

Clouds First – Spring 2018



Figure 1: Final Image

Context:

The First Cloud assignment is an introduction into imaging the physics of clouds. I wanted to capture some sort of cloud scene while the sun was setting, to have vibrant yellow and orange hues in the background. I decided to use the image in Figure 1 because of the overall composition in this photo. I think the two clouds in the middle of the image have some sort of symmetry between them and I enjoy how the contrast between the dark clouds and the moody background turned out. In post processing, I increased the saturation and cropped out the mountains from the bottom to put more emphasis on the central wispy clouds.

Circumstances:

This image was taken in Boulder, CO by Regent Dr. near the Coors Events Center. The camera was elevated approximately 30 degrees above parallel and facing west, evident by the mountains seen in the original image. See Figure 2. This image was taken at sunset 5:30 PM on February 21st, 2018.

Cloud Identification:

In the background of the image, seen in the lower $\frac{1}{4}$, is a cloud stretched across the sky. The classification of this cloud is a stratus, most likely a stratus nebulosus [1]. These clouds are the most common variety of stratus, and form between 0-6500m. The stratus nebulosus are grey and generally featureless. As seen in Figure 1, the cloud has an almost mist like appearance, typical of this classification of clouds. In the foreground of the image are two wispy looking small clouds, likely the remnants of a mountain wave cloud. These mountain wave clouds are common, due to the location at the base of the foothills. The terrain provides an orthographic lift mechanism that is the source of many clouds seen in and around Boulder. The appearance of the clouds in Figure 1 is due to the cloud

evaporating, it cannot maintain droplets at the current elevation and temperature. Looking around the sky, there were hardly any clouds in the immediate area, meaning this was likely the last of the evaporating cloud. Looking at the day before and the day after, the temperature varied to an extent, becoming gradually warmer by 15 degrees over the course of the week. The barometric pressure reached a peak around Wednesday morning and dipped slightly before this image was taken, possibly contributing to the mountain wave cloud [2]. The wind was low or non-existent when the image was taken. At times, it appeared as though the remnant mountain wave stood still. The tails of the clouds although wispy, do not look extremely turbulent. Looking at the Skew-T data for February 21st, the cloud seen likely formed around 3000m due to how close the dew point and temperature profile are at that elevation [3]. It is possible that the cloud formation was even closer to the ground judging from the Skew-T. The atmosphere was stable, evident by the CAPE value of zero.

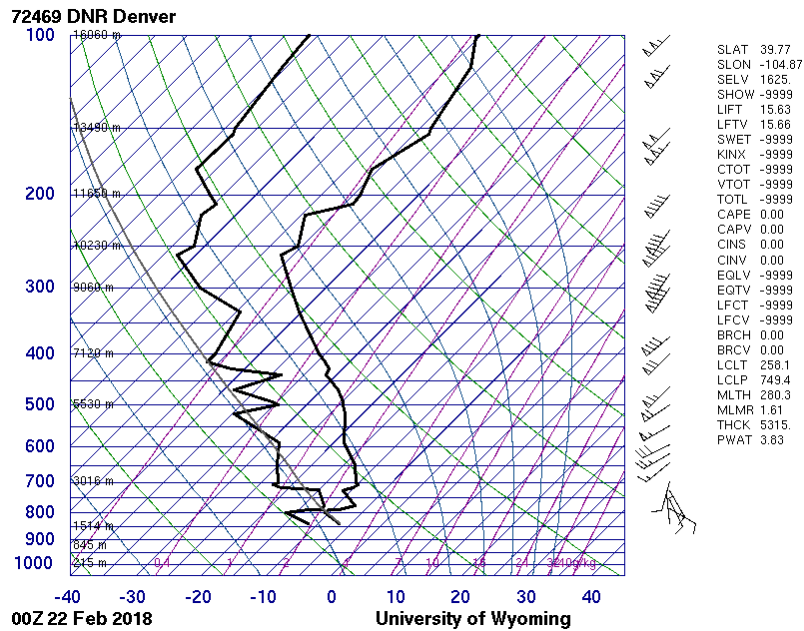


Figure 2: Skew-T diagram for February 21, 6:00PM Denver

Photographic Technique:

The original photo shown in figure is 5312 pixels x 2988 pixels. The camera used is from a Samsung Galaxy S6 Active, 16 MP. The camera was held 30 degrees from horizontal. Although the stratus in the background is over the mountains, the evaporating clouds in the main portion of the image were much closer, no more than a mile away. The estimated elevation of the clouds is around 3,000 m. The field of view of the image is approximately ¼ mile at the focal point. The camera specifications are: an aperture of f/9, an ISO of 40, and a shutter speed of 1/500 s. The focal length is set at 4.3mm, but zoomed in to focus on the image. The image was cropped to dimensions of 5312 x 2728 pixels in Gimp to put emphasis on the middle section and remove the foothills protruding from the bottom of the image. Saturation was increased slightly in post processing to brighten up the sunset and give more depth to the clouds edges.



Figure 3: Original Image

Critique:

The image captures the wispy nature of the evaporating cloud, and I like how the light from the sunset enhances the stratus cloud in the background. The pastel pallet plays well into the composition in my opinion. However, I would have liked to use a higher resolution camera and save a higher resolution image, the final result from Figure 1 is a bit granular and does not capture all the detail I would have liked. The remnants of the mountain wave cloud had an interesting texture to them that could have come through more.

References:

- [1] Pretor-Pinney, Gavin. *The Cloudspotter's Guide*. Hodder & Stoughton, 2007.
- [2] Weather History for Boulder Muni, Boulder, CO, CO | Weather Underground. (n.d.). Retrieved March 15, 2018, from https://www.wunderground.com/history/airport/KBDU/2018/2/19/CustomHistory.html?dayend=23&monthend=2&yearend=2018&req_city=&req_state=&req_statename=&reqdb.zip=&reqdb.magic=&reqdb.wmo=
- [3] University of Wyoming College of Engineering. (n.d.). Retrieved March 15, 2018, from <http://weather.uwyo.edu/upperair/sounding.html>