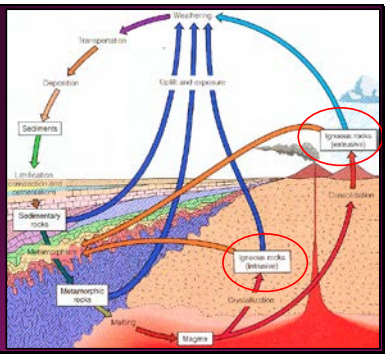
Magma and Igneous Rocks

Up from the Inferno

Igneous Rock

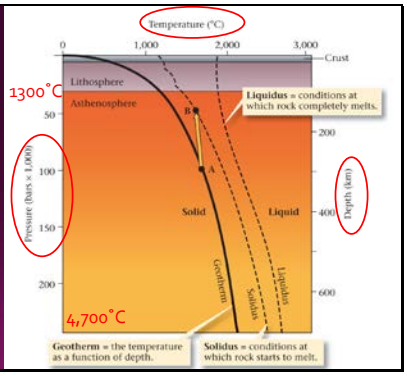
Magma Vs. Lava

Intrusive Vs. Extrusive



Melting

1. Decompression (pressure inhibits melting)
2. Addition of volatiles (E.g. H_2O and CO_2 act as a *catalyst)*
3. Heat transfer (rising magma melts surrounding rock)



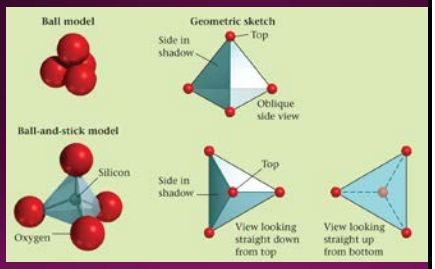
Clearing up a misconception

- There are **NOT** 'seas' / large layers of molten magma beneath the crust.
- Magma is only present under very specific depth, temperature, and pressure settings.

What is magma made of ?

- Silicon
- Oxygen

And variable amounts of Al, Ca, Na, K, Fe, Mg



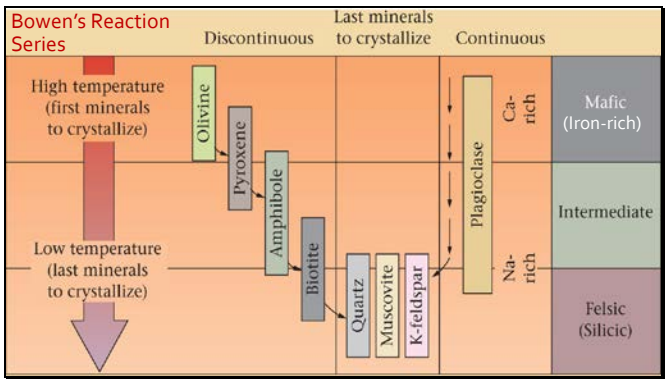
Magma (chemistry) types

Rock Color

Felsic (or silicic) magma	Light	66–76% silica*	Si
Intermediate magma	Grey	52–66% silica	
Mafic magma	Dark	45–52% silica	
Ultramafic magma		38–45% silica	

Questions…

1. Where does lava come from?
2. Will the chemistry of that lava be much different than it's magma source?

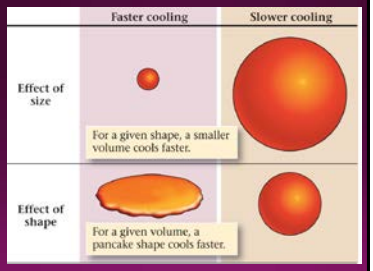


Continental VERSUS Oceanic Crust

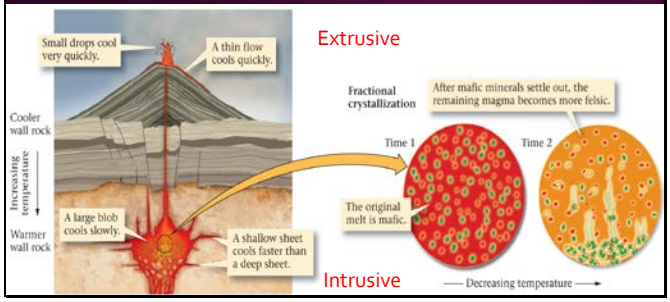
How fast does magma cool?

