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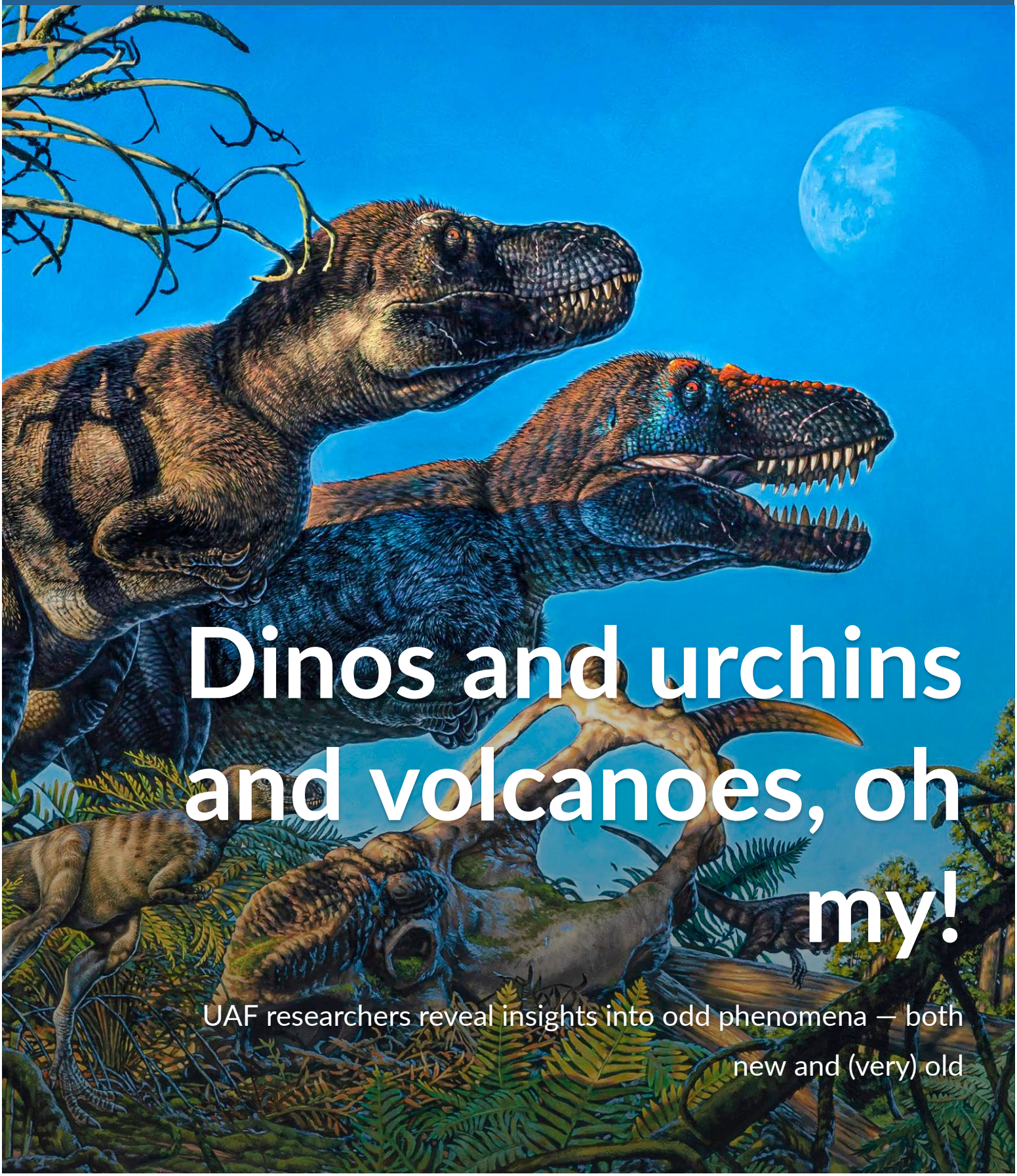


Dinos and urchins and volcanoes, oh my!

UAF researchers reveal insights into odd phenomena — both new and (very) old

Above: An illustration shows a pair of adult tyrannosaurs and their young living in the Arctic during the Cretaceous Period. Art by James Havens.

“There are strange things done in the midnight sun,” the poet Robert Service wrote of the North in 1907. Today, investigating strange things is the job of researchers across UAF. Below, read about some of their recent efforts to answer intriguing

questions — mostly in the Earth's northern hemisphere but also far beyond.

