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## NIGHTTIME CLOUDS SHED LIGHT ON SPACE WEATHER



NASA is looking for the opportunity, beginning June 23, to launch rocket experiments that will form nighttime clouds in a project intended to shed light on space weather.



Three of the four rocket experiments, launched from the NASA Wallops Flight Facility on Wallops Island, Va., will include the formation of milky, white clouds. The clouds allow scientists to view winds in a high and poorly accessible layer of Earth's atmosphere called the ionosphere. The ionosphere is strongly affected by space weather events such as solar flares and UV radiation from sunspots. The state of the ionosphere affects such things as radio communications and Global Positioning System reception.



The clouds from each experiment may be visible, for up to 20 minutes, by the mid-Atlantic region, the lower northeastern United States and South Carolina. The chemicals used to make the clouds pose no danger to the public.

The clouds will allow scientists to monitor the Earth's winds at the edge of space. Dr. Gregory Earle from the University of Texas in Dallas, the lead researcher on the project.

"Winds in the ionosphere impact space weather just as the winds on Earth impact our weather. Space weather in turn can affect satellites orbiting the Earth and communication and electrical systems on the ground," Earle said. "The clouds act as a tracer and allow us to view the winds at various altitudes over a period of time."

"The data gathered from this project will aid in our understanding of the relationship between the winds and ionospheric activity. This research may one day lead to the ability to forecast space weather, just as forecasters do today for Earth weather. If we can forecast space weather, then we can better protect our systems in space and on Earth," Earle said.

The time and day of launch depends on two major factors: clear skies are required and two of three special camera sites located along the Virginia and North Carolina coast must be clear and a layer of ionized particles must form in the upper layers of the ionosphere before the clouds begin to descend.

All four launches will occur in one night between 9:30 p.m. and 5 a.m., EDT, from June 23 through July 10. There will be about 90 minutes between the launch of the first and second rockets, and about 10 minutes between the launch of the second and third rockets. The third and fourth rockets will be launched about 10 minutes apart. The actual period between launches will be decided in real-time as the mission progresses.

The milky white clouds form from the release of trimethylaluminum (TMA) on the second and fourth rockets. The third rocket carries only scientific instruments. TMA will be released in space over the Atlantic Ocean at altitudes from 56 kilometers (35 miles) to 109 miles (175 kilometers). The clouds will take about four to five minutes to form after the TMA release. NASA has used TMA for decades in rocket studies from sites worldwide to study the near-space environment. TMA burns slowly and produces visible light that can be tracked visually and with special equipment.

The products of the reaction, when TMA is exposed to air or water, are aluminum oxide, carbon dioxide and water. Aluminum oxides are commonly used to neutralize heartburn and to purify drinking water. TMA poses no threat to the public or the environment. Preparation on the ground or during the release in space.

The project is a NASA and multi-university effort. In addition to the University of Texas, students and personnel from Clemson University and Utah State University are participating in the mission.

The public can keep track of the progress of the mission by calling the NASA Wallops Flight Facility launch status line at: 757/824-2050.

NASA will have a Web site with text updates and live video of the launch. For more information on the mission at: <http://www.wff.nasa.gov/webcast>

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