3 Controlling factors

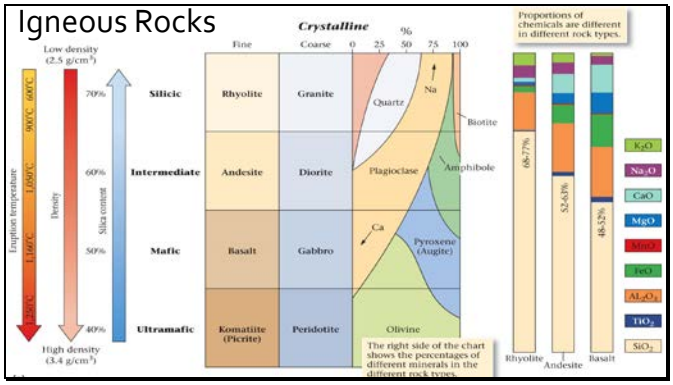
1. Depth of intrusion
2. Shape and size of magma body
3. Presence of groundwater and/or volatiles

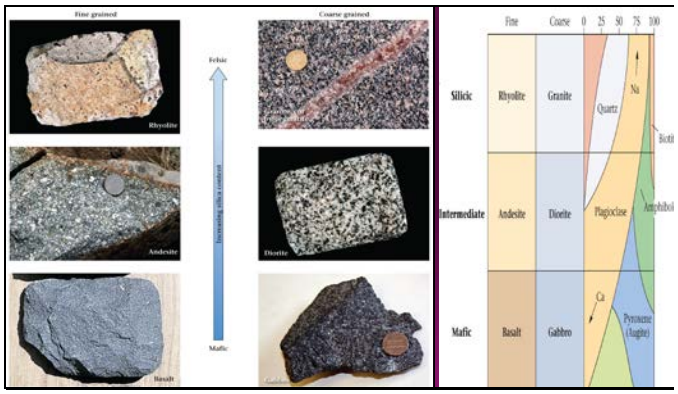


Magma fractional crystallization



Igneous Rocks

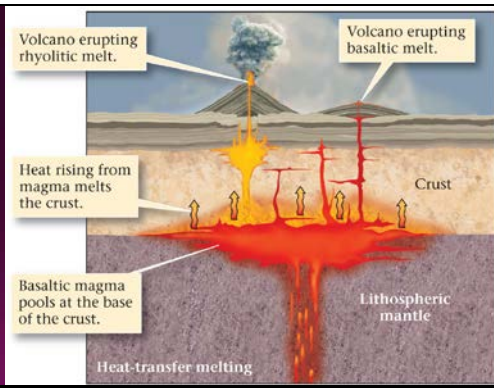


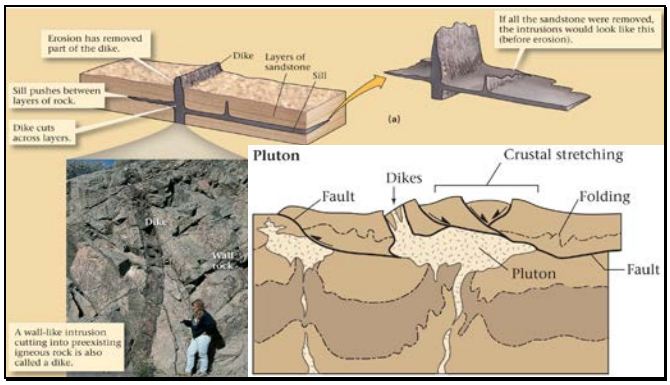


