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For the people of NCAR, UCAR, and UOP Vol.38 #5 • May 2003

In the midnight hour: BAMEX takes aim at dangerous night storms

Researchers are taking to the field this month to peer into giant clusters of thunderstorms, called mesoscale convective systems, that can strike at night with devastating impacts. Their goal: improve predictions of these mesoscale monsters. < more

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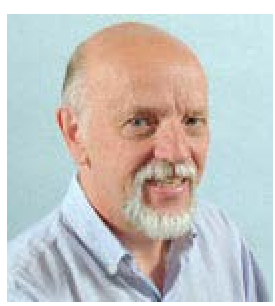
The long riders: How some staffers cope with epic commutes

Louis Wynn, a data operator in the Scientific and Computing Division who doesn't mind riding the bus, spends up to three hours each way to get from his Aurora home to his Mesa Lab job. He's one of a number of staffers who face long

Study finds lower atmosphere warming

A team of scientists, including several from



the Climate and Global Dynamics Division, has used a reanalysis of satellite data to show the lowest few miles of the atmosphere are warming. The research could refute commutes. < more

An information divide

Forecasters in Uganda rely on grainy satellite photos from neighboring countries as their only weather prediction tools—an example of the troubling information divide in the climate sciences between developing and developed countries. < more

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skeptics of global warming. < more

Building bridges for Latina students

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Just One Look

Here comes spring! Staff Notes Monthly photograher Carlye Calvin in April captured this captivating cluster of tulips in front of FL2.

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May 2003

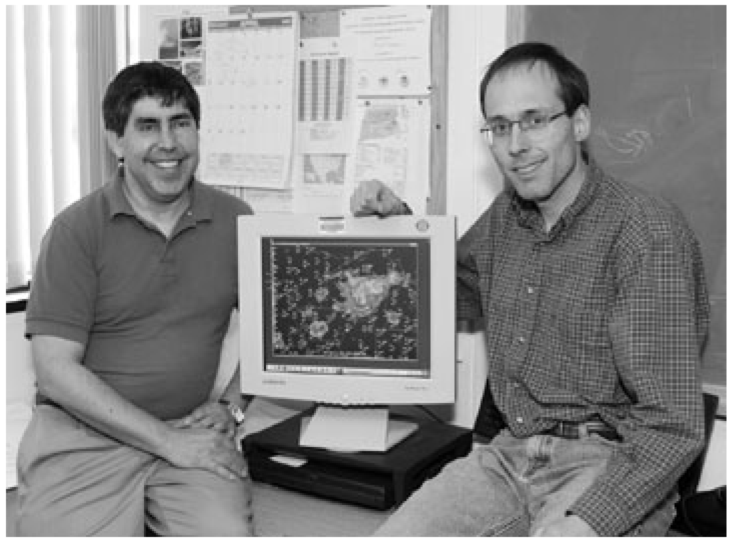
In the midnight hour: BAMEX takes aim at dangerous night storms

Researchers are taking to the field this month to peer into giant clusters of thunderstorms, called mesoscale convective systems, that can strike at night with devastating impacts. Their goal: improve predictions of these mesoscale monsters.

As the director of the Atmospheric Technology Division, Dave Carlson has worked on his share of demanding field projects. But the assignment this spring and summer to help track powerful storms that form in the middle of the night and span hundreds of miles is enough to give him pause.

This menacing arcus cloud was part of a mesoscale convective system studied in a 1981 field project near Miles City, Montana. Such systems, dominated by strong, outflowing winds and heavy rain, are the focus of the Bow Echo and MCV Experiment, slated for this May through July across the Midwest.

"This one is very challenging," says Dave. "You take a big system that's moving through four states in the night and you have to coordinate the ground systems and the aircraft in the right locations— man, it's going to be tough." BAMEX, or the Bow Echo and MCV (Mesoscale Convective Vortex) Experiment, is the most ambitious attempt yet mounted to peer into giant clusters of thunderstorms, called mesoscale convective systems, that batter the eastern two-thirds of the country. The storms typically form by evening, rage through the night, and die the next morning. Some regenerate the following night or even the next. They can dump as much rain as a landfalling hurricane and plaster huge areas with hurricane-force winds.



Morris Weisman and Chris Davis flank a bow echo.

Chris Davis and Morris Weisman of the Mesoscale and Microscale Meteorology Division are overseeing the experiment, which will run from 20 May to 6 July. Collaborating institutions include NOAA's National Severe Storms Laboratory, the Naval Research Laboratory, and over a dozen universities. ATD and the Joint Office for Science Support (JOSS) will be handling much of the logistics.

"Ultimately, what we're trying to do is get enough knowledge so these storms can be predicted," Morris says.

The stakes are high for protecting lives and property. Chris talks about a storm that formed in South Dakota in July 1977, dumped torrents of rain as it moved east, and ultimately caused a devastating flood in Johnstown, Pennsylvania, that killed 78 people.

And just three years ago, a storm barreled through Kansas City, packing winds that were clocked at 74 mph (119 kmph), ripping off roofs, downing trees, and cutting electric power to about 100,000 homes and businesses. Such storms can be terrifying, especially late at night—the most likely time for the Midwest to get summertime thunderstorms.

