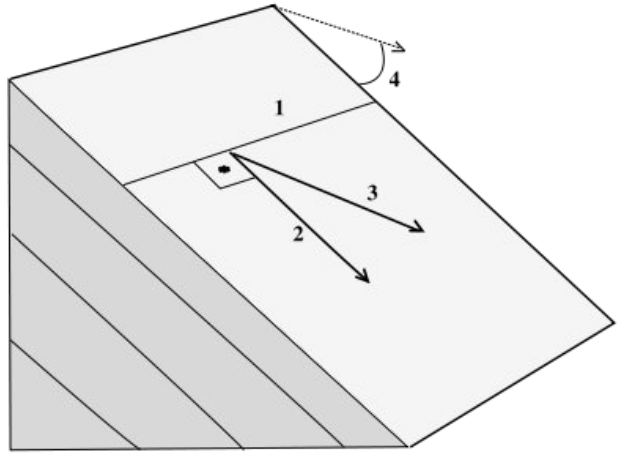
OUT CROP: **The portion of rock beds which project above the earths surface and are thus exposed to view.**

DIP: Deposition of strata may take place in horizontal or in inclined position depending upon the original surface over which the deposition takes place. If the deposition is horizontal due to earth movement, the beds are tilted and their original position is lost. The beds become inclined in any direction. This inclination of beds with horizontal plane is known as Dip. The direction in which bed has a maximum inclination is known as Direction of Dip

STRIKE: The direction of the line formed by inter section of a rock surface with a horizontal plane. The Strike is always perpendicular to the direction of the dip.

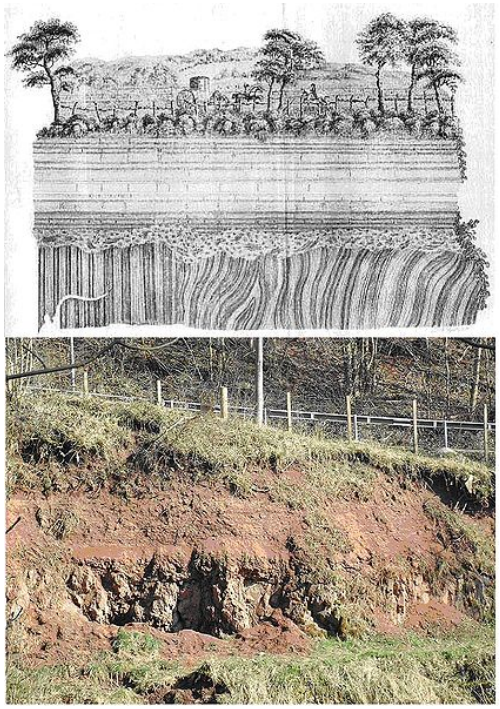


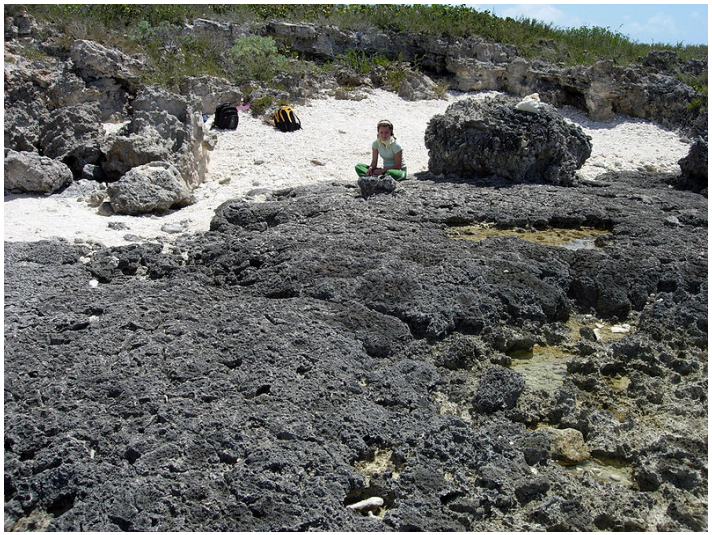
Strike and dip of the beds. 1-Strike, 2-Dip, 3-Apparent dip
4-Angle of dip

OUTLIER: A mass of comparatively new rocks surrounded by older rocks. It is an erosional feature.

