Geological contacts

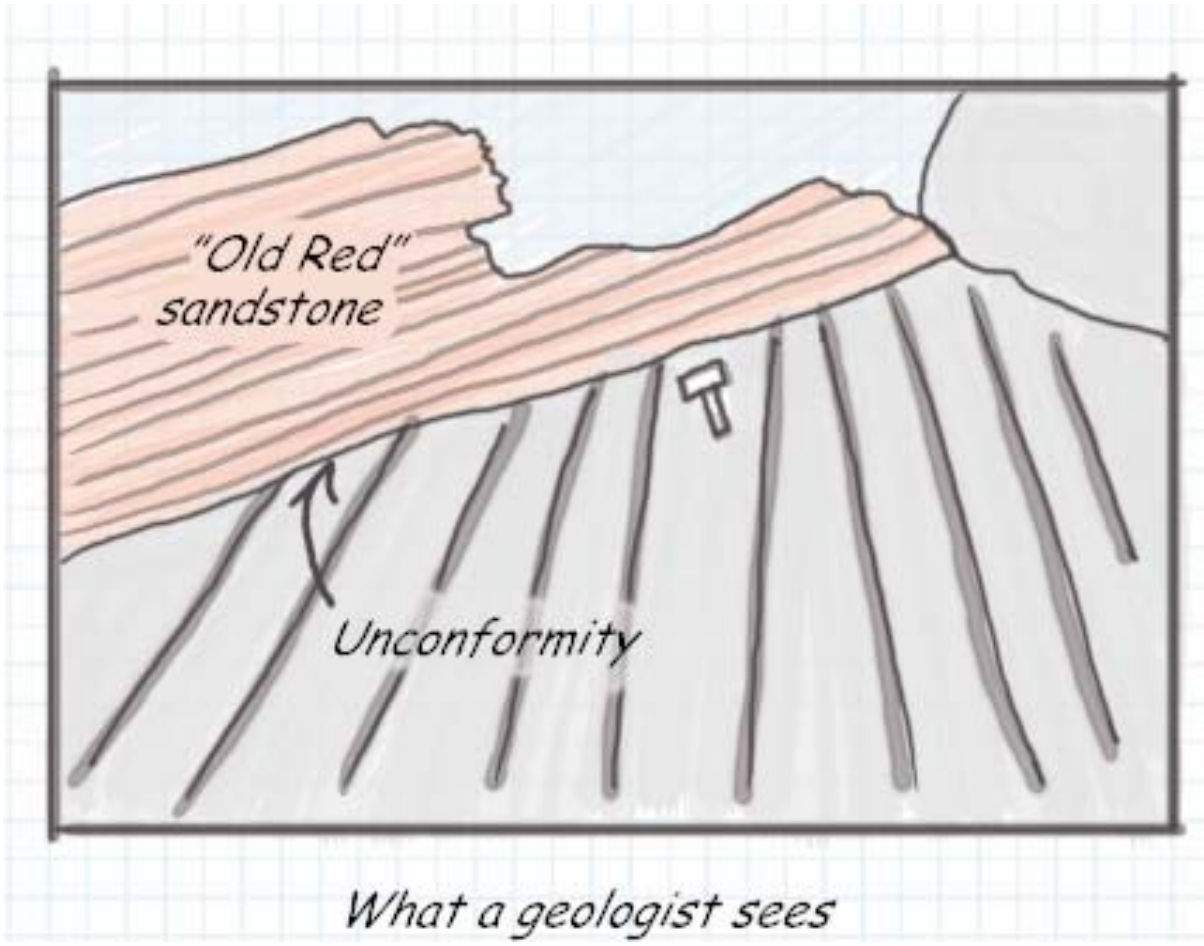
Primary contacts:

- Depositional
  - Conformity
  - Unconformity:
    - Disconformity (parallel unconformity)
    - Unconformity (angular unconformity
    - Non-conformity
- Intrusive

