





# Night Clouds



**A series of upcoming rocket launches will create glowing-white nighttime clouds visible from the eastern seaboard of the United States.**

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**June 20, 2003:** One night soon, people on the eastern seaboard of the United States might see some strange clouds in the sky: milky white, glowing and twisting in the wind. The clouds will be manmade, created by scientists to study Earth's ionosphere--a layer of our atmosphere near the edge of space.



Three rockets launched from the NASA Wallops Flight Facility, Wallops Island, Va., will release a chemical called trimethylaluminum (TMA) into the air 90 km to 175 km above the Atlantic Ocean. TMA burns spontaneously in the presence of oxygen. The harmless by-products of this glowing reaction will be visible from coastal Virginia, North Carolina, Maryland, New Jersey, Washington DC, and possibly parts of lower New York and Pennsylvania.

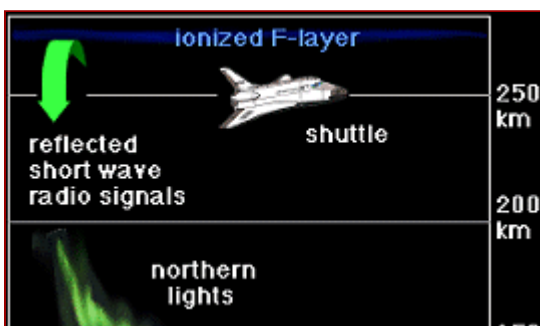
**Right:** A trimethylaluminum-burning cloud photographed over the University of Alaska's Poker Flat Research Range in 1978.

The launches will take place between 9:30 pm and 5:00 a.m. on a night yet to be decided between June 23rd and July 10th. The time and date depends in part on clear skies at two of three special camera sites located along the Virginia and North Carolina coasts.



Members of the public can keep track of the mission by calling the NASA Wallops Flight Facility launch status line at: 757/824-2050. A pre-recorded message will be promptly updated when launches begin. NASA will also have a web site with text updates and live video of the launches during the mission at <http://www.wff.nasa.gov/webcast>

The clouds will allow scientists to monitor winds in the ionosphere, explains Gregory Earle from the University of Texas in Dallas, the lead researcher for the project. "They will act as a tracer and allow us to view the winds at various altitudes over a period of time."



This is important because of space weather. The ionosphere is a critical link in the chain of Sun-Earth interactions. Solar flares and radiation from sunspots break apart molecules and ionize atoms in Earth's upper atmosphere--this is how the ionosphere is formed. The ionosphere, in turn, affects such things as radio communications and Global Positioning System

reception on Earth.

**Left:** Layers of the ionosphere. [\[more\]](#)

"The data gathered from this project will aid in our understanding of the relationship between the winds and ionospheric activity," says Earle. This research may one day lead to better forecasting of space weather effects on satellites, communications and power systems.

There will be four rockets launched, but only three will release TMA: the first, second and fourth rockets. The third rocket carries only scientific instruments. The TMA will be released over the Atlantic Ocean at altitudes from 56 miles (90 kilometers) to 109 miles (175 kilometers). The clouds will take about four to five minutes to form after the TMA release and remain visible for approximately 20 minutes.

There will be about 90 minutes between the launch of the first, 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 occurs.

NASA has used TMA for decades as part of 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 camera equipment.



**Above:** TMA will be delivered to the ionosphere by three Terrier-Orion rockets like this one.

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 combat heartburn and to purify drinking water. TMA poses no threat to the public during preparation on the ground or during the release in Earth's atmosphere.

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.

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### Web Links

[Live video of the rocket launches](#) (NASA/Wallops)

**Ionosphere links:** [Introduction to the Ionosphere](#) (NOAA); [Earth's Ionosphere](#) (Oulu); [Regions of the Ionosphere](#) (Windows to the Universe);

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