Observations of marine stratocumulus microphysics, turbulence, and aerosols during ACE-ENA

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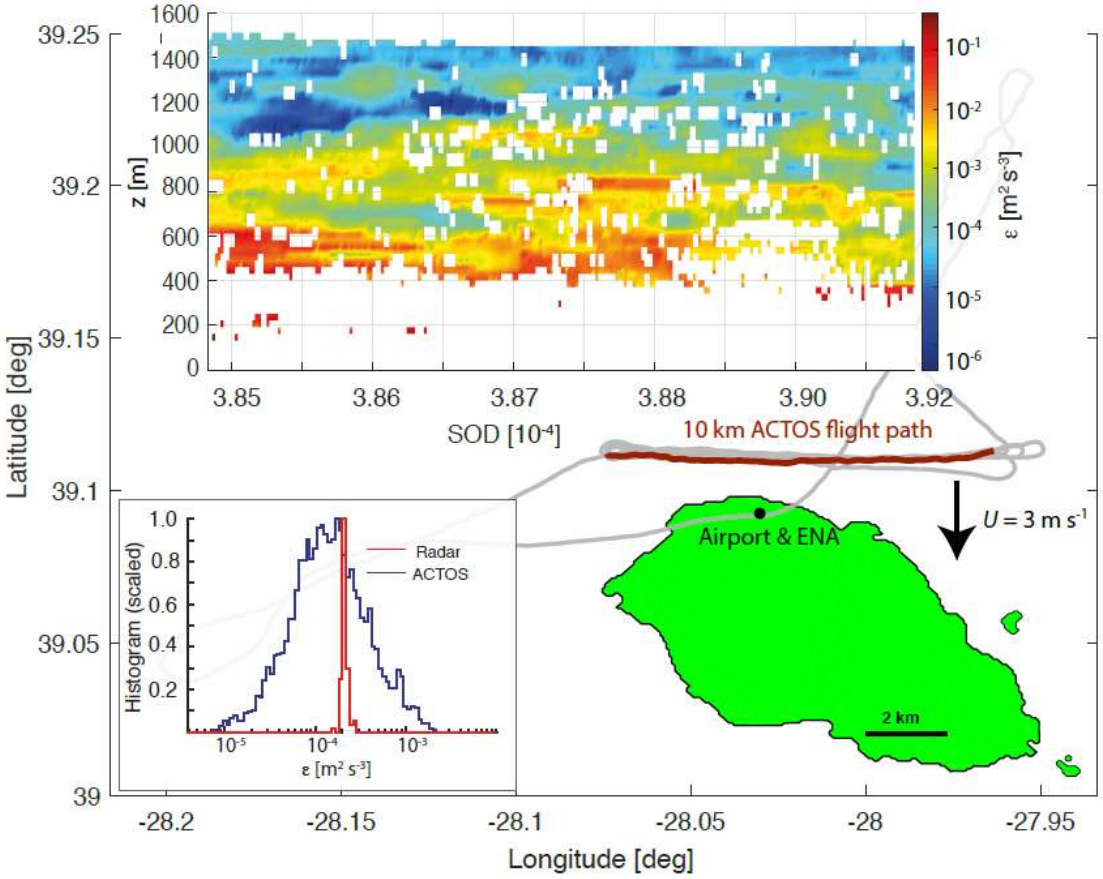
Remote vs in-situ turbulence energy dissipation rate

- **Favorable comparison of ACTOS in-situ cloud turbulence observations with RADAR observations**



