

Weathering and Soils

S=slide

S1

Key Concepts

What is weathering

What are the two main types of weathering, including the processes and examples

What factors affect weathering rates

How is soil formed and eroded

What is a soil profile

S2

Earth's External Processes

External processes occur at or near the surface and are powered by energy from the sun

-Weathering

-Mass wasting

-Erosion

Internal processes derive energy from Earth's interior

S3

Weathering

Weathering is the physical breakdown (disintegration) and chemical alteration (decomposition) of rocks

Mechanical weathering (disintegration) – physical forces break the rock into smaller pieces without changing the composition

Chemical weathering (decomposition) – chemical transformation of the rock into one or more new compounds

S4

Mass Wasting

The transfer of rock and soil down slope under the influence of gravity

S5

Erosion

The physical removal of material by mobile agents such as water, wind, or ice

S6

Mechanical Weathering

S7

More fractures increase the exposed surface area

24 square units 48 square units 96 square units

S8

Weathering & Fractures

Weathering begins along natural fractures (or joints) in rocks. As more mechanical weathering increases surface area, chemical weathering works at faster rates.

S9

Jointed rock, with two directions of jointing.

S10

An exfoliation surface in granite.

Half Dome, Yosemite, CA.

S11

Frost (Ice) Wedging

As water changes from a Liquid to a solid - it expands by 9 %

This expansion causes rock to split & crack

Climates must have daily or seasonal freezing temperatures for this to occur

S12

Frost wedging in a jointed rock.

S13

Gneiss boulder (3 m diameter) fractured by frost-wedging.

Taylor Valley, Victoria Land, Antarctica.

S14

Unloading:

Exfoliation of Half Dome in Yosemite National Park, California

Curved slabs of rock are created

S15

Root Wedging - as a tree grows the diameter (size) of the roots increase

This slow process can split Rock apart & crack concrete sidewalks & home foundations

S16

Chemical Weathering

The chemical transformation of the rock into one or more new compounds

Water and carbonic acid

How granite weathers

Weathering of silicate minerals

S17

Dissolution by water: leaching of coffee (left) and of feldspars (right).
Press & Siever (2001)