"I saw water coming through the ceiling," 13-year-old Reginald Smith told the Kansas City Star. "The water started getting heavier, so I panicked and started packing my clothes and put the rest of my stuff in my closet." His family fled to safety in the darkness when the roof of their townhouse blew off.

A pair of silos in western Kansas was half-flattened on 27 May 2001 by a derecho—a long, intense swath of destructive wind produced by a mesoscale convective system. This derecho extended from northwest Kansas into north Texas, producing more than 170 reports of high wind over 12 hours. Derechoes typically produce a bow echo on radar. (Photo by Bob Henson.)

The alarming bow

While lines of storms are informally called squall lines, some of them are classified by meteorologists as "bow echoes." The name comes about because strong upper-level winds that descend through the core of rain-cooled air cause the leading edge of the system to bow outward. The characteristic radar echo that results can serve as a good indicator of potential severe weather.

Bow echoes are dangerous because the outflowing winds of their rapidly moving thunderstorms produce gusts that can approach 100 mph (161 kmph)—and they can also spin off tornadoes. Such tornadoes can be difficult to predict because often there are no clear precursors, such as a storm-scale rotation at upper levels, that can signal potential tornado formation.

While a typical tornadic thunderstorm might span 20 kilometers (12 miles), the agglomerations to be studied in BAMEX can stretch more than 140 kilometers (87 miles) in width and carve paths that span several states.

For years Morris and his colleagues, have simulated various modes of thunderstorm growth and decay in computer models, while Chris Davis and his colleagues have studied and simulated mesoscale convective vortices. Davis and NCAR colleague Stanley Trier were the first to reproduce the vortices in a cloud- resolving computer model. They found that when a vortex outlives its parent thunderstorms, it can help trigger more storms the following day—making it a potentially useful forecast tool.

The scientists decided to move from modeling to fieldwork because, as Morris puts it, "We came to realize that we'd gone about as far as we could with the idealized simulations. We needed to get good data." They joined forces with Roger Wakimoto (University of California, Los Angeles) and Dave Jorgenson (National Severe Storms Laboratory), who had extensive experience making aircraft observations of convective systems—and BAMEX was born.

The BAMEX study area extends from the central plains to the Ohio Valley, an expanse that should keep the odometers of both aircraft and ground vehicles churning. On the ground, researchers will line up three vehicles on a north-south axis, with two ATD sounding units flanking the University of Alabama in Huntsville's Mobile Integrated Profiling System (an atmospheric research system that includes Doppler radar, lidar, and other instruments). In addition, a mobile weather station will double as scout car, seeking out clearings large enough for the balloon launchers and profilers to operate safely.

Three aircraft will probe the storms, including P-3s from NOAA and the Naval Research Laboratory with onboard Doppler radars. A chartered Learjet will deploy NCAR dropsondes, key to analyzing the convective vortices. All three planes will be based at MidAmerica Airport, a little-used facility located about 25 miles east of St. Louis. BAMEX will virtually have the place to itself, which simplifies the aircraft operations enormously. "At least on paper, it's probably the ideal setup for this kind of experiment," Morris says.

A daunting task

Still, the logistics are formidable. To begin with, researchers are confined to areas that are built up enough to have good networks of paved roads, but not so densely populated as to have regular traffic jams and obstructions such as power lines that could snarl weather balloons. Much of the Midwest is made to order but, as Morris points out, "the farther west you go, you just run out of road."

A second challenge is the sheer size of the region. Traveling as a unit between deployments, the ground crews will zigzag from one storm to the next, working without a home base for the entire seven-week project.

And then there's the matter of the timing of the storms. Most bow echoes blow through at night, meaning crews will often work past midnight.

"It's going to be unique in that we'll be all over the place and never know where we'll be the next night," says ATD's Ned Chamberlain, who is overseeing the balloon launches. “We’ll be driving hundreds of miles in a day. We’ll head out about 10, and then at noon we’ll get a further definition of the forecast area. Early to mid afternoon is when they [the scientists in Mid America Airport] do a final sighting of the system. Then we’ll set up and start working. We’ll start making balloon launches at 4 p.m., and we may be out there until 2 in the morning.” The goal is to work no more than 42 hours during each three-day period, and then take the fourth day off, Ned explains.

At ATD, dozens of staffers are working on the project. Brigitte Baeuerle is the division’s BAMEX project manager, and she is working with Mike Daniels, Allen Schanot, Peggy Taylor, and Melinda Tignor on project logistics. Terry Hock is overseeing dropsonde operations; Mike Spowart is taking care of outfitting the Naval Research Laboratory P-3; and Eric Loew, Kurt Zrubek, and a team of technicians are assisting with aircraft operations.

JOSS will help oversee the airport-based operations center. The office also created the online BAMEX catalog, which has a substantial real-time component. “It’s a living, breathing thing on the Web,” says JOSS’s James Moore. The catalog will ingest vast amounts of data from the BAMEX fleet as well as the standard National Weather Service observing network.

If the storm season comes through, this $4 million experiment—funded primarily by NSF—may compile as many as 15 case studies. With any luck, that will include two or three detailed cases. It’s about time, says Morris. The last major study of mesoscale convective systems was in 1985, when the emphasis was on fixed sensors. This time, the behemoths are being chased instead of watched.

