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Clouds First  
Flow Visualization

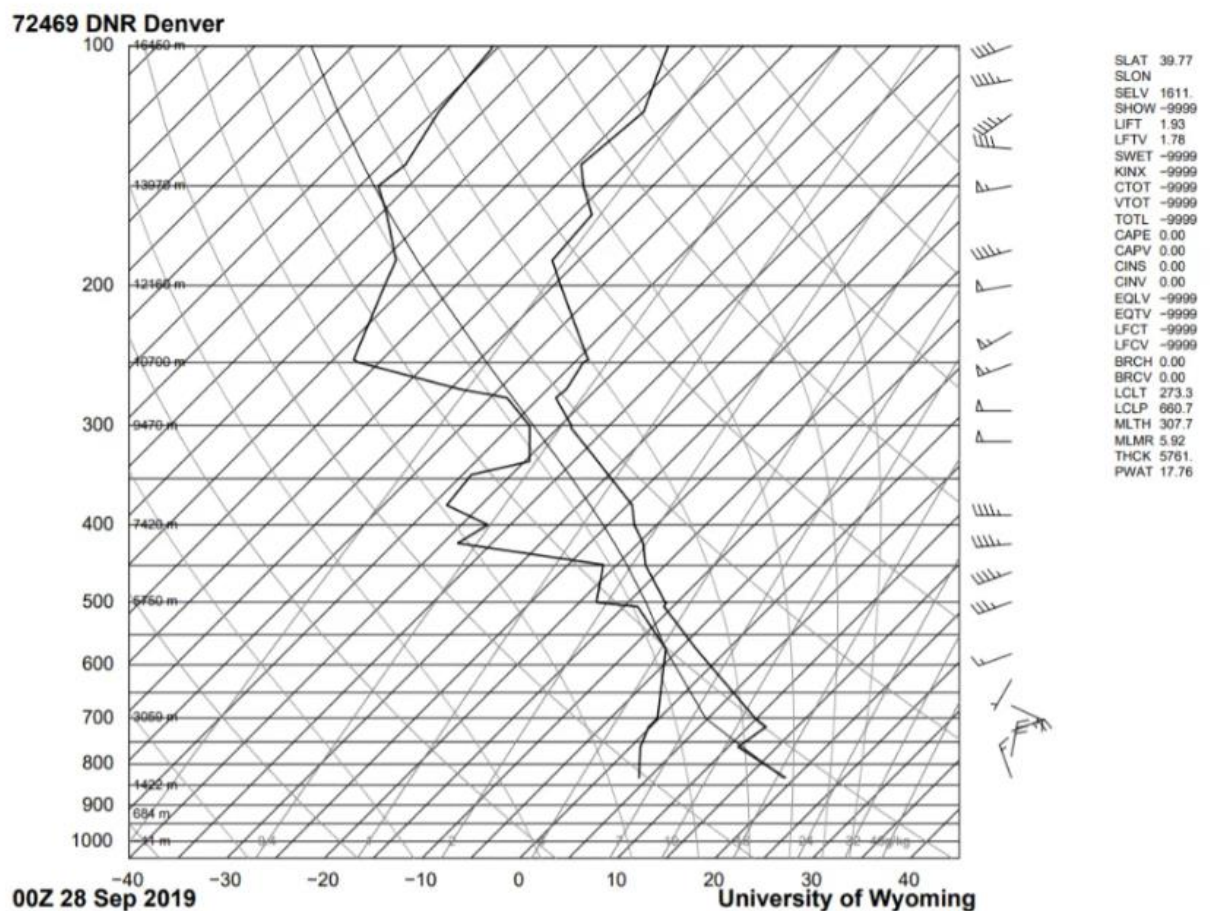
Stratocumulus Clouds  
September 28<sup>th</sup>, 2019  
29<sup>th</sup> Street Mall



The image described in this report was taken for the first clouds assignment of the flow visualization course. This assignment involved taking a photo of a cloud or cloud formation of interest and then learning to describe the properties of the cloud that was photographed. The intent that I had for this photo was to take a picture of low clouds, preferably fog or clouds obscuring the top of the flatirons, or alternatively, to take photos of aggressive storm clouds.

I was lucky enough to be at the 29<sup>th</sup> street mall in Boulder on September 28<sup>th</sup> when I noticed that there were some low clouds over the mountains that were very easily observable from the position I was at in the mall. This had been after a rather cold morning after a period of precipitation including rain and fog the days before. As the morning had progressed, the clouds were slowly moving upwards along the mountains, so I took my photo around 11:00 am at a point where the details of the clouds could be seen much better. Since I was standing on the second level of the mall, and the clouds I was photographing were relatively low, the elevation of the camera was no more than 10 degrees from horizontal, facing west towards the mountains.

The clouds seen in my image are Stratocumulus clouds. This is due to some of the properties that can be easily identified in the photo that was taken. First, it should be noted how low the photographed clouds are. Stratocumulus clouds lie between 2000-7000 feet and here, the clouds lie below the top of the Flatirons, which are a total of about 8000 feet in height. Next, although these clouds are obviously low enough to be stratocumulus clouds, there are several other cloud types that also lie this low. For this reason, we must look at the formation of the clouds as well. From the photo, it can be seen that these clouds are thick, puffy clouds that are conjoined across the sky, a property indicative of stratocumulus clouds. Based on the skew-t diagram seen below, one could expect cloud heights near those seen in the photo as well as near 6000m. Based on the stability and general weather, one could expect these clouds as well as stratus clouds to be apparent in the sky.



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 me. The original photo had a size of 4032x3024 pixels using an F-stop of f/1.8 and exposure time of 1/3289 seconds. The camera also had a focal length of 4mm and an ISO speed of 25. This all resulted in a photo that was able to be slightly edited to better bring out the details of the clouds. The editing done on the

photo was through lightroom, in order to increase contrast, shadows and adjust the colors present to create a more detailed image. 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, weather conditions, and properties such as the CAPE value found on the skew-t diagram. The fluid physics do seem to be apparent and interesting when looking at the picture and thus my intent was fulfilled. 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 anticipate the next clouds assignment and intend to learn more about cloud formation that way.