all weeks

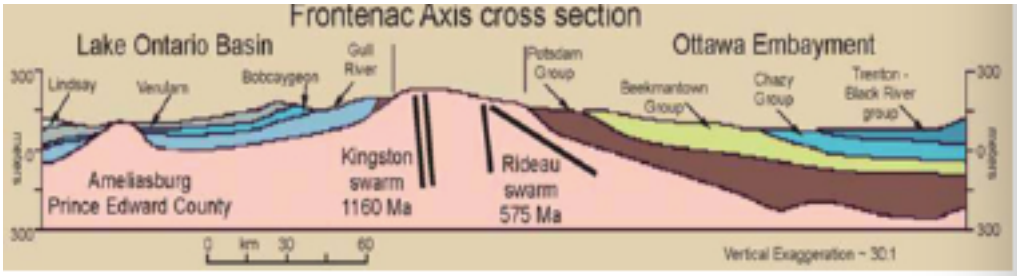
Saturday, October 27, 2018 12:31 PM

the north pole: the compass points well left of the actual spin pole, magnetic north pole is in canadian territory

- magnetic: where a compass points
    - correct magnetic reading with a declination, to make the measurement spin-pole relative
- spin pole: traditional north pole


048 / 34 (eg. of strike/dip)

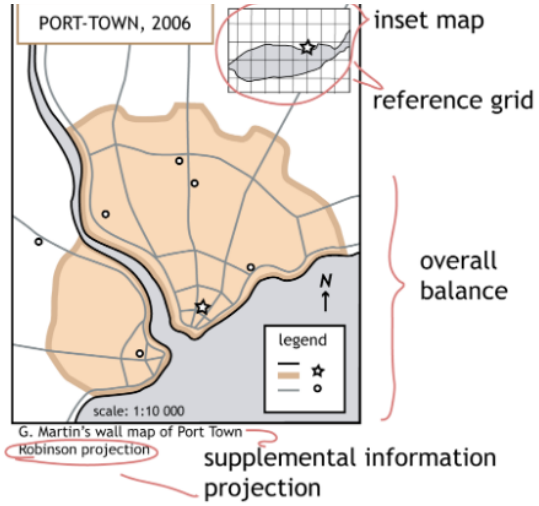
-Kingston is paleozoic rocks --> sedimentary succession of mostly ordovician age over precambrian rocks
-regionally tilted, underlying gneisses, granites, and schists

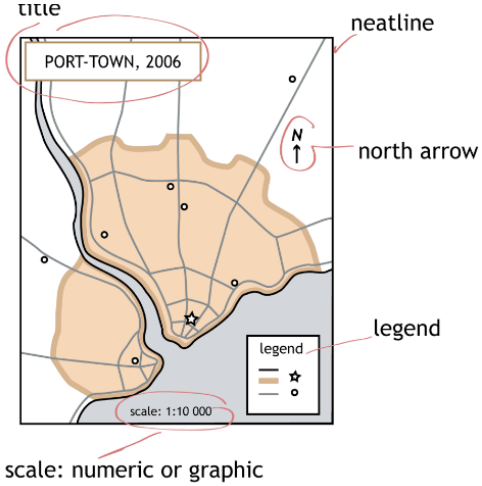


Grenville province: geological province/ area of common history
Making a Map:

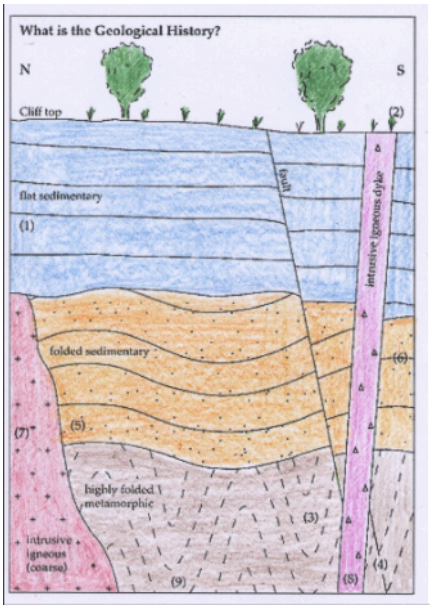
a

e-

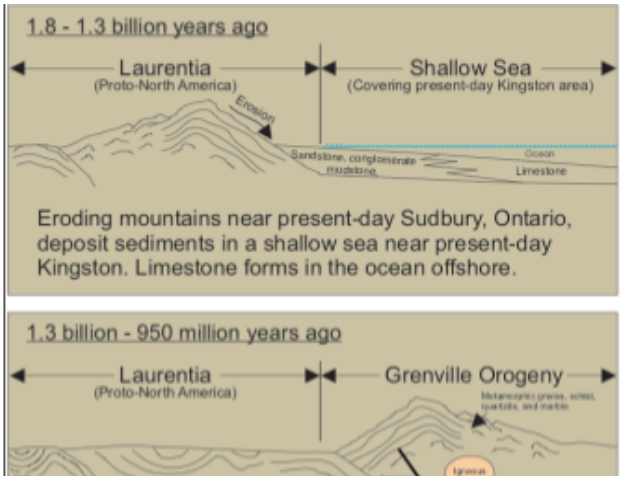




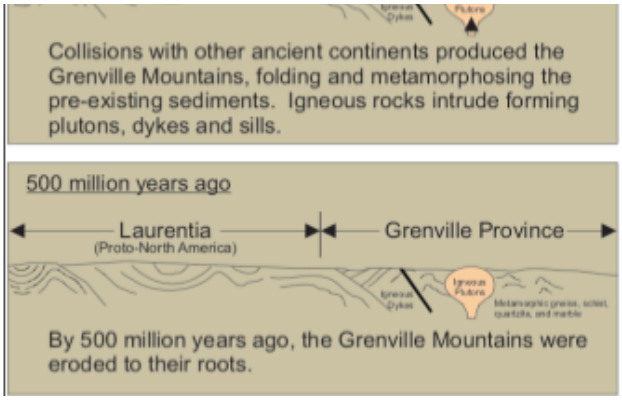
A rock unit is mapped only if it is a set of processes that were operating over an extended period of time (environmental history together)



Erosion
Intrusion of dyke
Faulting
Deposition of 'flat' Sediments
Erosion
(Metamorphism around…)
Intrusion of coarse igneous unit
Mild folding
Deposition of Sediments
Erosion
Metamorphism / folding / …???
Protolith to gneiss

