Arecibo Science Advocacy Partnership

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Returning Arecibo's planetary radar capabilities becomes a decadal priority

The recently released National Academies of Science, Engineering, and Medicine Planetary Science and Astrobiology Decadal Survey report, titled "Origins, Worlds, and Life: A Decadal Strategy for Planetary Science and Astrobiology", finds that "The loss of the Arecibo Observatory planetary radar program has resulted in a significant gap in solar system observations, particularly in support of planetary defense." Thus, the report ultimately recommends that, "NASA and NSF should review the current radar infrastructure to determine how best to meet the community's needs, including expanded capabilities to replace those lost with Arecibo."

The Arecibo Science Advocacy Partnership (ASAP) unanimously and whole-heartedly supports the findings and recommendations of the decadal survey report. The Arecibo Observatory planetary radar was unsurpassed in power and observing capability. As stated in the report, the remaining active planetary radar telescope is currently capable of observing *only half* as many near-Earth objects (NEOs) as was possible with the Arecibo radar telescope. In particular, the report states that, "The loss of the Arecibo Observatory planetary radar greatly inhibits the ability to perform follow-up near-Earth object characterization". As such, the legacy telescope played an invaluable role in the nation's and the world's planetary defense. **ASAP reiterates that restoring radar capabilities at the Arecibo Observatory is absolutely essential for ensuring the ability of the U.S. to maintain a strong planetary defense infrastructure.**

The planetary decadal survey began its evaluations in August 2020, before the devastating news of the collapse of the legacy Arecibo telescope in December 2020. Although this prevented community submissions that could acknowledge the catastrophe of the collapse, the planetary science community nonetheless demonstrated clear support for the science conducted at the Arecibo Observatory through many white paper submissions. These papers, which are now published in the Bulletin of the American Astronomical Society, highlight the special importance of Arecibo to planetary defense, planetary science, and solar system exploration. In fact,

as noted in the decadal survey report, Arecibo's planetary radar was capable of piercing through Venus' dense atmosphere to study its surface, unlike current and planned ground-based radars, which operate at shorter wavelengths. With the upcoming series of NASA and ESA missions to Venus, the loss of "El Radar", as it is fondly referred to in Puerto Rico, is acutely felt by the Venus science community.

With both the planetary and astronomy decadal surveys now released, **it is clear that the loss of Arecibo's capabilities will significantly impact the ability of the U.S. planetary and astronomy communities to address high-priority science questions.** In support of the planetary decadal's recommendation that "NASA and NSF should support studies to develop a plan for ground-based planetary radar capabilities comparable to or exceeding those of the Arecibo Observatory", ASAP has mobilized a committee to explore and support plans for the creation of a new Arecibo telescope.

The NSF has yet to comment on its plans for extending the current contract with Arecibo (which expires soon) and a call for recompetition, as well as convey its response on the planetary decadal survey's recommendations for a future the Arecibo Observatory.