Tectonic contact

fault

Note the relative time relationship between units



What a geologist sees

Three Types of Unconformities

Formation of a disconformity

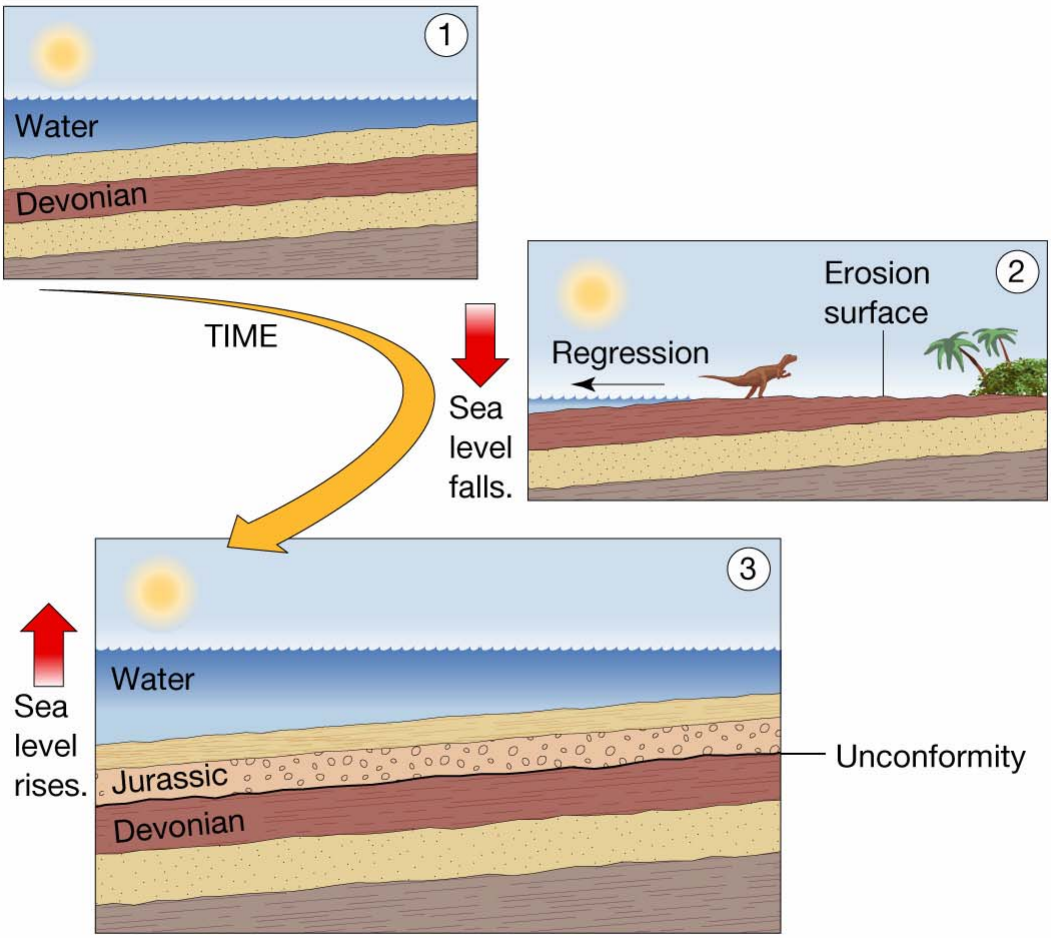


Figure 10.6c

Formation of angular