Deformation and Strain

- Deformation structures
 - Tectonic (as opposed to primary) structures
- Deformation: change has taken place in the rock body
- Configuration:
 - the general term referring to the positions and geometrical arrangement of all points making up <u>a continuous body</u> (continuum) such as a volume of rock

Deformation: Change of Configuration



How can one recognize the change of configuration in rock?

One need markers!

2 Types of Deformation

- 1. Rigid-body motion
 - Change of position of the body but no shape nor volume change

RB translation, RB rotation, Both

- 2. Deformation (motion of deformable bodies)
 - Volume change along (expansion, contraction)
 - Shape change
 - Both

Strain: measure of the degree of deformation

- Length change (longitudinal strain)
 - Elongation = change of length/initial length (+ means elongation or extension, - means shortening)
 - Stretch
 - Natural strain = natural logarithm of Stretch (why?)
- Angle change (shear strain)

Homogeneous and heterogeneous deformation

- If everywhere the strain is the same, the deformation is said to be homogeneous. Otherwise, heterogeneous.
- Criterion: in homogeneous deformation, all straight lines before deformation remain straight after deformation.

Homogeneous vs heterogeneous deformation



Which ones are heterogeneous deformations?

Linear strains

- Elongation
- Stretch
- Logarithm strain (natural strain)