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"When we are tired, we are attacked by ideas we conquered long ago."

— Friedrich Nietzsche

ORNL researchers showcase AI-driven science at national expo

Published: June 18, 2026 Updated: June 18, 2026 Attendees at the AI+ Expo for National Competitiveness, visiting the Department of Energy's booth showcasing research from national labs. Credit: Mark Alewine/ ORNL, U.S. Dept. of Energy The Department of Energy's Oak Ridge National Laboratory had a major presence at the 2026 AI+ Expo for National Competitiveness, held May 7–9 in Washington D.C., with multiple ORNL researchers presenting and demoing their latest work. Hosted by the Special Competitive Studies Project, the event brought together leaders from technology, academia, industry and government to discuss the rapidly evolving role of artificial intelligence in advancing U.S. innovation, energy resilience, competitiveness and national security. Featured speakers included U.S. Secretary of Energy Chris Wright, DOE Under Secretary for Science and Innovation Dario Gil, and other leaders from federal agencies, academia and the private sector focused on AI-driven scientific and technological leadership. The event also reinforced DOE's growing emphasis on AI as a strategic capability for scientific discovery, energy innovation and national security, highlighting the critical role of national laboratories, open science, next-generation computing infrastructure and initiatives such as the Genesis Mission in accelerating innovation, strengthening U.S. competitiveness and enabling a resilient energy future. ORNL Associate Laboratory Director for the Computing

Source: Oak Ridge National Laboratory

and Computational Sciences Directorate Gina Tourassi spoke as part of a discussion panel with her fellow computing leaders at other national labs discussing the importance of collaboration toward DOE's Genesis Mission , which aims to double the productivity and impact of American science, engineering and R&D within a decade. "The Genesis Mission reflects a bold national commitment to accelerate discovery by integrating AI, high-performance computing, advanced scientific instrumentation, and multidisciplinary expertise across the Department of Energy ecosystem," said Tourassi. "Events like the AI+ Expo are critical because they bring together varied stakeholders to align capabilities around a shared goal: dramatically increasing the productivity, impact and competitiveness of American science and technology." Several ORNL researchers representing high-performance computing, AI and advanced scientific computing contributed to the conversation through presentations and demonstrations highlighting the laboratory's leadership in AI for science, including Arjun Shankar, who serves as director for the National Center for Computational Sciences at ORNL. Shankar detailed ORNL's role in leading the American Science Cloud, a cornerstone initiative within the Genesis Mission, and stressed the importance of presenting at the event. "The AI expo brought together practitioners, designers and users, and presenting on the American Science Cloud at the DOE booth to an engaged audience was truly energizing," said Shankar. Events like the AI+ Expo are critical because they bring together varied stakeholders to align capabilities around a shared goal: dramatically increasing the productivity, impact and

Source: Oak Ridge National Laboratory

competitiveness of American science and technology. - Gina Tourassi, ORNL Associate Laboratory Director for the Computing and Computational Sciences Directorate Demonstrating 3D printing, quantum materials and autonomous laboratories Other ORNL presenters included senior computational scientist Stephen DeWitt, who demonstrated an AI-driven system called LOOP that improves metal 3D printing by monitoring parts in real time and automatically adjusting the manufacturing process. The system combines AI agents, supercomputing and advanced manufacturing tools to produce reliable parts for critical energy infrastructure more efficiently. Yongqiang Cheng, who serves as a distinguished staff scientist at ORNL's Spallation Neutron Source , also demonstrated how AI and high-performance computing can help scientists better understand quantum materials by uncovering hidden spin interactions that drive their behaviors. Along with his team, their research showed how AI and advanced computing methods can analyze experimental data faster and more accurately, helping accelerate the discovery of materials for future technologies such as advanced electronics and quantum computing. Distinguished research scientist Rafael Ferreira da Silva demonstrated how ORNL uses OPAL , the Orchestrated Platform for Autonomous Laboratories, together with AI and supercomputing to automatically monitor and analyze plant growth at the Advanced Plant Phenotyping Laboratory. The system combines several types of plant images and processes them on the Frontier supercomputer to quickly predict plant traits across large populations, collapsing week-long detection cycles into sub-minute

