Staff Notes MONTHLY
UNIVERSITY CORPORATION FOR ATMOSPHERIC RESEARCH
NATIONAL CENTER FOR ATMOSPHERIC RESEARCH • UCAR OFFICE OF PROGRAMS

Volume 31, Number 12 -- December 1996

In this issue

Just One Look

Carlye Calvin pulled off the ML road and captured this wintry scene. Such is the life of a professional photographer. We at Staff Notes wish you and yours the happiest of holidays.

About this publication

Staff Notes Monthly is published by the University Corporation for Atmospheric Research, P.O. Box 3000, Boulder, Colorado 80307-3000. UCAR operates the National Center for Atmospheric Research, UCAR Office of Programs, and Walter Orr Roberts Institute with support from the National Science Foundation and other sponsors.

Production
Writer/editor: Bob Henson
Design: Peter Bockenthien
Printing: Image & Design Center, Speedy Bee
Print distribution: Milli Butterworth
Electronic distribution: Jacque Marshall

UCAR Communication
UCAR North (3300 Mitchell Lane), Suite 330
Phone: 303-497-8605
Fax: 303-497-8610
E-mail: butterwo@ncar.ucar.edu

Subscription and access information
Print: Contact the UCAR Communications office (see above).
E-mail: To subscribe to the e-mail news service UCARline, send a message with no title and only the words subscribe ucarline in the message body to the address majordomo@ucar.edu. You will receive a "welcome to UCARline" message and more information.
Gopher: Contents are at gopher.ucar.edu in the folder "Publications/Staff Notes Monthly" within "NCAR/UCAR News and Information."

UCAR
NCAR
UOP

Prepared by Jacque Marshall, jacque@ucar.edu, 303-497-8616

A new C-90 arrives for climate modeling

NCAR's climate system model (CSM) and other integrated models have an spacious new home. Over Thanksgiving week, a CRAY Y-MP8I supercomputer leased by NCAR since 1991 was replaced by a CRAY C-90. The new machine--dubbed antero, like the one it replaced--has 256 million words of memory and 16 processors, twice as many as its predecessor. It can produce up to 5 billion floating-point operations per second.

"We believe it'll give us a factor of three to four increase in speed over the previous antero," says Bill Buzbee, SCD director. As the linchpin of the Climate System Laboratory (CSL), the new Cray will be dedicated to extensive climate simulations.

The C-90 has arrived at SCD through an 18-month extension of the previous lease arrangement for the Y-MP8I with Cray Research, Inc. The old lease had been due to expire in mid-1997.

The arrival of the C-90 comes after a stalled process for longer-term acquisition of a new supercomputer for climate modeling. In May, NCAR announced the selection of the Japan-based NEC Corp. to provide four large vector supercomputers over five years. However, the acquisition has been put on hold pending a formal complaint by Cray. Investigations are now under way by the International Trade Commission and the U.S. Commerce Department. Decisions are not expected until well into 1997.

"We spent the better part of two years developing requirements for supercomputing support for the CSM," says Jeff Reaves, UCAR associate vice president for finance and administration. "The extension of our lease with Cray enables us to provide the additional computing power we need for the Climate Modeling, Analysis, and Prediction program and other modeling projects."

The C-90 is in its testing-and-acceptance phase through December. Shortly after the two-day hardware installation and checking process, software was delivered and installed. The next step was to ask "friendly" users (primarily NCAR-based modelers) to begin running familiar programs and verify that the algorithms worked as expected. "Typically on a big mainframe, the acceptance tests take one or two weeks." says Bo Connell, head of SCD's Computer Production Group (formerly the Operations Group). •BH

[All photos by Carlye Calvin.]

Above and below: Workmen lower the C-90 into SCD's staging area.

Before the C-90's bright blue "skin" was attached, the computer's innards were in full view.

The C-90 weighs in at 256 million words of memory with 5 gigaflops. On the left is the machine's solid-state storage device; at right is its central processing unit.

Next step: a J-9

Hot on the heels of the C-90, another powerful new computer is joining the ranks in SCD, this one for the overall user community. Just before press time, NSF gave its approval for acquisition of a CRAY J-9 to be delivered this month.

NCAR already has two other J-9s, one with 20 processors devoted to the CSL and the other with 16 processors for users at large. The new machine also has 20 processors, but it boasts more random-access memory than any other NCAR machine to date: a billion words. "The large memory will offer community users the opportunity to run much larger jobs than they can now run on the [community] Y-MP," says Bill Buzbee.

This is one of two NCAR's current J-9 models, soon to be joined by a third.