Dinosaurs hatched in Arctic

Dinosaurs lived year-round and reproduced in the Arctic 70 million years ago.

UAF and Florida State University scientists concluded as much after finding teeth and bones from baby dinosaurs on Alaska's North Slope

during the past decade. The dinosaurs had either just hatched from eggs or were about to do so when they died millions of years ago.

Greg Erickson, left, and Pat Druckenmiller place a plaster jacket on a bone found along the Colville River on Alaska's North Slope. Photo by Kevin May.

The team screened the tiny teeth and bones from sediment in a Colville River bluff.

The remains provide more evidence that Arctic dinosaurs did not migrate and were warmblooded.

Photos of teeth from perinatal dinosaurs are superimposed on the face of an illustrated penny. Illustration by Patrick Druckenmiller for Current Biology.

Background photo: The research team's camp sits on the banks of the Colville River on Alaska's North Slope, with the bluffs rising in the background. Photo by Pat Druckenmiller.

Read more.

Infrastructure goes all sideways

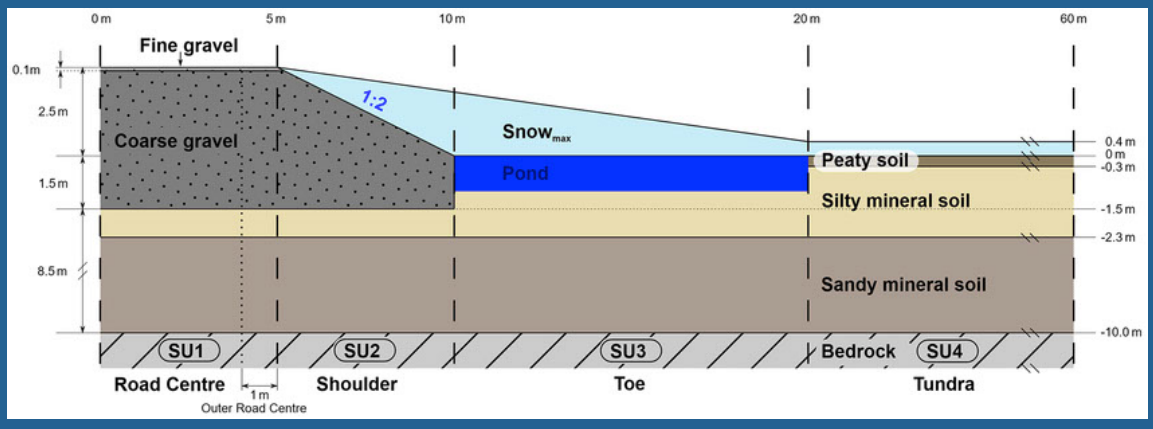
Roads, bridges and pipelines in Alaska will fall apart faster than expected because ground thaws not only beneath them but also to each side.

A UAF Geophysical Institute permafrost expert and others quantified the sideways thawing at a study site along the Dalton Highway on Alaska's North Slope.

Permafrost ground sinks when it thaws because much of its bulk comes from ice either mixed in the soil or frozen in pure deposits.

Sideways thawing hasn't been widely incorporated in infrastructure lifespan modeling, the researchers said, so manmade structures in the Arctic likely will fail sooner than projected.

This illustration from the article shows the location of temperature sensors at the Dalton Highway research site. Drone photo by Soraya Kaiser; illustration distributed under a Creative Commons 4.0 International license.



This diagram models half a road in cross-section from the road center to the adjacent tundra. The graphic illustrates the subdivision into four structural units (road center, shoulder, toe and tundra). The grayish area with black dots represents the road

embankment. The light blue shading indicates potential maximum snow height. The dark blue area illustrates ponding next to the road. Image distributed under a Creative Commons 4.0 International license.

Background photo: Cyclists make their way along a stretch of the Dalton Highway. In places, thawing permafrost below and to each side of the highway can damage it. The road parallels the trans-Alaska pipeline, visible at left, from near Livengood, an old mining town northwest of Fairbanks, to Deadhorse, an oil field base camp near Prudhoe Bay on the Arctic Ocean. UAF photo by Todd Paris.

Read more.