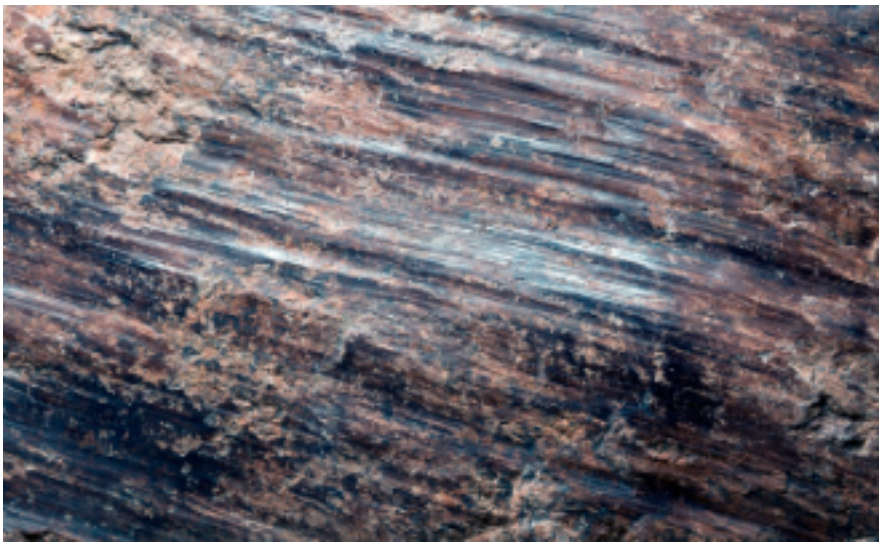


Tectonic history of Kingston

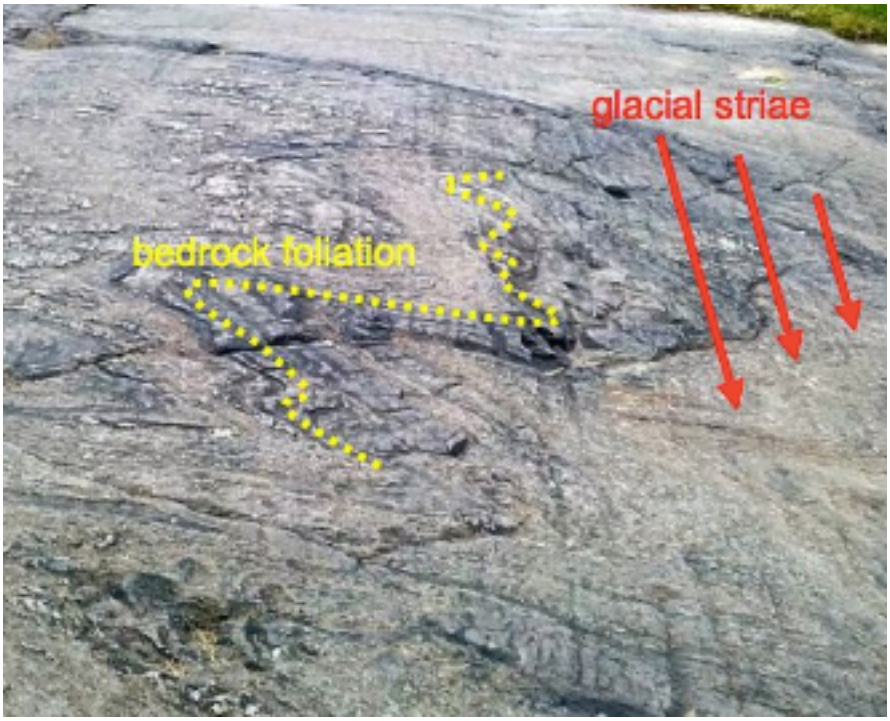


What to measure?

Slickensides/ slickenlines



glacial striations



Trend and Plunge

- use clinometer to measure plunge

convention - looking at it ‘falling away from you’

convention - point the compass that way

take the trend

orient the compass so back is vertical and side is on the li

use clinometer to measure plunge

- record as PL->TRE format

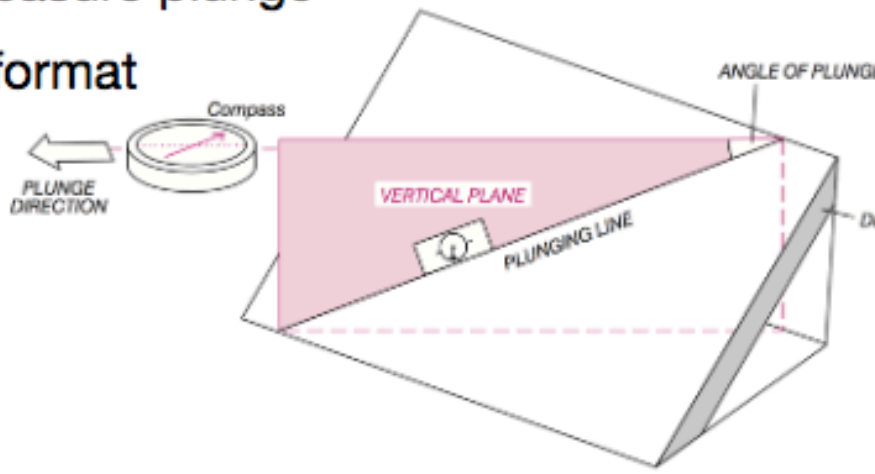


Fig. 2.5 The concepts of direction of plunge and angle of plunge.

Tectonics & continental crust:

O+C = volcanic arc

- andesites, granodiorites, diorites, basalt, derived sediments in accretionary prism (andean)

C+C = mountain range

- deformed and metemorphosed sedimentary and volcanic rocks (india, asia)
- high grade metemorphic, granites, granodiorites, derived (meta) sediments

C-C = rift

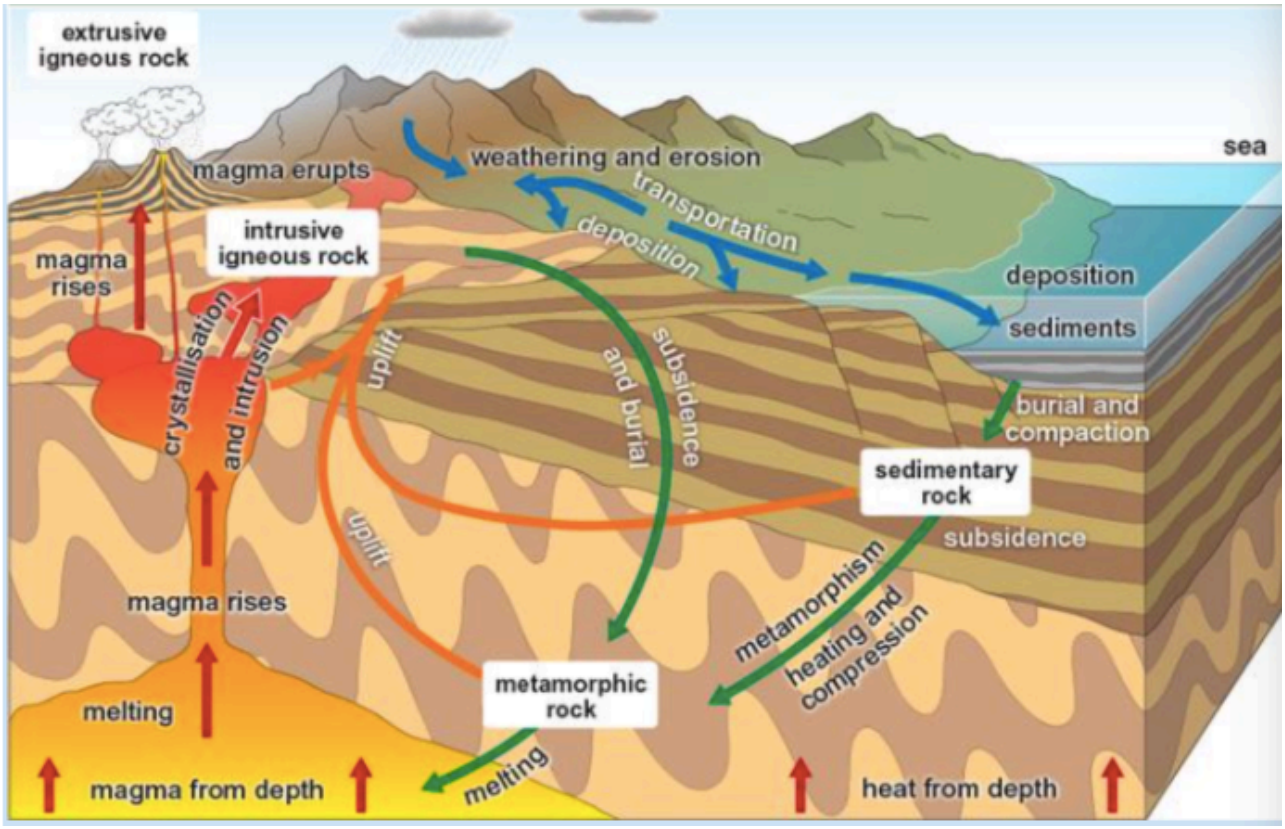
- red sea
- high grade metamorphic rocks, granites, granodiorites, metasediments

