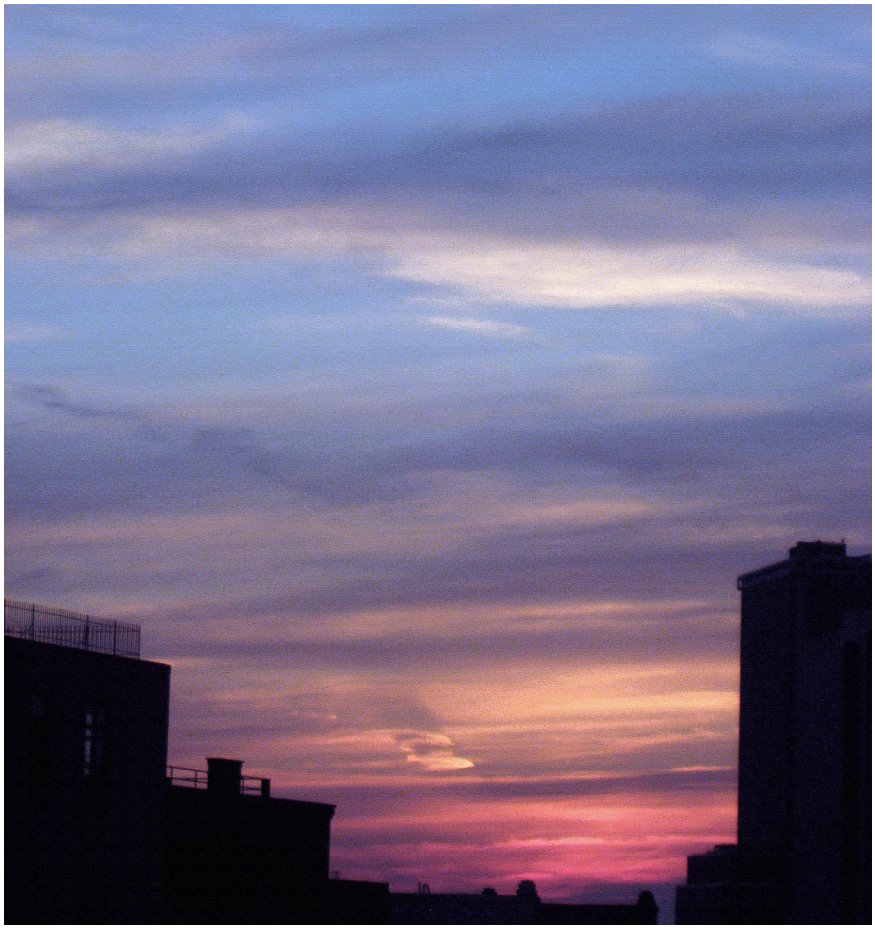
MCEN 5228- Flow Visualization



"Painted Skies of New York"