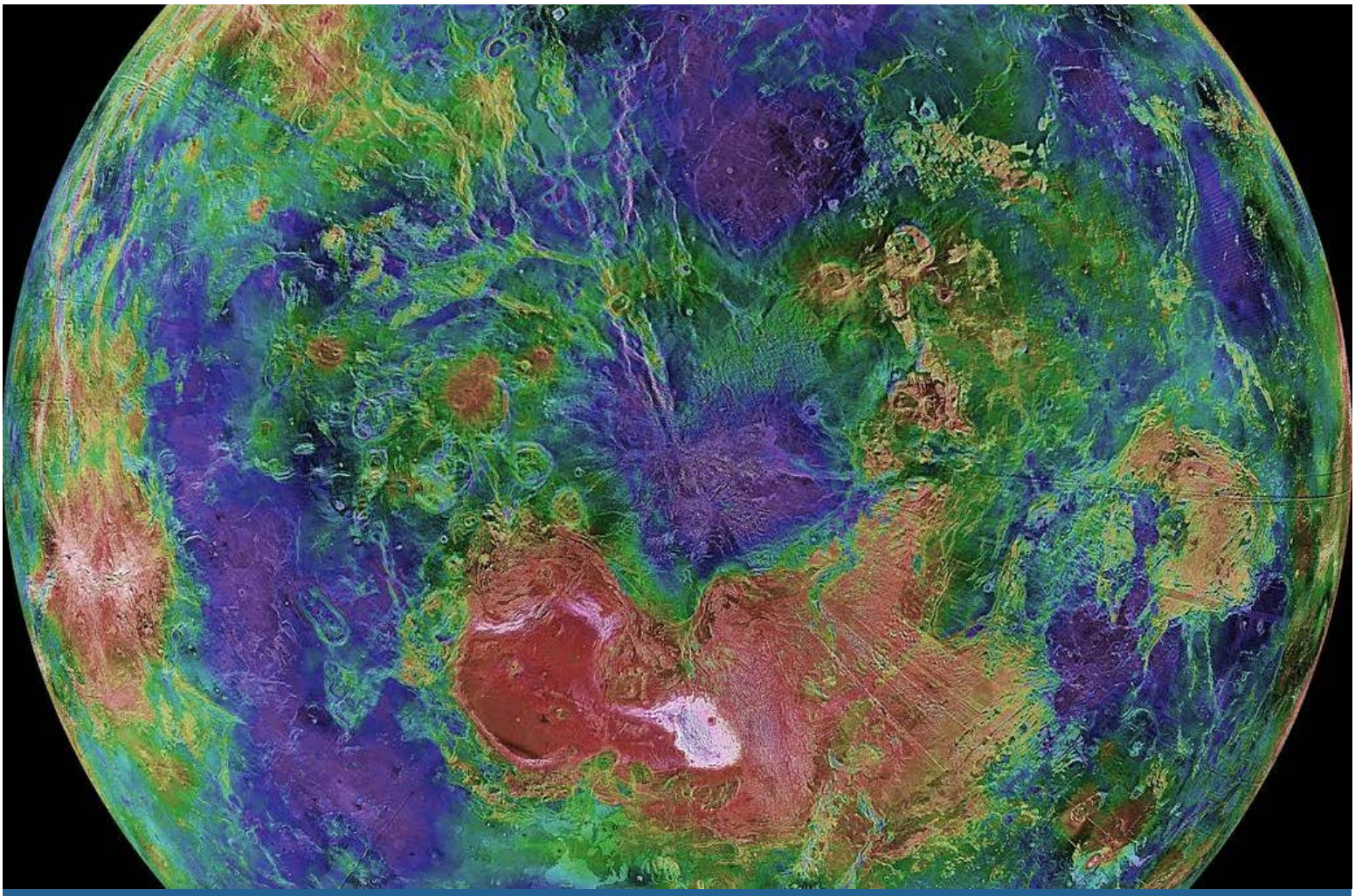


Photo caption: This hemispheric view of Venus was created using more than a decade of radar investigations culminating in the 1990-1994 Magellan mission, and is centered on the planet's North Pole. Image courtesy of NASA/JPL/USGS.

Peering into the craters of Venus

A UAF research professor is on the science team for a new mission to Venus that will launch as early as 2028.

Robert Herrick will study the impact craters of Venus to help understand the planet's history. "They serve as little indicators of the progression of time on a planet," he said of the craters.

NASA last visited the cloud-covered planet with the Magellan spacecraft, launched in 1989.

