

Clouds 1

Flow Visualization

MCEN 4151



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Introduction

The purpose of this assignment was to observe and capture the natural flowing phenomena of clouds. Throughout this assignment, it was necessary to learn various cloud types and formation processes in order to accurately identify what phenomena was being observed. This knowledge also assisted in recognizing where and when to look for different clouds depending on the time, temperature, weather, etc. The intent of this image was to capture multiple different type of clouds, but also to have a sense of scale by showing the height of the clouds.

Methodology

This image was taken Saturday September 5, 2015 at approximately 12:00p in route from Colorado to California. I was about an hour west of Grand Junction on I-70 right before the exit to Arches National Park. This area is a very dry, desert like climate, with a very large sky. This image was taken out of a moving car, traveling approximately 70 mph, at angle of 20 degrees above the horizontal, facing northwest.

Analysis

In the center and lower parts of the image are a mixture of stratocumulus and cumulus clouds. These are the main clouds types in this particular image. These clouds typically have bulgy mounds or domes that tend to resemble a cauliflower ^[1]. They are usually separate clouds with very defined edges while their bottoms can be flat and dark ^[1]. Stratocumulus clouds can be far apart or grouped together and can be present in all sorts of weather ^[4]. Stratocumulus and Cumulus clouds are low level clouds (2000 meters) that are very common and easily identified. Cirrus clouds are also visible in the upper right and left hand portion of the image. These upper atmosphere (6000 meters) clouds look somewhat wispy and are composed of ice crystals ^[1]. These clouds generally move west to east, along with the jet stream, and usually “point” to fair weather ^[2].

If we reference the Skew-T diagrams ^[3] from Grand Junction Regional Airport (shown in figure 1), we can learn more about what the atmosphere was like that day. Seeing as I captured this image around noon mountain standard time, that puts me at a time right in between both diagrams. This made it difficult to determine whether the atmosphere was stable or not. According to the diagrams, in the morning this atmosphere was very calm (stable) which is very common around that time. But in the evening it appears that a storm (unstable) may have moved through based on the CAPE of 600.5. In my image, judging by the variation in height of the cumulus clouds and the strange activity toward the bottom of the image, I believe that the atmosphere was in an unstable state. I remember there being a nasty headwind on the highway that day so the wind must have been blowing due east.

There is no landscape in the picture so it's tough to have a sense of scale when analyzing cloud heights. The skew-T show possible cloud formations at around 4100 meters and 7400 meters. I

was a few thousand feet above sea level so that may explain why these values are higher slightly than the height those clouds are commonly found at.

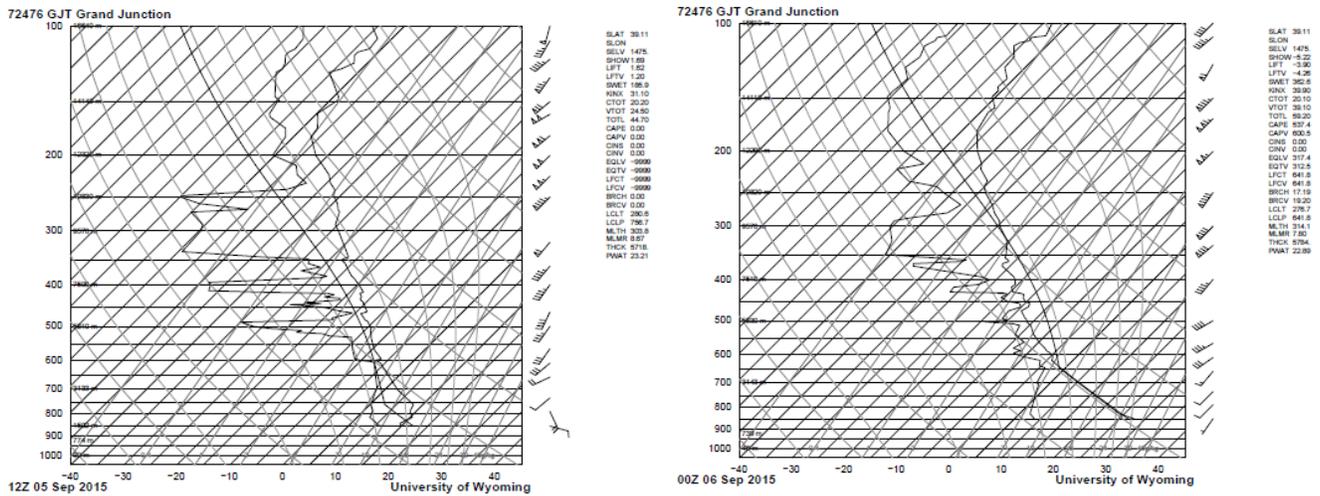


Figure 1: Skew-T diagrams [2] for 6am MDT (left) and 6pm MDT (right).

Technique

My friend who I was accompanying back to California let me borrow her digital Canon EOS 5D Mark III for this shot. I chose to shoot in manual mode with an ISO of 100, F-stop f/9, and a shutter speed of 1/640 sec. I was probably about ten miles from the clouds at the time and had a focal length of 50 mm. As for post processing, I actually did not crop the image (5760 x 3840), I personally thought it didn't need to be. I did however manipulate the curves in order to really make the blue sky pop (figure 2).



Figure 2: Clouds 1 original (left) and edited (right)

Conclusion

I am extremely pleased on how this image turned out. However, there is one aspect I wish I took into consideration; there is a slight glare from the car window on the image. It's tough to see if

you don't know it there, it almost looks like more clouds but I wish I saw it before post processing. Other than that, I think this image is diverse with cloud activity and is a great example of an unstable atmosphere. Next time I would hope to observe and capture some storm clouds with a nice landscape, or maybe some clouds at night. I think the moon has a very nice effect when it black lights clouds. Overall, this was a very fun assignment. I enjoyed learning details about each cloud type and I am anxious for our second cloud assignment.

References

- [1] "Ten Basic Cloud Types." National Oceanic and Atmospheric Administration. Web. 10/12/2015. <http://www.srh.noaa.gov/srh/jetstream/clouds/cloudwise/types.html>.
- [2] "Cirrus Clouds." Weather. 10/12/2015. Web. <http://usatoday30.usatoday.com/weather/wcirrus.htm>
- [3] "Atmospheric Soundings." Wyoming Weather Web. Web. 10/13/15. <http://weather.uwyo.edu/upperair/sounding.html>.
- [4] Met Office. "low Level Clouds Web. 12/13/15. <http://www.metoffice.gov.uk/learning/clouds/low-level-clouds#stratocumulus-clouds>

Acknowledgements

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