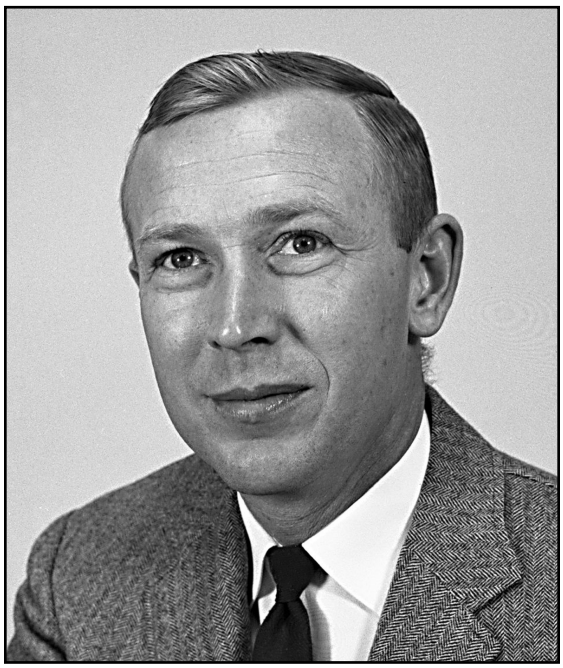
DAVID SUTPHIN HEESCHEN



COURTESY OF THE AMERICAN ASTRONOMICAL SOCIETY

12 MARCH 1926 · 13 APRIL 2012

DAVID SUTPHIN HEESCHEN, former director of the National Radio Astronomy Observatory (NRAO) and father of the Very Large Array, died at his home in Charlottesville, Virginia, on 13 April 2012 after a series of illnesses. He was 86.

Heeschen was born in Davenport, Iowa, in 1926. He received his Bachelor's and Master of Science degrees from University of Illinois in 1949 and 1951, respectively, and his Ph.D. in Astronomy from Harvard University in 1954.

After teaching for 1 year at Wesleyan University, he returned to Harvard in 1955 as a lecturer and research associate. His work at Harvard was principally in radio astronomy, and he was associated with the Harvard Observatory Radio Astronomy Project from its beginning in 1953 until 1956, helping to set up Harvard's 24-foot and 60-foot telescopes. Heeschen began his association with Associated Universities, Inc. (AUI) during the early planning process for a national radio astronomy facility, and he became the third employee at the NRAO on 1 July 1956. He spent the rest of his professional career at the NRAO.

Heeschen served as the director of the NRAO from October 1962 to September 1978. During this period, the NRAO evolved into its current role as a world class observatory, hosting four major telescopes and serving as both the focal point for U.S. astronomers for their ongoing research and a vehicle through which they could contribute their advice on the needs of astronomy to federal government agencies. Heeschen was involved in many aspects, but he left two principal legacies that continue to shape the NRAO and U.S. radio astronomy.

First, with the strong support of AUI, Heeschen formulated and implemented a successful concept for a national center. The concept was based on only a few guiding principles, but each was critical and, at the time, both controversial and challenging. These principles follow:

- A national observatory should have front-line instruments and should concentrate its efforts on designing, building, and maintaining such instruments. It should not support instruments of a scale that could be effectively managed by university groups, as such instruments are important in the development and training of future generations of technically capable scientists.

- These instruments should be freely accessible to all, a requirement that has become known colloquially as the "open skies" policy. The availability of instruments for application to the best research ideas ensures that the telescopes will be used to their full potential.

- There should be a scientific staff to inspire, promote, design, and implement new instruments. The staff scientists should themselves have active research programs to identify the most promising avenues of research, but they should not have preferential access to the instrumentation.

- The university community would be fully involved in the decisions on instrumentation through advisory and design panels, and would advise on the operations of the telescopes through a user committee. The community would be actively involved in the planning and design of major new instrumentation to both ensure that such instrumentation meets the anticipated future scientific challenges and marshal broad community support during the governmental review processes.

- The scientific community would advise on the allocation of observing time for the telescopes, both by serving as referees of the many proposals that are submitted to the NRAO and later by serving on time allocation committees.

Some of these ideas were applied at the NRAO sister laboratory, the Brookhaven National Laboratory, which was also managed by AUI, but they were modified to better apply to the situations found in observational radio astronomy. The system was highly successful and has resulted in hundreds of research papers by thousands of scientists from throughout the United States and many foreign observatories.

Second, Heeschen is widely considered to be the father of the Very Large Array (VLA). Even before assuming the position of director, Heeschen identified the need for a radio telescope that (1) was capable of producing images of high quality and (2) had the highest angular resolution that technology would support. In late 1961, after returning from a meeting at which he had discussed imaging with Martin Ryle of Cambridge, Heeschen met with some of the NRAO staff at a coffee break in the Green Bank cafeteria; at that meeting, it was decided to investigate the feasibility of building an imaging radio telescope array as a national instrument for U.S. astronomy. Radio interferometry of the time could provide good positions and resolve extended radio emission, but until it could map radio emission in sufficient detail to illuminate the physical conditions within radio sources, only slight progress could be made in understanding the nature of the objects.