RF0716: 10 km ACTOS flight path

The mean energy dissipation rate (ε) matches well

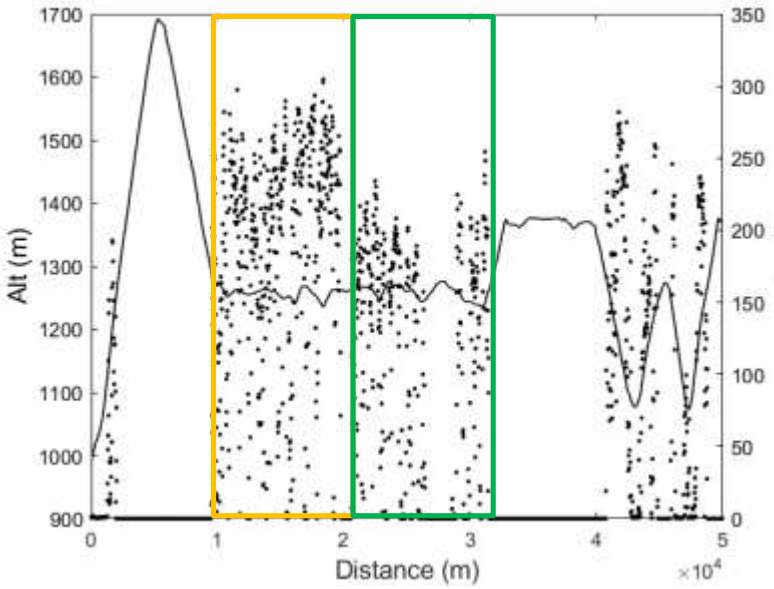
Narrow distribution for RADAR due to larger averaging time

