# Mountain Mixing

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Clouds First Assignment: Cumulus and Altostratus

North of Folsom Field on September 30, 2025 at 6:00PM MDT

MCEN 5151: Flow Visualization

University of Colorado Boulder

# 1 Introduction

While using the north facing stationary bikes at the rec, I noticed a cloud with a stratus type base and a cumulus top. Feeling inspired, I ran home to get my camera, and immediately returned to find that cloud. Although the initial cloud of inspiration had dissipated into a stratus cloud, there was an interesting mixing of clouds in the distance. This image is intended to highlight the small, thick, and fluffy clouds blown over the ridge line with thinner, translucent clouds higher and further in the distance. As this image was taken near dusk, the shapes of the clouds are highlighted by the westward sun. The overall intent of the Clouds First assignment is to capture and understand the fluid dynamics in Earth's atmosphere. The visual in this report is intended to capture motion and duality, while also examining some of the effects of mountain meteorology.

# 2 Image Context

This scene is captured from the parking lot of CU Sports Medicine and Performance Center, just north of Folsom field. The time was 6:00PM MDT on September 30, 2025. The camera was turned at an angle of roughly forty-five degrees west from north, and it was tilted at an angle around ten degrees above the horizon.

# 3 Cloud Analysis

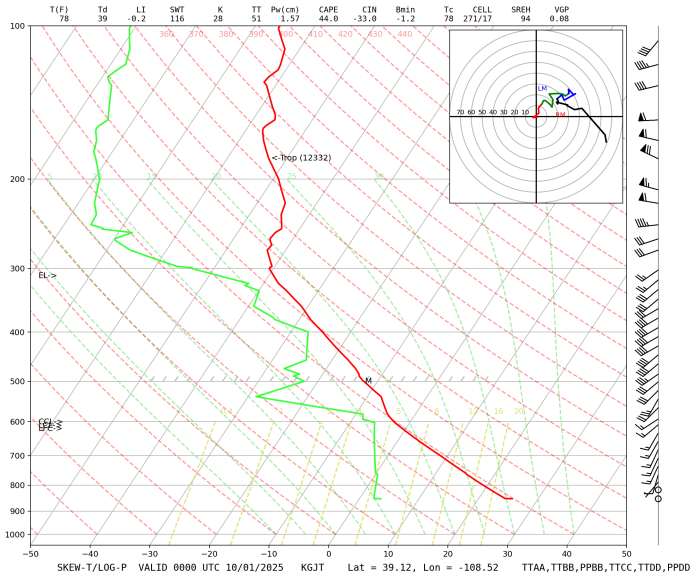


Figure 1: Relevant Skew T Diagram - Grand Junction (Upper-Air Page)

There are two types of clouds visible in this atmosphere, cumulus humilis and altostratus. The cumulus humilis clouds are the smaller, denser clouds near the lower portion of the image. These are being blown over the mountain ridge from the westerly winds in the skew-t diagram, and dissipating once reaching the eastern atmosphere. It should be noted that there were no cumulus further east, and the initial cloud referenced in the intro was likely a cumulus dissipating into a stratus type cloud. These clouds are relatively low, and are likely present around the 600mb level of the atmosphere, as seen in the skew-t diagram. The other cloud type, seen further in the background of

this image, is most likely an altostratus, possibly extending into the cirrostratus region. These clouds are indicated above the 400mb line on the skew-t diagram, which could indicate medium or high clouds. The cloud base here was observed at 3km (Skywatch), which likely signifies altostratus. The combination of these clouds signifies a stable environment with minor instabilities at lower elevations in the mountain range. This can be noted on the skew-t diagram, with a low CAPE of 44.0. The general weather of this day is also significant of a stable environment. There was no precipitation, nor strong winds around the time of this image. We can conclude that this was a stable day with only minor instabilities within the mountain range, and those instable clouds dissipated upon arrival into the eastern atmosphere.

# 4 Photographic Technique

Figure 2: Unedited, original photograph

Captured using a Nikon D810 paired with a macro-lens, this image demonstrates sharp, high-definition details of the flow. The Nikon D810 is a full frame sensor DSLR, producing an image size of 7380 x 4928 pixels. The lens used was a Nikon macro lens with a fixed focal length of 105mm and maximum aperture of f/2.8. The exposure was set as follows: ISO-320, F-stop f/18, and shutter speed 1/500 sec. The scene was bright, leading to a faster shutter speed and closed down aperture. The native ISO of this camera is 100 to 400, although I did not realize that until after this image. The ISO was intended to be low, but should go lower in a future iteration. The mountain ridge seen in the original image is approximately two miles, and the camera was roughly five miles away. The longer focal length of the macro lens brings the subject much more zoomed in. Manual focus was set to focus on the cumulus clouds, which is near infinite but not quite. The final image was developed using Adobe Lightroom, with a final image size of 6118 x 4083 pixels. The tone curve was edited to fit the s shaped curve, and exposure was brought down. Highlights and whites were brought up slightly, while shadows and blacks were darkened. Vibrance and saturation were brought up slightly as well, to bring out the blue of the background sky. These edits improved the sharpness and clarity of the cloud structure, and gave a more dramatic final image. Many of these edits were focused on

making the mountain range into a complete silhouette, as this draws more detail and attention to the sky. Cropping was used to fill the frame with mostly cumulus clouds, and follow a slightly offset rule of thirds. The original photo is displayed above for reference.

# 5 Artists Statement

In all, I feel that this image is very representative of the Boulder atmosphere. It shows the motion of the clouds coming from the west, which is due to the westerly winds experienced here so often. Most of our weather comes from the mountains, and I think that this is a represenative visual of that phenomenon. The duality of instable clouds in front of a larger stable backdrop presents an interesting scientific and visual appeal. One of my primary interests is mountain meteorology, and I am pleased that I captured a bit of mountain weather. Unfortunately, I had collected many more mountain related clouds, but lost that SD card. I am disappointed that I was not able to report on one of the cooler clouds I captured on that SD card, but I look forward to exploring mountain clouds more in the future.

# 6 Citations

Skywatch Observatory, skywatch.colorado.edu/. Accessed 20 Oct. 2025.
Upper-Air Page: Ral Real-Time Weather, weather.ral.ucar.edu/upper/. Accessed 20 Oct. 2025.