



WEATHER REPORT: The Aurora Australis over the South Pole. KEITH VANDERLINDE/NSF

## Autonomous Antarctic observatories gather space weather data

National Science Foundation

An international scientific consortium has successfully developed a series of autonomous observatories in Antarctica that for the first time provide critical year-round "space weather" data from Earth's harshest environment.

Recently, data from these observatories was used in conjunction with the National Aeronautics and Space Administration's array of THEMIS satellites to reveal new information about magnetospheric substorms—the sudden release of energy that causes auroral displays.

"The Antarctic is magnetically connected to vast regions of space and the solar wind, and provides a unique window to observe dynamic processes in Earth's upper atmosphere and beyond," said Allan Weatherwax of Siena College.

Weatherwax and Marc Lessard, of the Institute for the Study of Earth, Oceans and Space at the University of New Hampshire, are co-principal investigators for the multi-institutional project known as the Polar Experiment Network for Geospace Upper-atmosphere Investigations (PENGUIn).

In addition to the University of New Hampshire and Siena College, the PENGUIn science and engineering team includes investigators from

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Augsburg College, the University of California-Berkeley, Dartmouth College, the University of Maryland, the New Jersey Institute of Technology, Stanford University, Virginia Polytechnic Institute and State University, the University of Michigan, and Japan's Tohoku University.

The U.S. investigators were supported by the National Science Foundation, which administers the U.S. Antarctic Program.

The suite of remote observatories ranges in size and complexity from multi-instrumented platforms that run on solar and wind power and

provide around-the-clock, real-time data to microwatt units that collect and store data for retrieval.

The observatories gather data on the interaction of solar-wind energy with Earth's magnetic field lines, which arc high above our atmosphere and connect at both the North and South poles. Gathering such information in Antarctica is significantly more challenging in comparison to the more populous and relatively milder Arctic.

"In order to fully understand the phenomena we're studying, you have to know what happens with the field lines at both the poles," notes Lessard.

Earth's magnetic field extends far into space, where energy from the solar wind can be readily transferred to our "magnetosphere." A vast amount of energy follows magnetic field lines to the vicinity of the poles, driving aurora and other phenomena at high latitudes. By measuring such things as magnetic field variations, auroral emissions, and other phenomena, scientists are learning more about space weather.

The term "space weather" generally refers to conditions on the sun, in the solar wind, and within Earth's magnetosphere and upper atmosphere that can influence the performance and reliability of space-borne and ground-based

technological systems and can pose risks to astronauts and people on-board aircraft in polar regions.

Besides emitting a continuous stream of plasma (solar wind), the sun periodically releases billions of tons of matter via coronal mass ejections. These immense clouds of material, when directed toward Earth, can cause large magnetic storms in the space environment around Earth or "geospace"—the magnetosphere and the upper atmosphere.

The automated observatories have been developed over a period of years, evolving from platforms that ran on fossil fuels and required frequent maintenance to the more efficient, modular observatories that can be easily transported and installed at remote locations with extreme climates. In addition, the new-generation observatories operate by solar and wind energy alone and transfer data via satellite uplinks.

As energy from the solar wind is transferred to Earth's magnetic field, it is sometimes stored for a period of time and then released to deliver large fluxes of energetic particles. The combined satellite and observatory data showed for the first time that some of these energetic particles reach very high latitudes as they collide with Earth's upper atmosphere.

## The Coso artifact

By LEONARDO VINTINI  
Epoch Times Staff

An Oopart (Out Of Place Artifact) is a term applied to dozens of prehistoric objects found in various places around the world that, given their level of technology, are completely at odds with their determined age based on physical, chemical, and/or geological evidence. Ooparts often are frustrating to conventional scientists and a delight to adventurous investigators and individuals interested in alternative scientific theories.

Collecting specimens for their rock shop during an expedition in 1961, treasure hunters Wallace Lane, Virginia Maxey, and Mike Mikesell came across a strange artifact high in California's Coso Mountains.

The group was on their usual field search, looking for geodes for their store. But the next day when Mikesell began cutting the finds open to prepare them for display, one specimen proved so hard that it ruined his new diamond saw blade. Instead of the quartz crystal layer normally present inside a geode, he found a porcelain-like component embedded in the stone.

