

LIVERMORE LAB REPORT

A weekly review of scientific and technological achievements from Lawrence Livermore National Laboratory, Jan. 7-11, 2013.

The New York Times WHAT A DRAG



LLNL conducted tests on tractor trailer trucks with drag reducing devices at the NASA Ames wind tunnel.

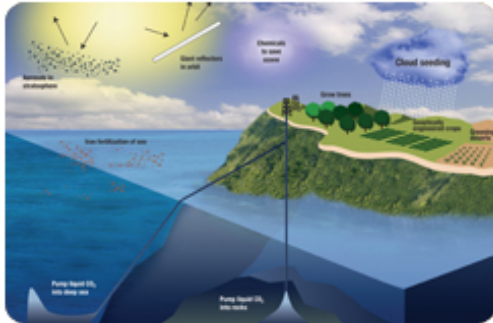
The drag created by the turbulent wake behind a tractor trailer's squared-off rear end can reduce the vehicle's fuel economy by leaps and bounds.

Lawrence Livermore National Laboratory researchers are working with truck manufacturers and other companies to help reduce the drag and increase fuel economy by more than 17 percent.

Drag is created as air rushes into the low-pressure immediately behind the trailer, causing an aerodynamic effect that can be felt as a distinct pull in a closely following car. More than half of the energy needed to keep a truck moving at highway speeds is expended just to overcome aerodynamic drag, according to an LLNL report.

Companies are now developing devices that would attach to long-haul trucks that would reduce that aerodynamic drag.

To read more, go to [The New York Times](#).



A schematic representation of various geoengineering and carbon storage proposals.

When it comes to ways of slowing down climate change, geoengineering is in a league of its own -- namely terra incognita.

Geoengineering is a broad category for techniques that could remove greenhouse gases from the atmosphere or reflect away more heat, including things as innocuous as painting roofs white and as controversial as spraying sulfate particles into the stratosphere.

But as the threat of global warming rises, geoengineering strategies have shifted from the scientific fringes into mainstream debate. Few are eager to tweak a system as complicated, sensitive and interconnected as the climate. But many scientists worry that nations simply won't cut fossil-fuel emissions enough to prevent rising temperatures from unleashing humanitarian and ecological calamities.

"If we have to intervene, we should be doing the research now because these ideas are extremely complicated and extremely risky," said Jane Long, a former associate director at Lawrence Livermore National Laboratory. "I hope we never have to do it, but I think it's irresponsible not to understand as much as we possibly can in case we need it."

To read more, go to the [San Francisco Chronicle](#).





Ben Santer

When scientists over the years have conducted research that strays away from the norm -- think Galileo (Earth revolves around the sun) -- they aren't necessarily expecting the worst.

In 1996, Lawrence Livermore's Benjamin Santer authored a chapter in a report of the Intergovernmental Panel on Climate Change that included this sentence: "The balance of evidence suggests a discernible human influence on global climate."

It would prove to be a pivotal moment for the discussion of global warming. Today, the political discord can be traced back to that sentence.

"I was blissfully unaware of what would happen at the end of 1995," the MacArthur Award-winning researcher said. "The only thing I thought about was doing the best possible science and searching for that holy grail of objectivity."

"Nothing in your scientific training prepares you for that kind of challenge to your integrity. You're prepared as a scientist to stand up there and defend your research, but you're not prepared to have people call you a liar or a cheat."

To read more, go to [Grist](#).



BREAK ON THROUGH



Bill Goldstein

In the first of a two-part series in *Research Media Ltd.*, Bill Goldstein, acting deputy director for Science and Technology, talks about how Lawrence Livermore is breaking into new frontiers in space exploration, as well as supporting the U.S. Government’s efforts to provide energy and environmental security.

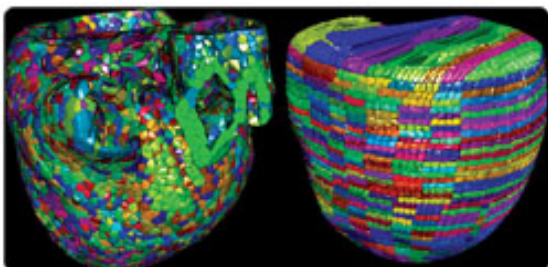
“We are asked to solve problems that require the best and brightest scientists, with expertise ranging across biology, chemistry and physics,” Goldstein says. “My job is to create an environment that attracts these scientists, keeps them at the forefront of their field and enables them to team up to attack important national problems. I work to make sure they have the best laboratories, tools and support, in order to do their jobs.”

Goldstein goes on to explain the roles of the different divisions within the Laboratory and his future vision: “I’m convinced that in the future the work of Physical and Life Sciences will grow in significance and impact. The nature of the stockpile stewardship problem requires increasing levels of scientific understanding to match the growing complexity of stockpile systems as they age.”

To read more of the interview, go to [Research Media Ltd.](#)



BEHOLD THE BEATING HEART



The **Cardioid** code developed by a team of Livermore and IBM scientists divides the heart into a large number of manageable pieces, or subdomains. The development team used two approaches, called **Voronoi (left) and grid (right)**, to break the enormous computing challenge into much smaller individual tasks.

Using one of the world's most powerful supercomputers, Lawrence Livermore and IBM scientists have created a program that mimics a beating human heart down to the cellular level.

The technology may one day revolutionize the way drugs for the heart are created.

“When your heart beats, it’s actually an electric signal that goes around the heart and that causes it to contract,” says Fred Streitz, the director of the LLNL’s High Performance Computing Innovation Center. “How that electric signal transmits around the heart -- we can now model at near cellular resolution, at real time.”

Streitz’s extensive research indicates that the Lab’s Sequoia computer technology may be a godsend to pharmaceutical companies and could provide critical data before they enter the clinical trial phase.

To read more, go to [YNN](#).

A LOOK BACK



Newsline's month-by-month highlights from 2012 are available on the [Web](#). As in the past, listings will be in four categories: Science and technology; People; Operations; and Awards and recognition. The 2012 Year-in-Review will appear only electronically; there will be no print edition. The Web-based format offers the advantage of providing links to the referenced Newsline articles, press releases or the LLNL Report

See the [2012 Newsline Year-in-Review](#).

LLNL applies and advances science and technology to help ensure national security and global stability. Through multi-disciplinary research and development, with particular expertise in high-energy-density physics, laser science, high-performance computing and science/engineering at the nanometer/subpicosecond scale, LLNL innovations improve security, meet energy and environmental needs and strengthen U.S. economic competitiveness. The Laboratory also partners with other research institutions, universities and industry to bring the full weight of the nation's science and technology community to bear on solving problems of national importance.

To send input to the *Livermore Lab Report*, send [e-mail](#).