Reflections

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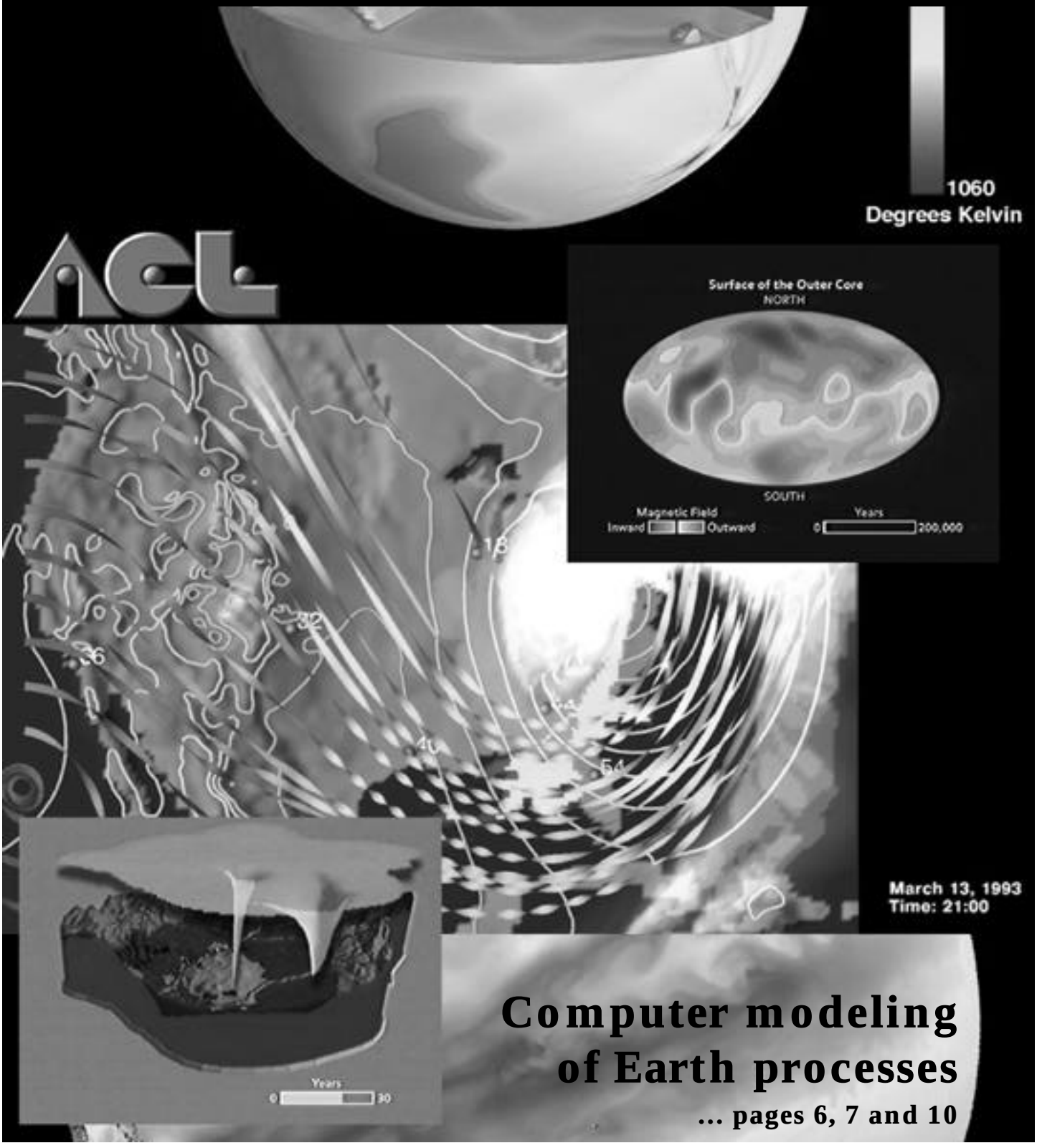

Computer modeling of Earth processes

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Cover illustration by Ed Vigil

Reflections

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editor's journal

If you can't do it safely, don't do it

"Safety First." Simply put, it means don't perform a task if you can't do it safely.

I'm sure if the Laboratory had to pick a mantra or code to live by, Safety First no doubt would be it. Safety First not only is a mandate from Lab management but a good way to help ensure our health and well being.

Consequently, I try to keep safety foremost whenever I'm on the job — whether I'm in my office or walking across the parking lot to my car. Granted, there aren't as many safety concerns associated with my work as there are with the work of some others at the Lab, but I still watch out for those things that can affect my safety and that of my coworkers. These safety concerns include frayed electrical cords and other fire hazards, items blocking exits, objects piled up precariously on shelves over desks or chairs and improperly set up workstations, the kind that inevitably lead to neck and back pain. And I especially watch out for drivers around the Lab who don't seem to know that the broken white lines across streets are pedestrian crosswalks.

The Department of Energy takes safety seriously too, and consequently, a five-step process for performing work is used throughout the DOE complex. The process is *define the scope of work, analyze hazards, develop and implement controls, perform work, ensure controls.* This five-step process is an integral part of the Lab's Integrated Safety Management (ISM) initiative, which strives to make safety a key part of all the work planning, performance and checking processes at the Lab. ISM also strives to make the Lab a productive and injury-free workplace.

It all sounds so simple and sensible. Yet, if everyone at the Lab truly had bought into the principles of ISM, we'd have zero safety incidents, which has not occurred yet. So, the effort continues to make safety the No. 1 priority for all who work at the Lab. In fact, safety is being pushed as a priority across the country this month, be it at work, school or home. National Safety Days runs from June 21 through 25. The Lab, which is calling its observance "Safety for Life: Safety Days '99," will sponsor a number of events to heighten safety awareness during this period. Planned events include a talk June 22 by motivational speaker Mike Marchev, an ergonomics buffet [sounds interesting] June 23 and a Community Safety Days Festival in the town site June 24. The winners of a Safety Poster Contest will be announced during the Community Safety Days event. The contest, sponsored by the Lab, Johnson Controls Northern New Mexico, Protection Technology Los Alamos and the University of California, was open to Northern New Mexico students; first-place winners will receive $100 gift certificates.

