Brandon Gushlaw

Jean Hertzberg

MCEN 4151-001

10/19/2018

Cloud Image Report

The intent of this photo was to determine the cloud type and the flow associated with it. For this to be possible the capture needed to be clear as possible with proper lighting. It was important to know the angle, weather conditions, and elevation of the cloud. The weather conditions are given by the Skew-T diagram which gives information about the stability and elevation of where clouds are likely to form. A second cloud in the background was captured to gain better depth perception and narrow the cloud type analysis.

The location of the photo was at Chautauqua park in Boulder, Colorado. The time of the picture was 7:30 pm on August 31, 2018. During this time of the year the sun starting to set, providing enough light to capture a clear image. A setup of the camera was staged at the bottom of the hike at roughly zero elevation gain relative to Boulder County's average elevation above sea level. The camera was positioned facing Northwest and was pitched 45 degrees above a flat ground surface.

By observing the Skew-T and the photograph of the cloud along with data collected the two cloud types shown is assumed to be a stratoculumus and altostratus. Stratocumulus typically happen around 6,000 feet or lower while altostratus occur below 20,000 feet (UCAR, 2012). According to the Skew-T, the most probable height of cloud development occured around 4,800 feet where the dewpoint and atmosphere temperature are closest. The cape, which represent stability factor, was relatively low at 16.00. This generally means there was very little instability in the atmosphere. A common phenomenon in the Boulder front range is the mountain effect on clouds as they go from low elevation relative to ground and rapid high elevation gain entering

the front range. Since the location is so close to higher continuous elevation gain it is probable that clouds typical in lower elevations are being seen briefly.

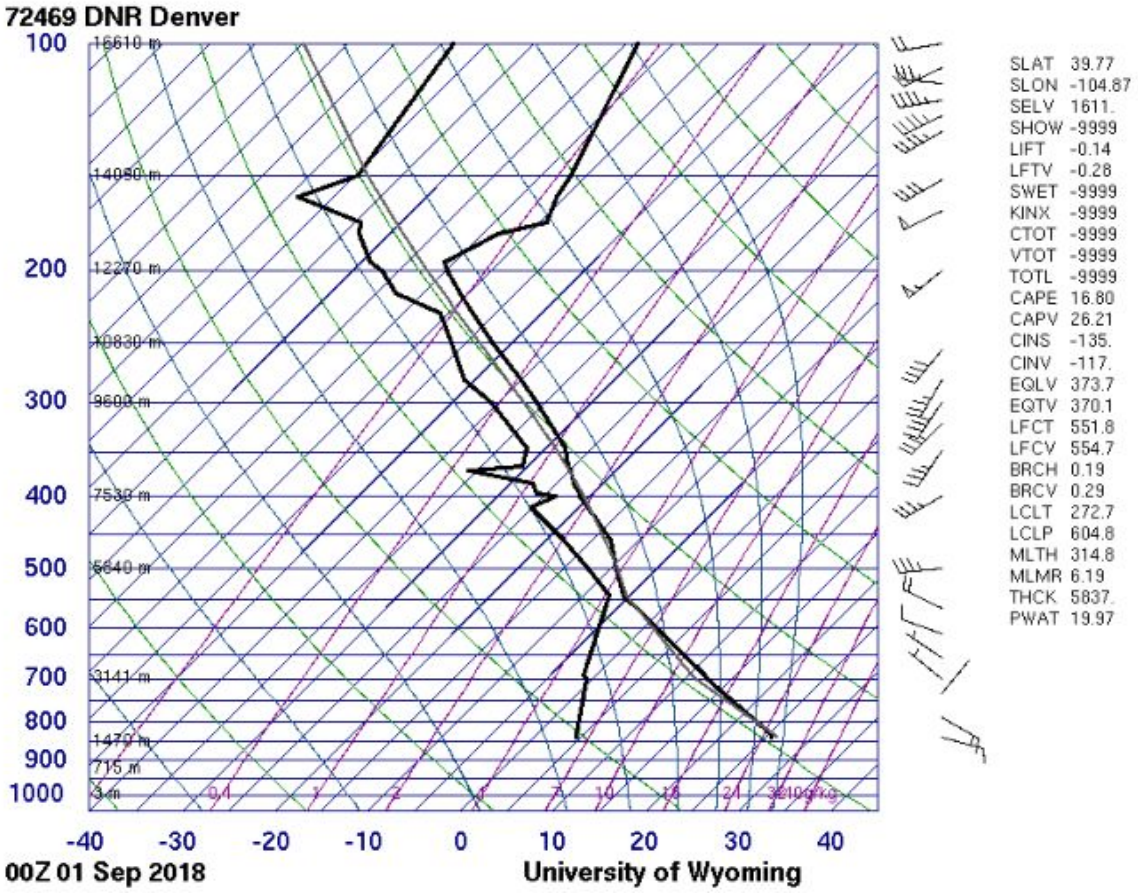

Fig 1. Skew-T diagram of the atmosphere in the denver area from the University of Wyoming. Cape stability, wind direction, and elevation cloud development are the crucial empirical data.

Using techniques from reference 1 (Charity, 1998), and the assumption that the stratocumlus cloud is 50 ft in height, a field of view and object distance from the lense can be calculated. To cover the vertical height of the cloud in the image required one and a half thumbs. This means one thumb represents 33 feet in height (50 feet/1.5thumbs). Therefore the distance from the object to the lense is 990 feet (33x30) (Charity,1998). A 15-55mm lens was used with a focal length of 42mm. This photo was captured with a nikon d3000 DSLR, which is a digital camera. The original image is 2896 x 1944 pixels, and the final image is 1308 x 808 pixels. To capture this image at sunset, adjustments to aperture, shutter speed, and ISO settings were required.The

final settings were ISO-100, shutter speed 1/200 secs, and aperture 4. Final edited image has an a 1.15 saturation ratio and a 2.25 contrast ratio.

Fig 1. Unedited raw image with resolution of 2896 x 1944 pixels.

The final edited photograph focuses on a cloud which appears to be a stratocumulus type defined by visual and empirical data presented in the above sections. The evidence of the cloud type is represented by the elevation, cloud stability, and visual comparison to other stratocumulus clouds. The conclusion of the cloud structure could be enhance for future research by analyzing the Skew-T of the local weather to the post and previous dates as well as photographs of these days. Another angle and observation of this cloud would also be helpful for analysis purposes.

References

[1] Mitchell N Charity, 1998. http://www.vendian.org/mncharity/dir3/bodyruler_angle/ retrieved Oct 19th, 2018

[2] UCAR, 2012. https://scied.ucar.edu/webweather/clouds/cloud-types retrieved Oct 19th 2018