Soils

Soils are surface material that forms due to weathering. Soil is a combination of mineral and organic matter with water and air.

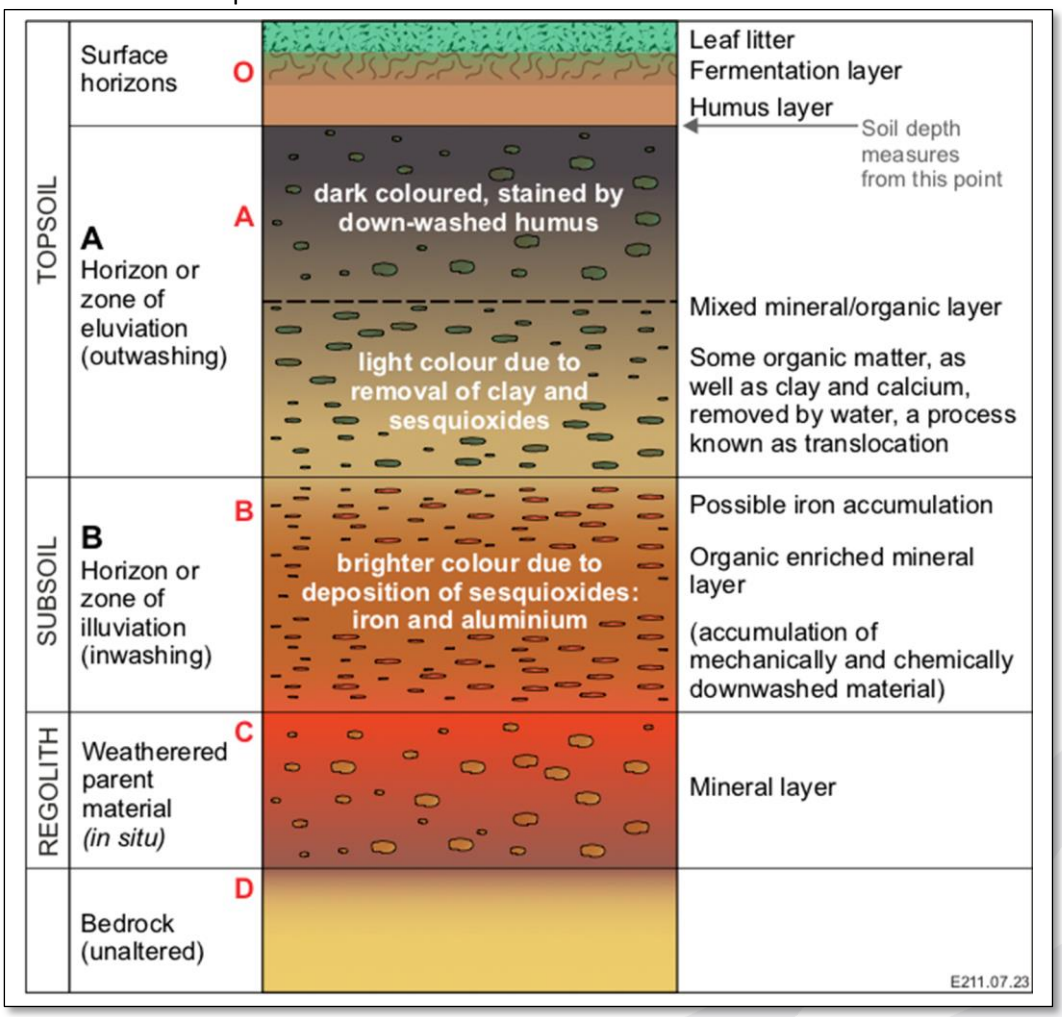
Factors affecting their formation are:

1. Time
2. Climate (temperature, rainfall)
3. Topography (altitude, aspect and slope)
4. Parent material (permeability and minerals)
5. Organisms (nutrient cycling, mixing, organic matter)

Classification of soils varies depending on the classifier. Geologists use a very simple classification based largely on materials added or removed from the soil during its formation.

Soil Profile

The diagram shows an idealised profile for a well-developed soil in a region with temperate climate. Similar soils are found in parts of Tasmania and Victoria.



