

Evidence of recent warming and thawing of permafrost in the Arctic and sub-Arctic

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The impact of climate warming on permafrost and the potential of climate feedbacks resulting from permafrost thawing have recently received a great deal of attention. Most of the permafrost observatories in the Northern Hemisphere show substantial warming of permafrost since the 1980s. The magnitude of warming has varied with location, but was typically from 0.5 to 3°C. A more pronounced warming has been observed in cold permafrost in higher northern latitudes and a smaller increase in temperature was typical for the warmer permafrost. Permafrost temperatures were stable or even slightly cooling during the last several years in the lower northern latitudes. During the second half of the 20th century, permafrost has been already thawing within the southern part of the permafrost domain. However, recent observations documented propagation of this process northward into the continuous permafrost zone. The close proximity of the exceptionally ice-rich soil horizons to the ground surface, which is typical for the arctic tundra biome, makes tundra surfaces extremely sensitive to the natural and human-made changes that resulted in development of processes such as thermokarst, thermal erosion, and retrogressive thaw slumps that strongly affect the stability of ecosystems and infrastructure.

