

Thawing permafrost likely to boost global warming

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The thawing of permafrost in northern latitudes, which greatly increases microbial decomposition of carbon compounds in soil, will dominate other effects of warming in the region and could become a major force promoting the release of carbon dioxide and thus further warming, according to a new assessment in the September 2008 issue of *BioScience*.

The study, by Edward A. G. Schuur of the University of Florida and an international team of coauthors, more than doubles previous estimates of the amount of carbon stored in the permafrost: the new figure is equivalent to twice the total amount of atmospheric carbon dioxide. The authors conclude that releases of the gas from melting permafrost could amount to roughly half those resulting from global land-use change during this century.

Schuur and his colleagues refine earlier assessments by considering complex processes that mix soil from different depths during melting and freezing of permafrost, which occur to some degree every year. They judge that over millennia, soil processes have buried and frozen over a trillion metric tons of organic compounds in the world's vast permafrost regions. The relatively rapid warming now under way is bringing the organic material back into the ecosystem, in part by turning over soil. Some effects of permafrost thawing can be seen in Alaska and Siberia as dramatic subsidence features called thermokarsts.

Schuur and his colleagues acknowledge many difficulties in estimating

carbon dioxide emissions from permafrost regions, which hold more carbon in the Arctic and boreal regions of the Northern Hemisphere than in the Southern Hemisphere. Data are limited, and emissions are influenced by the amount of surface water, topography, wildfires, snow cover, and other factors. Thawing, although believed to be critical, is hard to model accurately.

Some warming-related trends in Arctic regions, such as the encroachment of trees into tundra, may cause absorption of carbon dioxide and thus partly counter the effects of thawing permafrost. But Schuur and colleagues' new assessment indicates that thawing is likely to dominate known countervailing trends.

Source: American Institute of Biological Sciences

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