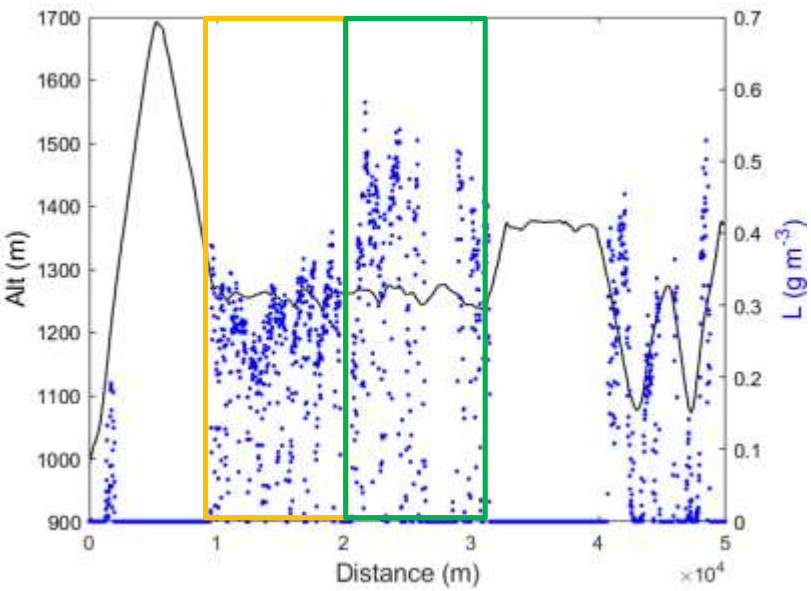
Introduction

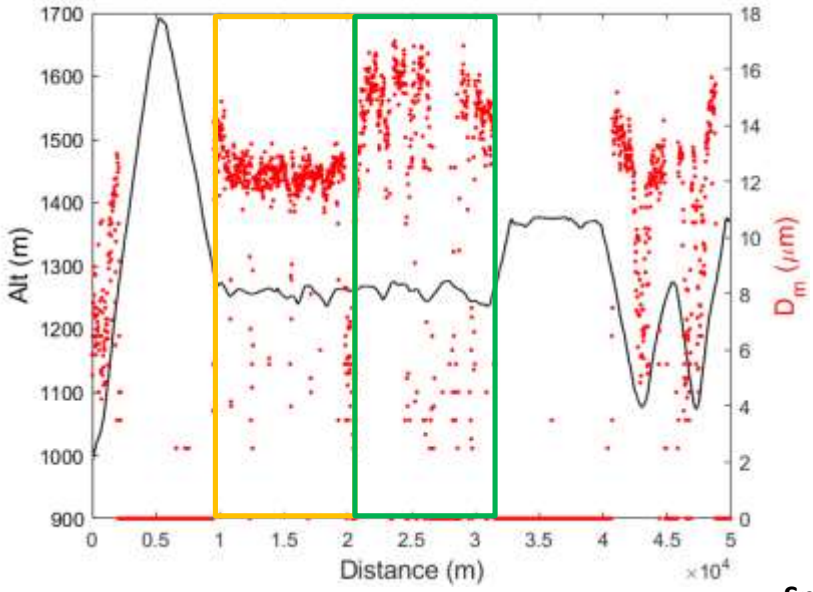
Result & Discussion

Conclusion

- **RF0709-P1 and P2** Same cloud system, but two microphysical regimes







Spatial resolution: ~ 20 m (CDP)

