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Flow Visualization 5151-002

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Clouds Second | Nimbostratus Clouds while Climbing

October 30<sup>th</sup>, 2024 | Scituate MA



*Figure 1: Final Image*

The purpose of this image is to capture and analyze cloud formations I witnessed as the sun rose on October 30<sup>th</sup>, 2024. This report will document and discover the atmospheric conditions leading to the formation of both the nimbostratus clouds and the faint altostratus seen in Figure 1. I will discuss the conditions that may lead to altocumulus cloud formation, and the information that can be learned from an ariel view.

The image was taken above Scituate Massachusetts facing south at an elevation of about 5000 meters as the airplane was climbing to its cruising altitude on October 30, 2024, just after 5 AM Eastern Standard Time. The astronomical twilight was predicted to occur at 5:40 AM in Scituate on that day while the sunrise itself was predicted for 7:15 AM. The timing was a byproduct of the flight's schedule, but the elevation was selected to capture the top surface of the clouds, the climbing rate of the plane was such that there was only about thirty seconds where my window was in line with the surface of the clouds to take the image I desired.

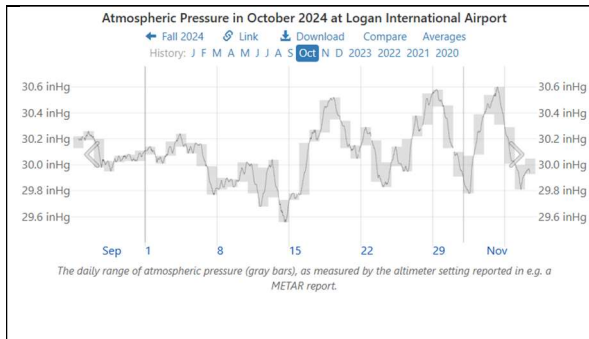


Figure 2: Atmospheric Pressure Plot October 2024

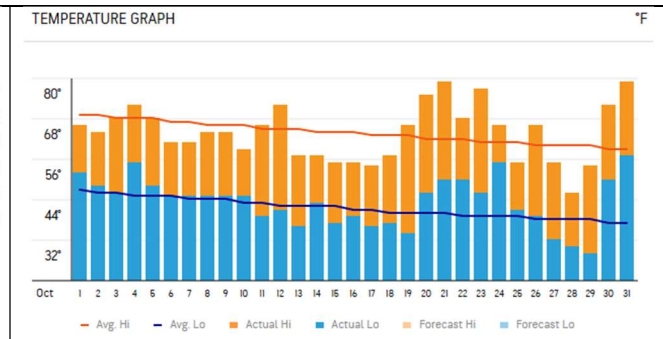


Figure 3: Daily Temperature Plot October 2024

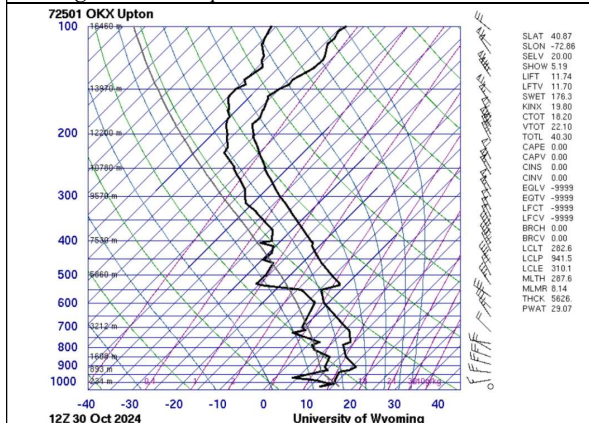


Figure 4: Relevant Skew-T Plot

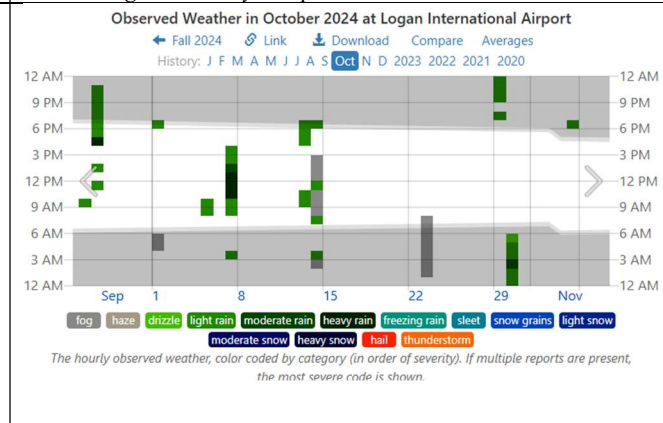


Figure 5: Relevant Precipitation Data

The clouds captured in the image present primarily as nimbostratus clouds in the bottom of the image, while the center of the image appears to possess the faint trails of altostratus clouds floating just above the main body. The entire sky was overcast while on the ground before taking off and the sky would remain overcast for the remainder of the day, with there having been heavy rain just two hours before the