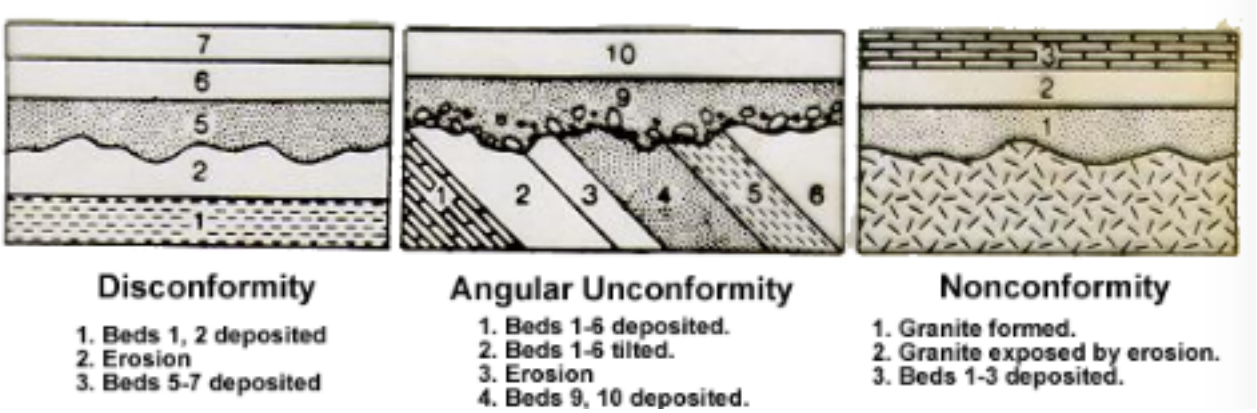
Continental crust: mostly doesnt subduct, geothermal gradient, flattens in mantle bc crust is conductive, mantle is convective

Processes and where they occur


ne
E
IPPING BED

1. transport ---> atmosphere
2. erosion, deposition, glaciation ---> surficial environment
3. chemical erosion, hydrothermal, jointing, cementation, shallow intrusions ---> near-surface environment
4. metamorphism, deeper intrusions, metemorphic-related melting ---> deeper crust
5. mantle-crust interaction (melting) ---> mantle





disconformity vs. nonconformity: nonconformity is where sedimentary rocs are deposited on igneous or metamorphic rocks

-igneous rocks-

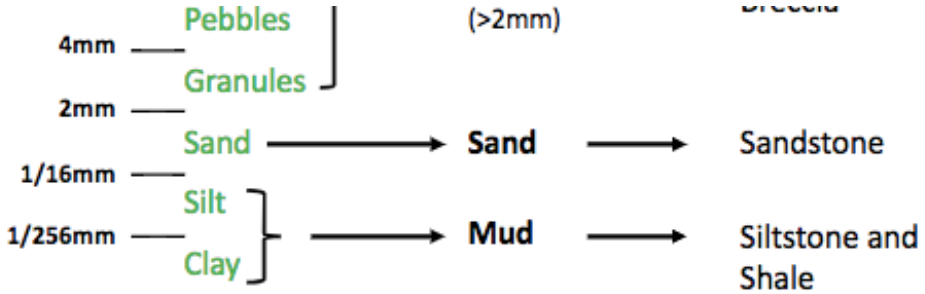
- products of melting

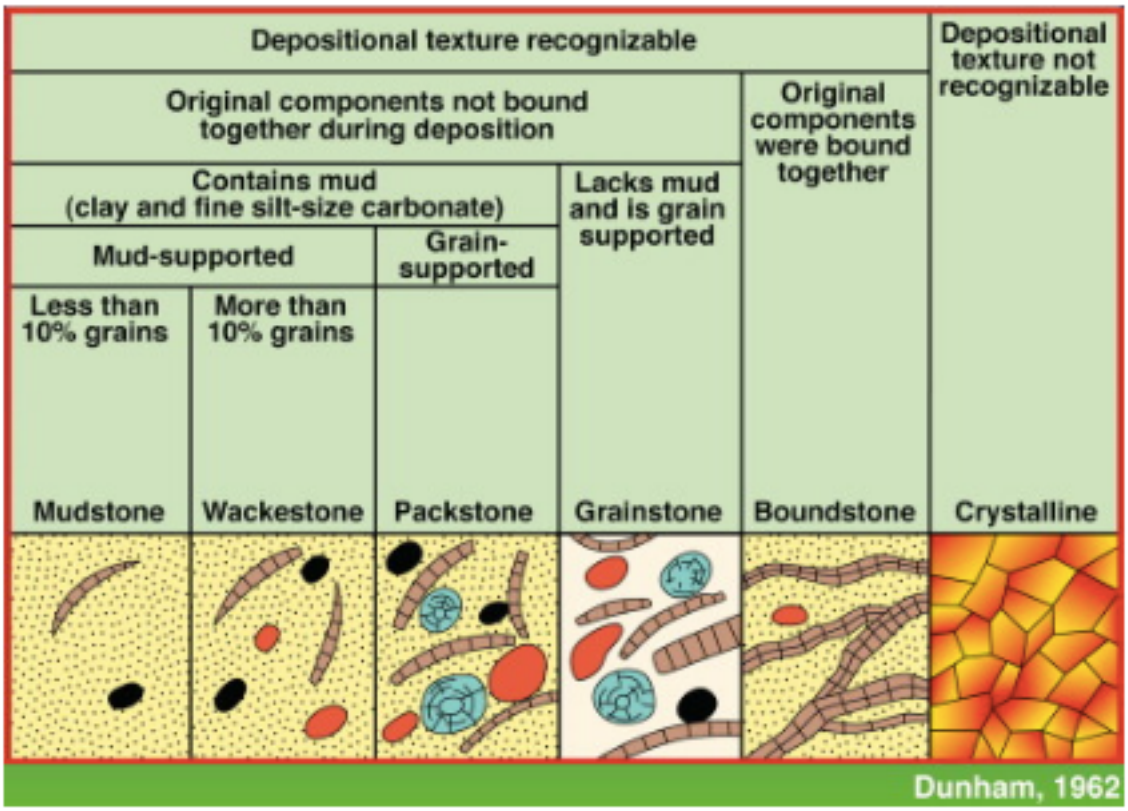
- products of melting
- crystallize at some rate, producing grain size, texture, etc.
- chemistry dictated by what was melted, how, and how much
- extrusive vs. intrusive
    - large bodies of intrusive rocks are called batholiths
    - crystals found in granite are quartz, feldspar, and mica
- 

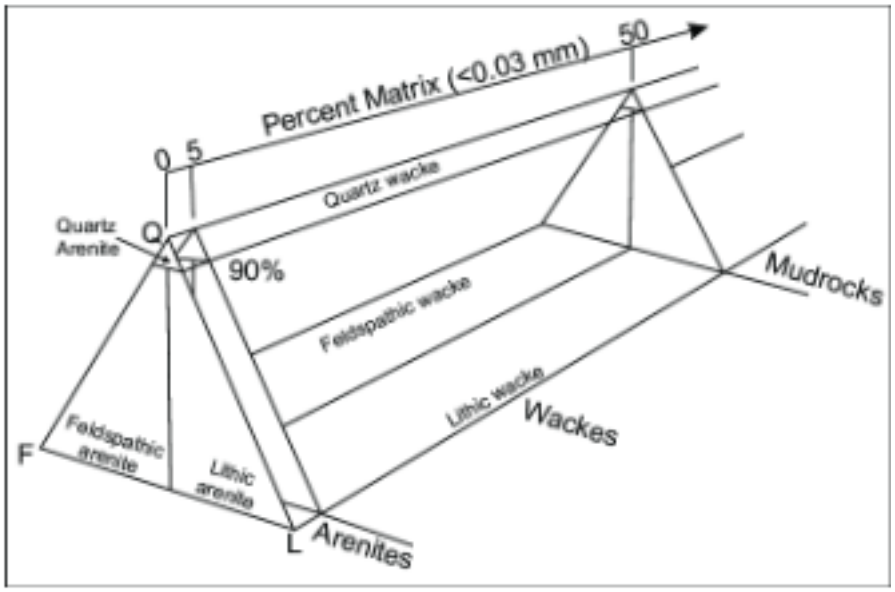
Granite is a coarse grained rock. Granite is a igneous rock. It has nice light colors. Granite is an intrusive Igneous rock. It has lot's of quartz and feldspar. It forms from slow cooling magma at the bottom of earth's surface.	Obsidian is a dark colored volcanic rock that cools really fast and does not have crystals. It looks like glass. It cools immediately that crystals don't even form. It is an igneous rock.	Basalt is a fine grained rock. It is dark colored intrusive rock. Basalt is an igneous rock. It is most likely to form in intrusive rock like lava flow. It can also form from small intrusive rocks.	Pumice is a light colored rock. It is an igneous rock. It forms from very fast solidification of melting. It forms during volcanic explosion eruptions. It is also light waited.

