



PNNL's John Hauer



Science and Technology Highlights from the DOE National Laboratories

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Research Highlights . . .

Global warming to squeeze western mountains dry by 2050

Global warming will diminish the amount of water stored as snow in the Western United States by up to 70 percent in the coastal mountains over the next 50 years, according to a new Pacific Northwest National Laboratory-led climate change model. The full report will appear in the journal *Climatic Change*. The reduction in Western mountain snow cover, from the Sierra Nevada range that feeds California in the south to the snowcapped volcanic peaks of the Cascades in the Pacific Northwest, will lead to increased fall and winter flooding, severe spring and summer drought that will play havoc with the West's agriculture, fisheries and hydropower industry. "And this is a *best case scenario*," warned the forecast's chief modeler, L. Ruby Leung, a PNNL staff scientist.

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Research bolsters theory behind spectacle

New computer models have bolstered the case for a theory of what causes a white-dwarf supernova to occur. Under certain conditions, a supernova happens when a white dwarf star in a binary system accretes material from its neighbor until, eventually, the big blast occurs. Astrophysicists at DOE's Oak Ridge National Laboratory were among researchers who applied their computational and experimental support to work published by Arizona State University. The new models help explain why the white dwarf gathers the hydrogen from its companion instead of blowing off the material as it arrives. White-dwarf supernovae interest researchers because they are believed to create heavy elements and are used to measure astronomical distances.

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Stopping the SARS virus quickly

Researchers at NNSA's Sandia National Laboratories and Kansas State University have shown that chemical formulations previously developed at Sandia to decontaminate chemical and biological warfare agents are likely effective at killing the virus that causes Severe Acute Respiratory Syndrome (SARS). In a series of tests conducted at Kansas State on Bovine coronavirus (BCV), the internationally accepted surrogate for the SARS coronavirus, Sandia-modified versions of its DF-200 formulation fully inactivated BCV samples in one minute or less. The team now is pursuing funding to conduct similar tests on the SARS coronavirus and hopes to test other emerging viruses such as the avian influenza virus (bird flu).

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International collaboration advances cancer treatment

An ongoing collaboration between researchers at DOE's Idaho National Engineering and Environmental Laboratory and the National Atomic Energy Commission of Argentina (CNEA) strives to improve protocols used in the current trials of an innovative form of cancer treatment. Boron Neutron Capture Therapy is a technique that delivers concentrated doses of radiation directly to tumors while sparing non-cancerous tissues. Injecting a boron delivery agent into the site of the tumor, then exposing the area to a beam of neutrons releases radiation wherever neutrons interact with boron. INEEL scientists developed unique software that aids treatment planning by calculating the doses of delivered radiation. The researchers have also synthesized a key precursor to a promising new boron delivery agent.

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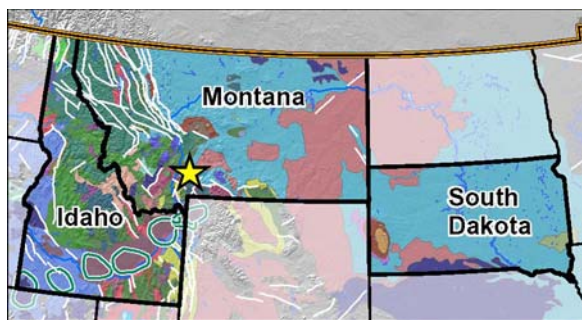
DOE Pulse highlights work being done at the Department of Energy's national laboratories. DOE's laboratories house world-class facilities where more than 30,000 scientists and engineers perform cutting-edge research spanning DOE's science, energy, national security and environmental quality missions. *DOE Pulse* (www.ornl.gov/news/pulse/) is distributed every two weeks. For more information, please contact Jeff Sherwood (jeff.sherwood@hq.doe.gov, 202-586-5806).

Looking to the 'Big Sky' for greenhouse gas answers

Researchers evaluating carbon management alternatives are setting their sights on the wide-open spaces of Montana and its neighboring states.

As part of the Big Sky Carbon Sequestration Partnership, scientists from DOE's national labs, industry and academia are focusing on the region as they explore solutions to stabilize atmospheric levels of carbon dioxide without creating major impacts on energy infrastructures. And the DOE's [Idaho National Engineering and Environmental Laboratory \(INEEL\)](#) has been asked to join this world-class collaboration by partnership leader Montana State University (MSU).

The partnership is examining options to sequester and manage greenhouse gases in plants and geologic features. They'll accomplish this by cataloging carbon sources and promising storage sites in Idaho, Montana, South Dakota – and contiguous



areas in North Dakota and Wyoming. The partners are also researching regulatory compliance and public perception issues to help

develop project implementation plans for the most promising carbon mitigation opportunities in the region.

DOE awarded the partnership a \$1.6 million grant from the National Energy Technology Laboratory's Carbon Sequestration Program. After initiating the partnership MSU also coordinated efforts to raise an additional \$400,000 of required matching funds from collaborators.

The INEEL's role includes researching mineralization trapping and supplying geologic and geospatial data management expertise. One of the INEEL's managing partners, the Inland Northwest Research Alliance (of which MSU is a member), conducts hydrodynamic and solubility trapping research through [Boise State University](#) and the [University of Idaho](#).

The [South Dakota School of Mines](#) and [Texas A&M University](#) provide soil carbon measurement and monitoring techniques for plant-based sequestration and rangeland management, while [Los Alamos National Laboratory](#) is evaluating advanced sequestration concepts.

The Nez Perce Tribe and the Confederated Salish and Kootenai Tribes provide links to forestry carbon projects, and private company EnTech Strategies will gather public comments regarding the government's future carbon sequestration strategies.

Submitted by DOE'S [Idaho National Engineering and Environmental Laboratory](#)

PNNL RESEARCHER PIONEERS GRID RELIABILITY



John Hauer

Much of the Eastern United States and Canada had just emerged from the August 14, 2003 blackout when John Hauer joined other leading grid analysts to investigate the largest and most costly blackout in North America's history. Hauer, a Laboratory Fellow

at DOE's [Pacific Northwest National Laboratory](#), is internationally recognized for measurement, analysis, and control of large power systems.

Large dynamic systems first attracted Hauer in the early 1960s, when he worked on the measurement and control of nuclear reactor dynamics at Hanford. He moved to even larger systems at Boeing, where he produced spacecraft navigation and guidance tools, including the algorithm for the camera orientation used to take historic photographs of the earth and moon.

Hauer entered the electric power arena at [Bonneville Power Administration](#). For 20 years he worked at the leading edge of systems technology and practices for ensuring reliable power system performance. As BPA's Principal Engineer for Power System Dynamics, Hauer helped initiate and implement the [Wide Area Measurements System \(WAMS\)](#) that now serves the western power system.

DOE has recognized WAMS with an Energy 100 Award, naming it one of the department's foremost scientific and technological accomplishments of the 20th century.

At PNNL, Hauer helped found and is a key participant in the DOE real time wide area measurement activity, where he leads the WAMS Outreach. This effort serves the critical information needs of the increasingly stressed power system by providing federally owned knowledge and technology to an emerging North American WAMS infrastructure.

DOE has been expanding WAMS into the eastern interconnection, leveraging technology that the western power grid has used for many years. "This information gave an excellent profile of system dynamic behavior on August 14," Hauer said.

Submitted by DOE'S [Pacific Northwest National Laboratory](#)