

Austin Ramirez  
Clouds Second  
Flow Visualization

Altostratus and Altoprostratus Clouds

November 4th, 2019

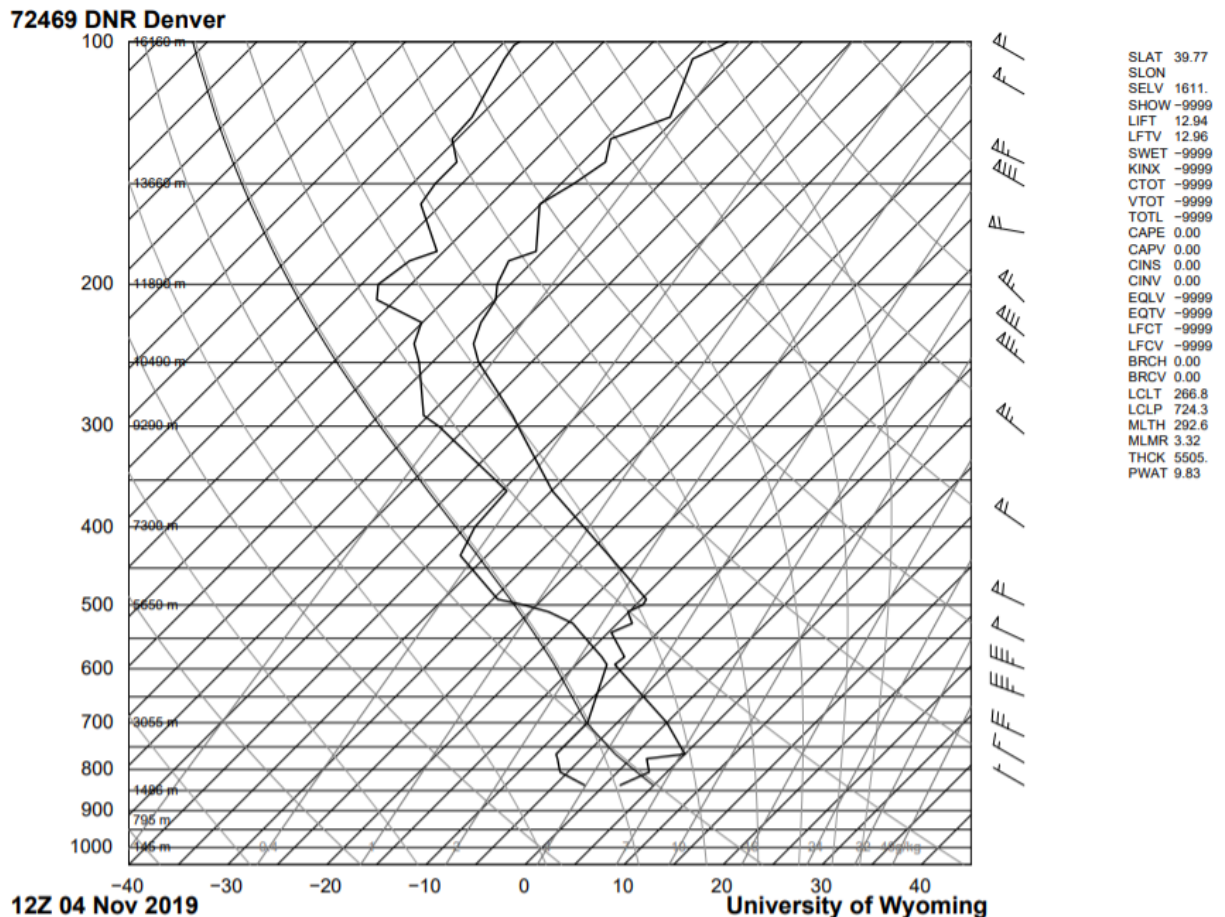
Challenge Mountain



The image described in this report was taken for the second clouds assignment of the flow visualization course. This assignment involved taking a photo of a cloud or cloud formation of interest and then describing the properties of the cloud(s) that were photographed. The intent that I had for this photo was to take a picture of clouds from the peak of a mountain, preferably around the time of a storm occurring.

I was at Eldora ski resort on November the 4<sup>th</sup> and, after taking the ski lift to the top of the mountain, I noticed there were some very interesting clouds above, which can be seen in the photo that was taken. This had been after a rather cold morning after a period of precipitation including snow throughout the week before. The clouds had been moving through the mountains all morning as it had been very windy that day, particularly towards the top of the mountain. Once the clouds had moved enough to be able to view the scale and details from the side, around 11 am, I took this photo facing east at a very slight upwards angle, around 5 degrees from horizontal. This was possible due to the fact that I was at the top of the mountain, which was nearly at the same height as the larger clouds.

At the point which I took this photo, a large system of altocumulus clouds had just passed by, allowing for the lighter altostratus clouds to be observed as well. These clouds could be identified based on properties apparent in the photo. First, the altitude of the photographed clouds should be observed. Altocumulus clouds lie between 6000 and 20,000 feet and here, the clouds are slightly higher in elevation than the peak of the mountain, which itself is at an elevation of approximately 9000 feet. The altostratus clouds also seem to lie in this range of elevations, and partially obscure the sun, which is common of altostratus clouds. The formation of the clouds should also be considered. The altocumulus clouds are thick and puffy, common for the cumulus family of clouds. The altostratus clouds, however, are very thin, and through them, a rainbow can be observed due to prismatic crystals that are present in this type of cloud. Based on the skew-t diagram seen below, one could expect cloud heights around those seen in the photo, as well as the high winds that were present that day around 8000-9000ft. Since the cape value is 0, this system is stable, which was also evident by the weather that was occurring the morning that this photo was taken.



The photo itself was taken by an iPhone XR with a field of view of several thousand feet in each direction, at a distance of several miles. This photo therefore was taken with camera properties that were automatically assigned and not controlled by myself. The original photo had a size of 4032x3024 pixels using an F-stop of f/1.8 and exposure time of 1/8696 seconds. The

camera also had a focal length of 4mm and an ISO speed of 25. This produced a photo that was able to be edited to better bring out the details of the clouds while reducing the colors and intensity of the terrain so that the main focus in the photo can shift to the clouds. The editing done on the photo was through lightroom, and was used to increase the contrast, erase distracting elements, and enhance some of the colors in the clouds. The original photo can be seen below:



The image taken was able to reveal the great details and the influence of all sorts of different factors on the formation of clouds including the temperature, wind, and properties such as the stability and pressure of the weather system that is present. The fluid and optical physics are apparent and interesting, both fulfilling and exceeding my intent as I did not expect to see the rainbow of colors through the altostratus clouds. Not only did the photograph come out well to my standards, but I also had the opportunity to learn more about cloud formations. In order to develop the idea further, I would like to research the weather patterns that develop certain clouds and use a better camera to more accurately capture details of the clouds.