Structural Geology
and
Structural Analysis

The Earth is a Dynamic Planet.

Structural geology is about folds, faults and other deformation structures in the lithosphere – how they appear and how and why they formed.

The word structure is derived from the Latin word *struere*, *to build,*

A geologic structure is a geometric configuration of rocks, and structural geology deals with the geometry, distribution and formation of structures.

Structural geology only deals with structures created during rock deformation, not with primary structures formed by sedimentary or magmatic processes.

Applications

The primary goal of structural geology is to use measurements of present-day rock geometries to uncover information about the history of deformation (*strain*) in the rocks.

- Economic geology: *Deposits of gold, silver, copper, lead, zinc, and other metals, are commonly located in structurally complex areas.*
- Petroleum geology: *traps that accumulate and concentrate fluids such as petroleum and natural gas.*
- Engineering geology: *physical and mechanical properties of natural rocks*
- *etc……..*

Geologic Structures

Types of geologic structures:

(1) Primary structures: those which develop at the time of formation of the rocks (e.g. sedimentary structures, some volcanic structures, ... etc.).

(2) Secondary structures: which are those that develop in rocks after their formation as a result of their subjection to external forces.

(3) Compound structures: form by a combination of events some of which are contemporaneous with the formation of a group of rocks taking part in these "structures".

PRIMARY STRUCTURES

They are very important :

- Primary structures often allow us to determine to original facing direction of strata.
- Primary structures can be used as strain markers in deformed rocks.
- Primary structures help us interpret the conditions under which the rock was formed.
- Some primary features (fossils) are useful in age determination.

Sedimentary structures

- Bedding
- Graded beds
- Ripple marks
- Crossbeds
- Sole marks
- Channel structures
- Mud cracks
- Fossils (tracks, imprints, body fossils etc., . stromatolites)
- Impact features (raindrop imprints, volcanic bombs etc)
- De-watering (flame) structures
- Soft-sediment deformation
- Reduction spots

Igneous structures

- Columnar jointing
- Flow surface features
- Pillow basalts

Secondary structures

Types of secondary geologic structures: *folds, faults , joints , foliation and lineation.*

