

UNIVERSITY OF COLORADO AT BOULDER

Alto cumulus Lenticularis Above Boulder: Cloudspotting

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Background/Purpose

The purpose of this image was to capture and analyze a cloud formation that was interesting. Clouds are visible masses of condensed water (or ice crystals) that are in the saturated atmosphere [3]. Whether a particular cloud forms close to the ground, in the troposphere, or higher up in the stratosphere or even the mesosphere is dependent on the moisture content of the air and the atmospheric conditions that surround the cloud. Stability, moisture, wind speed, temperature, pressure and other factors all contribute to the appearance of the cloud and define it such that it can be classified. The Cloud Appreciation Society, a group that keeps an active record of what defines and classifies cloud types, has good information on all sorts of cloud species and examples [2]. In my particular image, I was trying to capture the beauty of a sunset's colors as well as the uniqueness of the altocumulus lenticularis that can be seen in the center and lower-right portion of the image. The original image looked as follows:



Figure 1 – Original Photograph



Figure 2 – Location [Google Maps]

Image Circumstances and Geography

This image was taken at 5:56 P.M. on the 15th of March, 2011, just off of Highway 36 coming into Boulder (Figure 2) in the Regent Drive Autopark. The photograph was taken facing west, at an angle of approximately 30 degrees to the horizontal. I liked keeping the mountains in my final image for aesthetic reasons, but the clouds are definitely the focus of the overall composition. The clouds depicted, as mentioned before, are altocumulus lenticularis due to their condensation just above the mountains. The sounding data below shows the condensation point for the clouds.

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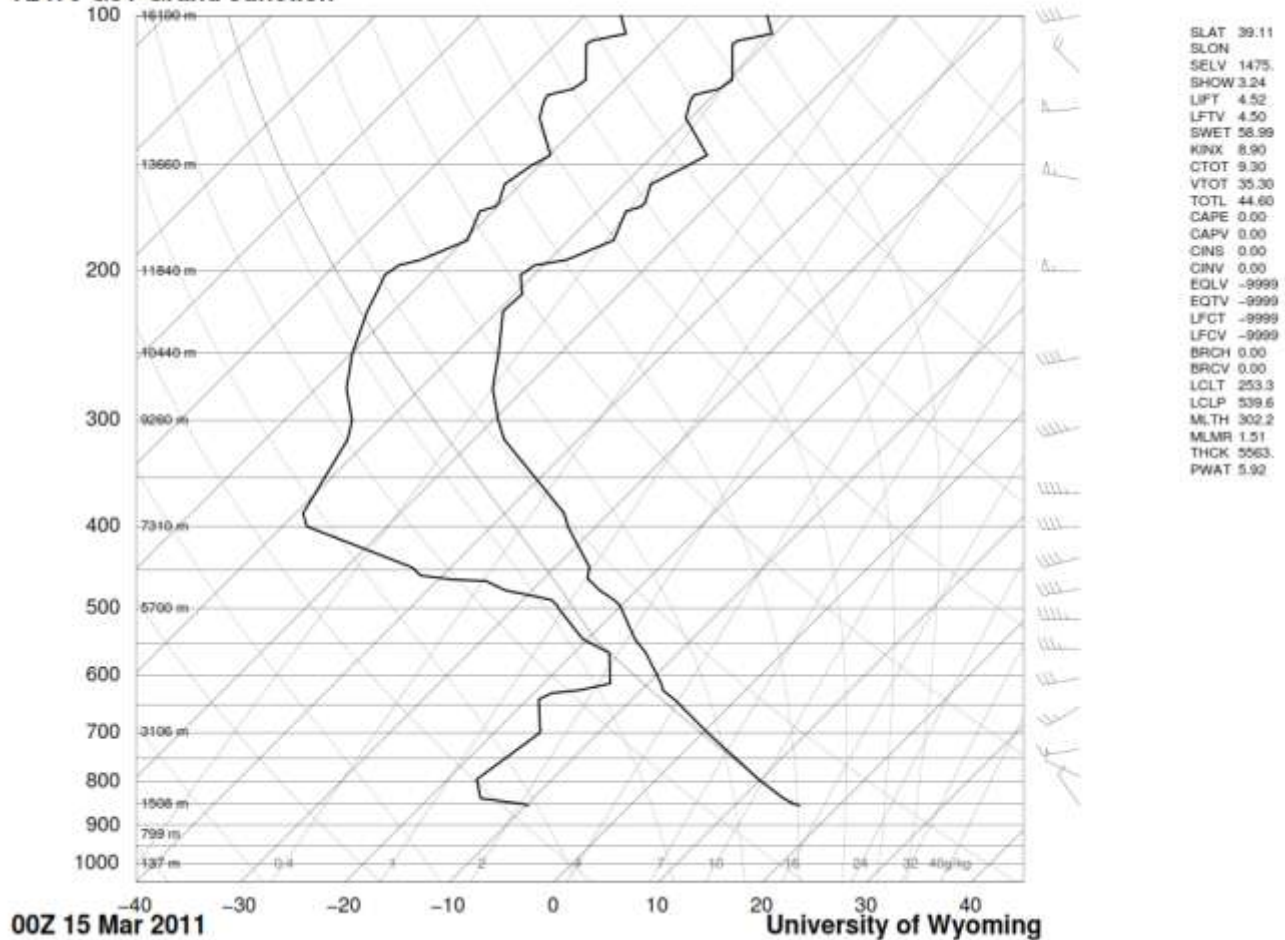