Assignment: Clouds 2
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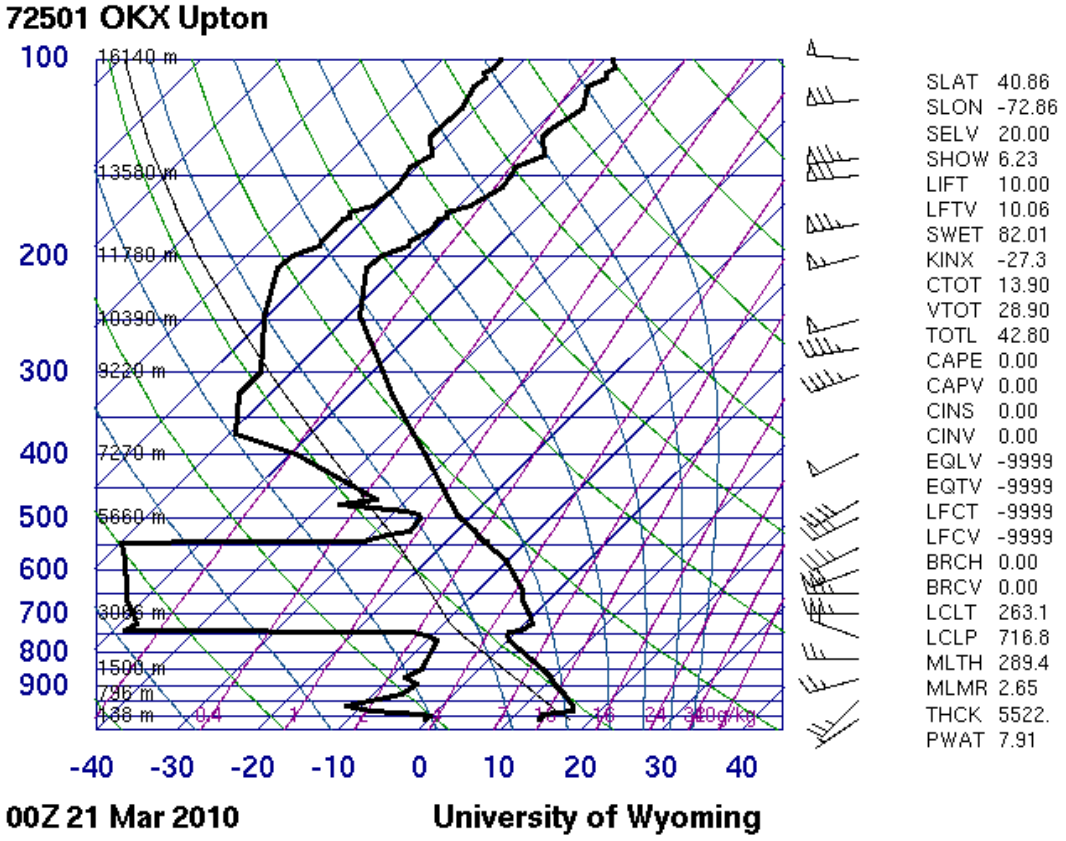
"Clouds come floating into my life, no longer to carry rain or usher storm, but to add color to my sunset sky." (Tagore). Clouds usher in and demonstrate a beauty only our imaginations can typically conceive. Clouds hold a mystic beauty that eludes those who simply walk beneath their shadows, yet when we look up we marvel at just how magnificent they are. This picture was taken in one of those moments. I was on spring break in New York City walking from Brooklyn to Manhattan Island on the Brooklyn Bridge when I looked up and beheld this beautiful sunset before me. I took many pictures that included the statue of liberty and other famous buildings near by, but this skyline picture turned out the best and shows the entire color spectrum. This picture was taken for the second cloud project for Professor Hertzberg's Flow Visualization class for the University of Colorado at Boulder. My intent for the image was to capture the color variety scattered by the clouds during the sunset. These clouds are altostratus (near the top of the picture) and altocumulus (towards near the horizon).

As mentioned previously, this picture was taken on the Brooklyn Bridge in New York City, New York. I was standing on the pedestrian walkway above the bridge directly between both Brooklyn and Manhattan Island. The Brooklyn bridge is 277 feet above the water and is located at Latitude: 40° 42' 20" N Longitude: 73° 59' 47" W (Brooklyn Bridge). The camera was pointing west as the sun set, and was pointing up at a 30 degree angle above the horizon. The shot was taken on March 20,2010 at 6:06 pm Eastern Standard Time. According to the Skew-T diagram (discussed later in the report), the clouds are at an elevation of 3.5 miles (5,660 meters) above the earth's surface. By simple trigonometry, the distance from the cloud to the camera can be calculated using the formula: Hypotenuse=Height/Sin(Theta). Therefore Hyp=3.5/sin(30) → 7 miles. There is a distance of seven miles between the observer and the clouds.

Brooklyn Bridge - New York

The clouds in the image are altostratus (near the top of the picture) and altocumulus (towards near the horizon). These clouds formed in the afernoon and started to drift as the picture was taken during sunset. There was some wind present (approx. 15 mph) blowing inland from the river. The previous day it had rained and the day after the picture was taken it also rained, but it did not rain on the exact day the picture was taken. The Skew-T plot can be seen below in Figure 1. The Skew-T plot shows CAPE=0, indicating that the atmosphere is stable. Also, the imaginary parcel line is shallower than the actual line, indicating a stable atmosphere. The data for the Skew-T diagram seems to not be completely accurate, as the data at the lower third of the plot has a piecewise nature to it. As mentioned earlier, the expected cloud heights are around 3 miles above the surface, and this does seem to correlate very well to the observable height.

