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Flow Visualization
March 1st 2010

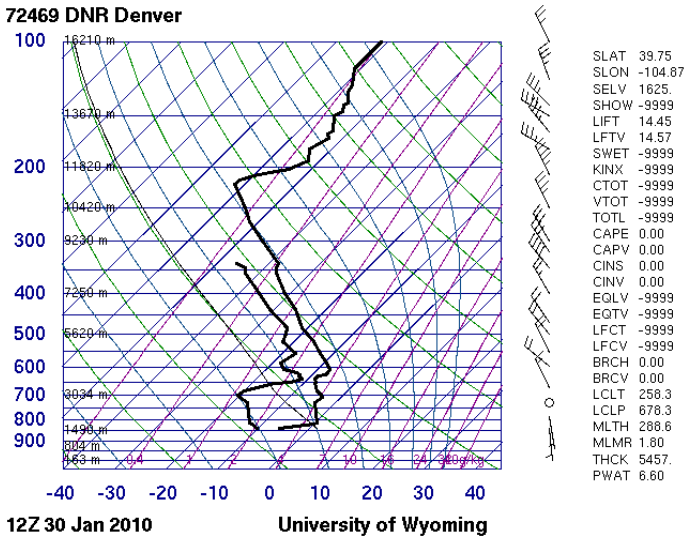
f/5.8 : f-stop
1/500 sec :exposure
ISO-80 : iso speed
17.3mm : focal length
Canon SD870 IS : camera
0.5 miles : distance
3264 x 945 : dimensions
no : flash

## Clouds 1: Lenticularis Wave Form

I was having a real hard time capturing cloud physics, well especially the times that I had my camera. I had seen wave clouds before, but unfortunately I never had my camera with me. As soon as I woke up one morning, I looked out and saw some almost perfect wave clouds sitting above the foothills, so I brought out my camera and took this photo. I would have liked to have stayed out and view the movement of the clouds over time, but sadly I had to get ready for class and was unable to.

This image was taken from the 4th floor balcony of my apartment complex in Boulder. The sun is located behind me as the clouds are forming over the foothills in the early morning. The clouds are being viewed from a ¾ perspective as they come over the foothills and a semi profile view of the clouds was obtained. The picture was taken with a relatively flat 10° elevation at 8:12am on January 30th, 2010. Below is a map of where the picture was taken from in relation to the city.

This image shows lenticularis mountain wave clouds. These clouds were seen just on the east side of the foothills. The rest of the sky was almost a perfectly blue bird day with no other clouds in my sight. In the skew-T plot below, you can see that cape=0.00 showing a relatively stable atmosphere. This could be confirmed with the relatively no other clouds in the sky. The skew-T also shows high winds at the upper elevations, which are required to form the wave form effect as air passes over the cloud. My best guess is that the clouds were 5,000-10,000 feet above the ground.




Mountain wave clouds are caused by winds traveling over mountains and passing over condensed air. When this wind approaches the other side it speeds up and travels right over and under forming clouds. A diagram of this phenomenon can be seen in the graphic below.

Schematic diagram showing airflow and clouds in a mountain wave[1]

For the image, I tried to capture the various wave clouds that I could at the same time. I zoomed out as far as I could then cropped the image to make a dramatic landscape representation, to emphasis the flat clouds. The image was taken with an f/stop of 5.8, and a shutter speed of 1/500, and a ISO of 80. The camera used to take this picture was a Canon PowerShot SD870 taken at 3264x2448. The image was imported into my computer and cropped to obtain a more dramatic aspect

1. http://www.tpub.com/content/aerographer/14312/css/14312_84.htm

ratio. After some post processing in Photoshop to increase the contrast and saturate the light, the final image was 3264x945.

I hope that the image reveals the long and flat mountain wave clouds that appear over Boulder. This picture does a decent job of demonstrating the cloud physics that takes place when high winds rush over the mountains. I wish that I could have viewed the clouds from a more profile position, and taken several shots throughout the morning as the clouds were being transformed.