Herrick's team, one of two funded this year by NASA, will orbit a spacecraft around Venus. Instruments aboard will capture images used to explore the planet's largely unknown geology.

Robert Herrick.

Read more.

Northern lights over Bermuda

A rocket released barium in the upper atmosphere near Bermuda in May, part of an experiment led by a UAF Geophysical Institute space physics professor who is exploring the nature of the aurora.

The barium created plasma, visible as purple and green clouds, similar to natural aurora. The idea was to learn more about how the solar wind's

plasma interacts with, for example, the plasma of Earth's space environment.

The launch came on the final day of the 10-day launch window, which was plagued by bad weather and high winds at upper elevations.

The NASA Black Brant XII rocket lifts off May 16, 2021, carrying the KiNET-X experiment at Wallops Flight Facility in Virginia. Photo by NASA Wallops/Terry Zaperach.

Background photo: Glowing clouds are created by the release of barium into the ionosphere. UAF photo by ***Don Hampton '90, '96****, Geophysical Institute.*

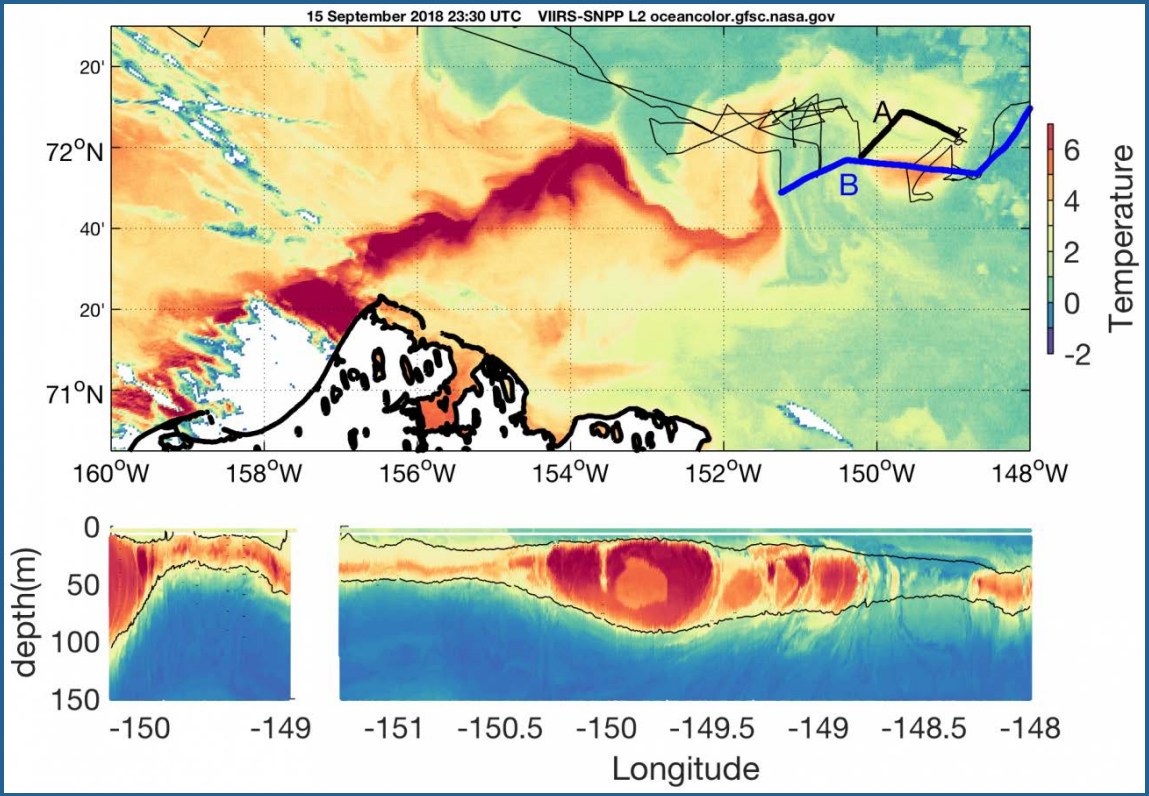
Read more.

Warm water hides in Arctic

Warm, northbound water slips under the cold surface of the Beaufort Sea but doesn't disappear, UAF College of Fisheries and Ocean Sciences researchers have helped to reveal.

The research suggests polar ice may be melting faster than models predict.

