

magazine for inquiring minds
hmmm...

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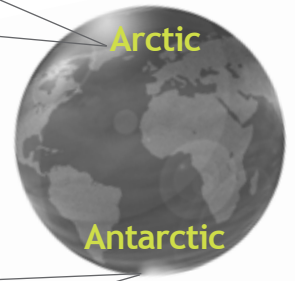
Spring 2009

Ducks in Greenland



Each summer, as temperatures rise, snow and ice melt on the Greenland ice sheet, forming rivers and lakes on the ice sheet's surface. Scientists are trying to understand where this melt water goes and how it influences the speed of the ice sheet as it flows to the ocean. Using advanced lasers and camera systems, they're mapping the volume and geometry of enormous drainage pipes in the ice, called moulins (pronounced moo-lawns). Scientists have also released rubber ducks and canisters full of instruments into the moulins to flow with the water through the ice sheet and collect data. — DM

90: number of rubber ducks released
0: number recovered...so far



At home on ice

CU scientist Ted Scambos crosses Antarctica

Why did you go to Antarctica?

One important job was to drill ice cores*, which give us a picture of what Earth's climate was like for the last 2,000 years. We're hoping to compare the past few climate changes to today's.

Did you go alone?

No, I was with a team—a superb one. Antarctica is a dangerous place to be, and science is complicated work. Teamwork is important.

What was Antarctica like?

Away from the coasts, Antarctica is flat and snowy. Just snow and ice as far as you can see and 24 hours of daylight for much of the trip. All of the work we did was hard because of the cold and the wind (-15 to -35 degrees Fahrenheit; 17 mph winds).

What did you find out?

One thing we already know is this area of Antarctica has bedrock features buried more than 2 miles beneath the ice. There's a whole landscape down there: old lakebeds, ridges, cliffs.

Would you ever go back?

Too late—I'm already going back! The teamwork, the challenge against the unknown, the scenery, achieving our scientific goals. I'm already looking forward to it.

— SR



Ted Scambos traveled about 1,500 miles during January and February. Read the blog: <http://traverse.npolar.no/expedition-diary>

*Back in the US, scientists will study the chemistry and physical properties of the ice cores to learn how snowfall rates have changed over time. Learn about ice cores at <http://www.classroom.antarctica.gov.au/6-climate>

P.S. Since Last time...

27 Feb 2009

NASA and European Space Agency officials have selected two of Jupiter's moons, Europa and Ganymede, to be the target of their next deep space mission in 2020. Rockets will boost 2 spacecraft toward the moons in a mission estimated to cost \$4 billion.

6 Mar 2009

Kazakhstani horse skeletons about 5,500 years old had damaged mouth bones, indicating they were ridden. The discovery suggests the ancient Eneolithic Botai in Kazakhstan were the first culture to domesticate the horse using a bridle.

Google the DOI numbers to find the original article!

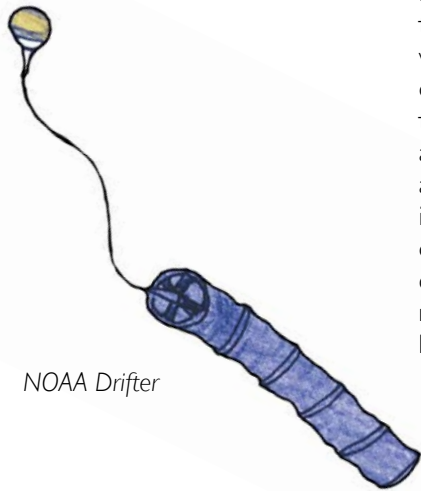
(DOI: 10.1126/science.323.5918.1154)

(DOI: 10.1126/science.1168594)



YOU BE THE SCIENTIST

Take a virtual trip across the ocean



NOAA Drifter

Imagine clinging to a buoy in the middle of the Atlantic Ocean, tossing around in the waves while experiencing the excitement of a severe storm. That's probably not going to happen, but you, your entire school, and a partnering school abroad can co-adopt a NOAA drifting buoy that does spend its life collecting oceanographic data. Each drifter records ocean temperature and GPS coordinates that can help meteorologists make predictions about storms like hurricanes or nor'easters.

Once you've adopted a buoy, you can track it as it floats in warm and cold ocean currents. You and your classmates

can plot your drifter's data, along with data from a network of 1,250 drifters, to discover things like how sea surface temperatures compare between the Atlantic and Pacific Oceans.

The drifters' path will help you learn how the ocean circulates in the Northern and Southern Hemispheres. Talk with your teacher and join in the fun by applying for this free NOAA Adopt a Drifter Program.

You'll receive NOAA stickers in the mail that you and your classmates can sign and send to the chief scientist on board a NOAA ship. A crew member will attach your stickers to your drifter before it's tossed into the ocean. — DS

<http://www.adoptadrifter.noaa.gov>

Ice-Age Stone Tools

uncovered in Boulder front yard

Last spring, landscapers working in a Boulder front yard unearthed an archeologist's treasure: a collection of 83 stone tools as old as the last ice age. The tools were chiseled from rocks that originated as far away as Kremmling and the Northwest corner of Colorado, more than 100 miles from Boulder, as the crow flies.

