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Cloud Report

Objective

The objective of this project is to capture the cloud image and study the physics of cloud formation. Cloud physics give us insight into many interesting phenomena such as the stability of the weather and weather forecast. In order to fully classify the cloud, skew-T plot will be examined carefully.

Experimental Details

The image was taken on the 23rd of January, 2010 around 2:00pm. The maximum temperature for that day was 44 F with a minimum of 15 F. It was semi windy that day as well, National Weather Service recorded that the average wind speed was approximately 7.3 MPH with the highest being 17 MPH (1). The image was taken in the SkyLake Ranch neighborhood which is located in Thornton, Colorado. The camera was facing North at the time that the cloud image was taken.

Discussion

Originally, I thought that the cloud type is cirrus due to the hook formation toward the bottom of the picture. However, after carefully examining the picture and researching the literatures, my picture composes of many different types of cloud. The dew point line on the 6am skew-T plot on the 23rd of January shows two distinguished types of cloud: stratus and cirrus (2). Cirrus only can be formed at an elevation of 6,000 meters or above and stratus at 2,000 meters or above (3). The 6am skew-T plot is also compared with the 6pm skew-T plot to ensure that there is not a shift in weather that causes a different type of cloud to form. The 6pm skew-T also indicates that two types of cloud are existed in the picture.

To further determine the right cloud name, I have taken the skew-T plot information and the cloud shape based on the image and matched them with the Cloud Spotter's Guide. I believe that the cloud name for my image is called cirrostratus fibratus. The "cirro" part in the cloud name indicates that this cloud is composed of small thin ice crystals (4). In addition to this, my cloud is cirrostratus because it has milky veils of high cloud and it also covers large areas of the sky due to the stratus effect. Based on "A new satellite-based census of precipitating and nonprecipating clouds over the tropics and subtropics" article, cirrostratus is a precipitating clouds (P-PCs) meaning that the cloud has a high cloud top and moderate cloud optical thickness (5). Studies also have shown that contrails can also lead to the cirrostratus cloud formation and this happens more frequently in the Midwest region due to a higher density of jet air traffic (6). Furthermore, the "fibratus" word is part of the cloud name because the cloud image shows some fiber formations. Therefore, the final name for my cloud image is cirrostratus fibratus.

The skew-T plot does not only provide the type of cloud but also the weather stability. The weather is known to be stable if the slope of the air parcels line is less steep than the saturation adiabats line (7). Based on both the 6am and 6pm skew-T plot, the weather is stable throughout the day on the 23rd of January because air parcels are always less dense than their neighbors. Also, cirrostratus fibratus is a stable cloud, which means the weather should also be stable.

72469 DNR Denver
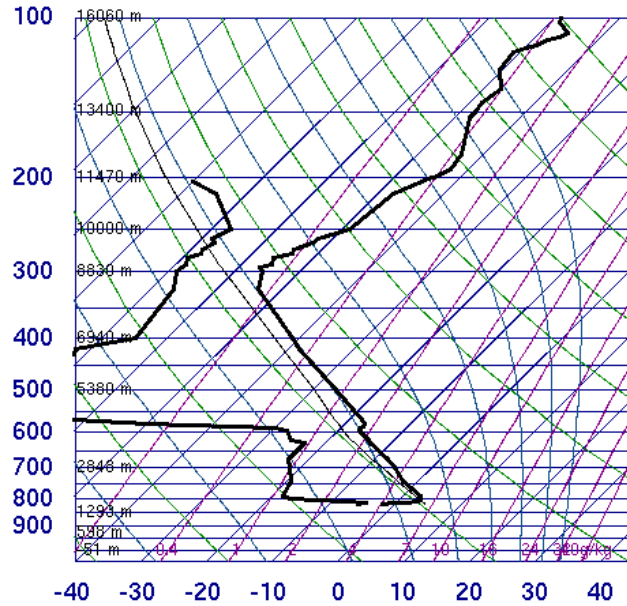
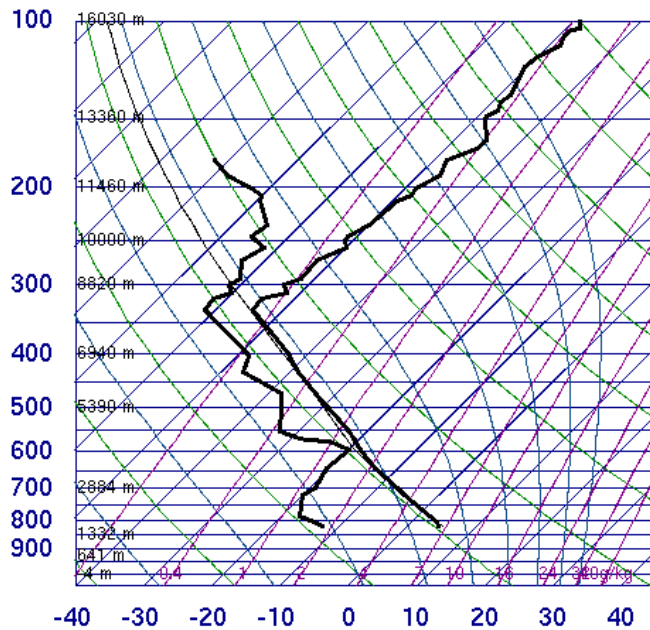|	
SLAT	39.75
SLON	-104.87
SELV	1625.
SHOW	-9999
LIFT	3.33
LFTV	3.24
SWET	-9999
KINX	-9999
CTOT	-9999
VTOT	-9999
TOTL	-9999
CAPE	0.00
CAPV	0.00
CINS	0.00
CINV	0.00
EQLV	-9999
EQTV	-9999
LFCT	-9999
LFCV	-9999
BRCH	0.00
BRCV	0.00
LCLT	254.7
LCLP	605.3
MLTH	294.0
MLMR	1.63
THCK	5431.
PWAT	2.59

