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Clouds 1 Report
MCEN 4151

Introduction

For the first cloud assignment the picture taken was due to being in the right place at the right time. Early morning weather reports had indicated that a storm front was moving in from the West. The intent was to capture the first of the clouds coming over the flatirons as a precursor to the storm. The final image taken, however, captured that intent and more.

Background

This photograph was taken at the National Center for Atmospheric Research, NCAR, in Boulder, CO. The increased elevation of the site helped capture the entirety of the image without anything getting in the way. The camera was facing South-West and held roughly 10 degrees above the horizontal plane of the ground. The image was taken on October 1st, 2015 at exactly 1:02 PM.

Clouds

Within this picture multiple cloud types were captured. The contrails, clouds formed from aircraft exhaust, can be seen within the upper atmosphere. There are the cumulus clouds that take up the majority of the image with their darker, ominous nature. More cirrus clouds can be seen in the upper left hand corner of the image past the contrails. Last but not least, there is a nimbus virga cloud in between the cumulus clouds and the flatirons. This is a cloud that is precipitating, but the said precipitation does not reach the ground. One added effect imaged, are the crepuscular rays of the sun shown at the top of the image beaming down. These clouds are all at different heights. The cumuli are the lowest, being about a 5,800 feet above the photographer. The nimbus virga cloud is at a similar height as the cumuli clouds, appearing to be a 1,000 feet or so higher. Given that the cruising altitude for jets is about 40,000 feet, one can safely estimate the contrails at this height. The cirrus clouds also share a similar height, being around 37,000 feet high. These heights were estimated using a Skew-T diagram that can be found in section A of the appendix. When evaluating this diagram you'll notice that the CAPE value is above zero, this suggests an unstable atmosphere. This is true for the lower atmosphere; however the upper atmosphere seems to be mostly stable. This is backed up by the cirrus clouds in the image, as they only occur in stable atmospheres. The weather of October 1st reflects this observation in the fact that the morning was sunny with little to no clouds, and in the afternoon there was a thunderstorm. The image captures this transition, with both stable and unstable cloud types depicted.

Photo Specifications

To capture this image, a Nikon D3200 was used with the AF-S Nikkor 18-70 mm 1:3.5-4.5G ED lens. The field of view here is about a mile side to side, and a half mile top to bottom. The focal point of the image, the cumuli clouds, is about a mile and a half away from the point of photography, if we assume the clouds are directly above the flatirons. The minimum

focal length of the lens was used, 18 mm, to increase the field of view as much as possible. A sensitivity of ISO-100 was used. Shutter speed was 1/400 of a second, and the aperture was f/11. These settings were chosen to help maximize the sun highlighting the edges of the clouds. Little was done in image post processing. A crop to remove some unnecessary foreground items and some manipulation of the color curves to bring out the blue of the sky. The before and after can be viewed below in Figure 1.

Figure 1: Image before and after post processing, the before is on the left and the after the right.

Conclusion

This image reveals an atmosphere in transition. An unstable lower atmosphere can be seen rolling in and overtaking the still stable upper atmosphere. This depiction was very successful, capturing all and more of the original intent. The multiple cloud types shown are a reminder of a how diverse the spectrum of clouds is. To develop this further, it would be advantageous to use a tripod and take photos of the same point every five minutes or so and create a time lapse of the storm front as it rolls in.