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## Introduction and Objectives

- EarthCARE CPR provides unprecedented sensitivity for observing cloud vertical structure.
- Eastern Mediterranean is a strong convective and seasonal transition zone.
- Objective: characterize cloud regimes and macrophysical properties from CPR overpasses over Eastern Mediterranean (centered around Cyprus).
- Significance: Provides critical observational constraints for regional climate models

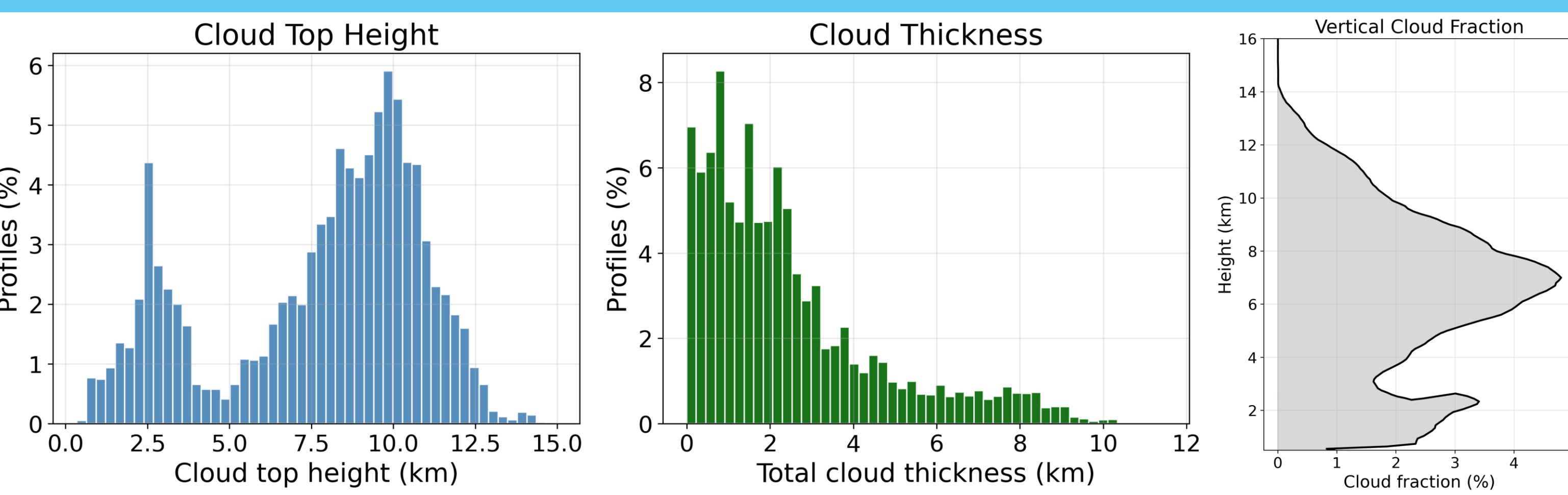
## Data and Methodology

- Data: Level-2 CPR products, common baseline (BA)
  - CPR-FMR for Cloud Top Height (CTH) and thickness
  - CPR-TC for identifying convective structures
- 159 EarthCARE overpasses July 2024–November 2025
- Regime classification: 5 classes based on CTH and TC

Single-layer Low	Single-layer Mid	Single-layer High	Deep Convective	Multi-layer non-deep
CTH < 2km	2km < CTH < 6km	CTH > 6km	TC product	N layers ≥ 2