•*Bob Henson and David Hosansky*

On the web:

[BAMEX materials (NCAR/ATD)]

[BAMEX data management (UCAR/JOSS]

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May 2003

The long riders: How some staffers cope with epic commutes

Louis Wynn, a data operator in the Scientific and Computing Division, is a glass-half-full kind of guy. When asked about his commute to work, he says with a laugh, “I really don’t have a problem riding the bus.”

Louis Wynn.

That’s a good thing, because Louis lives in Aurora—a walk, three bus rides, and a car or shuttle ride to his job at the mesa.

His odyssey typically begins with a four-block walk from his house to Sable Boulevard, where he catches the 153 bus to Colfax Avenue (a 15-minute ride). From there, he rides the 15 downtown to Market Street Station (about an hour, including wait time). Then he takes the Boulder Express (40 minutes) or Local (one hour) to South Boulder Road. This brings him to the homestretch—a ride in a car or on the UCAR shuttle to the Mesa Lab.

Tally up the various segments, and the commute totals 2 1/2 hours each way—on a good day. If traffic is bad or he misses a connection, Louis could easily spend three hours in transit.

Louis is hardly the only staffer with a long commute to the office. Although 42 percent of UCAR’s approximately 1,400 employees live in Boulder, others live in the mountains, the Denver area, or even as far north as Fort Collins.

The reasons are many: a desire to live in the mountains or downtown Denver, a desire to escape the high costs of housing in Boulder, or family ties to another community.

For some staffers who want to work at UCAR because of its research mission, good benefits, and job stability, the long commute—while not ideal—is a reasonable trade-off. And some have come up with creative ways of getting to work.

Car avoidance

Louis, for example, could be at work in less than an hour if he took his car. And he wouldn’t even have to deal with rush-hour traffic, because the shifts in his four-day workweek run from 11 a.m. to 9 p.m. But he doesn’t like to drive.

So he devised this system:

“Normally, I drive to work on Monday, and when I get off at 9 p.m., I drive to the park-n-ride, leave my car, and bus it home. The next day, I bus it to the park-n-ride and drive up the hill to work. I continue this process till Thursday night, then drive home.”

Louis cuts out the car altogether in the warmer weather by bringing his bike on the bus to Boulder. He then loads the bike on the shuttle to go into work and rides it downhill from the mesa at the end of the day. His goal someday is to ride his bike both ways. But, as he explained in a recent e-mail, “I don’t know if this 50-year-old body will make it up THAT hill.”

Does it feel like a waste of time to spend as much as five to six hours a day commuting? “It really doesn’t bother me,” Louis says. “I have my bus pass, so it’s free. I like to read novels or the newspaper. I know all the bus drivers.”

If he had a shorter commute, he muses that he could spend more time with his “lady friend” or take in a late-night movie with a buddy. But he’s used to the world of buses. His previous job was “another three-buser” to Lakewood—and that commute was even more challenging, in a sense, because he had to be there by 4 a.m.

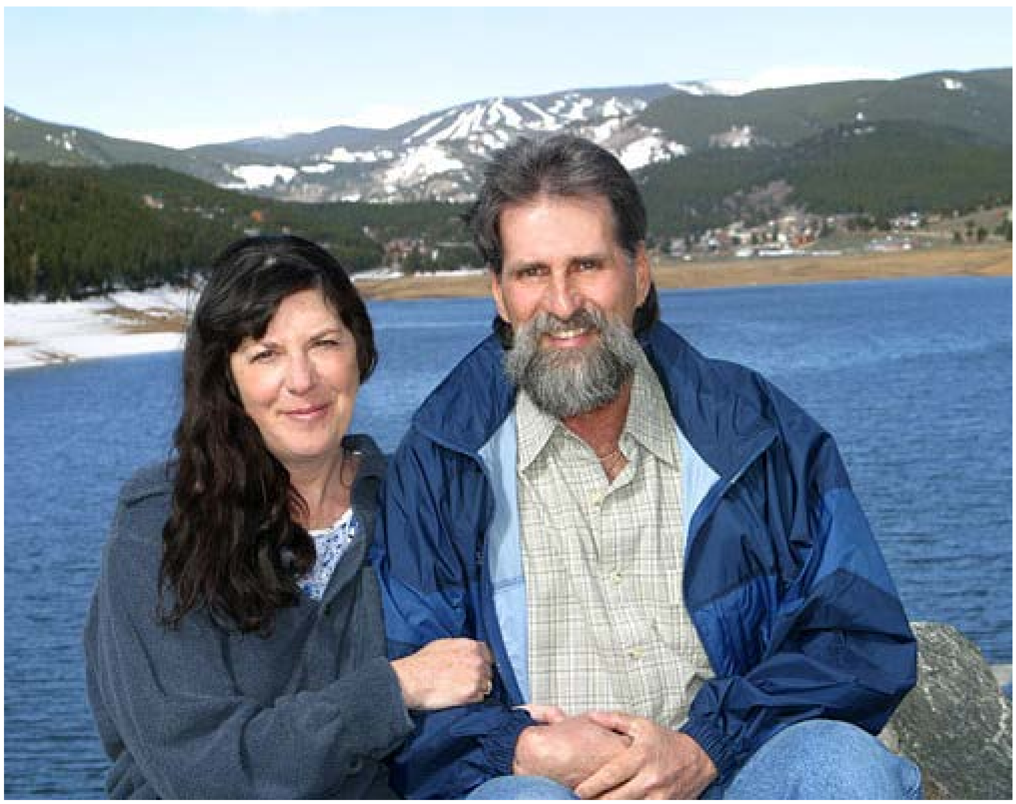
While he relaxes on his bus rides, Louis marvels at people who spend time in traffic jams.