INLIER: A mass of old stratified rocks surrounded by newer strata. It is an erosional feature produced by erosion of synclines.

UNCONFIRMITY: When strata are deposited in uninterrupted succession, layer upon layer, they are said to be conformable. On the other hand, sets of rocks whose regular succession is thus interrupted are said to be unconformable and the structure is known as unconfirmity. It may be local or regional. When two sets of beds are inclined to each other at an angle, the term Angular unconfirmity is applied. When beds on opposite sides of the unconfirmity are parallel, the term disconfirmity is applied. A disconfirmity covers a large area and represents a considerable inter lock of time.This generally indicates transgressional and regressional features. In brief it may be stated that every unconfirmity is an erosional surface of one kind or another. The process of unconfirmity is important in the correlation of rocks especially when they contain fossils.

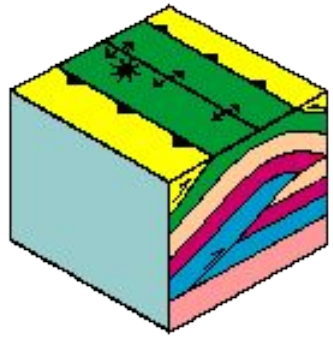




FOLD

A FOLD is a bend in the rocks. Folding means contraction in an area and hence a number of troughs and archs are built. The arches of the fold are known as ANTICLINES, while the troughs are called as SYNCLINES. Due to presence of such anticlines and synclines, the whole crust appears to have a wavy structure. Every fold consists of sides known as LIMBS and the top known as CREST.

The line which divides the fold into two equal parts is known as AXIAL LINE or the AXIS OF FOLD, and this plane is called the MEDIAN PLANE or AXIAL PLANE. The angle between the axis of fold and the horizontal plane is known as PITCH OF THE FOLD, whereas, the angle between axis of fold and the vertical plane is known as PLUNGE OF THE FOLD.



KINDS OF FOLDS

ANTICLINE FOLD : Upward fold opening downwards. Two limbs dip in different directions from the crust. Younger rocks found in the crest while older found at the bottom where it opens.

SYNCLINE FOLD: Concave upward fold. Limbs in a syncline commonly slope towards axial plane. Core contains the younger beds and the limbs the older ones. A large syncline with numerous folds is known as synclinorium

SYMMETRICAL FOLD: In which axial plane is vertical and the limbs are of equal inclination to it and of equal length

ASSYEMETRICAL FOLD: In which limbs are unequally inclined to the axial plane or unequal length

INCLINED FOLD: **Also known as oblique fold. Here the axial plane is inclined but not sufficiently inclined to invert on any other bed**

HOMOCLINE FOLD: **When a group of strata which have a fairly regular amount of dip in the same direction**

MONOCLINE FOLD: **In which there is only one bend and the beds are horizontal on both sides of the bend**

UPRIGHT FOLD: **In which axial plane is vertical**

OVERTURNED FOLD: **In which axial plane is inclined and one limb is partly doubled under the other**

RECUMBENT FOLD: **In which one limb practically resting on the other and the two limbs are more or less in horizontal position**

FAN FOLD: **If in any fold both the limbs are overturned, the same assumes the shape of a fan**

CHEVRON FOLD: **In which crests and troughs are sharp**

ISOCLINAL FOLD: **In which limbs are parallel to each other and to the axial plane**

OPEN FOLD: **In which limbs are folded in such a way that the thickness of the limbs remain same throughout the fold**

CLOSED FOLD: **In which the beds thin out at the limbs and thicker at the crest and troughs due to plastic flow of constituent material**

DRAG FOLD: **When a weak bed lies between two strong beds, any sliding motion in the stronger beds leads to the development of a drag fold**

PLUNGING FOLD: **In which top of axial plane is dipping in a vertical plane. The plunge of such a fold is defined in terms of amount and direction of dip of the axis of fold**

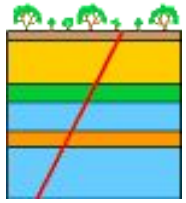
DOME: It is a doubly pitching anticline. In a dome beds appear to dip in all directions away from the central point

BASIN: It is a doubly pitching syncline. Beds in a basin dip towards a common point from all directions

COMPLEX FOLD: When the compression is great, the folds become steeper, turn over , lie down and even thrust each other

