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Flow visualization

Clouds 1

Figure 1: Flagstaff Mountain Oct 5th 2015 2:30PM MST

This picture was taken on Flagstaff Mountain Oct 5th afternoon around 2:30pm. It was a super cloudy day in the morning with no sun at all. About noon the sun came out and started getting sunny. Because the weather changed dramatically, there are so many layers and types of clouds in this picture. During the camera testing process, some parts of the clouds already gone, and the types of clouds changed rapidly in the short period of time due to the sun and temperature raise.

There are few types of cloud in this photo, the clouds shown down the picture were stratocumulus, the one on the right corner and the left might be altocumulus, and there were some cirrostratus spread in the picture. The skew-T diagram from Denver was used for that day. As shown in Figure 2. The black line on the right is the environmental temperature and the one on the left is the dew point temperature. Horizontal line, curved green and curved blue are Isobars, dry-adiabatic and saturated lines.

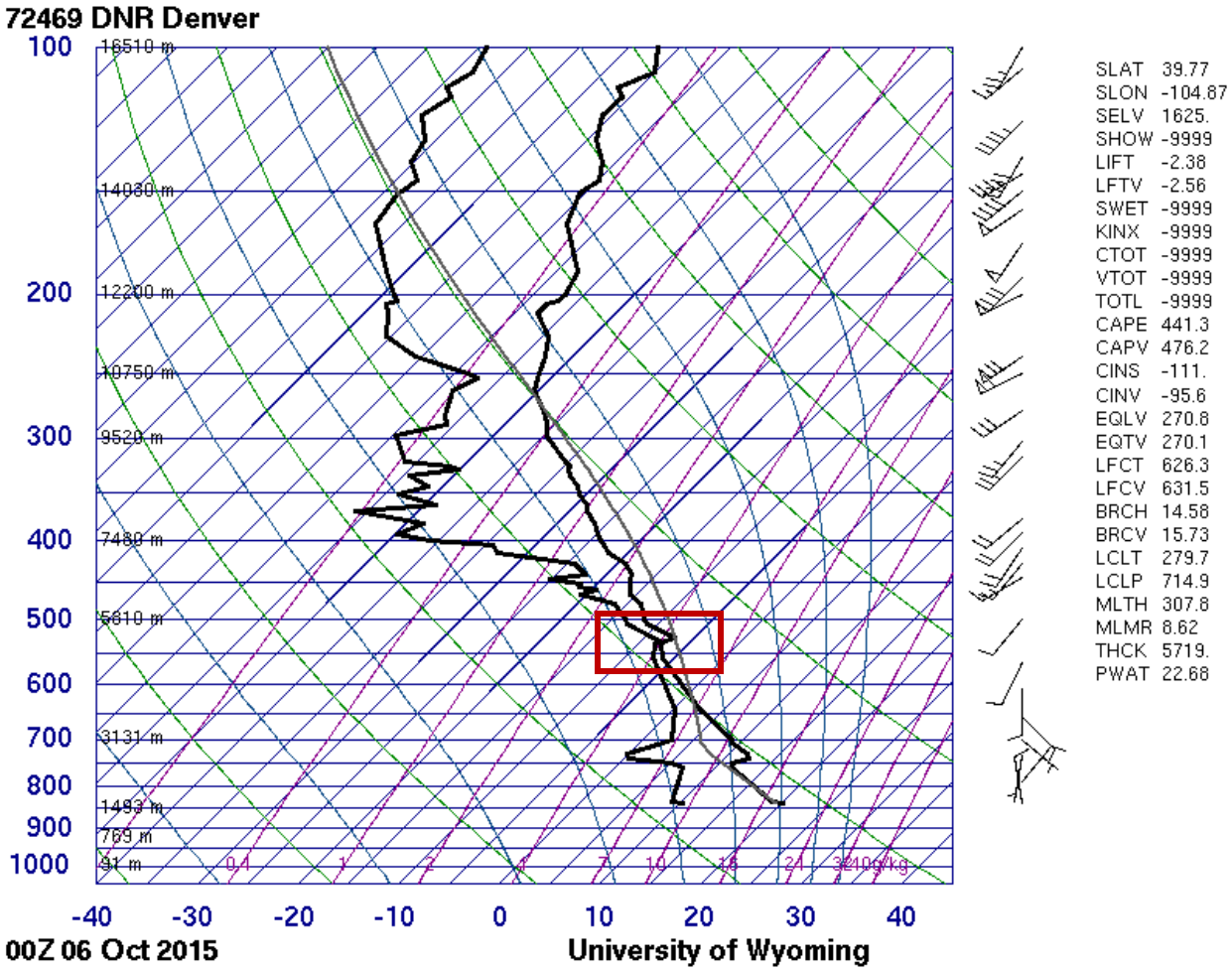

Figure 2: Skew-T diagram

There are a lot information can be obtained from the skew-T diagram, CAPE is not equal to 0 from this diagram, so the atmosphere is unstable. This can also be seen from the picture. Cloud layers are anticipated where the temperature and dew point are close. This means when the air is near saturation, a cloud may exist. From the diagram clouds are expected at the range of height ~4500m to ~5800m from the sea level and the cloud most likely would occur at ~5200m. The photo was shot on Flagstaff which has elevation of 7000ft (2100m) peak. The clouds shown in the picture would be around ~2500m, ~3500m, ~4000 m above the ground level. Boulder is about ~1600m above the sea level, so the cloud shown in the picture would be around~4100m, ~5100m, and ~5600m above sea level. As I mentioned above, there were stratocumulus, altocumulus, and some cirrostratus clouds in the picture. Those types of cloud appear about ~2000m, ~4000m, ~5000m above ground level, so in our case this type of cloud would be ~3600, ~5600m, and ~6600 above the sea level which matched our expectation from the skew-T diagram. So those information approves our observation of clouds type were right.

The photo was taken using Canon EOS REBEL T2i camera and the camera setting is shown in table 1. When the photo was taken, the sun was on the left side of the picture, so I

was slightly facing the sun. Somehow the picture didn't look good on the camera screen, so I have to increase the shutter speed to get a better picture. Because of facing the sun, so I got too much light and I have to set the ISO to minimum. I used Photoshop to do the editing and I only used curve to enhance the color to make the clouds more obvious.

Table1

Focal Length	40mm
Exposure	1/4000 sec; f/5.6; ISO 100
Image size	3456 x 2304
Resolution	72 Pixel per Inch

Figure 3: Original and Final cloud picture

Reference:

[1]. http://williams.best.vwh.net/weather/skewtlogp.pdf

[2]. http://www.atmos.washington.edu/~houze/301/Miscellaneous/Skew-T.pdf

[3]. http://www.atmos.millersville.edu/~lead/SkewT_HowTo.html