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Cloud 1 Report

The goal of this assignment was to photograph a cloud and analyze the basic physics behind its formation. In this photograph I was trying to capture the effect that the clouds made when a bulk of high altitude clouds formed a gap. Underneath the higher altitude clouds there were also mid-level clouds that are unique to our area. The combination of different cloud types and their formations made for an interesting picture.

The photograph was taken on February 22, 2009 at approximately 4:00 PM from a scenic overview on Flagstaff Road, near Boulder, Colorado. The camera was facing North West and was at an elevation just above horizontal. This positioning allowed for the image to capture the mountain scenery as well as the clouds above it.

In this image there are two general types of clouds, altocumulus and altostratus. The altocumulus clouds are fairly easily identifiable. When air flows over mountain ranges lenticular clouds can form. As the name implies these clouds take the shape of lenses. Lenticular clouds can be seen in the far right side of the photograph. These clouds form when moisture in the air condenses in large standing waves that form when air flows over the mountains [1]. They are unique to mountainous areas, such as Colorado's front range. There is also another, less identifiable, altocumulus in the middle of the picture in front of some of the higher clouds. This cloud didn't take the same shape because of the different location however they are still similar clouds. According to the National Weather Services website, altocumulus clouds are middle clouds that form between 6,500 and 23,000 ft [2]. The second type of cloud in this picture was a little more difficult to identify. Looking at the particular characteristics it most matched an altostratus cloud. An altostratus clouds can be identified by large veil it creates as well as the grey or blue color of the cloud. An altostratus cloud never forms in a white color [2]. In the photograph the majority of the clouds seen would be classified as altostratus. They are mostly shades of grey, which matches the description. The parts that appear to be closer to a white color are created by the lighting of the sun through the opening in the clouds. The sun is starting to set farther to the left than can be seen in the photograph. Altostratus clouds are also classified as middle clouds that form in the 6,500 to 23,000 ft range [2]. To help classify the clouds the nearest Skew T plot was

used, as seen in figure 1. When reading the skew t plot it can be seen that the atmosphere was stable on this afternoon, the temperature line was never warmer than the adiabatic line. This would indicate the probable presence of a stratus cloud, which was observed. The dew point approached the temperature line in the range of 5000 to 7000 meters, which corresponds to 16,000 to 23,000 ft. This data would agree with the classifications above. Both of the clouds are on the upper end of their classification levels, which also makes sense because the altostratus clouds tend to form from the thickening of cirrostratus clouds. Cirrostratus are high clouds in the 23,000 feet and up range [2].