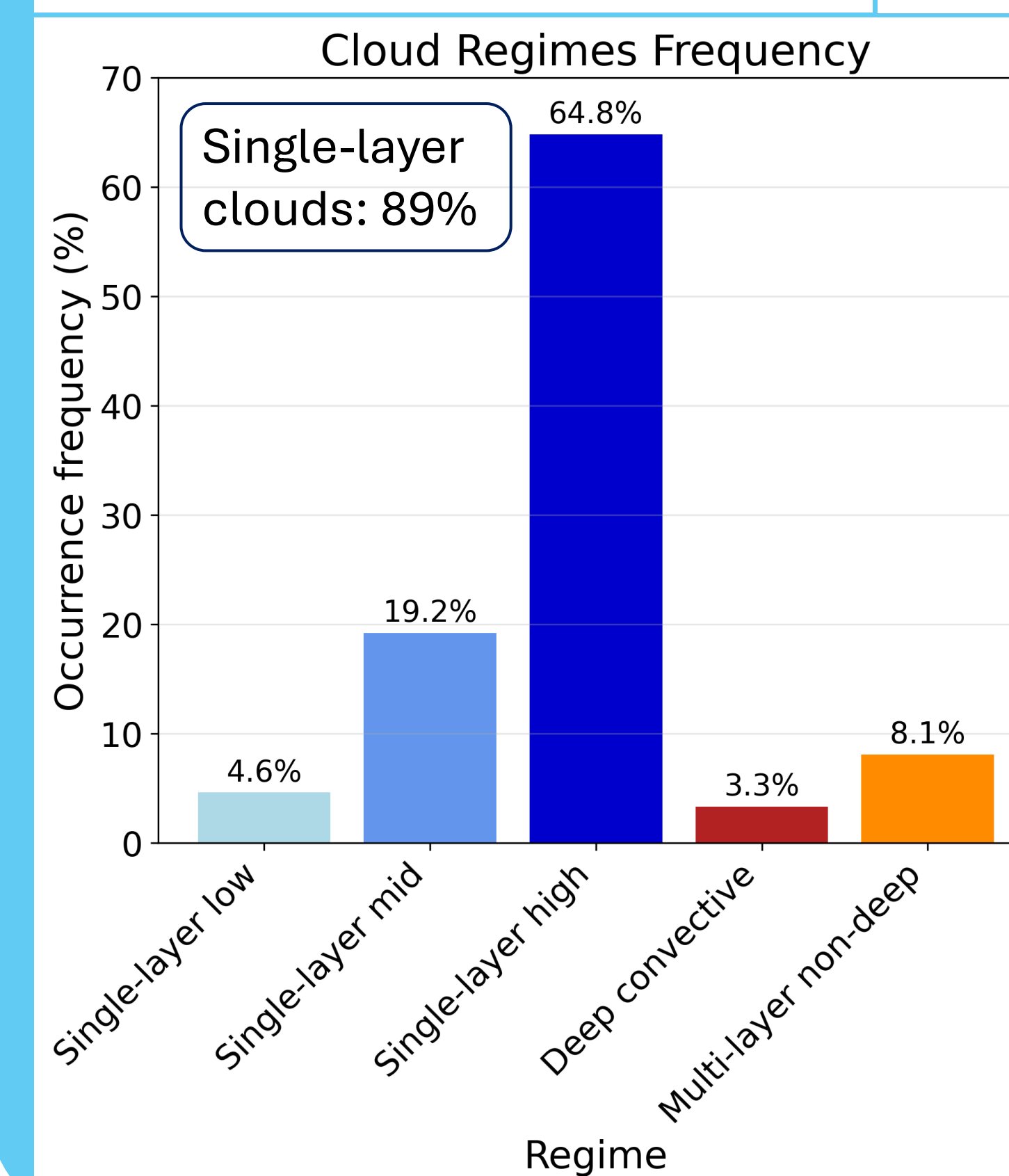
