

Clouds I



Cory Fuhrmeister

Flow Visualization, Clouds I

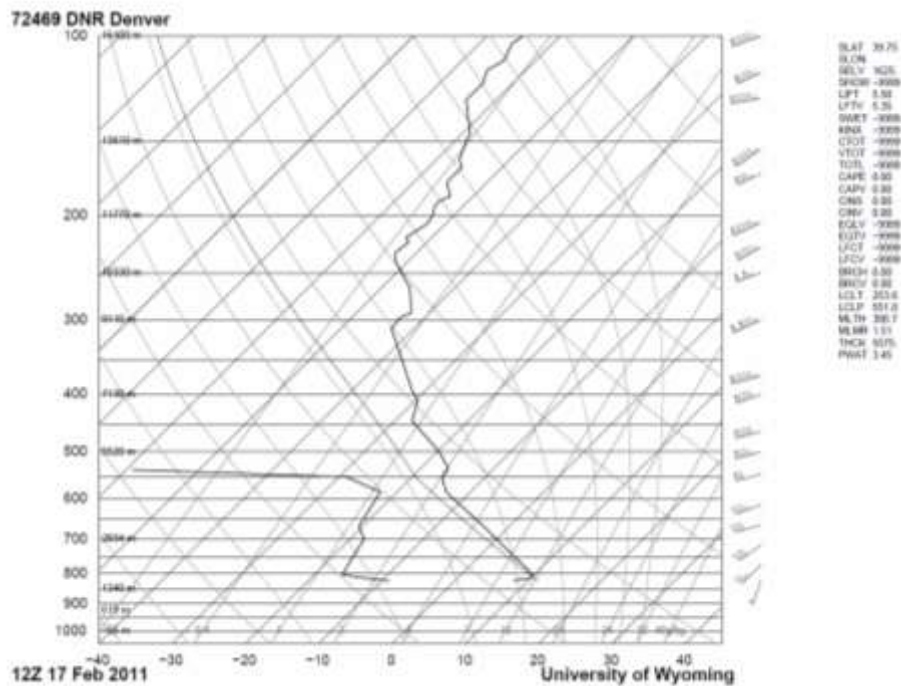
University of Colorado - Boulder

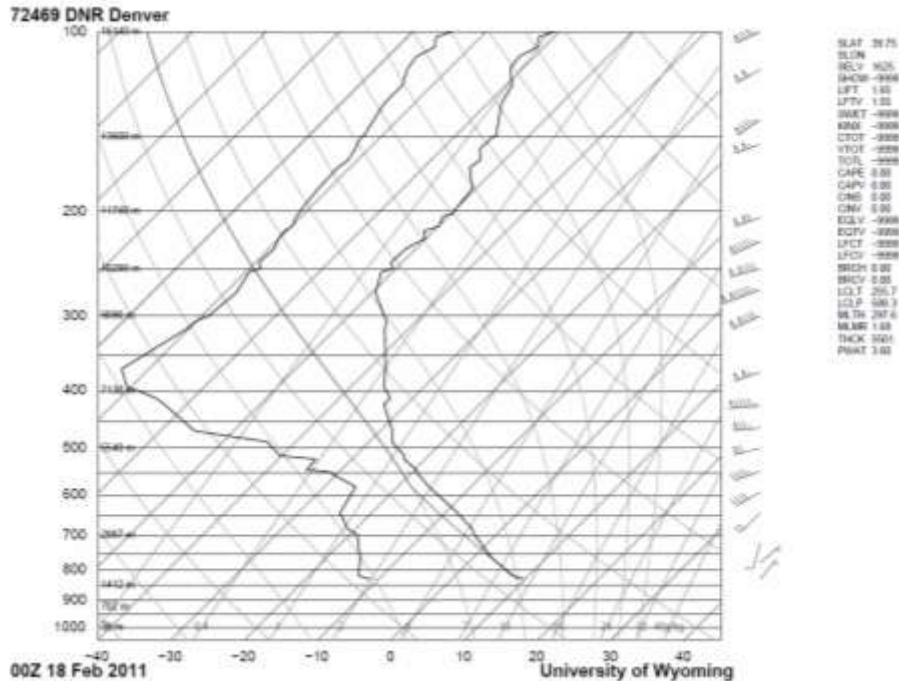
February, 2011

The goal of this image was to capture an aesthetically pleasing photograph of clouds and provide an explanation of the cloud and its origin. This image was submitted as part of a fluid visualization course at the University of Colorado at Boulder.

This photograph was taken just off of Four Mile Canyon Rd. in Boulder, CO at 1:55 PM on February 17th, 2011. I was facing South-East and my camera was tilted up at an angle between 1 and 5 degrees above the horizontal.

The clouds shown in the image are most likely Altocumulus-Lenticularis clouds. They are orographic which means that they are caused by air that is forced upwards over the mountains. The following skew-t plots show the atmospheric sounding data for the Denver, CO area at 6 AM & 6 PM, respectively, on 2/17/2011.





The atmosphere is stable as you can see in the skew-T plot since the local temperature line is steeper than the adiabatic lines at certain points. Since the local temperature and dew point lines do not intersect on either of the plots this suggests that there were no clouds in the sky. This discrepancy probably comes from the fact that these clouds were seen approximately 30 miles West of Denver, the location that the weather balloon was launched from. These lines are closest right around an altitude of 3.2 mi. I estimate that the clouds I saw were somewhat lower than this at an altitude of 2.5 mi. This puts the clouds in the lower half of the troposphere.

The rest of sky had similar Altocumulus clouds to the East and West. These clouds were not massed together quite as well as those shown in the photograph and therefore, were not the focus of this image. Above and behind the camera, the sky was very clear, especially to the North-West. Winds were light between 5 – 10 mph. A cold front moved in within 24 hours after this photo was taken. The daily low temperature dropped the night of February 17th by about 15-20 degrees compared to the first half of the week. This nightly low temperature continued for the next few days with light snow falling late on the night of the 18th. Daily high temperatures ranged from the mid-60s earlier in the week to low 50s later in the week, including the day this image was taken.

This photo was taken in sunlight from an overcast sky. The following photographic settings were used on a Canon EOS Digital Rebel XS (Lens EF-S 18-55 mm 1:3.5-5.6 IS):

- No flash
- Landscape Mode
- Distance from lens to object: 3 – 5 mi.
- Focal length: 34 mm
- Original image dimensions: 3888 X 2592 pixels
- Cropped image dimensions: 3888 X 1568 pixels
- Exposure: 1/160 sec.
- F-stop: f/11
- Max Aperture: 4.375
- ISO: 100
- White balance: Auto

The image was edited using Adobe Photoshop. The image was cropped, brightness was decreased to -67 and contrast was increased to +51.

The image displays a great view of soft, Altocumulus clouds that are commonly found above the Flatirons in Boulder. I was very pleased with the way this image turned out especially after tweaking the brightness and contrast. I wish I could have increased my depth of field slightly more to bring the trees in the foreground into better focus. Also, with more practice in Photoshop I could probably enhance the green colors seen in trees to make a more pleasing image. The original un-edited photo is included below.



References

University of Wyoming, Department of Atmospheric Science: Atmospheric Soundings

<http://weather.uwyo.edu/cgi-bin/sounding?region=naconf&TYPE=PDF%3ASKEWT&YEAR=2011&MONTH=02&FROM=1712&TO=1800&STNM=72469>

Weather Underground, history for Broomfield, CO

http://www.wunderground.com/history/airport/KBJC/2011/2/17/MonthlyHistory.html?req_city=NA&req_state=NA&req_statename=NA