Figure 3 - Skew-T plot [1]

The photograph that I took happened about the same time as the above data was acquired in a different location, but it should give some general indications about what was going on in the atmosphere due to its nearby location and the progression of the weather. Figure 3 shows a saturation point (where the two lines are close to touching and condensation occurs) of approximately 5000m. This is consistent with the “alto” part of the altocumulus classification [2]. These altocumulus clouds came about due to stable convective forces in moist air, which are reflected by the sounding data by the low CAPE (however, a possible hydrolapse appears at the boundary between the near saturated lower troposphere and dry mid-levels).

Camera Configuration

Camera Model	Canon Powershot A480
Lens	6.6 - 21.6 mm
F-Stop	f/3.2
Exposure	1/500 sec
ISO Setting	ISO-80
Exposure Bias	0 step
Focal Length	8 mm (35 mm equivalent = 120 mm)
Aperture (Max)	3.35
Subject Distance	Roughly 8000 m

Digital photography was the technique used to capture the image. The actual settings are displayed above, and the approximate field of view would be:

$$FOV = \frac{\text{Camera Sensor Dimensions} * \text{Object Distance}}{\text{Focal Length}} = \frac{[\text{Approx. } 5\text{mm} \times 4\text{mm}] * 8000\text{m}}{8\text{mm}}$$
$$= 5000 \text{ m} \times 4000 \text{ m}$$

No flash was used, as it would be useless for this application, and the natural, outdoor lighting was used. The only image adjustments were cropping the image down from 3648 x 2736 px to 3648 x 1912 px, and raising the contrast levels a little bit (using The GNU Image Manipulation Program) to add saturation and deeper color. The final result was Figure 4.



Figure 4 - Final Image

Conclusion

Overall, I am pleased with how the final image came out. The clouds are soft and serene, and display the soft, rounded characteristics that their genus and species identify for them. Additionally, the sounding data might not match perfectly with the observations due to the difference in location, but it is not very far off. Something that I might have changed was the perspective; since some of the clouds are cut off by the limited field of view of the camera, it would have been nice to do a panoramic image, perhaps. Also, as mentioned before, I think that completely blacking-out the mountains (creating a silhouette as opposed to leaving some detail like I did) would have been a nice aesthetic addition. If I could re-do the photograph, I may have used a camera with manual focus, and more carefully have picked the exposure and shutter speed. I think that the texture of the clouds could have been captured more accurately and artfully if I had done that.

Sources Cited

[1] "Atmospheric Soundings." *Wyoming Weather Web*. University of Wyoming. Web. 15 Mar. 2011.

<<http://weather.uwyo.edu/upperair/sounding.html>>.

[2] "Glossary of Meteorology." *AMS Glossary*. Web. 02 Apr. 2011.

<<http://amsglossary.allenpress.com/glossary/>>.

[3] "SKEW-T BASICS." *WEATHER PREDICTION EDUCATION*. Web. 02 Apr. 2011.

<<http://www.theweatherprediction.com/thermo/skewt/>>.