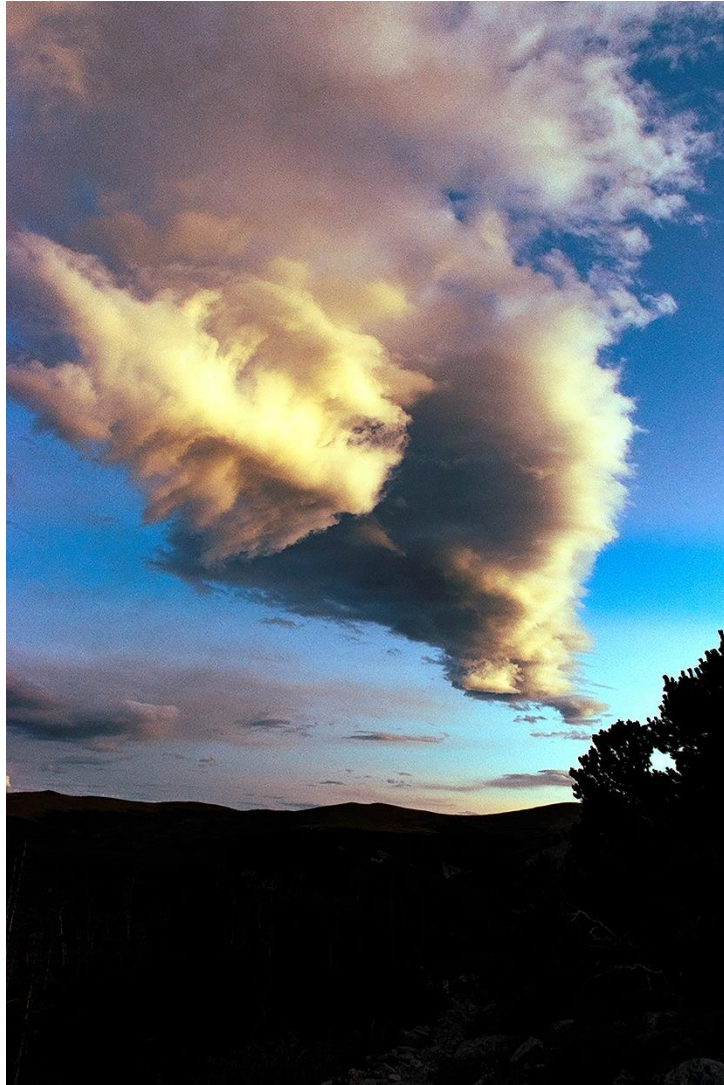


# Indian Peaks Evening Sky



Cloud First Report

MCEN 5151

10/28/2019

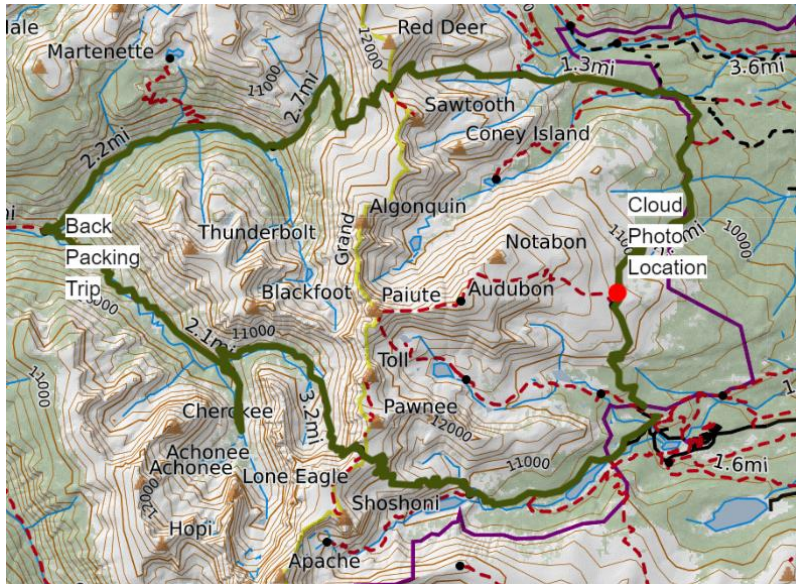
Aaron Zetley

## Introduction:

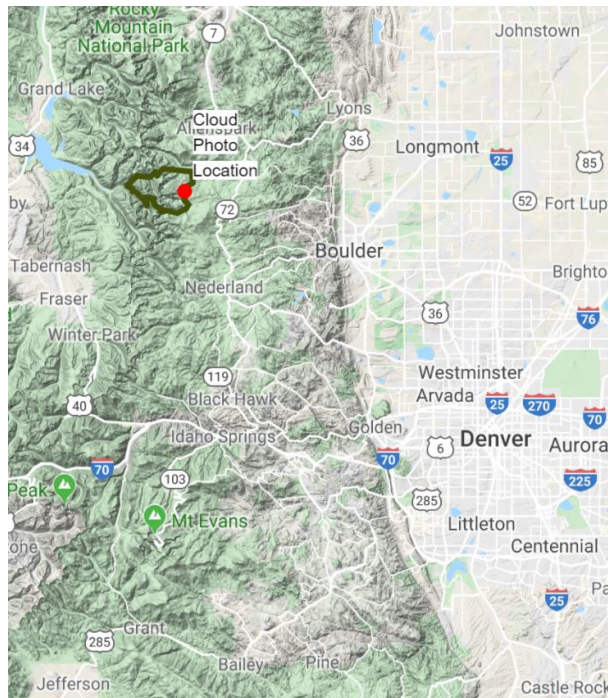
The cloud image was taken during the first few hours of 3 day backpacking trip Indian Peaks wilderness over labor day weekend. As we casually hiked uphill with our 30 pound packs I began to be mesmerized by the dramatic shapes of the clouds flying just above us. As the sun was setting over mountains, stark red and orange hues painted the clouds into an unforgettable image that I thought was perfect for my first cloud project. The unstable atmosphere forming the clouds present within the image is common for the “monsoon” season of late summer in Colorado. Luckily these clouds did not transition into any of the typical afternoon thunderstorms usually befit of these weather patterns. I felt like this cloud was very reminiscent of the mood of the moment, a last attempt at appreciating the beauty, freedom, and opportunity of summer in the mountains before the weather transitioned to cold and my workload back to stressful.