The new J-9 earned a strong recommendation from the SCD advisory panel. Purchased outright rather than leased, it should be on hand for two or three years, said Buzbee. "If we can keep the old community Y-MP running as well, then the net effect will be a 50 percent increase in community computing power." •BH

Fred gets a mate

When SCD got its first robotic silo from StorageTek in 1989, the machine was dubbed "Fred," as in Flintstone. (For better or worse, the name didn't stick.) The silo's job was to store up to 6000 data-stuffed cartridges and provide access to them for users of NCAR supercomputers. Visitors were soon able to watch Fred at work via an internal camera and a lobby-mounted monitor.

Now Fred has company. A second silo arrived at SCD in late August and is currently going through its final stages of testing. From the outside, it looks identical to its predecessor. Inside, though, it's a silo on steroids. Its cartridges hold up to 50 gigabytes of data, compared to 800 megabytes for the older cartridges. Thus, the new machine eventually could hold up to 60 times more data than the old one does in its present configuration.

"The robotics are identical. The only difference is in the cartridges and in the tape drives attached to the silo," says Gene Harano, head of the SCD Mass Storage Systems group. The old silo has 16 drives, while the new one has 8 drives configured to accept the new, higher-capacity cartridges. If budgets allow, 8 additional drives could be added to the new silo later on.

Silos old (left) and new (right) sit side by side in the SCD machine room.

The difference between the old and new cartridges is roughly analogous to the difference between an audio cassette tape and a videocassette tape. Data are stored on an audio tape in straightforward fashion, perpendicular to the tape's length, while a videocassette uses what's called a helical-scan approach in which data are recorded in staggered, angled tracks.

The helical-scan technology means that more information can be packed onto a given stretch of tape, but storing or accessing short bits of data is relatively time-consuming (just as it seems to take forever to stop and start a videotape several times over). Because of this, "the new drives don't handle small files of less than 50 megabytes very well," says Gene. "It takes a long time to load the tape and get it positioned. If you write a small file, you're wasting a lot of time. But you come out way ahead for big files because of the much higher transfer rate."

SCD has opened the new silo with a starter set of about 600 cartridges on hand, representing 30 terabytes of data-storage potential. About 100 more of the new cartridges are being used as a back-end, manually mounted archive. They represent a potential solution to the mushrooming of long-term storage in the machine room. "We're slowly chewing up the room space with cartridges that have to stay on hand," says Gene. In time, many of the older cartridges in SCD's permanent archive will be copied onto the new format.

The old and new silos are joined at the hip, as it were. A pass-through connection allows one silo to transfer a cartridge to the other for temporary storage or use, although the dissimilar tape drives and cartridge formats prohibit the latter option for now. Eventually, the older silo could be retrofitted to share formats with the new one. •BH

In this issue...
Other issues of *Staff Notes*

UCAR
NCAR
UOP

Prepared by Jacque Marshall, jacque@ucar.edu, 303-497-8616

Kids' party at the Mesa Lab: Santa, elves, and "controlled chaos"

When Mom or Dad works at UCAR, you're assured of at least one perk at holiday time: an extra visit from Santa. Each year on a Saturday morning the Employee Activities Committee herds about 200 children of staff into the ML cafeteria for three hours of merriment bordering on mayhem.

"It's very high-energy. The kids' excitement is infectious." says Paula Drager, who coordinated this year's bash for the EAC on 7 December. The highlight for many of the youngsters was a chance to sit on Santa's lap and get their picture taken. As in several years past, Kerry Slaven returned to wear the red suit and the white beard. Carlye Calvin snapped photos. Parents get a complimentary print of their child with Santa, courtesy of the EAC. For each youngster, there's an age-appropriate gift. This year, it was books--well received, according to Paula.

Dee Johnson, wife of NCAR's Paul Johnson, helped the kids paint their own ceramic ornaments. "They love it," says Paula. "Some of them spend hours on it." The children also could turn the other cheek and have their own faces painted by Denise Anderson (daughter of UCAR's Sandra Sundquist). Members of the NCAR cafeteria staff served up treats for the kids, with the help of some contributions from parents. The beverage of choice was red punch, says Paula. "Once they're all running around with red mouths, they look really cute in their pictures." •BH

[All photos by Carlye Calvin.]

"I want that, too!" Victoria and Matthew Bailey (Lori Bailey) share their Christmas list with Santa.

Perhaps Dominic Cristanelli (Cheryl Cristanelli) is content with just meeting Santa. Or could it be Santa shared that he had a secret supply of Tickle Me Elmos?

Face painting was one of several attractions for employees' kids to enjoy. Denise Anderson applies her artistic talents to the cheek of Eduardo Rivas (Teresa Rivas).