Major Australian Soil Types:

Tenosol (26.3%) – Slightly developed soils that tend to develop on rocky areas or where wind and water have deposited soil and soil development is weak.

Kandosols (16.5%) – Strongly weathered earths with minor changes in texture with depth. These soils are usually well drained with low fertility. They are often associated with granite or gneiss parent rocks.

Rudosols (14.0 %) – Minimally developed soils that occur as young sedimentary deposits along flood plains. In wetter areas they may develop a well-structured A horizon. Rudosols are typically acidic with variable nutrient availability, good infiltration and low water holding characteristics.

Sodosols (13.0 %) – Soils with sodic subsoils, which are often alkaline. Sodosols have a strong contrast between a loamy A horizon and clay B horizon.

Red sodosol near Coober Pedy, South Australia

Vertosols (11.5%) – Cracking clays commonly found on low lying plains.

Calcarosols (9.2%) – Soils dominated by carbonate sediments, often windblown. They have a slight, gradual increase in clay content with depth. The pH is alkaline and salt levels are often high in deep subsoil.

The term **laterite** is often used to describe Australian soils. Laterite soils and rocks are the product of weathering. They are often brightly coloured with red iron and yellow aluminium oxides. Many different soil types can be lateritic.

State Soils

Soil Science Australia recognises the following 'iconic' soils for each State or Territory:

New South Wales – **Red Chromosol**. These soils occupy approximately 20% of the state and are valuable for agriculture. They generally have a neutral pH with good physical properties for agriculture, but may become degraded and acidified with long term cultivation.

Northern Territory – Kandosol. These even-textured soils are the most widespread soil type in the NT, used for crops and grazing.

Red kandosol near Darwin, Northern Territory

Queensland – Vertosol. These clay soils occupy 28% of the state's total area and are responsible for 58% of Queensland's cropping area. Many are formed from weathered basalt and naturally host grasslands, eucalypt woodland and brigalow forests.


Grey vertosol profile in south Queensland

South Australia – Calcarosol. Calcarosols occur widely in southern Australia, but are not common elsewhere. South Australian calcarosols typically are well drained, moderately fertile soils with a sandy loam texture. They are used for broadacre cropping, pasture and irrigated crops. The calcium carbonate may form hard nodules or concretions and many are also underlain by a hard layer of carbonate.

Tasmania – Ferrosol. Tasmania's ferrosols are formed from weathering of basalt from volcanoes that erupted 10 – 50 mya. The iron-rich basalt has weathered into iron oxides giving the deep soils a red colour. Iron oxide content ranges from 7 – 18% iron.

Victoria – Mottled Brown Sodosol. These sodosols occur mainly in areas of high rainfall. The soil has poor drainage and becomes waterlogged after heavy rain. The main use is for grazing, but some cropping occurs on sodosol in the south-west.


Perth basin soil profile

Western Australia – Yellow Chromosol. This sandy, grey topsoil occurs on top of a mottled clay subsoil in south-west WA. These are some of the most fertile soils used for crops, forestry and grazing.

References:

CSIRO (2004). Grey Vertosol soil profile in the Chinchilla district of south Queensland (image). CSIRO ScienceImage.

CSIRO (2004). Red Kandosol soil profile in the Darwin district Northern Territory (image). CSIRO ScienceImage.

CSIRO (2004). Red Sodosol soil profile near Coober Pedy South Australia (image). CSIRO ScienceImage.

Metcalfe D, Bui E (2016). Land: Soil: Understanding. In: Australia state of the environment 2016, Australian Government Department of the Environment and Energy, Canberra. https://soe.environment.gov.au/theme/land/topic/2016/soil-understanding

Soil profile in Jandakot 2012 (image). Wikimedia Commons.

Soil Science Australia (n.d.). State Soils. https://www.soilscienceaustralia.org.au/about/about-soil/state-soils/

State of Victoria (Agriculture Victoria) (2019). Soils of the North East Region. http://vro.agriculture.vic.gov.au/dpi/vro/neregn.nsf/pages/ne_soil_north

Tompkins DE, Watkins JM (2016). *Exploring Earth and Environmental Science: Year 11*, 2nd Edition. Earth Science Western Australia.