Ancient Arctic ice could tell us about the future of permafrost

September 22 2008

Duane Froese examines an ancient ice wedge.

(PhysOrg.com) -- Researchers have discovered the oldest known ice in North America, and that permafrost may be a significant touchstone when looking at global warming.

"Previously it had been thought that permafrost completely melted out of the interior of Yukon and Alaska about 120,000 years ago, when climate was warmer than today," said Duane Froese, an assistant professor in the Department of Earth and Atmospheric Science and lead author of the

study.

"What we found is that even within the discontinuous permafrost zone-the area where permafrost is warm and within a few degrees of 0C and shallow, only a few to tens of metres thick-it has survived at some locations for more than 700,000 years." Because of the potential longevity of the permafrost, it tells the story of climate changes over the course of hundreds of thousands of years, which Froese says is immeasurably valuable.

When permafrost thaws, much of the carbon that was formerly locked up becomes available for decomposition in thawed soil or beneath lakes and is released as carbon dioxide or methane. "Based on the incredible antiquity of the ice wedges we documented, we think that permafrost that is more than several metres below the surface is more resilient to climate warming that previously thought," said Froese.

However, Froese and his colleagues emphasize that their study is not an invitation to ignore the potentially serious impacts of climate warming, particularly in the North.

"Permafrost is like the glue that holds the Arctic together," said University of Alberta graduate student Alberto Reyes. "Widespread deep thaw would be bad news for northern infrastructure and economic development, and may have dramatic effects on ecosystems that are adapted to the presence of shallow permafrost."

Provided by University of Alberta

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