



# Frequently Asked Questions about the Arecibo Observatory

## **What is the Arecibo Observatory and what did it do?**

For fifty years, the 1000-foot dish at Arecibo, Puerto Rico, was the largest radar and radio telescope in the world, working together with other instruments to study astronomical, asteroid, planetary, space, and atmospheric radar and radio science.

The telescope underwent two major upgrades, leading to many crucial discoveries and a Nobel Prize, awarded for Arecibo's validation of Einstein's theory of general relativity. Millions of taxpayer dollars were invested in this remarkable facility. Thanks to Arecibo, we know the details about the shapes and orbits of potentially dangerous near-Earth asteroids, including the one NASA's DART spacecraft just nudged. Arecibo was key to revealing a secret nuclear test known as the Vela incident, and has more than once assisted NASA in regaining contact with lost deep space probes worth billions of dollars. The first message sent from Earth aimed at contacting possible other intelligent beings is called the Arecibo message, because it was transmitted by the Arecibo radar. The first exoplanets were discovered by Arecibo. And there's more.

## **Why did the telescope collapse?**

The 900-ton suspended instrument platform collapsed into the dish on December 1, 2020, because of the failure of one of the main support cables. The National Academy of Sciences is still studying the reasons, but it was most likely due to a manufacturing defect in the cable.

## **Can't scientists use other observatories for research they used to do at Arecibo?**

Arecibo's capabilities are unmatched for detailed mapping of asteroids and their orbits, long-term high-resolution climate data sets, and the effects of geomagnetic storms on spacecraft, communication and navigation systems, and electric power grids on Earth. It's also a key location for mapping space weather, and for national defense monitoring.

## **Wasn't Arecibo out of date at the time it collapsed?**

The telescope underwent two major upgrades, there were multiple smaller upgrades to the radio and radar systems, and it continued to make major discoveries. The only comparable single dish radio telescope, the FAST dish in China, has a much more limited frequency range and no radar capabilities whatsoever. The radio/radar combination is part of Arecibo's uniqueness.

## **If the U.S. is going to rebuild, why not do it in a different location?**

Arecibo lies in the hurricane corridor between the equatorial Atlantic and the U.S. east and Gulf coasts, and at the end of the earth's magnetic field lines originating in a region called the South Atlantic Anomaly, which is important for space weather. Arecibo is close to the equator, giving an excellent view of asteroids, comets, and planets, which is critical for detecting near-Earth objects and potential Earth impactors, and for astronomical studies of our galaxy. Arecibo already has equipment, trained staff, software, and infrastructure – and a carefully negotiated radio quiet zone which has been protected for more than fifty years.

## **Doesn't NSF plan to fund some science at Arecibo?**

Only if it complements the new STEM education center. It's a huge demotion for what was one of the great observatories in the world, and, since the STEM educators would no longer be Arecibo staff, but would come from local universities, it will likely amount to a net loss for STEM education in Puerto Rico. If NSF is serious about expanding the number of underrepresented people in science, the last thing it should do is cut out the science mission of this great institution. Arecibo has had a huge impact on science and scientists in Puerto Rico by doing active, world class research. Let's do it again.