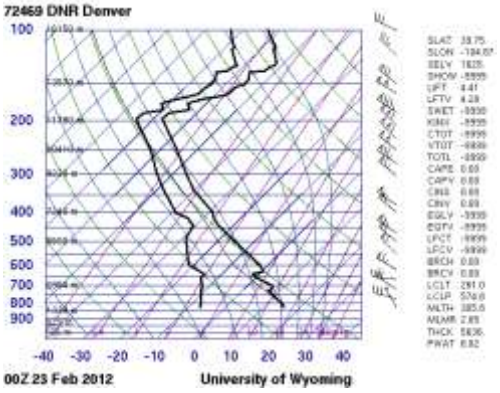
Sreyas Krishnan
Cloud Image Report #1
3/6/2012

The image that I chose to use for this first cloud assignment was taken on February 22, 2012, which was an exceptionally windy day in Boulder. On my way home that day, I noticed that in the sky, there were three distinct, and separate, layers of clouds. There were two enormous clouds in the sky straddling a wavy and jagged cloud. Given the extreme wind gusts blowing that day, I thought that this jagged cloud was a great representation of the conditions, and looked visually interesting.

The photo was taken at 5:23 PM on that day, and because of the time of year as well as the presence of other clouds, it was fairly dark at this point. In terms of location, it was taken from the intersection of Folsom Street and Arapahoe Road in Boulder. Also, the camera was pointed almost directly upwards while facing north.

It was somewhat difficult to distinguish what type of cloud this was because of its significantly different appearance to the clouds straddling it. My best guess would be that this cloud was simply a wind-sheared extension of those surrounding clouds, which I believe were "altocumulus lenticularis." Even before analyzing data, I believed this for a number of intuitive reasons. The on-campus weather summary stated that there were wind speeds exceeding 60 miles per hour during that part of the day, and this seems like more than enough wind speed to modify a cloud's geometry (especially a stationary cloud like the altocumulus lenticularis). Another major hint was the fact that these clouds had been forming very consistently throughout the week in Boulder. So, in order to confirm this guess, I analyzed the skew-t diagram for 0Z of February 23rd (6 PM on the 22nd), pictured below.



The CAPE was registered at 0.00, which means that the atmosphere was stable at the time. Altocumulus lenticularis tends to form under stable atmospheric conditions near mountains. This cloud type is created by 'orographic lift,' which is a phenomenon in which a cloud is forced to move or behave differently because of a rapid change in elevation. This change in elevation creates a standing wave in which the cloud becomes trapped.

Interestingly, the chart shows that clouds may have been forming around 10,000 meters above sea level. This suggests more of a cirrus formation in terms of altitude. This is also supported by the impending snow storm that would hit later that night. However, none of the significant clouds in the foreground were wispy enough, or appeared high enough, to be cirrus clouds; though the raw photos showed that there were cirrus clouds far in the background. After reevaluating the skew-t, cloud formation also appeared possible at around 6000 meters above level, which is more consistent with the altocumulus and is a more reasonable number for the cloud captured in the image. Moreover, this is consistent with the classification of the straddling clouds. However, beyond this analysis, the exact classification of the cloud in question is still difficult to pin down. As previously stated, the most reasonable guess is that this cloud was a wind-sheared portion of the altocumulus lenticularis clouds around it. If it were possible, another picture of this formation from several miles east and several miles south may have shed more insight into this classification. This may have revealed more wind-shearing effects, like the Kelvin-Helmholtz instability for example, and confirmed my guess.

A Canon PowerShot SX130 IS was used to take the picture. The exposure settings used were 1/1600s exposure time, f/8 and ISO-1600. This quick shutter speed was chosen because of the extreme winds – at lower shutter speed, the resulting image was very blurry. The high ISO was chosen because of the dim twilight lighting during that time. A short focal length of 5mm was chosen since the object being focused on was so far away. While many cloud images show panoramas with large fields of view, I chose to limit the field of view to a very small arc in the sky to focus on the cloud, and used cropping in GIMP to further narrow it. Additionally, I rotated the final image 180 degrees in order to make it look even more than a rocket's fuel exhaust. Other final touches included increasing the contrast, and changing the blue curve slightly to bring it out more. The final resolution was 1727 x 2910 pixels.

Overall, I like this image because it focuses on a single, and unique, cloud. I think it would have looked great as a panorama as well, but I would have wanted this to be the focus of the image anyways. As I previously mentioned, it would have been excellent to capture a photo of that cloud from a completely different angle. It would have helped me gain a better perception of how exactly the wind affected its formation. Nevertheless, I'm definitely satisfied with the final product.

Works Cited

CU-Boulder Weather Archive. (2012, 2 23). Retrieved 3 6, 2012, from http://foehn.colorado.edu/weather/atoc1/PAOSweather20120223.html

University of Wyoming Department of Atmospheric Science. (2012, 2 22). Retrieved 3 6, 2012, from http://weather.uwyo.edu/cgi-bin/sounding?region=naconf&TYPE=GIF%3ASKEWT&YEAR=2012&MONTH=02&FROM=2300&TO=2300&STNM=72469