

An Analysis of “Coming Storm”



Figure I: “Coming Storm” Final Image

(I) Project Background

The image shown in Figure I above was taken specifically for the Clouds First project; part of the Flow Visualization curriculum at the University of Colorado Boulder. The goal of the project was to capture an interesting and artistic cloud formation and analyze its formation and background weather physics. This image was selected out of many because of its unique depiction of an isolated rain shower at the forefront. Surrounded by blue sky and dark clouds, the image depicts the early stages of a rainstorm and the formation of a cumulonimbus cloud.

(II) Environmental Background

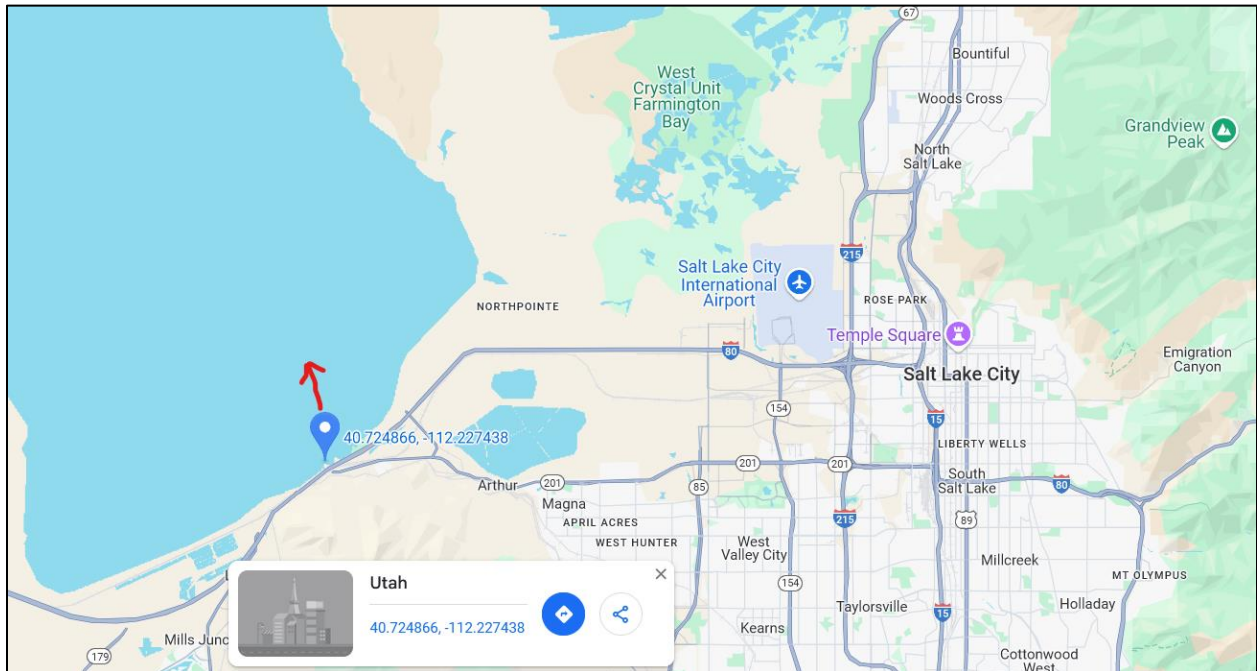


Figure II: Location (Credit: Google Maps)

The image was taken on the south side of Great Salt Lake near Salt Lake City, Utah at coordinates 40.72451°N , $112.22555^{\circ}\text{W}$. This location is approximately 4,200ft above sea level, and the camera was above 5ft off the ground facing north when the image was taken. The image was taken on September 3rd, 2024 at 3:48 PM with winds blowing eastward, and about an hour later there was an intense rainstorm within Salt Lake City for about 30 minutes. “Weather Underground” recorded 0.09” of rainfall between 5:00 PM and 7:00 PM.

(III) Cloud Physics and Analysis

Based on the Skew-T diagram shown in Figure III below (courtesy of the University of Wyoming), the cloud pictured was formed in an unstable atmosphere at about 6.5km of elevation. Due to the atmosphere being unstable and the cloud being in the mid-troposphere (suggested by the more significant dewpoint and temperature “bumps” at about 6.5km) the surrounding clouds in this image are likely altocumulus. Meanwhile, the isolated rain shower in the center suggests the growth and formation of a large cumulonimbus cloud in the process of blowing eastward.

