Next stage will depend on climate and parent materials

- Rainfall and temperature will determine nature of vegetation
- Resistance of parent material to weathering will determine rate and type of clay formation, acidity
- Rainfall (effective precipitation) will determine extent of translocation

Progression in soil development

- High rainfall
- Moderate rainfall
- Low rainfall

Arid environment

- Less organic matter accumulation in surface
- Less translocation of clays, cations
- Cations never leave the profile
- Accumulation of salts (cations)
Arid environment

- Organic accumulation less pronounced
- White in B = salts, carbonates
- Clays in B

General overview

Humid, temperate climate

Soil Taxonomy

- Language and terminology used to identify, characterize, and classify different types of soils
- Using this, you can understand origins of soil as well as productivity of soils

Description of an individual soil:

- Pedon - smallest 3D unit that displays characteristic of an individual soil
Tools to study soil development

- Horizons
  - O- organic horizon, consists of OM in various stages of decomposition
    - Oi - slightly decomposed
      - Source of material easily recognized
    - Oe - moderately decomposed
      - some recognizable components
    - Oa - highly decomposed
      - primarily organic, not recognizable

Horizons

- A- surface horizon, dark in color due to OM accumulation, coarser in texture due to translocation of finer clays

Horizons

- E- forms below O,A horizons
  - horizon of loss (clays and cations) from eluviation
  - Generally lighter in color than A or B horizon
  - Acidic parent material

• B- form below O,A,E horizons
  - horizon of accumulation (clays and cations) from illuviation
  - sufficiently altered so it is no longer recognizable as parent material

Horizons

• C- At the bottom
  - insufficiently changed from parent material to qualify as part of the solum
Words to further describe each horizon
• These descriptives are used to classify a soil
• Different tools to delve into particular characteristics of the pedon under investigation

Epipedon - to characterize A horizon
• Mollic - >25 cm thick, >0.6% C, soft when dry, high cation
• Umbric - same as above, but cations (%base saturation) lower
• Melanic - high OM, fluffy, on volcanic soils

Epipedon - to characterize A horizon
• Histic - accumulation of OM overlaying a mineral soil, wet
• Ochric - OM but not enough to qualify for other designations

Melanic

Mollic

Ochric

Histic

Salic
• Surface accumulation of soluble salts, usually occurs in dry climates where moisture in subsoil is wicked to the surface
Beginnings of a B horizon

- Cambic - some indications of change, usually a color difference
- Cambiare to change
- Albic - more pronounced, light color with clay, Fe and Al removed

Subsurface Horizons

- Argillic (Bt)
  - High accumulation of clays in the B horizon
  - See them as coatings or skins

Clay skins

- Argillia (clay) - skins on the surface of particles in the B horizon

Natric (Btn)

- Clay skins with exchangeable Na > 15%, columnar or prismatic soil structure

Prismatic

- Common in B horizons in arid areas (where you will have high salt accumulation)

Subsurface Horizons

- Kandic accumulation of Fe and Al oxide clays in the B horizon
Subsurface Horizons

- Oxic (Bo)- very high Fe and Al, few weatherable minerals, > 30 cm deep

Subsurface Horizons

- Spodic (Bh, Bs)- illuvial horizon, below E, high in OM, Al and Fe oxides
- Found in primarily in acidic soils

Subsurface Horizons

- Calcic (k)- accumulation of carbonates, can appear as white nodules

Cemented horizons

- Duripan (qm) - Hardpan, strongly cemented by silica
- Fragipan (x) - Brittle pan, dense
- Petrocalcic (km) Cemented calcic horizon
- Petrogypsic (ym) Cemented gypsic horizon
- Placic (sm) Cemented with Fe, Mn, OM

Petra - rock in greek

Petrogypsic (ym) Cemented gypsic horizon

Petrocalcic (km) Cemented calcic horizon

Cemented horizons:

- Impermeable or slowly permeable by water
- Barrier to root growth
You are in a forest

• There are pine trees all around
• It’s raining
• The ground is level
• The surface soil has a lot of leaf litter and feels sandy
• What would you expect the soil to look like?

You are on the prairie

• The areas all around you are covered with grass
• It’s sunny and dry
• The soil where you are standing has much less grass and a white crust on the surface
• What would you expect the soil to look like?

Moisture regimes

• Aquic
• Udic
• Ustic
• Aridic
• Xeric

Temperature

• Classifications based on soil T at 50 cm depth
• Consideration differences between summer and winter averaged
Temperature

- Include terms like:
  - Frigid, Mesic, Hyperthermic
  - Cold, Moderate, Hot
  - ISO (Greek meaning same)
  - Isofrigid, Isomesic, Isothermic