image was taken. On the 30<sup>th</sup>, the temperature rose rather dramatically while atmospheric pressure dropped from the days prior, possibly serving as an indication of the source of the rain. Atmospheric sounding data taken an hour before the image suggests a fairly stable atmosphere with a CAPE value of 0.00. The Skew-T plot narrows between 4,400 and 5000 meters. This is rather

high for nimbostratus, but the supporting data reaffirms my convictions. This data does not directly support the presence of the altostratus clouds seen at the middle of the image; instead, I believe these clouds to be a product of warmed air from the weather system below interacting with the cool air to form suspended ice crystals.

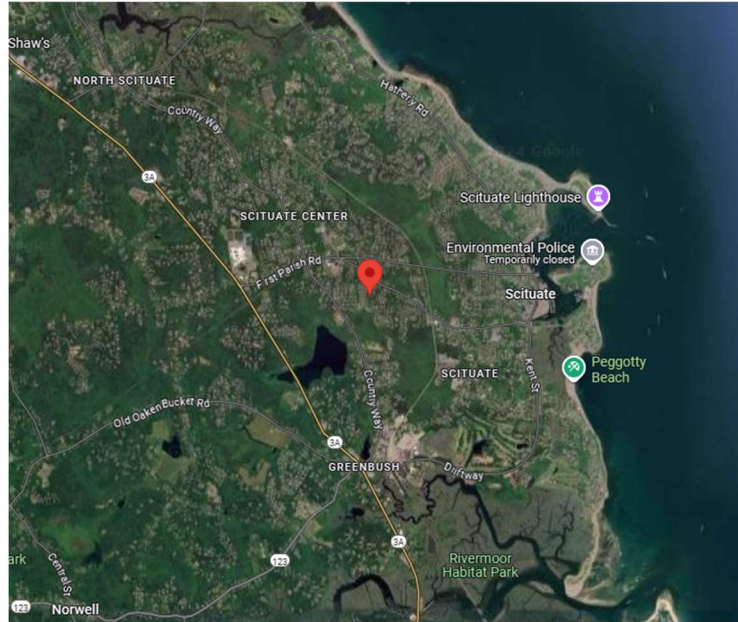


Figure 6: Satellite View of the Location

The approximate field of view from an airplane window is 40-50 degrees, and the distance to the clouds was several kilometers. The photograph was taken on a Samsung S24+ Smart phone, utilizing the telephoto, 12MP lens with a focal length of F1.8 and 23mm focal length. The image was 3000x4000 pixels. I utilized an ISO of 200 to minimize camera noise and set the shutter speed to slightly underexpose the image, at 1/180s. I found that I thoroughly enjoyed the natural framing from the window and the image from the phone as it went through its internal color adjustments. I would have liked to take a raw image, but the fleeting moment proved too rapid for my brain to consider changing the file type at 5 am.

The image reveals the seldom seen superior surface structure of nimbostratus clouds with wisps of altostratus formations floating just above. When I was taking this image, I was reminded of the “shot on iPhone” ads, specifically one where a camera traverses through the clouds while “Past Lives” by Børns. I appreciate the ethereal feeling of the image with the gentle purple tint and pastel oranges of the background. I do wish I had a raw image to manipulate but I am rather happy with the end product.

## References

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