

Permafrost

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Permafrost in a coastal bluff in Alaska. The frozen ground holds a lot of ice. When it thaws, the coast collapses, and carbon in the soil can escape as CO₂ and methane.

Brandt Meixell, USGS. Public domain. [Wikimedia Commons](#).

Soil or rock frozen for a period of at least two years.

Permafrost can develop in areas with an annual mean [temperature](#) at or below the freezing point of water (0° C / 32° F).

Of the Earth's land surface, 20 percent is estimated to be in a state of permafrost. It is widespread in the Arctic and subarctic, in Siberia, Alaska and Canada, but also in the Antarctic and at high altitude in mountains.

Determining the distribution of permafrost can be difficult. An air temperature well below freezing does not necessarily mean that the ground is frozen. Land under [glaciers](#) and rivers is often without permafrost, despite freezing air temperature.

Ground with permafrost does not necessarily contain water. Ground consisting entirely of dry rock with a temperature below freezing is also called permafrost. Nonetheless, permafrost often contains water but not always ice. The permafrost definition only concerns the temperature of the ground, and not the existence of ice in it.

Under certain circumstances water may have a temperature below its freezing point without actually freezing. For example the temperature of water with a high concentration of salt may be below freezing without ever turning to ice. Most permafrost do, however, contain ice, which makes the ground solid.

In some areas with permafrost, the top layer will thaw in summer and freeze again in winter. This is called the active layer, where plants can grow. The thickness of the underlying permafrost layer varies greatly. It is up to 1,500 meters thick in northern Siberia.

Increasing temperatures could potentially set off a [positive feedback](#) mechanism as the permafrost areas thaw. The worry is that thawing will result in the release of great quantities of [methane](#), which is a [greenhouse gas](#).

Another problem is that buildings, roads and other human-made structures in permafrost areas depend on the stability of the frozen ground.

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