

Chapter 8 Geomorphology

Endogenic and Exogenic processes

Endogenic processes (internal driven) Exogenic processes (external driven)

Super-position Uniformitarianism

UPPER MOST MANTLE + CRUST = LITHOSPHERE
ATHENOSPHERE

What major elements make up the earth's crust?

CONTINENT crust vs OCEAN crust

Extrusive rock; from lava (i.e. molten rock exposed at the surface); fast cooling; volcano eruptions; lava flows on surface.

Intrusive rock; from magma (i.e. molten rock NOT exposed to surface); slow cooling; plutons; batholiths, dikes, sills etc. cooled under the surface.

Building Crust: craton, shield, sedimentation, Pluton terranes
Orogeny
Transform faulting on Ocean floor along plate boundaries

Rock cycle-		
Igneous	Sedimentary	Metamorphic
Intrusive-Plutons-magma	1) Clastic type	heat/ pressure
Examples	Examples	Examples? see text
Extrusive-flow- lava	2) Chemical	
Examples	Examples	
Various form and texture	Strata or layers	foliated texture
Variance in Crystal size	Cementation	Crystals Changed
Viscosity differences	Lithification	
Cooling differences	Examples of Cementing agents??	

High viscosity = sticky, stiff lava or magma creating composite volcanoes

Low viscosity = more liquid and flows easily creating shield volcanoes and flood basalts.

Chapter 9 Tectonic earthquakes and volcanoes

Topography =lay of the land

Plate tectonics: Convergent and Divergent plates, **Where?** What Why?

Subduction zones, **Where?** What? Why?

Sea-floor spreading centers, **Where?** What? Why?

Continental Drift

Hot spot.

Crustal Deformation-

Tectonic activity and landform development and slope

Ductile Rock v. Brittle rock; importance to landform topography?

Folded mountains

Fault Block mountains

Volcanic Mountains

Where? locations of each type in the US, **What?** form taken? **Why?** causes/forces involved.

3 Types of forces and resulting landscape fault types and features

Compression

Reverse fault

Folded mountains

Where? What Why?

Tension

Normal Fault

Fault block mountains

Where? What Why?

Shear

Strike Slip Fault

not necessarily mountain building

Where? What Why?

All of these can come together in areas due to complexities of nature. But dominant stresses occur in various regions,

Earth quakes Common locations of quake activity

Seismic waves; P Waves; S-waves foci epicenter asperities

Elastic rebound theory

Volcanism Common locations of volcanic activity Where? Why?

Explosive vs effusive landform features, conditions, viscosity and characteristics

Landform features: composite volcanoes, shield volcano, flood basalts, and fissure

Chapters 10, 11, 14

Chapter 10 Weathering and Mass Movement

Terminology: Denudation Geomorphology

WEATHERING –

Jointing is important to all types of weathering. Jointing is initiated by tectonic activity.

Rock is unstable at earth's surface due to conditions upon which they were formed.

Mechanical /Physical Weathering

Frost Action

Salt Crystal Growth,

Tree roots

Pressure Release

Chemical Weathering Processes

Oxidation

Hydration & Hydrolysis

Carbonation

Carbonation- Rain dissolves Carbon Dioxide CO₂

H₂O + CO₂ = H₂CO₃ carbonic acid- a weak natural occurring acid

H₂CO₃ = creates “carbonation process” which

Effectively dissolves limestone, dolomite and carbonate cemented sedimentary rock

Soil formation and the variety of soils are caused by combination of Climate, Organisms Parent material and Time. (CLORPT)

Soil forms in layers called horizons A B C (see video notes)

Cave formation due to carbonation process

MASS MOVEMENT; rearrangement of earth materials by erosion transport and deposition.

Slope Avalanche, debris flow, rockfall (fastest) slides = fast movement of intact blocks

Ch 11 River or Fluvial Landforms; Key Learning concepts and review

ROCK MATERIAL CAN BE ERODED

TRANSPORTED

DEPOSITED

BY WIND WATER ICE

WE ARE ONLY ADDRESSING WATER (RIVERS) AND ICE (GLACIERS)

Drainage basin = Catchment area, Watershed 11.2

Drainage divide – highest elevation between watersheds 11.3

Base-level (local, artificial and ultimate)

Confluence

Stream profile 11.18

Sheet flow

Tributary Distributaries 11.26 11.27

Braided Stream 11.4

Alluvium Alluvial Fan 11.25

Aggraded stream (i.e. aggradation process)

Bed-load

Erosion- abrasion, hydraulic action, solution

Transport-, suspended load (suspension), saltation, traction, and dissolved load 11.13

Deposition –aggradation; Braided rivers. River deltas, sand bars, point bar

Active floodplain

Terraces: paired landforms that change with climate cycles& human impact 11.24 a&b

Flow and Channel Characteristics

Meanders, point bar, undercut bank (aka cut-bank) 11.15 11.23

Incised or degraded channel, entrenched meander 11.19

Human impact of dam construction.

Glaciers and Landscapes. Chapter 13 pp 409--422 and 428-430

Isostasy regarding glaciers.

Open systems

Ice covers about 11% of planet.

% of fresh water is tied up as ICE

Two basic types of glaciers

Alpine: High elevation and or high latitude regions. Formation Alpine of glaciers Parts of an alpine glacier: Cirque basin 13.6 , **accumulation** zone 13.5 b, **firn** line, **tributary glacier**, 13.5 **Ablation** zone 13.5b 13.5a lateral moraine, end moraines 13.5a.

Landforms of Alpine Glaciers = fjord, see 13.12 U shaped glacial valleys, horns, moraines arêtes, cirques 13.9 compare with 13.10

Continental: 428-430 see all figures and maps

High to mid Latitude areas depending on climate cycle.

Glacial cycles nearly every 100,000 years. Followed by interglacial cycles. Milankovitch sun-earth relationship.

Ice domes, albedo rate changes, **sea level changes**, See maps and diagrams, part of continental glaciers: lobes domes, melt ponds, positive feedback loops.

Landforms of continental glaciers: Kettle lakes, kames, drumlins, eskers, outwash plain, till plain, **loess** (aka glacial dust or glacial flour).

Pluvial Lakes or Paleo-lakes of the American West (Lake Missoula video)

Flow of ice- internal and external , Plastic flow, basal slip, crevasses, glacial surges. P 416

See extent of Pleistocene Glaciation at 18K fig 13.25

Erosion- glacial plucking, abrasion, grinding, gouging, polishing, striations