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For the people of NCAR, UCAR, and UOP Vol.43 #5 • May 2008

A close look at one geoengineering scheme

Researchers find that plan to artificially cool Earth could damage ozone layer

As society grapples with how to address climate change, some scientists have turned their attention toward a bold, direct route for cooling Earth: geoengineering.

Geoengineering is a broad term for rearranging Earth's environment on a large scale to suit human needs and enhance habitability. For climate, this includes futuristic-sounding schemes to launch mirrors into orbit to shield the planet from the Sun, as well as more down-to-Earth plans such as reforesting the globe on a massive scale to absorb carbon dioxide. Some scientists and policymakers believe that such plans could function as an insurance policy for society if efforts to reduce fossil fuel consumption are not sufficient to slow climate change. [More>](#)



(Photo courtesy U.S. Geological Survey/Cascades Volcano Observatory.)



Clouds and rainbow from a recent road trip to New Mexico (Photo by Carlye Calvin.)



Spring Fling '08

Staff converged at Center Green on May 2 for the annual Spring Fling celebration, which featured a return to the classic lip-sync competition of years past. [More >](#)



Talks and treats for National Library Week

It's never easy to eat your words—unless they literally taste good. The NCAR Library celebrated National Library Week in mid-April with book presentations, readings, and an edible book festival. [More >](#)



People, planet, and productivity: Sustainable UCAR

UCAR/NCAR's new sustainability coordinator, Kimberly Kosmenko, started work in March as part of SaSS. She holds a master's degree in environmental science and policy from CU-Boulder and has experience in land conservation and environmental nonprofit work. [More >](#)



Multimedia Services helps staff collaborate across time and space

Conferencing technologies provide alternatives to travel. [More >](#)

"The Stories Clouds Tell" gets a facelift



"However you choose to watch the sky, you'll encounter fascinating stories being told by the clouds overhead," writes Peggy LeMone (ESSL/MMM) in the newly updated version of "The Stories Clouds Tell," her guide to cloud study originally published in 1993. [More >](#)



Warren M. Washington Digital Collection

In one of the first efforts of its kind, the NCAR Library has launched the preliminary version of the Warren M. Washington Digital Collection, an online resource chronicling the career of Warren Washington (ESSL/CGD). [More >](#)

Delphi questions

Reclassifications, hiring freeze. [More >](#)



Just One Look



Peter Thornton (ESSL/CGD), left, and Craig Hartsough (ESSL/ACD) perform Abbott and Costello's "Who's on First?" during Spring Fling. Held on May 2, the annual all-staff party sponsored by the Employee Activities Committee featured lip syncs, food, music, and other fun.

[More coverage of Spring Fling](#)



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Geoengineering is a broad term for rearranging Earth's environment on a large scale to suit human needs and enhance habitability. For climate, this includes futuristic-sounding schemes to launch mirrors into orbit to shield the planet from the Sun, as well as more

Injecting sulfates into the atmosphere mimics a major volcanic eruption. When an eruption has enough force to send fine-grained particles into the stratosphere, such particles can linger for several years and shield enough sunlight to lower global temperatures measurably. The 1991 eruption of Mount Pinatubo in the Philippines (shown here) blocked sunlight and cooled global climate for more than a year. *(Photo courtesy U.S. Geological Survey/Cascades Volcano Observatory.)*



down-to-Earth plans such as reforesting the globe on a massive scale to absorb carbon dioxide. Some scientists and policymakers believe that such plans could function as an insurance policy for society if efforts to reduce fossil fuel consumption are not sufficient to slow climate change.

One geoengineering proposal that has received considerable attention is to regularly inject sulfate particles into the stratosphere to block sunlight. The goal would be to cool Earth's surface much as sulfur particles from major volcanic eruptions have cooled temperatures in the past.

According to new research by Simone Tilmes (ESSL/ACD and ASP), however, such injections could have a drastic impact on Earth's protective ozone layer. In a study published in *Science Express* in April, Simone and colleagues describe how the particles would delay the recovery of the Antarctic ozone hole by decades and cause significant ozone loss over the Arctic during very cold Arctic winters.

