



## POSITION STATEMENT

# SAVING THE ARECIBO OBSERVATORY

**(Approved by the IEEE-USA  
Board of Directors, 14 Nov. 2008)**

A unique world resource, the Arecibo astronomical observatory in Puerto Rico is scheduled to be phased out over the next few years, due to withdrawal of funding by the National Science Foundation. With its 305-meter diameter antenna, the Arecibo Observatory is the world's largest and most sensitive radio-radar telescope. The IEEE recognized the observatory as an electrical engineering milestone in 2002.

Arecibo is essential to support the recent congressionally-mandated NASA mission for high-precision tracking and characterizing potentially hazardous Near-Earth Objects (NEOs) -- defined as objects 140 meters or greater in diameter, with orbits that may cross that of Earth.

A NASA report released last year estimates that, among the many millions of asteroids and comets in the solar system, approximately 100,000 potentially hazardous NEOs are yet to be located. Some assess the likelihood of such an object hitting the earth in a typical human lifetime as about one in sixty. But we are doing little to reduce that likelihood. If a 140 meter NEO were to hit the earth, a huge amount of energy -- *equivalent to 100 megatons of TNT* -- would be released.

As an actual historical reference, the Tunguska event in Siberia in 1908 was most likely caused by a meteor about 40 meters in diameter, exploding at about 10 kilometers altitude. The explosion toppled more than 80 million trees over 2,150 square kilometers, and was about 1,000 times as powerful as the bomb dropped on Hiroshima.

IEEE-USA calls upon Congress and the administration to maintain the Arecibo, supporting the congressionally-mandated NASA NEO mission by:

- Provide funding for the continued operation and maintenance of the Arecibo facility at its present activity level.
- Directing the National Science Foundation to initiate and/or extend programs and activities to sustain the NASA mission and
- Encouraging NASA's continued use of Arecibo to carry out the mission

This statement was developed by the IEEE-USA Committee on Transportation and Aerospace Policy and represents the considered judgment of a group of U.S. IEEE members with expertise in the subject field. IEEE-USA advances the public good and promotes the careers and public-policy interests of the more than 215,000 engineers, scientists and allied professionals who are U.S. members of the IEEE. The positions taken by IEEE-USA do not necessarily reflect the views of the IEEE or its other organizational units.

## **BACKGROUND**

**Problem with Optical Systems to Track and Characterize NEOs:** Optical telescopes have been, and will continue to be, used to locate almost all NEOs. But locating NEOs is only the first step in determining whether a given NEO is a threat. Tracking and characterizing the NEO is paramount to determining if the NEO is potentially hazardous. Neither the speed nor the distance can be directly or quickly provided by optical observations.

**Advantages of Radar:** Arecibo can accelerate the time to determine if NEOs are potentially hazardous by a factor of ten to that needed using an optical telescope -- in other words, from 40 down to four years. The Arecibo radar capability also provides information to characterize the NEO on its size, shape, composition, tumble rates and number of moons -- all needed to make a decision on the course of action -- and all next to impossible to get optically. Arecibo is the only resource we have to accurately and quickly predict this kind of disaster.

**Impact on Decision-Makers:** Considering that something like 100,000 NEOs over 140 meters in size remain to be located, many will likely be assessed initially by optical means as having a possibility of actually hitting the Earth. This situation leaves leaders with incomplete information to make extremely important but extremely risky decisions. Employing radar will help avoid public hysteria that might arise from the early announcement of an assessed future collision that was faulty.

**Arecibo vs. Goldstone:** The only other facility that can perform anything similar to Arecibo's radar function is NASA's Deep Space Network Goldstone antenna. But Arecibo's radar is over 20 times more sensitive than that of Goldstone. Goldstone can only observe objects that are much larger than those that are routine targets for Arecibo.

**Arecibo Closing: The NSF Senior Report:** In response, NSF plans to reduce funding for Arecibo in steps beginning in 2009, reaching four million by 2011. The four million dollar figure falls well below the amount needed just to keep the doors open. The radar capability needed for the NEO threat is expected to be the first major function terminated in the budget drawdown.

## REFERENCES

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See story at

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See website at <http://www.naic.edu/>

The Tunguska Event.

For more information on the Tunguska Event, see [http://en.wikipedia.org/wiki/Tunguska\\_event](http://en.wikipedia.org/wiki/Tunguska_event)