

Photography of Clouds #1



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The purpose of this assignment was to capture an image of clouds, and to interpret cloud and weather behavior from the image. My desire was to capture an image of unique cloud type and behavior. This was facilitated by the location where the image was taken. Situated up against the Front Range of the Rocky Mountains, the city of Boulder gives a wonderful perspective from which to view interesting cloud formations.

The image on the front cover of this report was one of many taken during a single session from the top level of the Regent Parking Structure on the University of Colorado at Boulder campus, on January 16, 2011. On my way driving to campus from north Boulder, I had observed clouds over the mountain peaks to the west, and decided to try taking photographs of the formations from the parking garage. Being a Sunday, the top level of the parking structure was deserted, and this allowed me free reign of taking photographs from various positions and angles. I took images of the entire western horizon, but was chiefly interested in the cloud cover on top of the Continental Divide. My selected image was taken at 4:34pm MST looking due west, with the camera elevated approximately 20 degrees above horizontal (in order to shoot above campus buildings).

There are three distinct types of clouds shown in the final image. The clouds in the upper region appear to be cirrocumulus lenticularis undulatus (Pretor-Pinney, 196) due to their lens-like shape and independent separation, and higher elevation compared to the clouds atop the mountains. I would estimate the elevation of these clouds to be 20,000-25,000 ft. The cloud at center appears to be an altocumulus lenticularis opacus (Pretor-Pinney, 114) with extended individual layers forming the 'tails' at left-center. Prior to this image being taken, this cloud may have been a more classically-shaped 'flying saucer' version of the altocumulus lenticularis that was then deformed by wind and convection effects. This cloud is probably no higher than 18,000 ft in this image. The clouds near the bottom of the image are a classic example of an orographic mountain wave cloud, formed by orographic lift as air was forced upward to clear the mountains. As the air rose up over the mountains, and specifically the Continental Divide, the moisture in the air cooled and condensed to form this massive cloud layer. I believe the specific type to be stratus nebulosus opacus (Pretor-Pinney, 72) due to the extensive area which the formation covers, and the apparent thickness and non-transparent layer over the mountains. My estimate for the elevation for this cloud layer is around 15,000 ft, since the layer is above the highest peaks of the Continental Divide, which top out at just less than 15,000 ft.

At the time this photograph was taken, there were a number of other clouds in the sky, all looking similar to the altocumulus lenticularis cloud. The series of images captured along with my selected image show clouds to the SW, E, and NE of Boulder proper. The skew T plot that I obtained shows weather conditions over Denver International Airport at 6pm that evening (Skew T plot 0Z for Feb 17) with a stable atmosphere (indicated by steep heavy black line representing recorded weather balloon readings), winds from the N at approximately

17 mph, and most probable cloud formation around 18,700 ft (5700 m). There was no precipitation in Boulder or Denver the day prior or following this image. The stable atmosphere does compliment the types of clouds observed, since all generally are indicative of a stable atmosphere.

This image was captured from the top level of the Regent Parking Structure, giving me an approximate field of view of 2 miles (10,500 ft) across by 15,000 ft tall, with the distance from the lens to the middle cloud at around 5 miles (26,400 ft), and the distance to the orographic cloud layer on the order of 20 miles. The digital camera used is a Canon PowerShot SD 500, with an F-stop of f/13, image focal length of 23.1 mm, and shutter speed of 1/250 sec. Lighting used was natural ambient sunlight. The original image's dimensions are 3072 x 2304 pixels, vs. the edited image's size of 2046 x 2304 pixels. Editing was completed using Adobe Photoshop CS5, and included both cropping and contrast alteration. The image was cropped on both left and right sides to eliminate campus structures which detracted from the emphasis on the clouds. Using the contrast tool in Photoshop, I was able to bring out the blue of the sky and details of cloud texture. This also allowed me to alter the horizon elements (mountains and campus buildings) to be silhouettes which both complimented and opposed the shape and texture of the clouds. The original image is shown as Figure 1 on page 3.

In the process of taking images for this assignment, I observed some very interesting cloud behavior and cloud types. However, none of the images I captured in subsequent shoots even came close to the selected image in terms of both texture and variety of the cloud configurations. I am very pleased with my good fortune of being able to photograph such an interesting and layered image of the sky, and with the final version of the selected image. This image surprised me with how much information can be inferred from making observations of the shape, size, location of clouds, and the relevant weather data. I would like to capture a closer (increased zoom ability) and more detailed (increased resolution) image of a similar orographic cloud layer sitting atop the mountains from a different location, perhaps the Physics or Engineering Center towers to see what better detail I can capture. This will have to be accomplished with a better camera than I currently have available, preferably with an SLR.



Figure 1: Original, unedited image taken on 16 Jan 2011

References

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