-sedimentary rocks-

- deposited at surface (particles, or chemical precipitation)
- grain size tells you about energy
- sediments that contain abundant fossils telll u more about environment
- chalk is a sedimentary rock from calcium carbonate
- limestone is from deposits of sea organisms (shellfish/corals) (calcium carbonate)
- coal is formed from dead plants

- 
4mm
Pebbles
Granules
2mm
Sand
1/16mm
Silt
1/256mm
Clay
(>2mm)
Sand
Mud
Sandstone
Siltstone and Shale

- 
Depositional texture recognizable
Depositional texture not recognizable
Original components not bound together during deposition
Original components were bound together
Contains mud (clay and fine silt-size carbonate)
Lacks mud and is grain supported
Mud-supported
Grain-supported
Less than 10% grains
More than 10% grains
Mudstone
Wackestone
Packstone
Grainstone
Boundstone
Crystalline
Dunham, 1962

- 
Percent Matrix (<0.03 mm)
0
5
50
Quartz wacke
Quartz Arenite
Q
90%
Feldspathic wacke
Mudrocks
Lithic wacke
Wackes
F
Feldspathic arenite
Lithic arenite
L
Arenites

1	2	3	
			
BITUMENOUS COAL	CHALK LUMPS	CHERT	
6	7	8	
			
FLINT	LIME STONE BLACK	LIME STONE SILICIOUS	LI
11	12	13	
			
ROCK PHOSPHATE	ROCK SALT	SAND STONE RED	SAN

Shale	Sandstone
	

4  CONGLOMERATE	5  DIATOMITE
9  ME STONE WHITE	10  MUD STONE
14  D STONE SILICIOUS	15  SHALE

Limestone

	
Shale is a very fine-grained sedimentary rock that usually breaks into small flat pieces. Some black shales can be made into oil or gas.	Sandstone is a weak rock that contains of sand size minerals or tiny rock grains. This rock cannot be used for many things because it is not that strong.

- sandston > shale> siltstone > mudstone

METAMORPHIC ROCKS
-temperature increases 25celsius for every km below the surface
-types of metamorphism:

- contact:
  - heat source is not in equilibrium with geotherm
  - near an intrusion
- regional:
  - heat source is geotherm
- shock
  - meteorite impact

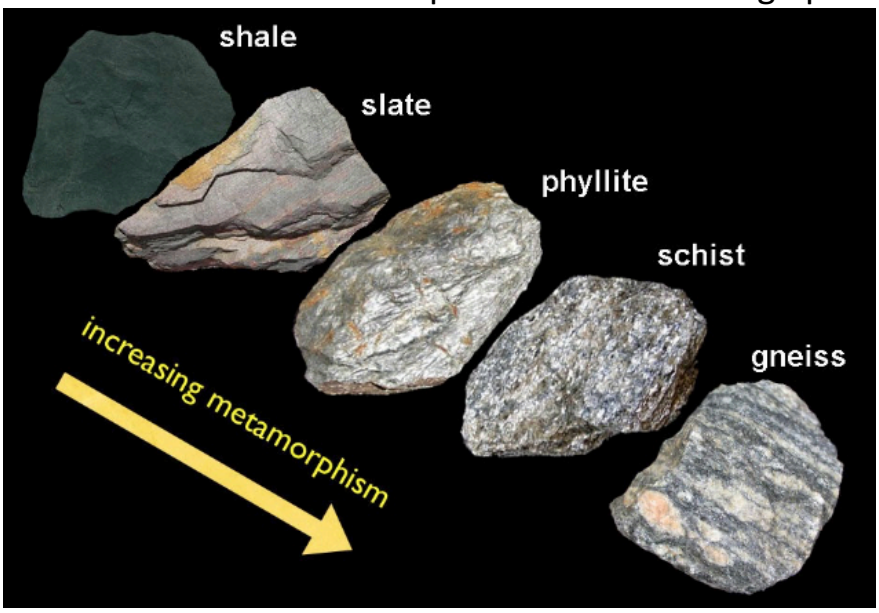
-shale --> slate (pressure)
-marble --> limestone (heat)

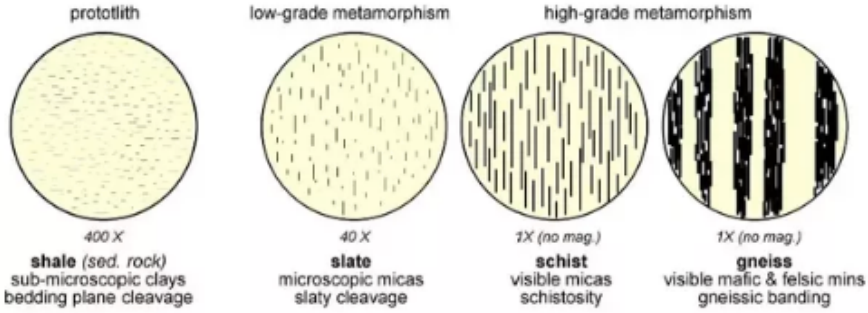
Most limestone is composed of skeletal fragments of underwater animals like coral.

-sandstone --> quartzite (heat)
-the changes that take place depend on:

- original rock type
- amt of heat
- amt of pressure
- amt of time

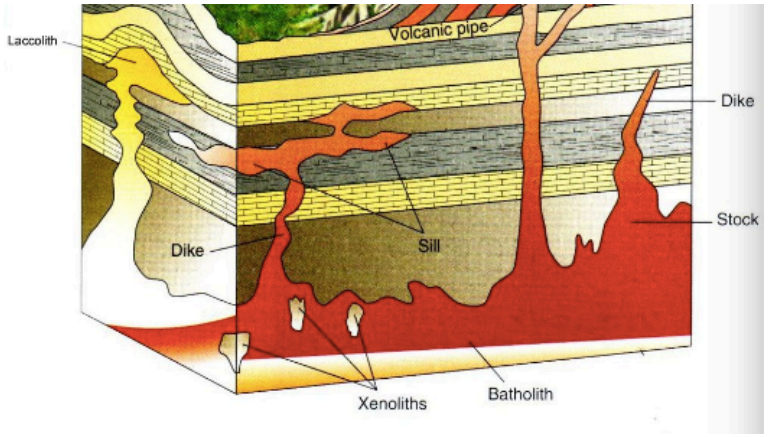
-metamorphic rocks that are mainly the result of great pressure are usually gneissic
-brittle vs ductile metamorphism: rocks breaking up is called **<u>boudinage</u>**