Introduction

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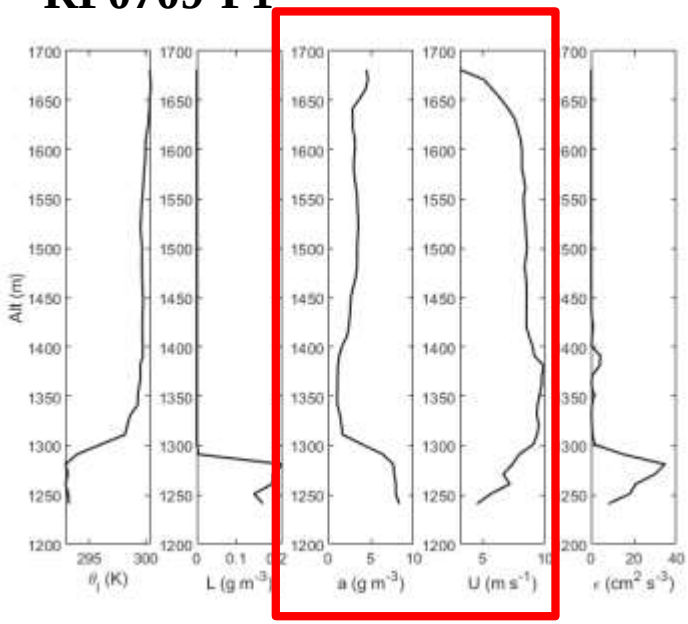
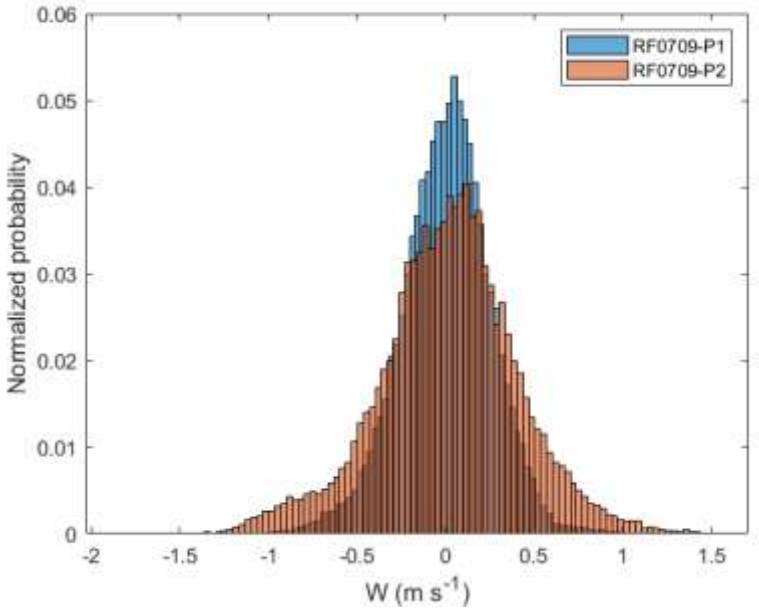
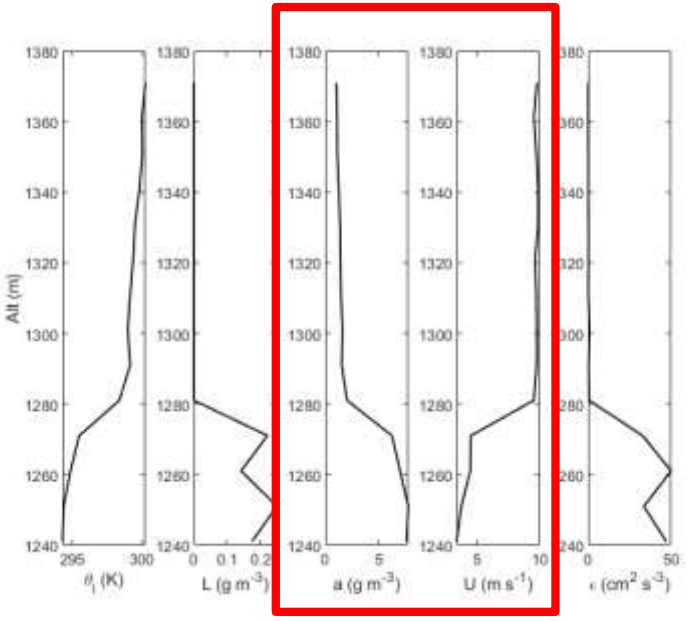
- **RF0709-P1**



