

# Moonlit Cloudscapes



**Cloud Type:** Altocumulus

**Cloud Location:** Leadville, CO

**Time of Image:** September 2, 2023 at 10:16 PM

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## I Introduction

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This picture was taken for the first cloud assignment for Flow Visualization. We were assigned to take pictures of clouds and explain how they formed. This image came from my friends and I experimenting with taking images of the night sky using our smartphones, while sitting around the campfire. An hour before the cloud image was taken, the image shown below was taken.



**Figure 1:** Sky One Hour before Clouds

We had finished taking photos once we all believed we had cool pictures of the stars. An hour after the clear sky image the clouds began to move in. I thought it was so cool to see the mix of the black sky with the bright stars and the gray clouds. The lack of light pollution made it so the sky was lit up by just the moon so the clouds weren't a bright white like they would have been in the daytime. I thought this cloud image would be cool because we don't often get to see clouds with a dark star filled background.

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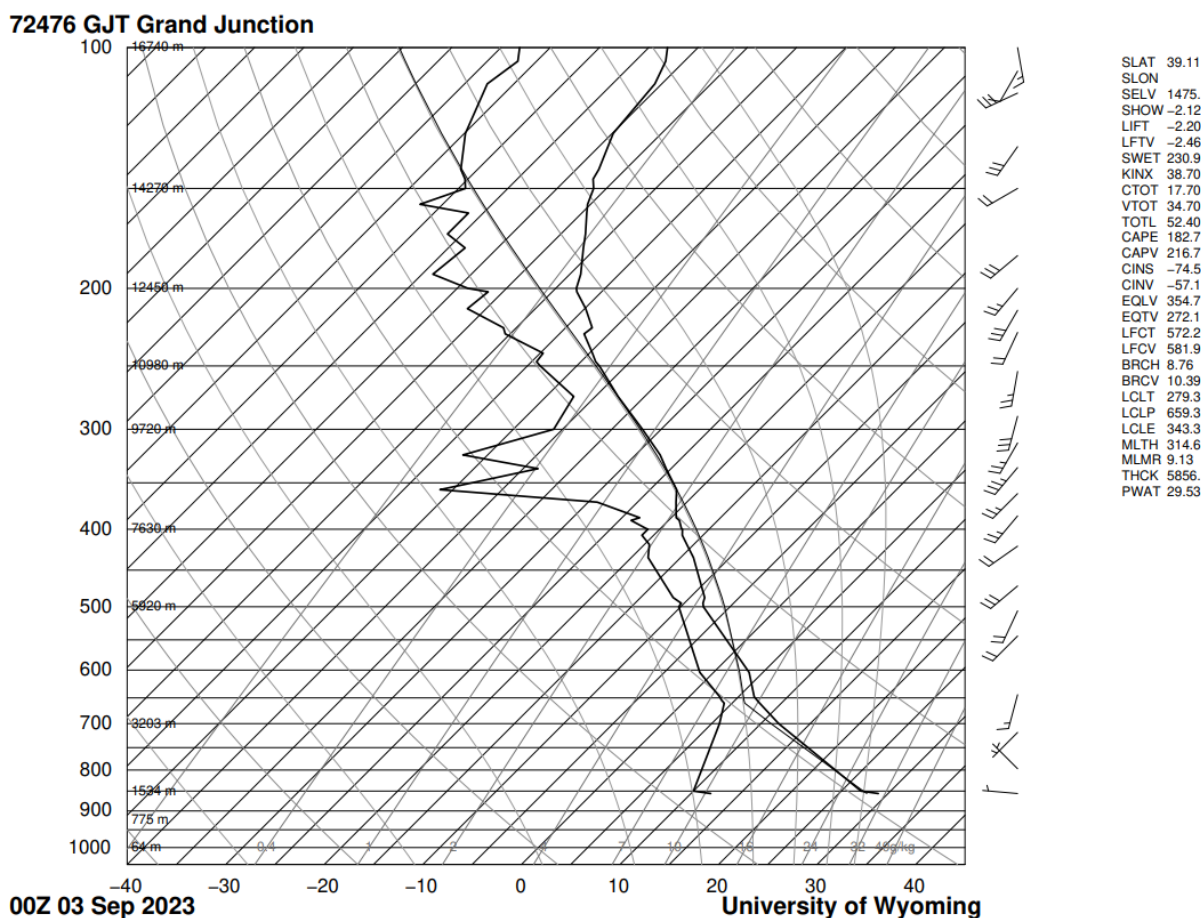
## II Circumstances

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This image was taken on September 2, 2023 at 10:16 pm. It was taken outside of Leadville, Colorado, near Mount Massive, at our campsite. Our campsite was far from other people and surrounded by pine trees. This photo was taken at an elevation of about 10,200 feet. The camera was facing almost straight up into the sky. It had been a relatively clear day, but clouds began rolling in at night around 10:00 pm.

### III Cloud Information

The clouds shown in the picture are altocumulus clouds. The rest of the sky was clear, but there were patches of these clouds throughout. The weather during the day had been clear, but a front was coming in. There was a large rainstorm the next day. Altocumulus clouds exist in the middle layer of clouds, from 2000 to 7000 meters. Based on the Skew T diagram shown below, the formation of clouds would most likely occur around 5920 m, which is in between the range for altocumulus clouds.



**Figure 2: Skew-T Diagram**

As shown in the diagram, the CAPE value is 182.7. This corresponds to a relatively stable atmosphere. Altocumulus clouds tend to appear in cool calm conditions followed by the development of storms later that day<sup>[1]</sup>. The presence of altocumulus clouds indicates the beginning of an unstable atmosphere in the troposphere<sup>[1]</sup>, which is why the CAPE is not zero. I believe that my prediction of altocumulus clouds is correct because the clouds are sparse but puffy. I also believe that my prediction is correct because on September 3<sup>rd</sup> around 2:00 pm there was a thunderstorm. This was the day after the image was taken, which agrees with the statement that a storm comes in later in the day after altocumulus clouds form.

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## IV Photographic Technique

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This picture was taken on an iPhone 12 with a wide camera lens. The settings on the phone were an ISO of 1600, a focal length of 47 mm, an aperture of f/1.6 and a shutter speed of 2.0 s. The field of view is about 45 degrees. The size of the initial image was 3024 x 4032 px. The dimensions of the edited image are 3024x4032 px. I chose not to crop it, since I thought the trees added some important depth to the image. The distance from the lens to the clouds was likely about 12000 feet. I really liked the image I took, but since it was taken at night, I felt like it could be improved. The original and edited images are shown below.



**Figure 3:** Unedited Image



**Figure 4:** Edited Image

The photo editing software I used was darktable. I started by adjusting the tone curve by moving it to the left. I then increased the detail of the image using the local contrast tool. The goal was to make the clouds stand out more than they had in the original image.

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## V Image Analysis

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Overall, I really like my picture. I think that nighttime cloud photos are very rare but also very beautiful. I think the picture does a good job capturing the clouds in a difficult environment. I think the physics of the clouds are shown well and these are a great example of altocumulus clouds. In the future, I think I could improve my editing skills. I am very happy with how it turned out, but I think there are always improvements I could be making.

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## V References

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[1] Oblack, R. (2019, July 23). *The Weather and Folklore of Altocumulus Clouds*. ThoughtCo. <https://www.thoughtco.com/altocumulus-cloud-overview-3444135#:~:text=Altocumulus%20clouds%20that%20appear%20on,the%20onset%20of%20cooler%20temperatures>.