

MCEN 4151
Flow Visualization

Instructor:
Jean Hertzberg

Andrew Locke
Assignment #2: Clouds



Introduction

The image shown above depicts what I believe to be stratocumulus cloud formations. The photo was not done in a team setting. The intent of the photo was to observe how clouds form and move, while capturing the beauty that nature offers in the sky. There are three distinct cloud formations in this image, and I wanted to capture the stark contrast between the dark foreground and bright background. Due to a stable skew-t diagram, I believe that the clouds are all of the same type, and that the darkness in the foreground is caused by shadowing.

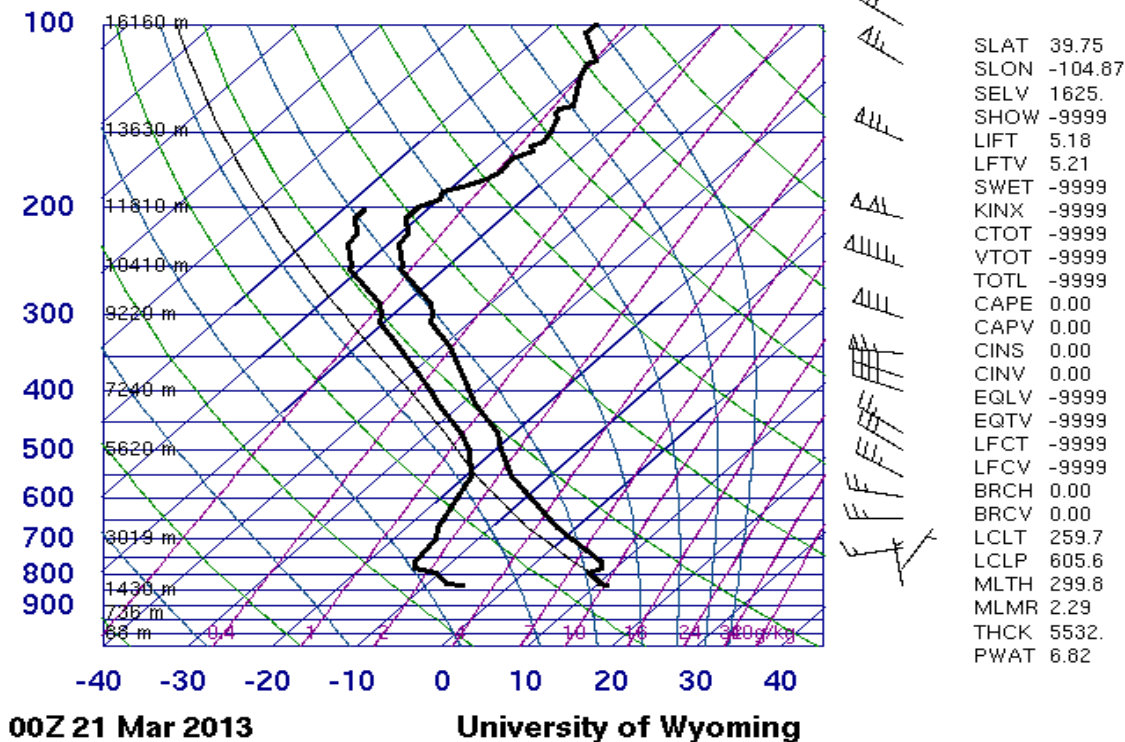
Location and Setup

The image was taken at coordinates 40.005922,-105.26473, on the University of Colorado Engineering Quadrangle, just west of Regent Drive in Boulder, CO. I was facing almost directly northwest, at a 60 degree angle from the horizontal. The shot was taken on 21st March, 2013 at approximately 7:40AM (07:40hr).

Cloud Classification

Stratocumulus clouds form due to weak convective currents creating shallow layers, and stable dry air preventing further vertical development. They often signify a front coming in. In this case, a large snowstorm came in the next afternoon, justifying the classification. An honorable mention goes to altocumulus lenticularis clouds, or mountain wave clouds, due to their close proximity to the Rocky Mountains. The visual aspects of the clouds certainly would suggest so. However, the cloud was much larger than would normally be expected from mountain wave clouds. Additionally, there was not a large cloud present over the mountains, justifying stratocumulus in favor of altocumulus lenticularis. The skew-t plot shown below shows a stable atmosphere (CAPE = 0). Furthermore, the area just above 1960m (6430 ft.) shows a brief instability in the atmosphere, giving way to cloud formation.

72469 DNR Denver



Proposed Explanation of Contrast

At first glance, it would appear that these are thunderstorm clouds. However, they did not precipitate at all, suggesting something else going on. I believe that this the result of shadowing due to the low angle of the sun (the shot was taken around 7:40am).

Camera Technique

FOV size: I can't find the size of my sensor, which means I can't estimate the FOV.

Distance from object to lens: ~6,500 ft.

Lens Focal Length: 8mm

Digital camera: Sony CyberShot DSC-W610, 4320 width by 3240 height

Exposure: 1/250s

F-stop: f/3.5

Aperture: 3.614

ISO: ISO-80

Post-shot processing: adjusted curves in photoshop to bring out contrast. I also edited out a branch on the right side of the image. The original is shown below:

Original Image



Intent and Assessment

This image is easily my favorite image from the past semester. I love the contrast between the

bumbling stratocumulus formations in the foreground and the more wispy formations in the background. I don't think I would change anything, were I to see this effect again.

References

<http://en.wikipedia.org/wiki/Stratocumulus>