Cloud Image Assessment

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The objective of this project was to create an image of an interesting cloud and describe its physical significance. There are so many species of clouds visible from the foothills of the Rocky Mountains, which allowed me to view a variety of options. My original intent was to capture a representative image of a fluffy, white cumulus humilis with a clear blue background. However, cumulus clouds begin to separate as they flow over a mountain range. Because most of the cumulus clouds in Boulder seem to be broken up to some extent, I decided to photograph a cumulus cloud undergoing dissipation. Therefore, the cumulus cloud image I produced shows properties of a cumulus fractus or a "mountain-wave" cloud.

This image was taken in Boulder, CO on February 16, 2010 at 4:21 PM. As I stood at the corner of 28th Street and Glenwood Drive, I directed my camera into the northwestern sky at an angle of approximately 70 degrees to the horizontal. The atmosphere seemed quite stable on this bright, sunny day, which will be confirmed via a skew T plot for the 6 PM sounding for February 16 (00Z, Feb. 17).

As mentioned previously, the clouds in the image I produced are of the species cumulus fractus. The dissipative nature of a general cumulus cloud is what distinguishes the cumulus humilis from the cumulus fractus. As can be seen in the photograph, a cumulus fractus cloud is wispy and separated. The image clearly shows sections of the cloud that have been physically forced apart by the mountains. The rest of the sky was filled with small cumulus clouds, which is quite common for bright, sunny days. There was no precipitation in Boulder within 24 hours of when

this picture was taken. No significant weather fronts or wind velocities were noted on these dates either. To more accurately analyze the stability of the atmosphere at the time of the photograph, refer to the skew T plots in the Appendix. The plot with a timestamp of 12Z February 16, 2010 corresponds to 6 AM on February 16, and the plot with a timestamp of 00Z corresponds to 6 PM on February 16. The CAPE values for both of these plots were zero, which strongly indicates that the clouds in the image were suspended in a stable atmosphere. The skew T plot can also reveal information about the height of cloud formation. The parcel lines become parallel at larger heights, which indicates extremely low cloud formation in this region. It is quite evident that cloud formation occurred from about 1,000 to 5,000 meters above the surface. The photographed cloud was approximately one mile from the earth's surface, which is typical for a cumulus fractus. In conclusion, the qualitative analysis of the cloud properties is in strong agreement with the information given from the skew T plots.

The photographic techniques used were based primarily on the distance of the cloud from the camera, as well as the intensity of light outside. Because the cumulus cloud in the image is about one mile away from the camera, the field of view is extremely large (~1 km). The height and width of the final image was 4000x3000 pixels. In order to capture the desired image, I used a Canon SD780IS digital camera and set the following exposure specifications: ISO setting – 80, aperture – F5.8, and shutter speed – 1/1250. Low sensitivity and a high shutter speed allowed me to capture a focused picture on this bright day. The photograph was cropped to really focus on the clouds themselves and not on other distracting

elements. Using iPhoto, I was able to enhance the shadowing on the front of the clouds. Also, I increased the definition and contrast of picture, which helped show the fluffy, bumpy nature of the cumulus clouds.

The image reveals the powerful dissipative effects mountains have on cumulus clouds. I like the complex structure of the semi-dissipated cumulus cloud, as well as the contrast with the bright blue background. However, I would have liked to capture an image of a cumulus humilis with less mountain wave effects. Overall, I feel that I created a beautiful, physically explainable photograph. In the future it may be interesting to follow a cumulus fractus and create time lapsed images to determine how long it takes to dissipate.

Appendix: Skew T Plots