bolted onto the back of a flatbed truck that scientists position in the path of hurricanes and tornados. It takes high-resolution measurements of wind speed and direction, as well as the speed and quantity of precipitation, in real time.

Wurman and his colleagues measured a surprising mosaic of wind speeds in Harvey and Irma. Some pockets within the hurricanes had wind speeds of up to 225 kilometres per hour (140 miles per hour), nearly 30% higher than those of nearby pockets. "In Harvey, 140-mile-per-hour gusts were ripping apart buildings and throwing cars," says Wurman. Understanding where the most extreme winds will materialize in a hurricane can help to improve the accuracy of public warnings, he says.

SHELTER IN PLACE

The DOW crew was able to leave Texas and Florida soon after gathering the data. But the scientists who took shelter in the Archbold Biological Station — which is nestled in the headwaters of the Everglades wetland region in Venus, Florida — live and work in the state.

Evelyn Gaiser, an aquatic ecologist at Florida International University in Miami, was one of the researchers who weathered Irma at the station. After the storm, she says, "we were all outside collecting data".

Roughly 50 researchers work from the station throughout the year, says biologist Hilary Swain, Archbold's executive director. Their projects range from monitoring the area's lakes and ecosystems to carrying on a long-term observational study of a population of Florida scrub jays (*Aphelocoma coerulescens*) listed as threatened by the federal government. Initial checks on the birds found that they had weathered Irma just fine.

Gaiser studies nearby Lake Annie, and found that Irma had upended its temperature profile. Normally, layers of warm water rest on top of cooler layers — but the hurricane brought colder waters to the surface. In the next few months, Gaiser will be monitoring whether or not that inversion has affected the lake's plant communities.

"It's a little less the science we're worried about. It's the people."

Another priority for Gaiser is checking on a long-term ecological research project that she oversees in Everglades National Park in south Florida. Officials closed the park on 6 September in preparation for Irma and started reopening certain areas on 21 September. Gaiser is not sure when her team will be able to access the project's sites.

Increased amounts of salt water, carried in by storm surges, can disrupt the delicate balance of fresh- and saltwater systems that shape the region. "Fresh water is the lifeblood of the Everglades," Gaiser says. She is anxious to see how the mix of water from the storm surge, rain and run-off has affected the health of the wetlands, and is planning to submit a proposal for a rapid-response research grant from the US National Science Foundation to help collect those data.

SALTING A MARSH

Merryl Alber, a marine ecologist at the University of Georgia in Athens, will be taking similar measurements at sites for her own long-term ecological research project on Sapelo Island, a barrier island off the Georgia coast that was also affected by Irma. In an ongoing experiment in the island's freshwater marshes, her team adds diluted salt water to 6.25-square-metre plots to simulate salinity increases from rising sea levels, storm surges or droughts.

After Irma, Alber returned to Sapelo briefly to check her experimental sites. She found that a 1.5-metre-high storm surge had raised salinity to 5 times the base levels in the artificially salted sites.

Irma's storm surge was a naturally occurring amplification of the experiment that Alber and her team have been doing for years, and Alber plans to compare its effects with their past findings. But that will take time. The labs and some of the researchers' homes on the island flooded during the storm.

The team will follow through on its annual data collection at the long-term research sites, says Alber. But with so much destruction in the region, her work isn't the only thing on her mind. "It's a little less the science we're worried about. It's the people." ■

SPACE

Most-energetic cosmic rays originate outside Milky Way

Giant observatory in Argentina finally confirms long-suspected theory.

BY DAVIDE CASTELVECCHI

The Pierre Auger Observatory in Argentina finally has solid evidence that the most energetic particles in nature come from sources outside the Milky Way. Scientists have suspected this for decades, but weren't able to confirm it — until now.

