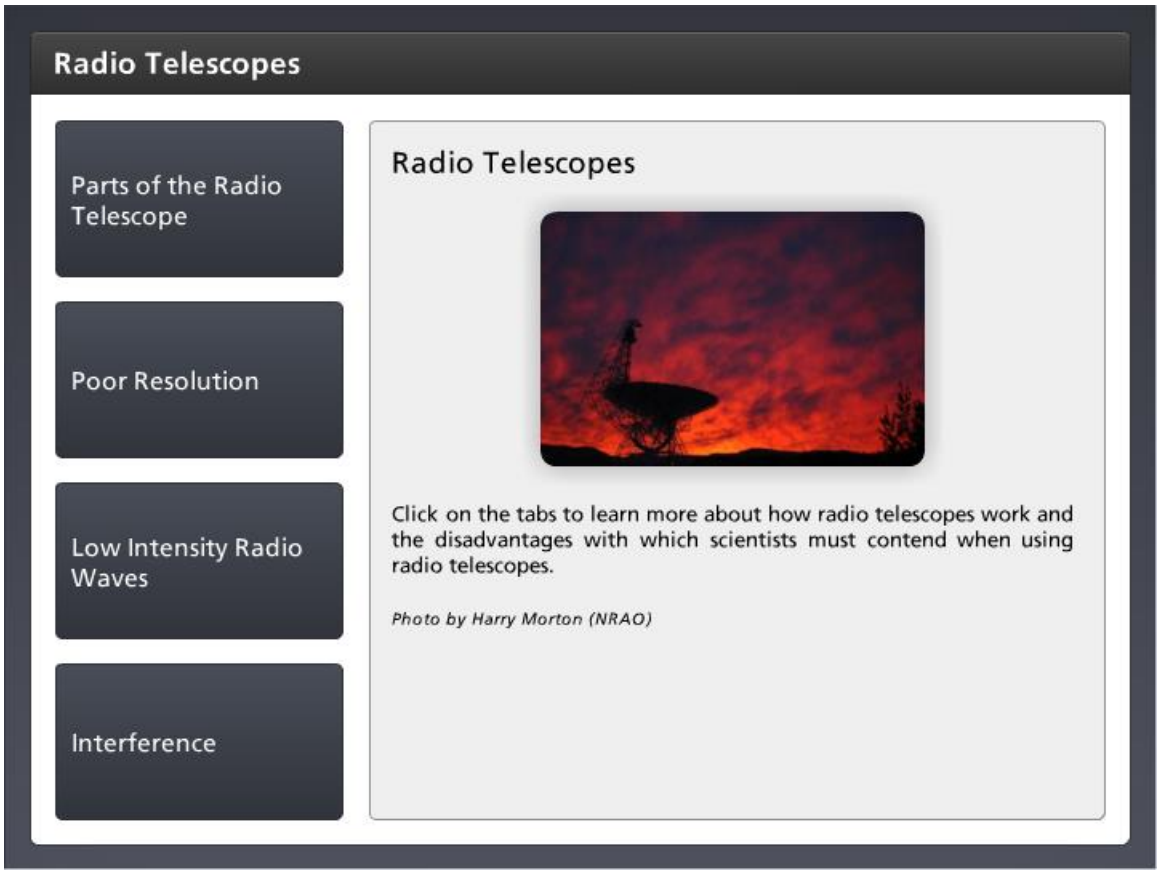
Module 5: Astronomical Tools
Topic 3 Content: Radio Telescopes

Radio Telescopes



Click on the tabs to learn more about how radio telescopes work and the disadvantages with which scientists must contend when using radio telescopes.

