

Poker Flat: 46 Years of Rockets Over Alaska

After spending a tropical summer launching atmospheric rockets off a Navy ship in 1965, Neil Davis's thoughts turned north to the aurora and his alma mater, the University of Alaska Fairbanks.

"The fact we launched 50 rockets, without a single failure, in one month, caused me to think that we could have a rocket range in Fairbanks patterned on the *Croatan* expedition," said Davis, now a professor emeritus at the UAF Geophysical Institute. "That is, build a small, highly compact facility that would be cheap to operate and highly efficient."

Davis, who earned his Ph.D. from UAF in 1961, found land 30 miles from Fairbanks and called it Poker Flat Research Range. GI started building a rocket launch facility in 1965.

Davis was deep into that when the Department of Defense approached the university about launching six barium-release rockets to create and view auroras from Fairbanks. The GI had gotten attention because of their modified orthicon televisions, at the time the world's most sensitive low-light imaging system.

The university agreed, and by fall of 1968, the first rocket launcher arrived to Chatanika by truck. Working over the winter, Poker Flat was ready by spring 1969 when seven rockets launched: the six DoD rockets and one NASA rocket on which Davis was the principal investigator.

The DoD intended to close the facility but Davis and others at the Geophysical Institute persisted and continued to launch rockets.

Soon U.S. rocketeers were seeing the advantage of launching from Poker Flat, and the working relationship between GI staff and federal agencies was also appealing.

In the nearly 50 years since, a permanent blockhouse, a geophysical observatory, rocket assembly buildings, four major launch pads and enhanced ground-based instrumentation were added.

UAF researchers, other agencies and universities have launched over 300 major rockets. More than 1,500 smaller meteorological rockets have also blasted off from Poker.

"What the Pentagon and the Atomic Energy Commission thought was a temporary launch site now has existed for 46 years," Davis said. "It now is the major high-latitude scientific launch site in North America, still university owned and operated."



Launchpad construction



Aurora TV crew



Rocket loaded on truck

Poker Flat Launches Five Rockets in Three Nights

Rich Collins waited through cloudy nights, emergency flights through rocket airspace and 13 nights before the Geophysical Institute professor ordered the launch of two NASA sounding rockets to carry his experiment skyward.

Collins's rockets were part of a unique four-rocket night at Poker Flat Research Range, 30 miles north of Fairbanks. Launching in turn with Collins was Poker Flat veteran Miguel Larsen of Clemson University. The four launches within 33 minutes began just after midnight on the morning of January 26, 2015, a night of active aurora and a ground temperature of 40 below zero Fahrenheit.

"The instruments all appeared to have behaved perfectly," said Collins the morning after his launches. "The quality of our measurements should be very high. I'm very happy and very exhausted."

Collins, who has for years operated the Poker Flat lidar system to assist others' missions, launched the first and

third rockets to measure turbulence in the upper atmosphere. Two minutes following both of Collins's launches, Larsen ordered the launch of two rockets that released a ghostly white vapor, trimethyl aluminum or TMA, to help researchers visualize turbulence in the space-atmosphere connection about 60 miles above the ground. Larsen said his preliminary results were also excellent.

Collins's mission was unusual in the number of rockets leaving the rails at Poker Flat in quick succession.

"Part of the drama on the range was that we were counting down for Miguel's launches while mine was counting up," Collins said. "Three years of effort wrapped itself up in 40 minutes."

Collins's experiments featured sensitive instruments carried by 50-foot rockets to measure air density on upward and downward portions of the rockets' parabola, which reached apex about 100 miles above northern Alaska. He also measured the lowest reaches of the zone in which the aurora interacts with the upper atmosphere. Collins designed his experiment, called the Mesosphere-Lower Thermosphere Turbulence Experiment, with Aroh Barjatya of Embry Riddle University and Gerald Lehman of Clemson.

Digital images of the rockets' trails will allow Larsen and his colleagues to tell whether turbulence in the space-atmosphere connection 60 miles high is two dimensional or three dimensional.

Two nights after the four-rocket salvo, Utah State's



photo by Jamie Lee Adkins, NASA

photo by Berit Bland, NASA



MTEx TEAM—Members of the MTEx science team, from left: Adam Blake, Richard Collins, Aroh Barjatya, Colin Triplett, Zachary Laurencio. Not pictured: Jintai Li and Zach Kreblik.



LAUNCH—Left: Bits of styrofoam fly off the rocket as it launches. Styrofoam is used before launch to keep the solid fuel in the rocket motors from freezing, which could damage them. Photo by Lee Wingfield, NASA. Right: A composite photo showing all four rockets launched on January 26. The stars are wheeling in the sky in this long exposure, and the white clouds of TMA are visible. Photo by Jamie Lee Adkins, NASA.

Charles Swenson launched the final rocket of Poker Flat’s 2015 season. At 1:41 a.m. on January 27, 2015, Swenson’s rocket arced through the upper atmosphere and ejected seven instruments that measured voltages and currents from an aurora display over Kaktovik.

“We are pleased,” Swenson said. “It’s an exciting thing to have gotten that complex payload that so many people poured their hearts and souls into, into an event that we wanted.”

On the downslope of its trajectory from Poker Flat to the ice of the Arctic Ocean, the four-stage rocket deployed seven instruments to create a moving formation 300 miles above Kaktovik. There, the instruments measured the electrical energy from auroral arcs. The instruments broadcast data back to Poker Flat instantly before they landed on the ice of the Arctic Ocean.

“Having this multi-point measurement was why NASA said this was the most difficult mission they’ve done,” Swenson said.

Swenson and his colleagues, including UAF’s Don Hampton, had pulled 14 all-nighters waiting for the right aurora and other conditions, which included clear skies in northern and interior Alaska. The temperature that morning was minus 44 degrees Fahrenheit.

All five of the 2015 launches were part of NASA’s Sounding Rocket Program, managed by officials from NASA’s Heliospheric Division at the Wallops Flight Facility in Virginia. Located in Chatanika, Alaska, Poker Flat Research Range is part of the Geophysical Institute. More than 300 research rockets have blasted off from Poker Flat since Neil Davis and others from the Geophysical Institute established it in 1969.

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Range Manager Kathe Rich

In a profession dominated by men, Kathe Rich, range manager for Poker Flat Research Range, has managed to make a name for herself. PFRR was entirely staffed by men when Rich joined the team as an operations controller in 1991. Rich remained the only woman until 2000 and became the range manager in 2012.

“We are just now beginning to see women as leads in launch operations,” Rich said. “At Poker Flat, there are less than 10 percent women even involved in operations.”

It was a “winding path” for Rich from her bachelor of science in natural resource management to her current position.

“I graduated in 1981, after the [Trans-Alaska] pipeline was in place and job opportunities were very limited,” she said. “I was a caterer for eight or nine years and did bookkeeping on the side, as well as working in the lands department at Doyon, Limited, and on an airspace project with the Federal Aviation Administration.”

This time spent in multiple logistics-based jobs led her to the perfect fit: the controlled chaos that is launch season.

“My favorite part of the job is being in the blockhouse,” Rich said. “Everything must go through me, from coordinating with the FAA to controlling access to the range. My first love is doing operations; regardless of whether it’s field ops or rocket ops.”