"I ended up coming into Boulder one evening about 5 and it's parking lot city," he recalls with a smile. "I look at the other drivers, and they're cursing and waving their arms in the air. I'm playing the radio and singing Earth, Wind, and Fire."

His view of commuting comes down to a simple philosophy: "You have to take it in stride." Otherwise, he adds, "All you're going to do is stress yourself before you even get to work."

The long descent

For a sizable commute that's nothing like Louis's, consider the route taken by Tom and Barb Petruzzi. Their drive to work consists of descending more than 3,000 feet from the upper foothills along quiet and beautiful roads.



Barb and Tom Petruzzi

The couple has worked in the organization for years. Both are now in Physical Plant Services—Barb as an administrator and Tom as a maintenance specialist. Neither has plans to work anywhere else.

Not being city people, they bought a house some 25 years ago on Overland Mountain, north of Ward. It's a 45-minute drive to the mesa, but they love living at 8,700 feet, far above the bustle of Boulder or Denver.

"It's the most beautiful place on Earth," Barb says. "Mt. Meeker and Longs Peak are our front view. It's God's country up there."

About three days a week, when their schedules coincide, they drive to work together. They wind their way down through James and Lefthand canyons to

Route 36, then join the heavier traffic on Broadway.

Although that's a long drive, it's mostly along low-trafficked roads winding through some of the more spectacular scenery in the county. So it's hardly something to complain about.

"It's not really a hardship in our estimation," Barb says. "We're lucky we can drive together and come to such a beautiful place to work. The time we have between our home and Broadway is a peaceful time to think and just be together, or listen to audio books."

In fact, sometimes they wish their commute was a bit longer—so they have more time to listen to books. On a recent day, Tom took a detour through Sugarloaf Canyon so he could finish Extreme Measures by Michael Palmer.

Even snowy days don't faze them. Tom and Barb each have a four-wheel drive vehicle, and they actually make better time than staffers coming in on snarled roads from places like Longmont or Broomfield. Asked what she would do differently, Barb admits to being stumped. "I wouldn't change a thing."

Another college town

Scott Longmore loves everything about Fort Collins except for the fact that it's so far from his office.
Last December, Scott landed the type of job he was looking for—as a UCAR associate scientist providing technical support for the Intergovernmental Panel on Climate Change. Working closely with the Joint Office for Science Support, he oversees both hardware systems and software development, which includes maintaining databases, upgrading computers, and presenting information on the Web.

Scott Longmore

The only problem is he spends two hours a day on State Route 287 for the roundtrip commute between Boulder and Fort Collins. “I really like my job,” he says. “The commute’s just one of those things. Nothing’s perfect.”

Scott grew up in Fort Collins, and it still feels like home. Like Boulder, it offers a wealth of outdoor activities coupled with the sophistication of a college town. Plus it’s a lot cheaper. He’s paying $650 a month to rent a two-bedroom house in Fort Collins—and he knows that anything like that in Boulder would cost nearly twice as much.

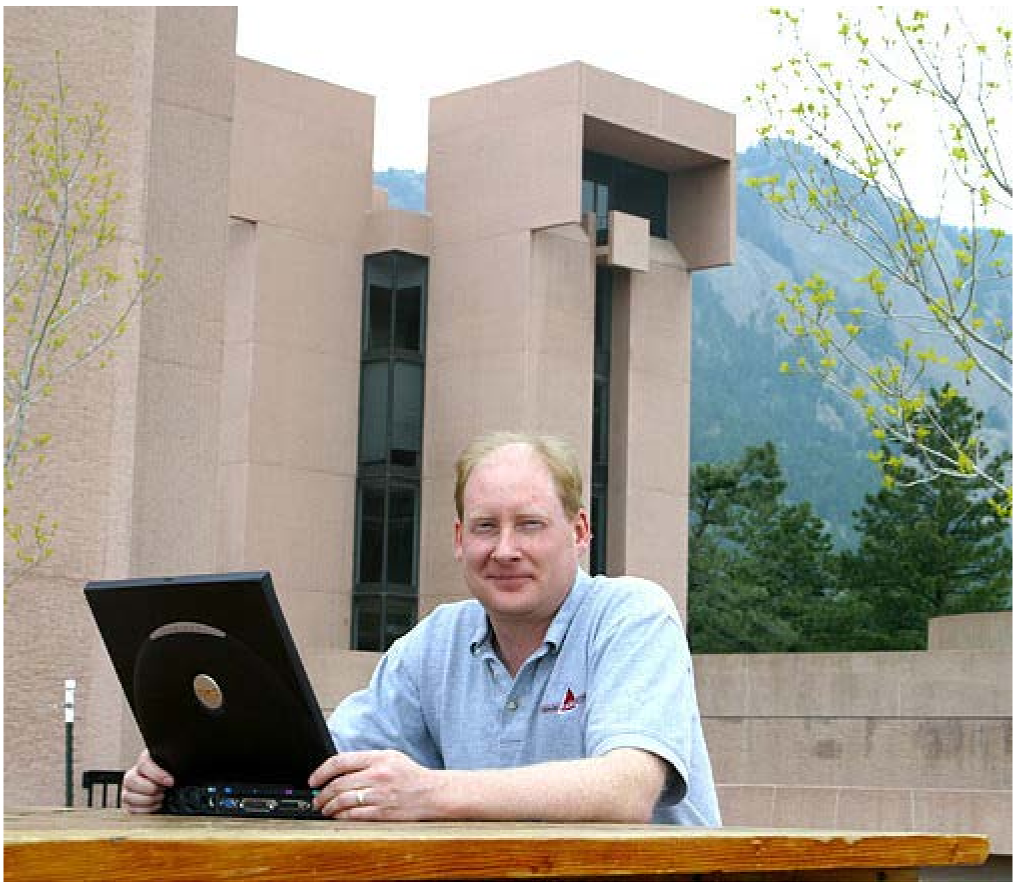
But he concedes, “There are definitely more meteorological software engineering jobs in Boulder.”