For more information on the Lab's Safety Days events or on Integrated Safety Management, see the web site at http://www.lanl.gov/orgs/ism/.

Repairin' the Riparian

by David Lyons

Nothing like springtime to inspire outdoor projects. Most people busy themselves cleaning out gutters, pruning trees or planning a garden, but not one small group of Lab employees and students from Santa Fe Community College. They devoted an entire day recently to restoring an at-risk riparian habitat found on Lab property — planting more than 250 plants in an arroyo and wetland area. Sound like an odd spot for a garden? Well, it probably does unless you happen to be part of Water Quality and Hydrology (ESH-18) or Ecology (ESH-20) — two groups that spend much of their time determining ways that they can improve the natural environment throughout the Lab.

Otowi Well No. 1

The reason for all this planting is a single water well that was placed in service in 1997, Otowi Well No. 1. The well is located at the base of the north side of the Main Hill Road (near the old "Y") and is "connected" to a wetland at the foot of Pueblo Canyon by an arroyo.

The well, which reaches down almost 2,500 feet to tap into the main aquifer, runs intermittently, supplying drinking water to Los Alamos County. Each time the pump pressurizes, it discharges water for a couple of minutes, streaming out of a 6-inch diameter pipe at more than 1,000 gallons per minute. The water then rushes down through the arroyo, causing erosion as it gathers sediment, which is ultimately deposited into the Pueblo Canyon wetlands.

Looking for solutions

Basically, two problems existed. The arroyo was eroding, and the sediment buildup in the wetlands was harming the existing vegetation — which, as Neil Williams of ESH-18 explained, is critical to the health of the wetland. "Wetlands are critical for a number of reasons," explained Williams. "They are home to a rich family of flora and fauna, often including endangered species, and the plants found in wetlands also serve as natural filtration systems, pulling out harmful contaminants."

Williams explained, "Part one of the solution was completed two years ago when we built a series of six rock check dams in the arroyo, which significantly slowed the flow of discharge water coming from the well and stopped the channel erosion." Williams noted that the sediment would stay behind, while the water now trickled much more slowly through the network of rocks.

To complete the project, though, and make the area into a naturally sustainable system, native plants needed to be reintroduced. With this in mind, Williams began talking with his colleagues in ESH-20, namely David Keller and Kathy Bennett. Working together, the group selected shrub and tree species for planting throughout the system, both in the arroyo and in the wetlands. The idea was that the plants would further discourage erosion and restore the wetland flora and wildlife habitat.

Bennett noted, "We had to think through what types of plants would match each area. In the dryer arroyo, we chose plants that can survive in arid conditions, such as New Mexico locust shrubs, Apache plume and skunk bush sumac." Added Keller, "The wetlands will support leafier plants, such as willows and cottonwoods." Cottonwood poles were chosen that had been cultivated at the Natural Resource Conservation Service's Plant Material Center in Los Lunas, and other plants were obtained through the New Mexico Forestry Seedling Program.

Planting

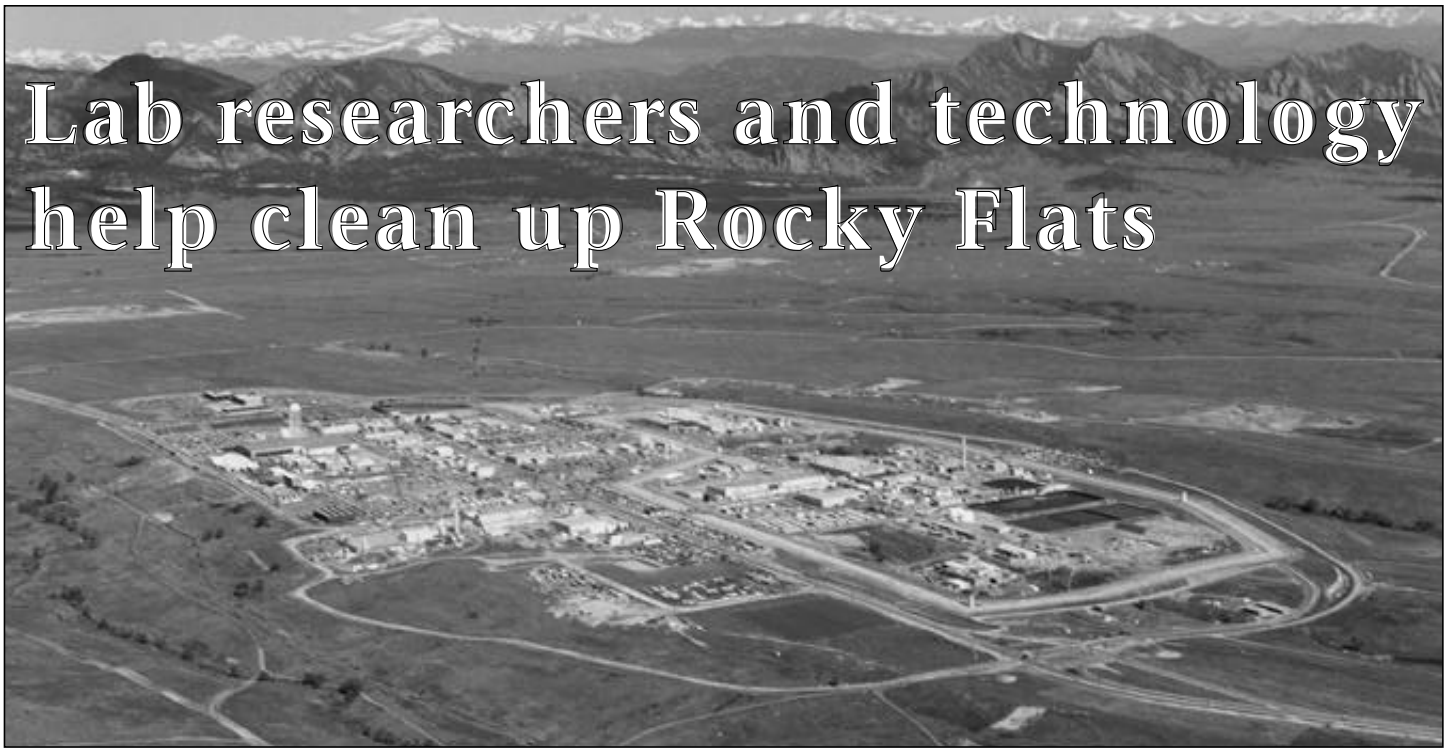
Deciding how to tackle the actual planting was made easier, thanks to the good connections of ESH-18 Graduate Research Assistant Penny Gomez. Her mother, Mary Ann Walz, teaches a riparian restoration class at SFCC. Walz and one of her SFCC colleagues, Mary Ann McGraw, helped select appropriate species and obtain the plant materials. Twelve students from the class joined the mass planting effort. On the designated planting day, after discussing project background and Lab safety issues, the students and employees fanned out throughout the arroyo and the wetlands and started planting.

