

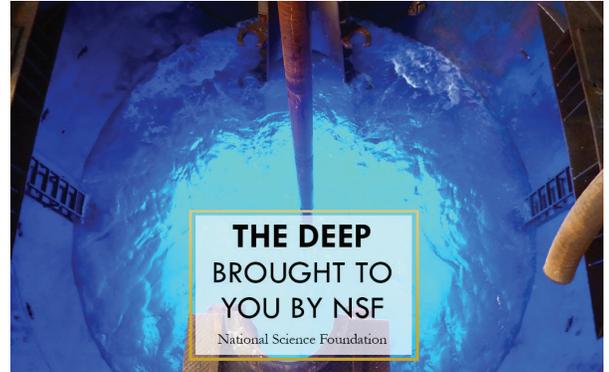


June 28, 2019

01

Brought to you by NSF

Before the internet was commercialized, before your phone was smart, before there was a picture of a black hole, there was an NSF-funded researcher pursuing their curiosity. NSF-funded research has laid the foundation for many of the groundbreaking discoveries and game-changing technologies we know today. Check out 12 irreplaceable innovations made possible by NSF, part of our “Brought to you by NSF” campaign, in this [NSF Special Report](#).



02

NSF-supported Frontera named 5th fastest supercomputer in the world

The NSF-supported Frontera supercomputer at the Texas Advanced Computing Center earned the number five spot on the Top500 list, which ranks the world’s most powerful non-distributed computer systems twice a year. Located at The University of Texas at Austin, Frontera is the fastest university supercomputer in the world. To match what Frontera can compute in just one second, a person would have to perform one calculation every second for about a billion years. Frontera will provide researchers with the most advanced capabilities for science and engineering when it goes into full operation later this summer. Find out more in this [NSF Research News](#) item.



03

NSF joins federal partners in announcing update to national AI research and development strategic plan

NSF joins other federal agency partners in announcing the release of the 2019 Update to the National Artificial Intelligence (AI) Research and Development (R&D) Strategic Plan. The 2019 National AI R&D plan offers a national agenda on AI science and engineering and follows the launch of the American AI Initiative earlier this year. Learn more in this [NSF News Release](#).



04

Discovery sheds light on next-generation solar cell technologies

Halide perovskite solar cells hold promise as the next generation of solar cell technologies, but while researchers have developed techniques for improving their material characteristics, no one has understood why these techniques worked. New NSF-supported research sheds light on the science behind these engineering solutions and paves the way for developing more efficient halide perovskite solar cells. Read more in this [NSF Research News](#) item.



05

Engineers create a simple test that can measure stress

NSF-funded researchers at the University of Cincinnati developed a new technology that can easily test and measure common stress hormones in sweat, blood, urine or saliva using ultraviolet light. Eventually, they hope to turn it into a simple device that patients can use at home to monitor their health. Stress biomarkers can be found in all these fluids. Learn more in this [NSF Research News](#) item.



06

Early season hurricanes result in greater transmission of mosquito-borne infectious disease

The timing of a hurricane is one of the primary factors influencing its impact on the spread of mosquito-borne infectious diseases such as West Nile virus, dengue, chikungunya and Zika, according to an NSF-supported study led by Georgia State University. Researchers from Georgia State and Arizona State University developed a mathematical model to study the impact of heavy rainfall events such as hurricanes on the transmission of vector-borne infectious diseases in temperate areas of the world, including the southern coastal U.S. In the aftermath of this type of extreme weather event, the mosquito population often booms in the presence of stagnant water. At the same time, the breakdown of public and private health infrastructure can put people at increased risk of infection. Read more in this [NSF Research News](#) item.



