

Introduction

This report examines the observation and analysis of cumulus congestus clouds photographed on September 2nd, 2024, at 14:47 on Interstate 70 near Denver. The study integrates photographic documentation with updated meteorological data from a Skew-T Log-P diagram observed at Grand Junction at 12Z on the same day to explore the atmospheric dynamics involved in cloud formation.

Methodology

Photographic Equipment and Settings:

- **Camera:** Samsung Galaxy S23 Ultra with a 200 MP wide-angle camera, optimal for detailed, high-resolution environmental photography across varying light conditions.
- **Settings:** Utilized the automatic and pro modes to optimize exposure and focus settings. The camera's AI was set to enhance the clarity and details of the cloud structures, ensuring high-quality captures.
- **Positioning:** Positioned northward to maximize natural lighting on the cloud formations, enhancing the visual contrast and depth in the photograph.

Meteorological Data Source:

- **Skew-T Log-P Diagram:** Provided by the University of Wyoming, detailing atmospheric conditions over Grand Junction, which is proximate to the observation location.

Observations and Findings

The image clearly depicts cumulus congestus clouds, identifiable by their prominent vertical development and relatively flat bases, indicating substantial atmospheric lifting and moisture content at lower levels.

Analysis

Skew-T Log-P Diagram Analysis:

- **LCL (Lifting Condensation Level):** The updated diagram indicates an LCL at approximately 274.0 meters, suggesting the initial formation height of the clouds.
- **Temperature and Dew Point:** The diagram shows a temperature profile that decreases with altitude, alongside a dew point that suggests sufficient moisture for cumulus development.
- **Instability Indicators:** The CAPE (Convective Available Potential Energy) value is noted at 0.0, indicating no significant convective instability at the time, which could suggest that the cloud formations were driven by other dynamic atmospheric processes.

Conclusion

This analysis using the updated Skew-T diagram confirms that the observed cumulus congestus clouds formed under conditions typical for this cloud type: sufficient low-level moisture and a mechanism for lifting air parcels to their condensation level. The photographic evidence

combined with meteorological data provides a comprehensive view of the atmospheric conditions that facilitated the cloud formations observed.

References

- Met Office. "Cumulus Clouds." Accessed October 8, 2024.
- Upperair Air Data: <https://weather.uwyo.edu/upperair/>
- Colorado Climate Centre. "Weather Patterns in Colorado." Accessed October 8, 2024.

Appendices

- **Appendix A:** Original and edited photographs of the cloud observation.



- **Appendix B:** Skew-T Log-P diagram from September 2nd, 2024.

