Clouds 1
Flow Visualization

Gamal Elbialy
10/16/2015

Introduction

This project is for the “Clouds 1” assignment in the Flow Visualization Class with Professor Jean Hertzberg at the University of Colorado Boulder. The intent of this assignment is to observe different types of clouds and understand the different flow phenomenon that may cause them. This image was taken on the University of Colorado Boulder campus.

Photographic Technique

The intention was to create a clear cloud image. The image was taken on October 4th, 2015, at 10:52 am. Since the image was taken in broad day light, settings were modified in order to not over expose and end up with an extremely bright picture. To do so, exposure specs were manipulated. First, ISO was modified. ISO is the level of sensitivity of a camera to available light. An ISO setting of 200 was selected, this made the camera not very sensitive to surrounding light sources. To not cause over exposure with the image, a fairly fast shutter speed of 1/1600 seconds was used. To keep the fluid in proper focus, a large depth of field was required, similar to macro imaging. Additionally, an aperture setting of f/16 was used. Finally, the camera’s built in flash was disabled as there was abundant light within the surrounding environment. The image was captured using a Nikkon 3200 DSLR.

Figure 1: Unedited image.

Visualization Technique

The original picture was further modified using photography processing software. The original was very dark in some spots; to combat that, it was edited using Adobe Photoshop. As to not distort the information in the image, only the contrast was then raised to a level of 100. This helped bring out some of the details and made the colors in the image clearer to the eye.

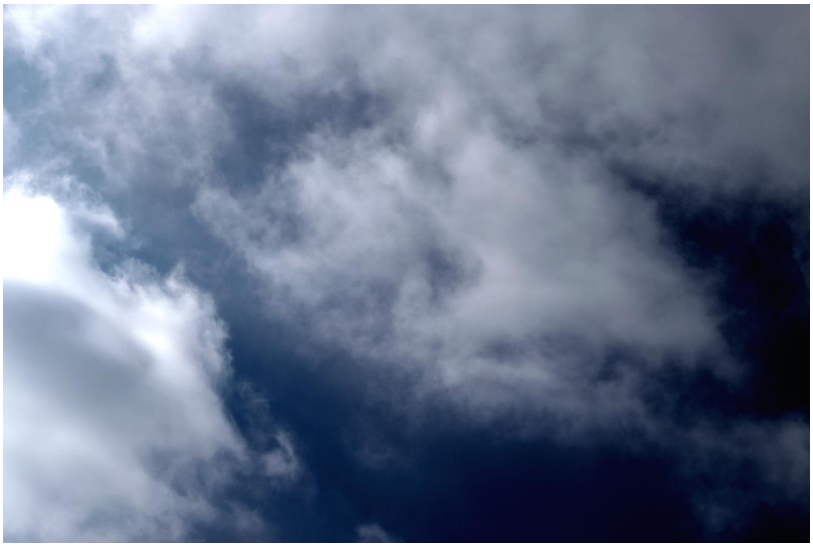

Figure 2: Final image.

Flow Physics

The clouds in the image above are of the Stratocumulus kind. These clouds usually form in gray or white patches and are most often low in altitude. This can also be seen from the Skew-T plot below. These clouds were most likely formed at an altitude of 1,500 meters to 3,000 meters. Additionally, it can be seen that the CAPE was 0, this means that the convective available potential energy in the system was negligible and therefore the clouds were mostly stable.

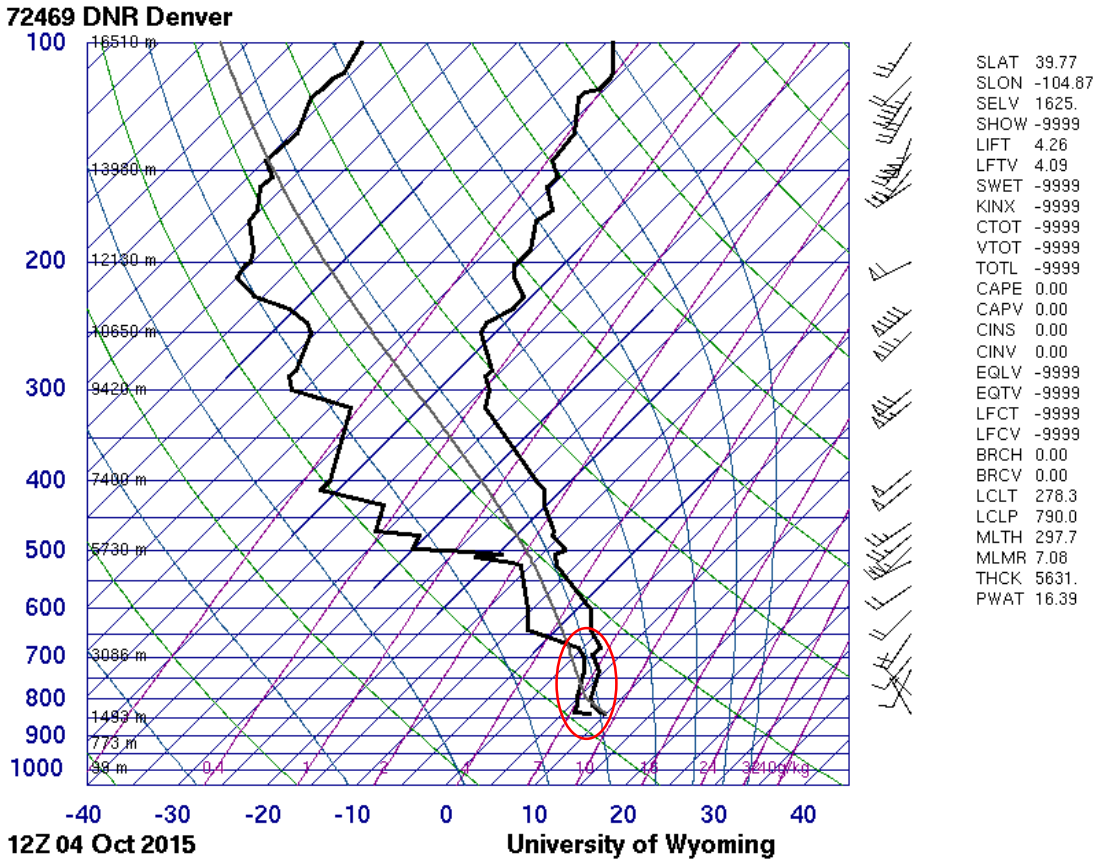

Figure 3: Skew-T for Denver Oct. 4th

Reflection

If I could go back and retake this image, I would like to observe some of the cloud systems forming closer to the mountains. Those systems are usually more volatile as the

mountains can force them to change directions and push them vertically. It would also be interesting to create a time lapse instead of a still image. This can help show the behavior of the different cloud systems in a specific spot throughout the day.

References

Nikkon. "DSLR Camera Basics." N.p., n.d. Web.

NOAA. "Ten Basic Cloud Types." *Cloudwise*. N.p., n.d. Web.

Rowse, Darren. "Introduction to Aperture - Digital Photography School." *Digital Photography School Introduction to Aperture in Digital Photography*. N.p., 23 Aug. 2006. Web.

"Understanding ISO - A Beginner's Guide." *Photography Life*. N.p., 15 Dec. 2009. Web.

University of Wyoming. "Denver Skew-T." *72469 DNR Denver Observations at 12Z 05 Oct 2015 - 12Z 16 Oct 2015*. University of Wyoming, 5 Oct. 2015. Web.