Source: Oak Ridge National Laboratory

autonomous responses. “At ORNL's Advanced Plant Phenotyping Laboratory, we are building a specialized set of AI agents to coordinate imaging instruments, exascale inference on Frontier, and experimental decision-making inside a single closed loop,” said Ferreira da Silva. “We're moving past the era of AI as a research assistant and into one where agents actively run the science. Coupling foundation vision models with exascale-class agentic workflows turns high-throughput plant phenotyping into a discovery engine that learns continuously and steers itself, with scientists on the loop where it matters most.” Throughout the expo, ORNL researchers emphasized the laboratory’s broader vision for converged computing, integrating AI, high-performance computing, quantum information science and autonomous scientific workflows. The discussions reflected ORNL’s strategic focus on advancing energy-efficient AI, scientific automation and next-generation computing capabilities that strengthen U.S. leadership in science and technology. UT-Battelle manages ORNL for the Department of Energy’s Office of Science, the single largest supporter of basic research in the physical sciences in the United States. The Office of Science is working to address some of the most pressing challenges of our time. For more information, please visit energy.gov/science. – Mark Alewine Media Contact Scott Jones , Communications Manager, Computing and Computational Sciences Directorate , 865.241.6491 | JONESG@ORNL.GOV

Source: Oak Ridge National Laboratory

NASA Mission to Study Space Weather Impacts of Earth's Atmosphere

Artist's rendition of the DAPHNE (Dynamic Atmosphere-Ionosphere Explorer) mission concept. The coloring represents auroras and atmospheric waves in Earth's atmosphere. Credit: Laboratory for Atmospheric and Space Physics/Mary Tostanoski NASA selected a mission concept to research how space weather and dynamics within Earth's atmosphere influence the space environment and help improve prediction capabilities for impacts on crucial technology, such as GPS and low Earth orbit satellites, as well as astronauts in space. The DAPHNE (Dynamic Atmosphere-Ionosphere Explorer) mission will enter Phase B of development, which includes planning and design for flight and mission operations. It will use identical twin satellites to study how changes in Earth's lower atmosphere influence our planet's upper atmosphere, where space weather is manifested. "NASA is advancing the United States' leadership as a space weather-ready nation, and by providing new insights into Earth's atmosphere we can better predict and prepare for impacts in our daily lives on Earth and in space," said Nicky Fox, associate administrator, Science Mission Directorate, NASA Headquarters in Washington. "As NASA sends astronauts beyond Earth's magnetic protection to the Moon, Mars, and beyond, DAPHNE will join the NASA science fleet strategically located across the solar system to provide data that will help mission

Source: NASA

planners predict and mitigate the effects of space weather for the benefit of all.” The DAPHNE mission’s low-risk high-return concept will provide coordinated, multi-point measurements of neutral winds, temperature, and composition in the thermosphere. The ionosphere and thermosphere regions are where Earth’s neutral atmosphere transitions into the ionized plasma of space. In this thin shell that surrounds the planet, the atmosphere is in constant motion, shaped by the influence of solar activity and changes in the lower atmosphere and in near-Earth space. Fundamental observations and physical insights from the DAPHNE mission will incorporate lower-atmospheric energy data to advance space weather predictive capabilities. The mission is led by Aimee Merkel from the Laboratory for Atmospheric and Space Physics at the University of Colorado, Boulder. The mission will be subject to a confirmation review in 2027, which will assess the progress of the mission and the availability of funds. If confirmed, the total estimated cost of the mission, excluding launch, will not exceed $250 million in fiscal year 2023 dollars, with a mission launch date of no earlier than 2029. The DAPHNE mission was proposed as a concept study in response to the DYNAMIC (Dynamical Neutral Atmosphere-Ionosphere Coupling) mission announcement of opportunity. Funding and management oversight for this mission is provided by the Solar Terrestrial Probes program at NASA’s Goddard Space Flight Center in Greenbelt, Maryland. For more information on NASA’s heliophysics missions, visit: https://science.nasa.gov/heliophysics -end- Abbey Interrante / Karen Fox Headquarters, Washington 202-358-1600 ab-