As originally envisioned, the instrument was to provide images at a wavelength of 10 cm with an angular resolution of 10 seconds of arc. As the design developed, it became clear that this goal was too modest,

and the new goal of a resolution of 1 second of arc was adopted. To reach this goal, the physical dimension of the array needed to be approximately 30 km, and a search for possible sites in the desert Southwest was undertaken.

The design was eventually completed, although it included a number of significant technical challenges. Three sites were identified, of which one, in New Mexico, was the best and was eventually chosen for the array. However, the effort to obtain the approval of the scientific community and the funding agency (the National Science Foundation [NSF]) proved to be very challenging, and it required that Heeschen work tirelessly until the funding was approved. In the process, he had to maintain useful relationships with university groups that had experience and expertise in array technology. He had to persuade the various review committees, especially those conducting the decade reviews undertaken by the National Academy of Sciences, that the VLA should be accorded the highest priority for funding among the radio astronomy initiatives. It was a journey of nearly 20 years from that coffee-hour discussion in 1961 until the dedication of the VLA in 1980.

The construction of the VLA required the application of all of Heeschen's management skills. The technical challenges were compounded by the high rate of inflation, which was present in the latter part of the 1970s when the VLA was being built. Despite these obstacles, the construction was completed on time and on budget, a goal which Heeschen had insisted must be met so that AUI and the NRAO could maintain their credibility with both the NSF and the astronomical community.

In the three decades following its completion, the VLA has surpassed all expectations and has become the premier instrument in radio astronomy. Investigations using the VLA produce more than 100 publications each year. The versatility of the telescope supports research on objects in the solar system, including the sun, as well as extensive work on (1) the Milky Way, including pulsars, supernovae, star formation, and the interstellar medium; (2) the structure of nearby galaxies, radio galaxies, and quasars; and (3) the properties of objects at cosmological distances, including gravitational lenses and gas-rich galaxies at high redshift.

The success of the VLA was tangible evidence of the deep scientific intuition that Heeschen possessed. It was his conviction that radio astronomy would achieve status as a major component of astronomical research only if it could make high quality images with excellent resolution and fidelity. This intuition, and his willingness to share

well-reasoned opinions, increased his demand among individuals organizing advisory and review panels. He served on a number of the National Academy's decade panels, advised the European consortium on the sites for its millimeter dish and antenna array, advised the National Research Council of Canada on the future of its radio observatories, and was in the first group of scientists to visit China at the beginning of the scientific exchanges between the United States and China.

During his career at the NRAO, his scientific interests included the study of the active nuclei in nearby galaxies and the time variation of the emitted power of selected radio sources. In pursuing long-term variability, he developed one of the first automated telescope systems that routinely monitored a dozen of the brightest radio sources each day. After retiring as director, his renewed interest in source variability led to his discovery of the intra-day variability of compact radio sources. This phenomenon is now recognized as the result of scintillation due to turbulence in the interstellar medium (ISM) of the Milky Way rather than intrinsic variability, and it has proved valuable to the study of the properties of the ISM.

David Heeschen was a member of the American Astronomical Society, serving as president from 1980–82, and was a member of the International Astronomical Union, where he served as a vice president and member of the Executive Committee between 1976 and 1981. He was elected to membership in the National Academy of Sciences and was a member of the American Philosophical Society and the American Academy of Arts and Sciences.

Dave's interests outside of astronomy were boats and driving high-performance cars. He raced an Austin-Healey Sprite for a number of years and had some success at the Virginia International raceway in Danville, Virginia. The car had been modified so that it could not be driven on state roads; for his regular transportation, he drove a Jaguar painted in traditional British Racing Green. This vehicle was featured in an early film about Green Bank.

Eventually, Dave phased out driving in competitive auto racing and became deeply involved in sailing. He had an avid interest in boats as a youth, so he took the opportunity to become a very experienced sailor, taking his sailing boat on a number of ocean voyages around the Caribbean. Only late in his life did he give up sailing and acquire a motor boat.

Dave and his wife of more than 50 years, Eloise St. Clair Heeschen, both held amateur radio licenses. Initially, they obtained their licenses to maintain contact during Dave's sailing trips, but Dave (AB4IE) later

took pride in developing his high-speed Morse code skills to contact other amateur stations in more than 100 countries around the world.

David Heeschen was predeceased by Eloise. He is survived by their three children, Lisa, David, and Richard, and eight grandchildren.

Elected 1974

David E. Hogg
Scientist Emeritus
National Radio Astronomy Observatory
Charlottesville, Virginia