Maxey contacted a geologist who, noting the fossilization present around the embedded specimen, dated the stone-trapped artifact between 100,000 and 500,000 years old. Unsure of what to do next with their unusual find, the group sent their artifact to the Charles Ford Society, which produced x-rays that were able to offer further detail to the object.

Researchers were stunned to find that the component found inside exhibited a technological level similar to that of our current civi-

lization. This finding suggested that an ancient culture may have attained a technical ability similar to modern times.

Naturally, not everyone believed the ancient artifact story. In particular, researchers Pierre Stromberg and Paul Heinrich insisted that the find was simply a modern spark plug. They argued that it could have remained trapped in the ferrous concrete formed by the oxidation of the object, giving the appearance of an ancient relic.

As investigation into the Coso artifact continued, x-rays of the object were sent to four different spark plug collectors throughout the U.S. to test the "spark plug" theory.

In 1999, Spark Plug Collectors of America (SPCA) President Chad Windham, who initially believed that the x-rays were a practical joke being played on the spark plug collector community, concluded that the specimen was actually a Champion model spark plug from the 1920s. He identified it as the kind of plug that would have been found in the Ford Model-T. Thus many concluded that the specimen was merely a component from an old vehicle that had been up in the mountains.

Yet many still insist that the rock-embedded component exhibits noticeable differences from the plug Windham describes. They point to a spring or helix at one end of the component that is not exhibited in a modern spark plug. Some even believe that the component may be a part from a time machine that got left behind. However, further study of the specimen is now impossible. The whereabouts of the Coso artifact, like that of other contentious Ooparts, remains unknown.

## Satellite data shows Arctic on thinner ice

LOS ANGELES (Reuters)—Arctic sea ice, a key component of Earth's natural thermostat, has thinned sharply in recent years with the northern polar ice cap shrinking steadily in surface area, government scientists said.

'It's not a matter of if, it's a matter of when.'

—Walter Meir, National Snow and Ice Data Center in Boulder, Colo.

with reporters. "The thicker ice particularly is very important, because it's the thicker ice that survives the summer to stay around and reflect that summer sunlight."

Walter Meir of the National Snow and Ice Data Center in Boulder, Colo., added, "We're getting an ice cover as we finish the winter and head into summer that's much more vulnerable to the summer melt and much more likely to melt completely and expose that dark ocean."

The decade-long trend of a contracting ice cap around the North Pole is continuing as well.

The maximum extent of Arctic sea ice for the winter of 2008-09 was measured at 5.85 million square miles, the fifth-lowest winter peak on record. That tally represents a loss of some 278,000 square miles, about the size of Texas, from the winter peak averaged from 1979 to 2000.

The six lowest measurements since satellite monitoring began in 1979 have all occurred in the past six years.

Still, the total volume of sea ice in the Arctic during winter is estimated to contain enough water to fill Lake Michigan and Lake Superior combined.

Meir said there are consequences of an Arctic thaw beside a speed-up of global climate change and the survival of wildlife that depend on the polar ice.

Vanishing summer ice will open new navigation routes for shipping, opportunities to develop the region's natural resources, and competition among northern nations to lay claim to parts of the Arctic, he said.

Meir said a strong consensus has emerged among climate scientists that the Arctic is headed for its first largely ice-free summer in the relatively near future, with forecasts running as early as 2013, though he sees that as too soon.

