



FOCUS ON RESEARCH

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Peat beds help researchers understand climate change

KLUANE LAKE, YT, JULY 2009 -- Up and down Silver Creek, a ten kilometre long creek bed in the southwest corner of the Yukon, Derek Turner is searching for evidence of previous glaciations.

While most studies agree there have been at least three different edges or extents of glacial coverage of the Yukon, there are theories that the glacial coverage was not all that neat and tidy. Some boundaries mask multiple glaciations that may not have extended as far as the maximum extent of glaciation in the Yukon. Part of Turner's work, as a PhD student in the Department of Earth Sciences at Simon Fraser University, is to confirm when glaciations happened.

He does this by looking for preserved sediments in the strata of old sediment on the edge of the creek. In the north, Beringia—that large area of northern Yukon and parts of Siberia that escaped glaciation—helped preserve its own regional plant, animal, even insect history in permafrost, freezing and preserving peat beds from thousands of years ago. “Those peat beds can tell us a lot.”

While pollen research has been big in paleoecology over the last 50 years, Turner admits that researchers can't tell some species from one another. With preserved peat beds, he says, they can know exactly what was here.

“In them are preserved plant life, ants, beetles, everything you'd find on a forest floor. A forest floor from 130,000 years ago.” Knowing what was around before and after a glaciation helps researchers understand the warming cycles in between.

Turner says, “If we're going to understand climate change—especially for this region—we can study those peat beds to understand how fast or how slow it warmed up. We can determine a lot from the beds. For instance, we can determine that 130,000 years ago this area had a boreal forest. And we can see how these warm periods changed coming into and out of glaciations across different regions. Peat beds are full of info.”

He emphasizes the need for precision in both determining what parts of the Yukon glaciers covered, and when. And also precision in knowing how a region is affected by rapid temperature change. “You want to know what happens in different regions, what weather patterns happened, if it warmed up slowly or quickly, and how the environment reacted to these changes. How warm were the warm periods?”

Dating the glaciers takes more than radiocarbon dating, which is only accurate from today back to 30-50,000 years ago. Turner studies the different layers of tephra in the rock strata. Tephra, or volcanic ash, can be used to date sediment.

He gets excited about discovering evidence of glaciation. “Out here in Silver Creek, when we find tephra in peat beds below sediment with evidence of glaciation, it’s hard evidence. We don’t need to infer where the glacier was. It was here.”

Turner does his research within reach of the Kluane Lake Research Station, run by the Arctic Institute of North America. He uses the Station as a base camp from which to hike out to different spots on the creek. Riley Gibson, his assistant, and a local geologist from Whitehorse, hikes out with him. They are gone all day, sometimes days at a time, climbing mountains and cliffs.

Turner enjoys it and he knows, ultimately, his work is collaborative. Research on the White River contributes to his own on Silver Creek. “It’s one of the joys of being a Quaternary geologist—your work is studying the last 2.6 million years. You don’t study the whole thing by yourself.”

The sections along Silver Creek were first discovered by George Denton, a PhD student at Harvard University, and his hiking partner, Sir Edmond Hillary.

But Turner is using tools Denton and Hillary didn’t have.

“I use Google Earth sometimes to look at the stratigraphy in the cliffs around the creek. The resolution is so good you can actually make out the different beds.”

He uses Google Earth to get an idea of where to hike next, so he can more closely examine those layers. On such a long creek, inaccessible by boat and often by vehicle, it’s a handy way of finding out where to look deeper to uncover more evidence of glacial events in the area. But Google Earth doesn’t make everything easy.

“We still have to pull ourselves up the side of the cliff using willow branches.”

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