Scott may end up moving to Boulder, even though it means higher rent and being further from friends and family. But he’s also looking to form a carpool with other staffers. That way, he’d spare his truck, save money on gas, and maybe even get some work done on his laptop.

For the moment, though, he spends his commute listening to music. He’s gotten busy burning compact discs of his favorite songs. He’s not opposed to listening to the radio but, as he puts it, “If I get three good songs in a row on the radio, that’s awesome.”

Working on wheels

As soon as he catches the bus in Littleton each morning to begin his two-hour commute to Boulder, Jim VanDyke gets to work.



Jim VanDyke

"I spend most of my time on the computer making database changes, reading, writing, or planning my day or my week," explains the network engineer and assistant section head in the Scientific Computing Division.

Jim has to be efficient that way because his commute is among the more challenging at UCAR. He moved into his Littleton house in 1991, two years before finding his present job. Rather than relocate his family, he elected to tough it out with a long drive west on C-470 to Golden and then north on Route 93 to Boulder—an hour each way on a good day.

For a while, it didn't seem that he had other commuting options. Telecommuting didn't work because he needed to be onsite to supervise his staff and take care of any technical problems. Carpooling wasn't practical because he had to be at work earlier than most staffers—about 7:30 a.m. And taking public transportation was hardly appealing, given that it took at least twice as long to navigate the bus system as it did to drive.

Then, just about two years ago, he realized that he could do as much work while riding on the bus and the new light rail that opened from Littleton to Denver as he could in the office. As he stated in a recent e-mail: "I found that after a number of years of driving and staying late each day that I would spend about the same amount of time away from home as if I just commuted and worked while I was commuting. I discussed it with my supervisor, and now I leave at a regular time and work while I'm commuting."
As a result, Jim works about a nine-hour day—almost half of which is spent in motion. He sets his alarm for 4:50 a.m., catches the 5:30 bus to the Mineral light rail station in Littleton, takes the train downtown, and hops on the B bus to Boulder.

Even though the commute is still something of a burden, he reports that his situation is quite manageable.

"I really enjoy working at NCAR, but I also like my community in Littleton," he says. "I think ultimately it would be nice if NCAR was closer, but I am happy with how the commute is working out."

•*David Hosansky*

TAP UCAR/NCAR TRANSPORTATION ALTERNATIVES PROGRAM

The UCAR/NCAR Transportation Alternatives Program helps employees get to and from work (and other places) through a variety of initiatives:

Eco-Passes. Every staffer gets an annual Eco-Pass. This is good for free bus and light rail service throughout the Denver-Boulder Regional Transportation District.

Guaranteed ride home. Any staffer who took the bus or another alternative mode to work gets a free taxi ride home if an emergency comes up.

Biking to work. Staffers can borrow a blue bike (and helmet) for daily use from a staff-maintained fleet, or they may be able to arrange a longer loan.

Carpooling. The Denver Regional Council of Governments seeks to link up potential carpoolers throughout the area. Check out www.drcog.org/ridearrangers.

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Study finds lower atmosphere warming

The reanalysis of satellite data could refute skeptics of global warming.

A new analysis of satellite data collected since the late 1970s from the lowest few miles of the atmosphere indicates a global temperature rise of about one-third of a degree Fahrenheit between 1979 and 1999. The results are at odds with previous analyses that show virtually no warming in the satellite record over the 20-year period—and they provide more evidence that global warming is actually occurring.

Tom Wigley

A team that includes Climate and Global Dynamics scientists Tom Wigley, Gerald Meehl, Caspar Ammann, Julie Arblaster, Thomas Bettge, and Warren Washington reported its findings in the 2 May online issue of Science. The lead author is Ben Santer of Lawrence Livermore National Laboratory.