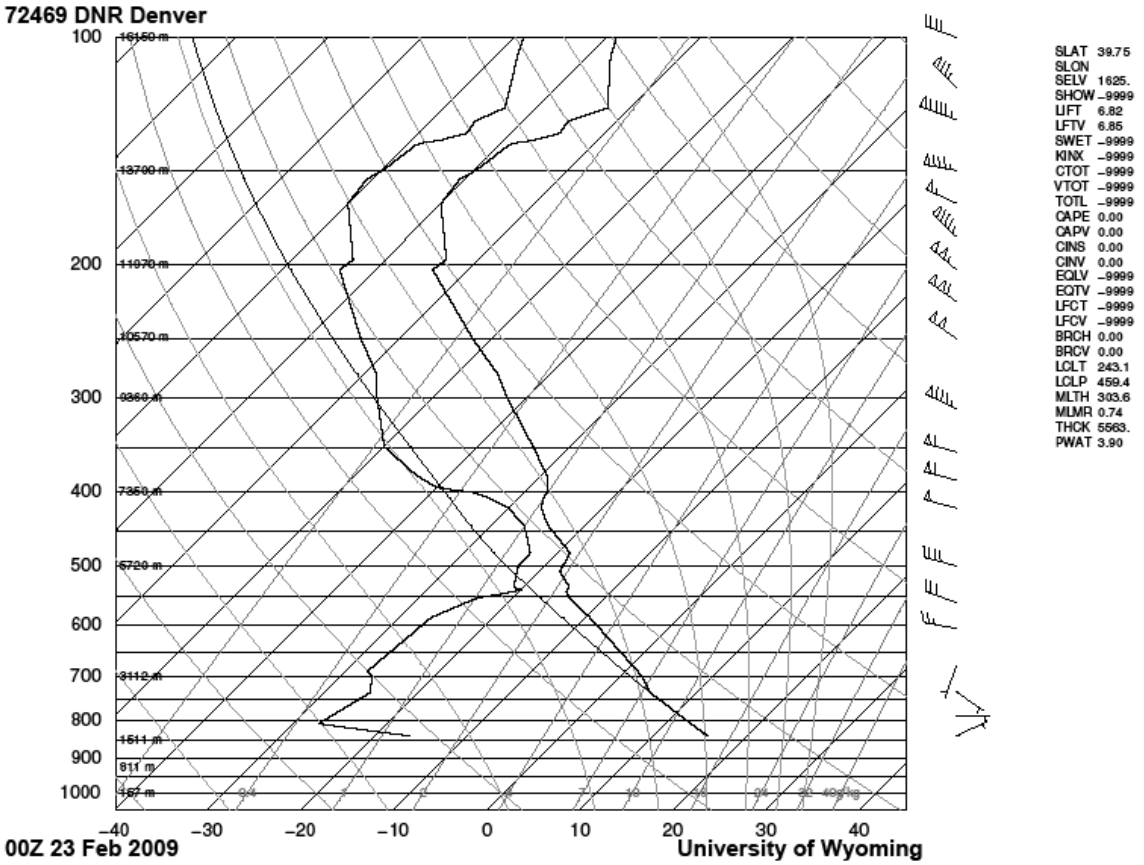

Figure 1 – Skew T Plot

The photograph was made by combining a series of pictures to form a panorama. This made for a very large field of view. It is hard to estimate the actual distance because it will be a matter of many miles. Once again the distance from the lens in hard to estimate, it is also a matter of many

miles. The lens used was a Canon Zoom Lens EF-S 18-55mm 1:3.5-5.6. The focal length was 28mm. The camera body was a Canon EOS Digital Rebel XT. The original picture was 11984x3760 pixels and was cropped to 8598x2239 pixels. The aperture was set to f/5.6, the shutter speed was 1/4000 seconds and the ISO was set at 200. In Photoshop the contrast was changed to darken the foreground. Without darkening the foreground colors were not sharp and distracted from the clouds. It only took a little darkening to remove most of the color from the foreground. The color of the clouds changed very little to ensure that no information about the clouds was lost.

This picture was able to show an interesting cloud formation while also providing good information about the physics behind their formation. The opening in middle of the cloud was very appealing to look at but by itself not very informative. Some of the other clouds were able to reveal to what is really physically happening in the photograph. For example the lenticular clouds on the right indicated that there was a lower level of clouds which could also be seen in the smaller middle cloud. These sets of clouds give the picture more depth than a single type of cloud could normally provide. Having two types of clouds also helped predict the relative heights. The physics of the clouds were fairly easy to see when the skew t plot was compared to the picture. The only thing I wish I could have changed was using a couple of different settings to change the light. I used a very fast shutter speed which created a darker image, which I do like, however I would have liked to experiment with a couple of other similar panoramas with the foreground lit and in focus. My initial intent wasn’t to create a panorama for my final image it was just something I was playing with. If I could retake all the pictures, I would have taken less individual pictures and focused more on series for panoramas.

References

[1] "Lenticular Cloud." Wikipedia. 22 Feb 2009 <http://en.wikipedia.org/wiki/Lenticular_cloud>.

[2] "NWS JetStream MAX." NOAA - National Oceanic and Atmospheric Administration. 22 Feb 2009 <http://www.srh.noaa.gov/jetstream/synoptic/clouds_max.htm#max>.