Scientists used instruments on the research vessel *Sikuliaq* and satellites to track warm water flowing into the Arctic through the Bering Strait. They found that the main core of warm water remains below the Beaufort Sea's surface, where it can swirl around for months to years, melting the Arctic ice pack from below.



Satellite imagery (upper figure) shows a warm jet of salty water flowing past Point Barrow then disappearing. Ship-based measurements (lower figures) show that the warm water subducts and continues below the surface. Lines A and B in the upper figure correlate with the ship-based data in the lower left and right figures, respectively. Figure by Harper Simmons.

Background photo: The RV Sikuliaq *navigates through the ice during a Beaufort Sea cruise in October 2020. UAF photo by Ethan Roth.*

Read more.

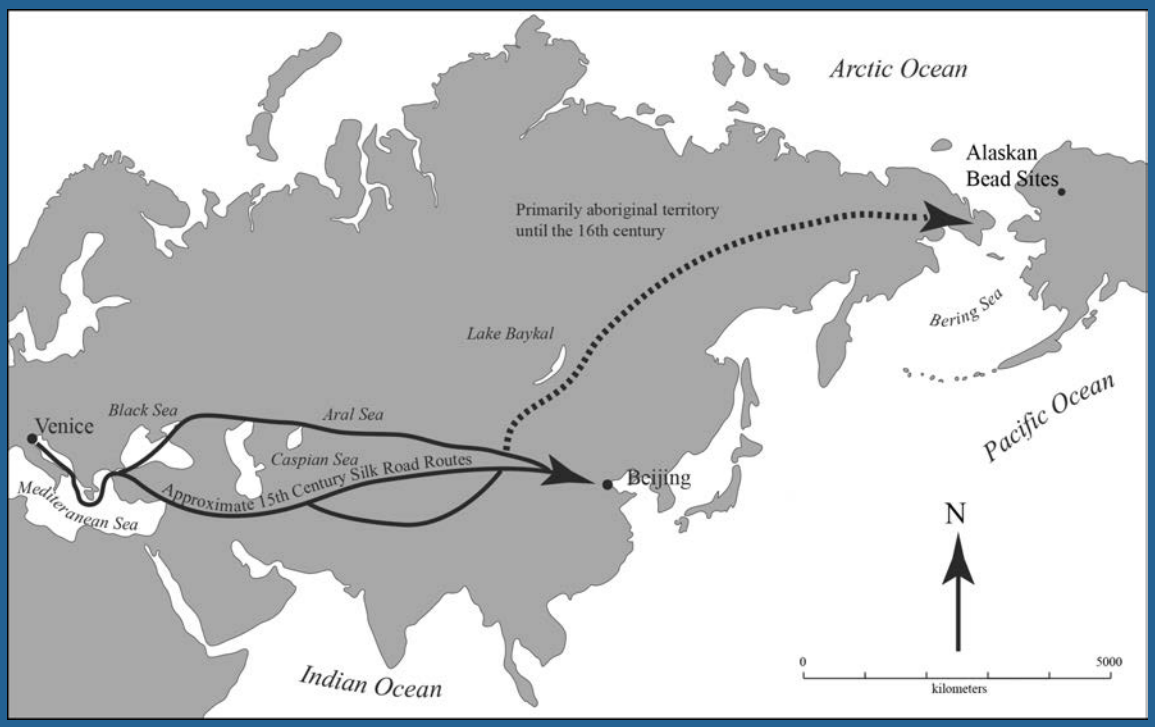
Venetian fashion hits Alaska — in the 1400s

Glass beads preserved in an ancient Alaska house since the 1400s came from Venice, Italy, researchers have concluded.

A few of the beads were first discovered at Punyik Point in the Brooks Range in the 1950s and 1960s. Archaeologists more recently returned

to the site and found more. Modern carbon dating of some twine found with the beads revealed their antiquity.

Traders probably carried the beads eastward from Italy along the Silk Road. The beads then would have made their way north through the Russian Far East and across the Bering Strait to Alaska.



This map shows the likely route of glass beads as traders carried them from Italy to Alaska. Image courtesy of American Antiquity, January 2021.

Background photo: Archaeologists found these glass beads in northern Alaska. They were made in Venice, Italy, in the 1400s. Image courtesy of American Antiquity, January 2021.

Read more.