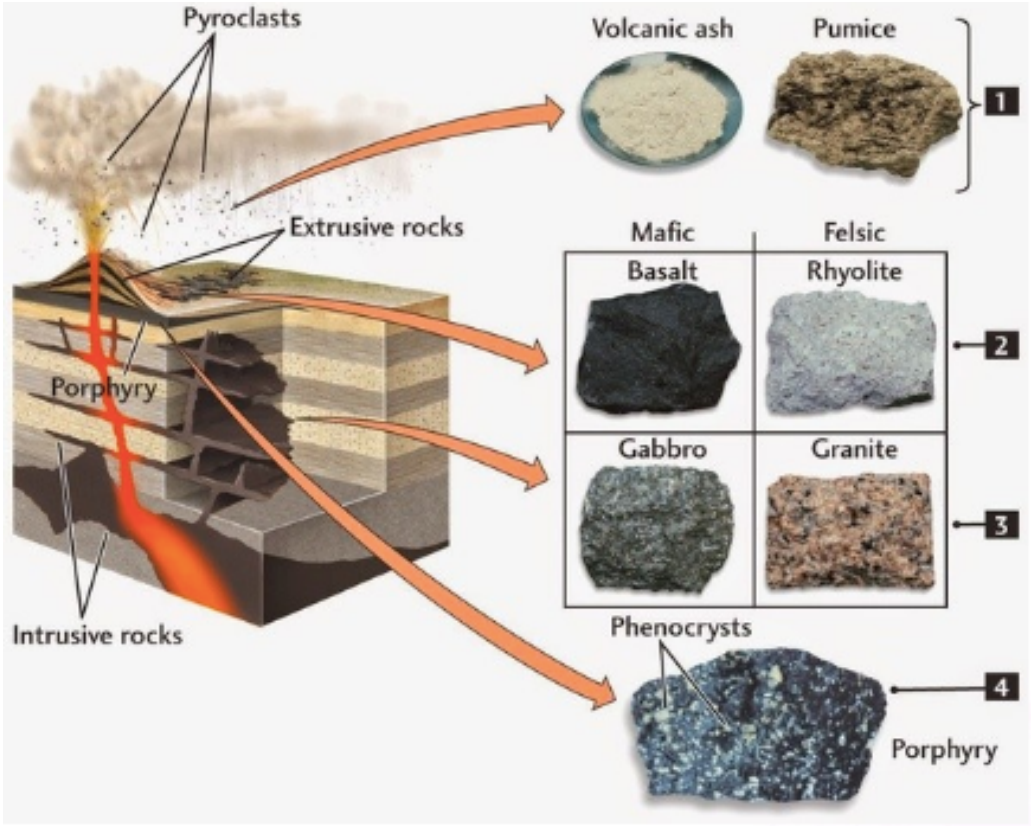


- regional metamorphism creates the tecxure/ foliation of rocks.
  - flattened = foliation
  - stretching = lineation
  - 

IGNEOUS ROCKS

Intrusive Igneous Rocks





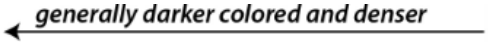
glassy vs. fragmental vs. crystalline

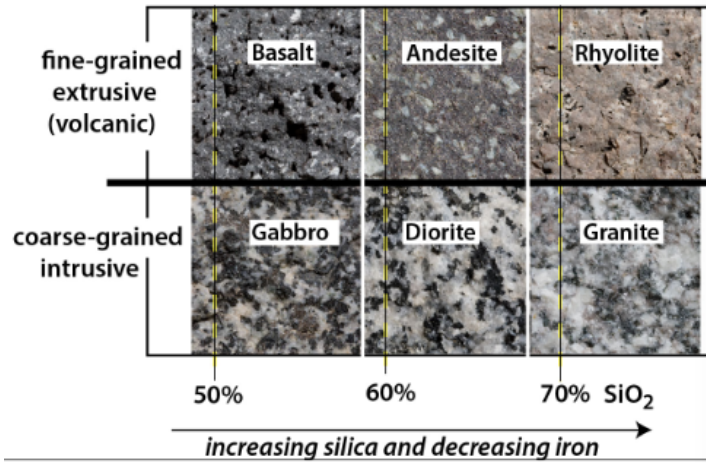
concordant intrusive: coincides with layers
discordant intrusive: discord w/ layers

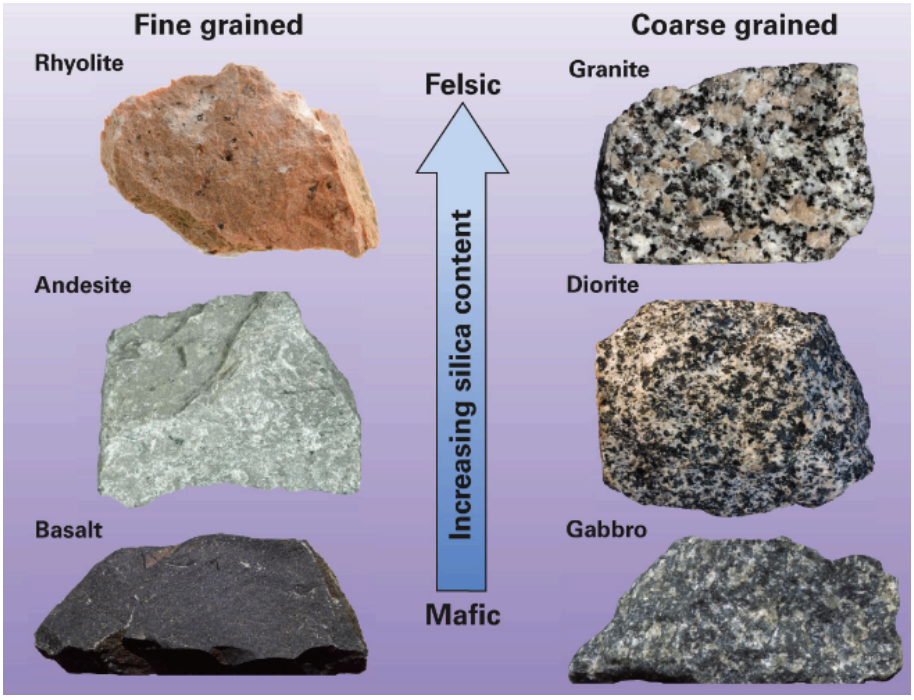
dike: cuts across layers
sill: pushes between layers

Major features in stocks/batholiths

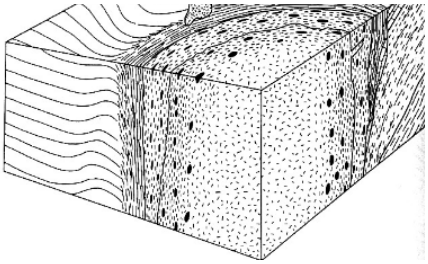
- intrusive margin



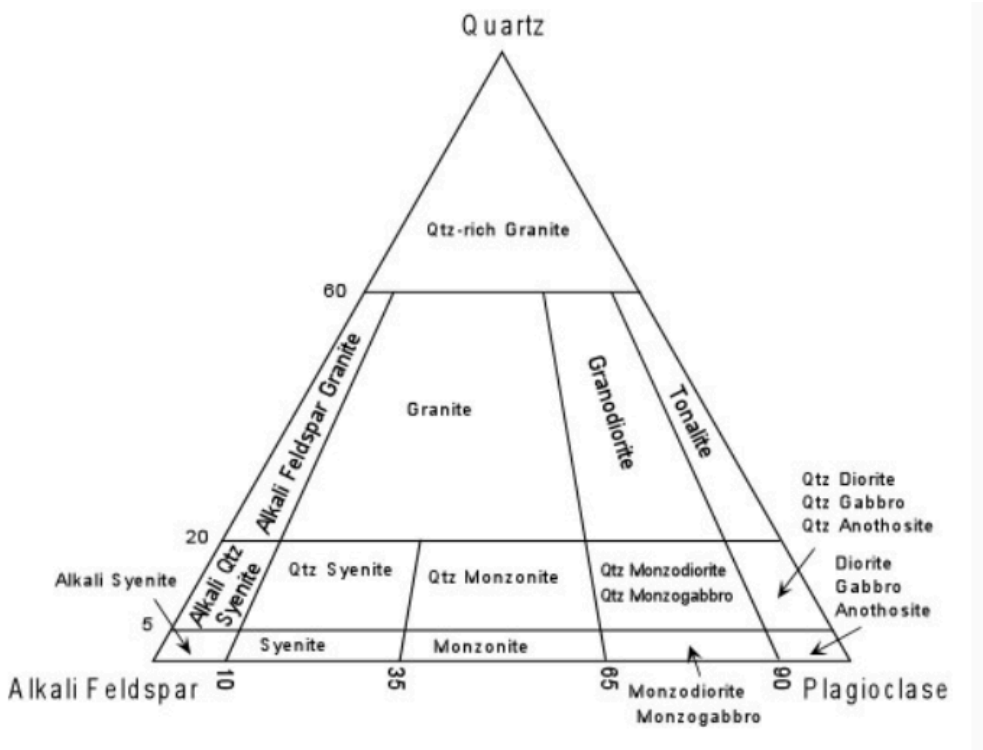
- 

- 

- assimilation
  - mix of wall rock w magma
- multiphase
  - magma chambers evolve over time
- roof pendants
  - isolated "country rocks" from erosion
- xenoliths and enclaves
  - x: external/incorporated
  - e: something from earlier part of the melts evolution
- igneous fabrics
  - not metamorphic , brittle --> ductile
- superimposed fabrics