12Z 23 Jan 2010   University of Wyoming

Prev   Next   Stop   Start   Slower   Faster   Delete

Figure 1: Skew-T plot at 6am on the 23rd of January

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SLAT	39.75
SLON	-104.87
SELV	1625.
SHOW	-9999
LIFT	0.57
LFTV	0.52
SWET	-9999
KINX	-9999
CTOT	-9999
VTOT	-9999
TOTL	-9999
CAPE	0.00
CAPV	0.00
CINS	0.00
CINV	0.00
EQLV	-9999
EQTV	-9999
LFCT	-9999
LFCV	-9999
BRCH	0.00
BRCV	0.00
LCLT	254.2
LCLP	598.4
MLTH	294.4
MLMR	1.46
THCK	5394.
PWAT	3.78

00Z 24 Jan 2010   University of Wyoming

Prev   Next   Stop   Start   Slower   Faster   Delete

Figure 2: Skew-T plot at 6pm on the 23rd of January

Visualization Technique

To take the picture, the camera is rotated around 25° facing the sky assuming that 0° is where the bottom of the camera is parallel to the ground (See figure 2). The picture is taken during the day to increase the contrast between the cloud and the sky.
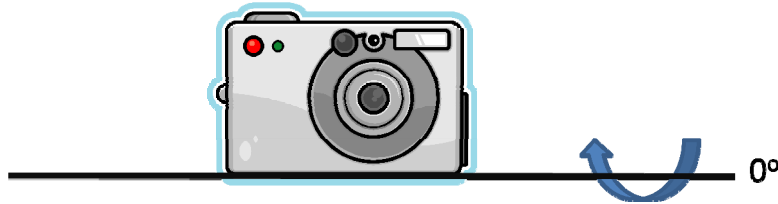

Figure 3: Camera Axis of Rotation

Photographic Technique

To capture the image, the Canon camera of PowerShot SD 1200 IS is used. The following table shows the camera data on the cloud image.

Table 1: Camera Data on the Cloud Image

Shutter Speed	1/320 sec
F-Stop	f/8
Aperture Value	f/8
Max Aperture Value	f/2.7
ISO Speed Ratings	80
Focal Length	6.2 mm
Flash	Did not fire

Conclusion

I think the picture turns out well because it shows two different types of cloud and has a great contrast. I also like the fact that I include part of the houses in the picture because this gives me and idea on how high the cloud. What I like best about this project is that I am now able to name the cloud tell whether there will be snowstorm tomorrow not based on the cloud shape. For further cloud project, I will research more about skew-T plot in order to completely understand the information that the skew-T plot is conveying.

Works Cited

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4. Cloud Atlas. *Clouds Online.* [Online] [Cited: February 28th, 2010.] http://www.clouds-online.com/cloud_atlas/cirrostratus/cirrostratus.htm.

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7. Introduction to the SkewT Diagram. *Jet Propulsion Laboratory.* [Online] California Institute of Technology. [Cited: February 28th, 2010.] http://airsnrt.jpl.nasa.gov/SkewT_info.html.