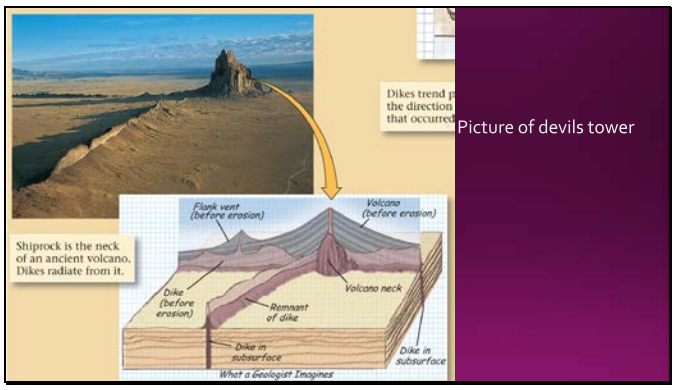
Extrusive

VERSUS

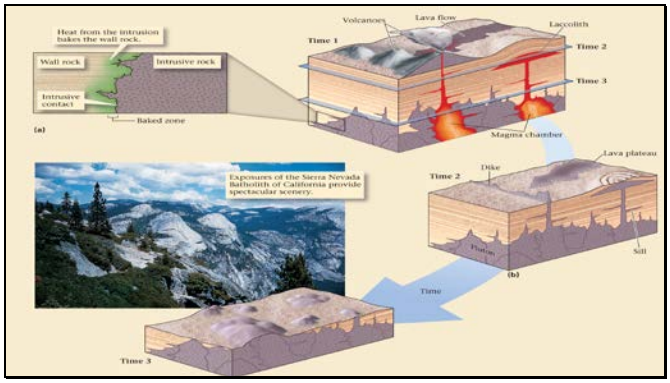
Intrusive

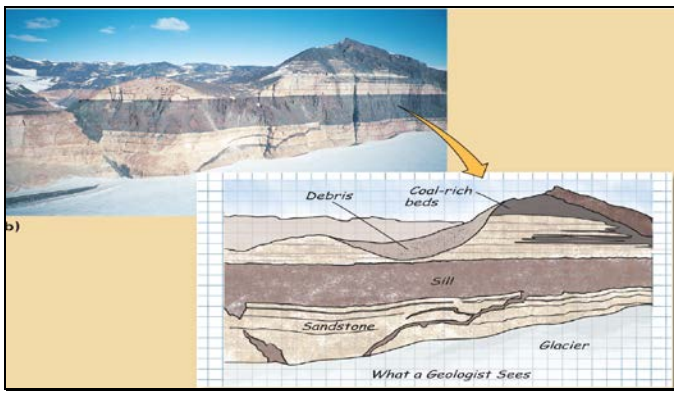


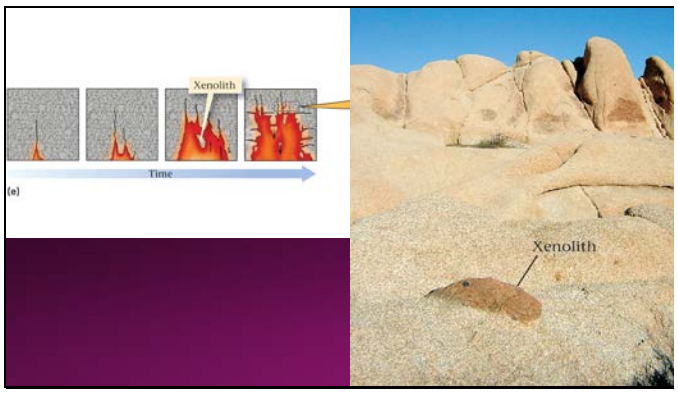


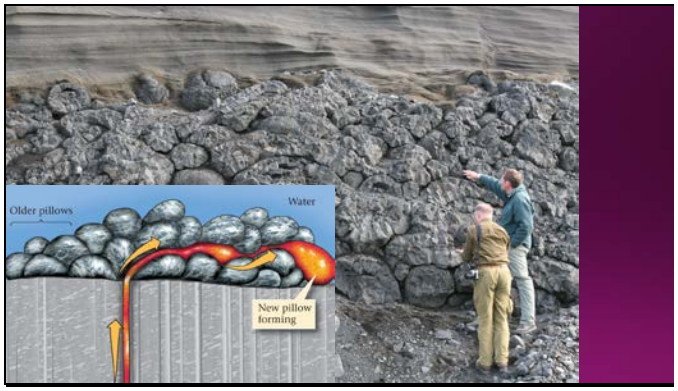


Picture of devils tower






Xenolith
Time
(a)
Xenolith


Older pillows
Water
New pillow forming