

Project #2 – Cloud Image



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Purpose and Intent

The purpose behind this visualization was for the “Cloud Image” assignment for the Flow Visualization course taught at the University of Colorado, Boulder. This course, taught by Professor Hertzberg, serves to bring together the phenomena of physics with the aesthetics and visualization of art. This image was my first chance at photographing clouds and also utilizing the atmospheric information available to me to compare what I am seeing to what is actually happening in the atmosphere.

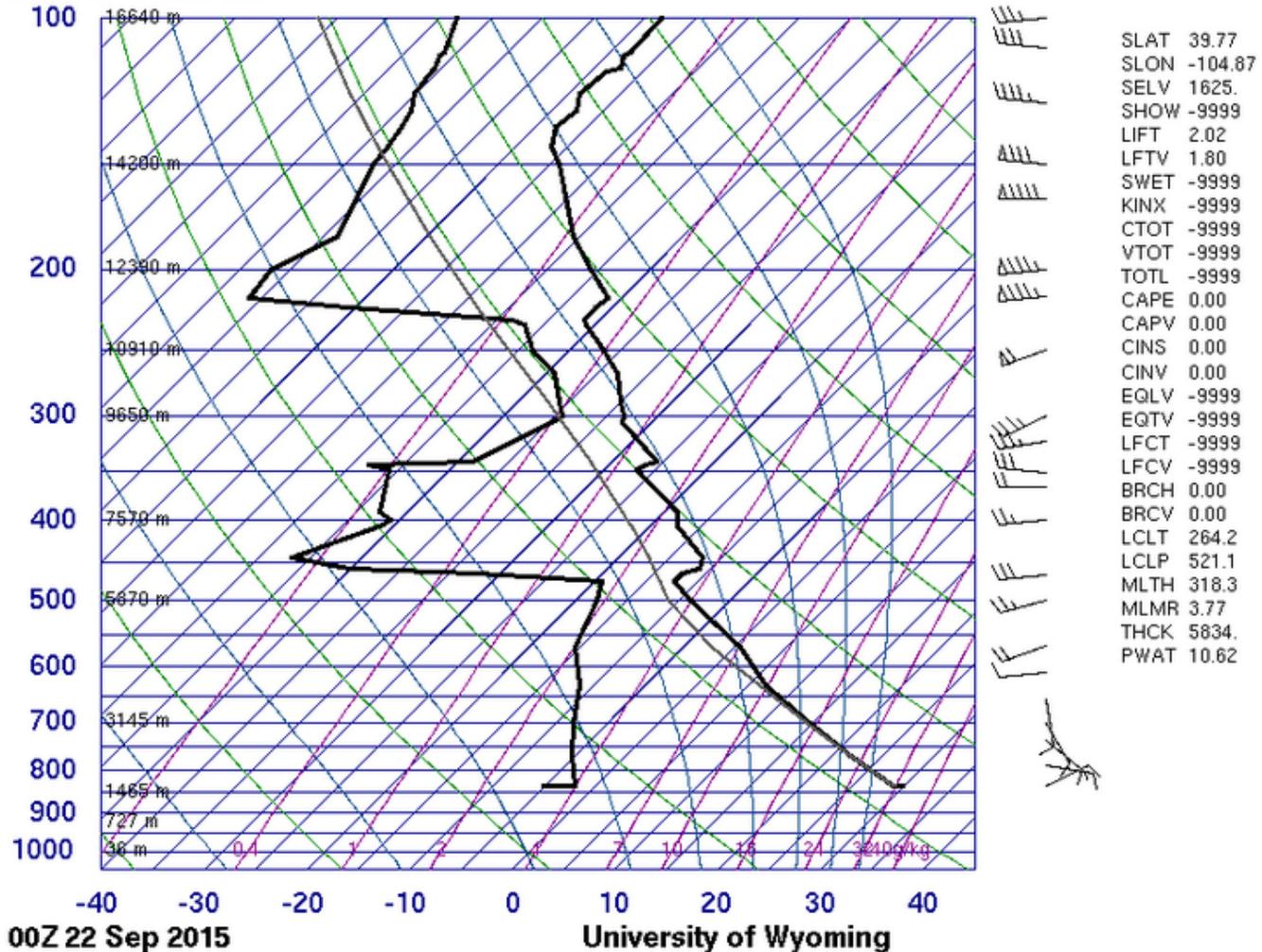
Image Circumstances

While driving to Silverthorne to go fishing in the early afternoon on September 21, 2015 I noticed a mostly blue sky with some interesting clouds seeming to wisp over the mountains and it was clear that they were Cirrus Clouds. I took this final image from I-70 on the drive between Boulder, CO and Silverthorne, CO just west of Idaho Springs. This image was taken around 1:30 PM while facing west. Idaho Springs is at an elevation of around 7,500 feet so I would estimate I was closer to 8,000 feet when taking this picture. The camera was placed at a very slight angle above horizontal when taking this image to get the whole cloud formation as well as some blue sky above it in the frame.

Clouds Captured

From looking at the image as well as looking at the skew-T diagram shown below, there is a lot of evidence pointing towards this being a Cirrus Cloud. The wispy thin nature of the clouds captured along with the high elevation immediately suggests that these clouds were indeed Cirrus. These types of clouds usually form very high up above 20,000 ft (6,000 meters) [1] and due to my location and the clouds height above the mountains this seems like a possible height to estimate these clouds at. When looking at the skew-T diagram below that was taken from Denver, it is clear that the clouds in the image formed right around 10,000 meters in a stable environment (CAPE is 0.00), which validates my initial thoughts of these being Cirrus Clouds.

72469 DNR Denver



