

DID YOU KNOW THAT SOME AURORAS SEEN ON EARTH ARE MAN-MADE?



ALASKA'S SPACE PYROTECHNICS

Article #703 - by Larry Gedney & Neal Brown, Alaska Science Forum - February 18, 1985, <http://www2.gi.alaska.edu/ScienceForum/ASF7/703.html>

This article is provided as a public service by the Geophysical Institute, University of Alaska Fairbanks, in cooperation with the UAF research community. Larry Gedney is a seismologist at the Institute.

"...With an intense auroral display in the background, a three-stage Black Brant sounding rocket is launched from the Poker Flat rocket range near Fairbanks. The rocket's first stage fell to the ground 0.8 mile from the launch site, while the second and third stages propelled the first barium canister to a height of 550 miles. The second injection occurred shortly thereafter at the lower altitude. Star tracks appear as streaks because of the seven minute time exposure. (Photo by Randall Sluder and Gregory Boquist of Technology International Corp.)

Before the last holiday season, there was considerable advance publicity about an artificial "Christmas comet" which was to be produced by the injection of barium crystals into space from a satellite in high earth orbit. Alas, even though the experiment was a success and faintly glimpsed by some observers to the south, it was never seen in Alaska.

However, since the mid-1970s, similar experiments have become old hat to Geophysical Institute researchers and other scientists from around the world who have been launching barium payloads into the aurora from the Institute's rocket range at Poker Flat north of Fairbanks. The primary difference between the Christmas comet experiment and those performed at Poker Flat is that the former was intended to observe the solar wind, while the latter, where the observations are made closer to earth, provide information relating primarily to the earth's magnetic and electric fields.

Typically, a barium-release experiment at Poker Flat involves explosively ejecting two or more charges of barium vapor into space from altitudes ranging from auroral heights (about 60 miles) upward to 500 miles or more. The barium is expelled at a high velocity from the rocket by a "shaped charge," made by molding an explosive around a conical hollow. (These devices were designed during World War II to penetrate armor and concrete with a high-speed jet of molten metal from projectiles fired from weapons such as the "bazooka.")

One of the objectives of the Poker Flat rocket shots has been to trace magnetic field lines of the earth by propelling barium metal vapor along them. The barium is ejected when the rocket is high enough so that it is in the sunlight and the earth below is in darkness. The vapor first disperses to form a bright yellow-green cloud about the size of a full moon. In a matter of seconds, it changes to a reddish-purple color as it is ionized by the sunlight and evolves into a series of long, parallel rods aligned along the magnetic field lines, approximating an auroral form. These drift away under the influence of the earth's electric field, and can be tracked for an hour or more by sensitive photographic imaging systems on the ground.

In Alaska, these experiments have an important bearing on understanding the behavior of auroral displays. It is known that auroras are caused when electrons and protons from the solar wind spiral down the earth's magnetic field lines, ionizing oxygen and nitrogen molecules as they go. By tracing abnormal accelerations or decelerations of the streaks of ionized barium, researchers are able to measure the additional effects on the tracks of incoming particles caused by the earth's electric field.

Regardless of the scientific rationale behind these experiments, the rocket launches are spectacular to behold, and the brilliantly colored clouds which they produce can be seen in the night skies all across Alaska and western Canada whenever a barium "shot" is fired from Poker Flat..." End

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Multiple Instrument Studies of Chemical Releases and Heating at Arecibo - 1993 Using Barium Releases
<http://www.stormingmedia.us/91/9123/A912392.html?searchTerms=Cloud%7EModification>

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January 1972
Solid Fuel-Gaseous Oxygen Reaction Techniques for Producing High Altitude Barium Vapor Clouds
<http://www.stormingmedia.us/90/9050/0905047.html?searchTerms=vapor%7Eclouds>

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<http://www2.gi.alaska.edu/ScienceForum/ASF0/028.html>
Alaska Science Forum - March 3, 1976

International Barium & TMA Releases

Article #28 by T. Neil Davis

"...This column is provided as a public service by the Geophysical Institute, University of Alaska Fairbanks, in cooperation with the UAF research community. T. Neil Davis is a seismologist at the institute.