"Our research indicates that trying to artificially cool off the planet could have perilous side effects," Simone says. "We knew that sulfate injections would impact the ozone layer, but the extent was never quantified before."

The ozone layer is critical for life on Earth because it blocks dangerous ultraviolet radiation from the Sun. The international community took action to protect it with the Montreal Protocol of 1987, which restricted the production of ozone-destroying chemical compounds known as chlorofluorocarbons (CFCs). Scientists have closely monitored the Antarctic ozone hole since then, and expect it to recover by around 2068.

Simone expects the new research to encourage scientists and decision

makers to proceed with extra caution. "While climate change is a major threat, more research is required before society might attempt global geoengineering solutions," she says. "Scientists need to understand the consequences for the entire atmosphere and biosphere that could result from such an approach, so as not to worsen the situation."

Sulfates and ozone

Simone collaborated with Rolf Müller (Jülich Research Center) and Ross Salawitch (University of Maryland). To assess the potential impact of the geoengineering proposal, the researchers focused on ozone over the poles. Airborne sulfates from volcanic eruptions have a negative effect on this atmospheric region, because as the particles drift into the lower stratosphere above the poles they provide a surface on which chlorine gases can become activated, causing chemical reactions that intensify destruction of ozone molecules.

The researchers found that if sulfates were injected into the atmosphere at the magnitude under discussion, they would likely destroy from about one-fourth to three-fourths of the ozone layer above the Arctic over the next few decades, depending on the size of aerosols used and the severity of Arctic winters. Because chlorine activation occurs under very cold temperature conditions within the polar vortex, very cold Arctic winters are estimated to deplete more ozone than warmer winters. The sulfates would also delay the expected recovery of the ozone hole over Antarctica by about 30 to 70 years.

Carrying out the study

To determine the relationship between sulfates and ozone loss, the researchers used a combination of measurements and computer simulations. They estimated future ozone loss by looking at two hypothetical geoengineering schemes, one that would use sulfates the same size as those from volcanoes and another that would use much smaller ones.

The study found that injections of the smaller particles would reduce the ozone layer over the Arctic by 100–230 Dobson Units over the next 20 years. As the average thickness of the ozone layer in the Northern Hemisphere is 300–450 Dobson Units, this represents a significant loss of ozone. Injections of the larger particles would result in a loss of 70–150 Dobson Units. The ozone loss would drop in the later part of the century to about 60–150 Dobson Units, depending on the size of the sulfates and the severity of winters.

A Dobson Unit is equivalent to the number of ozone molecules that would create a layer 0.01 millimeters thick under conditions at Earth's surface.

Above Antarctica, most of the ozone layer is already depleted. Sulfate injections would not significantly reduce its thickness. Instead, they would significantly delay the recovery of the ozone hole.

The impacts of sulfate injections in both regions would likely be somewhat less during the second half of the century as the ozone layer recovers in response to the Montreal Protocol's restrictions on CFCs.



Simone Tilmes.

The researchers caution that the actual impacts on ozone could be different than estimated if atmospheric changes led to unusually warm or cold polar winters, and they warn that a geoengineering project could lead to even more severe ozone loss if a major volcanic eruption took place at the same time. They also emphasize that more research is needed on how climate change and geoengineering impact the dynamical and chemical conditions in the stratosphere above low and mid latitudes.

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An edible literary creation by Leslie Forehand (Library) nourishes the mind and stomach.

Sponsored by the American Library Association, National Library Week began in 1958 as a way to celebrate libraries and promote their use and support. All types of libraries—academic, public, private—can participate.

"I think that everyone who attended was reminded, in very personal ways, of the roles that libraries have played in their lives," says Mary Marlino, NCAR Library director. "We also saw this occasion as a nice opportunity to talk about some of the exciting initiatives that the Library will be promoting over the next year, such as a focus on digital collections and stewardship of the organization's intellectual assets."

On April 15, Warren Washington discussed his recent book, *Odyssey in Climate Modeling, Global Warming, and Advising Five Presidents*, at Foothills Lab, followed by cake and champagne. A "Citation Station" was on hand for attendees to calculate their h-indexes and total citations. (The h-index, which is based on a scientist's most-cited papers and the number of citations that he or she has received in other scientists' publications, quantifies actual scientific productivity and apparent scientific impact.)

