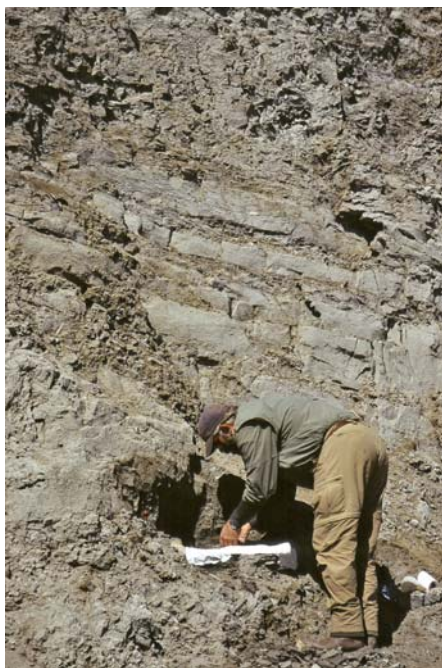




## Fossil Soil and Arctic Dinosaur Expeditions

Floating down the Colville River on the North Slope of Alaska during the 2005 field season, researchers Paul McCarthy and Tony Fiorillo watched with quiet wonder as dark chocolate, olive green, and rusty tan streaks of soil and sediment at least 65 million years old drifted past them. Each man lost himself in thought as to what possible secrets may be locked away in these bluffs. For Fiorillo, a vertebrate paleontologist with the Dallas Museum of Natural History, images of the dinosaurs that once reigned here danced through his mind as he scanned the bluffs for fossilized bones and teeth. McCarthy, a sedimentologist and paleopedologist (one who studies soils formed in past landscapes) at the University of Alaska Fairbanks (UAF), locked his gaze on organic fragments and clays embedded in the soils and pondered what the plants might have looked like and what the environmental conditions were like to fuel the growth of such plants in the far north.



*A student excavates a juvenile hadrosaur femur from the bluffs along the Colville River. Photo by Tony Fiorillo*

McCarthy, Fiorillo, and their co-investigator David Norton, who is with Arctic Rim Research in Fairbanks, are collaborating to reconstruct the ancient dinosaur ecosystem that prevailed on Alaska's North Slope 65 to 75 million years ago during the Late Cretaceous period. This area represents the most important and richest source of Late Cretaceous dinosaurs yet found in any ancient polar region. In fact, during this prehistoric time, the North Slope was situated at the same latitude, and perhaps higher, than it is now, making it "a truly paleoarctic ecosystem," according to McCarthy.

The 50-mile stretch of bluffs overlooking the Colville River where McCarthy, Fiorillo, and Norton are conducting their studies look and feel nothing like they did millions of years ago when dinosaurs roamed these lands. Rather than frozen grounds capped with snow, ice, and permafrost, Late Cretaceous Alaska consisted of lush forests fed with consistent, heavy rainfall. Temperatures ranged from a clement 3°C to 13°C, closely resembling the average temperature of 12°C found today in Portland, Oregon. Although the milder temperatures were more hospitable for supporting various plant and animal species, the area still received the diminished light during the polar winter that it does today, given its latitude above the Arctic Circle. The most prevalent dinosaur inhabiting the area, the Troodon, a type of theropod, was a small meat-eater particularly well-adapted to the low-light conditions given its very large eyes. In addition to Troodons, additional fossils indicate



*McCarthy (right) and student Erik Brandlen (left) prepare to measure a stratigraphic section of rock. Photo by Tony Fiorillo*

that large-horned dinosaurs; giant, plant-eating duckbill dinosaurs; and other carnivorous theropods made the North Slope their home.

The North Slope consists of rich sediment deposited by major river channels and smaller tributaries coursing down the alluvial plain, much like the modern Mississippi Delta. The researchers are exploring various segments of the sedimentary deposits to piece together the dinosaurs, plants, types of soils, and river systems that prevailed in the Arctic millions of years ago. McCarthy's task is to sample the soil and rocks to extract clues about the climate, such as annual precipitation and temperatures, of the local ancient environment. McCarthy

For more information about this research, go to:  
<http://www.dallasdino.org/exhibits/alaska/default.asp>

and Fiorillo are using pollen to figure out what plant species inhabited a given area and volcanic ash to correlate the age of the soils at a variety of spots along the Colville. McCarthy says that researchers "can use this information to draw analogies to modern soils in modern places." Indeed, the "greenhouse" conditions of this prehistoric environment may provide clues to environmental changes that

## GREENLAND News



*"The smile's returning to our faces"  
—Sunrise at Summit Station*

At Summit, our phase two staff is beginning to see the light at the end of the tunnel...and at the end of the darkness. The sun rose for the first time this year on January 28<sup>th</sup>. Our mid-winterers have turned the corner in their deployment, and are looking forward to the arrival of the phase 3 team, though Geoff points out that when the new folks arrive, his team will once again be forced to "follow the rules of civilized people." Ahem.