Source: NASA

bey.a.interrante@nasa.gov / karen.c.fox@nasa.gov Share Details Last Updated Jun 18, 2026 Location NASA Headquarters Related Terms Earth Heliophysics Science Mission Directorate Space Weather

Source: NASA

USGS Releases Expedition Report for Samoa Basin Box Coring Effort

USGS Releases Expedition Report for Samoa Basin Box Coring Effort Read the expedition report By Coastal and Marine Hazards and Resources Program June 17, 2026 On leg three of the American Samoa Mapping Project, an interagency-supported hydrograph survey project led by NOAA and in partnership with BOEM, USGS collected box cores and interdisciplinary datasets to inform prospectivity analyses throughout the region. Learn more about the American Samoa Mapping Project USGS scientists led a box coring effort to the Samoa Basin, in order to characterize minerals and the surrounding abyssal sediments and fauna. Thirty-eight box cores were deployed between April 13, 2026 and April 28, 2026. Thirty-six box cores recovered some amount of sediment material, with 36 recovering sufficient material to determine nodule density, and 35 recovering sufficient material for subcores to be collected for further analysis. USGS personnel directed the sampling locations and took custody of the box cores once recovered shipboard. USGS personnel then photographed and described the cores, subsampled, conducted analyses including wet weights and time sensitive measurements, and preserved subsamples and additional components for future work. This report is an expedition summary with preliminary datasets; remaining data releases and publications will be forthcoming. Read the report: Samoa Basin Abyssal Mapping: Box Coring Leg Related Science March 30, 2026

Source: U.S. Geological Survey

American Samoa Mapping Project USGS scientists are leading a sampling effort to the Samoa Basin, offshore of American Samoa. This work is part of an interagency-supported three-month hydrograph survey project led by NOAA and in partnership with BOEM. By Ecosystems Mission Area , Natural Hazards Mission Area , Coastal and Marine Hazards and Resources Program , Pacific Coastal and Marine Science Center , Wetland and Aquatic Research Center American Samoa Mapping Project March 30, 2026 American Samoa Mapping Project USGS scientists are leading a sampling effort to the Samoa Basin, offshore of American Samoa. This work is part of an interagency-supported three-month hydrograph survey project led by NOAA and in partnership with BOEM. Learn More Items per page 6 12 Label June 15, 2022 Global Seabed Mineral Resources The Global Marine Mineral Resources project studies deep ocean minerals that occur within the U.S. Exclusive Economic Zone and areas beyond national jurisdictions. Our research concerns the setting, genesis, and metal enrichment processes of mineral occurrences, the relationship between marine minerals and deep-sea biota, and the potential geochemical footprint of any seafloor mining. We aim to... By Natural Hazards Mission Area , Coastal and Marine Hazards and Resources Program , Pacific Coastal and Marine Science Center , Deep Sea Exploration, Mapping and Characterization Global Seabed Mineral Resources June 15, 2022 Global Seabed Mineral Resources The Global Marine Mineral Resources project studies deep ocean minerals that occur within the U.S. Exclusive Economic Zone and areas beyond national jurisdictions. Our research

Source: U.S. Geological Survey

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Source: U.S. Geological Survey

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Source: U.S. Geological Survey