Photo by Harry Morton (NRAO)

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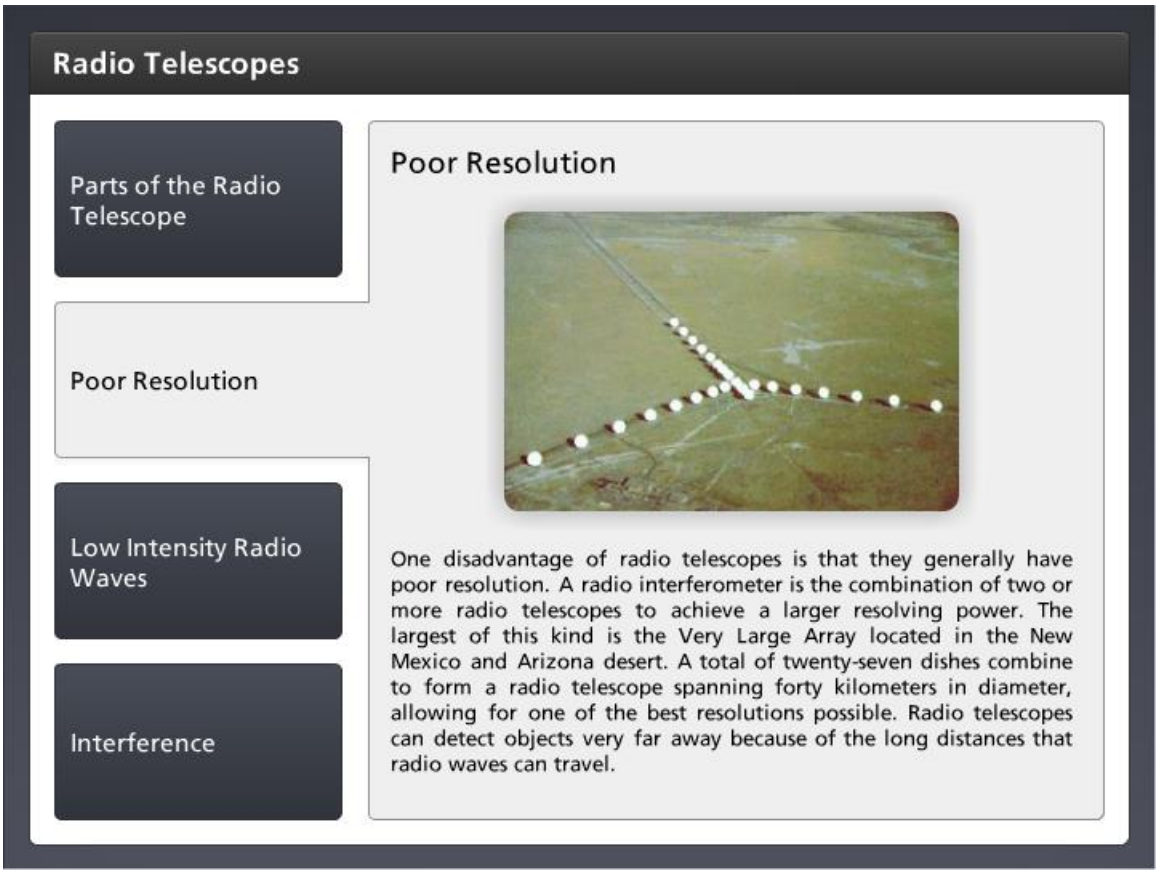
Parts of the Radio Telescope

Radio telescopes detect radio wavelengths and produce images that scientists can study. Since radio waves are so long, radio telescopes must be large in order to produce an image with enough resolution. The components of a radio telescope include a dish reflector, an antenna, an amplifier, and a recorder. The dish reflects the radio waves to the antenna, which directs the radio energy along a cable to an amplifier. After amplification, the radio waves are recorded and processed into images that can be seen. In the image shown is the Goldstone Apple Valley Radio Telescope.

