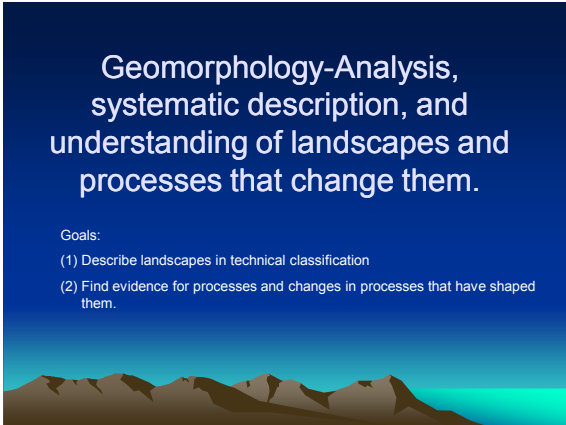


Geology 4320

Geomorphology


Intro



Geomorphology-Analysis, systematic description, and understanding of landscapes and processes that change them.

Goals:

- (1) Describe landscapes in technical classification
- (2) Find evidence for processes and changes in processes that have shaped them.



Approaches

- Regional description-describe landforms of region
- Process geomorphology-study mechanics of processes-no historical context
- Climatic morphogenesis-shaping of landforms in response to climatic conditions
- Tectonic geomorphology

Approaches (con't)

- Quantitative geomorphology
collect data, formulate equations
- Explanatory description
describe history of landscape in terms
structure, process, and time

- Structure
lithology (granite, sandstone,
limestone etc.), fractures, faults, tectonic
history
- Process
Climate (rainfall, temp), glaciers, wind,
rivers, mass wasting, etc.
- Time

Relationship to other fields

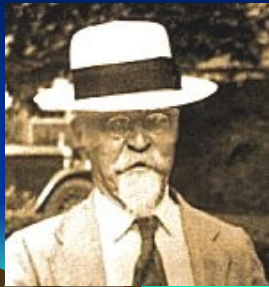
- Structure, geophysics, geochemistry,
pedology, hydrology/hydrogeology,
sedimentology, etc.

Landform-constant form or regular change of form

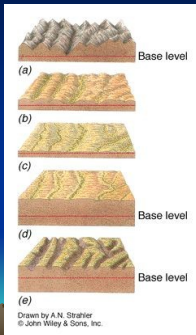
- Constructional
 - fault scarp
 - volcanic cone
 - drumlin
 - coral reef
 - delta
- Destructional
 - river channel
 - hillslope
 - cirque

Contrasting approaches

- Geomorphic cycles---
William Morris Davis-



Youth, Maturity, Old Age



Youth

Maturity

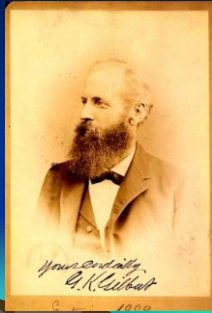
Old age-peneplain

Dynamic Equilibrium

Process Geomorphology

Process-response emphasized.
Delicate balance between processes and landforms

- Grove Karl Gilbert
- John Hack



Concepts of Process Geomorphology

- Equilibrium—delicate balance between process and landform
- Balance between driving and resisting forces.
- Threshold—point at which system is no longer in balance—response to develop new condition of equilibrium
- Process linkage (earthquake + tsunami)
- Complex response (change in base level in drainage basin)
- Landscape change is a function of type of time scale used

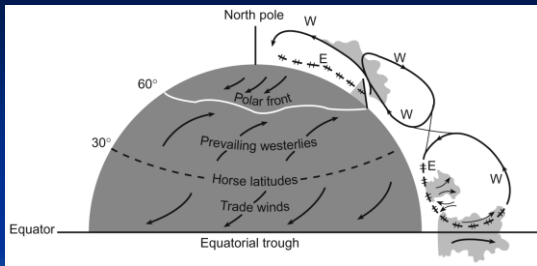
Driving forces

- Climate
- Gravity
- Internal Heat

Thermal gradients

- Latitudinal
Atmospheric and oceanic circulation
- Altitudinal
Clouds absorb long wave radiation
Warmed from below
- Seasonal
Tilt of axis and other rotational movements

Solar energy and thermal gradients

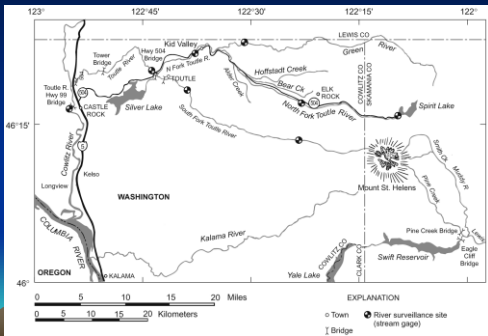


Thresholds

- Extrinsic
- Intrinsic

Process linkage

Mt. St. Helens



Feedbacks

- Positive
 - Warming causes reduction of ice cover, which causes adsorption of more solar radiation and more warming
- Negative
 - Warming causes more evaporation from oceans, more clouds. Clouds reflect solar radiation and decrease warming

Systems

- Closed

No exchange of energy or matter-
evolves toward equilibrium

Open

Evolve toward steady state
Geomorphic systems mostly open
matter-tectonism, volcanism
energy-solar energy, internal heat
