

MCEN 4151  
Flow Visualization  
Clouds Second Report

Ryan Daniel

December 2, 2016



## **1 Introduction**

The purpose of this image is to exhibit the natural beauty and physics of a cloud. For this photo, I wanted to capture an interesting cloud feature near the beautiful landscape of the front range. In order to accomplish this I choose to wait and capture a cloud phenomena that was at least somewhat out of the ordinary. After some patience I finally captured some interesting stratocumulus clouds with some crepuscular rays.

## **2 Image Specifications**

The image was captured on Panorama Point of of Flagstaff Rd in Boulder, Colorado. The camera was hand held and facing south looking down the front range at an elevation slightly above zero degrees from horizontal. The picture was taken on November 13th at 9:40 AM.

## **3 Cloud Type**

The clouds shown in this image are identified as the stratocumulus variety. These types of clouds are generally a low-level cloud meaning they usually form within 2 kilometers of the atmosphere. They are normally formed by small convection currents that cause air above the cloud to prevent additional upward development. A Skew-T diagram shown in Figure 1 indicates a CAPE value of 0.00 meaning there was a stable atmosphere when this image was shot.

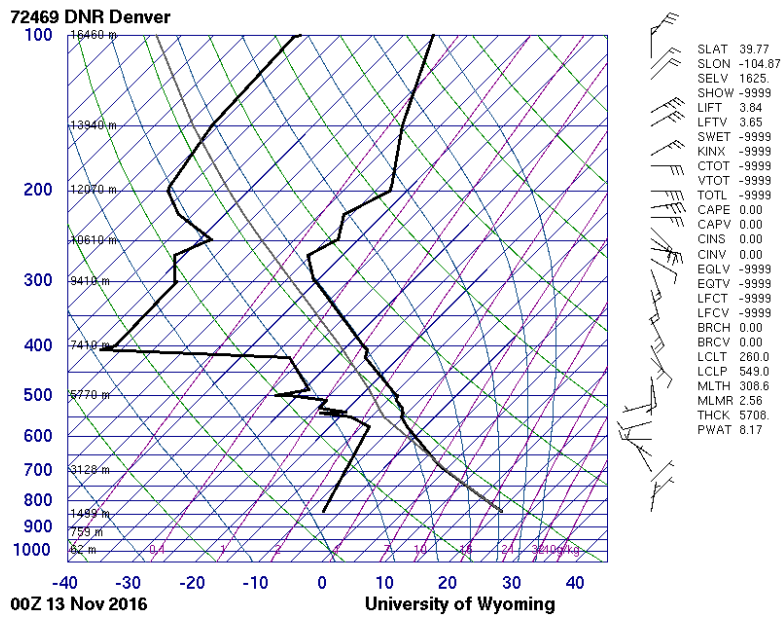


Figure 1: Skew-T diagram from November 13th in Denver

Stratocumulus clouds form as large layers that typically hang low in the sky. As shown in this image, they can also exhibit colors that range from dark gray to light gray and appear as rounded masses. I was lucky to capture some nice crepuscular rays breaking through this cloud structure which really gives this image a nice touch.

## 4 Photographic Technique

The camera was approximately 2 miles from the base of the flatirons and captured many miles beyond the Front Range. Due to the high dynamic range exhibited by clouds and landscapes, an HDR photo was taken. The Apple iPhone 7 was used in HDR mode and lens adjusted to a 4mm focal length. The original image captured was 4032x3024 pixels in dimension. Exposure time was set at 1/3546 sec with an F-stop value of f/1.8 and ISO-20. All post processing was done in Photoshop where only the vibrance settings were changed and shown in Figure 2. An original photo can be seen in Figure 3.

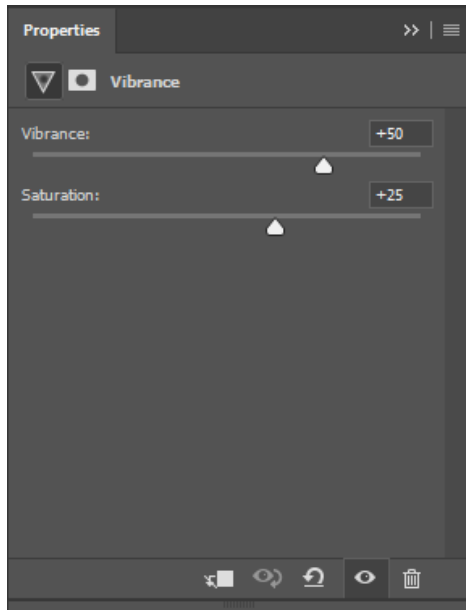


Figure 2: Vibrance properties



Figure 3: The original untouched image

## 5 Conclusion

The phenomena of crepuscular rays beaming through stratocumulus clouds is clearly shown in this image. I really like how these rays of sunshine make this image unique. The way these cloud structures form in such a random and dynamic way fascinates me and I really enjoyed learning about them. In the future I would like to learn how to take HDR images using a DSLR to get the highest quality image possible.