Penny Gomez, a graduate research assistant in Water Quality and Hydrology (ESH-18), plants Apache plume seedlings in an arroyo as part of a project to restore a riparian area at the Lab. *Photo by Mary Ann Walz, Santa Fe Community College*

The day was definitely tiring, according to Williams, but it was great to see the project complete and to have worked together with the students. Walz added, "The students felt good about being able to help, and everyone learned a lot."

Ultimately, though, Williams and Keller noted, this is only one project among many that they would like to tackle. So, if you see a bunch of people planting trees on Lab property, you'll know they're not amateur gardeners; they're probably riparian repairers.

Lab researchers and technology help clean up Rocky Flats



Laboratory researchers and technological innovations are playing a key role in the cleanup of Rocky Flats, located near the Rocky Mountain foothills between Boulder and Golden, Colo. The developed portion of Rocky Flats, shown in this view looking northwest, occupies about 400 acres in the middle of the site. *Photo by CIC-9*

by Ternel N. Martinez

For nearly 40 years, the Rocky Flats Nuclear Weapons Plant was the main U.S. site for manufacturing plutonium pits — the heart of nuclear weapons — and other weapon components for the nation's nuclear stockpile. With its defense mission long since past, the entire site currently is undergoing decontamination and decommissioning.

Laboratory researchers also are playing a vital role in the massive cleanup effort, which is headed by Kaiser Hill, LLC, of Denver. Specifically, the researchers are helping Kaiser Hill identify and solve urgent, unanticipated technical problems encountered during the cleanup work.

The task of cleaning up the Department of Energy-owned site is a daunting, technologically challenging one to say the least. Located about 15 miles from downtown Denver, what is now known as the Rocky Flats Environmental Technology Site has more than 100 buildings spread out over more than 6,500 acres. About 170 contaminated areas have been identified.

Moreover, Rocky Flats' current inventory includes 50,000 containers of transuranic and low-level radioactive waste — destined for the recently opened Waste Isolation Pilot Plant in Carlsbad, N.M., the Nevada Test Site Waste Repository or the Envirotech Waste Repository in Utah — and about 14 tons of plutonium, more than any other DOE manufacturing facility.

The goal is to raze all buildings and clean up the site to where it can be used for residential or other industrial purposes, if desired. Thus all existing wastes and residues must be disposed of properly, meaning the waste must be stabilized, possibly repackaged and certified for acceptance at the appropriate disposal sites.

Kaiser-Hill also is aiming at a new closure date of 2006, four years earlier than the original 10-year plan baseline date. If successful, this will save a substantial amount of money from the original plan's baseline cost, estimated at $7 billion.

Various types of nondestructive assay, or NDA, technologies are used to examine drums and containers and their contents to ensure that they meet safeguards requirements and repository acceptance criteria. Insufficient NDA capability or capacity delays cleanup activities and increases costs.

A joint Laboratory/Rocky Flats team was formed to provide the technical support necessary to successfully meet the NDA challenges at Rocky Flats. It is through this mechanism that the Lab is providing technical expertise and designing, fabricating and deploying several world-class NDA systems.

One Laboratory technology currently being used at Rocky Flats is the mobile Tomographic Gamma Scanner, a 4-foot by 6-foot device that performs gamma-ray tomographic scans of waste containers. Developed

originally to assay waste in 2-foot by 1-foot boxes, 30- and 55-gallon drums and 83-gallon overpacks, the versatile TGS provides quick assays of low, medium and high-density waste in both cans and drums. This mobile system can be taken directly to the waste drum storage location, which significantly reduces the transportation costs associated with transporting waste to an assay facility for characterization.

Initial TGS results show that radioactive material is located in the bottom portion of many drums. If this holds true, the unit may provide a database of information that could help minimize waste in the future.

The TGS outperformed 15 other NDA systems for superior assaying capability during a DOE-sponsored performance demonstration program. Indeed, Los Alamos technology has passed every one of the demonstration program test cycles to date and usually are the best performers of all equipment tested.

The Laboratory also built a skid-mounted TGS — an improved version of an earlier TGS system — that is being used at the glove-box line at Rocky Flats. Of particular note is that Lab researchers designed, tested and deployed this world-class system in only six months, half the time it normally takes for such an endeavor.