Figure 1: Skew-T Plot (3/21/2010-00 Zulu)



Altostratus clouds are known for being a uniformly gray sheet layer and are made up of medium sized ice crystals (Cloud Classification). Normally these clouds begin to form when there is an approaching cold front or cloud mass (Cloud Classification). This correlates well with the previous days and predicted weather, for both days yielded precipitation. Altostratus clouds can very in thickness, causing a variation in "grayness": the thinner the cloud the lighter it becomes (Hamblyn 2008). They normal exist when the atmosphere is stable. The other kind of clouds in the image, which is closer to the horizon, is the altocumulus clouds. These clouds are mid level clouds that can appear broken or smooth (Cloud Classification). Their appearance varies depending on winds, the stability of the atmosphere, and their proximity to other cloud types (Hamblyn 2008). In this image, the clouds are simply light and fluffy, corresponding to the clouds embodying "puffiness" but also the ability to release precipitation. The clouds grow when the atmosphere becomes unstable and warm and cold air is inverted, causing the air to move and condense, thus causing bigger clouds. Both of these cloud types will grow into nimbostratus clouds if the atmosphere is unstable enough.

The photographic technique for this picture used simple framing techniques to capture both the skyline and the clouds. The camera used was a Canon-Digital Elf point and shoot camera. The aperture was opened fairly wide (f/5.4) with a moderately fast shutter speed (1/640 sec). This allowed for the camera to get a high exposure of light in a relatively quick timeframe and reducing motion blur caused by the photographer. The estimate field of view is about half a mile from the far left of the first skyscraper to the far right skyscraper. The depth of field extends to 7 miles towards the horizon. The is relatively no motion blur since the field of view

is so large and the shutter speed is very quick. I did extensively edit the picture in Photoshop in order to remove the graininess of the image and increase the contrast. The first process I used was to shrink the grain size with the texture tool, and then increased the contrast with curves. Lastly, I filtered the entire image with a deep blue filter to result in the final image. Table 1 has all of the camera specifications taken for the picture.

Table 1: Camera Data

Camera Data 1		
Make:	Canon	
Model:	Canon PowerShot SD850 IS	
Date Time:	3/20/2010 - 4:06 PM	
Shutter Speed:	1/640 sec	
Exposure Program:		
F-Stop:	f/5.5	
Aperture Value:	f/5.4	
Max Aperture Value:	f/5.4	
ISO Speed Ratings:	400	
Focal Length:	23.2 mm	
Lens:		
Flash:	Did not fire	
	No strobe return detection (0)	
	Auto mode (3)	
	Flash function present	
	No red-eye reduction	
Metering Mode:	Pattern	
Camera Data 2		
Pixel Dimension X:	2448	Y: 3264
Orientation:	Normal	
Resolution X:	72	Y: 72
Resolution Unit:	Inch	
Compressed Bits per Pixel:	1	
Color Space:	65535	
Light Source:		
File Source:	DSC	

My intent for the picture was to capture the beauty of a sunset and how clouds augment the colors of the sun fading behind the horizon. I like how the image reveals a variety of colors ranging from the deep blue at the top of the image to the orange/purple at the bottom of the image. The cloud physics are shown very well, as altostratus and altocumulus clouds are both very similar clouds that can often look comparable. I fulfilled my intent and find the image quite beautiful. It evokes a lot of emotion and is pleasing, calming, restful, and also inspiring. However, I would like to improve the image's resolution and also zoom in more on the picture so as to give even better clarity and detail to the image. I could also develop this idea further by trying to manipulate the colors more in Photoshop. Overall, I am very pleased with the image and how inspires those who view it.

References:

The Brooklyn Bridge: http://www.inventionfactory.com/history/rhabridg/bb.html (4/1/2010)

Brooklyn Bridge Poster: http://www.starstore.com/acatalog/CPP20157-brooklyn-bridge.jpg

The Cloud classification System:
http://australiasevereweather.com/techniques/moreadv/class.htm#7

Hamblyn, Richard. The Cloud Book. David and Charles Publication Inc., Cincinnati: Ohio. 2008.

Tagore, Rabindranath. http://www.brainyquote.com/quotes/keywords/clouds.html (4/1/2010)

Original Picture: