

**Max Kitay**

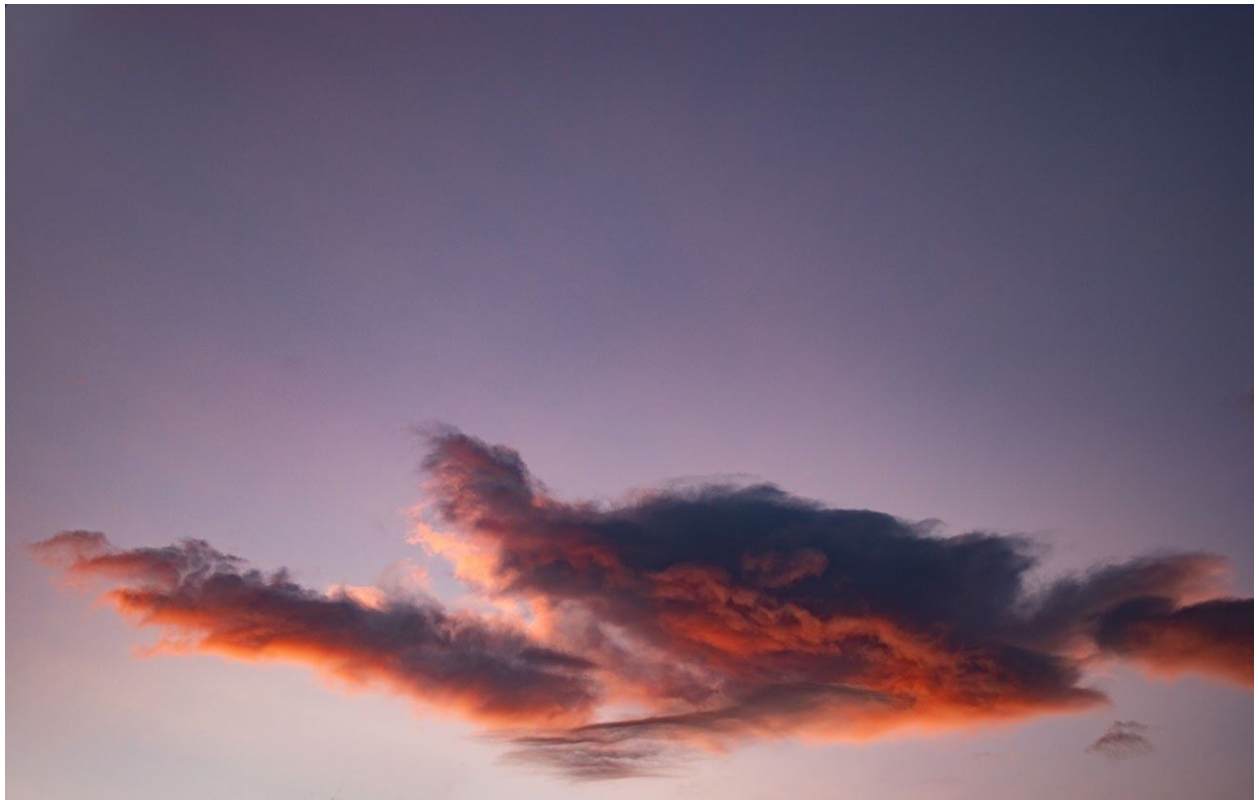
**ATLS 4151 - Flow Visualization**

**Clouds First**

**Alto cumulus lenticularis**

**09/11/2020 - 6:10PM - Boulder, CO**

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This image was captured for the first clouds assignment in ATLS 4151, Flow Visualization. At the time of this assignment we were learning about varying cloud types as well as identification characteristics and effects that the atmosphere has on cloud formation. The purpose of this assignment was to capture an image of a cloud or clouds in the sky and be able to identify the type of cloud. We were also tasked with noting the stability of the atmosphere at the given time and location.

Originally I was intending to use a different image for this assignment, however on the evening of September 11th around sunset, our professor noted there were some excellent clouds currently in the sky. When she sent that to the class I immediately stepped outside and captured this beautiful mountain wave cloud. It was taken in Boulder, Colorado in the University Hill area about 6:10PM. This cloud was located not directly overhead, but a bit North West of where I was standing. The camera was tilted at about a 45 degree angle from the horizon.

The cloud captured in this image is an Altocumulus Lenticularis or “mountain wave” cloud. The Altocumulus part comes from the fact that this was a middle-altitude cloud, typically consisting of globular masses or rolls in layers or patches.<sup>1</sup> The Skew T diagram below does in fact show cloud formation, when the dewpoint and temperature lines come close together, in the mid-altitude region roughly 2,000-7,000 meters. The Lenticularis part comes from the association with waves in the atmosphere that develop when relatively stable, fast moving air is forced up and over a topographic barrier that is oriented more or less perpendicular to the direction from which the upper-level wind is blowing.<sup>2</sup> In this case, the topographic barrier would be the foothills along the edge of Boulder. The Lenticular clouds form in the crest of these mountain waves that are formed, where the air is rising. Typical Lenticular clouds have a lens-like or saucer shape. Furthermore, in the unedited full sky image below you can see a few other Lenticular clouds to the right and left of the cloud I decided to focus on. Based on the CAPE (Convective Available Potential Energy<sup>3</sup>) value captured in the Skew T diagram, the value of 0 indicates a stable atmosphere.