Bob Henson (Communications) spoke at the Mesa Lab library on April 17 about his experiences writing *The Rough Guide to Climate Change*, published in 2006.

And on April 16, an edible book festival took place at Center Green, giving staff a chance to combine culinary skill and literary knowledge. Creations included a pizza version of *Under the Tuscan Sun*, a plate of crumbs illustrating *Gone With the Wind*, a lettuce-based vegetable depiction of *The Tale of Peter Rabbit*, and more.

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People, planet, and productivity: Sustainable UCAR

UCAR/NCAR's new sustainability coordinator, Kimberly Kosmenko, started work in March as part of SaSS. She holds a master's degree in environmental science and policy from CU-Boulder and has experience in land conservation and environmental nonprofit work. Here, Kimberly tells Staff Notes Monthly about her plans to help UCAR develop and implement a comprehensive sustainability plan.

As one of UCAR's newest staff members, I have the unique pleasure of announcing an exciting new suite of activities that will happen under the auspices of Sustainable UCAR.

Growing out of the Environmental Stewardship Program, Sustainable UCAR provides collaborative opportunities and leadership

for UCAR, NCAR, and UOP to work toward environmental sustainability.

I'm often asked what sustainability really means. For an organization like UCAR, sustainability is about operating in a way that supports environmental and human health while enhancing organizational productivity. Many organizations refer to this as the triple bottom line—people, planet, and productivity. Because UCAR is an organization that strives to benefit society by producing excellent research and education on climate and atmospheric science, working toward sustainability aligns perfectly with our mission.

More often than not, I'm asked if we can really accomplish something meaningful in the name of going green—and do it without spending a lot of money. Examples from other research and academic institutions demonstrate opportunities to increase the triple bottom line. Harvard University's Green Campus Initiative manages an internal revolving loan fund to enable projects for sustainability education, small-scale building improvements, waste reduction, and more—and shows an average return on investment of more than 20% while reducing resource consumption and carbon emissions.

Closer to home, facilities managers at CU-Boulder collaborated with the campus Environmental Center on a suite of strategies to reduce water use—including the installation of new fixtures, shifting irrigation practices, and community education—that lowered annual consumption by 10–20%. In the meantime, the university saved more than \$256,500 in the first two years of the program.



Kimberly Kosmenko.

Another Colorado neighbor, the National Renewable Energy Lab, leveraged private funding to install an on-site biomass energy plant as part of a goal to be net carbon neutral. NREL now generates renewable, local power with virtually no upfront costs.

What's possible here at UCAR? Sustainability is a process rather than a destination, and UCAR has the knowledge and institutional support to take a leadership role. A comprehensive sustainability plan includes goals for managing carbon footprint, energy and water consumption, transportation, ecological health of our land, waste reduction, and outreach and education. This year, Sustainable UCAR will partner with members of the UCAR community to assess our carbon footprint and resource consumption. Using the data from these assessments, we'll develop a suite of programmatic goals.

Thanks to past environmental stewardship efforts, we already have a comprehensive recycling program and have compost collection in many locations, with plans to expand. We'll continue to support the efforts of Event Services to move toward providing "zero waste" food service and Physical Plant Services' efforts to increase building efficiency. This summer, we'll bring in several distinguished speakers to offer a series of brown bag lunch discussions, offering you the opportunity to learn more about sustainability. A small sustainability committee will convene to work hands on with the nuts and bolts of program implementation. Information on all of our initiatives, along with resources for going green, will appear on our soon-to-be-released website over the course of the year.

Reaching for sustainability is a community effort, and I invite you to ask questions, make suggestions, and get involved. I look forward to working with all of you on this exciting process.