While this skew-T diagram was taken approximately 50 miles away and 4 hours later than the picture, it still seems to provide an accurate depiction of the atmosphere at the time the picture was taken. The sky remained clear for the rest of the afternoon and there were no sudden weather shifts, which also allowed me to assume this skew-T diagram is an accurate representation of the atmosphere I photographed.

Photography Technique

For this image, my phone was used to capture the clouds. Unfortunately I did not have my camera in my car at the time of the image. Although I did take other pictures with my camera, I really liked the visualization Cirrus clouds provide which is why I stuck

with my phone's image. Due to this, I was not able to change any of the exposure settings. However, the phone used is an iPhone 5s, which comes with an 8 MP camera that is set to a 30mm focal length and an f value of 2.2 for the aperture [2] From the EXIF info, I was able to see that the exposure time was 1/2,283 with an ISO rating of 32.

Having these types of clouds form at around 30,000 feet and with my elevation at around 3,000 feet higher than where the Skew-T was taken, I would estimate that the distance from the cloud to my lens (vertically) is somewhere between 25,000 and 27,000 feet. With this distance and estimating my camera angle with respect to horizontal to be 25 degrees, I can calculate that the clouds are approximately 61,500 feet from my lens. Using this, I would then estimate the different "fingers" of the clouds to be approximately 10,000 feet long. It is important to remember that these are extremely rough estimates though.

For post processing of my images, I really wanted to bring out the blue in the sky and the white in the clouds. I did this using the curves tool in GIMP. I also cropped out the bottom of the image (from 2448 x 3268 pixels to 2432 x 2480 pixels) to allow for a more aesthetically pleasing picture and to make sure the clouds were the main focus. Seen below are my original and final images.



Works Cited

[1] [http://ww2010.atmos.uiuc.edu/\(Gh\)/guides/mtr/cld/cldtyp/hgh/crs.rxml](http://ww2010.atmos.uiuc.edu/(Gh)/guides/mtr/cld/cldtyp/hgh/crs.rxml)

[2] https://en.wikipedia.org/wiki/IPhone_5S

[3] https://en.wikipedia.org/wiki/List_of_cloud_types