



# **Cirrus Clouds Over Indian Creek**

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For Clouds Second Assignment 2016

## Introduction

The Second Cloud assignment for the course “Flow Visualization” involved capturing a cloud phenomenon, and was left open to the photographer. This image was taken about noon on Saturday, November 12<sup>th</sup>. The location was Indian Creek, a dramatic set of valleys and cliffs about 50 miles from Moab Utah. The desert landscape provided a rugged and intriguing foreground while cirrus clouds formed a dramatic sky overhead.

## Clouds

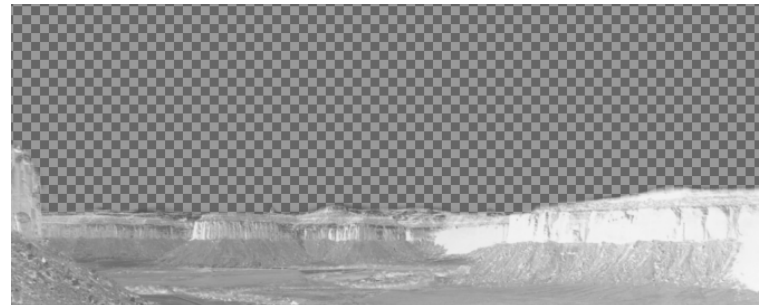
There were many types of clouds which occurred throughout the day, though most were clouds which occurred at higher elevations. There were cirrostratus clouds, indicated by a halo around the sun for most of the day and moon at night. These comprised the thin wispy clouds present in the image. The denser cloud sheet and more pronounced cloud fragments are cirrus clouds.

## Photographic Setup

The camera used for this shot was a canon 70D paired with a sigma 17-50mm. The camera was tripod mounted and shooting time-lapse. Due to the data requirements of shooting time-lapse the camera was shooting jpeg images, which led to some compromise in quality. There was plenty of light that day, with mostly clear skies above the camera, so the images were taken at f/8 1/1000<sup>th</sup> of a second and ISO 160. This provided a decent exposure of the sky, while still preserving the foreground.

The photo was edited using Gimp. Because the image was taken as a jpeg, there were a few areas which suffered from the lack of dynamic range. The first thing that was done was a layer mask was created to bring out the shadows of the foreground. As the photo was exposed for the sky, the

foreground was somewhat dark. The foreground was a significant part of the image and provided much of the feel, so it was important to bring out its details. The sky was erased from the layer; the image was desaturated then inverted. This left white where the shadows were. This mask was then overlaid onto the original image, which brought out the shadows with great success. The curves tool was then used to adjust the image as a whole.



**Figure 1**

Layer mask applied to the image

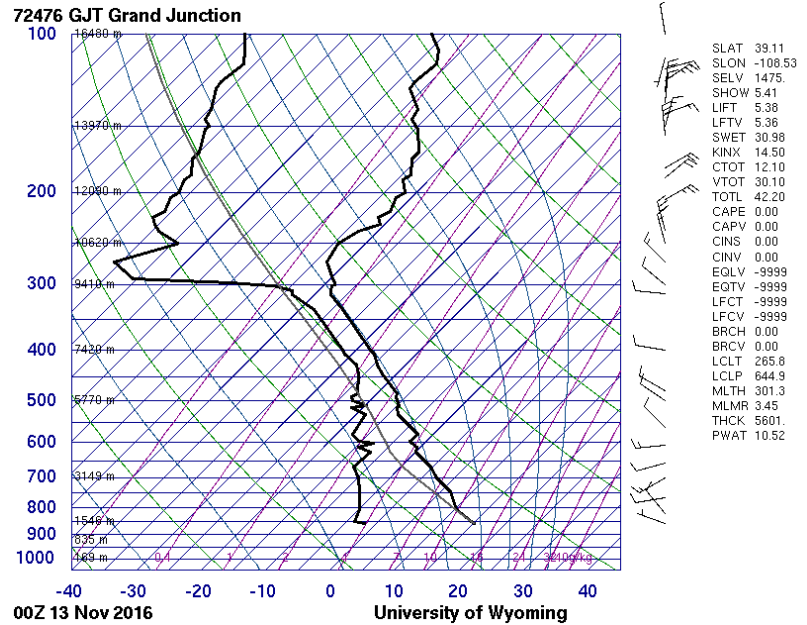
Upon seeing the image on different screens than the one I was using for editing I decided that the original image was much too saturated. The image was brought back into Gimp and

desaturated slightly to match what was intended. This is the image currently on the flow-vis website and in this report.

### Discussion of Flow Phenomena

Clouds in the image are cirrus clouds. These clouds are higher in the atmosphere and are normally composed of ice crystals. The Skew T diagram from a weather sounding 5 hours later out of Grand Junction Colorado indicates a stable atmosphere that day. The temperature approached the dew point between 6000 and 9000 meters MSL. This shows the possibility for cirrus clouds to form at this high altitude. There were winds higher in the atmosphere, but there may have been winds at cloud level earlier in the day.

Time-lapse of the same frame revealed the same cirrus clouds remaining in a similar position despite motion apparent from upper winds. This appears to indicate uplift from a particular location. Since the area was fairly flat these clouds were not orographic, however, the desert floor was capable of causing thermal uplift of air. This could explain what created the uplift which gave rise to this set of clouds.



**Figure 2**  
Skew T diagram from weather sounding

### Conclusion

In general the image achieves what I set out to capture that day. Peer review of the image was generally positive, commenting on the strong foreground as well as the sky. Prof. Hertzberg suggested bringing out more detail in the center clouds. However, when this was later attempted, the image turned out to be near saturated in that section, so there was little that could be done which preserved data and appeared natural. The again came down to the decision to shoot jpeg instead of raw. If I had the chance to redo this image, I would certainly shoot raw and probably even bracket the exposure to make sure all highlights and shadows are captured in full detail.

### **Works Cited**

"Cirrus." Cirrus - AMS Glossary. American Meteorological Society, 20 Feb. 2012. Web. 20 Nov. 2016.

"GJT Grand Junction." Atmospheric Soundings. University of Wyoming Department of Atmospheric Sciences, n.d. Web. 15 Nov. 2016.

Hertzberg, Jean. "Skew T in Detail." Flow Visualization. CU Boulder. 5 Oct. 2016. Lecture.