• Kimberly Kosmenko

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Multimedia Services helps staff collaborate across time and space

Conferencing technologies provide alternatives to travel

Imagine you have a meeting to attend in Washington, D.C., when a winter storm bears down on Denver. Your flight is cancelled. Fear not. Thanks to the brave new world of collaborative technologies, you've got several options. One is to hold a videoconference with your colleagues in the capital. This means you'd better change out of your pajamas, because you're going to be seeing each other on your computer screens. Or you might choose to webconference, sharing data and looking at documents and presentations on your computers while communicating over the phone. Alternatively, if it's not important that you actively participate in the meeting, you might be able to simply observe via webcast.

UCAR/NCAR's Multimedia Services are the go-to folks for more information about these technologies. The group provides audiovisual and collaborative technology support to staff for meetings, presentations, conferences, and special events. It also oversees designated multimedia rooms on all three



Brian Morrato runs the show from the multimedia room above the Center Green auditorium.

campuses, consults with staff on multimedia needs and equipment, and does a limited amount of select video production.

Eron Brennan, who heads the group, stresses that collaborative technologies offer more than just convenience, for they reduce carbon emissions from travel. "We support ongoing committee meetings each month that save on travel, and we've arranged a number of international conferences," he says.

In March, Media Services selected ReadyTalk as the organization's new webconferencing service provider. "We're also forming a committee to study the next generation of streaming media for adoption," Eron says. Webconferencing lets two or more people share data via the Web while communicating on the phone.

The group currently uses RealPlayer to broadcast webcasts (live or recorded audio and video content) from conferences, seminars, staff parties, and other events. All of UCAR/NCAR's webcasts are available online (see "On the Web").

Videoconferencing, which lets 2–6 sites interface, includes video, audio, and data sharing. As many people can participate as can fit in each room. AccessGrid, which Eron describes as "videoconferencing on steroids," is an

option when 6–20 sites want to conference, but fewer institutions have the technology necessary for participating.

“There is also a growing demand for our services in the areas of distance learning and tutorials,” Eron says. This includes producing seminars that are webcast with presentations imbedded in them.

One challenge for Multimedia Services is that the group only has enough resources to station one technician at each campus, along with a casual employee available on a limited basis. Will Burrows covers the Mesa Lab, while Jay Alipit covers Foothills Lab and Brian Morrato covers Center Green.

“What we really like to do is train others to use our technology,” Eron says. “We can be the ones to keep up with tools and technologies and pass this on to staff.”

He adds that one of the rewards of supporting multimedia at an organization such as UCAR/NCAR is that, in addition to helping researchers collaborate in creative ways, he and his team get to observe scientific research in action. “We get to witness a lot of the cutting-edge science because we’re in meetings, seminars, and conferences supporting these events.”

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May 2008

"The Stories Clouds Tell" gets a facelift

"However you choose to watch the sky, you'll encounter fascinating stories being told by the clouds overhead," writes Peggy LeMone (ESSL/MMM) in the newly updated version of "The Stories Clouds Tell," her guide to cloud study originally published in 1993.



Peggy LeMone.

The booklet features photos of cloud types and illustrations of cloud formation, and answers questions such as how much clouds weigh, how they form, and what they tell us about the airflow and different kinds of weather.

In the new version, Peggy's original drawings have been updated by Mike Shibao (formerly of the Image and Design Center and now a freelance designer), and a section about contrails has been added. A drawing done by Peggy's daughter, Sarah, when she was 10 years old is also included. UCAR photographer Carlye Calvin's cloud photos grace the cover. Other UCAR/NCAR staff who contributed photos and expertise are Bob Henson (Communications), Roberta Johnson (EO), and Sandra Henderson (EO).

Peggy developed a fascination with weather as a child growing up in Missouri. "Missouri has such great weather," she says. "Well, I don't know if everyone would call it 'great,' but it's severe and interesting."

An observational meteorologist, she studies the behavior of large, organized storm systems. She became NCAR's first female senior scientist in 1992.

"The Stories Clouds Tell" was originally produced as part of Project ATMOSPHERE, an educational initiative of the American Meteorological Society. The 32-page booklet is available in the NCAR Science Store for \$9.95. •

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May 2008

Delphi questions

Reclassifications, hiring freeze

Delphi Question #585 (received March 13): On Monday, March 10, some employees were given memos stating that there was a reclassification from exempt status to nonexempt status beginning that same day. The only explanation in the memo was that Human Resources had completed a Federal Labor Standards Act audit and that clarification to the changes resulted in HR's determination of our positions being subject to FLSA wage and hour guidelines. The audit and change were not discussed with supervisors or lab associate directors before the Thursday or Friday prior to the Monday when affected employees were told.

