



Book review: *My Life in Space Exploration* by G. Haerendel

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A leading figure in German and international space research for more than 50 years, Gerhard Haerendel has described his life, his research, and his research leadership in this fascinating autobiography in the *Springer Biographies* series. This edition of his autobiography was translated from German with the assistance of artificial intelligence and subsequent human revision for content to ensure accuracy.

Throughout his long and distinguished career, Haerendel saw, participated centrally in, and led many of the groundbreaking understandings of the space environment around Earth. As Director of the Max Planck Institute for Extraterrestrial Physics (MPE) in Munich from 1972 to his retirement in 2000, he also oversaw and mentored many talented science and engineering members of the institute, who themselves subsequently advanced important understanding of space conditions.

Born into, as he describes it, a family of “modest means” in Hamburg in 1935, Haerendel attended grammar school first in Hamelin because of war damage in Hamburg and completed high school in Hamburg in 1955. After university in Tübingen and Hamburg, he enrolled at Ludwig Maximilian University in Munich. Haerendel describes his studies with the famous Ludwig Biermann and Arnold Schluter and his progression to the Max Planck Institute for Extraterrestrial Physics, which had branched off from Biermann’s Institute for Physics and Astrophysics. After receiving his PhD in 1963, he was appointed a Fellow at the Institute for Physics and Astrophysics in 1969. In 1972 he was appointed Director of the MPE, which had been founded by Reimar Lüst.

Stimulated by Biermann and his research on the tails of comets wherein he deduced a “corpuscular” radiation from

the Sun, Haerendel, as a central member of the Lüst group, together with Lüst pioneered the needed laboratory research, design, development, and use of barium plasma clouds to visualize the structure of Earth’s magnetic field and the forces acting on the plasmas in space. Research successes were achieved with campaigns across the world. Rocket launches from the western coast of Greenland studied auroral processes along open magnetic field lines. Natal, Brazil, was the chosen site for studies of ionospheric holes and irregularities in Earth’s equatorial region.

As with many pioneers in early space research programs, Haerendel and his team’s successes were sometimes interrupted by failures of instruments and launch vehicles – the latter often spectacularly. Such was in fact the case on the MPE group’s very first barium cloud attempt in 1962 with two Centaure rockets from the French island launch site in the Mediterranean Sea just south of Marseille. His Firewheel payload, in development for 3 years with strong international participation and designed for flight on the second test launch of the first European launcher Ariane at the invitation of the ESA’s director, was lost – the first rocket stage failed just after launch.

It is not easy to describe succinctly Haerendel’s research and leadership path from his initial inauguration into space research to his many further studies of auroral and equatorial plasma properties with the ion cloud technique and with innovative instruments on spacecraft such as the ESA’s HEOS-2 satellite. In addition, over the course of his career, Haerendel contributed important theoretical works on auroral and space plasma topics, frequently with MPE and international colleagues.

As leading researchers often find, they eventually can be sought after for important administrative positions. Such was the case for Haerendel. In the late 1970s he made “one of the most important decisions of [his] life”, when he made

the career decision to not assume a major leadership role in the ESA. Significantly, an overall interest in his personal story is the way in which he is able to interleave the excitement of research projects around the world with cultural and tourist side excursions. He especially stresses the importance of family and friends, both at home and on science expeditions.

A major effort closely related to the work of Biermann on comets was the innovative satellite project AMPTE. AMPTE would produce a barium cloud “comet” outside the magnetosphere as well as a lithium cloud for producing ions that might be transported and detected inside the magnetosphere. This was a very successful three-spacecraft mission conducted jointly between the MPE, the Johns Hopkins University Applied Physics Laboratory in the US, and the Rutherford Appleton Laboratory in the UK. In addition to its unique science returns, it generated much general publicity in the print and broadcast media.

Along with his pioneering experimental and theoretical research, Haerendel was called upon for many additional science leadership responsibilities throughout his career. These included being Co-Founder and Co-Director of the Skinakas Observatory in Crete, Chairman of the Council of the European Incoherent Scatter Radar EISCAT in Norway, and Dean of the Summer Session of the International Space University in Strasbourg. Following retirement until 2005, he was Vice President and Founding Dean of the School of Engineering and Science at the International University Bremen (now Constructor University). While he served from 1994 to 2002 as President of the international Committee on Space Research (COSPAR), I was privileged to be one of his Vice Presidents (the other being Atsuhiko Nishida of Japan). He conducted the yearly Paris-based executive committee meetings and the biennial COSPAR assemblies with much professionalism and good camaraderie.

I recommend this autobiography for its very personalized description of space research from the early days of space programs and their internationalization to recent times. Gerhard Haerendel was a pioneer in many key aspects of this space research. His story is worth knowing. It is very good that he has recorded it.