Clouds Second Report

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Clouds Second Assignment, MCEN 4151

April 8, 2018, 1:39 pm, Boulder, CO

This image is intended to capture two stratocumulus clouds, one in the foreground complemented by another higher altitude cloud which the sun was shining through. Emphasis was placed on the foreground cloud and the lens artefacts created by the sun shining through the background cloud, as well as the shape created by the space between the two clouds.

The image was taken on April 8, 2018 at 1:39 pm near the intersection of Folsom St. and Arapahoe Ave. in Boulder, Colorado. The camera was facing northwest and had an elevation angle above the horizon of about 15 degrees.

Both clouds in the image are stratocumulus as they were at low altitudes, and examination of their edges shows tearing characteristic of high winds. There were many clouds in the sky the day the image was taken, and high winds were present at the altitude of the

clouds because they were visibly moving. Only low to moderate winds were present at ground level. The large number of clouds present indicate that a great deal of air movement was occurring at the time. Included in Figure 1 is a Skew-T plot for 6 pm on April 8th, which describes the temperature profile of the atmosphere about four hours after the image was taken (*Atmospheric Soundings*, 2018). Note that the CAPE value is zero, which indicates that the atmosphere was stable at that 6pm. However, it was unlikely that the atmosphere was completely stable at the time of the image, because, as discussed before, the high winds at altitude and large number of clouds imply significant air movement was occurring. Examining the temperature profile on the Skew-T plot indicates that the local temperature and dew point were close together from altitudes of about 5600 to 9170 m, or 18372 to 30085 ft, thus this is where clouds were most likely to form. This large altitude range is consistent with the large number and variety of clouds observed on April 8th, and provides evidence that the clouds in the image were stratocumulus, as they appeared to be located at about the middle of the atmosphere, which is within this range. Additionally, they have visible depth, and individual cloud elements take up 5° to 10° of a person's total field of view (*Cloud Identification Guide*). The lifting mechanism that produced these stratocumulus clouds was most likely caused by a temperature inversion, which can be seen occurring in Figure 1 at about 10350 m. The fibrous and tattered appearance of the clouds was caused by the high winds at altitude breaking them up.

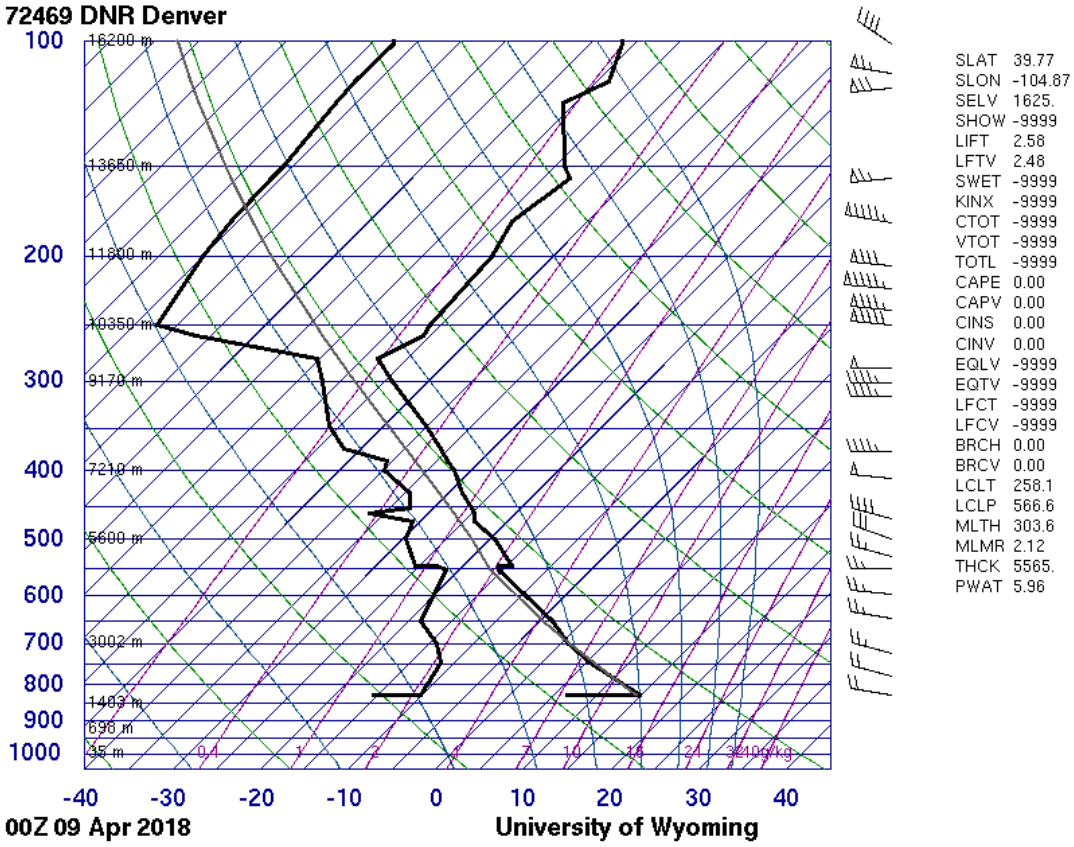

Figure 1. Skew-T Plot

The horizontal field of view of this image was approximately 100 ft, and the clouds were about 20,000 ft away from the camera lens. The image was taken with an iPhone 6 camera, which has a focal length of 4 mm and a fixed aperture of f/2.2. The shutter speed was 1/9615 seconds and the ISO setting was 25. The high dynamic range (HDR) mode of the iPhone was used to capture this image. In postprocessing, the bottom of the image was cropped to remove the top of a tree and the left side was cropped to remove a lens artefact. This changed the size of the image from 3024 by 4032 pixels to 2958 by 3905 pixels. The image was edited with the open-source editing software GIMP, and the color curves were altered in order to achieve a deeper and more natural looking sky color, as well as to make the edges of the clouds pop. For comparison, the unprocessed image is included below in Figure 2.

Figure 2. Unprocessed Image

While the clouds in this image may not be particularly exciting or unique, I enjoy the complimentary shapes that the two clouds create and the resulting negative space. The deep blue of the sky and bold, striking edges of the clouds that I was able to achieve with post processing were also really add to the image. The lens artefacts caused by the sun shining through one of the clouds also add an interesting element to the image. Overall, though the subject might be rather mundane, I achieved my goal of capturing a cloud image that is dynamic and interesting due to the shapes that the clouds create, the colors and the presence of lens artefacts due to the sun.

References

Cloud Identification Guide. World Meteorological Organization. https://cloudatlas.wmo.int/cloud-identification-guide.html

Atmospheric Soundings. University of Wyoming. April 8, 2018. weather.uwyo.edu/upperair/sounding.html