

Clouds 2 – Altopumulus Lenticularis



By: Andrew Fish
MCEN 5151
Professor Hertzberg
4/17/2012

Purpose

The purpose of this image is the second cloud project for MCEN 5151: Flow Visualization, taught by Professor Hertzberg at the University of Colorado at Boulder in Spring 2012. The image is meant to adequately show and demonstrate a cloud that can be physically explained in the accompanying report. The image shows an altocumulus lenticularis cloud.

Circumstances of the Image

This image was taken at Exit 163 on Interstate 25 north of Colorado Springs, Colorado. The camera was facing directly west, approximately horizontally. The image was captured on March 3, 2012, at 5:00pm.

Cloud Analysis

The cloud that is at the center of the image is an altocumulus lenticularis, or a mountain wave cloud. As stable, moist air travels east over the Rocky Mountains, it forms a standing wave on the downwind side of the mountains as they stop. If the temperature at this location is close to the dew point, the moisture condenses, and a cloud forms in the shape of a standing wave. The stable, slow moving nature of the air movement causes the smooth, laminar shape of the cloud¹.

The weather on March 3, 2012 was chilly, around 32°F, with cloud cover from 4am to 1pm but no precipitation since the day before. There were no fronts approaching and the atmosphere was stable that day. Winds were very slow for most of the day, around 10mph, but peaking with a 25mph gust at 3pm. The CAPE number on the skew-T diagram of the atmosphere, Figure 1, confirms that there was a stable atmosphere at the time in question.

72469 DNR Denver

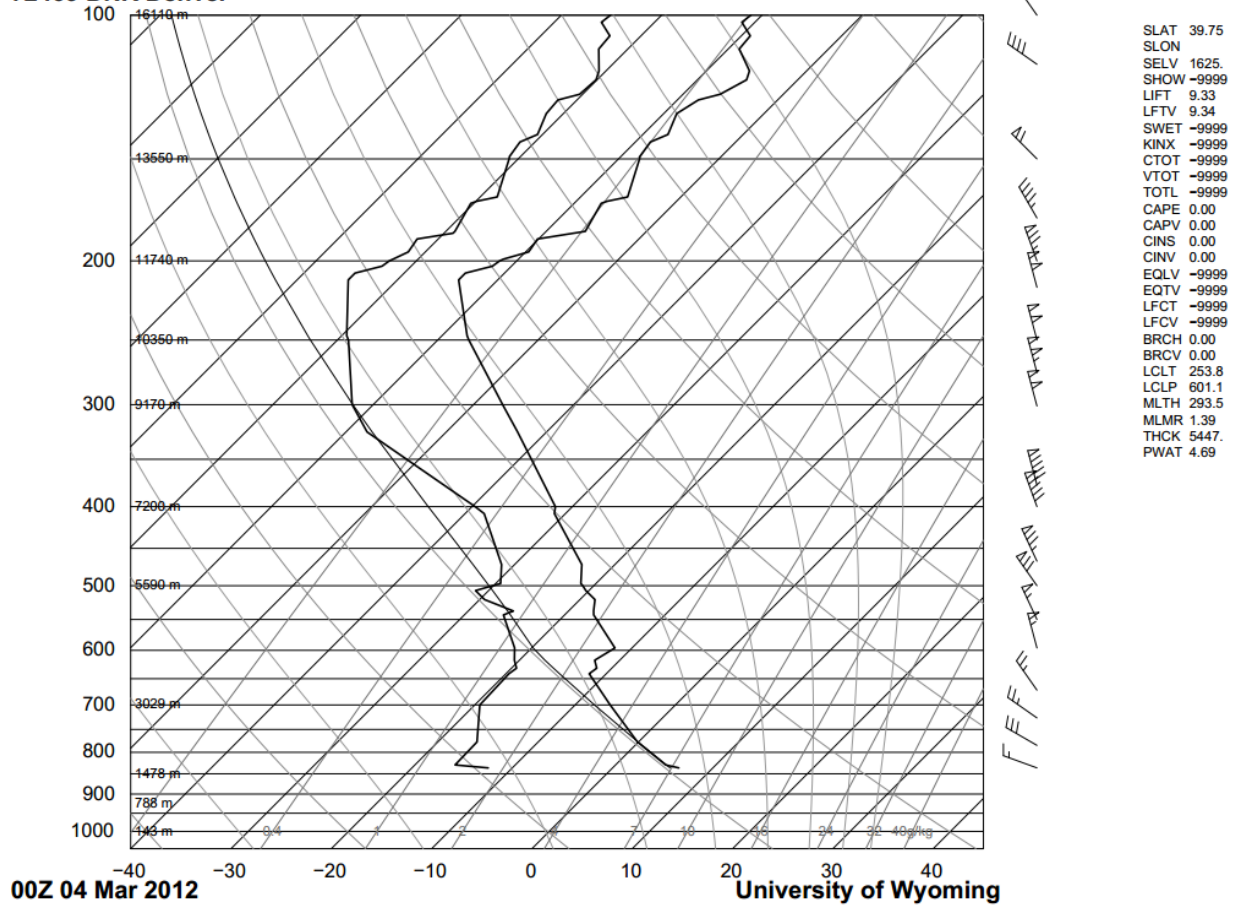


Figure 1: Skew-T Diagram for March 3 Afternoon²

The diagram shows that cloud heights were anywhere between 1,480m to 16,110m, which agrees with my observation. I know that the peaks in the picture are at an elevation of about 3,600m, so the mountain wave cloud was most likely at an elevation of approximately 4,000m, which is well within the window provided by the Skew-T diagram. The stability and the general weather of the day indicate that most of the clouds that day would be stratus, of varying heights. This is consistent with the image, because the altocumulus lenticularis cloud is labeled as a cumulus; it is actually a stable cloud.

Photographic Technique

The field of view in the image is approximately 50 miles, with the cloud being about 10 miles from the camera lens. The camera lens focal length is 4mm with an F-Stop of f/2.6. The camera is the rear-facing digital camera on the Samsung SGH I777 Smartphone, which produced four 3264x2448 pictures stitched together to make a 9289x1998 final image. The exposure settings were as follows: shutter speed of 1/714sec and ISO-32. The only post processing that was done was to stitch together the four original images and crop the final image.

Conclusion

In the pursuit of capturing an altocumulus lenticularis cloud, I believe that I did a very good job. I really like how clear and simple the final image ended up, as well as how well resolved it is. The core concept of the image is shown very well, as is the cloud itself. The intent of the image was fulfilled, and in the future I would like to possibly catch a similar cloud at different times of the day.

Original Images









References

1. "Lenticular Cloud." *Wikipedia*. Wikimedia Foundation, 17 Apr. 2012. Web. 17 Apr. 2012. <http://en.wikipedia.org/wiki/Lenticular_cloud>.
2. "Atmospheric Soundings." *Wyoming Weather Web*. University of Wyoming College of Engineering. Web. 17 Apr. 2012. <<http://weather.uwyo.edu/upperair/sounding.html>>.