

Geological mapping Techniques

Geological mapping is a recording of observations on the rock exposures, plotting them on a base map and logically interpreting the observation towards unraveling their evolutionary history i.e their mode of origin, diagenesis, metamorphism and the processes that lead to their present deposition. This also helps us to know about :

- The age of the rock present and sometimes even the fossils and minerals they contain.
- The distribution of rock present and the position of structure such as faults, folds and unconformities.
- The relationship between the older and younger rocks.
- The mineral deposits that rock may contain.
- The location of many physical features, such as landslides, quarries, springs , caves etc.

Geological Mapping Steps

1. Planning
2. Observation, mapping and collecting data by examination of all geological features on ground, Photography.
3. Laboratory study
4. Computation, Synthesis and subsequent interpretation of data through application of modern technique.
5. Finally, preparing a report of work.

Basic tools for Geological mapping

1. Base map : for plotting correct location
2. For examination and collection of rock and minerals : Geological hammer, Brunton compass, hand lense etc
3. For recording and representation of field data : Camera, field note book, Pencil, graph etc.

Geological Mapping Procedure

1. Locating Field data on a base map: Locating position on a base map, the map itself has to be oriented with reference to “North” direction.
 - Location by Observation: Data can be plotted directly by inspection when the configuration of surface feature makes it possible to identify them on the map.
 - Location by bearing and Pacing : A point may be located by reading a bearing to a nearby point that can be identified on the map and then by pacing and scaling the distance to that point.
 - Using Global Position system: Handheld GPS instrument have become standard surveying equipments. GPS can be used in two main ways: First, location coordinates can

be pre entered into the unit so the unit can be used to guide the geologist to a pre-determined point, perhaps obtained from a map.

Second, GPS are used to guide in the field is to “ mark” or automatically record a way point which in the field and then point the location map.

2. Field Observation:

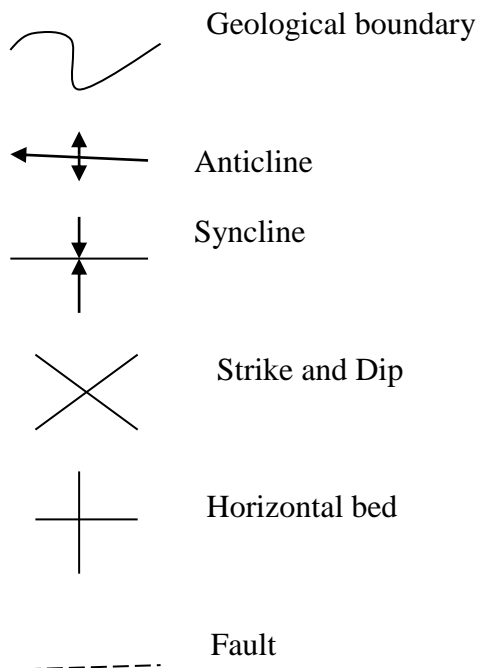
- a. Topography and Relief:
- b. Geological Structure :

3. Plotting of field data and preparation of Geological map :

The data plotted on map generally are :

- Outcrop / projected outcrop pattern of different mappable rock unit.
- Their contacts
- Attitude of primary structure i.e bedding, cross bedding etc.
- Attitude of secondary structure like folds, fault etc.

All these features are to be plotted on the map using standard symbols:



Plotting of Dip, Strike with the help of clinometers, Brunton etc.

Relation between topography and outcrop patterns of bed

- Abrupt change in topography
- Abrupt change in dip and strike
- Presence of slickenside and striation
- Observation in an exposure

- Mapping when a group of older rock strike into the base of a group of younger rock.

4. Recording in field note books

The type of information to be recorded on a field map is :

- i. The location of all rock exposure examined
- ii. Brief notes on the rock seam
- iii. Structural symbol and measurements, such as those for dip and strike.
- iv. Location from which each or fossil specimen was collected.
- v. The location at which every photograph was taken or field sketch made.
- vi. Topographic features from which geology may be indirectly inferred but which are not already printed on map.
- vii. All contacts, including faults both contain and inferred .
- viii. River terraces, beach terraces and other similar features.
- ix. Alluvium, scree, boulder clay and other superficial materials including load debries.
- x. Cuttings, quarries and other man-made exposing geology e.g. pits and boreholes

5. Collection of samples:

Samples are specimens of the rock type occurring in the area should be collected for further studies like sedimentology, petrology etc.

6. Cross section and two dimensional illustrations

- Plotting and drawing cross section
- Calculation and apparent dip
- Down – plunge projections

7. Preparation of Geological Report

- Preparation
- Revision and Editing
- Layout:
 - ✓ Title page
 - ✓ Content
 - ✓ Abstract
 - ✓ Introduction
 - ✓ Main body/ text
 - ✓ A locality Index
 - ✓ Photography
 - ✓ Conclusion
 - ✓ Bibliography
 - ✓ References
 - ✓ Appendices

Interpretation of Maps

1. The colour or pattern used on map indicates that only one stratum outcrop over a broad area.
2. Different strata outcrop in relatively straight, parallel belts
3. Different strata appear in sinuous or Zig Zag belt
- a. Relief is considerable: The boundaries between strata are roughly parallel to contours, following these up valleys and thus giving a tree like or dendritic pattern.
- b. Different strata appear in roughly concentric closed belt: The boundaries between strata are parallel to the contour. The closed belt appear only in isolated hills, elsewhere on the map, in valleys and on spur.
4. The beds are exposed in regular sequence across the strike
 - a. If the dips in different beds are in the same direction with nearly constant value (homoclinal) the outcrop of rock unit are elongated along the regional strike. Younger bed will be met with while traversing towards dip direction indicating the order of superposition.
 - b. If the strike of beds are in same direction, but the beds are repeated in inverse order with reversal of dip direction, a folded structure is indicated.
 - c. Closure of beds, accompanied by swing in strike indicate outcrop of folded strata.