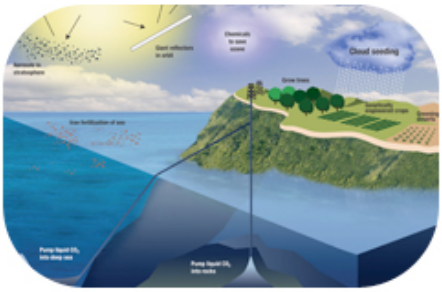
LIVERMORE LAB
REPORT

A weekly review of scientific and technological achievements from Lawrence Livermore National Laboratory, May 7- 11, 2012

THE NEW YORKER CLIMATE'S COSTLY CURE



A schematic representation of various geoengineering and carbon storage proposals.

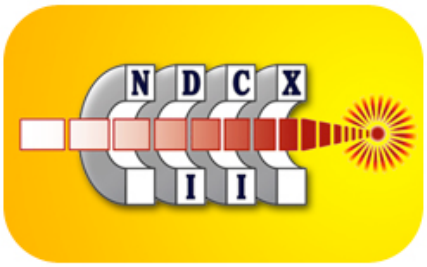
The heavy industrial activity of the previous 100 years and the emission of tons of carbon dioxide during that time have caused the Earth's climate to warm by roughly three-quarters of a degree Celsius, helping to make the 20th century the hottest in at least 1,000 years.

But when cutting carbon emissions isn't enough, what does the world turn to? Manipulating the climate in the form of geoengineering (such as blocking the son or shooting aerosols into the air) is one option that scientists don't want to turn to, but may have to if current solutions aren't enough.

Many climate scientists say their biggest fear is that warming could melt the Arctic permafrost -- which stretches for thousands of miles across Alaska, Canada and Siberia. There is twice as much CO_2 locked beneath the tundra as there is in the Earth's atmosphere. Melting would release enormous stores of methane, a greenhouse gas nearly 30 times more potent than carbon dioxide. If that happens, as the Lawrence Livermore hydrologist Jane Long says: "it's game over."

To read more, go *The New Yorker*.

TAKING BABY STEPS TOWARD FUSION



Construction of the second-generation Neutralized Drift Compression Experiment (NDCX-II) accelerator has been completed. NDCX-II is a unique, special-purpose particle accelerator designed and built by participants in the Heavy Ion Fusion Science Virtual National Laboratory collaboration, whose member institutions are Lawrence Livermore, Lawrence Berkeley and the Princeton Plasma Physics Laboratory.

NDCX-II is a compact machine designed to produce a high-quality, dense beam that can rapidly deliver a powerful pulse of lithium ions to a solid target. Once fully operational, research at the facility will make advances in the acceleration, compression and focusing of intense ion beams that can inform and guide the design of major components for heavy-ion fusion energy production.

Lawrence Livermore scientists in the Fusion Energy Sciences Program developed most of the physics design for NDCX-II. The Laboratory provided the accelerating cells (which had previously been used at the Lab's Advanced Test Accelerator, and were modified and rebuilt for NDCX-II) as well as the 250kV Blumlein pulsed-power sources.

To read more, go to *R&D*.

YOUNG AND RARING TO GO

Four Laboratory scientists have earned $10 million in funding through the Department of Energy Office of Science Early Career Research Program (ECRP).

Early career is defined as principal investigators (PIs) who are within 10 years of receiving a Ph.D. and are either untenured assistant professors on the tenure track, untenured associate professors on the tenure track, or full-time, non-postdoctoral, permanent DOE national laboratory employees. The PI must be employed by either a U.S. academic institution or a DOE national laboratory.

The five-year awards are designed to bolster the nation's scientific workforce by providing support to exceptional researchers during the crucial early career years, when many scientists do their most formative work.

Celine Bonfils, a climate scientist in the Atmospheric, Earth and Energy Division, earned the award for detection and attribution of regional climate change with a focus on the precursors of droughts. Bonfils was selected by the Office of Biological and Environmental Research.

Gianpaolo Carosi, a particle physicist in the Physics Division, won the award for his work in search of dark matter axions with new high-frequency tunable microwave cavities. He was selected by the Office of High Energy Physics.

Andreas Kemp, a physicist in the Physics Division, earned his award for large-scale modeling of intense short-pulse laser interaction for High Energy Density Laser Physics (HEDLP). Kemp was selected by the Office of Fusion Energy Sciences.

Jaime Marian, an engineer in the Materials Science Division, won the award for his work in computational modeling and design of radiation-tolerant materials for fusion. He was selected by the Office of Fusion Energy Sciences.

ON DEEP BACKGROUND

NIMBLE TITAN

Just four days after North Korea's failed three-stage missile launch, a pre-scheduled international missile defense exercise got under way at a high-tech conference center in southern Virginia.

Participants from 14 nations, and observers from such organizations as NATO, spent four days planning political, military and civil defense responses to scenarios involving mock missile launches 10 years in the future from fictitious countries named Seac and Rubicon.

Much of the background information on which the unclassified decision-making was based came from ballistic missile defense work undertaken at Lawrence Livermore. Coordinated by the Lab's Mike Tobin, assigned to the Missile Defense Agency (MDA) in Washington, D.C., Lawrence Livermore has been using its National Atmospheric Release Advisory Center and Advanced Simulation and Computing supercomputers to contribute vital and detailed information necessary for quick and well-informed decision-making on such critical issues.

To read more, go to the Web.

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.

The *Livermore Lab Report* archive is available on the Web.