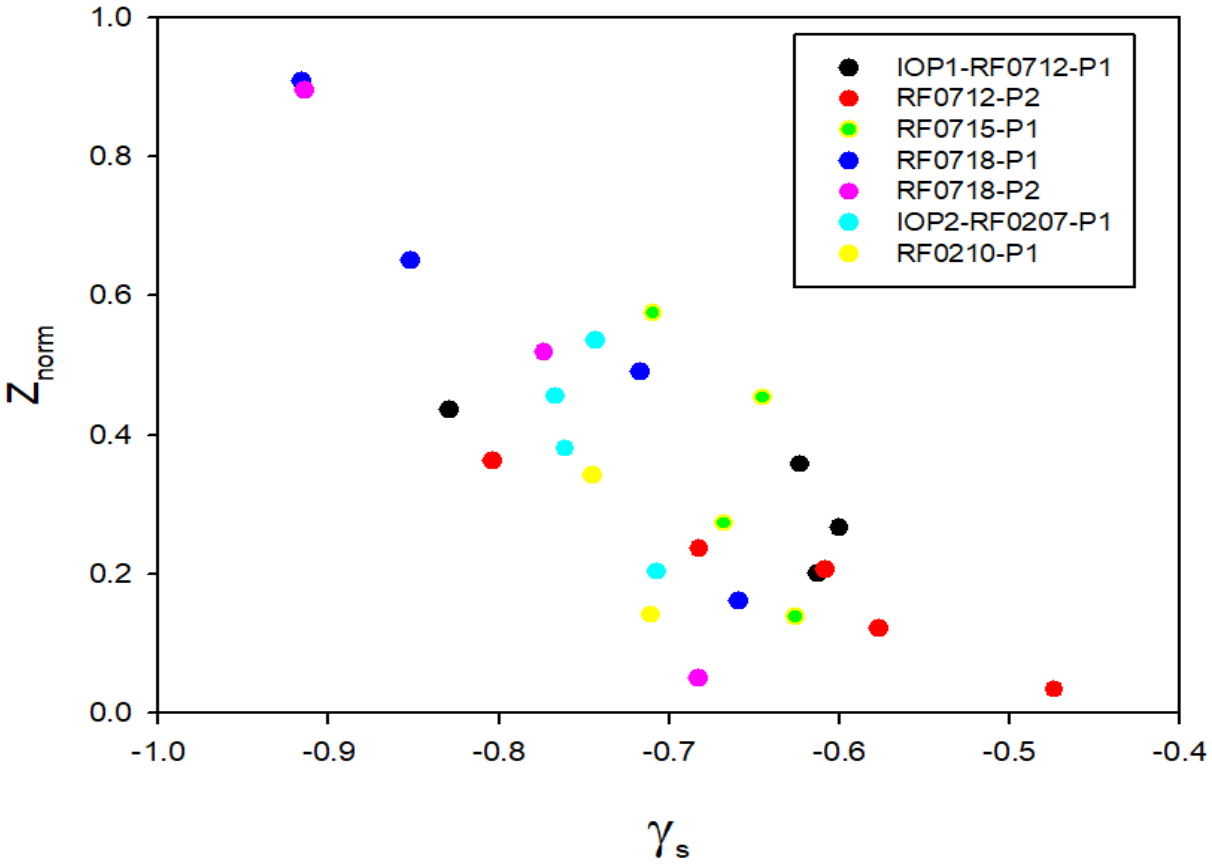


- **RF0709-P2**



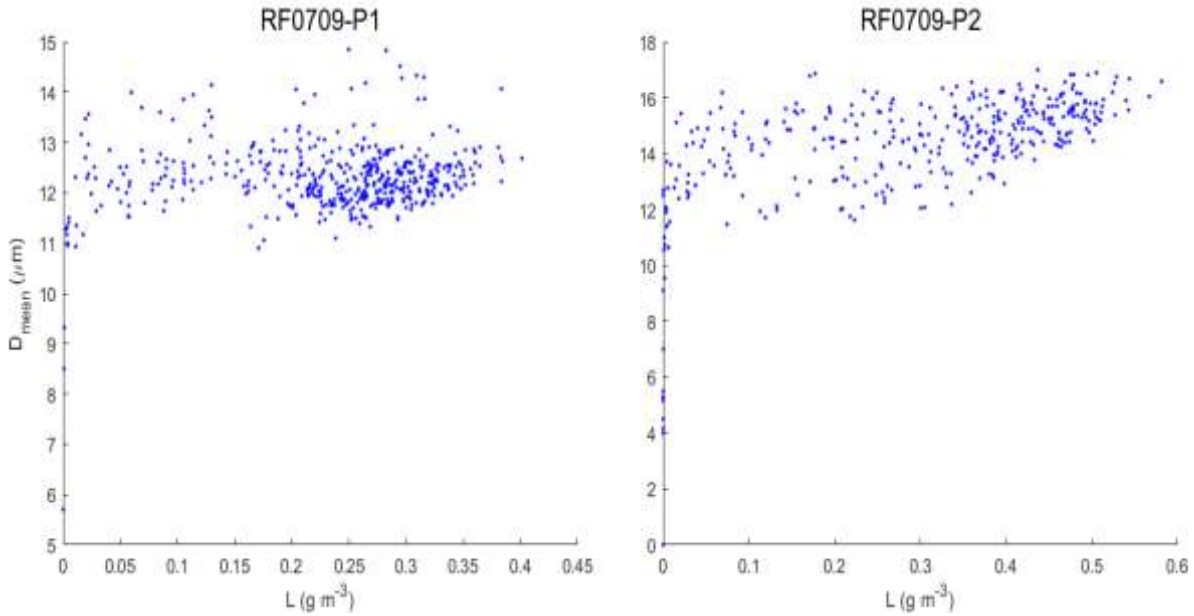
- **Wind shear is stronger in P2 than in P1.**
- **The values of in-cloud vertical velocity (W) of P1 show higher fluctuations than those of P2.**

- **Slope value (γ_s) in Log L and Log τ_p space is close to -1 if mixing is inhomogeneous.**
- **Shown below: γ_s for multiple G1 flights in stratocumulus clouds, organized by height within the cloud: inhomogeneous near cloud top.**



