Rock

Principle of uniformitarianism:

The physical laws that govern the physical/chemical world are the same now as in the past.

(That is, during virtually all of the 13.8 billion year history of the universe.)

igneous rock

crystallizes from magma: a hot silicate melt

sedimentary rock

sedimentation or precipitation at the ground surface

metamorphic rock

pre-existing rock changed by stress, pressure, different (usually hotter) temperature

Igneous Rock

Extrusive igneous rock crystallizes rapidly under relatively low pressure at or near Earth's surface.

Intrusive igneous rock crystallizes slowly at relatively high pressure below Earth's surface

Intrusive igneous rock crystallizes slowly and hence its grain size is usually large (more than a few millimeters)

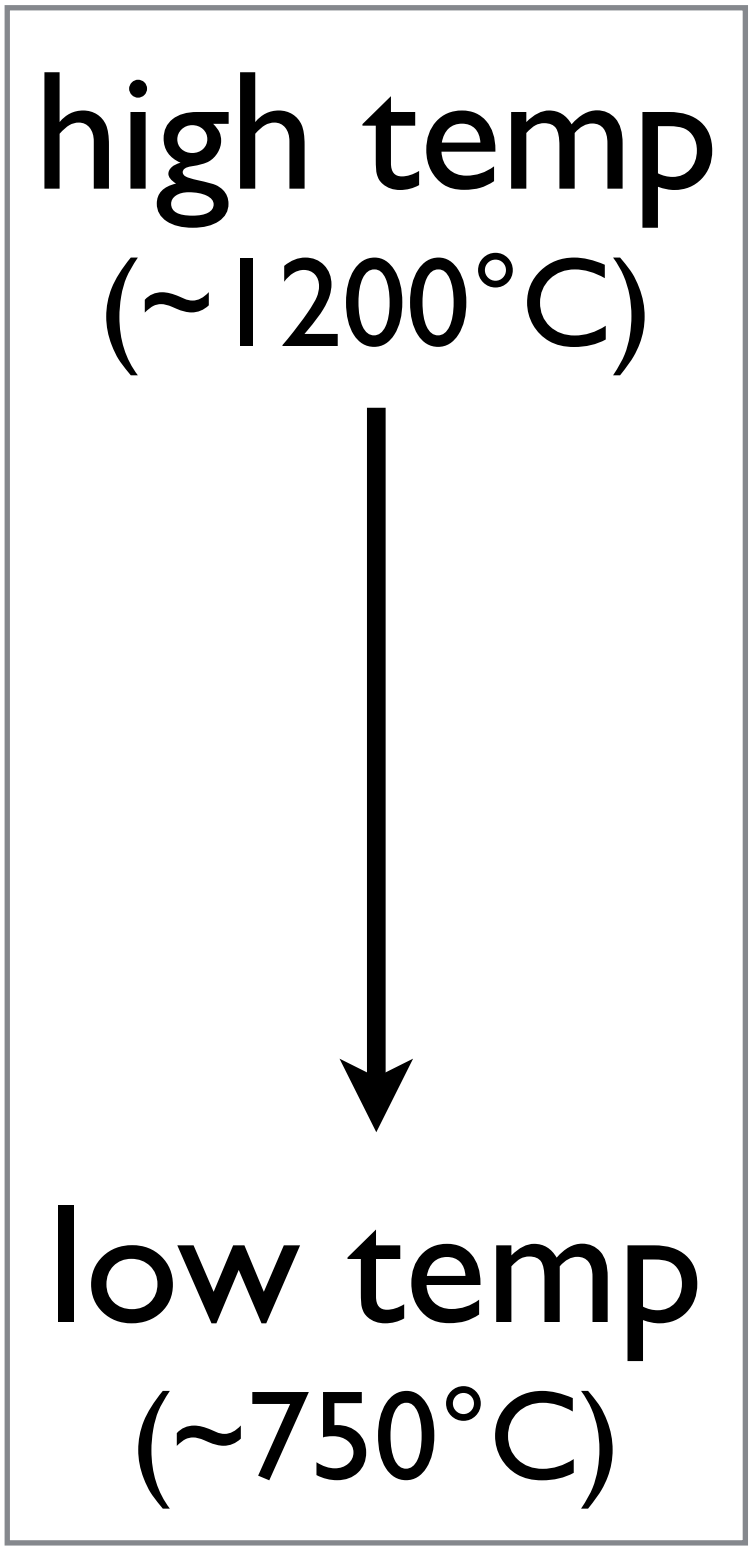
phaneritic: adjective for larger grain sizes

Extrusive igneous rock crystallizes rapidly and hence its grain size is usually small (less than a few millimeters)

aphanitic: adjective for small to microscopic grain sizes

Volcanic glass is not a rock because it is not made (primarily) of mineral grains. It solidifies very rapidly — too fast for crystals to form


QUARTER



olivine

pyroxene

amphibole

biotite

Ca-feldspar

continuous series

Na-feldspar

K-feldspar

muscovite

quartz

What might cause a porphyritic texture?

