Thomas Pohlman Flow Visualization Spring 2013
Second Cloud Image
4/18/13

Cloud 2: Stratocumulus over Broadway

Final Image

This image is for the second cloud image for my flow visualization course. The image was meant to capture the different layers of clouds in the sky. I focused on the stratocumulus in the center of the image but made sure that the wispy clouds that were higher up in the sky were visible for the layer comparison. I took several pictures at the time, but this image had the best contrast between the clouds and the sky.

Image was taken from the behind the firehouse at the corner of Baseline and Broadway in Boulder, CO. I was staying looking south east over the intersection. In the original image I just barely catch a tree in the bottom left and a lap post in the bottom right, and the rest is sky. The image was taken mid afternoon, around 2:00 pm.

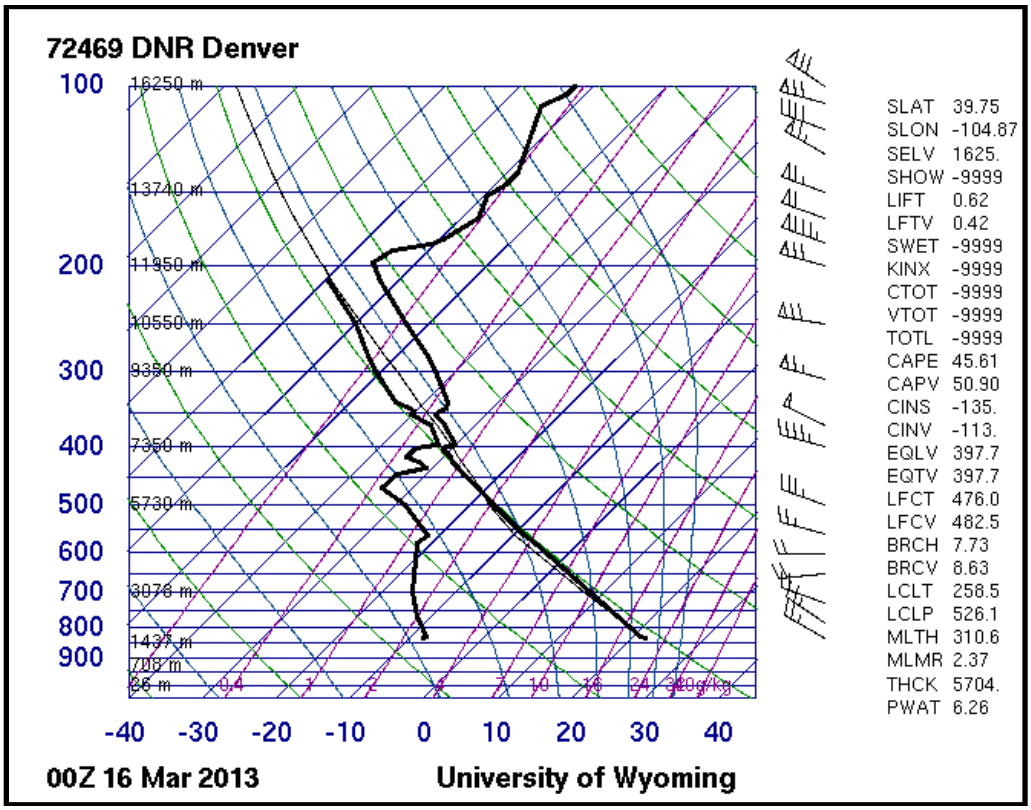
I have classified the cloud in my image as stratocumulus for the lower more defined clouds and altostratus for the wispier clouds that are higher up. Though the atmosphere was pretty stable, the CAPE value on the Skew-T was 45.61, which indicates that the atmosphere could be heading toward the instable range. This is consistent with the clouds that came later that afternoon/night. Skew-T shows that it is likely that there were clouds at 7350 m, though I believe that those clouds would be the higher altostratus clouds above the cloud that I am focusing on in the image. You can also see in the skew-T that there is a slight instability from about 3000 m to 5000m, I believe that it was in this range that those stratocumulus cloud were. To look deeper into the elevation of the stratocumulus clouds, I decide to calculate the Lifting Condensation Level (LCL). For this I looked back at what the temperature and dew point temperature were at 2 pm on the 15th of March. I then applied this info to Espy's equation:

$$h_{LCL} = \frac{T - T_d}{\Gamma_d - \Gamma_{dew}} = 125\ (T - T_d)$$

$$T = Temperature\ (^oC)$$
$$T_d = dew\ point\ Temperature\ (^oC)$$

$$h_{LCL} = 125\ \big(22 - (-10)\big)$$
$$h_{LCL} = 4125\ m$$

This h_{LCL} is within the slightly instable range, so this is would be my estimation of the stratocumulus clouds. From Wikipedia, there is claim that this equation is accurate to within 1%, though it does say that the accuracy goes down with drier atmospheres. So I checked the relative humidity of atmosphere at the time, and it claims an 11% relative humidity. This means that there might be more error than 1% in my estimation. Though since the range and estimation agree, it can't be that far off.



Denver Sounding for March 15 at 6 PM

I was shooting with my Nikon D40 a AF-S DX VR Zoom: 18-55 Nikkor lens, this is my serve all lens that I usually just leave on my camera cause it is the most versitile. It was enough for with image, though had I been able to put my telephoto lens on I would have been able to get and much closer and detail image. I have provided a table of the setting that my cmaera was for this shot:

Camera	Nikon D40
Lens	AF-S DX VR Zoom-Nikkor 18-55mm
Focal Length	40mm
F-Stop	F/5.6

ISO	100
Shutter Speed	1/1000 sec
Exposure Bias	-.03 step
Pixels (original)	3900 x 2613
Pixel (PhotoShop)	3780 x 2238

I did not mess with them a lot, most of it was what my camera was suggesting to me, though I did change the Exposure Bias to bring the exposure down abit so that less of the right side of the cloud was over exposed. When there is too much over exposure, the detail is lost in the clouds and since the stratocumulus was the cloud that I was focusing on I wanted as much detail as I could in there. There was not much post processing done to the image, I croped the lap post out of the right side of the image and played with the color curve. My main goal with changing the color curve was to get rid of the grey wash that the image had, I tightend the range so that the sky was more blue and the clouds had more shadowing in them to bring out the detail. I feel that I accoomplished this for the most par with PhotoShop work after the image was taken.

This image accomplished its intention, the layering of the sky in very clear. I was pleased with what I was able to capture, had I gotten the chance again to take another image of this cloud I would have liked ot be able to see more detail. This could have been accomplish with a differnet lens with more zoom. I would hoep that I would show moreo fo the upward motion in the cloud and how it is moving through the lifting Condensation Level. Though there would have been a different purpose to the image then, I feel that it would be a very interesting flow to capture.

Source:

Skew-T for day of Image: http://weather.uwyo.edu/upperair/sounding.html
Weather Data: http://weatherspark.com/#!graphs;a=USA/CO/Boulder
Lifting Condensation Level: http://en.wikipedia.org/wiki/Lifted_condensation_level#cite_note-1