- 
    - shear zones while rock is partially molten
        - brittle, brittle-ductile, ductile
        - foliated granitoides granitoids-- not metamorphic
- caldera systems
    - stoping and roof subsidence

igneous

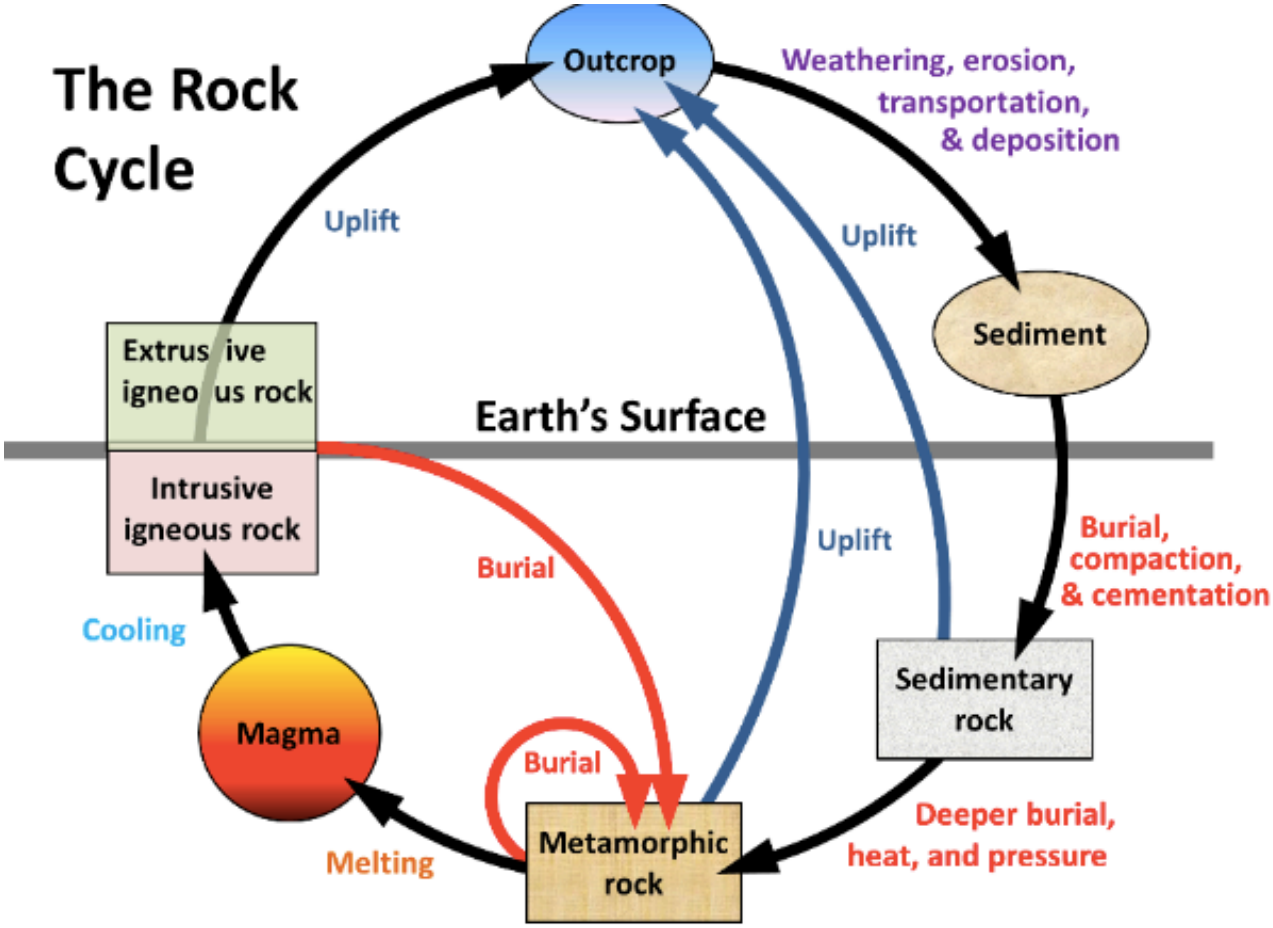


- weathered joint surfaces are highly misleading - may have alteration, may have secondary carbonate/minor mineralization
- phaneritic: crystals are visible
    - colour on fresh and weathered surface, minerals, grain shape, grain dimentions, percentage
    - phenocrysts are the larger minerals
    - euhedral subhedral anhedral
- aphantic: fine grained

common secondary alteration

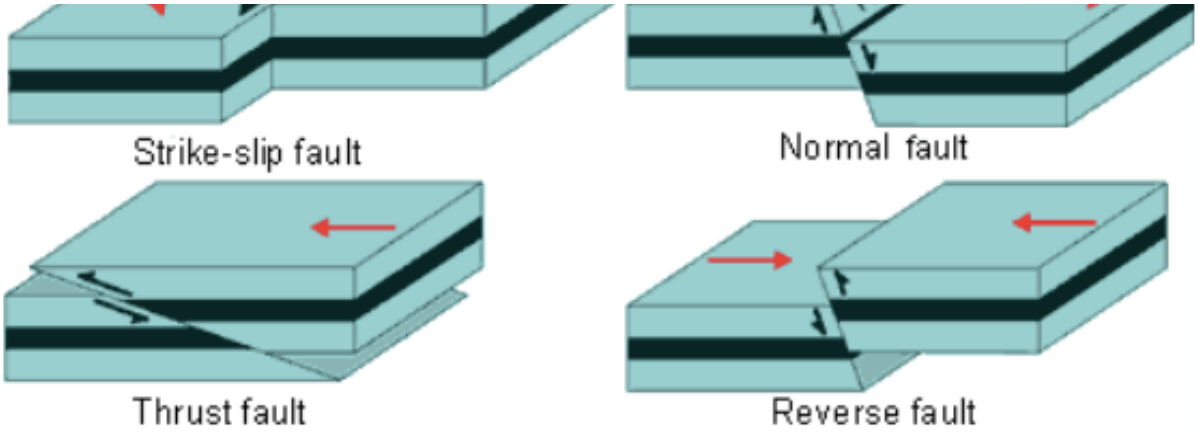
- mafic minerals go to chlorite, magnetite
- plagioclase --> epidote, calcite

