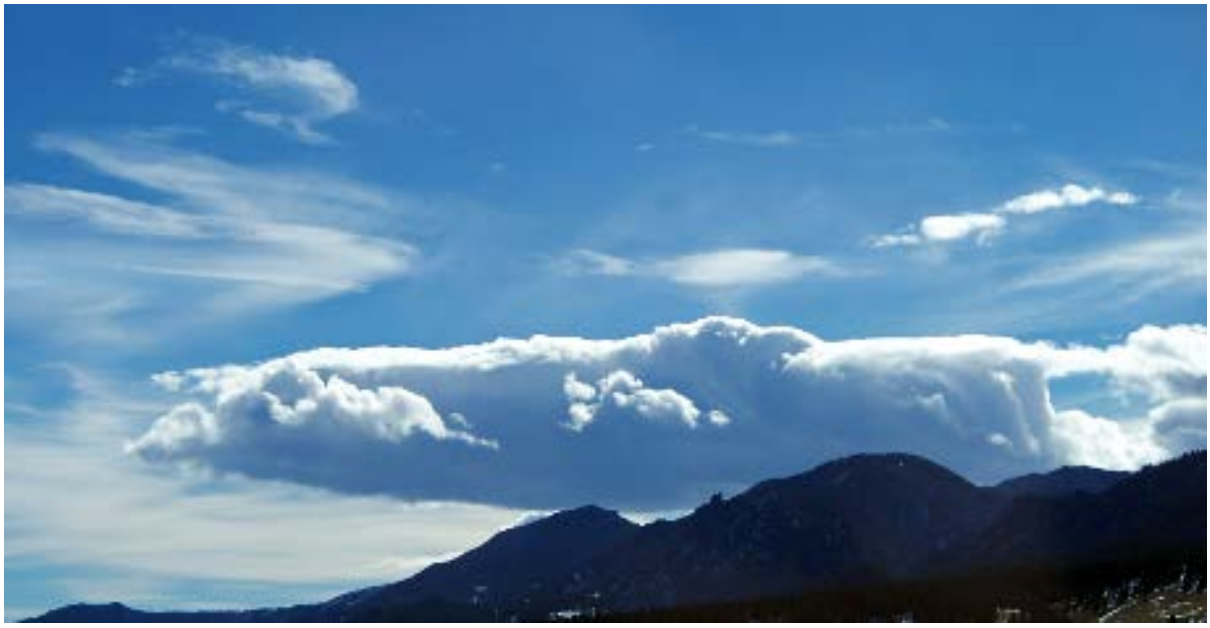
Flatiron Clouds

Stratocumulus Stratiformis



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Cloud Assignment 1

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Introduction

Flatiron Clouds was created as the first of two cloud images for the Flow visualization course. This project was not only used to introduce students to the art of cloud photography and cloud viewing, but also as an introduction to the atmospheric physics that cause many atmospheric phenomena. The intent of this image was to photograph a cloud that not only contained many features of a large, billowing storm cloud, but also allowed for clear visibility of these features. Furthermore, the image was take in such a location that simulates the view from a low-flying aircraft, despite being taken from within a building.

Circumstances

The original image for *Flatiron Clouds* was created on the afternoon of February 16, 2014 around 2:15 pm in Boulder, Colorado. The camera was facing almost directly southwest from the William's Village dormitory complex from which it was taken, with an elevation of nearly zero degrees from the horizontal.

Description of Cloud Physics

The primary cloud formation featured in *Flatiron Clouds* is a large Stratocumulus Stratiformis, which will be the primary focus of the analysis within this report. Around this cloud formation are also good examples of both Cirrus clouds, above the main Stratocumulus Stratiformis, and an Aviaticus cloud, also known as jet engine exhaust contrails, above the left quarter of the main Stratocumulus Stratiformis, but they are not the intended focus of this image.

This type of cloud formation is commonly mistaken for Cumulus, as they look very similar; after all Stratocumulus does contain Cumulus within its name. Furthermore both cloud formations resemble large, puffy cotton balls with dark, gloomy undersides; especially this species of Stratocumulus known as Stratiformis, which is distinctive for its extensive flat, yet fluffy sheets. However, the primary distinction between these cloud formations is atmospheric stability. Due to the fact Cumulus clouds are formed in unstable atmosphere, they are far more likely to precipitate than their Stratocumulus counterparts. This distinction can be proven through simple analysis of a Skew-T diagram, shown below.