Mid-January brought the coldest temperatures yet, with the mercury bottoming at -60 C. Unfortunately, the team had to refill the Big House generator fuel tank in those temperatures, a development we attribute to the building being up on stilts and therefore without the snow insulation it has had in past seasons, thus burning more fuel. Geoff reports that "the petrol gods" made sure the task was miserable, but they completed it nonetheless.

Ozonesonde balloon launches during this time were not without drama, but folks did manage to fly them for NOAA's investigation of springtime stratospheric ozone loss over the Arctic.

[http://www.vecopolar.com/arlss\\_reports/arlss\\_projectsdetail.asp?cbPropNum=NOAASummit](http://www.vecopolar.com/arlss_reports/arlss_projectsdetail.asp?cbPropNum=NOAASummit)

Elsewhere, other activities continued: Geoff relocated the meteorological data instruments from the Big House tower to the Green House tower, but found radio communications quality had degraded perhaps as a result. Folks also worked on the antennae for Atsumo Omurah's Swiss tower, but were not able to get them working properly.

Pat continued with routine science technician activities; he even skied out and measured the ATM line in spite of temperatures in the -40s (C) and a decent breeze, causing Geoff to wonder if Pat is actually "training for an escape from Summit."

Geoff also reported that the fruit flies were back, and that Pat's basil plant, which is probably not a basil plant, "is growing like a teenager, taller rather than bigger or smarter." (Pat props it up with toothpick crutches.) Geoff said he was done with his potato plant, and would be throwing it away "soon." Toast.

## DENVER News



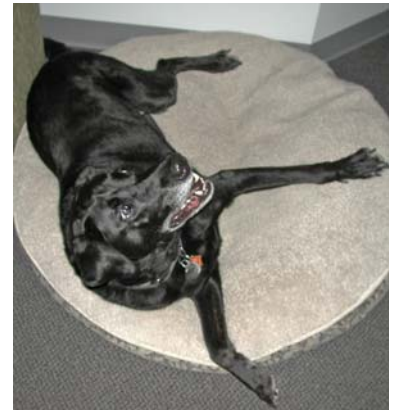
*VPR welcomes Kip Rithner.*

The New Year put us knee-deep in budget-writing and project-planning activities at VPR's headquarters. Many of us broke away from these activities to attend the two-day GEOSummit meeting in Boulder, where the Summit Station community discussed ongoing and proposed research, facilities upgrades, and alternative energy strategies for the station. <http://www.geosummit.org/>

VPR's full-time staff grew this month when Kip Rithner, frequent contributor to this newsletter, entered the fray as planning coordinator. Back in the day, Kip worked with Diana Garcia-Lavigne to develop processes for Antarctic support planning, "retiring" in 1998 to raise

children. She was happy with her lot until she started helping Diana develop the planning coordinator position and realized the job would be perfect for her, given her general familiarity with the planning process, her fondness for

polar science, and her established relationships with the fine folks at PFS. Now she's spinning, heartsick at leaving her three-year old in day care — but thrilled to be back at it. Breathe into that bag and welcome aboard, Kippy!



*Will work for food: VPR's Denver office dog Colby brings owner Tom Quinn to work every day.*

# ALASKA News

Our Alaska staff has been preparing for two spring campaigns, The Go North! dog-sledding expedition, and Martin Jeffries' ALISON project.

The Go North! expedition, beginning in February, will proceed from Circle, Alaska, to the northern coast, visiting with communities en route to collect information on their observations of and responses to climate change. NSF-funded researchers Henry Huntington and Shari Fox Gearhead will head up social science efforts for the team. The expedition ends at Prudhoe Bay in May. For more, go to

[http://www.vecopolar.com/arlss\\_reports/arlss\\_projectsdetail.asp?cbPropNum=0505736](http://www.vecopolar.com/arlss_reports/arlss_projectsdetail.asp?cbPropNum=0505736)

The Martin Jeffries-led ALISON project (Alaska Lake Ice and Snow Observatory Network) brings K-12 students and teachers and university faculty together to study lake ice and snow and heat conductivity at several sites around Alaska. Later in February, a group of 7 Connecticut high schoolers will travel north to participate in a sampling campaign. See: [http://www.vecopolar.com/arlss\\_reports/arlss\\_projectsdetail.asp?cbPropNum=0326631](http://www.vecopolar.com/arlss_reports/arlss_projectsdetail.asp?cbPropNum=0326631)

While Fairbanks was in the deep freeze (-50 to -30 degrees F), our Marin Kuizenga spent much of January in New Zealand on vacation with her family.



*Matt Irinaga, our Alaska operations manager, enjoys the view out his new office window.*



Larry Hinzman has been tapped to head the International Arctic Research Center at the University of Alaska, Fairbanks, after director Syun-Ichi Akasofu retires next year. Congratulations, Larry!