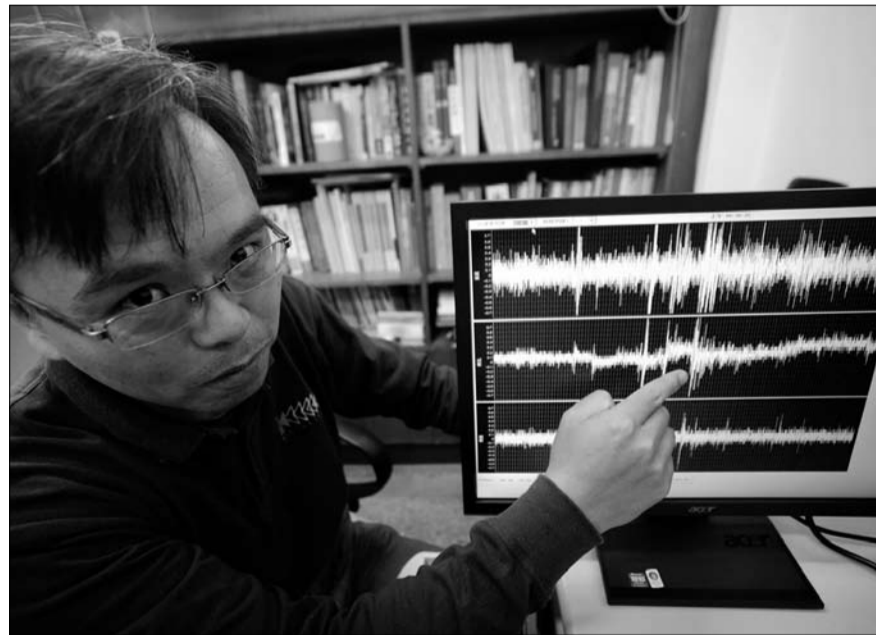
In any case, he added, "It's not a matter of if, it's a matter of when."

## Taiwan researchers invent quake sensing tool

TAIPEI (Reuters)—A research team at Taiwan's top university has rolled out a tiny low-budget device that can sense earthquakes within 30 seconds, enough time to issue crucial disaster warnings, the lead inventor said.

'We can tell within 30 seconds whether it's going to be a big or small quake.'

—Wu Yih-min, National Taiwan University Department of Geosciences



EARLY WARNING: Wu Yi-min, associate professor of National Taiwan University's Department of Geosciences, explains seismic curves displayed on a monitor in Taipei. SAM YEH/AP/GETTY IMAGES

University Department of Geosciences.

The tool is more precise than similar technology used overseas, and

could cost as little as \$302 once it reaches the market, said Wu, whose skeleton research team invented the tool after about five years of study.

"We can tell within 30 seconds whether it's going to be a big or small quake," Wu told reporters. "We can sense the scale and how much damage it's likely to cause."

The tool, which should be fastened to a place unlikely to be shaken by forces other than earthquakes, uses a chip that costs just a few U.S. dollars, Wu said.

Schools, railway systems, and nuclear power plants would benefit from the technology, said Kuo Kai-wen, seismological center director with Taiwan's Central Weather Bureau, which helped the university test its device.

But before it can be used, researchers must figure out how to link it to computerized alert systems, Kuo said.

The university has not yet applied for a patent, Wu said.

Taiwan is prone to earthquakes, logging 20 minor ones in the past 2-1/2 weeks.

In May 2008, a 7.9 magnitude quake hit Sichuan Province of southwest China, killing about 70,000 people and leaving more than 10 million homeless.

## Solar-powered cooker wins \$75,000 climate prize

OSLO (Reuters)—A \$6 cardboard box that uses solar power to cook food, sterilize water, and could help 3 billion poor people cut greenhouse gases, has won a \$75,000 prize for ideas to fight global warming.

The "Kyoto Box," named after

the United Nations' Kyoto Protocol that seeks to cut emissions of greenhouse gases, is aimed at billions of people who use firewood to cook.

Costing \$6.60 to make, it can also make it easier to boil polluted water.

"We're saving lives and saving trees," the Kyoto Box's developer Jon Boehmer, a Norwegian based in Kenya, said in a statement.

The FT Climate Change Challenge was backed by the Financial Times, technology group Hewlett-Packard, which sponsored the

award, and development group Forum for the Future.

The other four finalists were a garlic-based feed additive to cut methane emissions from livestock, an indoor cooling system using hollow tiles, a cover for truck wheels to reduce fuel use, and a

"giant industrial microwave" for creating charcoal.

A statement said that Boehmer would carry out trials in 10 countries, including South Africa, India, and Indonesia. He would then collect data to back an application for carbon credits.

The United Nations is discussing giving credits to developing countries that preserve tropical forests, which soak up carbon as they grow. Those credits could then be traded.

Many countries are looking for cheap green ways to stimulate economies mired in recession. More than 190 nations have agreed to work out a new U.N. climate pact to succeed Kyoto at a meeting in Copenhagen in December this year.