## Photo Location

This cloud image was captured during the first few miles of the 30 mile weekend backpacking trip on Friday August 30<sup>th</sup> at around 7:30pm. The image was taken facing southeast towards the Denver just above tree line on the eastern side of the continental divide. The elevation was around 11,000 feet as the sun was slowly setting creating vibrant colors and textures (which was obvious to the naked eye but not present in original image until edited.) Below are two maps of the location of where the photo was taken (red dot) in Indian Peaks wilderness along with the overall trip path. (1) Note this trail in Indian Peaks Wilderness was only 30-45 minutes away from Boulder Colorado and completely free to enter except for parking at certain locations during the summer. [\(See link for more info\).](#)



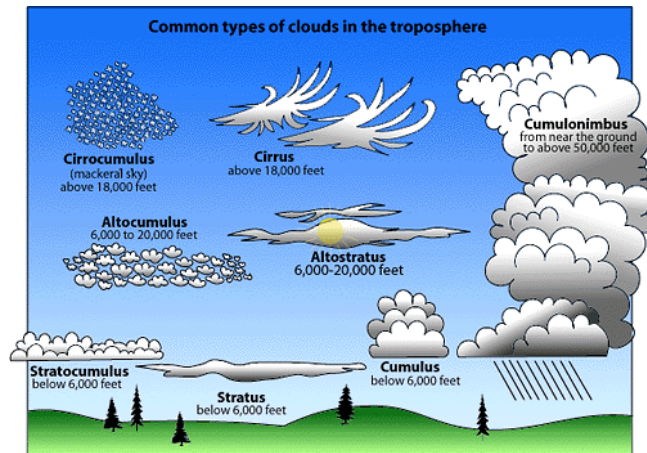
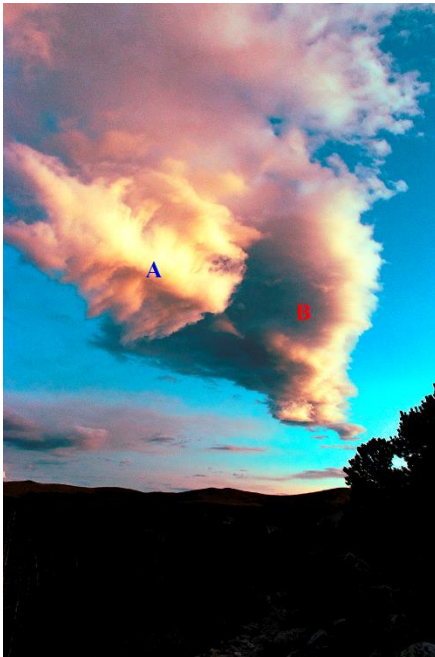
Zoomed in view of the photo location and the overall trip map



Location of photo and overall trip (in green) in size and location context of the Colorado front range.