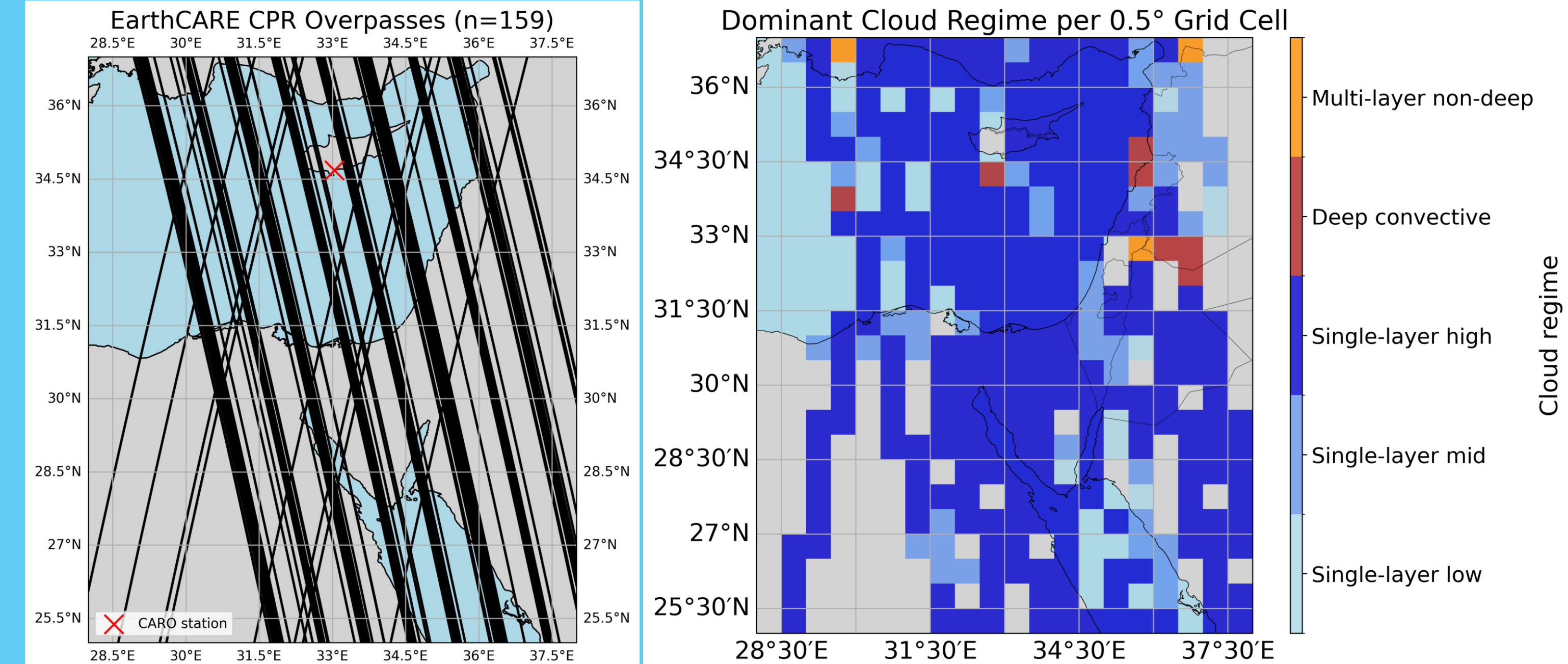
## Results