Also under construction at the Laboratory is the Standard Waste Box Counter (also known as the super High-efficiency Neutron Counter, or superHENC), a device that analyzes the amount and arrival times of neutrons from fissioning nuclear materials. This trailer-mounted NDA system is designed to measure transuranic waste and low-level waste packages in standard waste boxes. The SWB Counter is scheduled for delivery to Rocky Flats next February.

Another Laboratory technology being used in support of all assay systems is the Fixed-energy Response Analysis of Multiple energies, or FRAM, isotopic system. This technology determines the ratio of plutonium and other isotopes to total plutonium, which is necessary to accurately compute the total nuclear material in any given sample.

The Laboratory also is helping Rocky Flats upgrade its calorimeters and improve assay speeds. Calorimeters are devices used for measuring the heat developed from the nuclear decay of isotopes in waste and residue samples. A calorimeter is the most precise NDA instrument available, but the existing Rocky Flats calorimeters may take up to 27 hours for a single measurement. When complete, the upgraded calorimeters are expected to make the same measurement in about eight hours or less.

The Laboratory first established an office at Rocky Flats in 1989 to provide defense-related technical support to the site as part of the Laboratory's Nuclear Materials and Stockpile Management (NMSM) Program. The office now is part of Environmental Management (EM) Programs and is headed by Duane Catlett of EM.

The office collaborates with Safeguards Science and Technology (NIS-5) and Environmental Science and Waste Technology (CST-7) to provide technical support to Kaiser Hill. NIS-5 is providing the various NDA technologies, while CST-7 tests and certifies those technologies before they are shipped to the site. Laboratory researchers also make sure the systems operate as designed at Rocky Flats. Approximately 50 Laboratory staff members are involved in the Accelerating Cleanup Plan.

Tom Prettyman of Safeguards Science and Technology (NIS-5), chief scientist and project leader for the Lab's Tomographic Gamma Scanner project in support of clean-up efforts at Rocky Flats, makes an equipment adjustment on a skid-mounted TGS. The 30-gallon drum in the center of the device shows where a sample would be placed to be assayed by the equipment. *Photo by LeRoy N. Sanchez*

Computer modeling of Earth processes: Explaining, exploring

Lab collaborates with American Museum of Natural History on exhibits in the museum's new earth sciences facility

by John A. Webster

The map is similar to those in the weather reports on the evening news — most of North America is green, the Rocky and Sierra Madre Occidental mountain ranges appear as brownish and white humps, and the Atlantic Ocean, Gulf of Mexico and Great Lakes are deep blue.

Within a few seconds, however, thin, windblown ribbons of blue, green, yellow and red begin flowing and twisting across the continent. Long, looped white lines snake and swirl over the landscape. White pillows edged with pale blue emerge over east Texas and the Gulf of Mexico, then spin swiftly toward New England. As they surge northeastward, they reveal fast-moving patches of bright purple, orange, red and green beneath them.

This "weather map" is actually a detailed computer model of the so-called storm of the century, which swept across the eastern United States in March 1993. The storm generated blizzards from Alabama to Maine, isolated thousands of people with record snowfalls, closed every major airport on the East Coast, knocked homes into the sea on Long Island, and fostered some 15 tornadoes and a 12-foot storm surge in Florida. It was blamed for nearly 300 deaths.

The Laboratory computer simulation showing the storm as it churned across the eastern United States for three and a half days will be used as part of a computer and video exhibit in the new Hall of Planet Earth at the American Museum of Natural History in New York City. The Lab is contributing its expertise in earth and space sciences, along with scientific visualizations, to five video exhibits in the new hall. In addition to atmospheric dynamics, dramatically illustrated by the big storm, the Lab collaborated on exhibits about subsurface water flow, ocean dynamics, Earth's magnetic field and convection in Earth's mantle.

The videos, which run for several minutes apiece, show animations of the physical processes the scientists are working to understand, interviews with Laboratory researchers and the visualizations of their computer simulations. The computational "number-crunching" required to handle the vast amounts of data that go into the models is illustrated by equations and programming code that scroll up the screen while the narrator describes the extent of the calculations being performed by the models.

> ***'[This] is about how the Earth works.'***

The museum and Laboratory began working on the projects about two years ago to be ready for this spring's opening of the Hall of Planet Earth.

"The hall is about how the Earth works," said Ed Mathez, chair of the museum's Department of Earth and Planetary Sciences. "It's a new kind of hall for us in that it really focuses on process. More traditional exhibitions have been about the history of Earth. We don't discourage the historical view, but we want to explain the processes that shape the Earth."

The hall is the first of three components to open at the new Rose Center for Earth and Space at the New York museum. Next year, the Hayden Planetarium, contained in a huge sphere that is the centerpiece of the center, and the Hall of the Universe will open. The museum is the largest natural history museum in the world and hosts about 4 million visitors a year.

Chick Keller, director of the Institute of Geophysics and Planetary Physics (EES-IGPP) at Los Alamos and coordinator of the Laboratory's involvement in the project, views the collaboration as an exciting opportunity for scientists to communicate with the general public.

"This is one piece of a larger effort by the Laboratory to communicate science to nonscientists," Keller said. "One thing that's hard to communicate is the result of these enormous computer runs in focused, meaningful ways. We don't necessarily do it very well at the Lab, but the museum staff excels at it. So this collaboration has become an excellent way to tell the public quickly what scientists are doing, how they're doing it and what results they're seeing."

The model simulation of the storm of the century was developed by Jim Bossert and Judy Winterkamp, both of Atmospheric and Climate Sciences (EES-8). The ribbons represent wind speed and direction, the white lines show surface air pressure, the pillows are clouds, and the colored patches indicate location and type of precipitation.

"We're working to help people understand the importance of atmospheric modeling and how we do it," Bossert said. "It's important to stimulate people to take an interest in and enjoy science. This has been a real collaborative effort with the museum. It's been exciting for me to see how much the museum staff added in terms of explaining scientific concepts."

