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Clouds 2

Flow Visualization

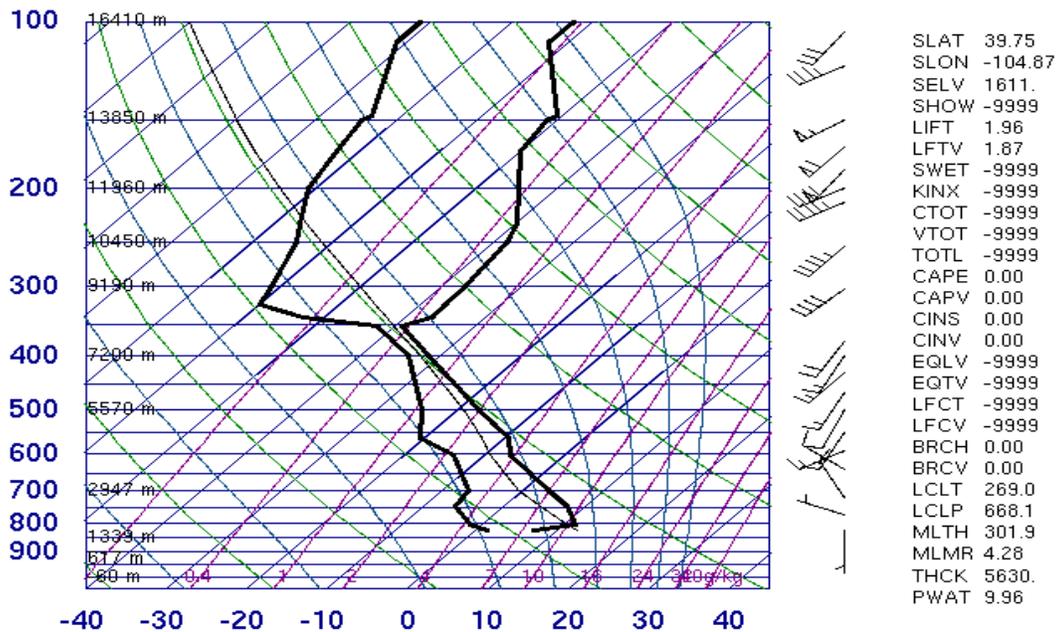
Professor Jean Hertzberg

## Clouds 2

For the second assignment, I wanted to capture an image that was significantly different than my image for Clouds 1. In the first assignment, the clouds shown were cumulonimbus clouds at sunset—there was a lot of movement, very strong and warm colors, and a very chaotic and rough impression. So, I wanted to take a picture for this assignment of clouds exhibiting more tranquil movement, with cooler colors and entirely different cloud types. So, I focused most of my efforts on capturing interesting cirrus and stratus cloud textures and patterns, and the end result was this image, of stratus clouds at sunset framing the moon. There is a lot of movement, but it is very languid and peaceful, and the colors strike a good balance between the predominant darker, cooler colors, and the bright highlights cast by the sun. I also think that the cloud phenomenon is very interesting; the wind patterns in Boulder always create very interesting textures and I believe I captured a good example of that here.

The clouds visible in this image are of the type Stratus Fractus<sup>1</sup>. They can be identified as such by the fact that they are generally gray, with a clearly visible outline when highlighted by the sun, as well as their apparent medium density (in comparison to thick cumulus or wispy cirrus) and height. Because of their ragged appearance, and the correlation with wind speed from the Skew-T plot, they can also be identified as being of the Fractus species.

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The Skew-T plot clearly shows a stable atmosphere, but one with extremely high wind speeds at the 7200 m elevation. This is likely due to an orographic effect—a storm front was moving in down from the mountains, and due to the shear stress in the atmosphere, there was a large amount of high-speed wind to rip up these medium-density clouds. Because of their composition, they exhibited the ragged edges, rather than spreading and becoming distending as cumulus clouds would have. Stratus clouds are usually present in the low etage, (up to an elevation of roughly 6500 ft), which supports the identification. The clouds present that afternoon all appeared to be of the same variety and the same height in this particular corner of the sky, and they were all identifiable by their extremely ragged texture. This suggests that the only elevation for cloud formation would be where there was extremely high wind speed—which the Skew-T shows as being at the appropriate elevation for Stratus clouds. Judging by the Skew-T plot, we can also guess that the clouds extended upwards from about 5750 m to 8000 m, a total cloud height of about 2250 m. With knowledge of the height of the clouds, the field of view and distance to the clouds can be calculated. Since my camera has a focal length of 80 mm, and my image encompasses the entire stratum of clouds from bottom to top (but no more), the distance from my camera to the clouds can be estimated at 8 km, with a field of view of 2250 m on the vertical by 1500 m on the horizontal.

I shot this image with a Nikon D50, with an f-stop of 5.6, shutter speed of 1/200<sup>th</sup> of a second, ISO setting of 200, focal length of 80 mm (Nikkor 28-80 mm standard lens), and a pixel space of 2000 x 3008 pixels. I applied a 'curves' adjustment in Photoshop to darken the black tones and highlight the light tones, and I increased the contrast to accentuate the edges of the cloud.

Overall, I am proud of and satisfied with my image. Rather than just letting an interesting cloud formation be my subject, I sought out to capture a specific type (or feel) of cloud formation, and I achieved what I wanted to. The cloud physics are very clear in this picture, and they display a very interesting phenomenon inherent to Colorado—wind shearing due to the mountains. I also like this image from an artistic perspective, I feel that the clouds frame the moon and that there is an interesting interplay between the dark upper sky and brighter sky down where the sun is setting. There is also a sunset, and the colors playing on the clouds contrast nicely with the blue sky and gray cloud.

## References

1. "International Cloud Atlas." World Meteorological Organization, 1969.