Title of the Unit: Unit 3.

In module name: fabric types: relict

& isotropic fabric in metamorphic rocks.

In this particular module,

we will outline the definition

of isotropic fabric.

Highlight the relict fabric in

metamorphic rock and outline few of

the factors responsible for developing

isotopic fabric in metamorphic rocks.

At the end of this module we will be

able to list the relicts fabrics and

metamorphic rocks as well as to describe

isotropic fabrics and state a few

factors responsible and developing.

Fabric and metamorphic rocks.

What is relict fabric?

All metamorphic rocks are

originally either sedimentary.

Igneous and sometimes metamorphic themselves.

The vestiges of the original fabric

and composition of the protolith can

generally be preserved to some degree.

Then the rock is said to have a relict fabric.

These fabric is seen in weakly

metamorphosed bodies of low grade,

and those that have perhaps suffered for a

short duration with little or no deformation.

So relict fabric,

the term relict or palimpsest,

indicates that the feature is

basically inherited from the protolith.

These include features from sedimentary

rocks such as bedding planes.

Cross bedding, ripple marks, the classic

grainn outlines and at times even the

fossil outlines. Relict features from

igneous rocks may include pillow structures,

porphyritic structures or

ophitic and graphic textures.

Therefore,

we can have relict bedding in metasediments

or relict porphyritic texture or

even individual relict minerals.

The suffix-“blasts” or “blastic” indicates

that the feature is of a metamorphic origin,

for example,

porphyro- blastic means a porphyritic-

like texture,

wherein you have a larger grain in

a finer matrix that has resulted

due to metamorphism,

whereas when you use the prefix “blasto”,

this means that the feature is

not of metamorphic origin,

but rather is inherited from the parent rock,

for example.

Blasto-porphyritic indicates an

igneous porphyritic texture that

basically survived metamorphism.

So as Blasto-polkilitic,

blasto-ophitic, blasto-

intergranular,

,

blasto oolitic or blasto amygdaloidal,

these all have their indication

of initial igneous texture.

The original minerals may have not survived,

however,

sometimes the original outlines or

outlines of a characteristic mineral

assemblages may be visible in Low

grade metamorphosed igneous rocks.

The original grain tends to be replaced.

Pseudomorphically by finer grained

aggregates that do not disturb

the original grain boundaries,

for example, ophitic texture,

can be recognized in the metamorphosis

dolerite wherein the labradorite.

is replaced by aggregates of

Epidode _serictite and albite,

and the pyroxene is replaced by sheaves

of actinolite with spine and chlorite.

Relict bedding is commonly preserved.

Also,

Low grade metamorphosed sediments,

however,

care must be taken in interpreting

layers as relict bedding or as

layering of contrasting mineral

composition and fabric that can

develop during metamorphism.

It's in such cases preserve epic-

clastic grain outlines or some kind

of structures such as graded and

cross bedding, if any, will help in

recognition of a relict bedding.

As a grade of metamorphism increases,

very few or lesser conspicuous

relic fabrics are preserved as,

the growth of new metamorphic minerals

obliterates the grains, original outlines.

Severe pervasive deformation can

erase even the largest scale

features such as pillow structures,

which would otherwise normally

survive, or even make the original

tabular form of a dolerite dyke

obscure. So what are isotropic fabrics?

These have random aspects and

appear the same in any direction.

For example, if we look at a bag

of marbles or sugar in a jar,

it all looks the same when

viewed from any angle.

In this particular case,

Non-hydrostatic stresses was

significant in their formation.

Sometimes the term massive

is used for isotropic rocks,

In outcrop or in hand specimen.

The absence of foliation in isotropic

fabric is possible largely or mainly,

basically due to the rocks.

As not all

are not subjected to differential

kind of stress,it is also mainly

the dominance of equal mineral,

such as quartz, feldspar,

garnet, and absence of platy minerals,

such as sheet silicates.

Typically these isotropic fabrics occur around

passively among those emplacements which

are passive of magmatic intrusions around

contact aureoles, that is low pressure.

