

Fall 2015

Flow Visualization

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[CLOUD IMAGE #1]

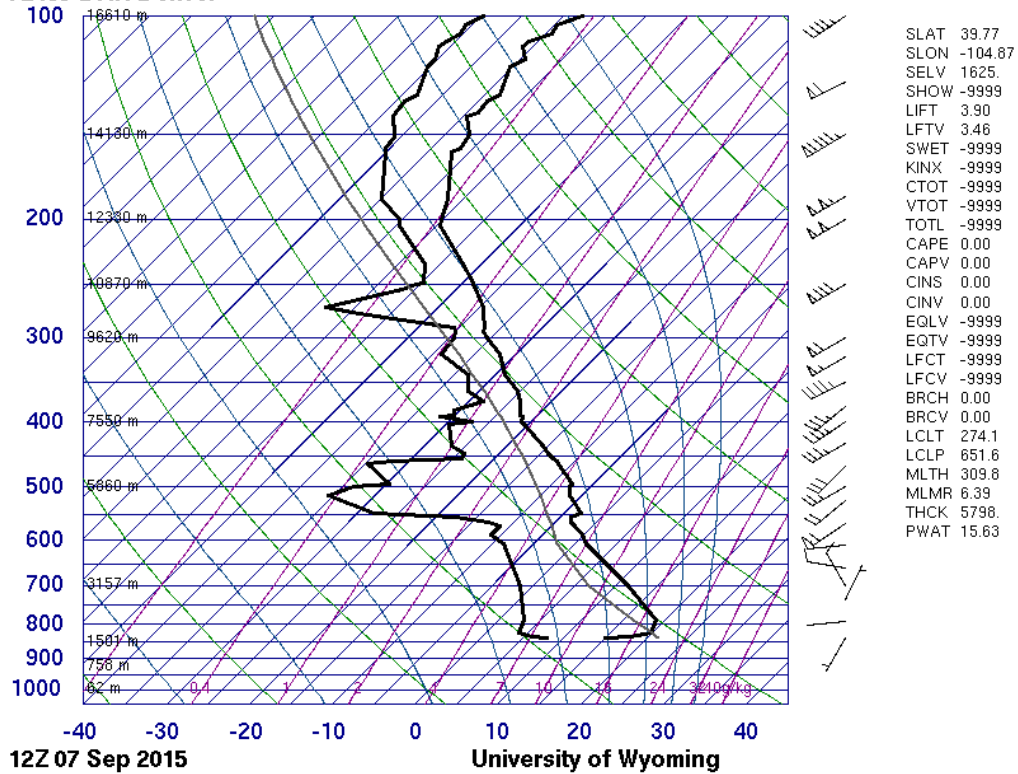
Clouds are typically used to predict weather and other atmospheric phenomenon. For this first cloud image project, the intent is to capture the art of clouds. This can be done by capturing the shapes, lines and colors of different cloud types. I wanted to take an image of a foehn cloud and capture the physics which form these types of clouds.

This particular image was taken on September 7, 2015 at roughly 3pm. I was in Broomfield, Colorado atop a large hill. The camera was directed west and slightly north toward the flatirons in Boulder. The elevation at this location is 5,420 feet while the flatirons reach about 7,500 feet.

The cloud in this image is a mountain wave cloud. These clouds are produced by stable atmospheres when air is pushed over a mountain face. The water in the air condenses due to a colder temperature and drops back to its original elevation. This movement creates momentum and the cloud bounces upward again. Once the cloud reaches a higher elevation the water condenses again to form yet another cloud. This process continues and the clouds eventually start to disperse. The multiple clouds created is why this phenomenon is called a wave effect. Although not seen in this particular image there was a mountain foehn cloud during this time. A foehn cloud is when the moist air rises over a mountain. The moisture condenses in the cloud but does not push over the peak. Instead the cloud becomes dry at the peak of the mountain. A wall of clouds is formed at the mountains because warm air is created on the lee side. This warm and dry air does not allow the formation of more clouds. Although not pictured there were more stratocumulus clouds in the surrounding area.

The skew t diagram can show more about what the atmosphere was like during the time the image was taken. The skew t diagram shown below is from September 7, 2015 at 12Z and was taken at the Denver location. The cape was zero which confirms the atmosphere was stable. There was also quite a bit of wind present (gusts up to 31 mph) which increases the likelihood of mountain wave and foehn clouds. There was no precipitation on this day and the temperature was about 70 degrees Fahrenheit.

72469 DNR Denver



The table below shows important information regarding the how the image was captured. There was very little post processing done to the image. It was cropped slightly, a small accessory cloud was removed using the clone tool in GIMP and the contrasting was enhanced slightly.

Camera	Canon PowerShot SX10IS
ISO	125
Shutter Speed	1/1000 sec
F-Stop	F4.5
Contrast Setting	Normal
Original Size	3648x2736 pixels
Flash	No flash

This image captures the physics of how mountain wave and foehn clouds are formed. It also shows the beauty of clouds. I like how the cloud in the image is parallel to the horizon and uniform across the picture. I also like the lighting and how some of the sun rays pierce through the backside of the cloud. If I was to do this project again, I would focus on more of the sky and not just a single portion. I would also like to use more contrast between the blue sky and brighter white clouds.