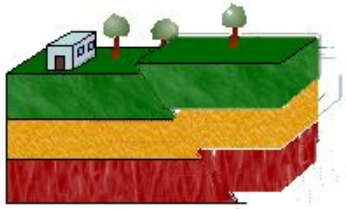
FAULTS

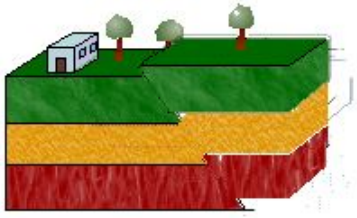
A fault is a fracture surface against which the rocks have been relatively displaced. The plane along which the displacement takes place is known as **Fault Plane**. If the surface of displacement is smooth, it is termed as **Sliken Side**, if at all full of angular fragments, it is termed as **Fault Breccia**. The block above the fault plane is called **Hanging Wall**, while that beneath the fault plane is **Foot Wall**. The **Hade** of the fault is the angle subtended between the fault plane and any vertical plane striking in the same direction. **Dip** and **Hade** are necessarily complimentary to each other. The total displacement is called **Net Slip**, the Slip is measured on fault plane and termed according to its direction as **Dip Slip, Strike Slip, Vertical Slip, Horizontal Slip, Horizontal Dip Slip. Throw** is vertical Displacement between **Hanging Wall** and **Foot Wall**, the side that relatively goes upwards is **Upthrow** while the side that goes down is **Downthrow**. **Heave** is the horizontal displacement between hanging wall and foot wall.

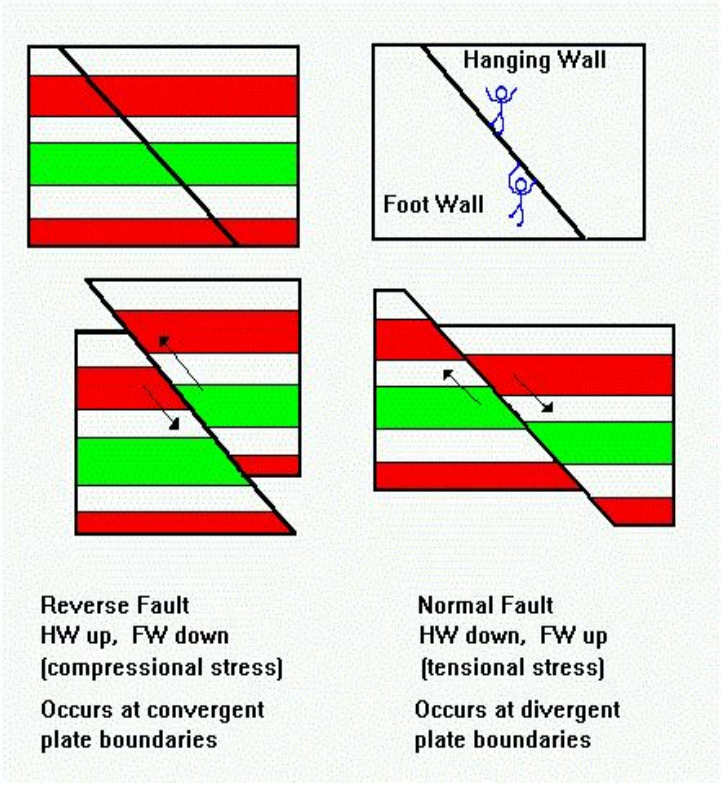


TYPES OF FAULT

NORMAL AND REVERSE FAULT: If the dip of the fault is in the direction of down throw, it is a normal fault and if the dip of the fault is in the direction of upthrow, it is a rverse fault. A low angled reverse fault is called as thrust



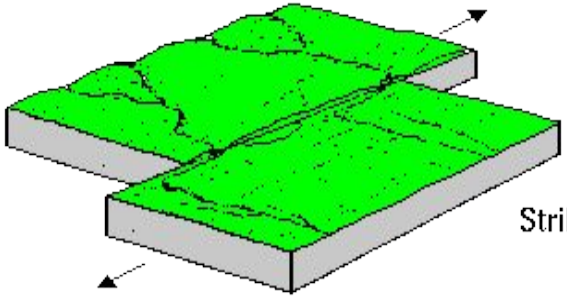




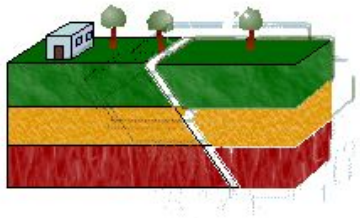
DIP, STRIKE AND OBLIQUE FAULT: When displacement takes place in dip direction, it is called Dip Fault, when displacement takes place in strike direction, it is called Strike Fault and when displacement is neither parallel nor to the strike of rocks, it is called Oblique Fault

