

2018

# Clouds Second - 2018

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MCEN 5151

## Image Context

For the second Clouds picture, my goal for this assignment was to catch a still image which can contain two types of clouds. Owing to the radical change in the elevation in Boulder as well as the extreme climate change, the occurrence of my desired sceneries is quite available. Bunch of altocumulus was captured in the top of the picture meanwhile a slice of cirrus clouds was blooming beneath it.

## Flow Apparatus

The image was taken on the top of the parking establishment behind Engineering Center on November 15<sup>th</sup>. Camera was pointed to the sky at 20 degrees above the ground to record the transition region in the firmament.

Based on the Skew-T diagram<sup>1</sup> from Department of Atmospheric Science University of Wyoming, the CAPE index equals to zero which indicates that the atmosphere in that afternoon was stable.

CAPE(Convective Available Potential Energy, J/kg) equal to 0.

$$CAPE = GRAVITY * SUMP ( DELZ * ( TP - TE ) / TE )$$

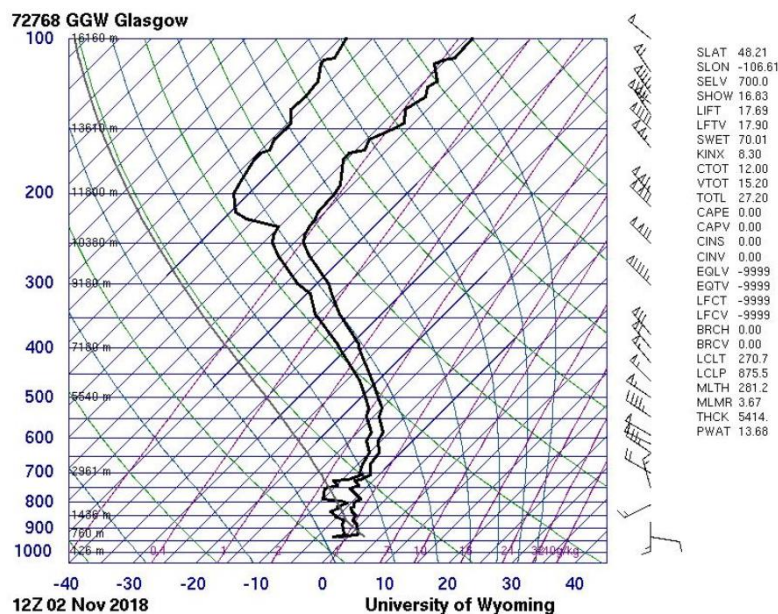
SUMP = sum over sounding layers from LFCT to EQLV for which ( TP - TE ) is greater than zero

DELZ = incremental depth

TP = temperature of a parcel from the lowest 500 m of the atmosphere, raised dry adiabatically to the LCL and moist adiabatically thereafter

TE = temperature of the environment

In figure 1, the clouds suspended at 2800 meter from the sea level since the distance between dew-point line and temperature line touches the bottom.



Description of the [sounding indices](#).

Figure 1 Skew-T

However, from Dr. Li's research, the thin Cirrus clouds in the bottom commonly

<sup>1</sup> Soundings from Department of Atmospheric Science University of Wyoming  
<http://weather.uwyo.edu/upperair/sounding.html>

occurs at the height larger than 6000 meters.<sup>2</sup> For the altocumulus clouds, its altitude range is from 2000-6000 meter, which fits the observation from figure 1.

## Visualization technique

I focus on the clouds part to have a darker exposure which could enhance the sense of perspective rather than getting a flat image. But due to the limit of the cell phone camera, the jellyfish icon in the center of the picture is not that kind of outstanding from the other part.

## Photographic technique

1/177 second was given for the shutter speed towards iPhone Xs. The aperture value is fixed at f/2.4 by the manufacturer. Photoshop was employed in the editing process and color curve was the main tool I applied on this image. To illustrate the jelly-fish shape in the center in a clearer way, the darker side of the curve was stretched down a bit and the brightness was elevated to a ting extend.



Figure 2 Original Image



Figure 3 Final edited Image

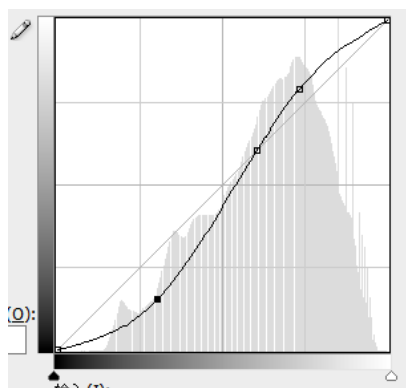


Figure 4 Curve in PS

## Image reveals

The transition region is my favorite section for the clouds second work. Though the cirrus clouds does a large distance from the altocumulus clouds in horizontal surface but owing to the special shooting angle, altocumulus clouds seems like origin from the below cirrus one.

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<sup>2</sup> Yana Li, Song Yang, Yi Deng, Xiaoming Hu, and Ming Cai. (2018) A process-level attribution of the annual cycle of surface temperature over the Maritime Continent. *Climate Dynamics* 51:7-8, 2759-2772.