

## **S-1:Introduction**

Stratigraphy is the description of all rock bodies forming the Earth's crust and their organization into distinctive, useful, mappable units based on their inherent properties or attributes in order to establish their distribution and relationship in space and their succession in time, and to interpret geologic history.

Stratigraphic classification encompasses all rocks of the crust of the Earth. Rock bodies may be classified according to many different inherent properties. Accordingly, each classification has its own distinctive nomenclature. There are various formal units which are widely used these include.

Lithostratigraphic units – these are units based on the lithologic properties of the rock bodies.

Biostratigraphic units – these units are based on the fossil content of the rock bodies.

Magnetostratigraphic polarity units – these units are based on changes in the orientation of the remanent magnetization of the rock bodies.

Chronostratigraphic units – these units based on the time of formation of the rock bodies.

The goal of stratigraphy is to improve our knowledge and understanding of the Earth's rock bodies and their history.

In this module we are going to learn about lithostratigraphic units

## **S-2: Lithostratigraphy**

First Lets us go through some terms

**Lithostratigraphy:** Lithostratigraphy is the element of stratigraphy that deals with the description and nomenclature of the rocks of the Earth based on their lithology and their stratigraphic relations.

**Lithostratigraphic classification:** Lithostratigraphic classification is the organization of rock bodies into units on the basis of their lithologic properties and their stratigraphic relations.

**Lithostratigraphic unit:** A Lithostratigraphic unit is a defined body of sedimentary, extrusive igneous, metasedimentary, or metavolcanic rocks which is distinguished and delimited on the basis of lithic characteristics and stratigraphic position. A lithostratigraphic unit generally conforms to the Law of Superposition and commonly is stratified and tabular in form.

## **S-3 : Formal lithostratigraphic units**

Let us now discuss the formal lithostratigraphic units

The conventional hierarchy of formal lithostratigraphic terms is as follows:

- **Group>Formation>Member> Bed**

In the successive slides we will discuss each of these in more detail

## S-4: Formation

Formation is the primary formal unit of lithostratigraphic classification.

**Formation:** a mappable rock unit with distinct upper and lower boundaries. It will often represent a single depositional setting, and thus a single rock type or set of related facies.

A Formations must:

- Have a distinct lower and upper boundary
- Have a type section: a particular spot where it is well exposed and can be compared to other localities
- Have been laterally continuous during formation
- Be stratigraphically continuous from top to bottom (except for intertonguing)
- Be mappable on a standard quadrangle-scale map

Formations are the only formal lithostratigraphic units into which the stratigraphic column everywhere should be divided completely on the basis of lithology.

A formation is not defined in terms of its age either by isotopic dating or in terms of biostratigraphy. Information about the fossil content of a mapping unit is useful in the description of a formation but the detailed taxonomy of the fossils that may define the relative age in biostratigraphic terms does not form part of the definition of a lithostratigraphic unit. A formation may be, and often is, a diachronous unit, that is, a deposit with the same lithological properties that was formed at different times in different places.

The thickness of formations may range from less than a meter to several thousand meters.

e.g. in Goa we have the Barcem Formation, Sanvordem Formation, Bicholim Formation, Vageri Formation of the Goa Group of rocks.

## S-5: Member

**Member** is the formal lithostratigraphic unit next in rank below a formation.

Laterally continuous distinct strata within a formation can be formally named members. A member is smaller than its containing formation, and might be too thin to be mappable

It possesses lithologic properties distinguishing it from adjacent parts of the formation.

An example would be a formation composed mainly of sandstone but which included beds of conglomerate in some parts of the area of outcrop.

A formation need not be divided into members unless a useful purpose is served. Some formations may be completely divided into members; others may have only certain parts designated as members.

A member may extend from one formation to another.

## **S-6 : Bed and Laminae**

Bed is the smallest formal unit in the hierarchy of sedimentary lithostratigraphic units, e.g. a single stratum lithologically distinguishable from other layers above and below.

Customarily only distinctive beds particularly useful for stratigraphic purposes are given proper names and considered formal lithostratigraphic units. These beds may have economic significance or be useful in correlation because of their easily recognisable characteristics across an area. The term 'bed' is usually applied to layers a centimetre to a few metres in thickness. Those of less thickness are called laminae

## **S-7: Group**

Where two or more formations are found associated with each other and share certain characteristics they are considered to form a group. Groups are commonly bound by unconformities which can be traced basin-wide.

Several stratigraphically continuous formations can be combined into a formal Group.

E.g: Goa Group

Formations need not be aggregated into groups unless doing so provides a useful means of simplifying stratigraphic classification in certain regions or certain intervals. Thickness of a stratigraphic succession is not a valid reason for defining a unit as a group rather than a formation.

## **S-8: Supergroup and subgroup**

The term "supergroup" may be used for several associated groups or for associated groups and formations with significant lithologic properties in common.

Unconformities that can be identified as major divisions in the stratigraphy over the area of a continent are sometimes considered to be the bounding surfaces of associations of two or more groups known as a supergroup.

Exceptionally, a group may be divided into subgroups.

E.g. Dharwar Supergroup is further subdivided into Chitradurga and Bababudan subgroups.

## **S-9: Boundaries:**

Boundaries of lithostratigraphic units are placed at positions of lithic change. Boundaries are placed at distinct contact or may be fixed arbitrarily within zone of gradation. Both vertical and lateral boundaries are based on the lithic criteria that provide the greatest unity and utility.

## **S-10: Type Section**

A type section is the location where the lithological characteristics are clear and, if possible, where the lower and upper boundaries of the formation can be seen.

The type section will normally be presented as a graphic sedimentary log and this will form the strato type. It must be precisely located to make it possible for any other geologist to visit the type section and see the boundaries and the lithological characteristics described.

**Thank you.**