The ocean dynamics exhibit is based on simulations by Mathew Maltrud of Fluid Dynamics (T-3) using a computer model of the oceans developed by Richard Smith and John Dukowicz, both of T-3, and Bob Malone of the Advanced Computing Laboratory (CIC-ACL). The model incorporates influences that affect ocean circulation, such as Earth's rotation, the presence of land masses, the topography of the ocean bottom, sunlight, wind, precipitation and evaporation, and the visualization shows the ocean circulation in different areas around the globe, including the El Niño phenomenon and the Agulhas eddies that swirl from east to west across the South Atlantic.

"The ocean transports heat from the equator to the poles, but the flow is constrained by the continents and impacted by other factors, so the patterns are quite different from atmospheric circulation," said Maltrud. "We hope the exhibit will show people how the ocean works."

The model on subsurface water flow in the Española Basin was developed by Bruce Robinson and Elizabeth Keating of Geoanalysis (EES-5), and the model on mantle convection in the Earth was developed by Peter Bunge, a former postdoctoral student in the IGPP who is now an assistant professor at Princeton University.

Gary Glatzmaier, a professor of earth sciences at the University of California-Santa Cruz who was a staff member with the IGPP at Los Alamos while the museum exhibits were being developed, worked with the museum staff on the exhibit showing the geodynamo, the mechanism that generates and maintains Earth's magnetic field.

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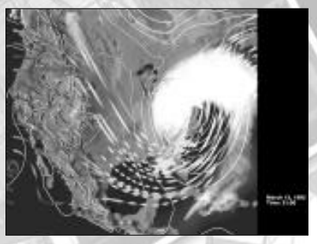
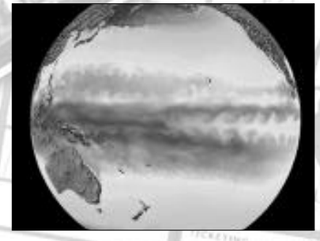




These images, which are included in the montage on the cover of this issue, are taken from sophisticated computer visualizations showing major processes that have shaped the Earth. They are included in the video exhibits on which the Laboratory collaborated with the American Museum of Natural History in New York City.

The top image is part of a computer simulation showing convection patterns in the Earth's mantle.

The middle image illustrates the dynamics of atmospheric circulation by simulating the so-called storm of the century.

The lower image shows ocean circulation patterns related to the El Niño phenomenon in the western Pacific Ocean.

Martinez named group leader for ESA-WE


Joseph Martinez

Joseph Martinez is the new group leader of Weapons Engineering (ESA-WE).

"Joe brings to this job strong weapons experience, excellent communication skills and successful demonstration during his tenure as acting group leader of his ability to lead the group," said Earle Marie Hanson, Engineering Sciences and Application (ESA) Division director.

"I am very honored to have been selected for this very important job," said Martinez. "There has been a strong tradition of leadership in this group, and I will do everything within my ability to maintain this tradition."

Martinez joined the Laboratory in 1984 and was a staff member in the former Weapons Engineering (WX) Division (now ESA Division).

ESA-WE provides the United States with leadership in weapons engineering and stockpile stewardship. There are about 120 fulltime and 30 part-time employees in ESA-WE.

Martinez has worked in a variety of areas including managing the Laboratory's Nuclear Explosive Safety Program. He also did assembly engineering having been responsible for the assembly of numerous hydro shots and more than 20 Nevada Test Site devices.

Martinez also assisted the Nuclear Weapons (NWT) Program Office with the management of the Surety Technology Program. He served on a change of station in Washington, D.C., in 1997.

Martinez was named deputy group leader in ESA-WE in February 1998; last August he became acting group leader.

"We believe that Joe is very well qualified to lead ESA-WE into the 21st century," said Hanson.

Martinez, an Española Valley native, graduated from Española Valley High in 1977 and received his bachelor's and master's degrees in mechanical engineering from the University of New Mexico in 1981 and 1992, respectively.

Harris receives Governor's Award


Betty Harris

Lab chemist **Betty Harris** of CMR/ Analytical Chemistry (NMT-1) was selected to receive a 1999 Governor's Award for Outstanding New Mexico Women.

Harris was one of 30 New Mexico women honored in the 14th annual competition, sponsored by the New Mexico Commission on the Status of Women and the Governor's Office.

"I received notification in the mail that I had been nominated, and oh, it was a wonderful surprise that made me smile," said Harris. "Then when I found out that I had been selected, that really elevated my adrenaline.

"It is so exciting and at the same very humbling to realize that other people appreciate who you are and what you do in life," said Harris. "I sincerely appreciate this award, and the person or people who nominated me."

The Commission on the Status of Women annually honors women from around the state who are actively involved in their communities, are leaders in their profession and have worked to implement positive change in their community.

Of the 30 women recognized annually, two are selected for induction to the New Mexico Women's Hall of Fame in September.

A chemist by profession, Harris is currently assigned to the Laboratory's Diversity (DV) Office, where she is working on a program to make better use of résumés the Human Resources (HR) Division receives from underrepresented groups. She also is working on a project that will help prepare members of underrepresented groups for positions in upper management.

Harris serves on the African American Diversity Working Group, one of six employee working groups at the Lab. She also is actively involved in science education outreach programs in Northern New Mexico, acts as a mentor to college students working summers at the Lab and recently worked with Girl Scouts to develop a chemistry badge similar to the chemistry merit badge of Boy Scouts.

She has served as president of the New Mexico Business and Professional Women's organization and holds membership in a number of professional associations, including the American Chemical Society.

In 1996, Harris was one of eight women profiled in a "Women in Science" compact disc for computers produced for the National Science Foundation. She was selected for inclusion in the CD-ROM after a nationwide search.

Harris has bachelor's, master's and doctoral degrees in chemistry from Southern University in Baton Rouge, La., Atlanta University and the University of New Mexico, respectively.

