



# Clouds 2

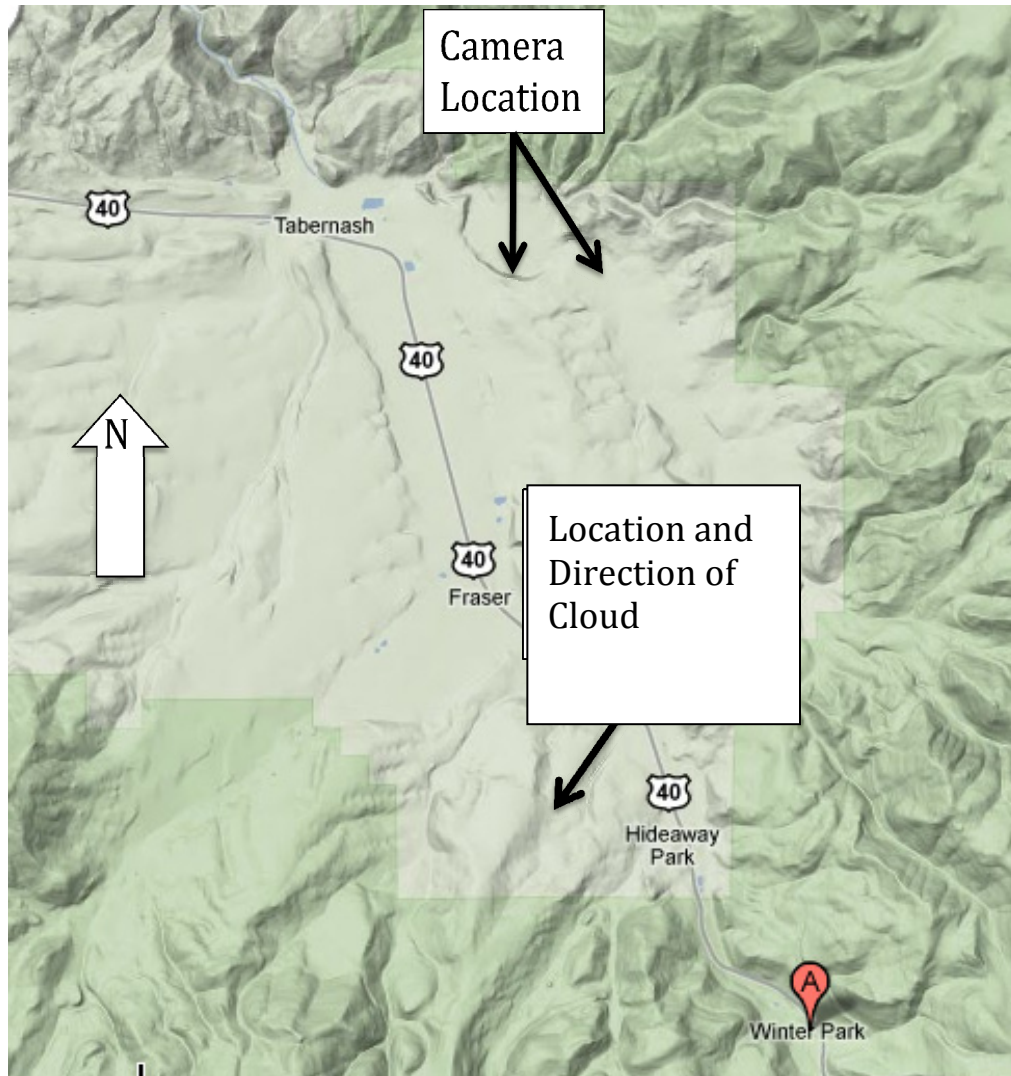
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**MCEN 4228 Flow Visualization**  
**April 19, 2010**

**Introduction:**

The purpose of this particular photo was to capture the unique behavior of clouds in the mountainous regions of Colorado. During some of the outdoor mountain activities that I take part in I have notice that there is often more unique cloud behavior in the high country than what we are use to seeing in the Front Range. The mountains themselves affect how the clouds propagate and ultimately form. The cloud in the image that I have selected showed some unique behavior as it traveled across the high mountain valley. In addition the cloud had a unique direction of travel as it preceded a winter storm.

**Image Background:**

This image was taken on March 27, 2010 a few miles North of Tabernash Colorado facing Southeast. The image was taken at 7:00pm taken approximately level with the horizon. The camera was hand held and set to standard camera settings. The image below shows the location of the photo and the relative location and of the cloud.



