Falling Sky

Clouds Image Report

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This report lists and describes the techniques performed to capture the photo *Falling Sky* as part of the first "Clouds" assignment. The image attempts to depict atmospheric fluid dynamics in clouds. The intent of this assignment was to capture an image that effectively displays the beauty and complexity of cloud flow phenomena. The relevant meteorological data will be discussed and used to analyze the cloud type and formation. The was one of several photographs captured during the project period, and it was found to be the most aesthetically-pleasing.

The image was captured on February 20 at 2:12 pm in Boulder, Colorado. The temperature was approximately 36°F with a relative humidity of 39%, dew point temperature of 24°F and wind speed of 13 mph[3]. As indicated in Figure 1, the image was captured at one of the most cloudy periods of the day.

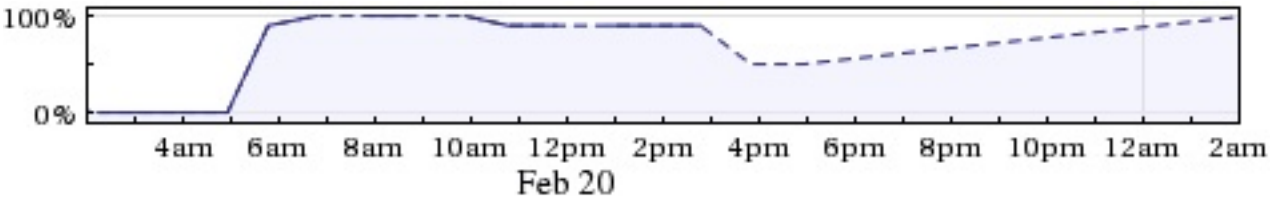

Figure 1: Cloud Cover in Boulder, CO

The clouds in the image are altocumulus perlucidus, which are characterized by light, puffy appearance with openings or spaces between formations. Altocumulus clouds typically indicate shallow convection. As it was previously stated, this image was captured midday on February 20. The sky was slightly overcast, with no precipitation. Figure 2 shows a slight cold front in the days following the image was taken [1]. This is typical for the presence of altocumus clouds. Also, it snowed later that night, which is another indication that these are altocumulus perlucidus, as precipitation is likely within 15-20 hours when they are present[2].

Figure 2: February Temperatures for Boulder, CO

Altocumulus clouds generally form around 6,500 feet to 23,000 feet above ground. Given the cloud type and size, the altitude of the clouds in the image can be approximated at about 20,000 feet. Analysis of the appropriate skew-t diagram, shown in Figure 3, reveals additional details about the formation of these clouds.

