Soil Horizons & Soil Profile

- **Soil horizons**
  Distinct layers in soils parallel to the Earth's surface

- **Soil profile**
  A vertical section of the soil through all of its horizons and extending into the parent material

A. Soil Profile
Soil formation and the development of soil horizons controlled by 5 factors:

- Time
- Climate
- Parent material
  - Organisms
    - Plants
    - Animals
    - Microorganisms
- Topography
Soils consist of:

organic material (derived from living organisms at the surface) and

inorganic material (derived from minerals in underlying rocks and from chemical reactions within the soil).

Soil Horizons

Because of the different sources of these materials,

soils can often be divided into different layers according to their:

• appearance,
• composition, and
• origin.
Soil Horizons

- There are five horizons, and they are named by capital letters:
  - the O horizon
  - the A horizon is the top layer,
  - beneath it the B horizon,
  - the C horizon is on the bottom and
  - at the bottom of this layer is the bedrock D (R) horizon.

SOIL STRUCTURE

O-horizon: leaf litter, organic material
A-horizon: plough zone, rich in organic matter
B-horizon: zone of accumulation
C-horizon: weathering soil; little organic material or life
R-horizon: unweathered parent material
O horizons

O = organic, or derived from living things

- O1: The actual source of the organic matter (e.g. dead leaves, roots, etc.) can be seen in the soil.

- O2: The soil is still almost entirely organic, but you can't tell what the organic material came from. This organic matter is called humus and is typically very dark in color.

The A horizon

The A horizons are primarily inorganic, although they may contain up to 20-30% organic matter.

The A horizons are often formed by washing of fine mineral grains (e.g. clays) and soluble materials (e.g. calcium carbonate) down to deeper areas.

The A horizon is what we commonly call topsoil.
The B horizon

The B horizon is the horizon just beneath the A horizon.

It is called the subsoil and is primarily made of clay, small pieces of weathered rock, and minerals.

This layer is much harder and has a lot more clay than the A horizon.

The C horizon

The C horizons lie below the part of the soil penetrated by plant roots.

C horizons can be distinguished from those above by the fact that they still contain the original minerals from the parent rock.

It is made up of large pieces of rock.

The weathering of these rocks is the first step in the formation of soil.
The D horizon

The D horizon is the bedrock of the region – the actual rock from which the soils above have been weathered.

- Soil does not automatically have five horizons to it. Take hundreds of years to reach that point.
- If a soil does have five horizons, it is called mature soil, and
- if it has less than five layers, it is called immature soil.

As the immature undergoes more decaying and weathering, it will eventually become mature soil.
Residual and Transported Soils

Based on the relationship between the soil and the parent material

Two general soil categories of soil are recognized:

Residual soils

Transported soils

Residual soils

consist of materials that are formed in place (not transported) by physical and chemical weathering of a parent rock.

As the residual soil develops, the products of its weathering eventually cover the parent rock.

Some characteristics of the residual soil are partially dependent on the characteristics of the underlying parent rock.
Transported soils

Transported soils consist of materials that are formed elsewhere by weathering processes.

They are then carried in a transporting medium such as:
• Moving water or ice
• Wind and
• Gravity

Transported soils

They are deposited as a layer or successive layers of unconsolidated material.

The characteristics of transported soils generally do not reflect the materials upon which they rest.

Soils found in river floodplains are examples of transported soils.