Compound Structures

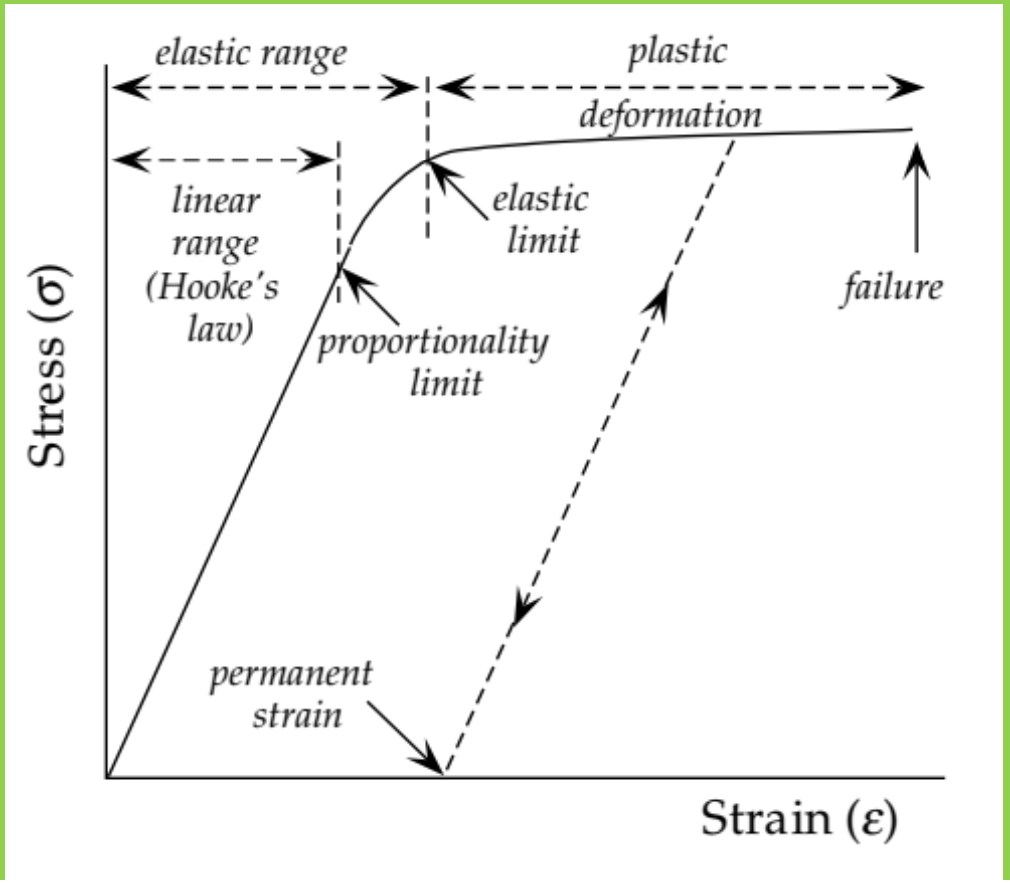
Unconformities

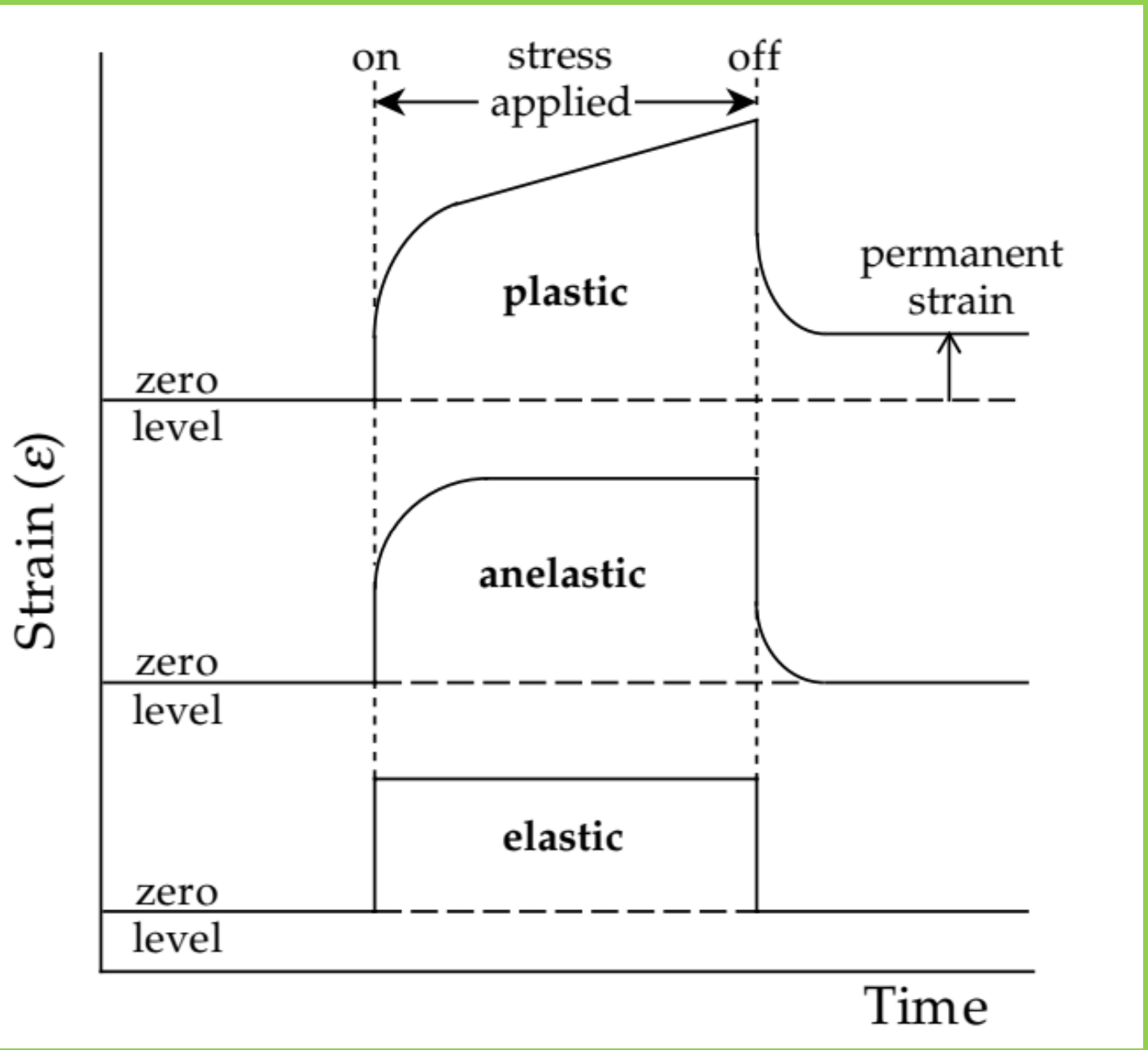
Deformation

RHEOLOGY

Rheology is the science of the deformation and flow of solid materials.

The strain in a body is proportional to the stress applied to it. This linear relationship is called Hooke's law.

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