unconformity and non-conformity

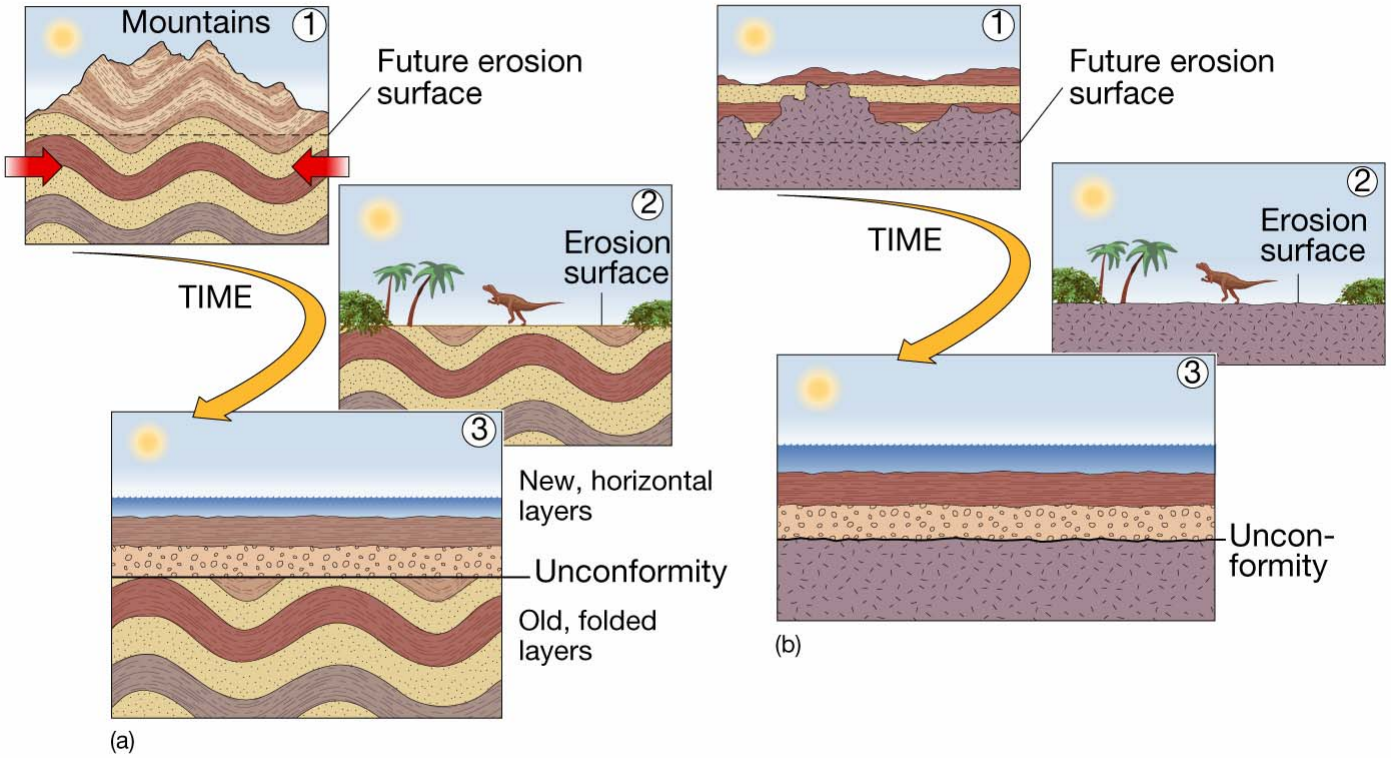
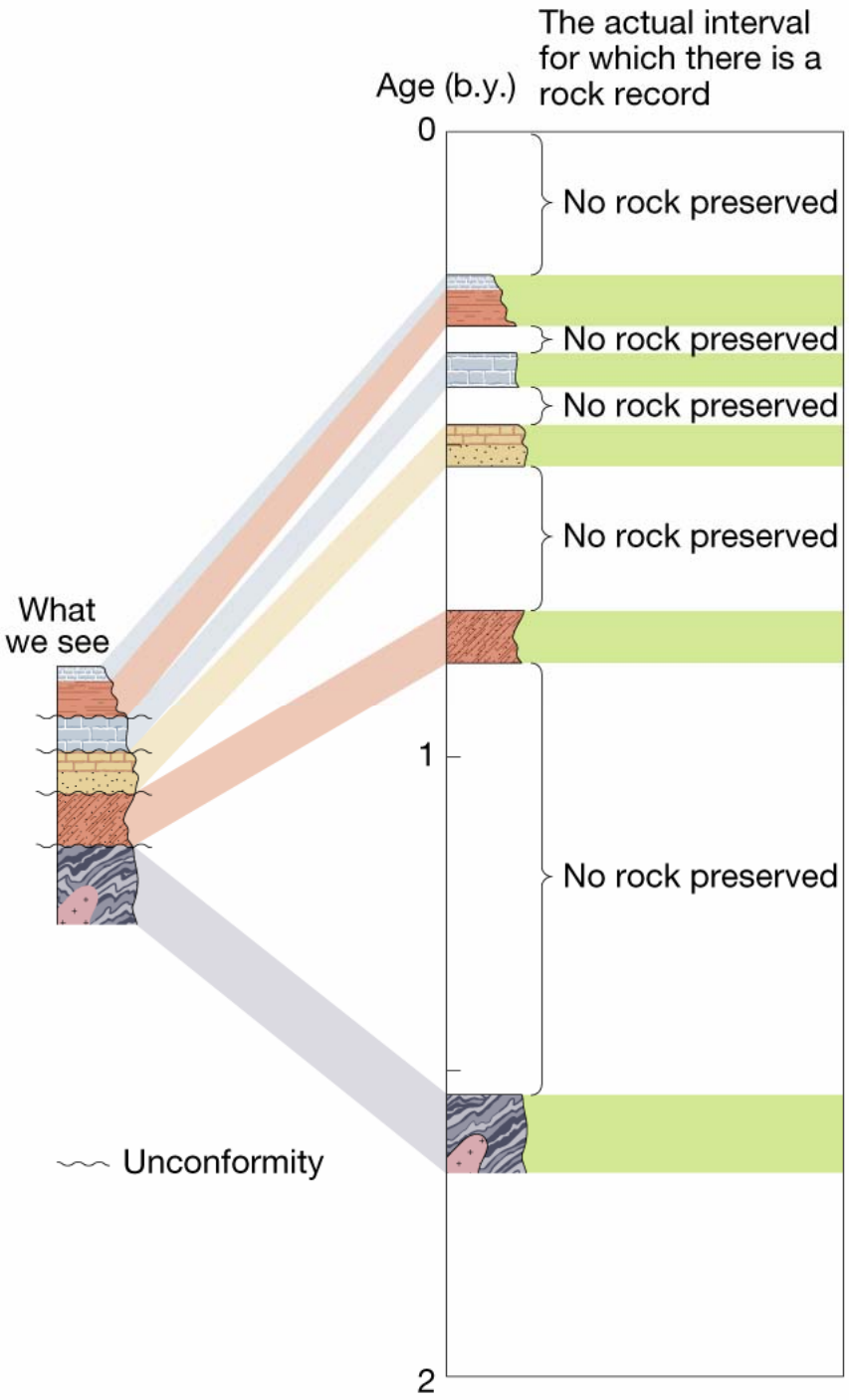