Terrain map of region

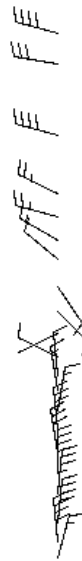
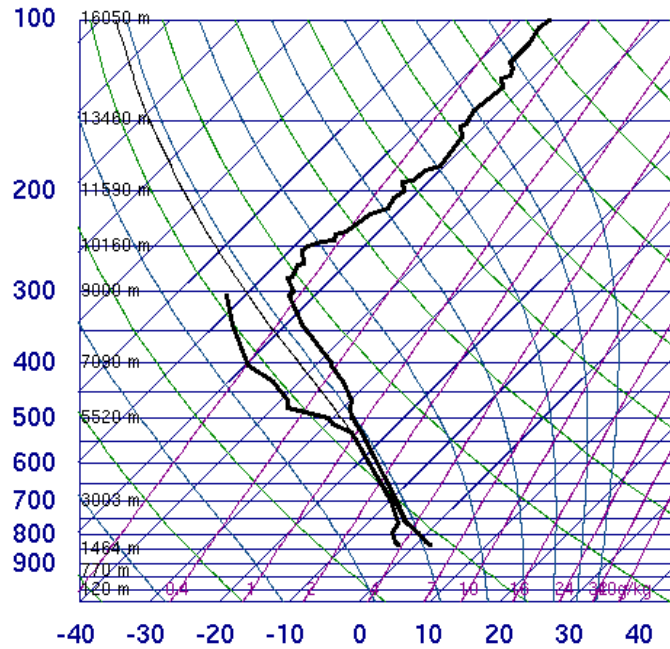
### **Cloud Physics:**

Based on the clouds general shape and development I have come to the conclusion that this cloud is a sample of a Cumulonimbus<sup>1</sup>. This assessment has been made because of the perception seen at the base of the cloud and the overall size of the cloud. This large column is similar to other cumulonimbus cloud formations. Due to the higher elevation that the photo was taken may suggest a reason as to why the cloud is so low to the ground. I would imagine that if you were near the base of the cloud it would appear to be a fog<sup>4</sup>. The night prior to taking this photo the Winter Park Mountain received 6-9 inches of snow creating a unique cloud formations the following evening. I believe that it was the previous nights weather and elevated temperatures during the day that caused this large cloud to be so close to the ground, as fog is commonly generated when the relative humidity is near 100%, and traveling from the valley earlier in the day we noticed that the air temperature was very high for the time of year. It is also important to note that the ground below the cloud is approximately 7,500-8,000 ft above sea level.

The day that the photo was taken the wind was traveling southwest (from left to right in photo), this is typical for Colorado as the winds shift after large snowstorms. The new wind direction may have been the cause for the elevated temperatures and moisture causing the low hanging cloud formation. In addition I found that the cloud was traveling across the valley in a very rapidly. It traveled from the location of the photo to Winter Park (4 miles) in approximate 2 minutes. In this image we can see how the direction of the cloud mimics the direction of the mountain valley until the cloud eventually traveled into Winter Park and dissipated.

We can also learn some information about the stability of the cloud based on the skew-t plot that was taken on that particular day. The skew-t plot shown below was taken in Denver Colorado, which is around 50 miles away. This does not provide a lot of information as to what the conditions were up in the mountains but it is still interesting to look at. With this said we could see from this skew-t plot that at the elevation the clouds are stable.

### 72469 DNR Denver



SLAT	39.75
SLON	-104.87
SELV	1625
SHOW	-9999
LIFT	1.68
LFTV	1.67
SWET	-9999
KINX	-9999
CTOT	-9999
VTOT	-9999
TOTL	-9999
CAPE	0.00
CAPV	0.00
CINS	0.00
CINV	0.00
EQLV	-9999
EQTV	-9999
LFCT	-9999
LFCV	-9999
BRCH	0.00
BRCV	0.00
LCLT	288.2
LCLP	761.4
MLTH	289.9
MLMR	3.50
THCK	5400
PWAT	7.88

12Z 27 Mar 2010

University of Wyoming

Skew-t Plot: March 27, 2010<sup>2</sup>

### Photographic Technique:

This photo was taken with a Canon PowerShot SD1100 IS with an exposure time of 1/320. The photo was taken with an F setting of 6.3 and the image size was 2816x2112 pixels. This image was then taken into Photoshop and altered by both cropping the image to size and adjusting the colors and contrast using the levels tool. The image was cropped to 2550x2448, this was done to draw the viewer's focus to the cloud. The image alteration can be seen below by directly comparing the two photos.



Original Image



Final Image

**Summary:**

In general I am very pleased with the final result of his photo as it shows a unique situation in cloud behavior. The unique direction of travel in the cloud captured some interesting cloud behaviors in the high country of Colorado. The purpose of this image was to gain some insight into cloud behavior in the mountains. Similar to the first cloud image that I have taken this assignment as given me a new found respect for cloud behavior and development.

**Reference:**

1. "The Clouds Collector's Reference." *The Cloud Appreciation Society*. Web. 16 Apr. 2010. <<http://cloudappreciationsociety.org/collecting/tina-moore/>>.
2. "Atmospheric Soundings." *Wyoming Weather Web*. Web. 16 Apr. 2010. <<http://weather.uwyo.edu/upperair/sounding.html>>.
3. "Winter Park." *Google Maps*. Web. 19 Apr. 2010. <<http://maps.google.com/>>.
4. "Fog - Wikipedia, the Free Encyclopedia." *Main Page - Wikipedia, the Free Encyclopedia*. Web. 19 Apr. 2010. <<http://en.wikipedia.org/wiki/Fog>>.
5. "Formation of Clouds." *Atmospheric Chemistry: Start Page*. Web. 16 Apr. 2010. <[http://www.atmosphere.mpg.de/enid/1\\_\\_Clouds/-\\_Formation\\_of\\_clouds\\_t9.html](http://www.atmosphere.mpg.de/enid/1__Clouds/-_Formation_of_clouds_t9.html)>.