Rocks

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Schedule

Monday: 9-10AM [L]

Wednesday: 4-6PM [L]

Thursday: 5-6PM [T/D]

Friday: 5-6PM [L]

Any change in plan will be notified/discuss in the class

Topics

Rocks: 6 classes

Geological Time Scale: 2 classes

Fossils and evolution: 7 classes

PPT

Study material

Appointment

Demonstrations!

Rocks

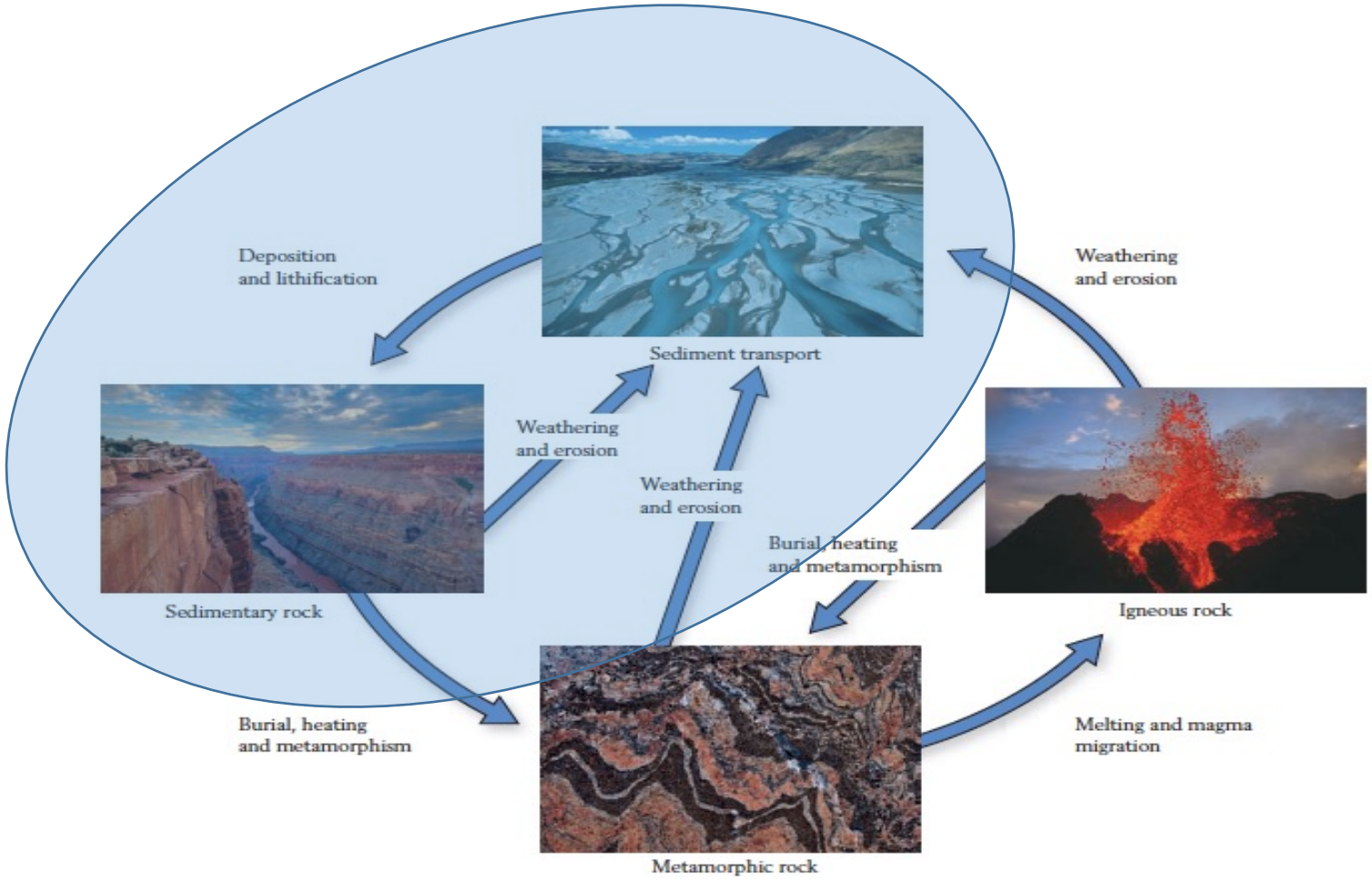
"Minerals: Building Blocks of Rocks" → Rocks

> Rock: naturally occurring solid aggregate of minerals (or nonmineral solid matters).

Grotzinger and Jordan book

Rocks and Rock Cycles

A. Igneous rock – from molten magma
B. Metamorphic rock – modification of existing rocks
C. Sedimentary rocks - breaking down of existing rocks and then redeposition



