



THE ATMOSPHERIC RESERVOIR

Examining the Atmosphere and Atmospheric Resource Management

"Red Sprites"

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Thunderstorms produce lightning, which is a release of static electricity between positive and negative charges in the atmosphere. This discharge is extremely hot, (approximately 50,000 degrees Fahrenheit) roughly five times greater than the temperature of the sun. Occasionally, during positive or cloud to ground lightning strokes, another discharge of energy can take place above the thunderstorm and stretch into the upper reaches of earth's atmosphere. This is called a red sprite. In comparison to lightning, red sprites are actually quite cold and their color is thought to result from charged particles interacting with nitrogen.

Scientists compare the appearance of red sprites to jellyfish or squids because of the "tendrils" that branch off from the main column of light and extend downward (see image). The three most commonly observed shapes of sprites include jellyfish, carrots, and columns. Sprites were first observed back in the late 1800s; however, because of their elusiveness, photographs of them weren't actually taken until



Photo courtesy of Jason Ahrns via Flickr

1989! Sprites were given their name (meaning air spirit) by Dr. David Sentman of the University of Alaska-Fairbanks (UAF) with reference to the character Puck in William Shakespeare's *A Midsummer Night's Dream*.

This summer, a collaborative research project between the UAF, the U.S. Air Force Academy, and Fort Lewis College in Durango, Colo., was conducted to learn more about sprites. The National Center for Atmospheric Research's Gulfstream V jet aircraft was utilized during the project and this enabled scientists to reach observation altitudes in brief amounts of time. Large thunderstorm complexes in the Midwestern United States were targeted by the aircraft to give the scientists a better chance of observing the occurrence of sprites. Even with the use of a high altitude

research aircraft it is extremely difficult to see and document sprites. Ideal conditions must be present, such as dark, unobscured skies and researchers must rely on high-speed cameras to take continuous images and video because a sprite flash only lasts a few milliseconds.

Findings from these research flights include the image seen in this article, taken by Jason Ahrns, a graduate student attending UAF.

To date, this summer's research on red sprites hasn't uncovered any definitive secrets about them, but it is through scientific observation that many discoveries are made. It is not known for sure if sprites actually have an effect on the earth's upper atmosphere or whether there are any environmental implications associated with them. Sprites are a reminder that we don't understand everything about earth or its surroundings and that scientists can make the effort to learn more.

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