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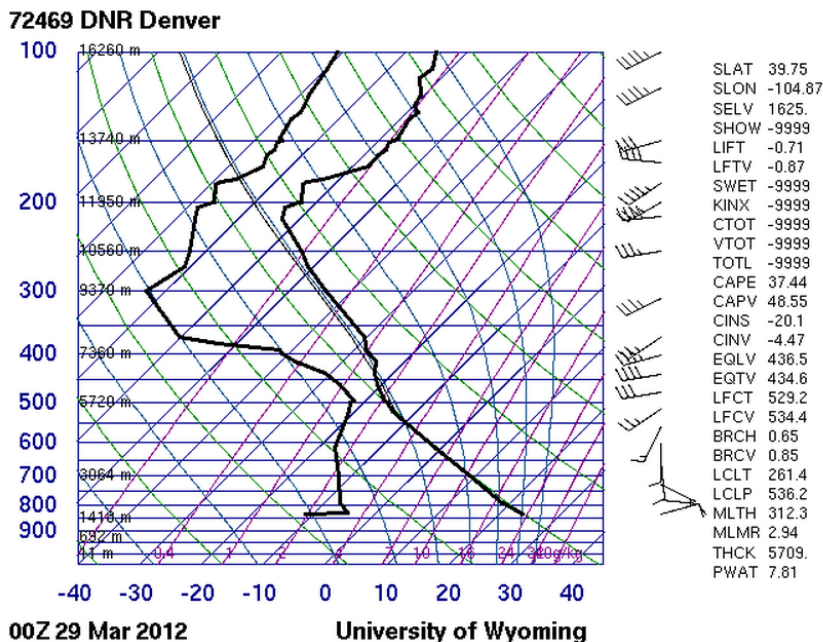
Flow Visualization: Cloud Report 2.



This photograph was taken for the second cloud assignment in Flow Visualization. The intent of the image was to capture interesting cloud dynamics. When photographing, I did not have a particular cloud type in mind that I wanted to capture. Throughout a trip to Rocky Mountain National Park (RMNP) I photographed clouds. It was not until the drive home that this cloud caught my eye and I pulled over and took a few shots. It was taken about 2 miles outside of Estes Park, Colorado, on Rt. 36. The time was around 3:30 in the afternoon on March 27th, 2012. My camera is pointed about 60° from the horizon, generally facing east. What really grabbed my attention was the semi-heart shaped swirl in the upper left. It looked like the formation of a vortex at the end of a buoyant plume, almost like a smoke ring from the side. It is not likely that this is what we are actually seeing here, but that was why I took this photo. With a little imagination it also looks like a hand swinging at a ball.

The main cloud seen in this image is a small localized mountain wave cloud. They form in stable atmospheres above the peaks of mountains. Essentially what happens is the moving air flows over the

peak and is forced to rise up, cool and form a cloud, and then drop back down. In class, we learned that it is essentially an under-damped system and can form repeated waves of either altocumulus or stratocumulus lenticularis clouds in the standing waves formed by the wind. Throughout the day higher altocumulus lenticularis clouds were observed over some of the ridgelines in RMNP. In addition there were several lower elevation, fair weather, cumulus humilis clouds in the park. I believe that in this photo we are seeing a small stratocumulus lenticularis which has been torn up by the gusty winds that day. By examining the skewT plot from Denver International Airport it is clear that it was a stable atmosphere that day. Because the sounding was taken about 70 miles away and the local topologies are very different it is likely that the local atmosphere was much different than this skewT. I believe that the small puffy cloud in the lower right of the photo is one of the cumulus humilis clouds that I mentioned earlier. These clouds usually form between five and ten thousand feet in sunny warm weather conditions and often can be a sign of oncoming weather. The weather in Estes did change to total cloud cover soon after the time this photo was taken, which would support the idea of that humilis clouds were present. Also based on the skewT and I think some of the long sweeping clouds could be high elevation cirrus fibratus clouds.



The photograph was taken with a Canon EOS Rebel T2i with a Tamron 10-24mm, f/3.5 – 4.5, wide angle lens. The ISO was set to 200, the shutter speed was 1/256 s, and the aperture was at F/14.1. The slow movement of the clouds and the fast shutter speed means that the cloud really didn't move a measurable amount during the exposure. The focus was set at infinity for this photo. If I had to estimate, the clouds in the photo were between two and three thousand feet overhead, because Estes Park is at 7500 feet, and I was just outside of town, I would guess they were at about 9000 feet above sea level. The fibratus clouds, based on the skewT were probably somewhere around 39,000 feet above

sea level. The raw photo was 5302x3465 pixels. I really did very little editing, I only lightened the image slightly, otherwise it is the same. The raw image can be seen below.



Sources for weather, atmospheric, and cloud data:

“Weather Spark Beta”, <http://weatherspark.com/#!/dashboard;q=Estes+Park,+CO,+USA>

“University of Wyoming Dept. of Atmospheric Science”, <http://weather.uwyo.edu/cgi-bin/sounding?region=naconf&TYPE=GIF%3ASKEWT&YEAR=2012&MONTH=03&FROM=2900&TO=2900&STNM=72469>

“The Cloud Appreciation Society”, <http://cloudappreciationsociety.org/>