This action raises the following questions:

- Was this change mandatory and, if so, why?
- Who decided the reclassification was necessary and how was this decided?
- Why was this not communicated earlier—at least to supervisors and associate directors?
- Why was there no input from supervisors or associate directors regarding classifications and ranges?
- How were the ranges decided—especially since some of the ranges are lower than the original ranges (thus having the appearance of a demotion)?

UCAR professes leadership, yet the way HR handled the reclassification is a poor example of that leadership and communication. How can a company that is supposed to be considered one of the "2007 best companies to work for in Colorado" not take into account the impact this could have on the affected employees? We understand that laws and policies may change, but we would expect better communication from HR. Better communication means less shock and anger on an employee's part.

Some employees are wondering what else will change without notification—benefits, retirement?

Response (received March 19): I think I hear a couple of things in this question. First, a request for additional information concerning the change; second, disappointment in the effects of the change and the way it was communicated.

Regarding the change, it was made as a result of external requirements over which UCAR has no control. It was not made because of any internal desire to change the status of certain jobs. If it were up to us, we would have left the jobs unchanged. The Federal Labor Standards Act (FLSA) prescribes standards for the basic minimum wage and overtime pay, and affects most private and public employment. Following recent guidance from the Department of Labor, many organizations are changing the exempt status of certain jobs.

Human Resources reviewed several job categories. Some of the positions we reviewed remained exempt, while others were changed to nonexempt. The affected jobs are Software Engineer I, Systems Administrator I, Network Engineer I, Executive Assistant I, and Web Developer I and II. Other Boulder employers have also recently changed the status of jobs similar to ours.

Before making the changes, we had external attorneys review the jobs to ensure we were required to make these changes. Other than the change in exempt status, there was no change in the jobs, and the classification stayed the same.

UCAR has a separate salary range for nonexempt positions, so all of the affected positions were moved to that salary range. This means there were minor changes in the midpoints for all of the affected jobs, but these were less than \$300. No employee's rate of pay was changed, and no one was demoted. (We are aware of one major employer that did reduce pay rates by 15% concurrent with the change to nonexempt status, but UCAR did not.) Those who moved to nonexempt positions will be eligible for time-and-a-half pay for all hours worked over 40 in a work week, as required under the FLSA.

Concerning the disappointment in the effects of the changes, I think the - disappointment is real. The FLSA is written to "protect" some employees and ensure they receive overtime pay, but its actual impact feels different. These changes were not made based on employee performance, value to the organization, or any other internal motivation. Based on our internal and external review of the jobs, and on the recent Department of Labor guidance, we had no option but to make the change.

Regarding the communication, senior management was made aware of the issue prior to the announcement. Some managers who had multiple employees affected were briefed on the changes from the Department of Labor and the likelihood of UCAR changing the status of some jobs to nonexempt. Because of the sensitivity and uncertainty of the issue, these discussions were confidential. Until we were certain which jobs would be impacted, we did not want to unnecessarily alarm employees in jobs not affected by the changes.

You are correct that most supervisors were unaware of the change until a few days before it went into effect and that employees in the affected jobs were given no advance notice. Because the change was legally required, we wanted to put it into place as soon as practical. Meetings and discussions were held with administrators, supervisors, and/or directors, depending on availability, the week of March 3. However, in retrospect, we could have done better in communicating the necessary changes to affected employees and supervisors.

As to the future, there are likely to be other legally required changes to some of our policies and plans. Every year we have some minor changes and they are included in our communications to employees. Benefit plans are reviewed every year, and we have seen some changes. The last major change was the implementation of the High Deductible (HSA) Health Plan. This change was widely communicated months in advance.