Therefore, under conditions of low

directed stresses here recrystallization

occurs in near static environments

and therefore it lacks significance

preferred mineral orientation.

Many minerals are equidimensional

and elongate minerals,

that do form, are randomly oriented.

If you have monomineralic

with minor difference where the

orientation dependence is low,

such as in mineral such as quartz or calcite,

there is no preference.

Faces that are developed.

in such minerals occur,

the result is a grain of

granoblastic polygonal texture.

In such cases, relict textures are common,

as there is little shear to destroy them.

Let's take a look at what

is Granoblastic fabrics?

Granoblastic fabrics is first of all

created under hydrostatic state of stresses.

It consists of isotropic

aggregates of equidimensional,

anhedral grains of more or less similar sizes,

for example,

quartzites and marbles.

For granoblastic-

polygonal,

when viewed under thin section,

these grains appear as equidimensional

polygons with grain boundaries

that meet at triple junction at

approximately 120 degrees between them.

This texture,

which is seen in monominerelic rocks,

can also be seen in poly-phase rocks.

But over here these will consist of

isotropic aggregates of polygonal

grains of more or less similar size.

In equant grains such as micas

will be randomly oriented.

Another type of isotropic

fabric is hornfelsic fabric.

It's a typical fabric developed

in contact metamorphosed rocks

such as Pelites or any other

fine grained igneous rocks.

These are fine grain and they lack

foliation and are called hornfels.

These rocks have been baked and

indurated by heat of the intrusive magma.

This magma is usually granitic in nature.

Example biotite hornfels.

Hornfels are, massive, hard, splintery

and sometimes very tough and

durable. Traces of bedding planes

in parent rock may be retained.

Please note depends on the

character of emplacement.

If you had a forceful intrusion,

not a passive intrusion,

this will produce strongly foliated

and lineated rocks that could give

contact gneisses and schists.

Let us take a look at granofelsic fabric

At highest grades of regional metamorphism.

All of the hydrous minerals and

sheet silicates usually become

unstable and thus there are very

few minerals present that would

show preferred orientations.

It is usually rich in quartz and

feldspars with minor amounts

of platy and prismatic minerals.

The resulting rock will be having

a granofelsic fabric,

For example granulite that lacks

foliation at very high grades.

So how are these fabrics developed?

The first thing is that since

it's in solid state,

metamorphism occurs in solid state.

You have recrystallization of new

minerals from pre-existing one.

This could happen out of two processes.

One is recrystallization sensu-strictu where the boundaries

of existing grains are textually

modified in some way.

In this case, no new phases are created.

The static heating can cause

Increase in grain size,

Whereas, recrystallization

of strain grains can yield smaller grains.

An example of grain coarsening is seen in

the conversion of limestone to marble.

The other way.

Fabrics can be developed is by solid

state recrystallization, wherein,

you have nucleation and growth of

crystalline grains of new phase

or phases that are stabilized by

changing the metamorphic conditions

such as formation of white Mica and

chlorite from illite and smectite in

the transition from shale to slate.

Once the nuclei, of

the new phases or phases are viable,

Requisite ions for grain growth

diffuse from nearby decomposing,

unstable or reacting mineral grains.

Some sort of intergranular fluid

is sometimes commonly involved.

Some of the examples of metamorphic

rock that exhibits isotropic fabric is:

first of all,

Quartzite that show a granoblastic

The rock here is entirely made

up of equidimensional quartz.

It is formed by metamorphism of sandstone,

which was dominated by quartzite arenites.

Due to the metamorphic effect.

that occurs, the quartz recrystallize

as interlocking crystals that

make the rock very hard.

This is an image under thin section

showing granoblastic textures.

This is another image that shows

that the grain boundaries of the

quartz meet at almost 120 degrees,

creating triple junctions.

This is also under crossed polarized light.

Another example is your marble,

which was also granoblastic texture.

It is basically when a limestone or a

dolostone as converted into a marble.

So this is made up of recrystallized

calcite or dolomite.

The recrystallization usually

obliterates all fossils.

This is enhanced specimen of a marble

showing granoblastic texture.

These are your references.

Thank you.