07

Scientists solve longstanding mystery: Why atmospheric carbon dioxide was lower during ice ages

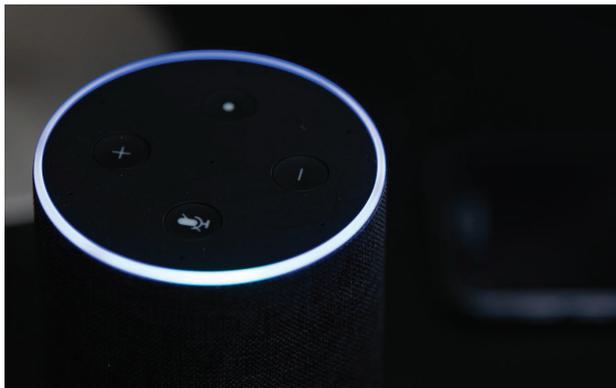
Since scientists first determined that atmospheric carbon dioxide (CO₂) was lower during ice ages than during warm phases, they have looked at why, theorizing that it may be a function of ocean circulation, sea ice, iron-laden dust or temperature. Yet, no computer model has been able to explain why CO₂ levels were as much as one-third lower when an ice age settled in. Now, a new study supported by NSF offers a compelling answer -- a combination of temperature variation in seawater and iron from dust off Southern Hemisphere continents. Read more in this [NSF Research News](#) item.



08

Researchers develop first contactless cardiac arrest AI system for smart speakers

Almost 500,000 Americans die each year from cardiac arrest, when the heart suddenly stops beating. People experiencing cardiac arrest suddenly become unresponsive and stop breathing or begin gasping for air, a sign known as agonal breathing. Immediate CPR can double or triple someone's chance of survival, but that requires a bystander to be present. NSF-supported researchers at the University of Washington have developed a new tool to monitor people for cardiac arrest while they're asleep. A smart speaker -- like Google Home or Amazon Alexa -- or a smartphone lets the device detect the gasping sound of agonal breathing and call for help. On average, the proof-of-concept tool, which was developed using real agonal breathing instances captured from 911 calls, detected agonal breathing events 97% of the time from up to 20 feet away. Find out more in this [NSF Research News](#) item.



09

Stabilizing food production through crop diversity

With increasing demand for food by the planet's growing human population, and climate change threatening the stability of food systems around the world, University of Minnesota researchers affiliated with NSF's Cedar Creek Long-Term Ecological Research site examined how a nation's crop diversity could increase its harvest stability. The researchers found that countries with some of the lowest crop diversities experienced a severe food shortage about every eight years; those with some of the highest crop diversities experienced a severe food shortage about every 100 years; and that robust irrigation capabilities have significant stabilizing effects on crop production, leading to fewer years with severe food shortages. Learn more in this [NSF Research News](#) item.



10

Stable, strongly magnetized plasma jet created in laboratory

Scientists for the first time have created a form of coherent and magnetized plasma jet that could deepen understanding of larger plasma jets that stream from newborn stars and possibly black holes. The research team, supported in part by NSF, created the jets using the OMEGA Laser Facility at the University of Rochester. Researchers aimed 20 laser beams into a ring-shaped area on a plastic target. Each laser created a tiny puff of plasma; as the puffs expanded, they put pressure on the inner region of the ring. That pressure squeezed out a plasma jet reaching more than 4 millimeters in length and created a magnetic field that had the strength of more than 100 tesla. Find out more in this [NSF Research News](#) item.

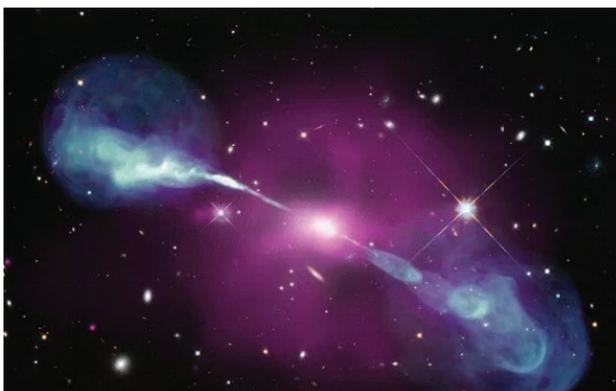


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