

## Standing Wave Cloud- Altocumulus Lenticularis Travis Bildahl



The image I presented was a time lapse of an altocumulus standing lenticularis cloud. I used time lapse in order to capture the movement of the cloud over a long period of time. That way you can see not only the shape of the cloud but also how it forms and disappears all at the same time. It allows you to see the formation of the cloud as well as the other side of the cloud going away.

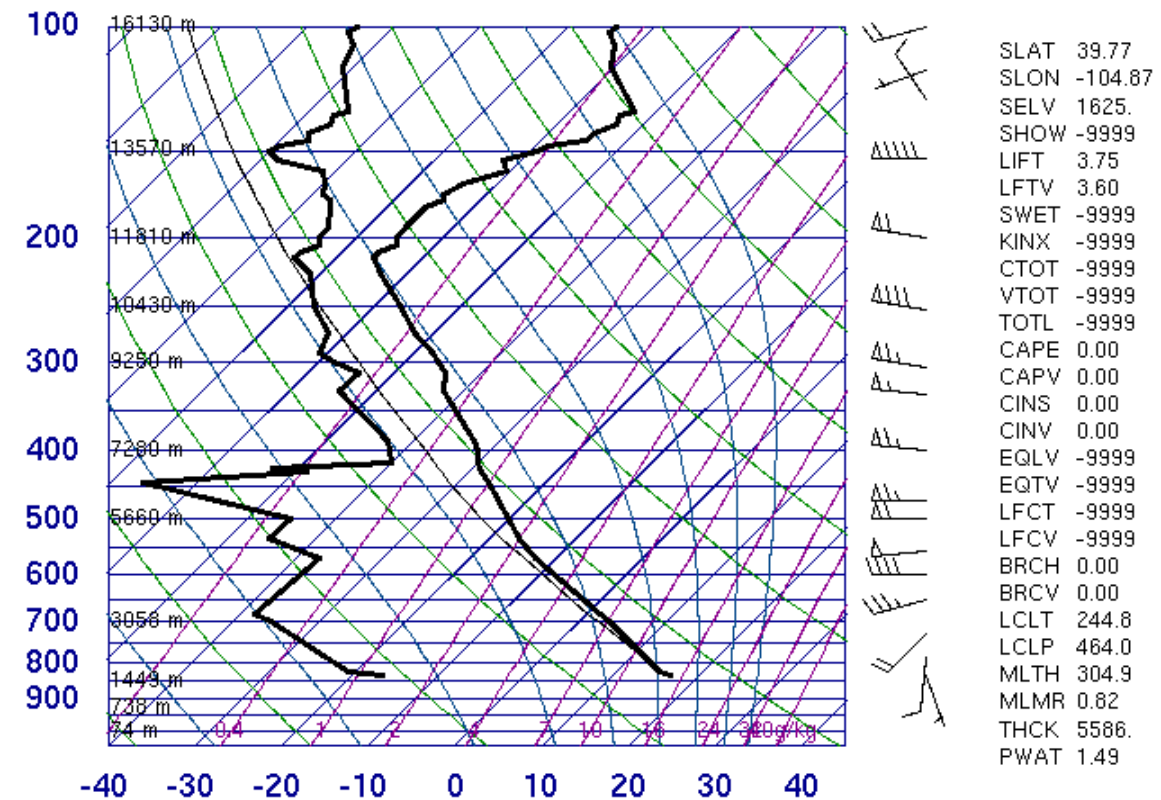
I shot this picture from the roof of the UMC building on the university of Colorado Boulder's Campus. The camera was pointing towards the southwest and was angled towards the sky. The elevation is 5430 feet since this is the elevation of Boulder, Colorado plus the height of the building would probably be around 5440 feet. This shot was taken at 2:00 PM on February 18<sup>th</sup> 2014.

The day I took the picture was right after a warm front had rolled in. It was a warm day that came a couple days before a cold front rolled back through. The clouds this day look somewhat similar to the clouds the day before and the day I took the picture there was very high winds in Boulder.