*Photo caption: A researcher at UAF holds a hibernating Arctic ground squirrel. Photo by **Carla Frare '19**.*

Little hibernators recycle nutrients

Hibernating Arctic ground squirrels recycle their body's own nutrients to survive a long, inactive winter.

UAF researchers at the Institute of Arctic Biology studied ground squirrel body chemistry in a lab for two years to discover the adaptation.

Knowledge of the process might point to ways to prevent muscle loss in cancer patients and the elderly. Other ground squirrel adaptations already have inspired new potential treatments for traumatic brain injuries.

As the squirrels' muscles broke down in temperatures just above freezing, the animals converted the resulting nitrogen into amino acids. The squirrels may use those amino acids to synthesize protein in tissues such as lungs, kidneys and skeletal muscle.

Read more.

Big Chinooks may be targets

Big Chinook salmon may be dying at higher rates than expected in the ocean — perhaps because they're big targets for predators.

A life cycle simulation created by UAF College of Fisheries and Ocean Sciences researchers found that a higher-than-expected death rate of

older Chinook salmon while at sea would explain why those returning to Alaska's rivers have become smaller and younger.

Sharks and other predators may be targeting bigger salmon, researchers said. There is some evidence for that; research with tagged Chinooks has shown that many of them end up in the bellies of salmon sharks.

Background photo: A Chinook (king) salmon is measured at a test fishery on the Yukon River. Photo by Kousei Martin Perales.

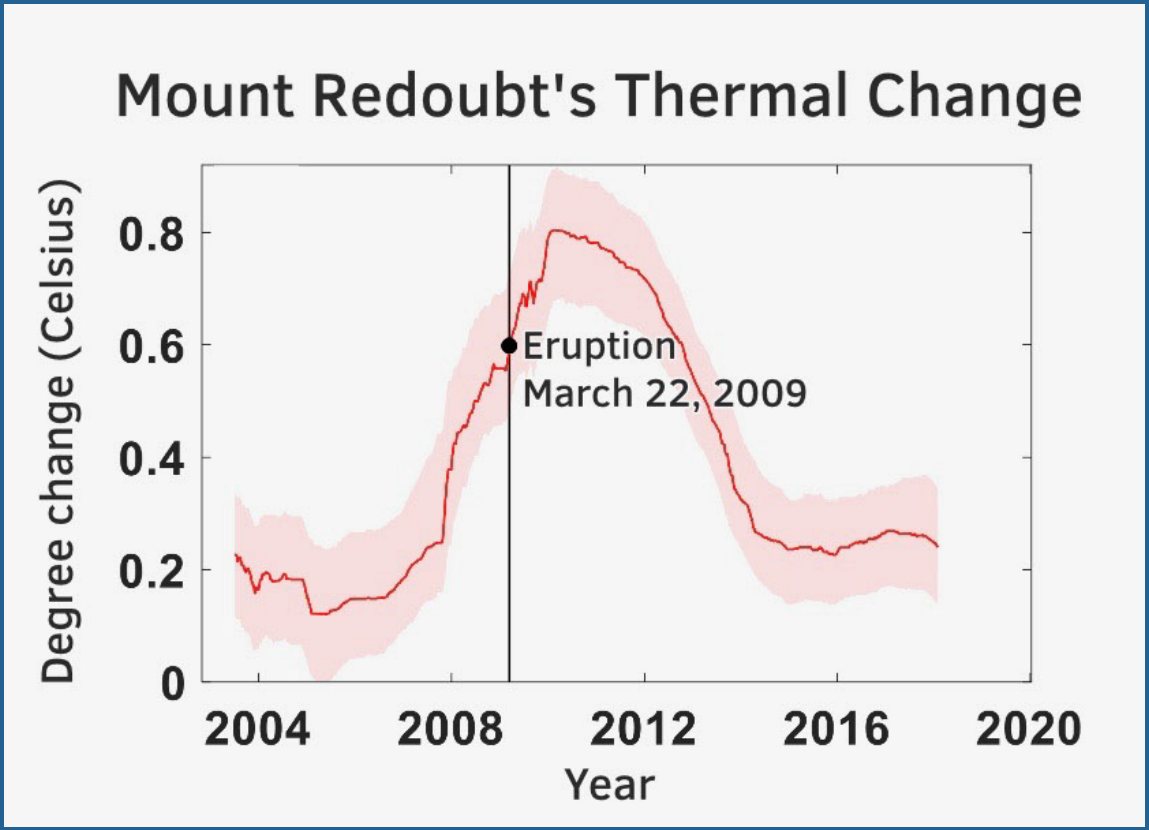
Read more.

