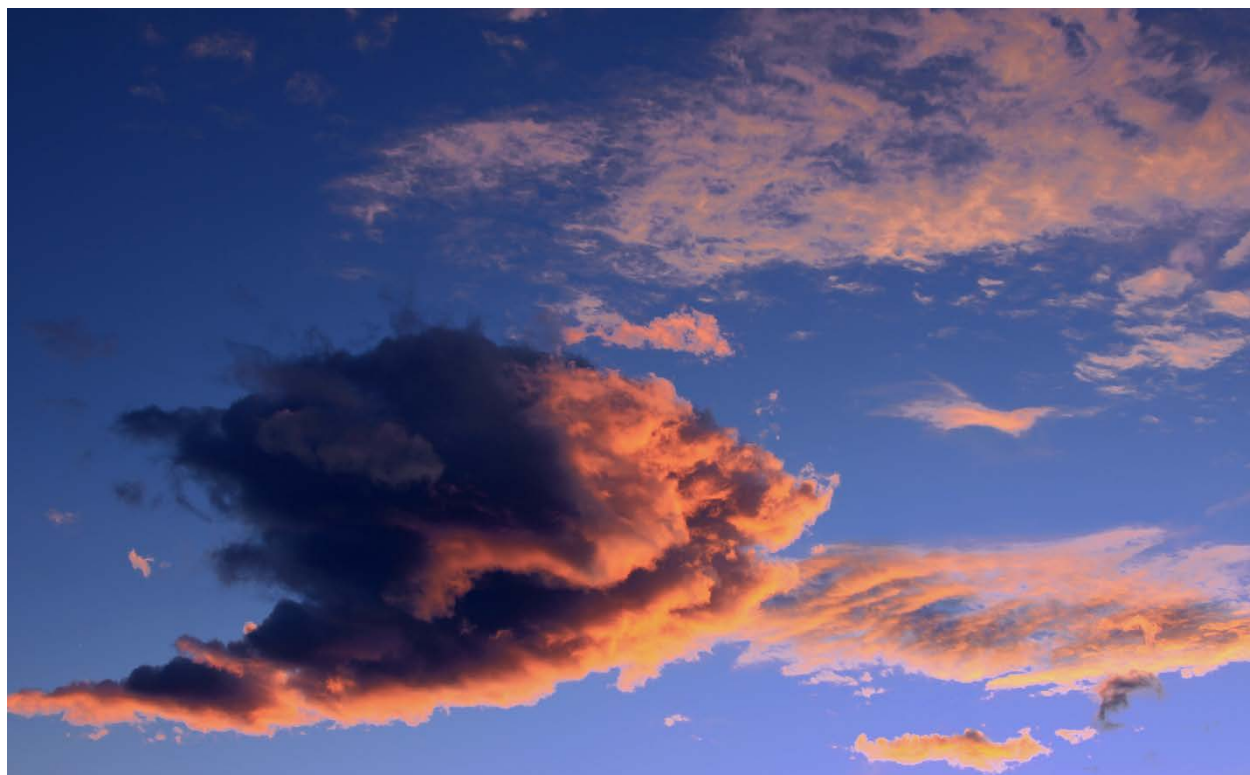


Cloud 2

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Flow Visualization

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Introduction

This image was taken for the second cloud image for the fall 2016 Flow Visualization Course at CU Boulder. The intent of this image was to capture the lighting effects on a cloud during a Colorado sunset.

Image Circumstances

This image was taken on October 25th 2016 at approximately 6:00 pm. I was facing west with the camera angled ~20 degrees above the horizontal, and I was located just east of 28th on Colorado Ave.

Cloud and Atmosphere Information

The clouds in this image are cumulus and stratus clouds. The cumulus cloud is the large cloud in the lower right center of the image, and the stratus clouds are at the top and bottom of the right side of the image. Both cumulus and stratus clouds are classified as low clouds and form below 6,500 feet off the ground. The clouds in the image were approximately 2500 feet off the ground, so both clouds were inside of their formation altitudes. When this photo was taken the atmosphere was slightly unstable with a CAPE value of 23.36, as can be seen in the skew-T diagram below. When this photo was taken the wind speed was less than 5 mph and the air blowing to the northwest. The sky was scattered with clouds and there were no weather incidents (rain or otherwise) around the time of this image. Based on the skew-T below at an altitude of ~7750 feet the temperature was 15 degrees Celsius and the dew point temperature was 5 degrees Celsius. While there are points on the skew-T where these numbers are closer together and there were higher clouds near those altitudes at the time this image was taken, the 10 degree difference in dew point and is sufficiently small to enable cloud formation.