The final shot was captured on a Nikon D3500 using an 18-55mm lens set at a focal length of 48mm. This allowed me to focus in on the specific cloud I wanted to capture and eliminated many of the distracting elements of the environment. The original image came in at 6000 x 4000 pixels and the final cropped JPEG ended up being 1300 x 833 pixels. My camera exposure specs were as follows, ISO of 180, shutter speed of 1/80 second and aperture of f/5.3. Lastly, I did quite a bit of editing in

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<sup>1</sup> Altocumulus cloud. (2020, September 02). Retrieved October 21, 2020, from [https://en.wikipedia.org/wiki/Altocumulus\\_cloud](https://en.wikipedia.org/wiki/Altocumulus_cloud)

<sup>2</sup> US Department of Commerce, N. (2018, September 14). Altocumulus Standing Lenticular Clouds. Retrieved October 21, 2020, from [https://www.weather.gov/abq/features\\_acsl](https://www.weather.gov/abq/features_acsl)

<sup>3</sup> SKEW-T: A LOOK AT CAPE. (n.d.). Retrieved October 21, 2020, from <http://www.theweatherprediction.com/habyhints/305/>

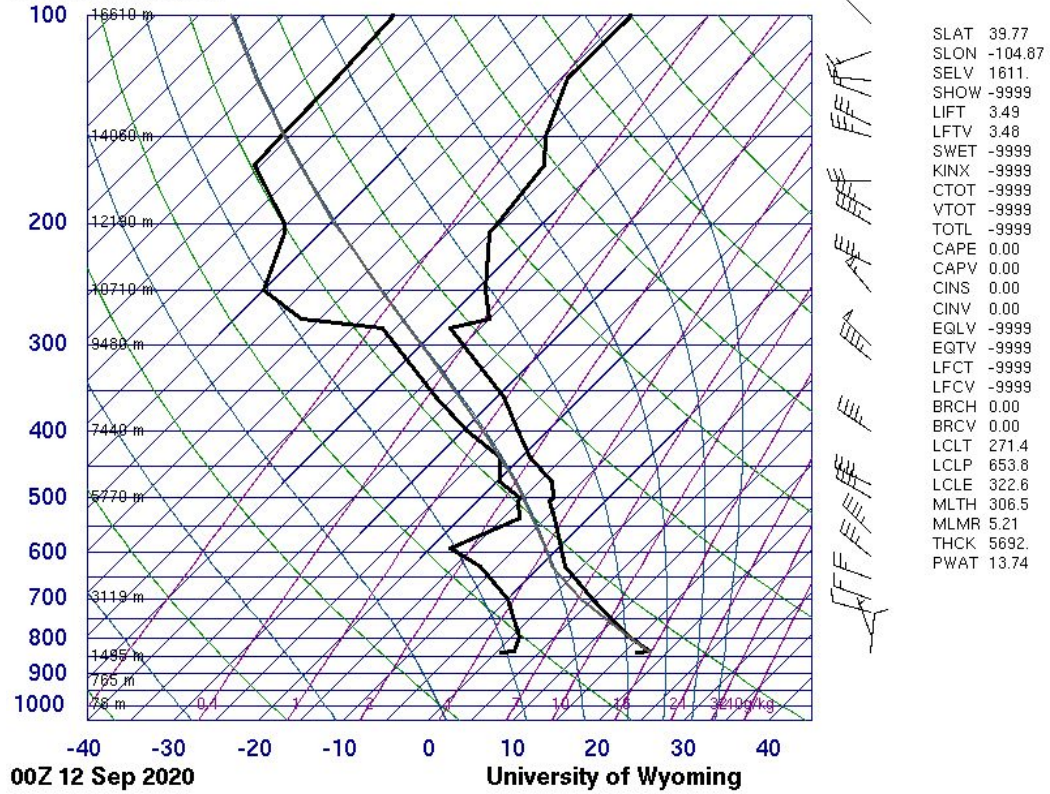
both Adobe Lightroom Classic and Adobe Photoshop. Main adjustments in Lightroom that were made included increasing contrast by bringing down highlights and bringing up shadows, as well as using the dehaze slider to bring out details within the cloud. As well I increased vibrance and saturation to achieve a more realistic coloring of the sunset scene. In Photoshop I used the clone stamp tool to get rid of the tree and wire on the right side of the image that can be seen in the original on the final page of this document. I thought these elements were distracting and shifted the viewers attention away from the beautiful cloud.

I really enjoy the purple gradient of the sky captured in this image as well as the sharp reds and oranges of the sunset. I believe this image also well represents the kind of globular and smooth elements associated with Altocumulus Lenticularis. As well, I'm very proud of the photoshop work I did of removing the tree and wire from the original image, I feel the final image looks quite natural and you probably wouldn't know they were removed if you didn't see the original. Overall I am very pleased with this image however, one aspect I think could be improved would have been to shoot this in a more natural environment where I could include the landscape to provide a more interesting image.



(full sky image - unedited)

# 72469 DNR Denver



(Skew T diagram for Sept 11th 6PM)



(original image - unedited)