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NASA Wallops Flight Facility to Conduct Sounding Rocket Campaign From Kwajalein Atoll

NASA will conduct a sounding rocket campaign in the South Pacific during August and September to better understand the Earth's ionosphere in the equatorial region. The EQUatorial Ionospheric Study (EQUIS II) project is designed to study disturbances in the ionosphere created by interactions between the Sun and the Earth's magnetic field.

NASA Goddard Space Flight Center's Wallops Flight Facility, Wallops Island, Va., will launch 14 suborbital sounding rockets from a launch complex located on the island of Roi-Namur, Kwajalein Atoll, Republic of the Marshall Islands. EQUIS II is similar to studies conducted from Roi-Namur during the EQUIS project in 1990.

"NASA and a team of scientists from several universities will launch the rockets to make measurements of electrical and turbulent layers that occur in the ionosphere," said Miguel Larsen, campaign scientist from Clemson University, S.C. "People tend to think that space is a quiet place with relatively little activity. Over the years, we have come to realize that this is not true."

Four separate scientific missions will investigate nighttime plasma structures, electrodynamics, and mesospheric scattering processes. Six rockets will carry experiments containing Trimethyl Aluminum (TMA), a tracer of atmospheric motions, that when released will form milky, white clouds in the nighttime sky. Two rockets will carry instrumentation as well as TMA and six rockets will carry only scientific instruments.

The TMA will be released over the Pacific Ocean at altitudes from 50 miles (80 kilometers) to 125 miles (200 kilometers) and will produce light that can be tracked visually and with special camera equipment located at optical sites on the islands of

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Roi-Namur, Likiep, Rongelap, and Bikini. The clouds form within seconds after the TMA release and are visible for 10 to 30 minutes. The tracer, which breaks down into harmless components of aluminum oxide, carbon dioxide and water vapor, will show the location of shears and turbulence responsible for electrical disturbances in the upper atmosphere.

“Winds in the ionosphere create disturbances, just as winds on Earth impact our weather. Space weather in turn can affect communication and electrical systems such as Global Positioning Systems (GPS),” said Dr. David Hysell, Principal Investigator, from Cornell University, Ithaca, N.Y. “Communication and navigation systems, particularly those that involve ground to satellite links either experience errors or they fail altogether when this phenomenon called Spread-F occurs.”

The time and day of launch depends on two major factors: clear nighttime skies are required at two of the four special camera sites and a layer of ionized particles must form in the upper layers of the ionosphere and begin to descend. The launches will include eight Terrier-Improved Orions, two Terrier-Malemites, two Nike-Black Brants and two Black Brant rockets.

Dr. David Hysell, Cornell University, is the principal investigator for experiments that will investigate the electrodynamics of the nighttime equatorial ionosphere and the bearing this has on the thin radar scattering layers that form within the upper atmosphere.

Dr. Lynette Gelinis, Cornell University, will use TMA releases to characterize the neutral winds associated with the ionospheric gravity wave disturbances using ground-based imagers and wind profile measurements.

Dr. Gerald Lemacher, Clemson University, will use instrumented payloads to measure neutral density, temperature fluctuations, electron, ion and particle environment parameters in order to understand the unusually strong radar scattering often observed in the equatorial mesosphere.

Dr. Robert Pfaff, NASA Goddard Space Flight Center, Greenbelt, Md., will conduct an investigation of plasma irregularity structure in the nighttime equatorial ionosphere and the bearing this has on strong radio wave scattering layers that form in this region.

The EQUIS II project is being conducted under the Sounding Rocket Program, which is managed at Wallops for NASA’s Office of Science, Washington, D.C. Approximately 125 people from NASA Wallops Flight Facility and the scientific community will be involved in the campaign.

Further information and updates on the EQUIS II project, including a schedule of the rocket launches, is available at:

<http://www.wff.nasa.gov/~code810/>