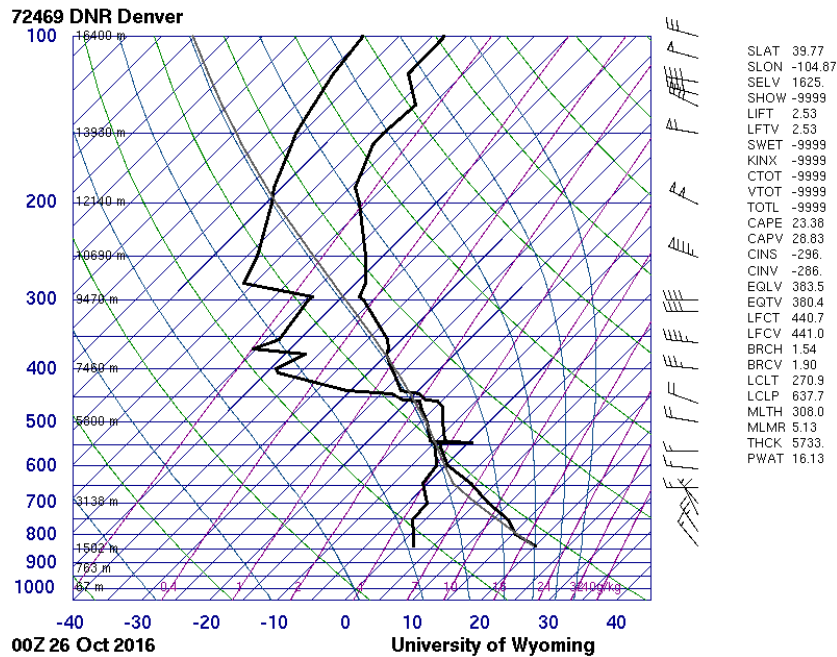


Figure 1: Skew-T diagram

Photographic Technique

The photo was obtained using a Canon EOS 50D with a 28-135mm lens. No tripod was used, however the shutter speed was sufficiently fast to not have hand motion show up and the clouds were moving quite slowly so there isn't much motion blur at all. Lighting was obtained via the setting sun to the west over the mountains. Since the setting sun provided an abundance of light the ISO was set to 100 with a 1/60 second shutter speed and mid-range aperture. The camera was approximately 1.5 miles. With the noted shutter speed the clouds moved at most 1.5 inches based on wind speeds at the time of the shot being less than 5 mph.

Table 1: Camera Settings

Camera	Canon EOS 50D
Lens	28-135mm 1:3.5-5.6 IS
Original Image Size	4752 x 3168
Final Image Size	4564 x 2824
Object Distance	1.5 miles
Field of View	$\frac{3}{4}$ mile by $\frac{1}{2}$ mile
Focal Length	30mm
Aperture	f/7.1
Shutter Speed	1/60
ISO	100
Exposure Bias	0 step



Figure 2: Original Image

The original image (Figure 2) shows the clouds as fairly saturated with color already and with a silhouette of the mountains with a few trees poking in at the bottom. I wanted to really push the saturation of the colors in the clouds so I pushed the levels to obtain a purplish and orangeish hue in the clouds. I also didn't want the tree top in the image and ended up just cropping out the entire mountain silhouette.

Image Discussion

I like how this image came out after some post processing, and think I managed to meet my goal of capturing the interesting lighting effects on the clouds during a Colorado sunset. One possible change to the image though would be to still crop out the trees but leave the mountains, and to also crop down on the slightly oversaturated clouds at the top of the image. Moving forward I would like to capture other sunset pictures when the sunset has different hues to it, and what other lighting effects are visible.