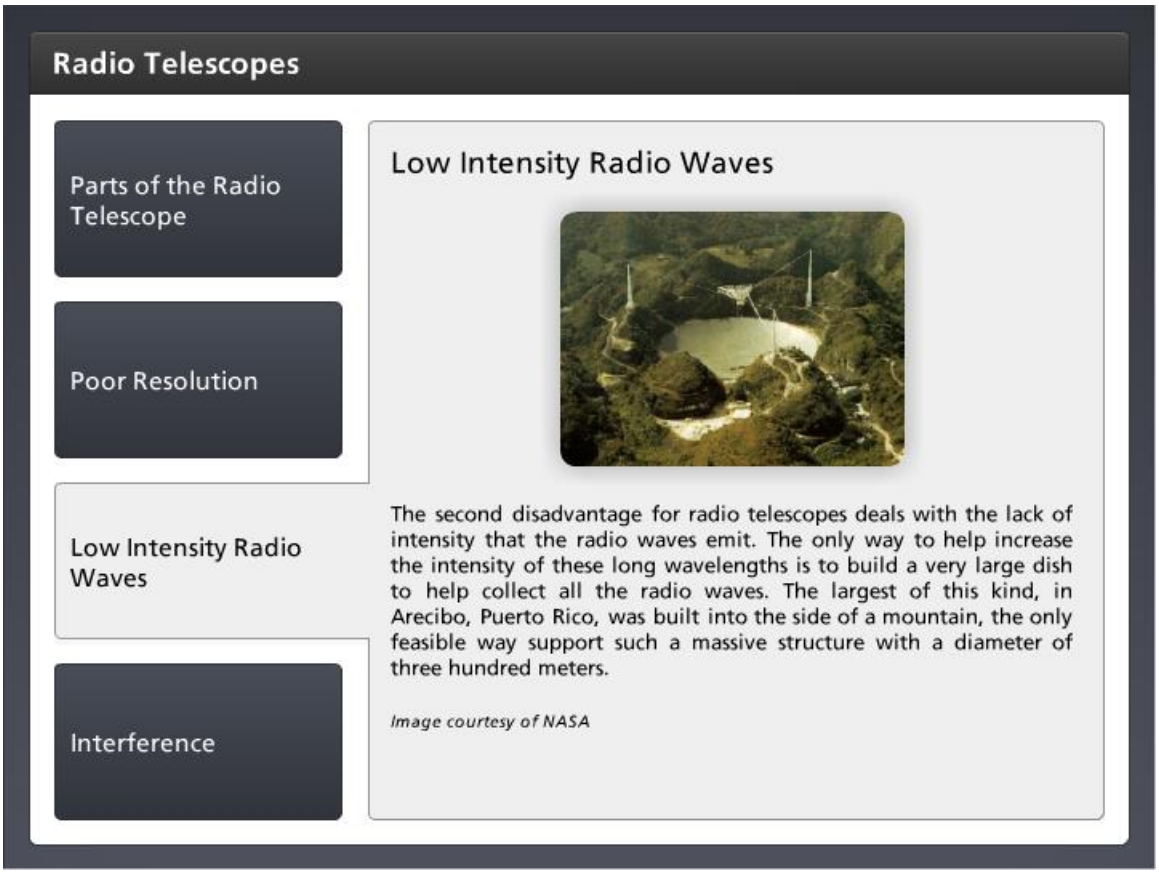
Image courtesy of NASA

Poor Resolution



One disadvantage of radio telescopes is that they generally have poor resolution. A radio interferometer is the combination of two or more radio telescopes to achieve a larger resolving power. The largest of this kind is the Very Large Array located in the New Mexico and Arizona desert. A total of twenty-seven dishes combine to form a radio telescope spanning forty kilometers in diameter, allowing for one of the best resolutions possible. Radio telescopes can detect objects very far away because of the long distances that radio waves can travel.