Hint: Each type of mineral in an igneous rock crystallizes within a particular pressure-temperature range.

Where is magma formed?

Repeat after me:

Earth's crust is *NOT* floating on a sea of molten magma.

Where is magma formed?

Repeat after me:

Earth's plates are *NOT* floating on a sea of molten magma.

Where is magma formed?

- Above a subducting slab
- Along a mid-ocean ridge or continental rift
- Above a hotspot
- Misc crustal gaps or unusually thick crust

Compositional Twins

Intrusive		Magma	**Extrusive**
granite		felsic	rhyolite
diorite		intermediate	andesite
gabbro		mafic	basalt

Why do different magmas have different compositions?

mafic xenolith in granite

Intrusive igneous rock bodies

dikes

plutons

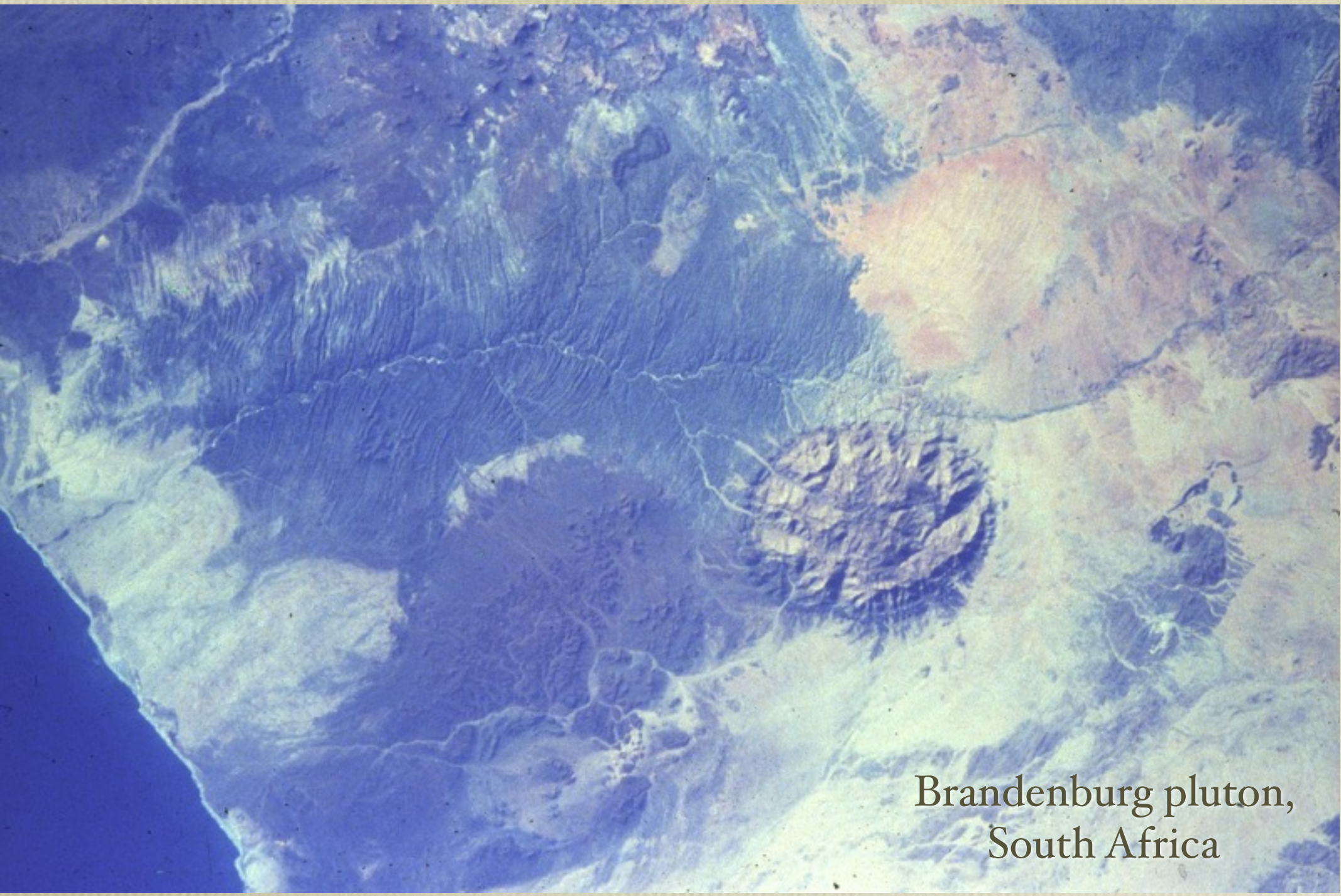
stocks

sills

batholiths

(necks)

laccoliths



Brandenburg pluton,
South Africa


Sierra Nevada batholith, California
Tenaya Lake, Yosemite National Park

On to volcanoes, extrusive rocks and volcanic landforms…