Heat long precedes eruptions

The radiant temperature on a volcano's flanks can slightly increase in a way that could help warn of potential eruptions far in advance, researchers have learned.

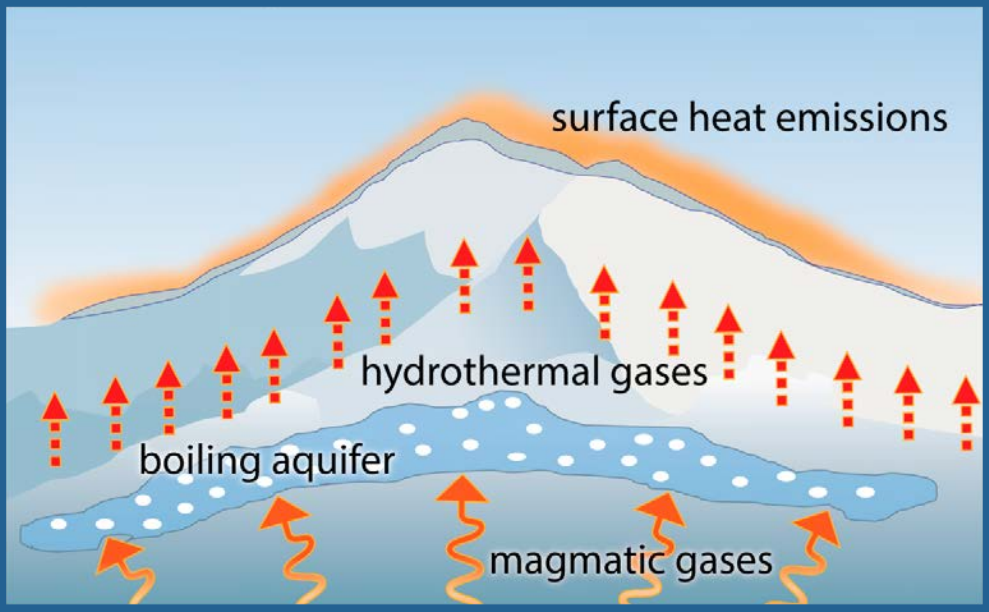
A team led by a UAF Geophysical Institute research assistant professor analyzed 16½ years of infrared satellite data to make the discovery.

The team looked at five volcanoes around the world. Alaska's Mount Redoubt, one of the five, showed an increase of about 0.85 degrees Fahrenheit between mid-2006 and its major eruption in March 2009. The radiant temperature began increasing approximately one year earlier than the onset of other warning signs.



This chart shows the temperature changes before and after Mount Redoubt's 2009 eruption. Image by UAF Geophysical Institute.

Diagram of large-scale volcano surface heat emissions



This diagram illustrates how heat from magmatic gases rises, causing widespread heat increases on the flanks of a volcano. Image by UAF Geophysical Institute.

Background photo: Mount Redoubt, 108 miles southwest of Anchorage, Alaska, erupts on March 31, 2009. Photo by R. G. McGimsey, Alaska Volcano Observatory/USGS.

Read more.

Urchins eat into Aleutian reefs

Sea urchins, facing little predation by sea otters in recent years, have exploded in numbers and are devouring the limestone reefs surrounding the Aleutian Islands.

Urchins have already decimated Aleutian kelp beds. Now they're eating the algae that creates the regions' reefs, according to a research team

that included a UAF College of Fisheries and Ocean Sciences professor.

Climate change has hastened the process — the acidification of the ocean has impeded calcification in the algae's protective skeleton, the source of the reefs. The urchins are now eating through the reefs faster than the algae can replenish them.

Divers prepare for underwater sampling in the remote Aleutian archipelago. Photo by E. Conover.

Sea otters such as this one are the primary natural predators of sea urchins. With few otters, the urchin population is out of control in the Aleutian Islands. Photo by J. Tomoleoni, USGS.

Background photo: Sea urchins dine on a reef in the Aleutian Islands. Urchins, which boomed after sea otters disappeared, destroyed many kelp forests on the reefs and are now eating the algae-filled reefs, which are weakened by ocean acidification. Photo by J. Tomoleoni, USGS.

Read more.

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