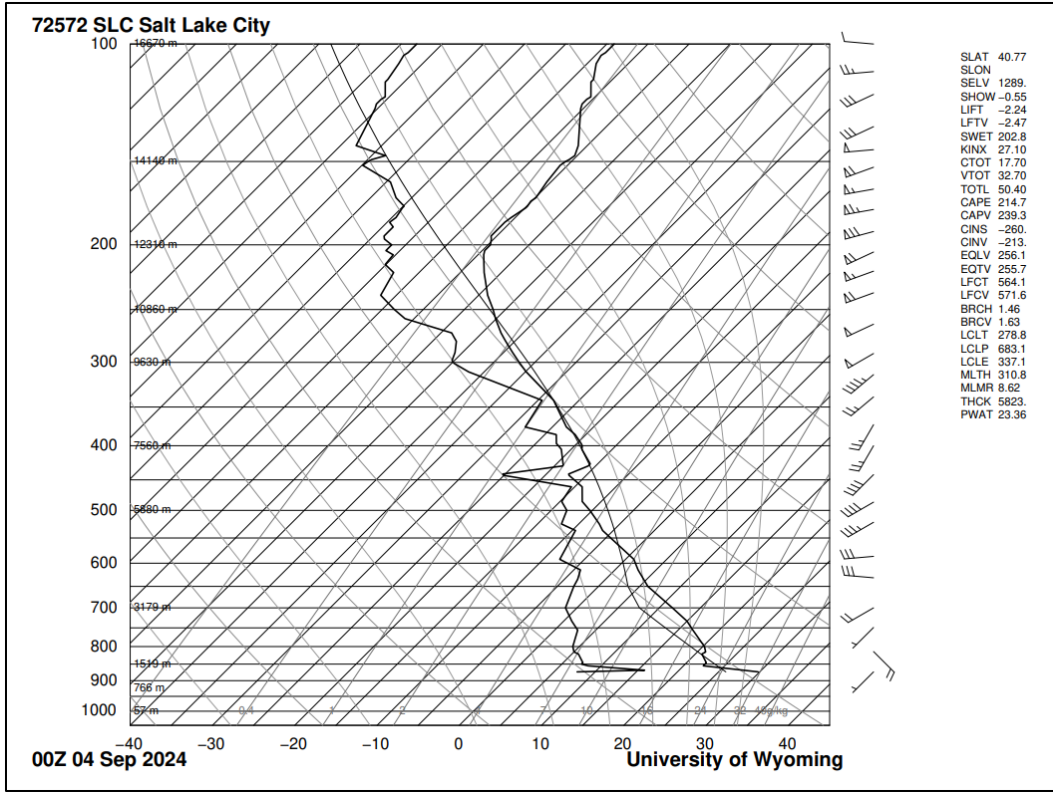


Figure III: Skew-T Diagram



Figure IV: Surrounding Environment

The rest of the sky appears as shown in Figure IV, with isolated cumulonimbus and cumulus clouds on an otherwise sunny day. The day before had a similar weather pattern with fair weather in the morning and isolated clouds in the afternoon. Given the onset of fall, weather is now making the general transition from stable to unstable, and I would otherwise predict the formation of low-altitude cumulus clouds given the circumstances of the image. This generally seems to be the case given the Skew-T plot and surrounding environment of the captured cloud and other non-rain producing heaps. This cloud was likely formed directly from the Great Salt Lake below it. As the strong afternoon sun heated up the water, it evaporated, and with a low enough above-ground temperature clouds condensed fairly quickly, which led to an immediate rainstorm.

(IV) Photographic Techniques



Unedited Image



Edited Image

Figure V: Image Comparison

The image was captured using the ultrawide (0.5) lens on an Apple iPhone 13 Pro with the below settings.

Camera Type	Apple iPhone 13 Pro Digital Camera
Aperture	f/1.8
Focal Length	13mm
Shutter Speed	1/4785
ISO	40
Unedited Image Size	4032x2268
Edited Image Size	1661x934

I would estimate the cloud to be approximately 2 miles from the camera, with the image capturing about 20 miles of the horizon. Ultimately, this image was chosen out of a few for its composition, with the rain falling at the center of the image. I edited the image in post-processing using Adobe Lightroom with a heavy emphasis on increasing contrast, brightening the highlights, and darkening the shadows to add drama. I also cropped the image and rotated it so that the horizon is parallel and blurred the ground to place the focus on the sky.

(V) Conclusion

To me the image most importantly reveals the formation of a cumulonimbus cloud. I find the sheer width of the cloud to be striking, as well as its hidden vertical growth into a raincloud. The dark underside on the right side of the image suggests the coming release of chaotic forces in a dramatic fashion. Overall, I like the image as it strikes a unique aesthetic of a desert storm, however I think it would be even better with a more intense storm. I believe the blue sky on the left side of the image takes away from what I am trying to convey and though I think the fluid phenomenon is interesting I am disappointed I couldn't get the image to quite match the aesthetic I had in mind. My question may be whether the rock in the foreground adds to the image artistically or if I should have purposely kept it out of my shot. Though I was short on time when taking this image, if I could do it differently I think I would have waited to see the storm develop further for a more interesting image.

Bibliography:

“Weather Underground” <https://www.wunderground.com/history/daily/us/ut/salt-lake-city/KSLC/date/2024-9-3>

“University of Wyoming Skew-T Diagram”
<https://weather.uwyo.edu/upperair/sounding.html>

“Google Maps” <https://www.google.com/maps>