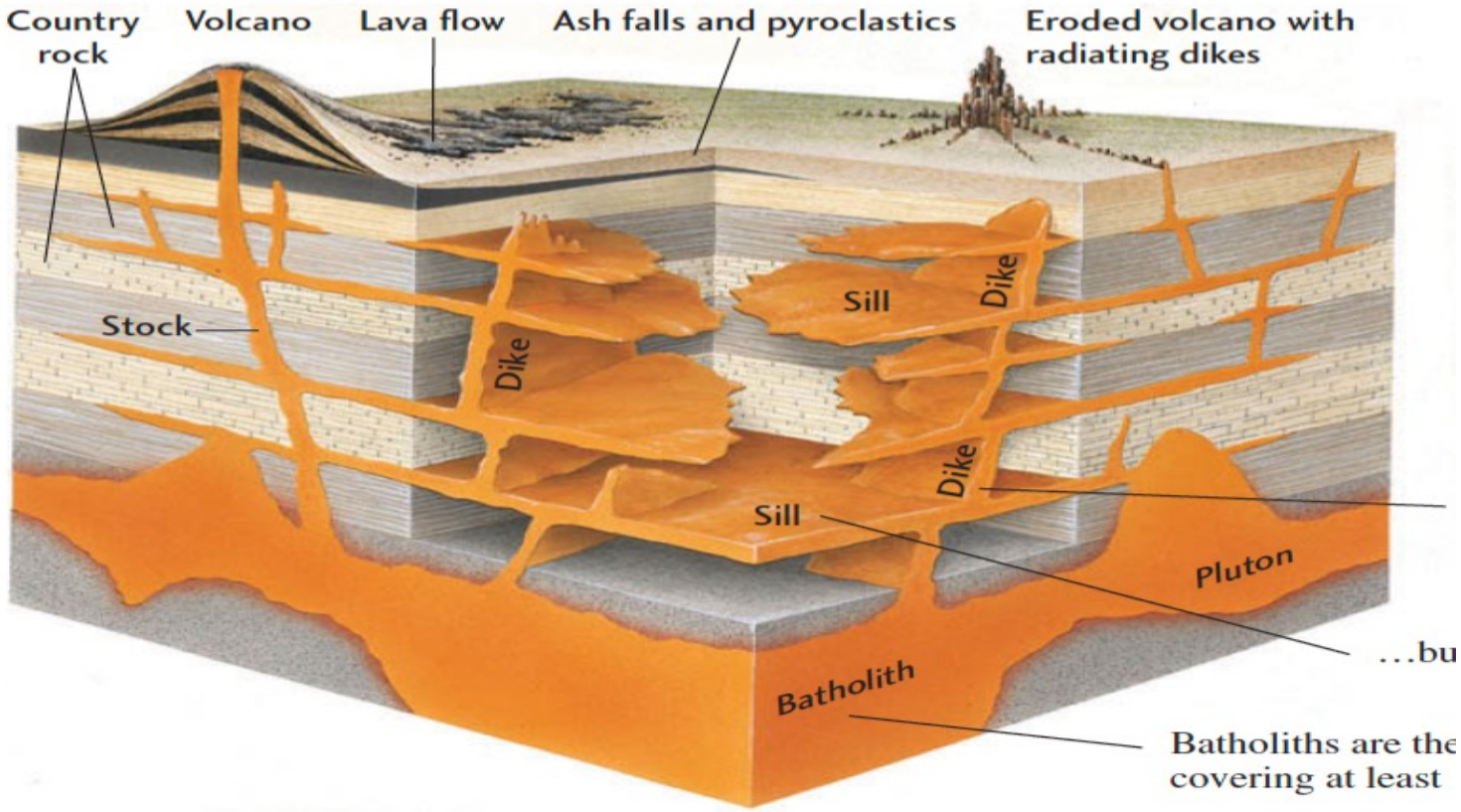
Igneous Rocks

Magma= Molten rock that comes from the Earth's interior. It has Volatiles (H_2O, CO_2, SO_2), Melts (mainly silicon, oxygen), Solid (mainly silicate minerals)

Intrusive/Plutonic: magma solidify below the ground (crust).
Magma cools slowly → *individual crystals grow large. Coarse-grained rocks!*
Extrusive/Volcanic: molten rocks solidify above the ground. *Cools and solidifies rapidly → individual crystals have no time to grow gradually. Fine-grained rocks!*

Igneous Rocks: Intrusive structures

Pluton: Large intrusive igneous bodies formed deep in Earth's crust. Batholiths is the largest pluton **(**> 100 km^2**).**
Dike: Discordant bodies produced when magma is injected into fractures/weak planes.
Sill: Concordant bodies produced when magma is injected along sedimentary bedding surface.



Igneous Rocks: compositions

- Mainly composed of silicate minerals.

Mafic: composed of dark-colored minerals, high in Mg and Fe, low in silica
Felsic: composed of light-colored minerals, high in feldspar and silica

Intermediate
Ultramafic

TABLE 4-1 Common Minerals of Igneous Rocks

Compositional Group	Mineral	Chemical Composition	Silicate Structure
FELSIC	Quartz	SiO_2	Frameworks
	Orthoclase feldspar	$KAlSi_3O_8$	
	Plagioclase feldspar	$NaAlSi_3O_8$; $CaAl_2Si_2O_8$	
	Muscovite (mica)	$KAl_3Si_3O_{10}(OH)_2$	Sheets
	Biotite (mica)	K, Mg, Fe, Al — $Si_3O_{10}(OH)_2$	
MAFIC	Amphibole group	Mg, Fe, Ca, Na — $Si_8O_{22}(OH)_2$	Double chains
	Pyroxene group	Mg, Fe, Ca, Al — SiO_3	Single chains
	Olivine	$(Mg,Fe)_2SiO_4$	Isolated tetrahedral

Igneous Rocks: classification