“There is a lot of statistical uncertainty when you’re trying to estimate a trend from very noisy data,” Tom says. “But it’s undeniable that the agreement with both global climate models and surface data is better for the new analysis than for the old one.”

Over the past 25 years, a series of instruments aboard 12 U.S. satellites has provided a unique temperature record extending as high as the lower stratosphere. Each sensor intercepts microwaves emitted by various parts of the atmosphere, with the emissions increasing as temperatures rise. These data are used to infer the temperature at key atmospheric layers.

Since the 1990s, skeptics have pointed to the absence of a warming signal in the satellite-derived temperatures, which stood in contrast to a distinct warming trend in average air temperature at Earth’s surface. A 2000 report from the National Research Council concluded that both trends might be correct—in other words, the global atmosphere might be warming more quickly near the ground than higher up.

Although Tom agreed, he felt there was more to be explained.

“The real issue is the trend in the satellite data from 1979 onward,” says Tom. “If the original analysis of the satellite data were right, then something must be missing in the models. With the new data set, the agreement with the models is improved, and the agreement with the surface data is quite good.”

In order to glean temperatures from the raw satellite data, several adjustments and corrections had to be made. Until now, only one group, based at the University of Alabama in Huntsville, had produced a complete set of global temperatures from the raw data. It found minimal warming.

For the new study, a group based at Remote Sensing Systems in Santa Rosa, California, applied a revised set of corrections to the satellite data. This accounted for the effects of heating on the radiation sensor itself—the first time this source of error had been addressed fully, according to the authors—and made adjustments for the drifting orbit of each satellite and other factors.

The group found a warming trend of 0.16°F (0.10°C) per decade in the layer between about 1.5 and 7.5 miles (2.4–12.1 kilometers) high, compared to a trend of 0.02°F (0.01°C) in the previously published University of Alabama in Huntsville analysis. Both estimates have a margin of error of plus-or-minus nearly 0.2°F (up to 0.12°C)

According to the authors, the new results are a closer match with surface warming, as well with four simulations of 20th-century climate produced by global-scale models of the ocean and atmosphere. These simulations were produced by CGD scientists and their colleagues using the Parallel Climate Model, a global-scale model of the ocean and atmosphere that was built by NCAR and Los Alamos National Laboratory. The simulations included solar variations, volcanoes, greenhouse gases, and sulfate aerosols, all of which affect climate.

As a further check on the new satellite data set, the team examined regional patterns. Using a statistical technique, the group analyzed the 20th-century simulations and searched for an underlying “fingerprint” of climate change. For instance, the rates of warming in the satellite-monitored data vary by latitude from north to south. The authors found that the overall fingerprint of climate change in the models resembled this and other regional patterns found in the new satellite data set.

•*Bob Henson*

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May 2003

An information divide: Developing nations lack advanced forecasting tools

Forecasters in Uganda rely on grainy satellite photos from neighboring countries as their only weather prediction tools. When massive thunderstorms form upwind in the tropics and head toward the area, Ugandans get very little warning.

In Nepal, there's no functioning hydroelectric forecasting system. Forecasters can't project stream flow or get information for flood predictions.

And along the Mekong River, which starts in China and flows through southeast Asia, different countries that all rely on the river's water don't have an effective regional modeling system to share information.

These are just three examples of the information divide in the climate sciences between developing and developed nations.

"The information divide mirrors the increasing 'digital divide' between wealthy and poor countries," says Andrew Gettelman of the Atmospheric Chemistry Division. "There are significant negative impacts on the abilities of developing countries to predict and respond to weather, climate, and extreme events."

Andrew Gettelman

Andrew and his German colleague, Gerd Hartmann of the Max Planck Institute for Aeronomy, monitored a town hall discussion at the annual European Geophysical Society meeting last month in Nice, France, to assess the information divide and brainstorm ways to bridge it.

While a postdoctoral researcher in NCAR's Advanced Study Program, Andrew conducted a survey of scientists in developing nations to better understand barriers to information exchange in the fields of meteorology and climatology. He pinpointed different obstacles that prevent scientists in developing nations from using climate and meteorology forecasts and from analyzing climate variability. Scientists might not have adequate tools, ranging from electronic teaching aids to mere phone lines and photocopy machines. They might lack access to research articles, data, forecasts, and instructional materials. Communication between scientists may be limited.

As a result, climate observing systems suffer, and local knowledge and expertise are lost from the global knowledge base, Andrew says.

The key to preventing this is collaboration. "It's is the most effective way that people in the developing world gain access to methodology and new ways of doing things," Andrew explains. "In many cases it's a lifeline for people."

When collaboration does occur, however, it's often sporadic and on a project-by-project basis. And sometimes there's a sharp difference between the goals of researchers from different countries.

"We have different needs and desires than they do for some of the research," says Andrew, referring to scientists in the developing world. "They are more concerned about weather, especially for agriculture, and we're more concerned about climate and climate change."

Even so, Andrew maintains that better weather and climate analysis is a reasonable goal for forecasters in developing nations.

“You don’t necessarily need special computers,” he says. “You just need the right software and need to know how to use it.”