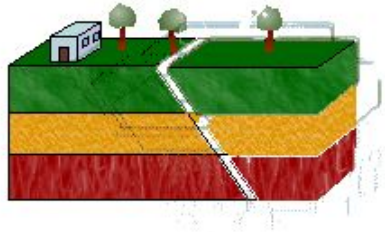
DIP SLIP, STRIKE SLIP AND OBLIQUE SLIP FAULT: The relative movement of the fault is either along the dip and strike direction of the fault plane, it is called as Dip Slip Fault and Strike Slip Fault accordingly. The strike slip fault is also known as Wrench. When the movement is oblique to the strike and dip of the fault plane, it is called Oblique Slip Fault

PARALLEL AND STEP FAULT: A series of faults having the same dip and strike constitute a group of Parallel Faults. If in a series of parallel faults, the successive blocks are down throw more and more towards a particular direction, it gives rise to Step Fault. If there be two series of step faults which converge, the resulting structure is known as Grabben or Trough fault. On the other hand if there be two series of step faults which diverge, t5he resulting structure is known as Ridge or Horst.



Strike-slip fault





Oblique slip fault

ROTARY FAULT: Faulting is sometimes attended by pivotal motion, thus producing down throw at one end and up throw at other end.

HINGE FAULT. It shows displacement at one end while the other remains at its original position.The throw is zero at hinge and goes on increasing along the fault line

VERTICAL FAULT: If the fault plane is vertical, it is known as vertical fault.

BLOCK FAULT: If a block is bounded on two or more sides by gravity faults, the resulting structure is known as Block Fault.

SEDIMENTARY ROCKS

SEDIMENTARY ROCKS are those rocks which are formed on the surface of earth as a result of action of water, air and organic masses. Many sedimentary rocks are stratified. The formation of the layer is connected with the condition of sedimentation. The layers are distinguished from each other by the composition, the size, colour and structure. In some cases, all these features exit simultaneously;y, I.e. the composition, size of the grains, colour and density of one layer differ from those of another.

There are sedimentary rocks in which no stratification is observed, for instance, limestone deposited in the sea as a result of the powerful activity of reef building corals and plants. Another common characteristics of many sedimentary rocks is the rounded nature of the fragments and particles which constitute them.

The sedimentary rocks often contain fossils, whereas igneous and metamorphic rocks do not contain them.

METAMORPHIC ROCKS

METAMORPHISM refers to any change in mineral composition, structure or texture of an igneous or a sedimentary rock whereby the original rock character is notably altered. Rocks which have been so formed are called **METAMORPHIC ROCKS.** The most important agents which bring metamorphism are heat, pressure and other chemical reactions. When heat is the dominating factor in changing the rocks, it is said to be **THERMAL METAMORPHISM.** When lateral pressure bring change in the rock, it is said to be **DYNAMIC METAMORPHISM.** On the other hand when there is downward or transverse pressure aided by water, it is called a **STATIC METAMORPHISM.** When heat and pressure both co-operate in bringing about metamorphism, the process is called as **DYNMO-THERMAL METAMORPHISM.** When metamorphism is only of local importance, it is called **LOCAL METAMORPHIM** otherwise **REGIONAL METAMORPHISM.**

There are three zones of metamorphism:

1. **Epizone – Metamorphism near the earths surface**
2. **Mesozone – Metamorphism in the intermediate part of earths interior**
3. **Katazone – Metamorphism deep in the earth**

Metamorphic rocks are coarse grained with a marked development of foliation, which distinguish them from igneous and sedimentary rocks. Another characteristic feature of the metamorphic rocks is the presence of minerals such as Kyanite, andalusite, Sillimanite, Zoisite, Wollastonite, Staurolite and Chebasite etc. which are neither found in igneous nor in sedimentary rocks.