In Memoriam

Richard J. Watts

Laboratory retiree Richard J. "Dick" Watts died Feb. 27. He was 86. Watts received a master's degree in physics from Ohio State University. In 1942 he joined the Manhattan Project in Chicago, building the ionization chambers and amplifiers used to measure and control the first atomic pile. In 1943 Watts moved with the project to the Laboratory as a staff member responsible for developing radiological monitoring instruments. He observed the first atomic explosion at Trinity Site in July 1945 and monitored the resulting radiation levels and fallout. Watts retired in 1965 to start his own electronics business. In 1994, he was awarded an honorary doctorate of science degree by the University of Denver for his contributions to the fields of electronics and nuclear physics.

May employee service anniversaries

30 years
Charles Foxx, NMT-7
Michael Kelly, NIS-9

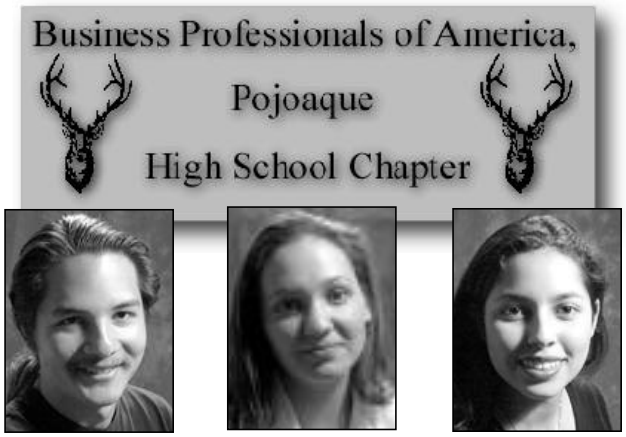
25 years
James Albright, EES-4
Jeremiah Brackbill, T-3
William Clements, EES-8
Robert Garcia, ESA-DE
Cyrus Hoffman, P-23
Gerald Langner, ESH-5
Elizabeth Lucero, BUS-1
Labriano Lucero, CIC-9
Guthrie Miller, ESH-12
Gloria Mirabal, TSA-10
Russell Pack, T-12
Michael Sorem, P-24
Jon Wilson, CIC-5

20 years
Juergen Eckert, LANSCE-12
Michael Gallegos, NMT-7
Virginia Herrera, NIS-4
Andrew Maestas, ESH-1
Teresita Martinez, BUS-7
Yvonne Montoya, BUS-6
Myrna Romero, CST-7
Johnny Roybal, CIC-10
Vernon Sandberg, P-25
John Ullmann, LANSCE-3
Laurie Walker, NMT-1
Peter Ward, BUS-2
Douglas Wilson, X-TA

15 years
Darrell Allison, ESH-OIO
Nancy Arendt, BUS-4
Donald Branch, BUS-2
Richard Bridge, PM-2
Melynda Brooks, P-25
Rendell Carver, DX-3
John Cerutti, X-CM
Gregory Cole, EES-1
Denise Dalmas, LS-DO
Christie Davis, CIC-DO
David Dubois, CIC-5
S.W. Eisenhawer, TSA-11
W.S. Johnson Jr., NIS-6
Richard Kieltyka, ESA-WE
Diana Langner, NIS-5
Dennis Lujan, NMT-5
Roger Meade, CIC-10
Randy Michelsen, TSA-5
Debbie Montoya, ESA-DE
Henry Nunes, EM-DD
David Phillips, MST-6
Robin Reynolds, ESH-18
Phillip Romero, CIC-12
Lourdes Salazar, HR-3
Fred Shelley Jr., LANSCE-6
Robert Tomlinson, CIC-8
Elizabeth Trujillo, BUS-4
Irene Vigil, CIC-9
Martha Waters, CRO

10 years
James Archuleta, CIC-4
Debra Baca, ESH-5
Elizabeth Barnett, CIC-1
Kathryn Bennett, ESH-20
Portia Blackman, HR-7
Robert Cox, ESH-1
Scott Currie, ESA-EPE
Robert Currier, CST-6
Phillip Ferguson, LANSCE-12
Gordon Foreman, CIC-2
Darryl Gardner, ESA-WE
Yolanda Giles, CST-9
Victoria Graham, BUS-2
Joe Gutierrez, AA-2
Gary Holladay, LANSCE-6
Vivienne Hriscu, CIC-1
Louis Jaramillo, ESH-1
Michael Keddy, ESA-TSE
Aaron Lopez, ESA-EPE
Emmanuel Lopez, DX-3
Stuart Maloy, APT-TPO
Ralph Martinez, BUS-4
Jacqueline Paris-Chitanvis, PA
Margaret Parker, CIC-1
Christopher Pearcy, CIC-1
William Roybal, LANSCE-5
Robert Travis, BUS-4
Susan Vidrine, BUS-8

5 years
Jay Armstrong, S-4
Alison Bailey, EM-PPC
Richard Barrett, X-CI
John Court, X-CI
Eric Dick, S-6
Benjamin Garcia, ESA-WE
Peter Jaegers, NIS-6
Julie Johnston, ESH-20
Marymargaret Lujan, MST-OPS
Brian MacDonald, CST-4
Michael McKay, X-CI
Christine Nelson, DX-DO
Stephen Nielson, TSA-7
James Owen, ESA-WE
Anthony Rendon, CIC-1
James Rickman, PA
Ronald Smith, ESA-EPE
James Stapleton, ESH-5
Matthew Stettler, LANSCE-8
Susan Stewart, NMT-10
Timothy Tuttle, BUS-DO
Chanda Vigil, NIS-DO
David Wannigman, ESH-1
Roger Wishau, ESH-12



Augustine Ortiz | *Elizabeth Rivera-Dirks* | *Theresa Montoya*

Students design winning web site

Four Pojoaque High School students, three of whom work in student programs at the Laboratory, finished third of 30 teams entered in a national web page design competition.