Figure 10.6a, b



- Geological mapping is essentially: 1) putting important geological contacts onto a base topographic map, 2) putting geol measurement on the map.

- Note geological contacts are complicated surfaces; they are NOT lines!

- A lot is learned about Earth history from geological mapping.

Attitudes of Planes and Lines

The first thing to do in a structural study is to determine the orientation of various structures.

Any structure can be reduced to planar and linear elements.

Let us therefore start with attitudes of planes and lines.

Attitude: general term for the orientation of a plane or line in space.

Azimuth: the angle of a horizontal line with respect to the North measured clockwise.

Trend: the direction of a line in a horizontal plane, specified by its azimuth.

The direction can be expressed in either azimuth or quadrant format.

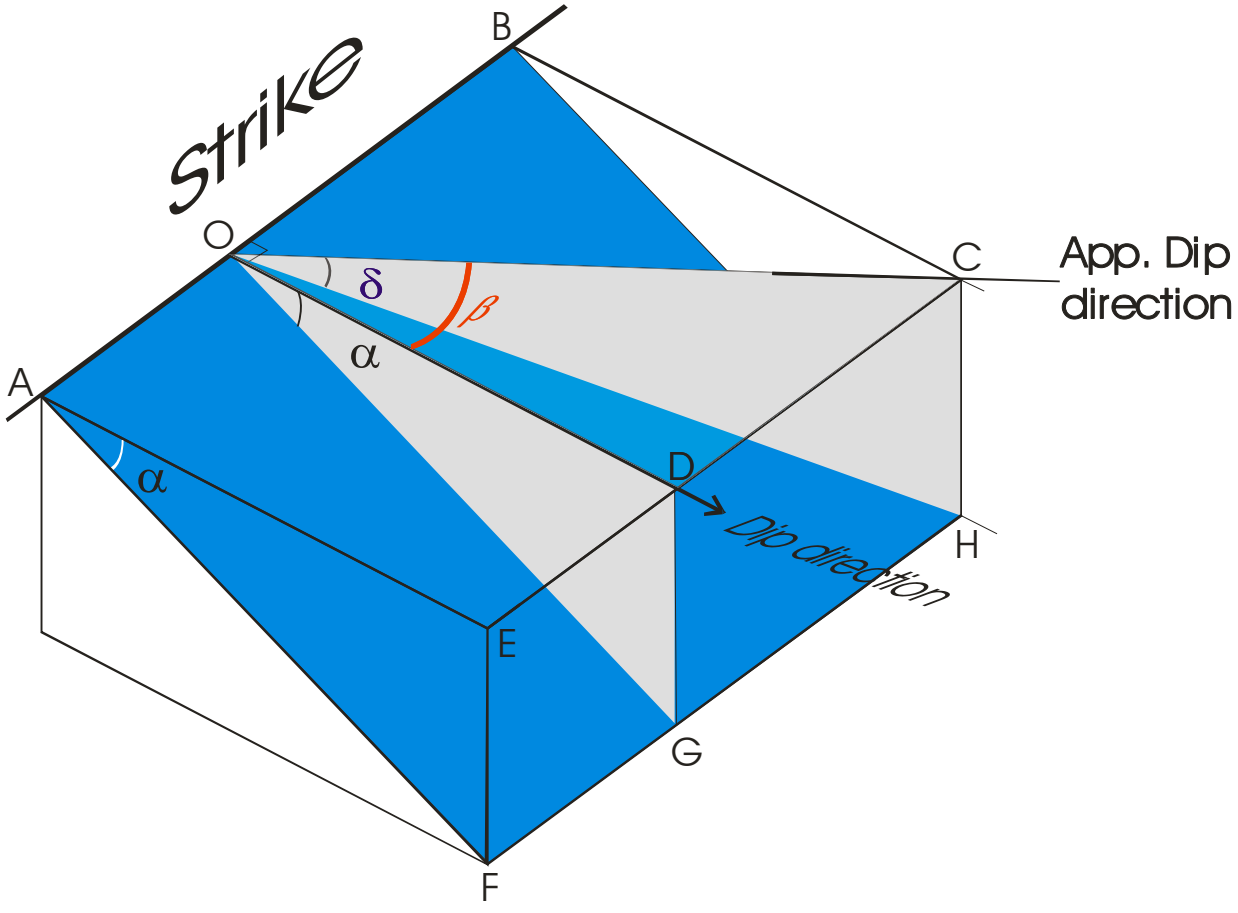
Strike and Dip of a plane

- Horizontal planes
- Vertical planes (strike)
- Dipping planes
  - True and Apparent dips

Relation between true and apparent dips

- $\tan(\delta) = \tan(\alpha)\cos(\beta)$

where α is true dip, δ apparent, and β is the angle between true dip-direction and apparent dip direction.



Derive the formulae by solving right-angle triangles (OCH, ODG, and ODC); review trigonometry…

Construct the paper model!!

Statement of the dip of a plane

1. Strike, dip, dip-direction indicator

   examples:

   030^o, 60^oE; 030^o, 60^oW; 310^o, 70^oNE; $N30^oE$, 60^oE; $S30^oW$, 60^oW

2. Strike, dip (implying right-hand rule), examples:

   030^o, 60^o; 210^o, 60^o; 310^o, 70^o

3. Dip, dip-direction, examples:

   30^o, 260^o

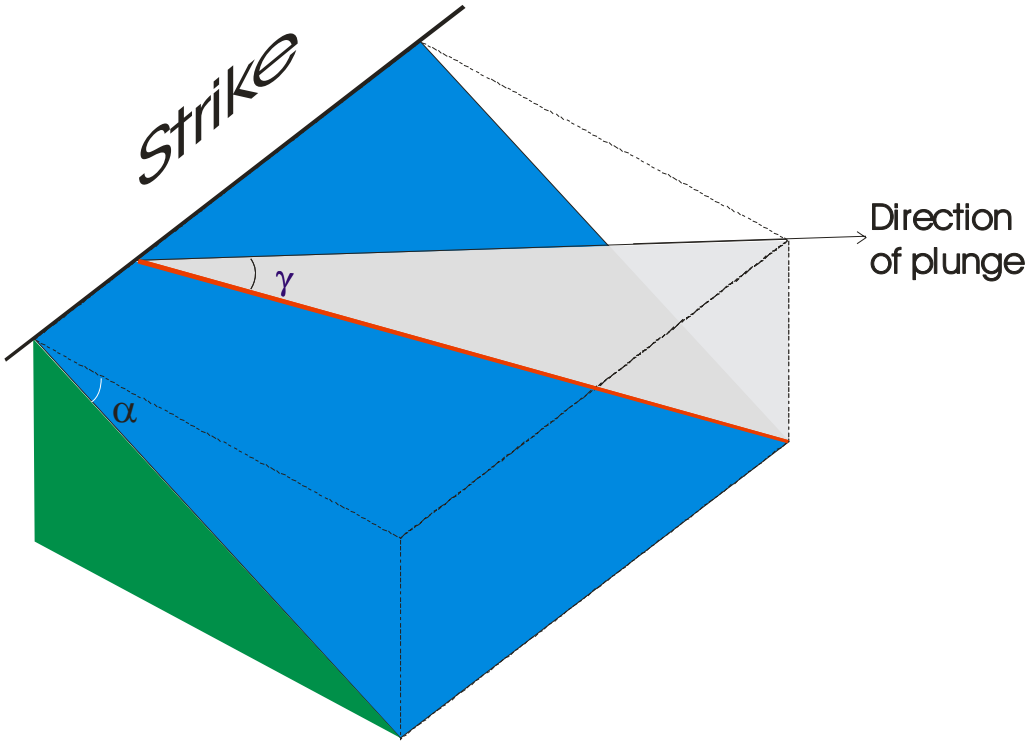
Attitudes of Lines

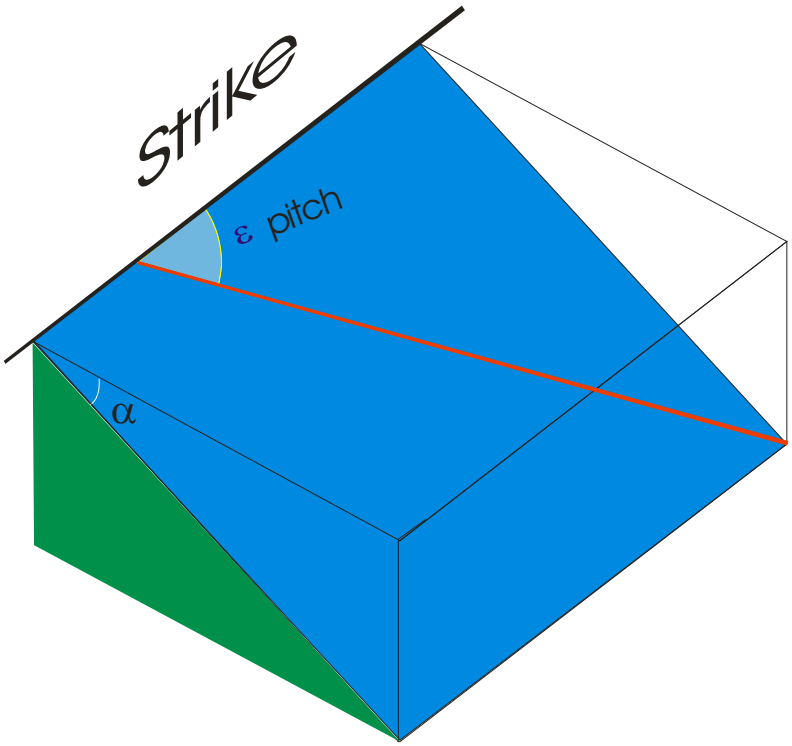
Plane dips and line *plunges*!

Plunge of a line

Vertical lines: need no further qualification
Horizontal lines: need specification of trend (azimuth)
Plunging lines: trend (direction of plunge) &
angle of plunge