### Cloud geometrical properties



- CTH Distribution: Pronounced bimodal structure with peaks at 2–3 and 8–11 km (pronounced)
- Cloud Thickness: Strongly right-skewed; most clouds < 3 km thick
- Cloud Fraction: Vertical profile mirrors bimodal CTH with max cloudiness in mid and lower troposphere

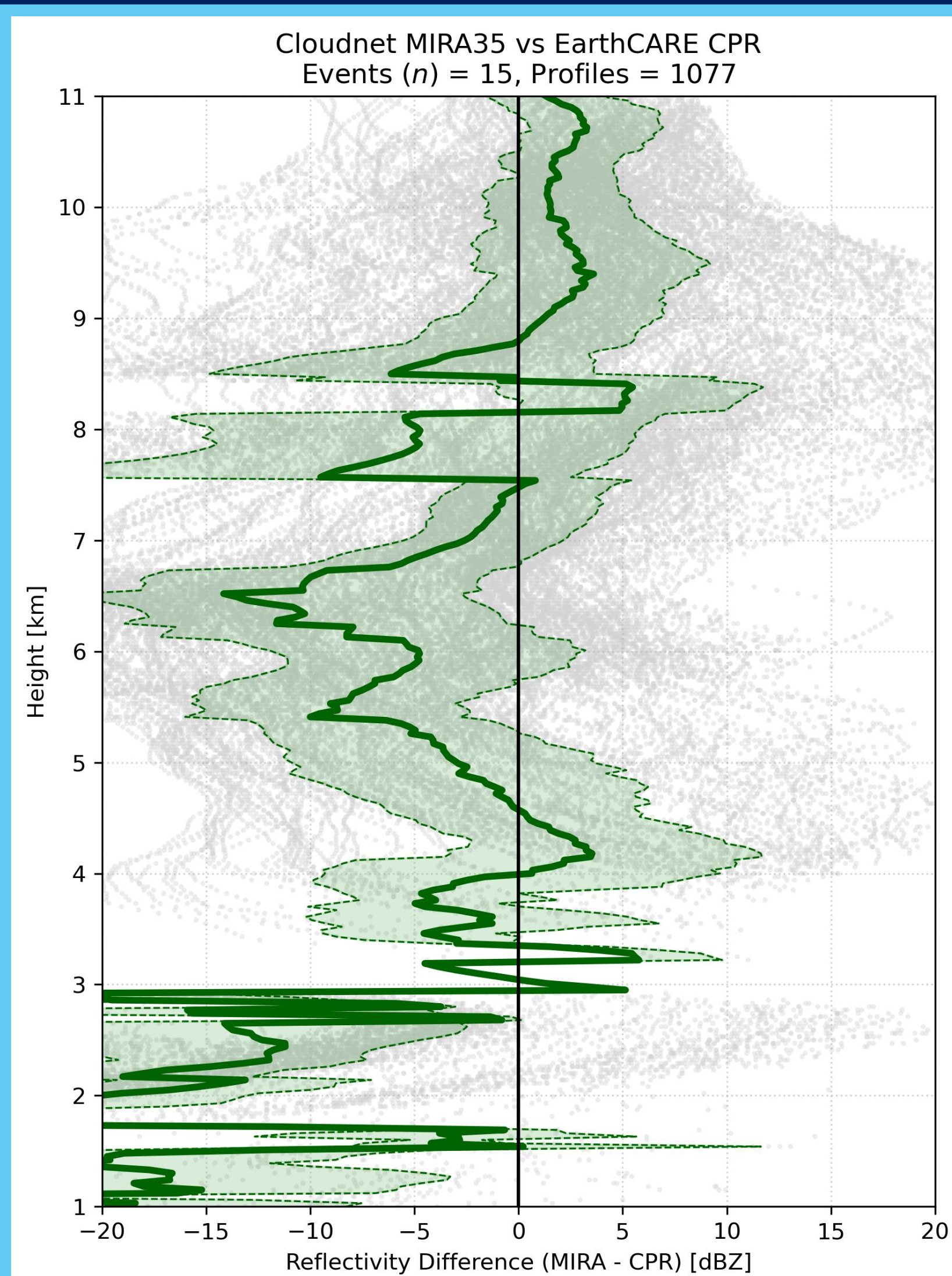
### Cloud regimes and frequency



- Single layer clouds (89%):
  - High (65%)
  - Mid (19%)
  - Low (5%)
- Multi-layer (8%)
- Deep convective (3%)

Single-layer systems dominate with high clouds prevailing

### EarthCARE CPR vs CARO MIRA35



- 15 overpasses near CARO (<150km)
- Overall agreement in mid–upper troposphere
- Large negative biases below 3 km likely linked to attenuation, sensitivity differences, and clutter effects

## Conclusions

- EarthCARE CPR successfully resolves regime-dependent cloud vertical structures
- High-level single-layer clouds dominate the regional cloud climatology (~65%)
- Ground-based MIRA35 observations demonstrate strong potential for CPR validation over Cyprus
- Future work: extend climatology and validation dataset

### Acknowledgments

This work was supported by the EXCELSIOR project that receives funding from the European Union's Horizon 2020 research and innovation programme under GA No 857510. The authors also acknowledged the ATARRI Horizon Europe Widespread Twinning Project receiving funding from the European Union's Horizon Europe Twinning Call (HORIZON-WIDERA-2023-ACCESS-02) under the GA No 101160258. The study has been implemented under the CORAL EVID39 CAL/VAL project.