The students earned the chance to enter the national competition, which was held in Philadelphia in late April, by finishing second in the New Mexico event. They each received a medal for finishing third, and their school will receive a plaque.

Augustine Ortiz of Nuclear Materials Information Management (NMT-3), **Elizabeth Rivera-Dirks** of Health Physics Measurements (ESH-14) and **Theresa Montoya** of Energy and Process Engineering (ESA-EPE) were joined by schoolmate Derek Fisher in creating a web page for the competition sponsored by Business Professionals of America.

The students said their goal was to create a page for students and community members to obtain information about finding jobs; culture, education and activities in the Pojoaque Valley; and Businesses Professionals. They also wanted to maintain a record of Pojoaque High School activities and encourage student involvement in school activities.

They created their web page from scratch, rather than using a commercially available programs and templates; designed the graphics; and wrote the programming code. Their web site address is http://wapiti.pvs.k12.nm.us/~bpa/.

Computer modeling of Earth processes ...

continued from Page 7

"It was a pleasure to work on this project," Glatzmaier said. "Computer simulations are becoming more and more relevant because they are getting so sophisticated and realistic ... that you can extrapolate into the future and explore the unknown. With the core of Earth, so little can be observed that the models are really being used to try to understand what's actually there.

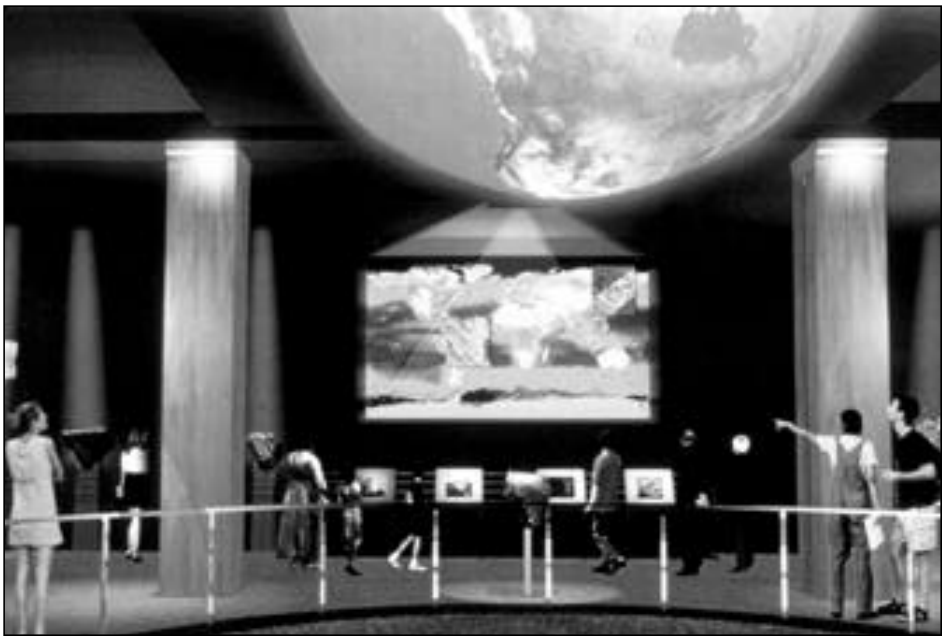
"Since so little of Earth's core can be measured or remotely observed, computer simulations are used to try to reveal and understand its structure and dynamics. We develop a model based on the fundamental laws of physics using Earth's dimensions, materials properties, rotation rate and cooling rate, then run it to see what happens. When the simulation produces magnetic fields at the surface of the model Earth that are similar to what is observed, then the simulated motions in the fluid core, which generate the fields, are likely also realistic. That's how we learn what's happening down there."

The use of computer models as learning tools is an important element of the museum exhibits. "A theme of this project is to help people understand how you can use computer models to understand phenomena that are outside human experience," said Malone. "Each exhibit explains the phenomenon, then shows how we use computer modeling to bring those phenomena from long time scales (200,000 years for the geodynamo model) down to something we can work with."

"These models are so detailed that ... they allow you to go where you can't go," said Keller. "You can actually explore with these kinds of things."

A key connection between the museum and Lab staffs was the ACL's visualization team, including Pat McCormick, Jamie Painter and Allen McPherson, who produced most of the "computer movies" for the project.

"Our job on this project was to help people, whether scientists or the public, understand the results of these big computer simulations, and the visualizations help people understand what's going on," said McCormick, who worked on the visualization for the storm-of-the-century.



Suspended from the ceiling, the 8-foot Dynamic Earth Globe in the Hall of Planet Earth at the American Museum of Natural History in New York City provides visitors with a spectacular view of Earth from outer space. As the globe rotates, clouds and oceans slowly disappear to reveal the planet's topography. *Illustration courtesy of the American Museum of Natural History*

"My goal was to portray the storm so it was close to what people see on television, while still giving the scientists the information they need to know to see if their simulation is accurate," he said. "The museum people asked lots of questions about what they were seeing, and I think the results of the collaboration look really good."

The Laboratory's contribution to the new hall at the museum has been important, said Mathez.

"We're doing something that I don't think has ever been done in a natural history museum before, and that's trying to explain the nature of computer modeling and its bearing on modern science," he said. "The kind of numerical modeling that Los Alamos is explaining has become a very important approach to explaining science in just the past few years.

"It has become so sophisticated that it's possible to test the assumptions of a model and thereby provide insight into how these processes are actually working. They're no longer gross generalizations that are untestable."

The collaboration has also been a good one for the Laboratory.

"It's very good for the Lab to have such a major forum to show people the range of the kinds of research we do here, both basic and applied," said Malone. "It's been very positive that the Laboratory's capabilities in modeling are featured in the new hall."