•*Nicole Gordon*

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For more about the information divide

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Building bridges for Latina students

Jasmine Schoonmaker, a senior at Fairview High School, is leaning toward a career in engineering or science. But she's not sure which options would work best for her.

That's why she enjoyed the most recent Latinas Building Bridges in Education conference. The event, held at UCAR on 23 April, gave middle and high school Latina girls a chance to pair up with professional women and get a preview of the working world.

Carlye Calvin (Communications), left, discusses photography with two high school students. (Photo by Bob Henson.)

"It's great to see how much people love their jobs," Jasmine said as HR's Nancy Wade introduced her to people in the organization. "I like seeing how people's personalities match their work."

Some 58 students signed up for the event. They shadowed their mentors in the workplace and attended workshops on such topics as job interviewing techniques and coping with peer pressure in high school. A luncheon at Center Green featured introductory remarks by NCAR director Tim Killeen in both Spanish and English and a keynote address by Ofelia Miramontes, the vice chancellor for diversity at CU.

This was the third annual conference organized by the Boulder County Latina Women's League, which seeks to help Latina girls and women with educational and career opportunities. It was the first time UCAR hosted the event.

"We're doing our share to make sure the girls are being prepared," says Teresa Rivas of the Atmospheric Chemistry Division, who chairs the league's conference committee. "We want to emphasize to them that college is within their grasp. The goal is to put the girls in the company of really positive role models—women with established careers—who can tell them about the drawbacks and some of the things to watch for, but above all who can show the girls that they can accomplish this."

Dorothy Bustamante of the Scientific Computer Division, who co-chaired the event, says she's received fantastic feedback from students and mentors alike. She is particularly pleased that the middle-school girls who attend the conference often talk about setting their sights on eventually going to college instead of ending their studies to get married and start a family. This is significant, she says, in light of Census Bureau figures indicating Hispanic girls have the highest dropout rate among female students of any ethnic group.

"After they come and hear some of the presenters and go to some of the workshops, they're saying, 'Hey, maybe I will stay in school,'" she says.

•*David Hosansky*

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short takes

For some staff, the March 2003 storm provided more than a day off. **Doug Wesley** of COMET is examining the storm from a mesoscale modeling viewpoint in order to understand the processes that caused widespread snowfall of historic proportions. He's working with Greg Poulos (Colorado Research Associates), Mike Meyers (National Weather Service), John Snook (Colorado Research Assciates), and Ed Szoke (NOAA). According to Doug, smaller-scale processes such as the influence of mountains were responsible for the local variations in wind and snow that left some people shoveling for days while others walked down clean sidewalks. The team's modeling will incorporate several unique observations about the storm: snowfall six feet or deeper on both sides of the Continental Divide; a fetch of warm, moist air with a conveyor belt appearance that moved from the Gulf of Mexico into northeastern Colorado; and unexpectedly light accumulations in a few locations, such as Lyons. Doug hopes to share some preliminary insights into the storm at the UCAR/National Weather Service Winter Storm Symposium in late May in FL2.

During the Investigation of Sulfur Chemistry in the Antarctic Troposphere, a joint venture between NCAR and the Georgia Institute of Technology, ACD's **Fred Eisele** and his team discovered a chemical surprise in the Antarctic. Hydroxyl radicals, the atmosphere's primary cleansing agents, occur in exceptionally high concentrations in the lower troposphere (the lowest level of the atmosphere). These elevated levels of radicals above the South Pole are most likely due to large amounts of nitric oxide released by the interaction of sunlight and nitrates in snow—a process known as photolysis. The hydroxyl radicals prevent toxic buildups by oxidizing (essentially erasing) pollution and many naturally occurring chemicals in the air. Some of this oxidation also appears to be occurring in sections of the snowpack that are no more than about 10 years old and are shallow enough to be reached by sunlight. This fact could complicate measurements, particularly of nitrates, in ice core samples used to determine atmospheric conditions of the past. While the hydroxyl radicals have an immediate, local effect of cleaning the air, the global implications are still unknown. Fred's research is continuing, and he hopes to use the NSF/NCAR C-130 research aircraft in 2005 to extend the investigation over much of the Antarctic Plateau.

Floods are the most expensive and the second deadliest natural hazard in the United States, and they remain a concern in Colorado even though parts of the state remain in a severe drought. In RAP, **Hatim Sharif** is working with **David Yates** and **Ed Brandes** to perform hydrometeorological analyses of flash floods in the Denver metropolitan area. The first area selected for analysis is Harvard Gulch, a highly urbanized catchment (an area, defined by topography, that drains to a common point). The sophisticated hydrologic model used in this study can include many physical details and incorporate high-resolution radar rainfall estimates to predict flash floods. The team, which includes RAP's **Rita Roberts**, is implementing a computer forecasting system known as the NCAR Auto-nowcaster to provide short-term flash flood forecasts for organizations such as the Denver Urban Drainage and Flood Control District. These forecasts can predict lead times of up to 90 minutes for the Harvard Gulch study area and potentially even longer lead times for larger catchments. The study results are encouraging; in one case, the errors were less than 25% for flash floods predicted 70 minutes beforehand.

Flash flooding in Fort Collins.