Sleep deprivation shows in your spit

Researchers have discovered signs of sleep loss in saliva. Acute sleep deprivation can be detected using just a single saliva sample, the researchers report. This method could help improve road safety and safety in high-risk professions in the future. Good sleep is essential for our physical and mental health. And yet, sleep problems are widespread. According to the latest Swiss Health Survey, around one-third of the population report suffering from sleep disorders. Women and young people aged 15 to 39 are particularly affected. Although sleep loss is widespread, it has not previously been possible to measure it directly and objectively in bodily fluids. A research team from the Institute of Forensic Medicine and the Institute of Pharmacology and Toxicology at University of Zurich (UZH) has now investigated whether sleep deprivation can be detected through metabolic changes in saliva. “Our study provides the first direct biomarkers of sleep deprivation in saliva under realistic conditions —a milestone for forensic research,” says Thomas Krämer, professor of forensic pharmacology and toxicology at the UZH Institute of Forensic Medicine. For the study, the researchers examined 20 healthy young men who normally sleep seven to nine hours. The participants completed three experimental conditions in random order: one night without any sleep, four consecutive nights of six hours’ sleep, and a control condition with the usual eight hours of sleep. The team then analyzed participants’ saliva

Source: Futurity.org

using high-resolution mass spectrometry and employed machine-learning methods to identify molecular patterns associated with acute sleep deprivation. “We found that acute sleep deprivation affects about 10% of all biomolecules in saliva. The challenge was to identify, among tens of thousands of molecules, those that reliably indicate fatigue. Using state-of-the-art technology, we succeeded in identifying 10 biomarkers that do exactly that,” says first author Michael Scholz. As part of his doctoral research, he investigated in depth how fatigue can be measured in the body. The project is now entering its next phase. In a large-scale international field study, the patented biomarker set will be validated under realistic conditions. The researchers will investigate whether the method can reliably detect sleep deprivation in a range of everyday situations involving shift work, alcohol, medications and other factors. In the long term, this research could lead to the development of a rapid test that can be used on-site to objectively detect fatigue. “Such a test could improve road safety and enhance safety in work environments where attention and concentration are critical,” says Scholz. The study appears in the Journal of Proteome Research . Source: University of Zurich The post Sleep deprivation shows in your spit appeared first on Futurity .

Source: Futurity.org

Tagged and Tracked: Mapping the Journeys of Pacific Cod in the Bering Sea

Pacific cod support Alaska’s second largest groundfish fishery and play a critical role in the Bering Sea ecosystem. In recent decades—particularly from 2017 to 2019—the Bering Sea experienced unusually warm temperatures and minimal sea ice. These conditions appear to have shifted Pacific cod distributions farther north compared to colder years, raising questions about long-term changes in population distribution and demographic structure. Understanding a Shifting Species In response to industry concerns and scientific data needs to support management, a research team launched a satellite tagging study in 2019 . Led by Dr. Susanne McDermott—the Gulf of Alaska bottom trawl survey lead—the team included fisheries biologists Julie Nielsen, Kimberly Rand, and many others. McDermott recalled, “There was tremendous anxiety over what’s going on. Why are these fish in different places? Is this something that's changing on a population level? Is this just the same population moving into different areas?” The summertime distribution of Bering Sea Pacific cod is usually centered in the southeastern portion of the region. Cod distribution typically varies with the extent of sea ice in the Bering Sea during the previous winter. It shifts northward in warm years and southward in cold years. However, beginning in 2017, the Bering Sea experienced unprecedented warming that resulted in greatly reduced sea

Source: NOAA Fisheries

ice. In conjunction with warming waters, the summertime distribution of Pacific cod shifted dramatically northward into the northern Bering Sea. This study aimed to determine whether cod observed in the northern Bering Sea during the summers of 2017 and 2018 were a separate population from the southeastern Bering Sea. Or were they migrants? Tagging fish can be a critical tool for understanding how and when fish cross regulatory boundaries. “When fish move across management boundaries, it really affects our management of that species because fishermen usually get assigned a certain quota in a certain management area. So, if fish move from one management area to another, they may not be able to catch them anymore,” explained McDermott. “That has a huge impact on the commercial fleet.” Satellite Tagging for Management Insight To answer these questions, the team deployed pop-up satellite archival tags to track the movements of Pacific cod. These tags collected high-resolution data on depth, temperature, light levels, and acceleration, providing a dynamic view of both fish behavior and their surrounding environments. Light data allowed estimates of latitude and longitude based on time of sunrise, sunset, and local noon. Researchers used information on depth, longitude, and sometimes latitude to estimate daily locations of tagged cod using a geolocation model. Simultaneously being able to understand what time of day, season, environmental habitat, or region a fish is actively swimming in has provided critical insight into their behavior. The tags detach from the fish after a programmed length of time, such as 30, 90, or 300 days. They float to the surface and transmit their data to the Argos satellite