isotropic: random
anisotropic: planar



magnetic field tings week 6

STRUCTURAL GEOLOGY
hanging and foot wall

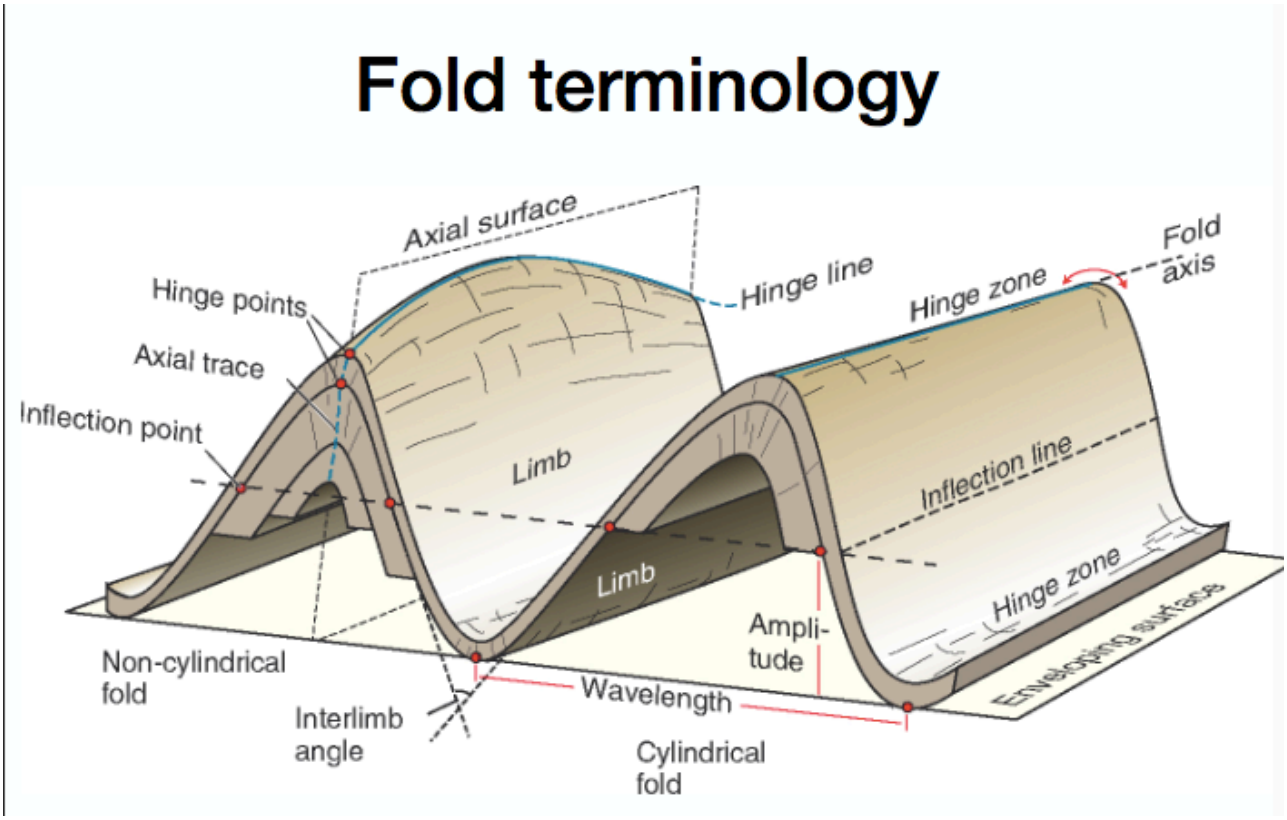


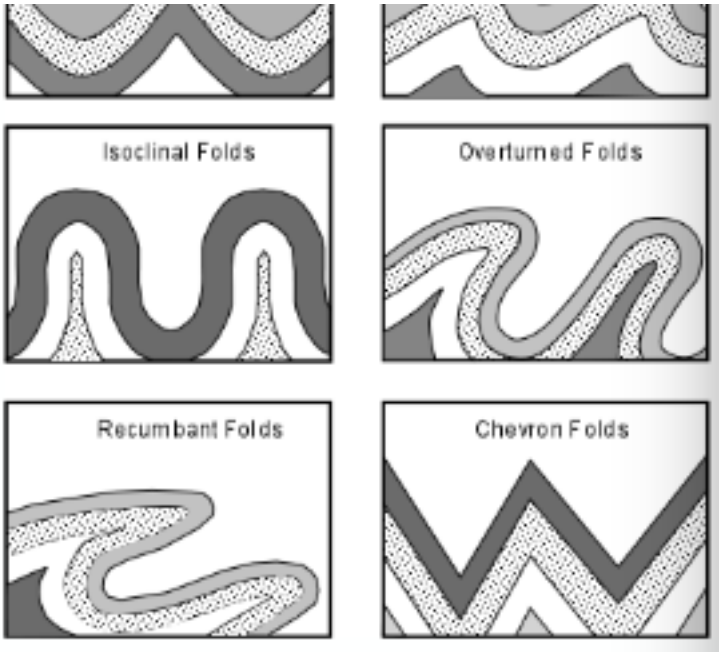
strike slip faults:

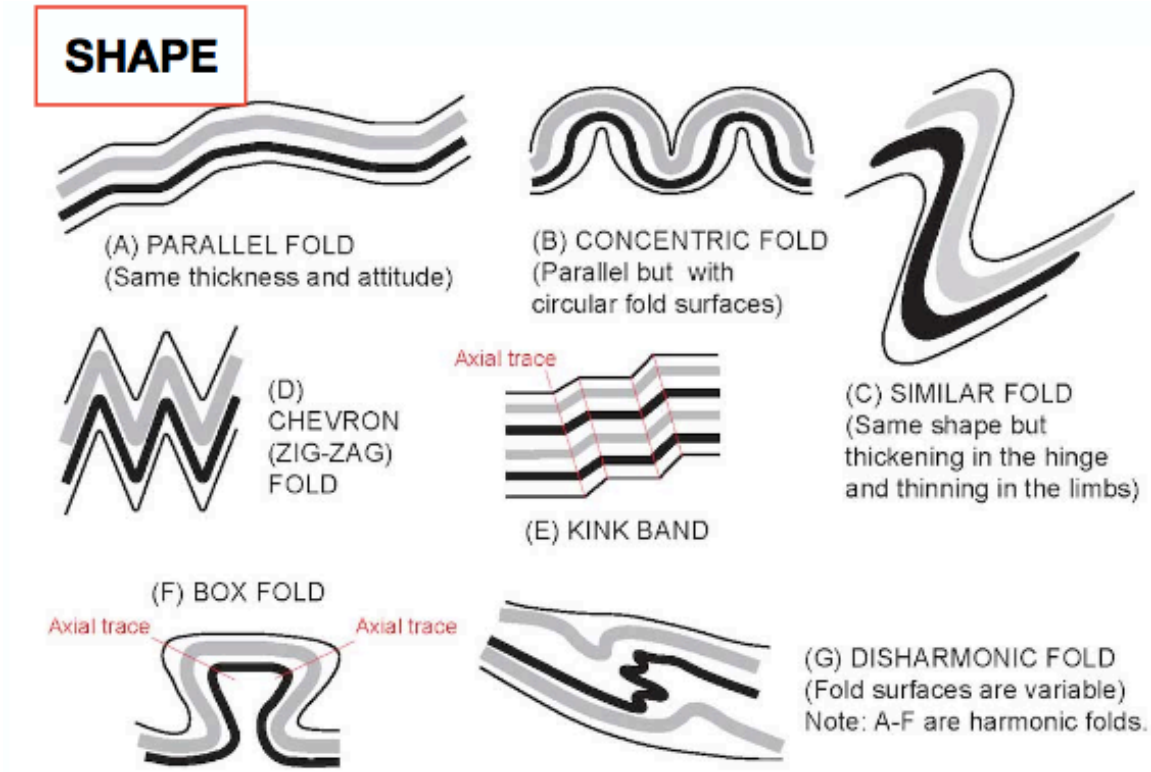
- left-lateral/sinistral
- right-lateral/dextral