—Bob Roesch
Director, Human Resources

Delphi Question #586 (received March 13): I heard in a meeting with the director of a lab that there is a UCAR-wide hiring freeze in place to help save UCAR money, considering the impending budget shortfalls. (It was the same meeting where we discussed the four-month delay in raises recently set by Rick Anthes.)

Yet I see many positions advertised and being filled. I have no problem with people being hired; some of them are my friends. I'm glad for that. But I'd like straight talk from the administration. If there is a hiring freeze, enforce it. If there is effectively no hiring freeze, don't say there is. It gives the appearance of preferential treatment when you say there is a hiring freeze, but some people are hired anyway. It makes it look like

those people are special exceptions instead of qualified applicants filling important positions. (I'm not confusing hiring with promotions.)

So, is there a UCAR-wide hiring freeze or not? Is it a limited hiring freeze? Perhaps limited to certain labs, or classes of positions, or to new positions but not replacement positions?

Response (received March 26): Thanks for the question. It is an involved issue and some clarification is needed.

The hiring freeze is actually an "NCAR external hiring freeze" and applies only to NCAR. It was initiated by the NCAR director last August in response to FY08 and FY09 budget pressures, the continuing resolution, and the omnibus bill.

The goal of the external hiring freeze is to coordinate and optimize internal assignments and redeployments of existing staff as an important and proactive part of our budget and program management. It covers all NCAR external hires, but provides for exceptions based on demonstration of the insufficiency of the internal applicant pool and the programmatic need to fill a position. All exceptions are approved by the NCAR director or the NCAR deputy director.

Since the freeze went into effect, no position has been opened for an external posting without this review and approval. NCAR plans to revisit this temporary policy after confirmation of the FY08 Target by NSF and in light of projections for funding for FY09 later this calendar year.

UOP has no hiring freeze in place and positions are filled based on programmatic needs and the availability of funding for the position.

While F&A does not have a hiring freeze in effect, open positions may not be filled without the specific approval of the F&A vice president. This requirement went into effect in January in response to the changes in NCAR's budget.

—Bob Roesch
Director, Human Resources

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May 2008

Warren M. Washington Digital Collection

In one of the first efforts of its kind, the NCAR Library has launched the preliminary version of the Warren M. Washington Digital Collection, an online resource chronicling the career of Warren Washington (ESSL/CGD).

Visitors can explore the site (see "On the Web"), which is still a work in progress, via an interactive timeline that documents Warren's life with photographs, webcasts, movies, animations, and more. With the help of an online finding aid, scholars can delve into a collection that encompasses Warren's publications, models and output, correspondence, honors and awards, manuscripts, newspaper clippings, diversity efforts, photographs, and media coverage. The site also includes Warren's biography, curriculum vitae, and publications list. Many of his accomplishments have been in collaboration with other NCAR scientists, such as Jerry Meehl and Akira Kasahara in CGD.



Warren M. Washington.

"Warren is a scientific trailblazer, an adviser to presidents and other - influential people, and a role model to African Americans and all Americans," says Mary Marlinio. "The NCAR Library is honored to be able to present his story in this way."

Library unveils new website

In late April, the Library launched a fresh website that features a new interface and different organization system for materials and tools, with an eye toward providing easy access to digital materials. Future plans include developing more special collections and implementing new tools for searching, accessing, and storing digital materials.

www.ucar.edu/library

Mary conceived of the idea for the digital collection when she became director of e-Science and the NCAR Library last year. One of her goals for the Library is to feature more digital content. This includes not just providing more information online, but building cohesive collections and better methods to search them.

"For Warren's online collection, we could simply have built a search engine to a disconnected set of - information bits," explains Web producer Kris Conrad (Library/Director's Office), who's worked with Mary, Warren, and Diane Rabson (Archives) to build the site. "A collection that can be explored via an interactive

timeline goes a step further by putting that information into context and telling a story.

"Warren has a tremendous story to tell about his life," Kris adds. "He's achieved so much in the field of climate science and modeling, has been very politically involved, and, on top of all that, has found time to help pave the way for others via his diversity efforts."

The Library hopes to produce similar collections for other prominent NCAR

scientists in the future. •

On the Web

www.ncar.ucar.edu/washington

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