



The Arecibo Observatory: Current Status and Future Visions for the Site

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The Arecibo Observatory has been a critical scientific site for over 57 years, performing cutting edge research in the areas of radio astronomy, space and atmospheric sciences and planetary sciences. The recent and unexpected collapse of the observatory's main instrument, the 305-meter telescope, has triggered the realignment of short term scientific objectives for the facility, and opened up discussions for the long term future of the historic site.

This presentation outlines the short and medium term goals for all three science areas, aligned with existing or expected capabilities at the facility. Some of these goals include the incorporation of the site's 12-meter telescope into the VLBI/EVN observation networks, resuming ionospheric heating observations, and implementing improvements to existing LIDAR and optical equipment. In addition to these efforts, analysis and archiving of existing datasets will also play a significant role, in particular the use of advanced machine learning and artificial intelligence techniques to reevaluate historical data for recently discovered phenomena.

The long term vision for the site is also discussed, along with potential operational concepts and next generation instruments that could significantly advance human knowledge in the study of exoplanets, climate change, planetary defense, and dark energy, by providing enhanced capabilities not matched by any other existing or planned instrument in the foreseeable future.

Despite the many challenges, the Arecibo Observatory continues to be a strategic research facility, and critical center for science, technology engineering and mathematics (STEM) education in the Caribbean. While operational capacities and goals have been modified in the short term, the long term vision anchored by a next generation instrument can significantly contribute to the advancement of key community science goals and continue the facility's legacy of scientific excellence and innovation.