Pitch/Rake of a line on a plane



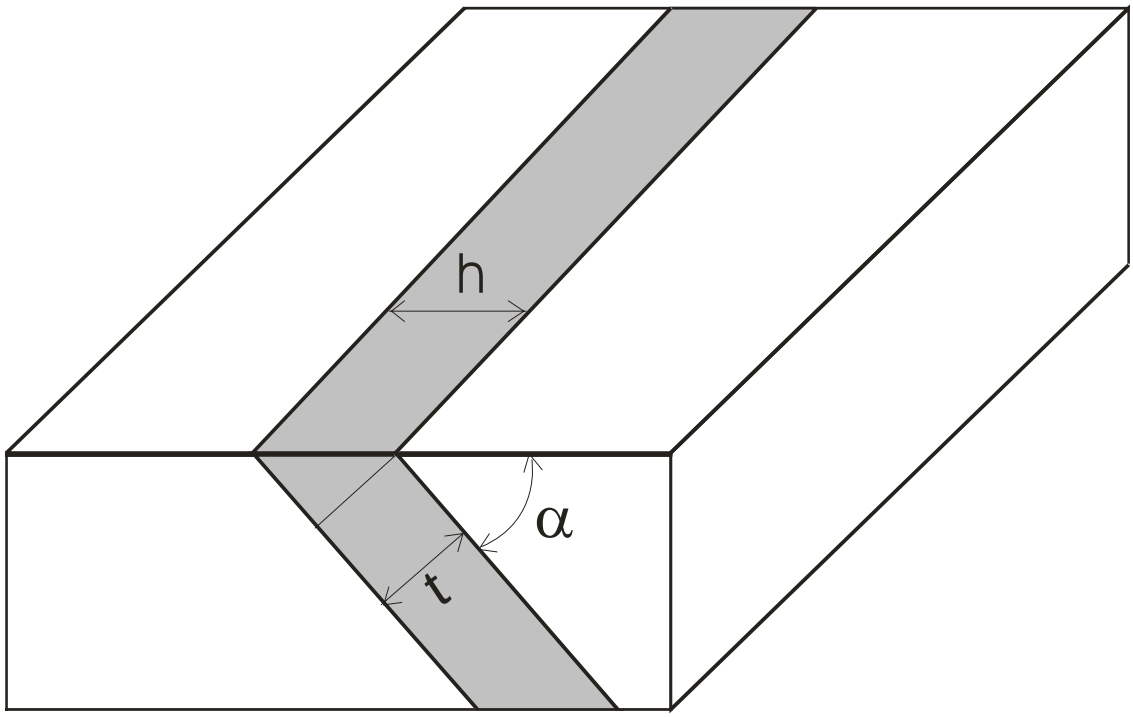


Thickness of a bed

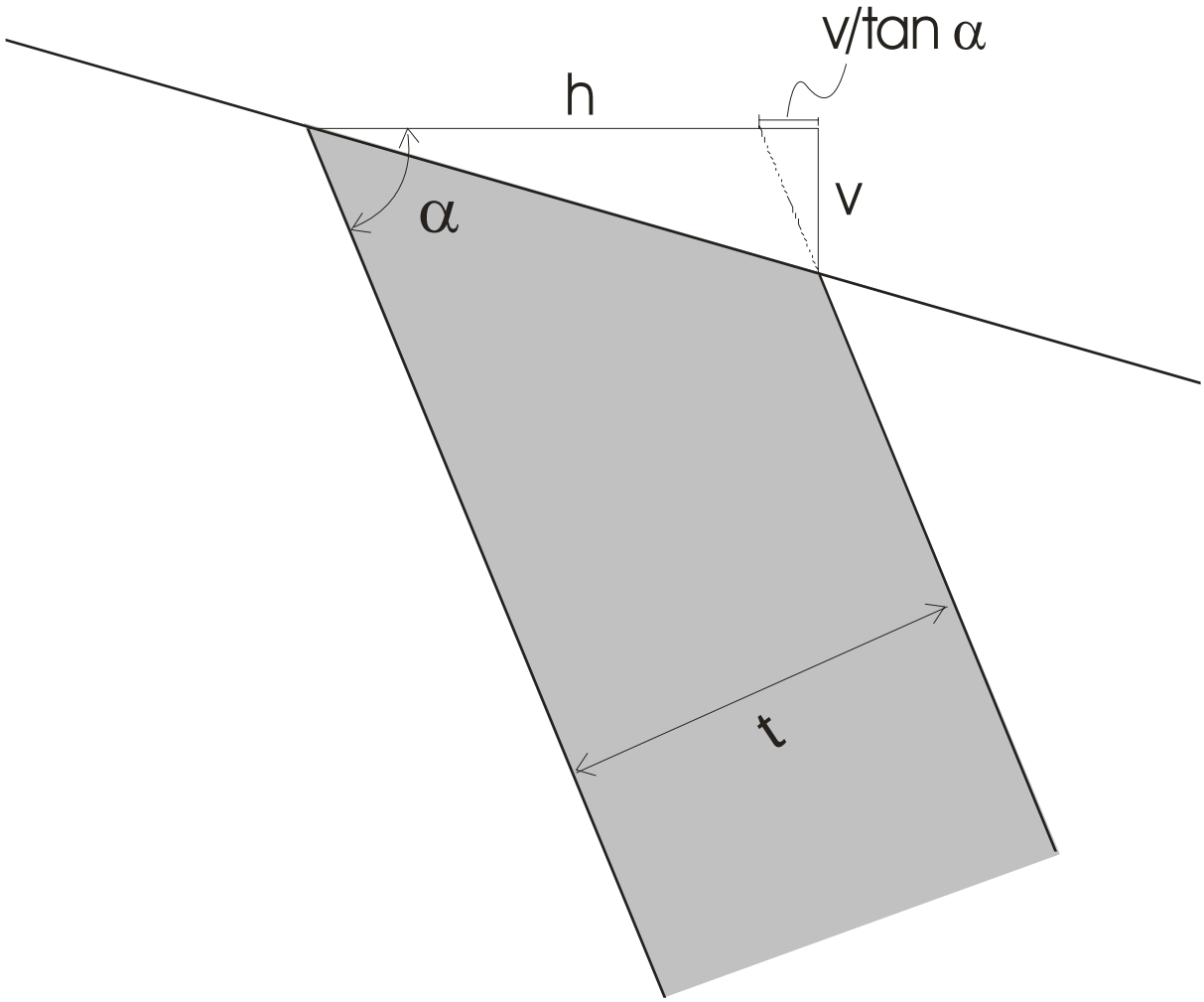
Thickness of vertical beds

Thickness of horizontal beds

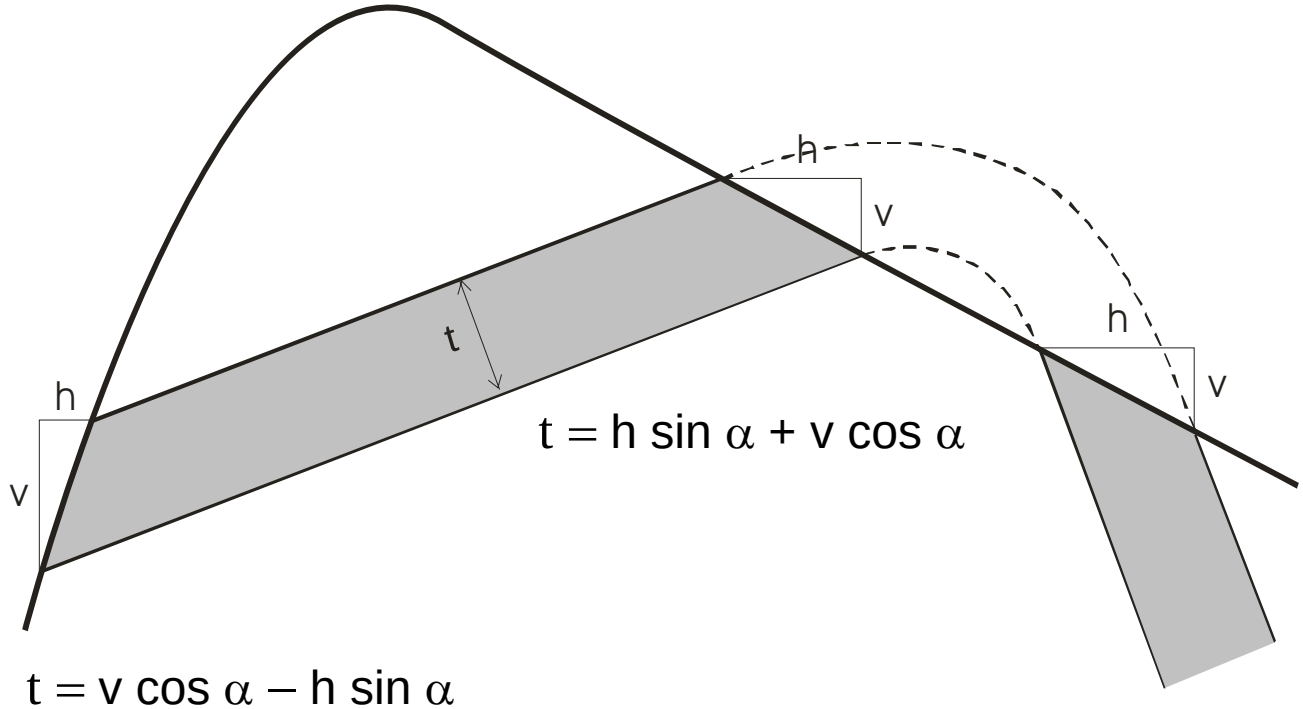
Thickness of dipping beds



$t = h \sin \alpha$



$t = (h - v/\tan \alpha) \sin \alpha = h \sin \alpha - v \cos \alpha$



$t = h \sin \alpha + v \cos \alpha$

$t = v \cos \alpha - h \sin \alpha$

$t = h \sin \alpha - v \cos \alpha$

Geological Maps

A geological map shows the distribution of bedrocks in an area. It usually consists of:

- Topographic map (base map)
- Contacts between different rock units
- Structural measurements
- Scale
- Cross sections (and block diagrams)
- Stratigraphic column