

## AWARDS, HONOURS AND ACHIEVEMENTS

- The unofficial Greenwald Award from his colleagues for his work contributing to the establishment of the SuperDARN network (2002)
- The De Beers Gold Medal of the South African Institute of Physics (1998)
- The Alexander van Humboldt Fellowship (1977 – 1978)

## DEFINING MOMENT

Being introduced by Ray Greenwald to the field of ionospheric radar that formed an important part of his work for the rest of his career.

## WHAT PEOPLE MIGHT NOT KNOW

He has written a book about Eastern Cape history in the 1800s, *Pawns in a Larger Game: Life on the Eastern Cape Frontier* (2013).

## THE MAN WHO HELPED USHER IN A NEW AGE OF SPACE SCIENCE

The space science field has gone through many changes since its early days in the 1950s, and David Walker is one of the people who help to bring it to what it is today. Starting at a time when not much was known about space beyond the earth's atmosphere, his theoretical insight into the nature of plasma waves and pioneering use of high-frequency radars allowed him to contribute to the study of space weather phenomena. In particular, Walker used the data from these radars to provide complete understanding of the nature of one type of long period pulsations of the magnetosphere. This is considered a seminal piece of research in the field of space physics.

“As our knowledge of the ionosphere and near-Earth space has changed, the way science is pursued has changed too, even the way calculations are made has changed beyond recognition – in fact our science has changed quite a lot. When I started off doing my MSc, I used a slide rule, graph paper and books of logarithmic tables to do all my calculations,” he says.

Walker completed his MSc at Rhodes University (RU) which earned him a scholarship in 1962 to study for three years at Cambridge University. His PhD at Cambridge studied radio waves in the ionosphere under the supervision of Dr Kenneth Budden, a Fellow of the Royal Society – “a very good scientist who

taught me a lot in terms of science, as well as how to write well and how to be meticulous in my writing”.

When he first went to RU in 1955, he had chosen to do physics and chemistry and some pure and applied mathematics, not really knowing “what I was in for”. He was encouraged by Professor Jack Gledhill who was a very enthusiastic scientist with a strong research leaning. Walker encountered an appreciation and enthusiasm for science in his high-school years when he chose to study science because of a passionate and capable teacher, even before he knew much about the subject that would later become his career. “It became obvious to me that physics was an interesting thing to do. I was theoretically inclined, so I majored in physics and mathematics and applied mathematics and I went on and did a physics Honours degree and an MSc under Professor Gledhill.”

Progress towards the modern picture we see in space science today was held back by the processing power available to Walker and other scientists at the time. “While I was doing my MSc, I needed to do some computer calculations. I spent a long vacation at the Council for Scientific and Industrial Research (CSIR), where they had just established the very first computer in South Africa.” At Cambridge he was able to use EDSAC2, then one of the best computers in the world, which worked on electronic valves and took up two floors of a building. “Scientific cooperation has developed enormously. In the 1970s, when I was doing cooperative science, I had to write a letter to somebody who was in the United Kingdom and ask ‘have you got data for such and such’; they would print it on paper and send it back to me by mail. Now, you can get it on the World Wide Web in half an hour.”

One of those collaborations led to a most important initiative in space science that is still in use all over the world today: While he was at the Max Planck Institute for Aeronomy in Germany, Walker met the American scientist Ray Greenwald who had developed a new very high-frequency radar in Scandinavia.

## COLLABORATION IS KEY

Walker was pleased that some of the observations they were getting from the new radar were findings that he was well-positioned to explain. The work he



was involved in from then changed the space science field, and he spent the rest of his working life doing this kind of physics at the University of Natal, now the University of KwaZulu-Natal (UKZN). His collaboration with Greenwald and other colleagues led to the Super Dual Auroral Radar Network (SuperDARN) system, a worldwide network of radars used for space measurements to understand the state of space weather above the ionosphere. When Greenwald produced an improved high-frequency radar in the 1980s, Professor Walker's involvement meant that South Africa played a big part in the early days of SuperDARN.

The South African radar (deployed in 1997 at Sanae, the South African Antarctic base) was one of the earliest radars in the southern hemisphere part of the SuperDARN network and Walker was the first principal investigator on the South African system. He was also one of the 14 co-authors who wrote a paper about the founding of SuperDARN; the paper has been cited over 800 times. Such was the impact of his contribution to the inception and operation of the SuperDARN network that upon his retirement, his colleagues in the SuperDARN community surprised him with an unofficial honour.

"One of the awards I value the most came from friends when I retired in 2002. The SuperDARN community gave me a certificate saying how much my work had been valued in the SuperDARN community – they called it The Greenwald Award."

After retirement, Walker's publication list takes an unconventional turn with the publishing of his book about a history of the Eastern Cape. "It involves the interaction of my ancestors who were all in the Eastern Cape in the 1800s, and there is a lot of Xhosa history and the history of the frontier wars," something he enjoyed writing.

Despite all that has changed in the past 60 years in the way science is conducted, Walker is adamant that collaboration remains as important as ever. In fact, he has noted that collaborations have changed from working with one partner at a time to collaborations that involve whole collections of people all over the world, aided by computing power and connectivity that has improved immeasurably. "I appreciate having had good teachers, good supervisors when I was a student and good colleagues throughout my life, because you can't do science without cooperation and colleagues."



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# Legends of South African Science II

**Academy of Science of South Africa (ASSAf)**

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