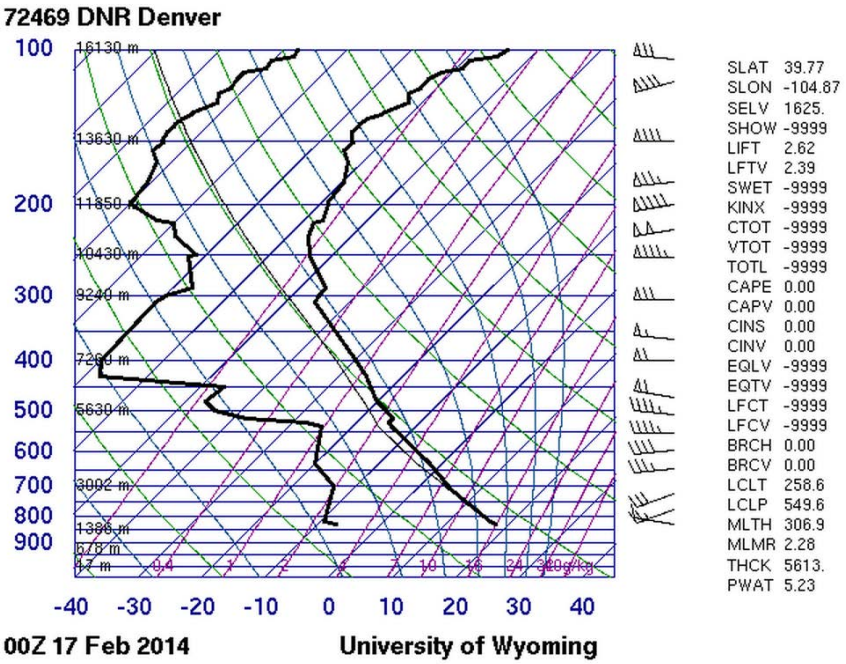

Figure 1: Skew-T Diagram for February 16 [1]

Although this diagram shows the relatively fast wind speeds present throughout much of the lower and upper atmosphere on the day the photo was taken, which provide for much of the texture present in the clouds, it also shows the cape number for these atmospheric conditions to be zero, suggesting a completely stable atmosphere. Furthermore, the dew point line (the bold, black line on the left) never nears contact with the temperature profile line (the bold, black line on the right), suggesting no chance of precipitation. This is further proven by the weather forecast surrounding the day from this image was taken, which predicted both clouds and large amounts of wind, but zero chance of rain.

The Skew-T can also be used to confirm the expected height of the Stratocumulus Stratiformis clouds within the atmosphere. This is done by observing the closest point of intersection between the dew point and temperature profile lines, which in this case is about 5000 meters, or 14700 feet from sea level. Due to the elevation of Boulder, Colorado the expected Stratocumulus elevation is around 10500 to 15500 feet relatively, which confirms that the cloud formation is indeed Stratocumulus.

Photographic Technique

To take the original JPEG image of *Flatiron Clouds* a 12 megapixel Kodak EasyShare Z1285 Digital Camera was used. As the camera is a simple “point and shoot”, the default 34 - 175 mm focal length with 5x optical zoom and image stabilization lens was used. The clouds were roughly 1.7 miles away from the camera lens, which allowed for the camera to simply be focused at infinity. The approximate size of the field of view of this image is roughly 7000 x

4500 ft using the flatirons as a guide. It is also important to note that this photo was taken though a moderately dirty window on the fifteenth floor of the William's Village dormitory complex. Although this did allow for the desired height to take the image, there was no way to completely remove the subtle blurriness of the dust. Luckily, placing the camera a few inches from the window did allow for the dust to create an almost light filter to the image instead of ruining it, due to the fact it was completely out of the depth of focus. Due to my failing health at the time this image was taken, food poisoning to be exact, the ISO, aperture size, and shutter speed were all recommended settings from the camera itself. Although I did assure the camera was focused to infinity, as I judged that as the most important of the cameras settings for this particular image, I hardly adjusted any other of the cameras settings. To be exact, these settings were an ISO of 64, an aperture value of 3.4, and a shutter speed of 1/640 seconds. Although capturing fluid flow requires fine tuning of the cameras specifications, I believe these default settings for a slow moving cloud miles from the camera's lens are sufficient.

For the post processing of the image, Adobe Photoshop CS5 was used. First, the photo was cropped from 4000 x 3000 pixels to 3524 x 1813 pixels. This was to remove much of the pre-mountain foreground as well as the glare from the window on the left side of the image. Then minor adjustments were made to the levels and contrast of the image, as well as the sharpness to increase the visibility of the features of the clouds without adding too much grain.

Figure 2: Pre-processed image (Left), Post-processed image (right)

Conclusion

Flatiron Clouds not only shows a wonderful example of Stratocumulus Stratiformis clouds, but also contains a variety of other interesting cloud types that give this image a sense of diversity. Given the circumstances, I am very proud of how this image turned out. I enjoy the situational irony of the ideal conditions for taking the exact image I wished to create occurring when I was bed ridden, and furthermore the tale of overcoming the sickness to take this rewarding photo.

If I were able to change one thing about this image, however, it would be the ability to open the window from which it was taken. Although I do believe it would make very little of a difference, the overall quality of the image would be improved, even if ever so slightly.

References

[1] "Atmospheric Soundings" *Wyoming Weather Web.* Web. 26 Feb. 2014.

<http://weather.uwyo.edu/upperair/sounding.html >.