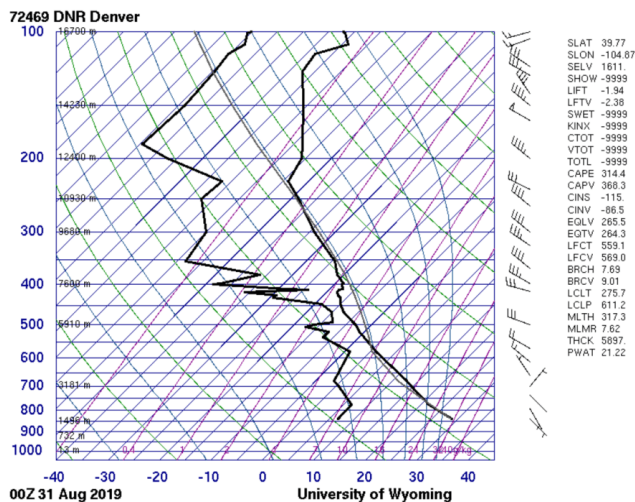
## Cloud Explanation and Description:

Looking at the contextual clues of the image, the skew-T plot, and the weather for the day it was determined that the most pronounced clouds in the image were most likely an array of stratocumulus, cumulus, and altocumulus clouds. With a highly unstable atmosphere at the time (Cape value of 314) the atmosphere was optimal for the formation of these cloud layers. The most upfront cloud in the image (labeled A in image below) is most likely a stratocumulus cloud lying 2,000-3,000 above the mountain ridge (13,000-15,000 feet above sea level). The clouds behind it (labeled B) are most likely cumulus clouds lying slightly above the stratocumulus in front of it also at 13,000-15,000 feet above sea level. The cumulus clouds were incredibly long dragging for miles south, remaining parallel with the continental divide ridgeline.





Despite the highly unstable atmosphere and the wind gusts (up to 30mph) that evening, no rain or snow was present for the entirety of the weekend or the few days earlier. (2) According to Skew-T Plot (4) most of the clouds that day lied between 6000-7000 meters (20,000-23,000 feet) above sea level which is dissimilar to the visual clues of the image demarcating cumulus type clouds. This dissimilarity between the visual indicators in the image and the data in the skew-T plot was likely caused by the differences in temperature, wind, and overall climate conditions in the high alpine of Indian Peaks Wilderness versus Denver.



Skew-T for Afternoon of August 30<sup>th</sup> 2019

(Time based on UCT-Time on Plot not Mountain Standard Time)

## Visual Technique

Camera Settings	
Property	Value
Type	Nikon D5500
Shutter Speed	1/50 sec
F-Stop	F/11
ISO	1000
Focal Length	18mm
Image Size	4000 X 6000 px
Flash Used	No
Cropped?	No

This image was taken using my Nikon d5500 DSLR camera pointed up towards the sky at around 30 degrees. The settings on camera are in the table above. As the image was taken as the sun was setting, a longer exposure and higher ISO were needed to capture the clouds in their

entirety. Note a relatively high f-stop (F/11) was used to keep a large range of distances in focus. As the cloud and landscape remained both in the foreground and dragged for miles southward the large f-stop helped give the full context of the landscape within the image. To show the stark colors and hues present when seen by the clouds were seen by naked eye during that evening, I edited the RAW image file in both Adobe Lightroom and Photoshop. To help pull out more of the true dramatic cloud textures and colors I edited the image's exposure, highlights, shadows, sharpness, and overall color hues.



Original (left) and Edited (right) Images

#### Self Reflection and Future Projects

I really enjoyed working with this image and researching the clouds and weather patterns within it. This project reminded of the quaint times adventuring in the backcountry this summer and provided me with more knowledge on signs of unstable weather patterns when in the mountains. I felt like this image is an incredible representation of the power, beauty, and vastness of our natural environment and how simple it is to appreciate it every day. In the future I would like to take more images of clouds up in the Colorado alpine and possibly take more measurements like barometric pressure, temperature, and wind speed on location to give a better understanding of what clouds may have and/or will form. I enjoyed learning more about the science of cloud mechanics through this report, providing me with an appreciation variety of the clouds above us and scientific knowledge to back up my mountain weather intuition.

#### References:

1. Zetley (Creator, Aaron. "Cal Top Map Editor Tool Colorado." *Cal Topo Map Editor*, Cal TOPO, 28 Oct. 2019, [caltopo.com/map.html#ll=40.09983,-105.60215&z=13&b=ter](http://caltopo.com/map.html#ll=40.09983,-105.60215&z=13&b=ter).
2. KCOWARD11 40.079° N, -105.512° W. "Weather Under Ground Brainard Lake Station." *Weather Underground Weather Station Conditions Dashboard Brainard*, Weather Underground, Aug. 2019,
3. UCAR. "Cloud Types." *Cloud Types / UCAR Center for Science Education*, NCAR/UCAR, 2012, [scied.ucar.edu/webweather/clouds/cloud-types](http://scied.ucar.edu/webweather/clouds/cloud-types).
4. Oolman, University of Wyoming, Lary. "Atmospheric Soundings University of Wyoming Engineering Department of Atmospheric Sciences." *Atmospheric Soundings Denver Location*, University of Wyoming Engineering Department of Atmospheric Sciences, 30 Aug. 2019, [weather.uwyo.edu/upperair/sounding.html](http://weather.uwyo.edu/upperair/sounding.html).