In this issue...
Other issues of *Staff Notes*

UCAR
NCAR
UOP

Prepared by Jacque Marshall, jacque@ucar.edu, 303-497-8616

Science Briefing

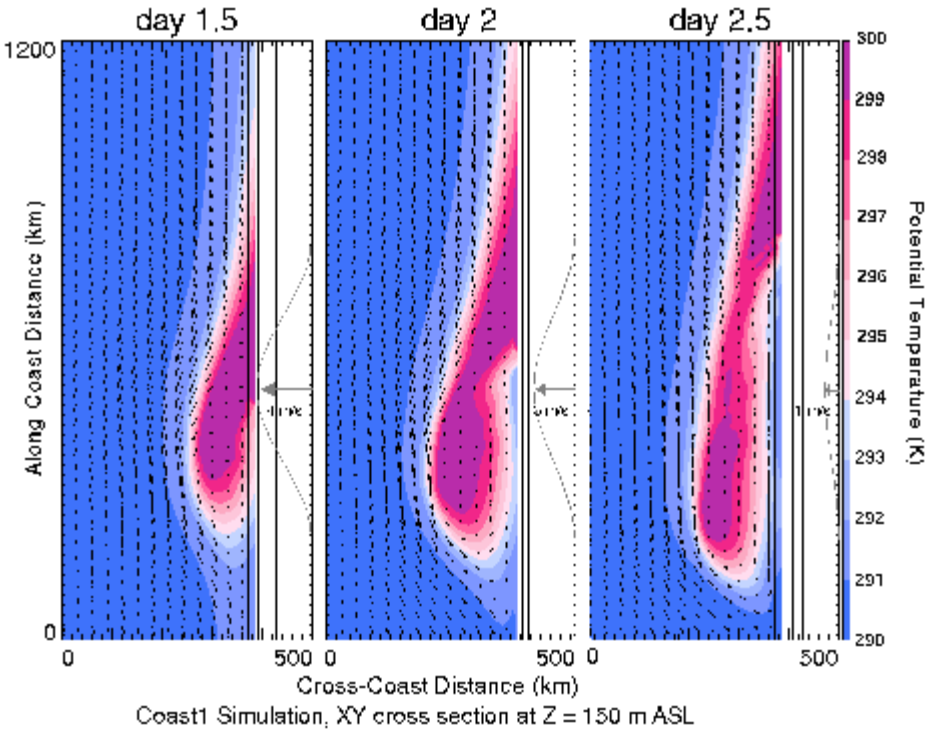
Using computer models of California weather, three MMM scientists have successfully replicated the process that causes a narrow tongue of low clouds and fog to surge northward along the state's coast after clearing has occurred. Their findings will help improve the models used in actual forecasting and could lead to better warnings for transportation, defense, and recreation in the coastal zone.

Rich Rotunno
[Photo by Carlye Calvin.]

Joe Klemp, Bill Skamarock, and Rich Rotunno are presenting first results of their modeling this month at the American Geophysical Union's fall meeting in San Francisco. The modeling was conducted with support from the Office of Naval Research (ONR) under the Navy's Accelerated Research Initiative. Rich previewed the talk in a seminar for staff last month.

While fog can occur under a variety of circumstances, the northward-surge phenomenon--especially common in the summertime--has vexed California forecasters for years. The process begins when high pressure noses eastward into Washington, Oregon, and Idaho, producing light east or southeast winds on the California coast. As they descend from the Coast Range, the breezes bring dry, sunny conditions to the shoreline while they push the marine layer (the cool, moist air that extends a few hundred meters above the Pacific) just offshore.

Forecasters can predict the large-scale pressure changes that cause the winds to blow offshore, but they cannot yet reliably tell when the marine layer might return and surge northward to bring overcast or fog. The computer models used by present-day forecasters trace the atmosphere at points separated by around 30 to 90 kilometers. That resolution is too coarse to fully outline the surges, which can be less than 100 km wide.



A three-dimensional computer model at NCAR produced this simulation of a California coastal surge. The marine layer is depicted by the darker shading, with air temperatures below 294 degrees Kelvin (about 21 degrees Celsius or 70 degrees Fahrenheit). The arrows depict air flow wrapping around a weak low pressure center offshore and surging northward near the coast. (Illustration courtesy Bill

Skamarock, Rich Rotunno, and Joe Klemp.)

Klemp and colleagues used a finer-scale research model in their attempt to depict the surges. They found that when the clearing-fog boundary is displaced a few tens of kilometers offshore, a weak area of low pressure--too small to be detected by coastal weather stations--may form just offshore. As the low circulates counterclockwise, it wraps moist marine air around its south side and toward the coast. When the marine air reaches the higher terrain along the shoreline, it is forced upward. Clouds and fog may form, along with a small high-pressure center that pushes the air northward. The result is a narrow tongue of cloud pinched between the coastline and the offshore clear zone. The surge can traverse hundreds of kilometers of coastline over a day or two.