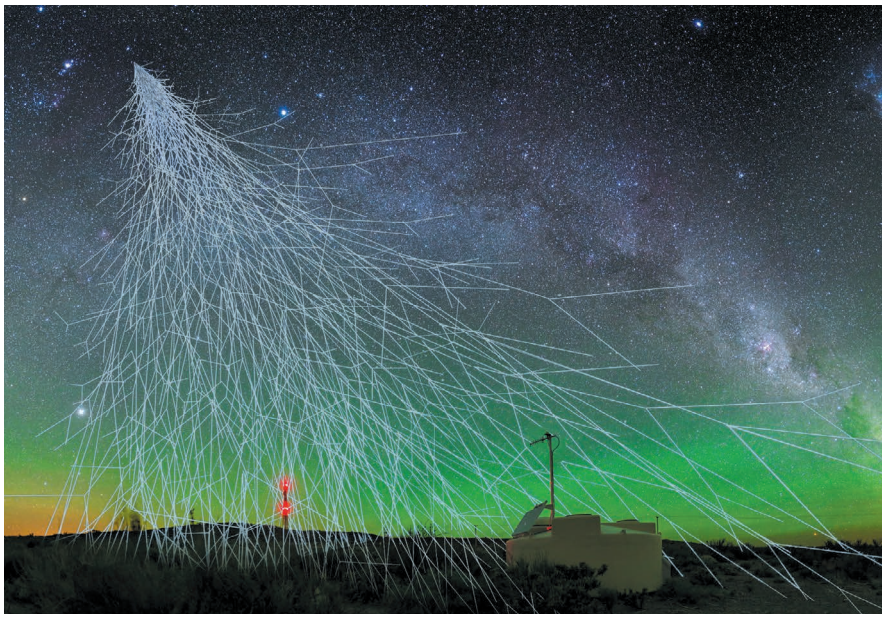
"For the first time, we have proof that the highest-energy cosmic rays are of extragalactic origin," says Alan Watson, a UK astronomer and co-founder of the observatory. The result comes as a relief to the researchers, after previous claims regarding the rays' origin made ten years ago by the Pierre Auger Collaboration turned out to be premature.

The international team analysed 12 years' worth of data, and found that particles in the upper range of energies were more likely to come from a region of the sky outside the Milky Way's disk. That asymmetry is roughly consistent with the distribution of neighbouring galaxies, the researchers report in the 22 September issue of *Science* (The Pierre Auger Collaboration *Science* **357,** 1266–1270; 2017). The study does not pinpoint individual sources of the cosmic rays, or explain how they reach their highest energies. But the researchers hope that it is a first step towards understanding the rays' origins.

Most cosmic rays are protons or other charged particles, including atomic nuclei as heavy as iron. When such a particle collides with an atomic nucleus in Earth's atmosphere, it produces a shrapnel burst of subatomic particles. These hit other nuclei and produce more particles, generating an invisible 'shower' that is often spread over many square kilometres by the time it hits the ground.

To detect these showers, the Pierre Auger Observatory has 1,600 car-sized water tanks at 1.5-kilometre intervals, covering 3,000 square kilometres of grassy plains in Argentina's Mendoza province. Four sets of telescopes monitor the sky over the array, and — on moonless nights — can detect flashes of ultraviolet light generated by the showers. From its location relatively close to the equator, the array can pick up cosmic rays from 85% of the celestial sphere.

The observatory needs to be so big in order to catch enough of the most-sought-after particles. Cosmic rays have been detected



A. CHANTELAUZE/S. STAFFI/L. BRET

An artist's impression shows how a high-energy cosmic ray creates a broad spray of particles.

with energies beyond 10^{20} electronvolts (eV); by comparison, the Large Hadron Collider near Geneva, Switzerland, the world's most powerful particle accelerator, pushes protons to just 7×10^{12} eV. However, cosmic rays become increasingly rare the higher their energies. A particle in the 10^{20} eV range, on average, hits a square kilometre of Earth only once per century.

The researchers looked at 32,187 particles that had energies above 8×10^{18} eV, detected by the observatory from its beginning in 2004 until 2016. The Galaxy's magnetic field bends the paths of charged particles, and this can randomize their direction by the time they hit Earth. But these particles were still 6% more likely than average to come from a particular region of the sky, which is outside the Milky Way's disk.

