The complete program of research and experimentation proposed including description of equipment and theory of operation.

The Atmospheric Radiation Measurement (ARM) Program was created in 1989 by the U.S. Department of Energy (DOE) to develop several highly instrumented ground stations to study cloud formation processes and their influence on radiative transfer. As the program evolved to include additional measurements of aerosol and precipitation, the original ground sites were supplemented with three mobile facilities and an aerial facility. This comprehensive scientific infrastructure and data archive were designated by DOE as a scientific user facility—the ARM Climate Research Facility—in 2003, and are freely available for use by scientists worldwide.

A primary objective of the facility is improved scientific understanding of the fundamental physics related to radiative feedback processes in the atmosphere, particularly the interactions between clouds and aerosols. ARM focuses on obtaining continuous measurements—supplemented by field campaigns—and providing data products that promote the advancement of climate models.

Sponsored by DOE's Office of Science and managed by the Office of Biological and Environmental Research, ARM is a multi-laboratory, interagency program, and a key contributor to national and international research efforts related to global climate change. This user facility holds enormous potential to advance scientific knowledge in a wide range of interdisciplinary Earth sciences. We are now adding a TigerShark UAV to our list of scientific instrumentation. Utilizing this new capability of have a Unmanned Aerial System will allow scientist world wide another approach to capturing their invaluable airborne data and further their scientific capability.

The specific objectives sought to be accomplished.

As an integral measurement capability of the ARM Climate Research Facility, the ARM Aerial Facility (AAF) provides airborne measurements required to answer science questions proposed by the Atmospheric System Research program and the external research community. Aircraft choice is dictated by science requirements—such as the required measurements and desired flight profile—and aircraft availability. In previous years to date all data has been collected via manned aircraft. We are now utilizing an Unmanned Manned Aerial Vehicle to further our research and collecting ability. While also contributing towards research and development of processes and procedures for unmanned aircraft integration into the National Airspace System. Technical and Concept of Operations (CONOPS) testing will be conducted within the Pendleton UAS Range, part of the FAA designated Pan-Pacific UAS Test Range Complex.

How the program of experimentation has a reasonable promise of contribution to the development, extension, expansion or utilization of the radio art, or is along line not already investigated.

The airborne observations acquired by the AAF enhance the surface-based ARM measurements by providing high-resolution in situ measurements for process understanding, retrieval-algorithm development, and model evaluation that are not possible using surface- or satellite-based techniques.

To acquire airborne measurements using the appropriate aerial vehicle and instruments, intensive field campaigns or long-term, regularly scheduled flights can be requested through the ARM field campaign process, a competitive process based upon scientific proposals submitted by teams of scientists. The ARM Facility's Science Board reviews proposals for use of the AAF in order to maximize the science return within the budget allotted to the program. Introducing this new Unmanned Areal Vehicle capability, will allow lower budget research teams an alternative to the higher cost manned platforms for areal research and specimen collecting. It will farthing our reach in scientific areal science and research.