



Snow's journey underground

Posted by frontierscientists

Posted: December 11, 2013 - 4:41 am



Water tracks serve as water drainage pathways. A dusting of snow in this image helps the water tracks stand out. Water tracks lie very slightly lower than surrounding ground, and support slightly different vegetation. This illustrative picture was taken at the Imnavait Creek Watershed site where Arctic snow records have been gathered since 1985. / Image credit: Larry Hinzman, Water and Environmental Research Center, University of Alaska Fairbanks (General Reference Format) Kane, D.L. and Hinzman, L.D., [retrieved 2013], Image data from the North Slope Hydrology Research project. University of Alaska Fairbanks, Water and Environmental Research Center. URL: <http://ine.uaf.edu/werc/projects/NorthSlope/> Fairbanks, Alaska, variously paged. [12/11].

Laura Nielsen for **Frontier Scientists** –

In Alaska's North Slope snow can be called overeager. Scientists at **Toolik** Field Station know that —except for the second half of August— they can expect it to snow any day of the year. Even during the brief summer, fierce storm fronts sometimes bring **snow that melts** away in 70°F (21°C) weather the very next day.

Water from Arctic snow melt creates something of a mystery because it moves and interacts with its local environment in ways we don't yet fully understand. Researchers tackling the little-explored topic of **water tracks** want to uncover those mysteries, including how Arctic melt water moves through soil in different temperature conditions, and what nutrients the water collects, how much and why. University of Alaska Fairbanks Institute of Arctic Biology assistant professor Tamara Harmes explains: "All organisms are built of the same elements. We are made mostly of hydrogen and oxygen," the elements that make up water (H₂O). "If we take that away," she continues, "we are made of first carbon (C), then nitrogen (N) and phosphorus (P)." All organisms, **plants** and animals alike, need to

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Photo by Astronaut Jeff Williams, NASA Earth Observatory

The Frontier Scientists blog is for travelers, teachers, students, aspiring scientists, and anyone interested in scientific discovery in the Alaskan arctic.

Come here for videos, photos and summaries that put you in the front row for breaking scientific news in the Far North. Research by our team of Alaska-based scientists includes 10,000-year-old archeological finds, photos of active Cook Inlet volcanoes taken from the space station, climate change, Denali Park's grizzlies, the nexus of Russian and native artistic traditions, and more.

Come along as scientists themselves are startled by the unexpected in field locations so remote researchers are often the first modern visitors to set foot in them.

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acquire those elements in order to grow.

Vital elements often move through ecosystems carried by water. Understanding how water flows through the Arctic tundra will help scientists map everything from flood risks to how nutrients are moving through the world, but it's no easy undertaking.

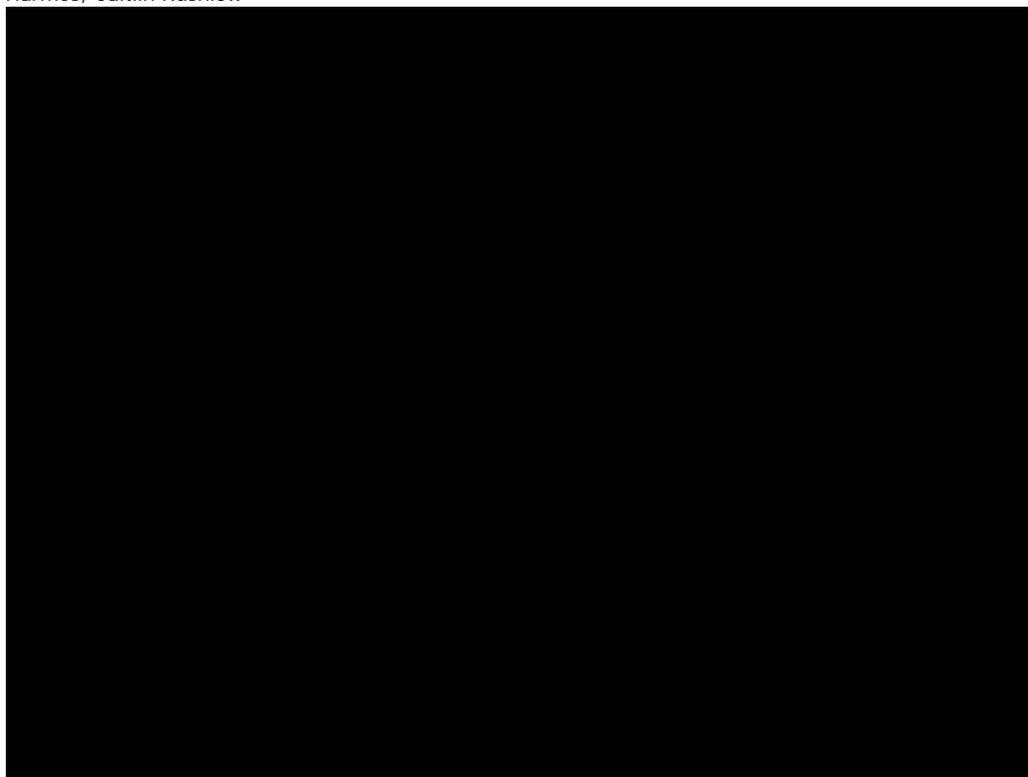
In Alaska's far north it's so cold for so much of the year that a lot of the ground stays frozen year-round. Those frozen underground layers of soil are called **permafrost**. Permafrost holds rock, soil, ice, dead plant matter, and even sometimes **ancient animals** that are preserved in the ground much like groceries in a freezer. Melt water from snow can't sink into the solid frozen underground permafrost. It can only flow through soil near the surface that has thawed out because of the Sun's **heat**.

While it's there, the water is interacting with soil, decomposing matter, microbes, and nutrients. Water chemistry changes depending on **how deeply** the Arctic ground has thawed. Slow-moving water soaking old leaves even makes a kind of tea: turning the water dark brown and picking up more nutrients. That nutrient-rich water benefits plants; growing along the routes where melt water flows you can often find knee-high shrubs and trees like dwarf willows as opposed to low-lying lichens and mosses.

Water that is unable to sink into deep soil will still flow downhill. In water drainage basins in the vast Arctic tundra, water flows down hillslopes and infiltrates features called water tracks. Some of the water flows on the ground- more of it flows underwater through the thawed soil.

In the Arctic, water tracks splay across the land like genealogy charts: huge family trees charted on the tundra. They provide important routes for water to travel on its way to streams, rivers, and eventually the ocean. And now the mysteries of water tracks and their role in the Arctic ecosystem are being uncovered by a team of scientists featured by FrontierScientists.

Watch the new video: **Water Tracks Flow & Transformation** featuring Sarah Godsey, Tamara Harmes, Caitlin Rushlow



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