SURPRISE SKEW

Most researchers expected a skew, but not such a strong one, says Piera Ghia, an astroparticle physicist at the CNRS Institute of Nuclear Physics in Orsay, France, who helped to coordinate the data analysis. Astrophysicist Francis Halzen of the University of Wisconsin–Madison agrees. "It's really very big. To me, it was a surprise," says Halzen, who is spokesperson for IceCube, a major neutrino observatory at the South Pole.

When magnetic deflection is taken into account, the asymmetry seen by the Pierre Auger Observatory is consistent with the distribution of galaxies lying within about 90 megaparsecs (around 300 million light years) of the Milky Way, says Silvia Mollerach, an Auger astrophysicist at the Balseiro Institute in San Carlos de Bariloche, Argentina.

The results strongly disfavour the supermassive black hole at the centre of the Milky Way as a major source of the higher-energy particles. "The most likely sources continue to be the usual suspects," Mollerach says: astrophysical phenomena that generate extremely intense magnetic fields, inside which charged particles can pinball around and gain energy. These include active galactic nuclei — supermassive black holes spewing jets of matter at near-light speed — and the stellar explosions called γ-ray bursts.

The latest claim is quite conservative compared to one that the collaboration made in 2007. Back then, it found a correlation between 27 extremely high-energy cosmic rays (above 57×10^{18} eV) it had seen up until that point and a set of known active galactic nuclei (The Pierre Auger Collaboration *Science* **318,** 938–943; 2007). The paper caused a sensation, but the statistical significance of the result was weak and soon melted away as the array collected more data. "In retrospect, it was a mistake that we published too early," says Auger spokesperson Karl-Heinz Kampert, a physicist at the University of Wuppertal in Germany.

"I don't think there is any doubt about the statistical significance."

This time, the team took no chances: it accumulated much more data and is confident that the results are solid, Kampert says. Halzen agrees. "I don't think there is any doubt about the statistical significance" of the latest results, he says.

Now that the researchers have more data, they will again try to find correlations with potential sources. The results of that study should appear within a few months. The collaboration also plans to join forces with a smaller observatory in Utah, the Telescope Array, to try to map the origins of cosmic rays across the entire sky. ■

POLITICS

German vote opens policy rift

Expected coalition could spar over climate regulation.

BY QUIRIN SCHIERMEIER AND ALISON ABBOTT

As Germany reels from an unexpected surge for the far right in the 24 September elections, researchers don't expect much effect on the country's generous support for science. But battles over how to cut greenhouse-gas emissions could grow fiercer.

Angela Merkel is set for a fourth term as Germany's chancellor after her centre-right Christian Democratic Union (CDU) won the largest share of seats in parliament, albeit with a diminished lead. Her coalition partner in the last government, the Social Democrats, came second, but lost support and pledged to move into opposition. Merkel will lead negotiations with other parties to form a coalition government; she hopes to do so by the end of this year.

Merkel has ruled out — as too radical — partnerships with the far-right AfD (Alternative for Germany) party and the socialist Left Party. Most expect her to strike an agreement with the Green Party and the liberal Free Democrats (FDP). Negotiations are expected to focus on political issues such as Germany's handling of the refugee crisis. But the country's climate and energy policies could be another area of conflict within the coalition, says Oliver Geden, a policy expert with the German Institute for International and Security Affairs in Berlin. The Greens want to shut down the country's dirtiest coal power plants, and support a climate-protection law to help Germany meet its plans to reduce greenhouse-gas emissions. But the FDP, a pro-business party, advocates against detailed central planning to force cuts to emissions — of the sort that has previously been proposed both by the Greens and by the outgoing coalition.

The strong presence of the AfD in parliament will make for noisy debates. Having won almost 13% of votes, the party is now the third largest. The AfD did not make election statements on science, but party leaders have previously expressed climate scepticism. The AfD's rise means that for the first time, a party is represented in parliament that opposes Germany's plans to move to renewable-energy sources. But its sceptical stance on climate and energy issues is unlikely to sway the next government, Geden says. ■

See go.nature.com/2hsmn53 for a longer version of this story.