About soils

Soils can be described as 'the interaction between the lithosphere, hydrosphere, and atmosphere'. They can be classified in a number of ways- i.e. based on colour, moisture, texture, structure etc.

Soil texture- The relative mixing of primary particles. Most commonly, we assess the levels of sand, silt & clay.

Soil structure- The organisation of primary particles into secondary units (called peds). We can describe peds as either prismatic, platy, blocky, or crumb.

Soil fauna

Microbiota- Microscopic organisms, e.g. bacteria and nematodes.

Mesofauna- Soil animals of an intermediate size, e.g. springtails.

Macrofauna- Soil animals larger than 2mm, e.g. earthworms. Lead to larger pore spaces in the soil.

Factors in soil formation

Temperature- Rates of chemical reaction, and microbial activity increase with increasing temperature. This increases the rate of weathering and decomposition.

Climate- Temperature and rainfall influence weathering and throughflow through soils, leading to the formation of eluvial and illuvial horizons. In polar regions, regolith is weathered by freeze-thaw.

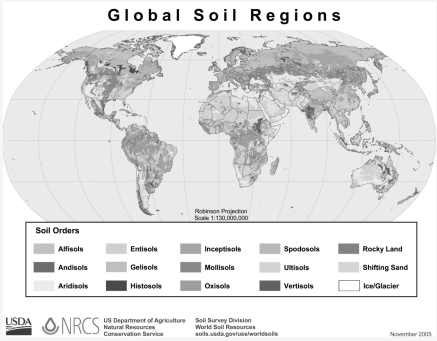
Organisms- Micro, macro, and mesofauna mix organic and mineral material thoughout soils through the process of bioturbation. Humans also modify soils to meet our demands (usually agricultural).

Topography- Altitude and slope aspect can influence soil temperatures, which influences rate and extent of weathering.

Parent materials- Different parent materials (bedrock types) are more easily weathered than others.

Time- *The most important factor in soil formation*. Eventually, bedrock will be weathered and incorporated with organic matter if given enough time. Soils in the tropics are much older than those in temperate regions.

Global soils



Key soil types to note are:

Oxisols- highly weathered, deep soils. Red in colour, typical of tropical forests.

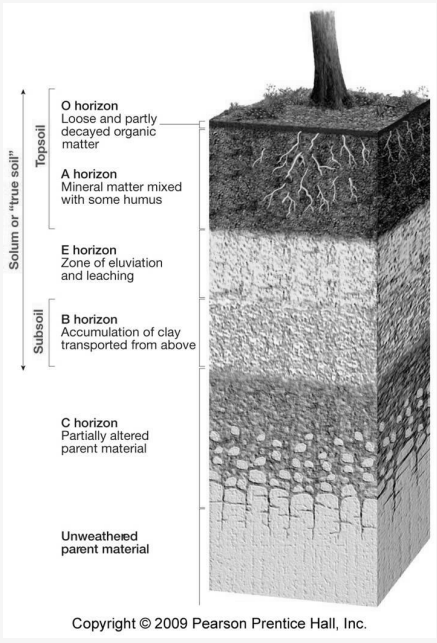
Ultisols- highly weathered, similar to oxisols. Reddish/yellow in colour, typical of warm, humid climates.

Aridisols- very little organic content. Typical of deserts.

Inceptisols- little in the way of horizons, e.g. brown earth.

Gelisols- containing permafrost.

A typical soil horizon profile



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Common types of soil

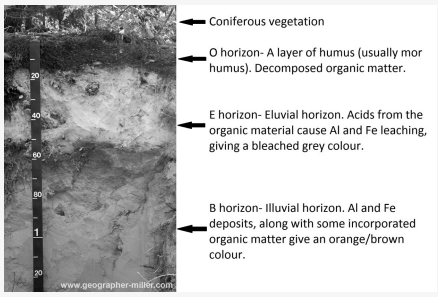
Brown Earth- Forms in temperate deciduous woodland. Well-incorporated organic and mineral material due to bioturbation by soil fauna; this results in an isotropic soil which is good for agriculture. Neutral/ mildly acidic pH.

Podzols (spodosols)- Form in coniferous woodland due to the presence of acidic needles. This needle litter decomposes and releases organic acids which form complexes with aluminium and iron in the E horizon. These leach down into the B horizon, giving an orange-brown colour. (See image below).

Gley Soils- Form in anoxic conditions in areas of saturated ground. This saturation allows chemical species to be reduced. If drained, gleys can be effective agricultural soils. Grey in colour.

Peat- Formed by the slow decomposition of organic matter under wet or cold conditions. Blanket peat is fed by precipitation, and raised bogs (which form in topographic hollows) is fed by groundwater running in from the sides.

A podzol soil profile. Note the distinct horizons:



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