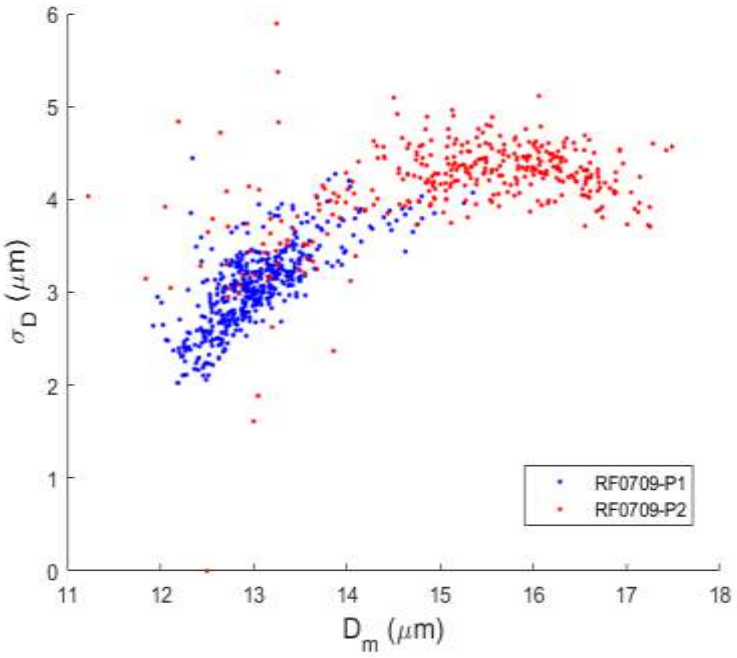
- **Slope value (γ_s) in Log L and Log τ_p space is close to -1 if mixing is inhomogeneous.**
- **Shown below: Mixing diagrams and averaged values of γ_s for P1 and P2**

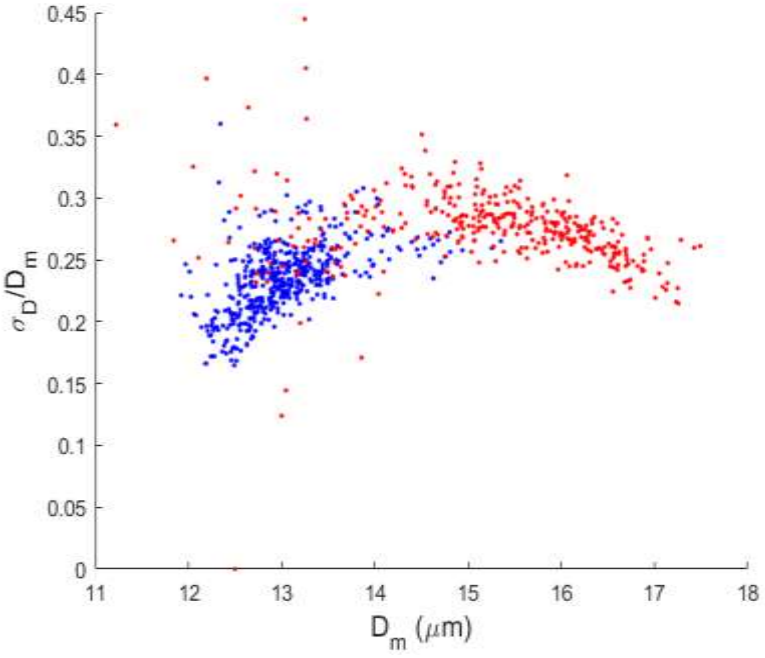
	RF0709-P1	RF0709-P2
γ_s	-0.98	-0.93



Discussion

- **The mean diameter (D_m) versus the standard deviation of diameter (σ_D) and relative dispersion (σ_D/D_m) for each penetration.**





- **Why are the relationships between D_m and σ_D/D_m different between RF0709-P1 and P2?**

- **Favorable comparison of remote and in-situ estimation of turbulence energy dissipation rate.**

- **Sharp transitions of cloud microphysical properties were found in one stratocumulus cloud system (RF0709-P1 and P2).**

- **Compared to P1, the wind shear and turbulent dissipation rate are stronger and larger in P2.**

- **The slope value (γ_s) analysis suggest inhomogeneous mixing near cloud top, but there is a slight difference between each penetration perhaps due to larger turbulent dissipation rate.**

Future work and collaboration

- **The horizontal structure of the cloud top will be investigated by using observations from the thermal-infrared camera**. (Dr. André Ehrlich)