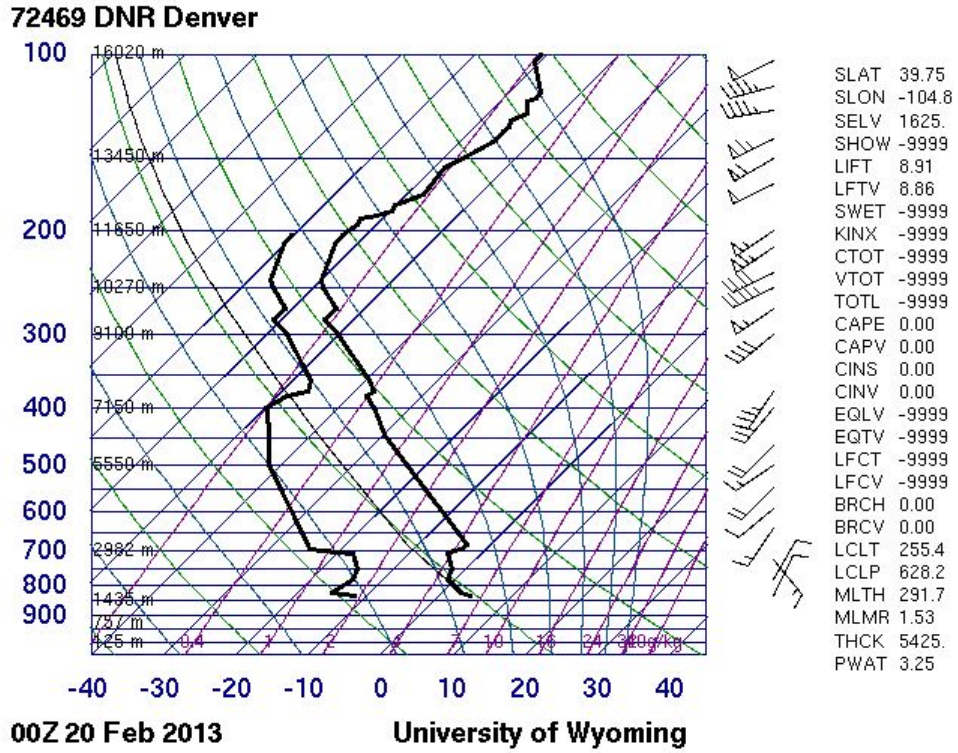

Figure 3: Atmospheric Sounding for Denver, CO on February 20, 2012

The skew-t shows no significant CAPE, indicating a stable atmosphere. Stability of individual air parcels of an atmospheric layer can be determined by comparing the slope of the virtual temperature to that of the saturation adiabats. The similarity of slopes also suggests a stable atmosphere. The dew point line's (the jagged line running south to north) closeness to the environmental surrounding line suggests a greater relative humidity, and subsequently more clouds, around 20,000 feet and higher. This supports the claim that the clouds photographed were likely altocumulus.

Several photos were taken over several days to depict cloud flow phenomena. Capturing an image that was both aesthetically-pleasing and effectively indicative of fluid flow was not an easy feat. There were several phases of photography taken from various locations in Boulder. Weather forcasts were used periodically throughout the day to determine good cloudcover. Additionally, lighting was a significant factor in capturing the image. There were several good cloud images that were deemed unacceptable because of low exposure.

The specifications for the final photo are listed in Table 1. Based on the focal length and image dimensions, the field of view of the image was estimated as 9.2mm. The photo was taken on Farrand Field on the University of Colorado at Boulder campus (aprroximate

elevation of one mile). While not directly measured, the angle at which the image was taken was about 90°. The camera used is not a DSLR, but the image does achieve a high level of clarity.

Camera	Canon Powershoot 500 IS
Dimensions	3648 x 2736 pixels
ISO Speed Rating	400
Focal Length	6.2 mm
Exposure time	1/320 s
F-stop	f/8
Aperture Value	f/8

Table 1: Photo Specifications

The image captured reveals the beauty of mid-level cloud dynamics. Being an altocumulus cloud formation, it is comprised mainly of water droplets and ice crystals. Altocumulus clouds generally form by convection prior to a cold front, which is due to an instability within the moist cloud layer. The image dramatically captures the undulation of these layers. Overall, I am extremely satisfied with the final image. I feel it successfully conveys the beauty of cloud flow dynamics. I performed some post-processing in Photoshop to enhance the colors and contrast, as well as the exposure. The original and final images are shown in Figure 4.

Figure 4: Original and Final Image

In Photoshop, the image was rotated 90°. This was done because the cloud closely resembles a waterfall from this angle. The exposure was increased slightly and curves were adjusted to enhance the blues. Finally, the contrast was increased to enhance the overall texture of the cloud. The photo is titled "Falling Sky" because of the cloud's resemblance to a waterfall.

References

[1] "Boulder Month Weather — Monthly Forecast for Boulder, CO." AccuWeather.com. AccuWeather Inc., Feb. 2013. 1 March 2013.

[2] International Cloud Atlas (1956) by WMO. 1 March 2013. http://nephology.eu/altocumulus

[3] Weather Underground. 1 March 2013. http://www.wunderground.com/weather-forecast/US/CO/Boulder.html