<http://www.news-miner.com/Stories/01413113-7244-322510700.html>



*Marin Kuizenga, husband Jeff & son Matteo hiking in Peel Forest Reserve on the east coast of the South Island, New Zealand.*

## SCIENCE & Other News

NASA's James Hansen, director of the Goddard Institute for Space Studies, says that NASA's public affairs office has put restrictions on his communications since he discussed his concerns about climate change during a presentation at the fall American Geophysical Union conference in December. <http://www.nytimes.com/2006/01/29/science/earth/29climate.html?ex=1139202000&en=908267d486417d02&ei=5070>

National Public Radio's *Living on Earth* series aired an interview with Dr. Hansen early this month: <http://www.loe.org/shows/segments.htm?programID=06-P13-00005&segmentID=3>

Two ice surges, or *ivus* as Alaska Natives call them, hit Alaska's shores near Barrow. These surges are like "frozen tsunamis." [http://www.redorbit.com/news/science/372343/arctic\\_ocean\\_ice\\_crashes\\_on\\_alaska\\_shores/](http://www.redorbit.com/news/science/372343/arctic_ocean_ice_crashes_on_alaska_shores/)

VPR-supported investigator Darrell Kaufman discusses his collaborative investigation of Alaskan lake sediment cores intended to describe paleoclimate processes in the *Arizona Daily Sun* [http://www.azdailysun.com/non\\_sec/nav\\_includes/story.cfm?storyID=124369](http://www.azdailysun.com/non_sec/nav_includes/story.cfm?storyID=124369)

Get your boots on: David Lawrence (National Center for Atmospheric Research) has modeling results that suggest about 90 percent of the permafrost in the Arctic regions could thaw before the end of this century. <http://www.newscientist.com/channel/earth/mg18925374.500>

When Pigs Fly: A Danish doctor has invented a system that may allow people on respirators to tolerate the low pressure found on commercial airplanes. The apparatus was tested on pigs during a flight from Greenland. [http://denmark.dk/portal/page?\\_pageid=374,610590&\\_dad=portal&\\_schema=PORTAL&\\_ic\\_itemid=915635](http://denmark.dk/portal/page?_pageid=374,610590&_dad=portal&_schema=PORTAL&_ic_itemid=915635)



*McCarthy and Fiorillo's group inspects the exposed bluffs along the Colville River for Late Cretaceous fossils. Photo by Paul McCarthy at UAF on Late Cretaceous dinosaur geology.*

The 2005 field season was primarily a reconnaissance mission. McCarthy and Fiorillo began at the Kikak-Tegoseak Quarry, one of the major bone beds in the area, and chartered their boats down the Colville River with guidance from Roland Gangloff, a retired professor from UAF who is readily familiar with paleontological research in the area. McCarthy collected soil and rock samples during their journey to begin to understand the spatial distribution of the fossil soil materials. He also collected soil samples at the Liscomb Quarry, another major bone bed located about 50 miles away from the Kikak-Tegoseak site, to try to link various sediment layers within each of the sites. Understanding the connection between these two sites is intriguing since the Liscomb fossils likely represent a single catastrophic event given the high concentration of juvenile duckbill dinosaur remains, whereas the Kikak-Tegoseak site represents a time average, given the diversity of dinosaur fossils found there.

Fiorillo prospected for bone material and fossil wood during the 2005 season and struck paydirt when he unearthed a partial Troodon skull not far down the river from the Liscomb Quarry. "This was a rare and significant find for the Alaskan region, because it is the most complete Troodon skull identified here to date and shows the large size of the optical part of the brain," Fiorillo says. In addition, he confirmed where a partial pachycephalosaur skullcap that Norton found in 1999 came from on the North Slope. "This is very exciting because this specimen confirms that these dinosaurs inhabited this area," Fiorillo comments.



*McCarthy and Fiorillo's group scans the bluffs along the Colville River for Late Cretaceous fossils. Photo by Tony Fiorillo*

could occur if the Arctic climate continues to warm.

Fiorillo's job is to figure out how the animal fossil record formed—that is, how the bones got to be where they are. Most fossils in the area consist of partial skeletons, isolated bones, and scattered teeth, suggesting that many of the bones in the area arrived where they are by some form of transportation. Understanding what caused the bones to become scattered, such as scavenging by other dinosaurs or flooding that carried off decomposed bones, is necessary to further flesh out the ecosystem picture.

Norton carries the responsibility of coordinating all the logistics of the fieldwork while also helping to carry out research. In addition, he is responsible for designing a series of 1-year courses that will be offered



*An aerial view of the North Slope of Alaska with the Colville River and exposed bluffs in the distance. Photo by Paul McCarthy*

The 2006 field season promises to offer additional thrilling finds as the researchers plan to carry out more intensive fieldwork to facilitate their Arctic paleoecological reconstruction. This ancient Arctic research will provide a better understanding of the Earth's history during a critical period of biological diversity, mass extinction, and climate change. In addition, results of this work will be put on display in Barrow to promote outreach to the Native communities on the Alaskan North Slope.

-Kara Nyberg, PhD

*Many thanks to Paul McCarthy and Tony Fiorillo for providing information and photos.*