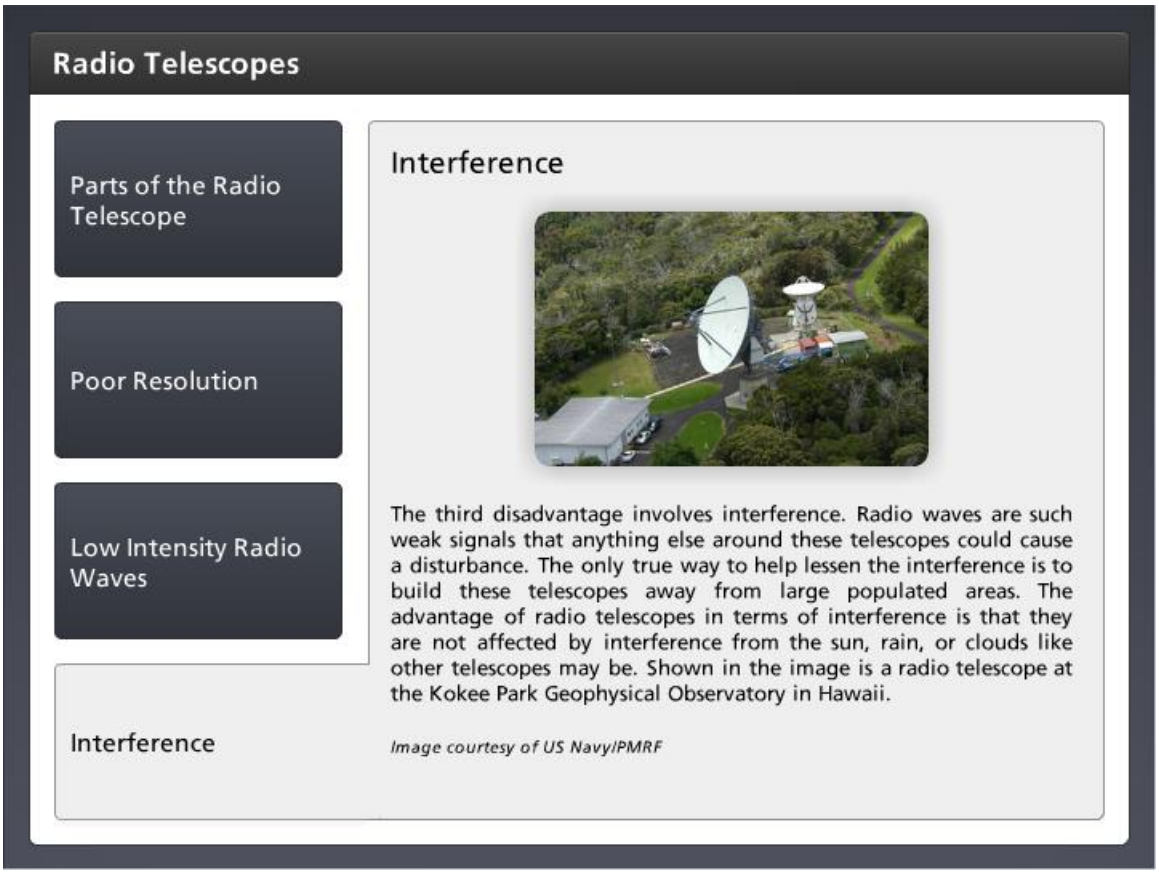
Low Intensity Radio Waves



The second disadvantage for radio telescopes deals with the lack of intensity that the radio waves emit. The only way to help increase the intensity of these long wavelengths is to build a very large dish to help collect all the radio waves. The largest of this kind, in Arecibo, Puerto Rico, was built into the side of a mountain, the only feasible way support such a massive structure with a diameter of three hundred meters.

Image courtesy of NASA

Interference



The third disadvantage involves interference. Radio waves are such weak signals that anything else around these telescopes could cause a disturbance. The only true way to help lessen the interference is to build these telescopes away from large populated areas. The advantage of radio telescopes in terms of interference is that they are not affected by interference from the sun, rain, or clouds like other telescopes may be. Shown in the image is a radio telescope at the Kokee Park Geophysical Observatory in Hawaii.

Image courtesy of US Navy/PMRF