"PHENOMENAL" PHOTOS

PLAINS PHOTO PROJECT
Captures Awe-Inspiring Weather Moments

By Greg Waxberg

When looking at a beautiful photograph of an exciting weather event, one might ask which is more spectacular—the photo or the weather phenomena depicted in it? A collection of photographs created by the Plains Photo Project at Emporia State University in Emporia, Kansas, prompts just such a question. The project is devoted to Great Plains life and culture, and has expanded since it was launched in December 2007 by the university's Center for Great Plains Studies. As more photographers have discovered the gallery, or as the Center has approached new photographers, the list of artists and their work has grown. The group of photographs published here ranges from foggy sunrises to gorgeous sunsets to ice storms.

Apparently, the Great Plains have developed a reputation over the years for not having much character, but this collection illustrates that the area is rife with meteorological wonders. "The region is often thought of as 'flyover' country, with nothing much to it, certainly nothing of beauty—yet these photographs are definitely things of beauty," said Jim Hoy, director of the Center for Great Plains Studies.

Furthermore, the same weather that fascinates some viewers, particularly those who live outside the Great Plains, tends to be taken for granted by those who call the region their home.

Hoy notes, "One of the great bodies of folklore in the Great Plains is the weather, whether in superstitions, forecasting, anecdotes, or jokes. But it's certainly true that an outsider recognizes things that insiders don't."

To fully understand the phenomena depicted in a sampling of the photos, *Weatherwise* spoke to a number of weather experts, including Tom Skilling, chief meteorologist at both Chicago's WGN-TV and *The Chicago Tribune*. "These are not random occurrences. They may look like chaos, but there is an amazing majesty to the forces that are at work creating these displays," Skilling said. W

NOVEMBER LIGHTNING
2008 (KANSAS)
JIM SAUERESSIG

This type of cloud-to-cloud lightning results from mesoscale convective systems, with mesoscale being defined as two to 10 miles in diameter. These systems are highly concentrated clusters of thunderstorms that produce torrential amounts of rain (an average of 10 to 12 inches) and hours of lightning. After sunset, a temperature gradient develops between humid air over the eastern plains and cool, dry air over the western plains, leading to high winds and rapid formation of thunderstorms. Toward the end of a storm, lightning channels often propagate horizontally along the bottom of the cloud for many miles, apparently mopping up residual cloud charge—a phenomenon best seen in twilight or darkness. According to Dr. Martin Uman of the University of Florida's Lightning Research Group, lightning during a storm's active phase is mostly vertical. Also known as "crawlers," the bolts give the appearance of a spider "crawling" across the sky.

SUNSET UNDER A LIGHT RAIN SHOWER
2009 (KANSAS)
JIM SAUERESSIG

Low-angle sunlight, scattering air molecules, and atmospheric particles create a red sunset. Dr. Craig Bohren, distinguished professor emeritus of meteorology at Pennsylvania State University, describes the atmosphere, in general, as acting like "a scattering filter, like looking through cellophane." However, in this picture, the red light has been transmitted, not scattered—the blue is scattered light, and the yellow areas are illuminated based on their height in the sky. Interestingly, according to Dr. Bohren, the clouds and rain have little, if anything, to do with the color; he believes that the clouds simply make the photo more aesthetically pleasing.

ROTATING WALL CLOUD WITHIN A LINE OF EMBEDDED SUPERCELLS

2009 (KANSAS)

JIM SAUERESSIG

A wall cloud, the base of a cumulonimbus cloud, is usually at the rear of a storm and produces an inflow (or updraft) of warm air. In this photo, the band extends from the wall cloud to the right. Supercells are thunderstorms that contain deep, rotating updrafts two to 10 miles in diameter. "It's like what happens when you open a bathtub drain. The drain pulls water from the tub, while the water around the drain rushes to fill in for the water being evacuated by the drain. In a thunderstorm, the air around the cloud rushes to fill in for the air that's being drawn up into the cloud,"
Skilling said.

UNDER THE SHELF CLOUD
2009 (KANSAS)
JIM SAUERESSIG

A shelf cloud is a low, horizontal, wedge-shaped formation attached to the base of the thunderstorm's main cloud. Unlike a wall cloud, a shelf cloud usually appears on the leading edge of a storm and produces an outflow (or downdraft) of rain-cooled air moving away from the storm. Here in this image, Skilling notes that the cool air is colliding with the humid air ahead of the storm, resulting in the appearance of a turbulent sky. The dark area in the lower left indicates heavy rain, and part of the storm's top "anvil" cloud extends away from the system.

DAYTIME LIGHTNING OVER JOHN REDMOND RESERVOIR

2009 (KANSAS)

JIM SAUERESSIG

Dr. Uman is intrigued that the lightning appears to strike the ground at an angle. "Most lightning approaches vertically because the ground is a conductor, and the electric field is perpendicular to conductors," he said. An angle would result from the following scenario: As the downward stepped leader (a stream of weakly charged particles) approaches the ground, its electric field draws an upward connecting leader, but the downward leader ends up being displaced horizontally. What causes the displacement? The upward leader leaves an object with the highest electric field at the top, and that could be a tree or tower displaced from the lowest tip of the downward leader.

FLINT HILLS RAINBOW
SEPTEMBER 2004 (LYON COUNTY, KANSAS)
DAVE LEIKER

Any rainbow is the first of an infinite number of rainbows, each one less bright than its predecessor. People can usually see only two, like the faint double rainbow in this picture, because the rest are lost in the background. Here are a primary rainbow forming nearly half of a complete circle and a secondary rainbow, an effect produced by scattering low-angle sunshine. Dr. Bart Wolf, chair of the Department of Geography and Meteorology and associate professor of meteorology at Valparaiso University, explains that the light bends upon entering the raindrops, bends and reflects twice upon hitting the back of the drops, and bends a fourth time upon leaving the drops. Also, the color order of the secondary rainbow is reversed.

SUNDOGS AT ALTA RIDGE
2008 (BARNES COUNTY, NORTH DAKOTA)
DENNIS STILLINGS

Also known as "parhelia," the word "sundog" comes from Greek mythology (Zeus walking his dogs across the sky). Bright spots on either side of the sun occur because of hexagonal ice crystals falling in the atmosphere with their flat sides parallel to the ground. These crystals act as prisms, refracting low-angle sunlight as a 22-degree sundog—each one is located 22 degrees from the sun, an angular distance. The arc is the halo, and the tree is blocking the sun. The orange/red interior of the sundogs is caused by color separation, while the outer edges become white from the overlap of colors.

CURTAINS
2003 (THOMAS COUNTY, KANSAS)
MARK FEIDEN

"Though I am not a weather photographer per se," Feiden said, "I have always believed that the sky is very much a part of the plains landscape because, on the plains, the sky comprises most of what you see if you are standing at ground level." Always on the lookout for interesting phenomena happening above the horizon line, Feiden captured this image of instability, and the photo turned out exactly as he envisioned it. The sky has layers of stratocumulus clouds (large, dark, and round), with the foreground in shadow and cumulus clouds farther away, more reflective of bright white clouds.

GREG WAXBERG is a writer and magazine editor for The Pingry School, and is an award-winning freelance writer. Visit the Plains Photo Project at http://www.emporia.edu/cgps/photo-project to view photos by and comments from more than 25 photographers. Anyone interested in submitting photos to the Center for Great Plains Studies for inclusion in the Plains Photo Project may contact Susan Brinkman at sbrinkma@emporia.edu.

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