

sandstone shale Association.

The rubidium strontium Isochron age

of this group formation states and age

of about 1100 to 1150 million years.

So this group again,

consists of sandstones,

shales,

and then we have the Mangesar

formation and Dhandraul

so it's an alternating of sandstone shale.

Deposit. The basal Sararam sandstone

overlain by the Markundi sandstone

and the intervening silicified

Shale indicate in high velocity

coastal stream or buried beach.

Dune type of depositional condition,

so the occurrence of a sandstone indicates

an high velocity coastal stream deposit,

whereas the carbonaceous

Bijaigarh Shale indicate

Swampy condition so the occurrence

of shale indicates that

the condition was swampy,

whereas the pyritiferous shales with pyrite beds

which is seen with the occurrence

of pyrite near near Amjhor area

suggest a quiet water or a lagoonal

Deposit.

While Dhandraul Quartzite

consisting of Arkosic sandstone

with pebbles and shales

indicates Braded ephemeral

stream deposit.

so the occurrence of Quartzite and

shale over here in the topmost part

tells us that there was a kind of a

stream deposit at the end of this group.

So next is the Rewar group.

So Rewa Group is named after

the RewaRiver.

It is characterized by frequent

change in the lateral facies

It is best exposed at

Satna, Shivapuri and Chittorgarh

Now this is also very less thick that

is around 100 to 300 meters whereas

the sediment thickness to the North

indicate deepening of the basin.

So over here if you see the Rewa group,

which is again a normal

contact after the Kaimur group.

Shows shales and sandstone,

shale, sandstone an again,

sandstone type of deposit.

So basically if you see from the base

to the top till now we can only see

transition between a shale and

sandstone and then we see that

there are intercalations of some

carbonaceous or pyroclastic.

Beds within the Vindhyan group.

Then let us see more about Rewa group,

the absence of basal conglomerate

between the Panna Shale

Indicates continuity in the

deposition from Kaimur to Rewa group

so that is what I was talking that

there is a direct normal contact between them

The absence of a basal conglomerate

indicates a direct continuity,

whereas the red Shale, limestone

barytes, and glauconitic siltstone

present at Panna Shale and Asan

Sandstone indicates a

lagoonal environment

whereas the

coarsening upward sandstone with mudcracks

indicate periodical exposure

So these are basically telling

us what was the environment of

the deposition during that time.

The Jhiri shales are separated

From Asan sandstone by

diamondiferous conglomerate at Panna.

The mud cracks and rain prints in the

shale indicates subaerial conditions,

while the red shales with glauconitic

Siltstone indicate a lagoonal environment.

Where as the sandstone indicates

shoreface environment

While the Govindgarh sandstone with

poorly sorted an immature texture

indicates a fluvial or deltaic condition

so the occurrence of these are

Shale and sand,

stone tells lot about the environment

at which the group was deposited.

So the next is the Bhander Group

name of the Bhander Upland,

extensively developed along the axis

of the base and in the Bhopal

inlier within the Deccan Traps.

So this Bhander

Group is quite thick that is

around 1300 to 1500 meters.

Separated from the Rewa group by a

diamond bearing conglomerate horizon so

That makes this group very interesting

Group to study. so if you see over

here in the statigraphy this

over here we have the shales,

the limestone,

the sandstone,

then again shale and sandstone so you

will understand now that basically

the entire sequence consists of shale,

limestone,

sandstone type of cyclic deposition,

so Bhander sandstone are fine grained and soft.

The Ganurgarh shale with

stromatolitic limestone

indicates shoreline.

Lagoonal tidal flat complex.

The top unit of of Maihar consist

of Ripple marks, cross beddings,

an load cast indicating a tidal flat

to the near shore littoral environment.

So all these things indicates

different types of shore to offshore

type of depositional environment

during the formation of the.

Vindhyan group

so in the summary we will

be able to see that this Vindhyan

Super Group is a Meso-Neoproterozoic Basin

and then the distribution that is the

Upper Vindhyan and Lower Vidhyan

We also saw the lithology of each unit

and then we saw how is the Vindhyan is divided

that is the Lower Vidhyan consisting of

the Semri group whereas the upper Vidhyan

consisting of Bhander, Rewa Group and Kaimur Group

Semri Group which is having the maximum

thickness also with the Bhander group.

Where is Kaimur and

Rewa are not thick,

it's very less thick sequence

but still signifies a lot when it

comes to the depositional trends.

This work has been referred from

Ramakrishnan and Vaidyanadan 2010.

It's a classical book on geology of India

and then also geology of India by DN Wadia.

And then now we you can also

refer this work on Google.

Thank you.