Clouds Second Report

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Cumulus, Nimbostratus, Cumulus fractus

The image contained in Figure 2 below, is my submission for the Clouds Second Assignment for MCEN 4151: Flow Visualization. The image contains a number of different clouds that were formed as a result of a storm system that had passed through the Boulder, Colorado area in the previous 24 hours. The intent of this image is to reveal to the beauty in clouds from in unstable atmosphere.

Figure 1: Image of clouds above Flatirons

This image was taken from the Business Field on the University of Colorado Boulder Campus, facing west towards the Flatirons of the Front Range of the Rockies, at approximately 10:58 am. The elevation of the camera was approximately 5,400 ft. and the clouds present in the image were at an approximate altitude of around 7,000 feet.

There are a few different clouds types present in the image in Figure 1. The first cloud type, which is the most prevalent in the image, is the nimbostratus, or rain cloud. These clouds hold high volumes of water and are generally present with high humidity. Nimbostratus is one of ten fundamental cloud types. As is typical with Nimbostratus, the clouds in the image appear dark, and fairly solid in appearance.

The Nimbostratus clouds also 'hug' the mountains. Note in the upper left portion of the image, how a fine 'mist' envelops the leftmost peak of the mountains. The second type of cloud present is Cumulus. Although the cumulus formation can be caused by mountain waves (wind flowing over a ridgeline) I believe that the cumulus clouds seen in the image in Figure 1 are caused simply by the amount of humidity that was present in the atmosphere on this day (see Figure 2 for Skew-T diagram). Thirdly, the last predominant cloud type in the image above is cumulus fractus (or nimbostratus fractus) which results in smaller clouds with relatively 'jagged' edges.

In analyzing the Skew-T diagram in Figure 2 below, it can be seen that the CAPE, or Convective Available Potential Energy, a measure of the atmospheric stability, was 27.92. Additionally, in tracing the path of the isobars in the schematic, we can see convergence allowing for the formation of clouds at the expected altitude.

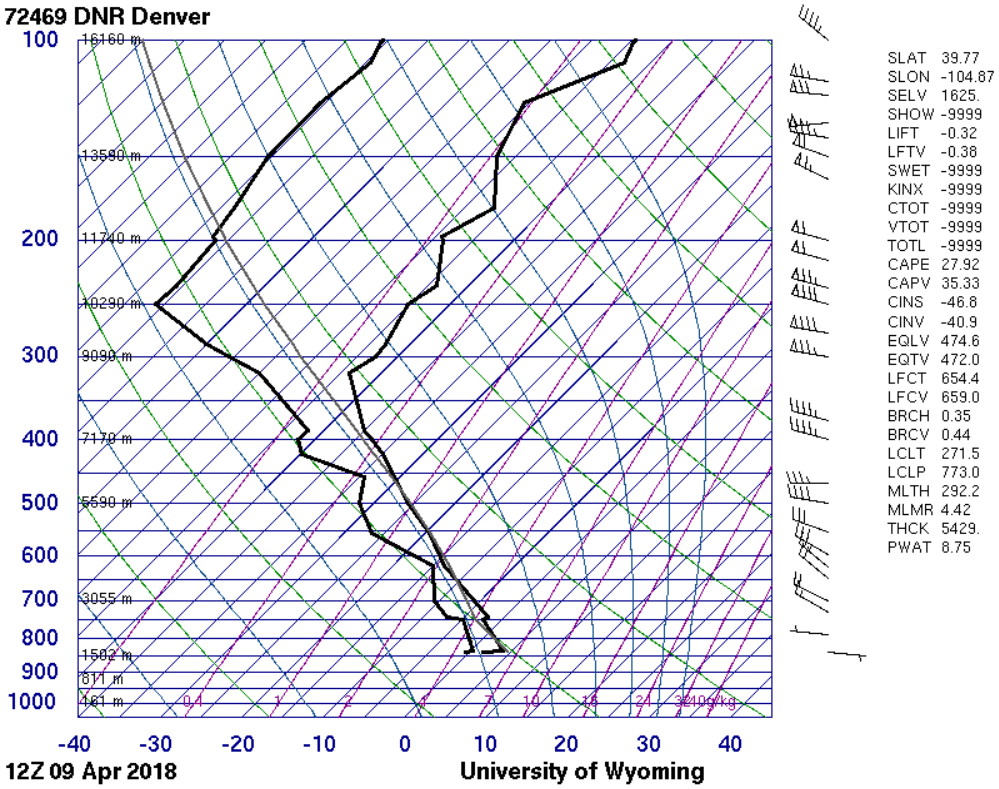

Figure 2: Skew-T diagram for April 8, 2018

Figure 3 below contains a comparison between the image originally captured by the camera, and the final image that was submitted.

Figure 3: Original image (left), Submitted image (right)

The estimated size of the field of view is approximately 300ftx1000ft. The distance of these clouds from the camera lens is up to 1000ft. The camera that was used to capture this image was a Canon PowerShot SX530 HS point-and-shoot digital camera, which has a 50x optical zoom and a 16.0 megapixel sensor. The image size is 4608x3456 px. The shutter speed was 1/1000 sec, with an ISO of 125, F/5.0, and automatic white balance. Minimal post-processing was done on the final image, with only saturation of blues and greens being boosted.

I really like the aesthetic that the clouds provide in this image. The mist above the Flatirons is quite nice to look at. For next time, I would improve the framing and cropping of this image.

Work Consulted

weatheronline.co.uk. "Cloud Types (Genera)." *Weather Facts: Cloud Types (Genera)*, www.weatheronline.co.uk/reports/wxfacts/Cloud-types.htm.