Source: NOAA Fisheries

network . The number of tag transmissions were limited by battery life and summarized for transmission. Tags that were physically recovered—mailed back by fishers or beach combers—provided the full suite of data collected by the tags. Nielsen was the team’s tag and modeling expert: “When you get the tag back,” Nielsen remarked, “you get data every second if it’s programmed for 90 days, every three seconds if it is out for 6 months or less, or every 5 seconds if it's out for a year or longer.” Rand assisted the team by processing the satellite tag models, communicating results, and writing manuscripts. “It's really exciting when we dive into the data to find new and exciting patterns—things we haven't seen before,” Rand shared eagerly. “We also collect genetics and otoliths for ages. It’s part of this comprehensive ecological picture.” Rand has witnessed the evolution of tagging research technology, including early catch-and-release studies with conventional “spaghetti” tags. Those conventional tags only provided information on release and recovery locations. Detecting seasonal movements was very difficult if tagged fish moved away after tagging but returned prior to recapture. In contrast, pop-up satellite archival tags provided a detailed understanding of seasonal movements even if the tagged fish is not recaptured. Data That Drive Discovery For this study, Pacific cod were tagged in both the summer and winter to track their movements year-round. Nielsen developed models that use the satellite tag data to reconstruct individual movement paths for the fish, and to deduce behavior. These contribute to a clearer understanding of cod life history. In the Bering Sea, the results indicated behavioral

Source: NOAA Fisheries

trends : August–November: Foraging December–January: Transition period February–April: Spawning May–July: Return migration Pacific cod tagged in summer in the northern Bering Sea left the area in November ahead of oncoming sea ice. Many went to traditional spawning areas in the eastern Bering Sea. However, some fish moved to Russian waters or the Gulf of Alaska during the winter, suggesting greater seasonal connectivity than expected. This demonstrated movement across international and management boundaries. Supporting Resilient Fisheries The team works with stock assessors to determine how these data and insights can be applied to stock and ecosystem assessments mandated under the Magnuson-Stevens Act . The team strategizes with the assessors to prioritize where they should release tags next to fill knowledge gaps. The effort helps to develop and support a framework for multi-area stock assessment models that incorporate fish movement across management zones. “We’ve all worked together for a long time,” Rand shared, and “really care about the fishery.” This research advances our understanding of how Pacific cod —and marine species more broadly—may adapt to climate-driven shifts in their environment. As the oceans continue to warm, these efforts will be useful for maintaining sustainable fisheries and resilient marine ecosystems. As scientists continue to evolve tagging methods, these advancements will help sustain healthy fish populations and support the broader marine ecosystem.

Source: NOAA Fisheries

Activity Time - Word Search

Find the words below in the puzzle. Words go across or down only.

Words to Find:

R	M	S	T	P	P	Q	H	Q	L	G
P	L	M	J	C	I	B	A	A	T	W
S	H	X	A	Y	O	S	Q	V	C	A
M	T	K	O	M	H	N	Z	N	O	H
H	V	F	K	H	P	E	N	R	A	Y
Q	P	U	Z	K	A	V	I	G	E	X
T	B	C	Z	G	B	A	Z	O	H	Y
R	F	F	W	Y	Q	E	Q	T	M	B
P	L	Y	I	U	E	L	P	S	H	N
F	U	Y	K	V	P	D	B	F	J	E
O	O	H	Z	P	P	Z	J	A	J	O