The cloud I photographed was an altocumulus standing lenticularis cloud, which is associated with mountain wave turbulence. These are formed when a stable cloud

comes across a barrier such as coming over the flatirons in Boulder and the air flowing upward from the other side blows through these clouds created a wave like cloud. The clouds stay stationary right over the mountains and that is where they get their name. The clouds have a lot of moisture and are formed as the air-cooled coming over the peak of the mountain. Once over the peak the air warms as it descends back down towards the plains. This is why there was so much wind this day while I took the pictures for the time-lapse. The atmosphere was stable this day shown by the cloud type and cape level of 0. When the cloud is stable it means that warm air is not pushing up through the cloud. This cloud comes over the mountain cool and then warms as it descends. It is not a cloud that is formed from warm air pushing up through it. Warm air coming up from the eddy created from the cloud coming over the mountain pushes into the standing wave cloud and creates the waves you see. The skew t shows a spike at around 19, 600 feet which would make me expect there to be clouds at that height in the sky which is height that is possible for an altocumulus cloud to be at. The weather was warm this day and allowed the cloud to be stable as it came over the mountain. It created high winds as it came down the descending side of the mountain warming up as it went down.

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I used a Canon EOS 7D DSLR camera and time lapse remote to create the time lapse. I set the camera on a tripod facing towards the cloud in the southwest and set the timer to take a picture every 2 seconds. The tripod keeps the image steady so that there is no shake in the final product, which is a time-lapse video. I had everything on the camera set to manual settings so that the camera didn't change exposure or white balance from picture to picture. I sat there and let the camera take pictures for about 15 minutes. Once I had all of the pictures uploaded into Final Cut Pro in the order I took them I then shortened the length of each one to 1 millisecond. This caused the pictures to roughly play at a rate of 24 frames a second, which creates a smooth video out of these pictures. The size of my field of view for this picture was about 50 feet and the cloud was about 20,000 feet away from my camera. I used a Canon EF 70-200mm f/4L USM lens to take the picture. I used this lens so that I could zoom up as close-up as possible on a section of the cloud.

The focal length: 73

Final Image: 5184 x 3456

Video: 1920 x 1080

Exposure Specs

Aperture: 11

Shutter Speed: 1/320

ISO: 100

I used an aperture of F-11 in order to get the whole cloud with varying depths in the focus field without having such a high f-stop that I lose the sharp focus associated with low f-stops. Once I also set everything on the camera to manual such as focus, f-stop, shutter speed, ISO, and white balance so that there was no variation in exposure or color from one photo to the next. This keeps the picture from getting an effect where it seems like the exposure is flashing around. It keeps everything constant for a smooth time-lapse video if you set everything to manual. Once I had all of the pictures I uploaded them into a Final Cut Pro timeline. I set each clip to play at 1 in the clip duration, which equals out to play a video at 24 frames a second. This then speeds up the pictures to be played in order at such a short time that they make a video. Once you do that you export it as a .mov file which can then be used in any video you want. It is no longer a set of pictures and is now a .mov file.

I like the time-lapse photography because it allows me to see the movement of the cloud rather than just a snap shot of it in time. I like to see this movement and physics of the cloud building up and dissipating. It is much faster than a video and allows you to see what the cloud does over a long period of time in a very short amount of video.

I think fluid physics of clouds are shown very well through this photography. It shows condensation and evaporation in a way that makes them easier to understand.

When I develop the idea further I am going to get a few different time lapses for each cloud that I take pictures of. I want to have a wide angle with the context of surrounding such as a mountain, have a close-up to see just a section of the cloud, and few other different shots in order to give the video more angles and perspectives to view the clouds from. I would also like to get the pictures from some more exotic locations or during the sunset/sunrise portion of the day.

#### References:

##### Standing wave cloud

Keller, Terry, Jr. "Standing Lenticular Clouds." *PFC::Standing Lenticular Clouds*. Premier Flight Center, 2014. Web. 03 Mar. 2014.  
<<http://www.premierflightct.com/newsletters/TrainingArticles/StandingLenticularClouds.html>>.

##### Skew-T

"Atmospheric Soundings." *Atmospheric Soundings*. University of Wyoming, n.d. Web. 03 Mar. 2014. <<http://weather.uwyo.edu/upperair/sounding.html>>.

A useful site for learning how to shoot time-lapse photography.

Laforet, Vincent. "The Basics of Time Lapse Photography with Vincent Laforet." *Canon DLC: Gallery*. Canon, n.d. Web. 03 Mar. 2014.  
<[http://learn.usa.canon.com/galleries/galleries/tutorials/time\\_lapse/laforet\\_time\\_lapse\\_basics.shtml](http://learn.usa.canon.com/galleries/galleries/tutorials/time_lapse/laforet_time_lapse_basics.shtml)>.