The new hall includes a suspended 8-foot hemisphere with an internal projection system that shows how Earth looks from space, complete with cloud and ocean formation. Other exhibits include sulfide chimneys, called "black smokers," from the ocean floor, an ice core containing a climate record dating back 115,000 years and an "Earth Event Wall" displaying events such as earthquakes, volcanic eruptions and major storms as they occur.

Numerous video stations, including those in which the Laboratory collaborated, are placed throughout the 8,830-square-foot facility. Plans call for the videos to be used in educational programs for secondary school students and for the exhibits involving the Laboratory to be shown in the Bradbury Science Museum.

This month in history

June

1752 — Benjamin Franklin flies a kite in a thunderstorm, demonstrating that lightning is electricity

1846 — The Smithsonian Institute, endowed by English scientist James Smithson, is established by Congress

1914 — Archduke Ferdinand of Serbia and his wife are assassinated at Sarajevo, setting the stage for World War I

1942 — J. Robert Oppenheimer convenes at UC Berkeley a study group, which reviews theories of fission reactions and concludes that a fission bomb is feasible

1947 — The first reported sighting of flying saucers is made near Mount Rainier in Washington State by Kenneth Arnold of Boise, Idaho

1950 — The United States sends 35 military advisers to South Vietnam and agrees to provide military and economic aid

1951 — The keel is laid for the USS Nautilus, the first nuclear-powered submarine

1973 — John Dean tells the Senate Watergate Committee about President Nixon's "enemies list"

1979 — Presidents Carter and Brezhnev sign the SALT II Treaty limiting offensive nuclear weapons and heavy bombers, but Carter later withdraws support after the Soviet invasion of Afghanistan

1988 — The Lab hosts a conference on "The Future of Nuclear Weapons: The Next Three Decades," attracting 150 participants from across the country

1996 — Laboratory researchers Don Petit and John Phillips are accepted into astronaut training

1998 — Federico Peña steps down as Energy Secretary

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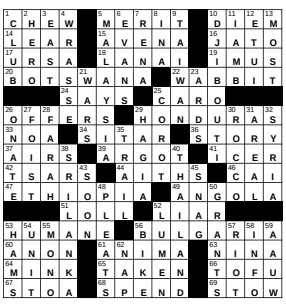
May solution



spotlight

Student stars on the court and in class

by John A. Webster

Crestina Vigil found her role model early in her basketball career — a career during which she helped Pojoaque High School become one of the top teams in New Mexico.

Vigil, an undergraduate student in Analytical Chemistry (NMT-1), said she first noticed Damon Stoudamire, presently the point guard for the Portland Trailblazers of the National Basketball Association, when he played at the University of Arizona.

"I was in seventh grade when he caught my attention because of his size (5 foot 10 inches, very short by NBA standards) and his ability to create," she said. "I'm not very tall, and my role has never been scoring. It's been getting the ball to others so they could score."

Vigil has done an outstanding job of "getting the ball to others" during the five years she played point guard for Pojoaque. She was third in the state last season with 6.1 assists per game.

She wrote Stoudamire a fan letter in seventh grade. He replied, and the two have maintained an intermittent correspondence since. "I've never met him," she said, "but I would sure like to see him play."

Basketball is important to Vigil, but she also has been involved in lots of other activities, including cross-country track, mentoring younger basketball players and helping raise funds for charity through her church and the National Honor Society.

She also maintained a perfect "A" at school, ranking second in her class. Her academic achievements, which have been recognized by the Nuclear Materials Technology (NMT) Division and Laboratory management, led to her receiving a University of New Mexico Presidential Scholarship, which is awarded to New Mexico high school students with superior grades and outstanding leadership skills and community service experience. She has not yet decided on a major field of study.

In her sophomore and junior years, Vigil participated in a student competition sponsored by Business Professionals of America, finishing first in the state in computerized accounting (as an individual) and financial analysis (as part of a team) and qualifying for the national competitions.

It was her computerized accounting skills that led to her employment at the Lab, said Maryrose Montalvo, the group administrator for Analytical Chemistry (NMT-1) and Vigil's supervisor.

"I was working in Audits and Assessments (AA-3) at the time, and we needed spreadsheet support. Crestina's résumé came in at the top of the list," Montalvo said. "Then, at about that time, I was selected for the new job (in NMT-1), and when I saw there was little administrative support, I asked for Crestina and we joined the group together."

Crestina Vigil, on the floor, a student employee in Analytical Chemistry (NMT-1) and recent graduate of Pojoaque High School, dives for the ball in a district game against St. Michael's High School last year. Pojoaque won the game, 65-42, and went on to win the state championship that year. *Photo by Julie Graber/Santa Fe New Mexican.*

Vigil has her name engraved on six state sports trophies in basketball and cross-country track — one for first place, two for second and three for third. *Photo courtesy of Vigil*

Vigil started working in NMT-1 in June of 1998 as a high school cooperative student assigned to the Office Administration Team, which provides administrative support to group management and staff. She also has helped retrieve and input data in the Sample Management Section and participated in various projects coordinated by NMT's Diversity Group.

"I like working here. I like supporting the people in the group," she said. "I hadn't had much experience with science, but here you can really see how it applies to lots of things. It really is interesting."

Montalvo said Vigil is a fast learner who brings a positive attitude to the workplace. "When she was playing in the (basketball) championships, everyone in the group was very supportive," Montalvo said. "Her co-workers filled her workspace with bright orange basketballs, and people always crowded around to read the newspaper stories about how the team did."

The Pojoaque Elkettes have been a major success on the basketball court, winning seven straight district titles. The team finished second in the state tournament in Vigil's freshman and sophomore years, won the state title in her junior year and finished third this past year.

"I like the competition," Vigil says about playing basketball. "Plus, it's an important way to learn how to cooperate with others. No matter what your differences, when you're on the court, you're one team and you have to play like it.

"It's also helped me learn that I have to push myself a lot. You can't just show up and expect to win. The more you work, the more successful you'll be."

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