Cloud Assignment II

Flow Visualization

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The purpose of cloud assignment 2 is to take pictures of phenomena related to clouds in the atmosphere. There are many different kinds of the cloud phenomena depending on the different atmosphere conditions on the Earth, especially in Colorado. The second assignment focuses on clouds that are not easy to find, because of the strange weather from beginning of the October until now. For example, there was not much snow and temperatures around the Boulder area were too high to induce clouds, making it difficult to capture a great image of the cloud phenomena for assignment 2. Fortunately, during fall break that I traveled to Colorado Springs. When I finished the trip and came back to Boulder via Denver by I-25, I took a few pictures of the clouds. This image was taken on Tuesday, November 20th at approximately 2:42 pm, facing north. I saw this nimbostratus cloud when I was driving on I-25. The weather report indicated that it would snow on Tuesday night; therefore I think this cloud came with

the snow storm. The snow storms usually come from north to south and look to be at very low altitudes above the ground and are very thick. It is a typical snow or rain storm, or so-called nimbostratus. This cloud looks like nimbostratus based on the cloud classifications. Nimbostratus clouds often form snow or rain storms in unstable atmospheres and are typically observed at low-levels below 8000 feet (2,400 meters) sometimes down to 350 ft (100 meters). The thickness of nimbostratus layer is usually 6500 - 10000 ft (2000 - 3000 meters), but can reach up to 15000 ft (4500 m) and down to 3500 ft (1000 m).

Image details

Location: Colorado Springs, Colorado Date: November 20/2007

Time: 14:25 pm Direction: north

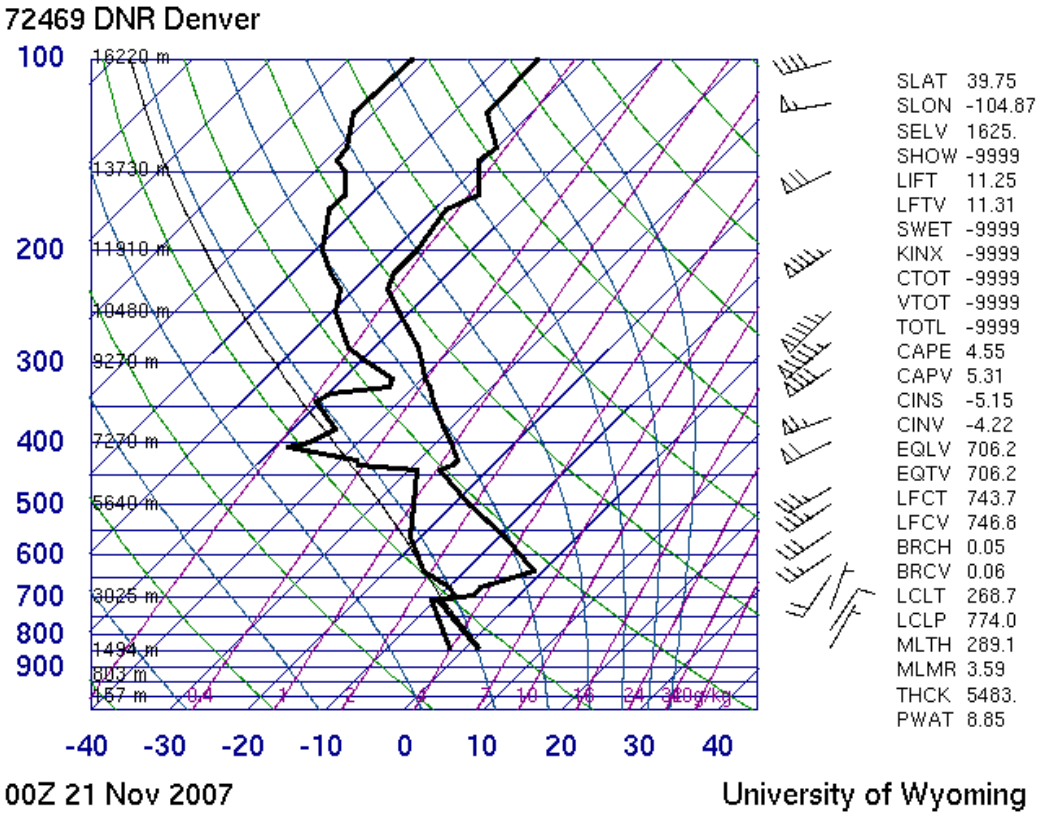
Temperature: Hi: 54F/12C, Lo: 26F/-3C Altitude: 5375'/1638.3 meters

Pixel Dimension: X: 3888; Y: 2592

Figure 2 is a Skew-T plot of the sounding data from November 21st downloaded from the website of the University of Wyoming. I captured the picture at 14:25 pm on

November 20th and the date of the Skew-T plot shows up at 00:00 on November 21st, which is 1900 Mountain Time, since the times in the Skew-T plot are based on **Coordinated Universal Time** (UTC). Therefore, the Skew-T plot for September 2nd is approximately around the time I took this picture. The horizontal line on the left side is pressure and height. The temperature line is blue and slopes up and to the right side. The curved blue line is the moist adiabat that slopes up and to the left. The green line is dry adiabat and slopes up and up to left side. The purple line is the saturation mixing ratio. There are two black lines. The right line is the environmental temperature profile. The left line is the dewpoint profile. The light black dashed line is air parcel temperature.

According to the figure 2, an air parcel lifted from the surface will first follow the dry adiabat. The temperature of the air parcel reaches the dewpoint temperature around approximately 3025 meters, which is the lifting condensation level (LCL). At this level, the moist air could be condensing to form clouds, so that the nimbostratus clouds start to develop around 1494 meters because the environment temperature profile line is close to dew adiabat line. I also saw clouds that might look like fog, because the clouds had a dark gray color and were moving around the ground level of Denver. The thickness of the cloud extends up to around 7270 meters, where the dew point temperature profile and environmental temperature profile become close again. This means that there may be two layers of clouds. The low one is in 3025 m and high one is 7270 m, increasing the possibility of local cloud formation. Between 3025 m and 7270 m, the environmental temperature profile shows that temperature had increased from 3025 m because condensation will release heat to environment.



My image of the cloud assignment 2 of the flow visualization illustrates the great picture of the nimbostratus on my camera. It's a bizarre phenomenon I had ever seen that before, especially from side view. After I took this picture two hours later, I drove through downtown Denver, in the middle of the nimbostratus cloud it seems like you are standing on the fog. Two hours later it was snowing in Denver. The nimbostratus clouds are very spectacular and look stunning especially during the upcoming snow storm. It was a really good chance to observe the movement of the nimbostratus clouds. After this semester, I think I will take a closer look at sky of the Colorado, finding some beautiful clouds, and hope to get a few perfect images of the clouds, accumulating more experience in observing the phenomena of the clouds above the Earth.

Camera information

Mark: Canon Model: Canon EOS DIGITAL REBEL XTI

Lens: Sigma 18-200mm with OS	Shutter speed: 1/800 sec
F-Stop: f/10.0	ISO: 800
Focal length: 18.0mm	Flash: No

References:

1 http://en.wikipedia.org/wiki/Cloud

2 http://en.wikipedia.org/wiki/Nimbostratus_cloud

3 http://weather.uwyo.edu/upperair/seasia.html

4 http://weather.unisys.com/upper_air/skew/skew_KDNR.html

5. http://www.atmos.uiuc.edu/weather/tree/viewer.pl?launch/irslp

6. http://ww2010.atmos.uiuc.edu/(Gh)/wx/surface.rxml