Strange lights seen in Alaskan skies on late February and early March 1978 evenings have a reasonable explanation. These were chemical releases performed at high altitude aboard rockets flown from the University's Poker Flat rocket range near Fairbanks.

The two most beautiful sequences, on February 27 and March 1, were conducted by a group of Danish scientists, the first truly international users of Alaska's scientific rocket range.

Each Danish rocket released a chemical called trimethylaluminum (TMA, for short) as it sped upward through altitude 80 km (50 miles). At this altitude the rocket was still in darkness and the TMA formed a yellowish trail. Then as the rocket entered sunlight, the TMA being released glowed a beautiful blue color.

By photographing the deformation of the TMA trail with cameras at Arctic Village, Fort Yukon and Fairbanks, the Danish scientists measured the wind in the region through which the rocket was flying.

A minute or so later, the rocket released a puff of barium gas. The barium release soon formed two clouds that drifted apart. One part, composed of ionized barium, drifted away westward under the influence of the electric field in the high atmosphere. Thus by tracking it, the Danes could measure the electric field. Two more barium releases and then a second TMA release, performed as the rocket fell back toward the earth, allowed additional measurements of the wind and electric field over an extended region above Alaska.

The highest barium releases were at altitude 270 km, high enough to be easily seen all over Alaska and western Canada wherever the sky was clear..."



HOW DO WE KNOW WHICH ONES ARE REAL OR MAN-MADE?

AURORA PHOTOS: THE BEST PICTURES OF THE NORTHERN AND SOUTHERN LIGHTS

Huffington Post - Updated: 9/30/11 06:57 PM ET

http://www.huffingtonpost.com/2011/09/29/aurora-photos-borealis-australis-northern-lights_n_987992.html#s382510&title=Aurora

"...There have been some stunning photos (and videos) taken of the aurora this year, and we just can't get enough of them. So as the seasons change and the days grow shorter, it's a good time not only to look back at some of our favorite images of this natural phenomenon, but check out some new pictures, too.

NASA says that more geomagnetic storms occur in the fall and spring, and this is a great time for viewing the aurora borealis or australis (if you're lucky enough to be in an area where it's visible!)

According to the Geophysical Institute at the University of Alaska Fairbanks, an aurora is caused by the collision of electrons from space with atoms and molecules of gases (like oxygen and nitrogen) from the Earth's atmosphere. This collision results in a transfer of energy to the oxygen's electrons, and, as a result, quick bursts of light are emitted. A great number of these collisions create the light that's visible to the naked eye. The aurora borealis, also known as the northern lights, is seen in the northern hemisphere, whereas the aurora australis, or southern lights, is visible in the southern latitudes.



<http://www2.gi.alaska.edu/ScienceForum/ASF0/019.html>
Alaska Science Forum - March 22, 1976

This column is provided as a public service by the Geophysical Institute, University of Alaska Fairbanks, in cooperation with the UAF research community. T. Neil Davis is a seismologist at the institute.

"...Again this year rockets are being flown from Poker Flat Research Range, near Chatanika, to create high-altitude barium releases. Five rockets, each carrying four to twelve releases, are being flown, on clear nights sometime in late March and early April.

Each release ejects a small quantity of barium vapor that is visible from the ground and which permits measurement of the wind and the electric field in the upper atmosphere. The release first appears in the form of a rapidly expanding yellow-green ball. Part of the barium vapor remains neutral and drifts with the wind forming a green cloud. From this cloud a reddish-purple cloud of ionized barium vapor emerges. This cloud drifts away under the influence of the electric field. Since the releases are at very high altitude, 150-300 km, they can be seen everywhere in central and northern Alaska. When feasible, there is an attempt to notify area radio stations of impending launches so that Alaskans can observe the releases if they choose..."