The surge's movement up the coast can be characterized as a Kelvin wave, a particular kind of atmospheric feature in which winds blow in the direction of movement of a pressure disturbance. Research computer models tend to handle Kelvin waves skillfully, so this bodes well for surge prediction efforts. The modelers are now using a simplified version of the coast's topography, so their next step is to add sharper resolution to incorporate the bays, inlets, and peninsulas that dot the California coast.

"This phenomenon is a tough test for a model," says Rich. "Delicate imbalances (in pressure) seem to set it off, and it's too fine-scale to show up in most models. Still, it can produce enough fog to envelop boats and airports."

A Canadian university has joined the fold as the 62nd member institution of UCAR. **The application of York University was formally approved by the assembled member representatives at the 1996 UCAR members' meeting, held in October at the Mesa Lab.**

York is located in North York, Ontario, just north of Toronto. Founded in 1959, it serves over 40,000 students. York offers master's- and doctoral-level programs through its departments of chemistry, earth and atmospheric science, and physics and astronomy, along with its Centre for Research in Earth and Space Science. York faculty have collaborated with each of NCAR's scientific divisions. Their specialties include remote sensing technologies, regional climate modeling, and boundary layer analysis.

In this issue...
Other issues of *Staff Notes*

UCAR
NCAR
UOP

Prepared by Jacque Marshall, jacque@ucar.edu, 303-497-8616

Middle-school innovators get a boost from NCAR

NCAR is serving as the 1996/97 Denver-Boulder area sponsor for the Bayer/NSF Award for Community Innovation. This new program challenges teams of students in sixth through eighth grades to identify issues affecting their communities and to use the scientific method to solve them. It is sponsored by Bayer Corporation, NSF, Discover magazine, and the Christopher Columbus Fellowship Foundation, an independent federal agency created in 1992 to encourage research and discovery.

"All children look for their own creative solutions to the problems around them," says Joseph Bordogna, NSF's assistant director for engineering. "This competition can foster children's innate impulse to make a better world for themselves and their communities."

Teams of four boys and girls prepare entries under the supervision of an adult coach. Each team tackles a community-based problem--social, political, economic, environmental, or technological--and proposes a creative solution that uses science and technology. The process and the proposed solution are documented in written and visual form and submitted for judging.

NCAR's sponsorship is being coordinated by Linda Carbone (Visual Communications). "Our role is to get information to the schools and students and to help them find scientific mentors and connections to community organizations," she says. Children of NCAR staff are eligible to participate, although their project coach cannot be a parent.

Team entries are due in late January 1997. Each will be judged by a national panel of experts. In May regional winners will travel to Epcot at Walt Disney World in Florida to compete in the national finals and to learn about technological innovation first hand. The grand prize winners will be awarded a $25,000 grant for their community. Savings bonds ranging from $1,000 to $5,000 in value will go to each member of the top three teams.

More details on the Bayer/NSF competition are available from Linda, ext. 8612, lcarbone@ucar.edu. •BH

In this issue...
Other issues of *Staff Notes*

UCAR
NCAR
UOP

Prepared by Jacque Marshall, jacque@ucar.edu, 303-497-8616

New Hires

(back row, left to right)
Marina Galand, postdoctoral researcher I in HAO. FL2 room 3077, ext. 1522.
Jon-Pierre Stoermer, student assistant I in CGD. ML room 314, ext. 1376.
Diane Wade, food service generalist in FSS. FL2 room 1072, ext. 8545.

(front row, left to right)
David Rogers, student assistant I in CGD. ML room 314, ext. 1376.
Gregory Fisher, student assistant I in CGD. ML room 314, ext. 1376.

(left to right)
Michael Smith, quality assurance specialist II in COMET. FL3 room 1053, ext. 8346.
Deborah McCommons, administrative assistant II in F&A. FL1 room 2050, ext. 8885.
John Adamson, maintenance mechanic in FSS. ML room 2, ext. 1135.

Other New Hires

Shelly Knight, student assistant II in RAP. FL2 room 2025, ext. 8382.
Diana Breed, casual in RAP. FL2 room 2057, ext. 8431.
Angerlyn Johnson, administrative assistant in JOSS. NOAA, 301-427-2089.
Scott Landolt, student assistant II in RAP. FL2 room 2108, ext. 8383.
Albert Pietrycha, student assistant II in RAP. FL2 room 2025, ext. 8382.

Departures

Gene Arnn, 1 November
Kevin Anderson, 25 October
Jana Davis, 22 November
Lara Ferraro, 1 November
Zhongqi Jing, 12 November
Jennifer Philion, 29 September
Jeffrey Smith, 27 November
Sidney Thurston, 25 October
Allan Walker, 15 November
Pamela Witter, 29 November
Joann Wolters, 25 October

In this issue...
Other issues of *Staff Notes*

UCAR
NCAR
UOP

Prepared by Jacque Marshall, jacque@ucar.edu, 303-497-8616