Figure 1: Clouds second image.

Clouds Second Report

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Altocumulus lenticularis wave cloud with rotors. Taken 7:05pm, Apr 5th 2018 from Colorado Ave.

4/23/2018

MCEN-4151
Flow Visualization: The Physics and Art of Fluid Flow

I glanced out the window in the middle of cooking dinner, and saw these beautiful clouds. I promptly went outside to take pictures. After waiting a few minutes to watch how it changed, this image was captured. The sun was at an angle such that the bottom of the high cloud was dark, but the light puffy ones were illuminated. A bit of blue sky is illuminated in the background.

This image was captured on Colorado Ave. between 28th street and 30th street in Boulder Colorado. The camera was facing west with and angle of approximately 40˚ above the horizon. It was taken on April 5th at 7:05 pm.

There are multiple different clouds in this image, but they are all a result of the mountain wave phenomenon. Mountain wave occurs when they prevailing winds are from the west and cross over the continental divide. The winds follow the terrain down until the winds hit flatter terrain. This causes the wind to bounce back up creating altocumulus lenticularis clouds. In this image, the altocumulus lenticularis is the dark cloud covering the upper portion of the image. If the winds are high enough, there may be secondary and tertiary waves. Underneath these lenticular clouds there are often rotor clouds, which are a type of cumulus. Here those are the puffy white ones in the foreground. These are stationary clouds and roll under when the air bounces back up. Therefore, the western edge of the rotor has rising air, and the eastern edge has sinking air.

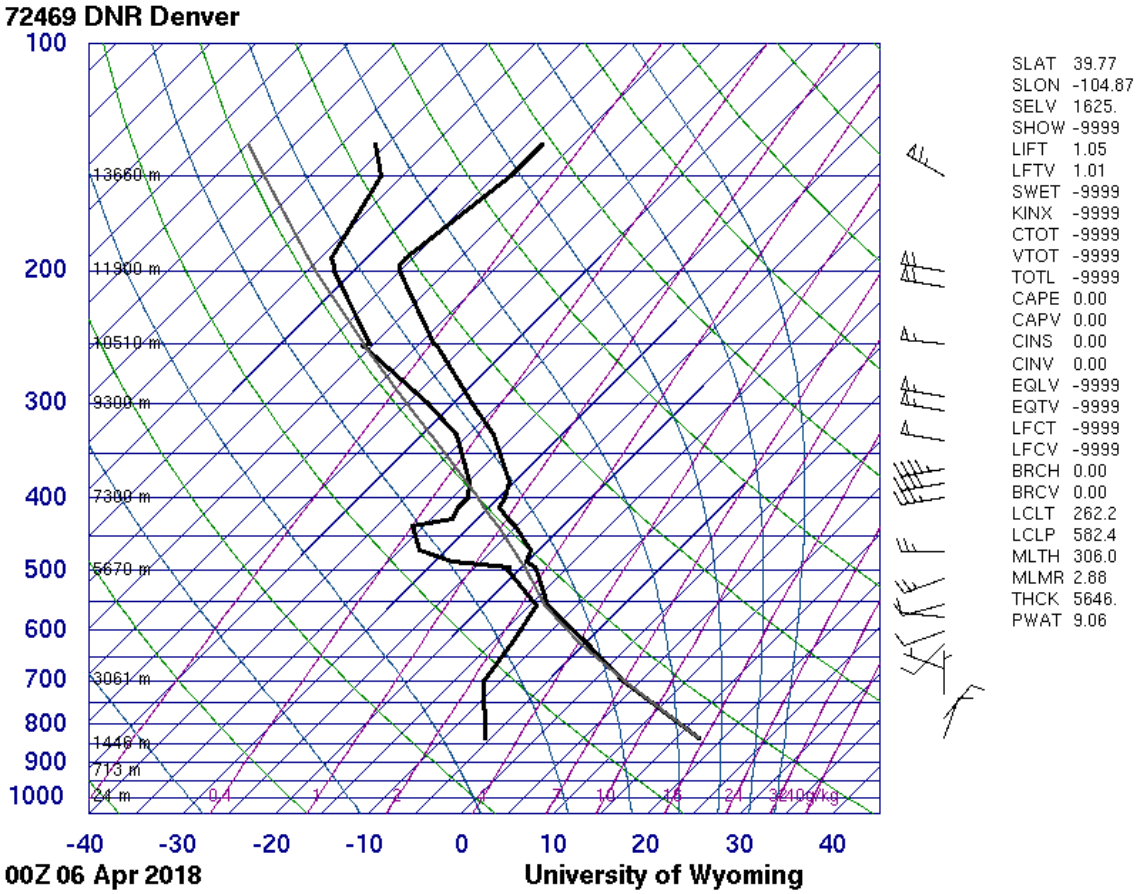

Figure 2: Skew-T diagram for April 5th 2018.

According to the Skew-T diagram, fig. 2, from DNR, 00Z 06 Apr 2018 there was a stable atmosphere, CAPE of 0.00. The LCLP was 582.4 mB, which corresponds to roughly 15,000 ft. This seems probable for the lenticular top cloud. At that altitude, the winds were blowing at 25 knots due east. This is the perfect wind for wave clouds. The lower rotor clouds are more likely around 9,000-10,000 ft.

The camera used was a Canon EOS Rebel XSi. The image was taken with and an 48mm focal length, an f stop f/9, an ISO of 100 and a shutter speed of 1/125 seconds. The image was edited in Photoshop and was cropped from 4272 × 2848 pixels to 4157 × 2360 pixels. In Apple Photos, the image was cropped and no other edits were done to the image. The original is shown in fig. 3.

The lighting in this image really shows the difference in the lenticular and the rotor cloud that are created by the wave. The shape of the blue spot at the bottom and the dark gray at the top make it look like it is inverted. Even though the bottom of the image is less defined and a bit washed out, I do not mind as it does not detract from the main focus of the image.

Figure 3: Original Image.