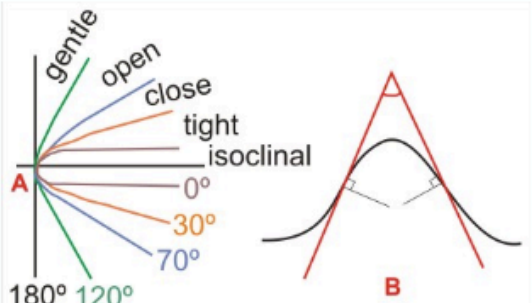
Folds

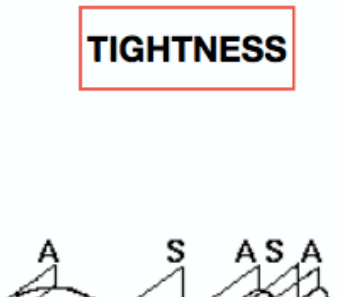
- antiform/anticline
- synform/syncline

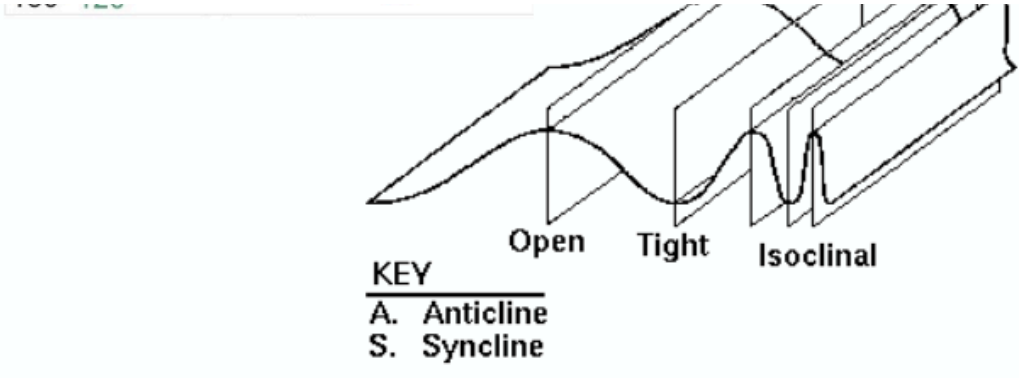


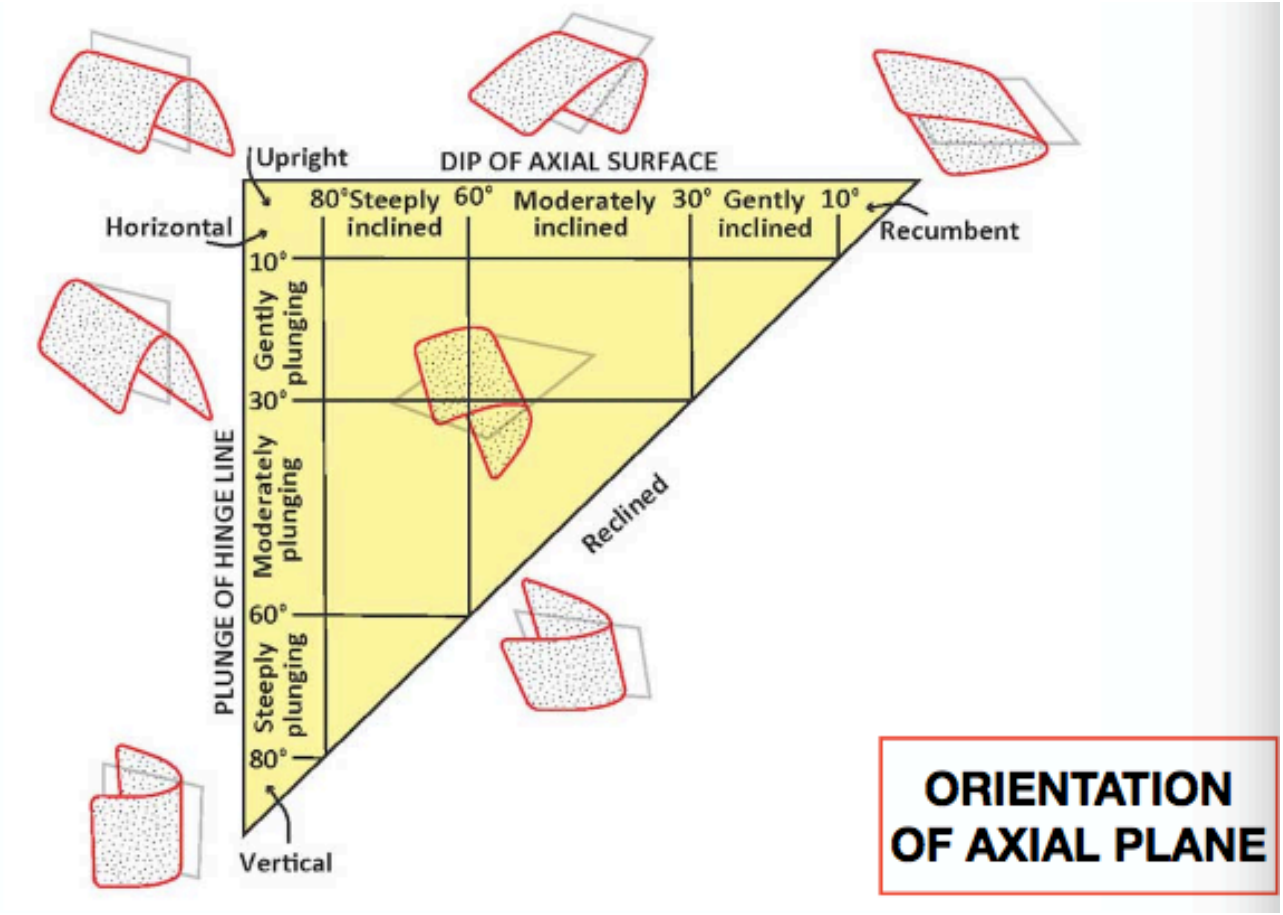

Isoclinal Folds
Overturned Folds
Recumbant Folds
Chevron Folds


SHAPE
(A) PARALLEL FOLD
(Same thickness and attitude)
(B) CONCENTRIC FOLD
(Parallel but with
circular fold surfaces)
(C) SIMILAR FOLD
(Same shape but
thickening in the hinge
and thinning in the limbs)
(D)
CHEVRON
(ZIG-ZAG)
FOLD
Axial trace
(E) KINK BAND
(F) BOX FOLD
Axial trace
Axial trace
(G) DISHARMONIC FOLD
(Fold surfaces are variable)
Note: A-F are harmonic folds.


gentle
open
close
tight
isoclinal
A
0°
30°
70°
180° 120°
B


TIGHTNESS
A
S
A S A





What causes these differences?

- material response to applied stress
- type, magnitude and duration of applied stress
- heat, confining pressure

Parasitic Folds

- minor folds associated with larger folds
- share orientation of fold axis and axial surface w larger fold
- vergence: sense of asymmetry

overturned limbs: bedding is steeper than cleavage

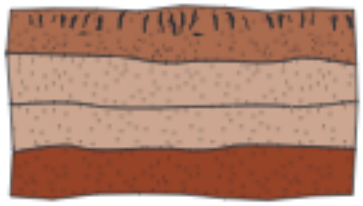
Stereonets

- either preserve the angle or area
- schmidt (equal-area) net
- planes plot as great circles
    - intersection of bedding and cleavage will be parallel to the hinge line
- lines plot as dots
    - plunge and trend
    - put dot on outside of circle for trend degree
    - move to EW and draw inwards the plunge
- intersection of 2 lines gives us a linear orientation
    - intersection b/w cleavage and bedding give us the hinge line

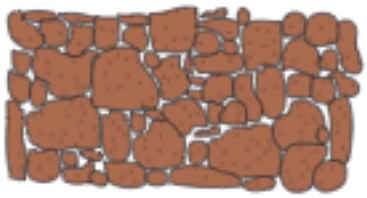
impact of structural geology

- engineering
- mapping
- resources
- natural hazards

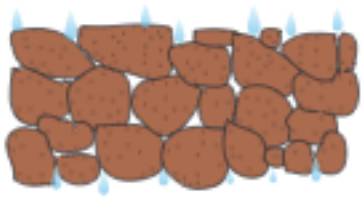
before traverse:
airphotos, maps, geophysical data, remotely sense data, water wells

1 

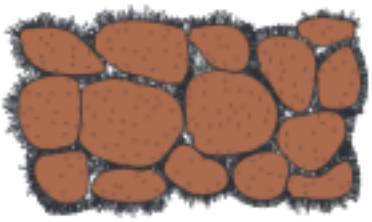
Sediments are laid down by ice, wind or water, in horizontal layers called beds.

2 

Within each bed, the sediment grains are squashed together so that they are in close contact.

3 

Water seeps in between the grains, bringing with it many dissolved chemicals.

4 

When the water evaporates, these chemicals are left behind as crystals around the edges of the grains. These crystals cement the grains of sediment together to form rock.

diapiric