While studying past volcanic eruptions, **Caspar Ammann** (CGD) and Philippe Naveau (CU's Applied Math Department) came across an intriguing pattern: major tropical volcanic activity appears to follow a 76-year cycle. Caspar examined 600 years of volcanic activity, using both traces of volcanic sulfates in ice cores as well as an independent index of past volcanic activity based on volcanologic field data and eyewitness accounts of eruptions. In the ice data, he found indications of 61 explosive eruptions in the tropics that were powerful enough to leave sulfate traces in polar ice fields and thus had the potential to affect the atmosphere worldwide. According to a probabilistic model put together by Philippe, the periods of activity have waxed and waned every 76 years. If the finding holds up, it could have important climatic implications, since major eruptions send enough sulfates and other aerosols into the air to block sunlight and cool global temperatures, sometimes for several years. (The last such event occurred in 1991, when Mt. Pinatubo in the Philippines erupted.) However, it remains unclear what force could be creating such a 76-year cycle. Caspar's next step is to peer farther into the past, seeing whether the cycle goes back 2,000 years.

Trees and other plants emit chemicals, such as isoprene, monoterpenes, and other volatile organic compounds, that have far-ranging impacts on climate and air quality. But not all plants emit the same levels of VOCs. A natural forest tends to produce a moderate amount of the chemicals because there are both high emitters and low emitters, but a tree plantation comprised of a single species is likely to produce either a very high or a very low level of emissions. **Alex Guenther** and his team in ACD's Biosphere Atmosphere Interactions Group has been studying natural forests and tree plantations in the western United States, the Amazon Basin, and China to determine their regional impacts on ground-level ozone and greenhouse gases. To analyze changes in emissions, the team uses the new Model of the Exchange of Gases between the Atmosphere and Nature (MEGAN). The model incorporates Geographic Information Systems technology to track changes in climate and land cover. The group recently received a three-year EPA grant to expand its research throughout the United States, looking into how vegetation and wildfire emissions will respond to changes in climate and land management and how this will impact climate, air quality, and ground cover. For more information, see bai.acd.ucar.edu.

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staff notes monthly

May 2003

Delphi Question: Publications on the Web

Delphi Question #500 (received 25 March): Regarding the various publications that come out on a regular basis (*Staff Notes, UCAR Quarterly*, etc.), wouldn’t it be more environmentally friendly to simply offer these on the Web, rather than placing a paper copy in every employee’s mailbox? When a new issue is ready, a link could be placed in *This Week*.

I realize there may be non-UCAR employees who receive these publications, and a paper copy may be the best solution for them, but it seems like we could save a lot of paper if we went with a Web solution at least internally.

Response (received 4 April): The short answer is that people tell us they prefer the paper versions. The last time we surveyed readers of *Staff Notes Monthly* and the *UCAR Quarterly* (1996 and 2001, respectively), they overwhelmingly preferred print. Fewer than *1%* of Staff Notes readers and *5.6%* of *Quarterly* readers opted for the Web version. As one staff member commented, “I know it’s environmentally appropriate and more cost-effective to do without hard copy, but it feels like work I need to deal with instead of something pleasurable to read.” We suspect staff think of our publications like a daily newspaper or a magazine—something to carry around and read at lunch, on the shuttle, on break, or even take home and share with the family. We’re regularly refilling the stands in the lobbies with current and back copies.

External readers seem to feel the same way. We just e-mailed 1,000 of the *Quarterly’s* 3,000 subscribers in early March. That message invited people to receive electronic notification when each issue of the *Quarterly* goes on the Web and (as a separate item) to cancel their print subscription if they preferred to read it on the Web. So far we have gotten only 26 requests to be notified of new issues by e-mail and four print cancellations. A purge last fall of the *Quarterly* and *Highlights* mailing lists yielded a similarly small number of cancellations.

In order to streamline internal distribution and avoid hundreds of labels, we don’t send individually addressed copies of our publications. This means that individual staff can't subscribe and unsubscribe. Instead, we ask administrators group by group to let the mailroom know how many copies they want. This allows groups to share copies. If you prefer to read *Staff Notes* or the *Quarterly* on the Web, please let the person in your group who distributes mail know. We have just redesigned the Web versions of both publications (see Staffnotes and Quarterly). We also use the Web for *Staff Notes* "extras" between issues. And of course, we distribute routine announcements only electronically and save the print newsletters for longer interpretive pieces. We use recycled paper in all our publications and revisit our print runs issue by issue to be sure we're not printing too many copies.

We are in the process of designing a new staff survey. It asks specifically about print vs. electronic preferences. Please watch for it and give us your feedback. Our bottom line is to produce publications people want to read, regardless of the format.

—Lucy Warner, director UCAR Communications

Questions and suggestions from the staff to management may be submitted in confidence to the Delphi Coordinator. They should be submitted in written form, preferably via interoffice mail in a sealed envelope marked confidential. They must be signed. Detailed procedures for submitting questions are given in the UCAR Policies and Procedures Manual, section 4-1-2, and on the Delphi Web site, www.ucar.edu/delphi. Staff Notes Monthly publishes questions and answers of general interest to staff, and the Delphi Web site has a log of all questions submitted since 1995.

Also in this issue:

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