How did such a large and well preserved collection of artifacts end up in one spot? CU Professor Doug Bamforth suspects that 13,000 years ago—8,000 years before the Great Pyramid of Giza was built—an early North American might have journeyed across the Rocky Mountains and buried the stash.



"The site was just a couple feet across. Finding it was total serendipity," he said. "Archeology is full of accidents."

Bamforth had the tools tested for protein residue, with support from the Boulder homeowner whose front yard once housed the artifacts. The tests showed the tools had been used to butcher early horses and camels, animals that went extinct in North America at the end of the last ice age. Geologic dating of the rocks surrounding the site supported the idea that the tools were thousands of years old.

"The landscapers were the first people to pick up these tools in 13,000 years," said Bamforth. "How cool is that?!"

quiz: Name 2 clues Professor Bamforth used to infer the tools were 13,000 years old. — AB



12 Mar 2009

Indonesian officials plan to join a World Bank program that will let them sell carbon credits in exchange for preserving tropical forests. The World Bank Forest Carbon Partnership program is trying to help developing countries preserve biodiversity.



(DOI:10.1038/458137b)

19 Mar 2009

Rising global temperatures could melt enough ice in Greenland alone to raise global sea levels by 1 m this century, according to 2,000-plus international scientists who met in Denmark in March. The scientists wrote an update on the state of climate science since a 2007 report by the Intergovernmental Panel on Climate Change.

1m = 3.28ft

(DOI:10.1038/458272d)

20 Mar 2009

The National Science Foundation received an extra \$3 million this year to establish an institute devoted to identifying and developing mathematical talent. This program won't just be for scientists, it also hopes to find exceptionally gifted high school students. — LC

(DOI: 10.1126/science.323.5921.1548)

Wyoming's Ozone Problem



It takes heat to bake a good cookie. At about 400 degrees Fahrenheit, a gooey blob transforms into a chewy treat. Similarly, it takes summer's hot temperatures and bright sunlight to "cook" up ozone smog, a pollutant that is a serious health threat in cities around the world, capable of killing people with lung disease.

Now, researchers in Wyoming and Colorado have discovered that ozone smog can also form in the winter, when temperatures drop and the sun's angle is low. That means regulators, such as



the U.S. Environmental Protection Agency, may need to begin monitoring ozone levels during all seasons, not just summer.

A few winters ago ozone levels unexpectedly soared in a rural Wyoming gas field, where energy companies were extracting natural gas. The ozone levels were puzzling enough that a Wyoming Department of Environmental Quality official began making some calls to scientists. Russell Schnell, at NOAA's Earth System Research Laboratory in Boulder, pulled together a team to tackle the mystery.

The scientists saw a repeated pattern leading to high-ozone events. First, temperature inversions occurred. (Inversions are weather patterns that can trap polluted air close to the ground instead of letting it drift up and away.) Second, chemicals built up in the air below the inversions. Finally, when the sun rose, its light scattered off the white snow, triggering the chemical reactions that create ozone. "It's as if at night, you spill a bunch of gasoline, and then you just wait for the match of the sun in the morning," Schnell said. — KH

Learn about ozone at <http://airnow.gov> and click on "Kids"

How HIGH can life exist?

Life is tough atop the desolate 19,850-foot-high Socompa stratovolcano in Chile. Towering miles above one of the driest deserts on Earth, the South American peak is cold, windswept, and low on oxygen. But that hasn't stopped some from calling it home.

Recently, scientists discovered a colony of microscopic organisms living near Socompa's summit, making them the highest known microbial ecosystem on the planet.

"Scientists just haven't been looking for microorganisms at these elevations, and when we did, we discovered some strange types found nowhere else," said Steve Schmidt, a CU biology professor who studies extreme environments. In this case, he and others had been asking, "how high can life exist?"

Schmidt was studying soils from Colorado's high country when a colleague collected a sample from Socompa's upper slopes for him. Using sophisticated molecular biology techniques, Schmidt and his team identified diverse microbes and an altogether new microscopic mite living in the Socompa soils.

How do these tiny critters survive where little other life exists? As it turns out, small volcanic vents called fumaroles emit a mixture of water, methane, and carbon dioxide that sustains Socompa's microbial communities. So, harsh as it seems to humans, Socompa's summit offers just what these microorganisms need to thrive. — MM

Socompa's barren soils



Socompa
19,850 ft

Mt. Evans
14,240 ft

Denver
5,280 ft

glossary

biodiversity - the number and variety of living organisms in a specified area; **CU** refers to the University of Colorado; **microbe** - a living organism only visible with the aid of a microscope, like a bacteria or virus; **NOAA** is the National Oceanic and Atmospheric Administration; **ozone** - an invisible gas formed by three oxygen molecules that acts like a pollutant at ground level; **"protein residue"** refers to bits of animal blood left behind on the stone tools; **serendipity** - making a fortunate discovery by accident; **stratovolcano** - a volcano built of alternating layers of ash and lava

hmm... is a science news magazine for Colorado middle schoolers.

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