

# **Clouds First Report**

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AltoCumulus Clouds in Boulder CO

Taken 10/13/23 at 12:30 PM

**MCEN 5151 – Flow Visualization**

10/30/23

## Introduction

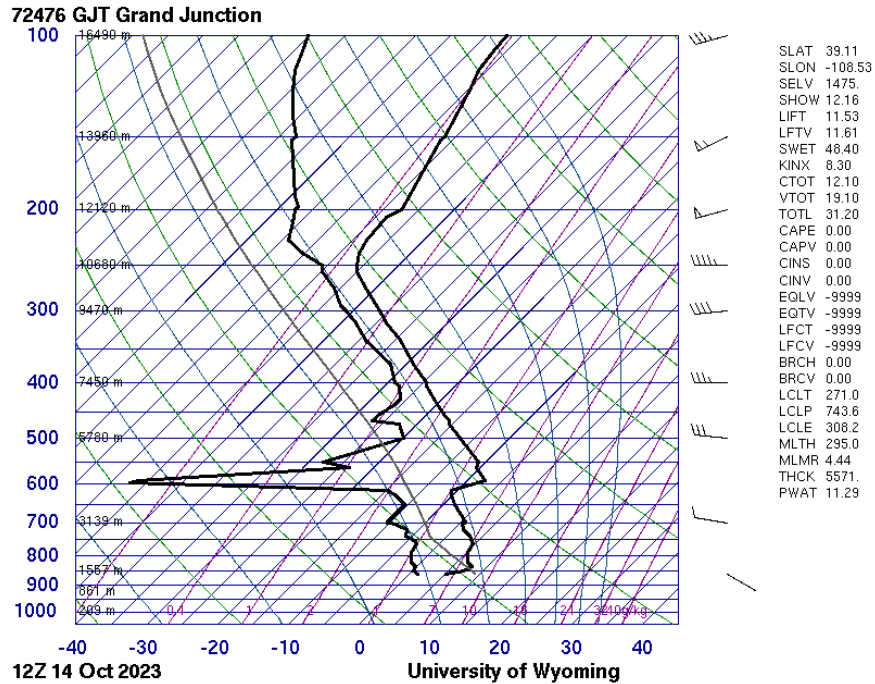
This image was captured for the first Cloud Image assignment for MCEN 5151. This is a Flow Visualization course at the University of Colorado Boulder. The goal of this course is to focus on making the physics of fluid flow more visible to the human eye [1]. The intent of this image was to capture a cloud phenomenon. After taking a variety of cloud pictures this semester, I found this to be my favorite. The cloud you see captured was an altocumulus with cirrostratus clouds underneath.

## Circumstances

This image was taken on 27<sup>th</sup> way Street on 10/13/23 at 12:30 PM. The photo was taken by my Apple iPhone 14, and I was standing on the street. The approximate elevation was 5577 feet. I was facing approximately 80° E and 90° from the horizontal. Overall, it was a cold but sunny day with winds at 4 mph W.

## Altocumulus Clouds

Altocumulus clouds are associated with settled weather and often appear white or grey with some shading. They have the shape of bands or areas of individual cells. The small mid-level layer of clouds is called cloudlets. They exist in the shape of round clumps. These clouds are a mix of ice and water, giving them a more delicate texture. Formation occurs through the lifting of moist air pockets that are cooled by gentle turbulence, and in mountainous terrain that produces atmospheric waves. These clouds are found in settled weather, which aligns with the overall weather these last few days. In addition, these clouds are present between 7,000-18,000 feet which lines up with the elevation [2]. There seems to be no front approaching and similar weather is expected in the following days. The figure below shows the skew-t plot from Grand Junction, Colorado.



**Figure 1) Skew-t chart derived from Grand Junction, CO on Oct 14<sup>th</sup>.**

The Skew-t chart shows a CAPE of 0 which indicates no atmospheric instability. Generally, altocumulus clouds with a vertical extent may indicate the presence of elevated instability, especially in the morning [3]. However, these clouds seem to line up in a generally horizontal fashion which lines up with the chart. These clouds tend to line up in a row or street fashion. The cloud axes can indicate areas of moist air and clear zones between rows of drier air.

## Photograph Technique

This image was captured with my iPhone 14 camera. I used the standard settings on the phone camera. This includes a 26mm lens with an aperture of 1.5. The ISO was only 50 as it was very bright outside. The original picture was a 3024 x 4032. The original picture can be seen below. The field of view was around 210 degrees estimated.



**Figure 2) Original Photo**

I used Dark Table to edit the image. The first step I took was cropping the image to focus in on the altocumulus clouds. I also edited the black and white relative exposure to make the clouds stand out more. A few more notable edits included sharpening and haze removal to make everything look a lot clearer.

## Conclusion

Overall, I believe I was able to capture a great image of some altocumulus clouds. I love the way the clouds lined up in rows and the overall texture of the image. The fluid physics shown line up well with the surrounding weather and atmosphere. I think the editing of the image also brought everything together

nicely. For my next Clouds assignment, I believe I'll try to capture clouds during a storm. I think this would allow me to explore more physics and capture a better image.

## References

- [1] Hertzberg, Jean. "SYLLABUS MCEN 4151/5151/ FILM 4200/ ARTF 5200/ ATLS 4151/5151 Flow Visualization: The Physics and Art of Fluid Flow Fall 2023." FLOW VISUALIZATION A Course in the Physics and Art of Fluid Flow, 23 Aug. 2023, <https://www.flowvis.org/wp/content/uploads/2023/08/syllabusF23.pdf>.
- [2] "AltoCumulus Clouds." Met Office, [www.metoffice.gov.uk/weather/learn-about/weather/types-of-weather/clouds/mid-level-clouds/altocumulus](http://www.metoffice.gov.uk/weather/learn-about/weather/types-of-weather/clouds/mid-level-clouds/altocumulus). Accessed 14 Oct. 2023.
- [3] Cloud Classifications and Characteristics - National Weather Service, [www.weather.gov/media/lmk/soo/cloudchart.pdf](http://www.weather.gov/media/lmk/soo/cloudchart.pdf). Accessed 14 Oct. 2023.