



Dessler's research career began in 1956 at the dawn of the space age. During the second half of the twentieth century, space science became a rigorous field of research in which theoretical reasoning could be challenged by observations made with instruments on the ground and in space, and Dessler was a pioneer in both arenas. During this time, it was established that space was not empty but filled with ionized gas (plasma) and embedded magnetic fields. The Sun's hot outer atmosphere was found to be not static but exploding continuously outward to produce a supersonic solar wind extending well beyond the realm of the planets. Dessler originated the concept of corotating interaction regions in which slower solar wind is overtaken by faster solar wind, producing magnetohydrodynamic (MHD) shock waves that perturb any planet that lies in their path.

Dessler was instrumental in developing the concept of the planetary magnetosphere—the comet-shaped cavity that surrounds planets such as Earth where the planet's magnetic field dominates rather than the solar wind. His work was also key to the development of theories about the much larger but analogous heliosphere, the bubble that surrounds the solar system where plasma motions are determined by the solar wind and its embedded interplanetary magnetic field. Dessler elucidated the roles of MHD waves and of Birkeland currents, which are aligned with the magnetic field, in providing the communication and dynamic coupling between the solar wind, the magnetosphere and the underlying planetary ionosphere. These interactions underlie the dazzling polar auroras. His analyses of the effects of the South Atlantic (magnetic) Anomaly on the structure and dynamics of the Van Allen radiation belts (donut-shaped zones of charged particles that are trapped in Earth's magnetic field) proved crucial in subsequent studies of Jupiter's pulsar-like magnetosphere.

Dessler's research largely anticipated, and greatly enabled the analysis of, the major heliospheric discoveries of the space age. It is no accident that his 1960's vision of Earth's magnetosphere adorns the Arctowski Medal.