



Clouds Report: Part Two

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Flow Visualization:
A Course in the Physics and Art of Fluid Flow

Clouds Report: Part Two

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The goal of this project was to produce a visually pleasing photograph of a cloud formation. This photograph shows a beautiful skyline of cumulus medeocris clouds traveling right to left. I followed these clouds eastward for nearly ten miles attempting to properly show their beauty and detail. Finally, I was able to capture an image that shows their uniqueness but also their homogeneity. The clouds seem peaceful and calm, yet they all relentlessly travel together eastward at a relatively high speed.

This photograph was taken around noon on April 18, 2006 from Stapleton, Colorado facing south-southeast towards Colorado Springs, Colorado. Again, it shows a grouping of cumulus medeocris clouds moving eastward towards Nebraska. I included a small portion of the ground to give perspective as to how large the cumulus clouds actually are. I determined the clouds to be cumulus medeocris based on their low elevation bases and their atypical higher elevation plumes. Upon reviewing the atmospheric information [1] for Denver on that date, several readings confirmed and specified the conditions shown in the photograph. The primary condition confirmed was a high velocity eastward wind at 60 to 90 knots. This wind was experienced from a relatively low elevation of 2 kilometers up to a high elevation of 10 kilometers. Secondly, it was determined that the atmosphere was relatively unstable in this area. This is confirmed by the fluffy plumes rising and falling within the clouds. Based on the heights of these clouds as well as the opaqueness, these clouds are moderately high in moisture (Carlson 1995). This can also be seen by the grey bottoms of the clouds where little light is traveling through the cloud.

This visualization technique for this photograph was very simple. I utilized the natural light of a bright sunny day and was lucky enough to photograph the clouds at noon. This produces an incredibly bright skyline that also has great contrast within the clouds themselves.

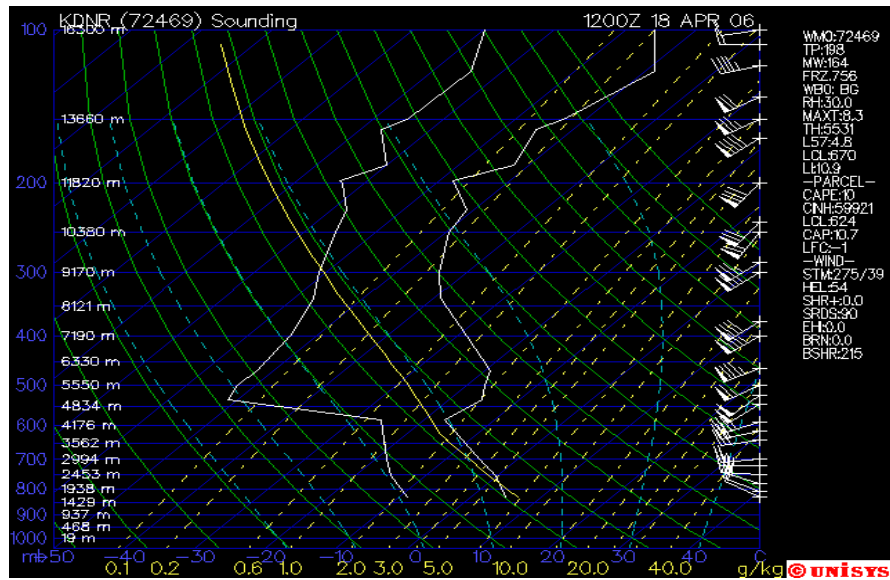
The photograph shows an approximately 2 to 5 kilometer wide portion of the skyline that also includes the near 40 kilometers of visibility. The closest cloud is approximately 5 kilometers away and the 150 ft crane seen on the ground is about 3 kilometers from the camera. The image has great time resolution since the cloud is a far distance away. Based on the cloud traveling at 1 km per minute and the shutter speed being 1/500 second, the cloud only moved 1/30 meters during the shutter opening and closing. The original photograph [2] was modified to further increase contrast between the clouds and sky. To do so the image color levels were adjusted slightly to add depth the blues and brighten the whites. The image was also cropped to eliminate empty blue sky that decrease from the impact of the clouds.

The specifications of the photograph are as follows:

Camera:	Digital Canon Rebel XT Camera (8.0 Megapixels)
Dimensions:	2794 pixels wide x 2070 pixels high (5.78 Megapixels)
Focal Length:	85mm (17-85mm lens)
Aperture:	16
Shutter Speed:	1/500 sec.

This image was very successful is showing cumulus medeocris clouds in a pleasing and immense way. By including the thin sliver of ground, the clouds are given scale and also increase the affect of the image. Unfortunately, the image was taken at a high angle and only the sliver of ground was shown. I would have liked to include a bit more ground just to increase the depth of the image and hence increase the impact of the image.

[1] Current Skew T Plot for Denver CO (DNR-72469)



[2] Original Image Prior to Photoshop



References:

Carlson, M.L. Cloud Identification: Thermal Physics. Pennsylvania State University, University Park, Pennsylvania. January 1995.

Current Skew T Plot for Denver CO (DNR-72469).

http://weather.unisys.com/upper_air/skew/skew_KDNR.html