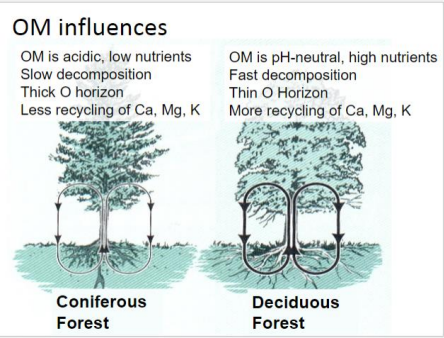
Week 2 soil HW

Lecture 1

There are four soil forming processes that promote horizonation and soil development. They are Additions, removals, transformations, and translocations. Additions include things like rain and organic matter being added to the topsoil, or rising up through soil water. Losses are the runoff of material on the topsoil and the leaching that occurs naturally. Translocations involve OM, clay, and iron seeping down into the soil and transformation includes the decomposition of OM and the change of primary minerals into secondary minerals. The five factors of soil formation are CLORPT; Climate, organisms, Relief/Topography, Parent Material, and Time. The first two (climate and organisms) are active throughout soil development while the last three are passive. Weathering can erode material both physically and biogeochemically. These change the physical aspects (size) and the chemical aspects of materials, respectively. Some primary examples of physical weathering include freeze-thaw, uneven heating, shrink-swell, abrasion, and root growth. An example of chemical weathering is how lichens release acids to get nutrients from rocks.

Lecture 2

Two key climate variables are temperature and Effective precipitation (the water that penetrates into the soil). Effective Precipitation is affected by topography, soil permeability, seasonal distribution of precipitation, and temperature. Heat and water speed up weathering, with strong chemical weathering more prominent in high rainfall and high temperature areas. Precipitation also affects the depth of carbonate accumulation; the greater the precipitation, the deeper you have to go in order to access carbonates in the soil. Furthermore, it affects soil PH: More precipitation = acidic soil. Next we went into organisms and how they influence soil formation.




I found these two slides to be very interesting and so included them here. As you can see, deciduous forests have heavy recycling but require ph neutral soil with high nutrients. Coniferous on the other hand can handle acidic soil but decomposes OM slowly and doesn't recycle well. Heres some more ways Organisms influence soil formation:

Plants – rooting patterns, leaf OM chemistry

Microorganisms – decompose OM, alter chemical environment

Animals – create pathways for movement of water, alter OM

Humans – EVERYTHING

Review: Effect of Vegetation

| | Grass/ Ag Land | Deciduous Forest | Coniferous Forest |
|---|---|---|---|
| Nutrient content of plant residues | high | high | low |
| OM decomp. rate | rapid | rapid | slow |
| O horizon | no | seasonally | yes |

Lecture 3

Topography has a large impact on soil formation. Topography has three primary components which are relief, aspect, and elevation. Relief is the slope angle or grade and determines effective precipitation and erosion. Aspect is the compass direction the slope faces and affects climate + organisms. Elevation is how high above sea level it is and also affects climate and organisms. Time is the fifth factor of soil formation and of course describes how the weathering process and soil formation operates over time. More time means more secondary minerals forming in soil and a higher amount of clay.