Finding Vorticity in the Flint Hills

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Summer Morning Rainstorm
Dave Leiker

FINDING VORTICITY IN THE FLINT HILLS

STORM CHASING MOTHER NATURE'S FURY IN A CHALLENGING LANDSCAPE

Morning thunderstorms barely snuck into far northeast Kansas before dissipating with the summer heat on August 15, 2019.

The remnants of these storms, combined with the warm, unstable air, were perfect ingredients for late-day massive clouds of cauliflower. Not the kind you eat, either. These cumulonimbus clouds are responsible for the strongest storms known to man, and I want to capture them all – documenting them for the next generations.

Kansas is well known for its severe weather. Any given day in April through October can be headlined with either hail, flooding, wind or tornadoes. That is what lured me here from Ohio. Growing up south of Cleveland, I had always been fascinated with extreme winter weather. Lake Erie provided massive snowstorms that dropped many feet of snow in a day or less. However, when I was in third grade, two events changed my life.

That year, the movie "Twister" was released, and a local broadcast meteorologist visited my school. The tornado movie's intense scenes scared me so much that I had to leave the theatre, but the meteorologist helped turn that fear into curiosity. This inquisitiveness drove me to study meteorology at an Ohio university. My college friends and I would road-trip westward in search of epic Plains storms on the weekends. So, when a weather/climate job opportunity opened up in Manhattan,

Kansas, post-graduation, I capitalized on it. Now my storm chasing hobby can be fueled without days of driving. Storm chasing occurs in my backyard, and I get to work with it!

When I arrived in Kansas, I wasn't overly familiar with the Flint Hills. The few roads and irregular terrain of the Hills often make it a challenge to catch the sneakiest and most damaging of all Mother Nature's wonders. Those challenges came into play on August 15 as a fellow storm chaser and I navigated a storm in the late afternoon. It developed just west of Manhattan and was slowly inching its way southward across Interstate 70. The thunderstorm tops stretched southward with bulging mammatus sagging toward the ground. To the north, gray low clouds wrapped from eastward ahead of the storm. She was angry but ... there was a calm about it.

That solace was the Flint Hills. Vibrant green grass displayed the wonder of the previous spring burns. The trees in the valley provided vital habitat for the chirping birds, singing summer's famous tune. Wind hummed through the barbed wire fence, providing a constant tone that vibrated the air. The rich smell of moisture was accented by abundant wildflowers while the storm raged. All senses were stimulated with the enchanted scene unfolding.

As the storm approached Alta Vista, it breathed deeply, inhaling the warm, moisture-laden air from the south. Taking on a cylindrical shape extending into the heavens, it strengthened, playing a familiar tune indicative of impending doom. Several massive lightning bolts shot outward from the cloud, searing the ground on contact. The deafening thunder seemed to shock the birds as an eerie silence fell upon the landscape. (This is usually the first visual and audible indication that a storm is strengthening.)

Another familiar tune is wind shear, changing wind speed and direction with height. It bends over the top of the storm and develops the rotation within. A characteristic of the world's strongest storms, called supercells, higher shear typically ensures storm longevity and severity. Screaming southerly wind enhances the shear and hums the anthem of trouble.

We raced down Kansas Highway 177, trying our best to stay ahead of the storm. Just before Alta Vista, we pulled off the road and took in the scene. Hair on the back of our necks stood up as the storm released more fury in the form of lightning, picking out unlucky targets. The intense display reached an apex as a small cone lowered from within the bowels of the violent heat engine. In an almost graceful movement, the cone briefly touched the open prairie before

Rotation
Kristin Goering

disappearing once again into the cloud. Its existence, though brief, was accented by a massive, sculpted storm greeted with a foreground of the gorgeous green prairie. We had captured Nature's fury, and it only disrupted a few trees — success! Much different from what is portrayed in the movies.

Fortunately for the community of Alta Vista, the storm shifted slightly eastward, taking the path less crowded. Unfortunately for us, it moved into an area of few roads. We searched our maps, grasping for a miracle road that would take us with the storm and ensure us a view. However, terrain and trees

dominated in every direction for several miles. We were leery of dirt roads because they also provide a quick way to bury a car to the axles if not carefully navigated. It takes both luck and skill to master these challenges of storm chasing.

Despite having pursued extreme nature for over 10 years, I still find night storms the most challenging. As the sun set on this day, darkness quickly made visibility difficult. Lightning is typically the only illumination of the storm and can be irregular. These beasts can move and change direction unpredictably, and you must depend on your senses. Thankfully, we were experienced and lucky, stumbling upon a view several miles to the southeast of the storm.

Shot in a turbulent wind, the first few photographs we captured made our hearts sink. Between the trees and cloud base roared a large cylinder of twisting cloud. Taking a few more images and viewing them in a quick sequence, we could tell it was spinning rapidly. The storm was producing another tornado. This twister appeared larger than the first one and was on the ground longer. We later learned that it not only drilled up the pasture but also struck several barns. Having seen significant damage multiple times in the past, we always pray it doesn't impact people. Our wish is that all tornadoes are like the first tornado. Unfortunately, extreme weather not only carves, chips and erodes the landscape of the Flint Hills — sometimes it also takes human creations and human lives with it.

After those few minutes of destruction, the storm wasn't alone in the sky anymore. Copious new clouds of water vapor developed all around it. These formed a complex and quickly moved to the southeast. We continued to capture the amazing display of nature into the early morning. Lightning flickered continuously along the horizon for hours, mimicking nearby lightning bugs. Accompanied by crickets, we enjoyed the stars and the lightning, savoring the feeling of a successful chase.

The Flint Hills have long been home to severe weather, bringing dangerous conditions but also beauty to those living here. Moisture from the Gulf, warmth from the Desert Southwest and strong winds from the Intermountain West collide here. This battleground and resulting phenomena not only brought me to this state but also provided a spiritual experience of a lifetime, overcoming my childhood fears. No place on Earth can challenge Mother Nature's display within the serene Flint Hills.

Christopher "Chip" Redmond is a meteorologist at Kansas State University and manager of the Weather Data Library and Kansas Mesonet. He also is a wildland firefighter and meteorologist, often spending time out west in the summer.

Brief Tornado Near Alta Vista, August 15, 2019
Christopher "Chip" Redmond