Objectively Assessing Characteristics of Mesoscale Convective Organization in an Operational Convection Permitting Model

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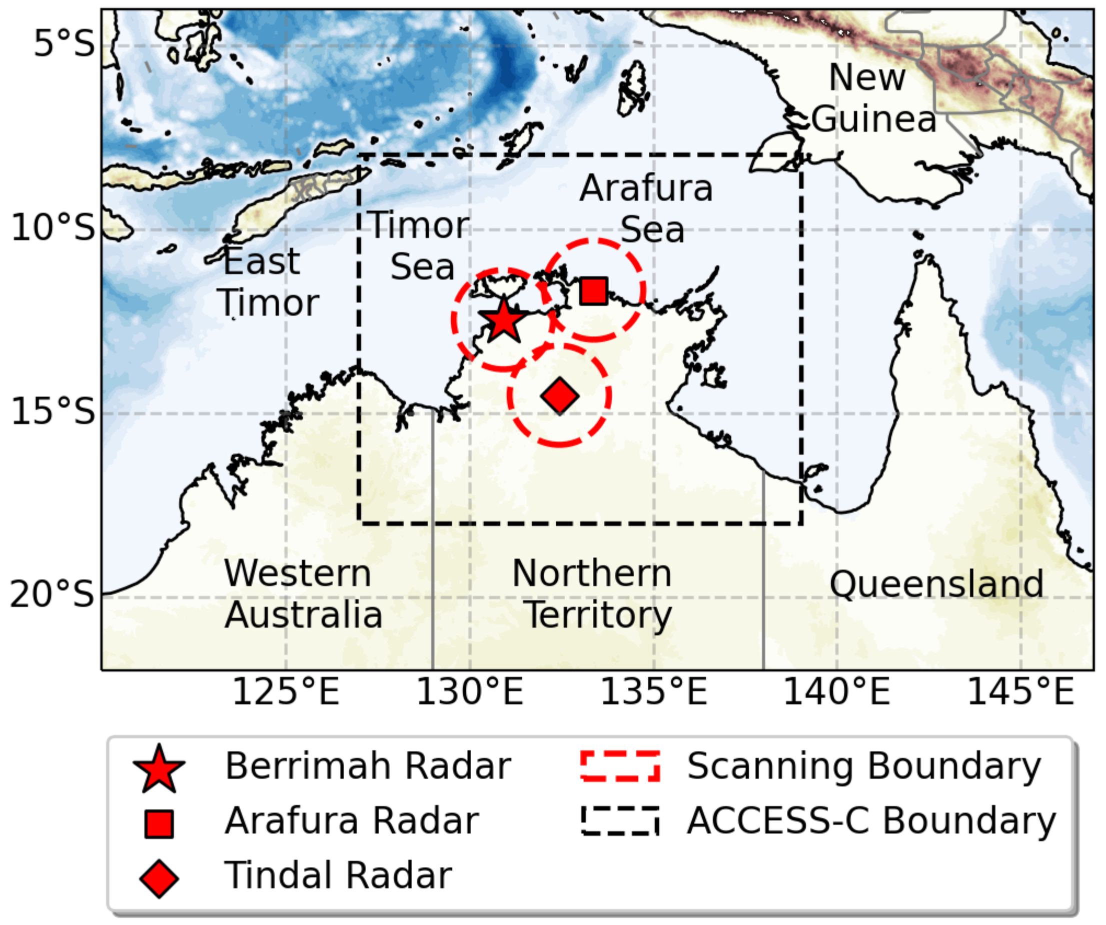
Introduction

Numerical weather prediction at ~1 km gridspacing now operationally feasible. At this scale convective motion is necessarily underresolved; can the mesoscale dynamics of convective systems nevertheless by simulated realistically?

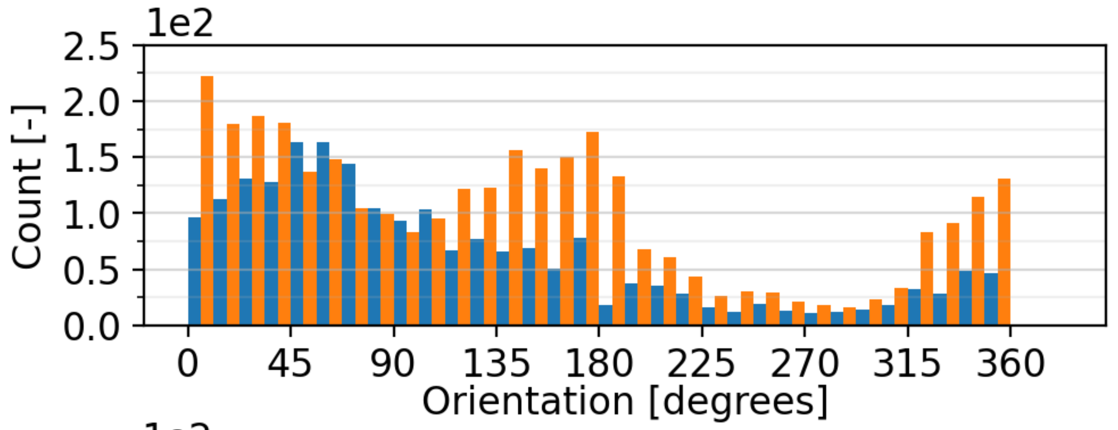
Approach

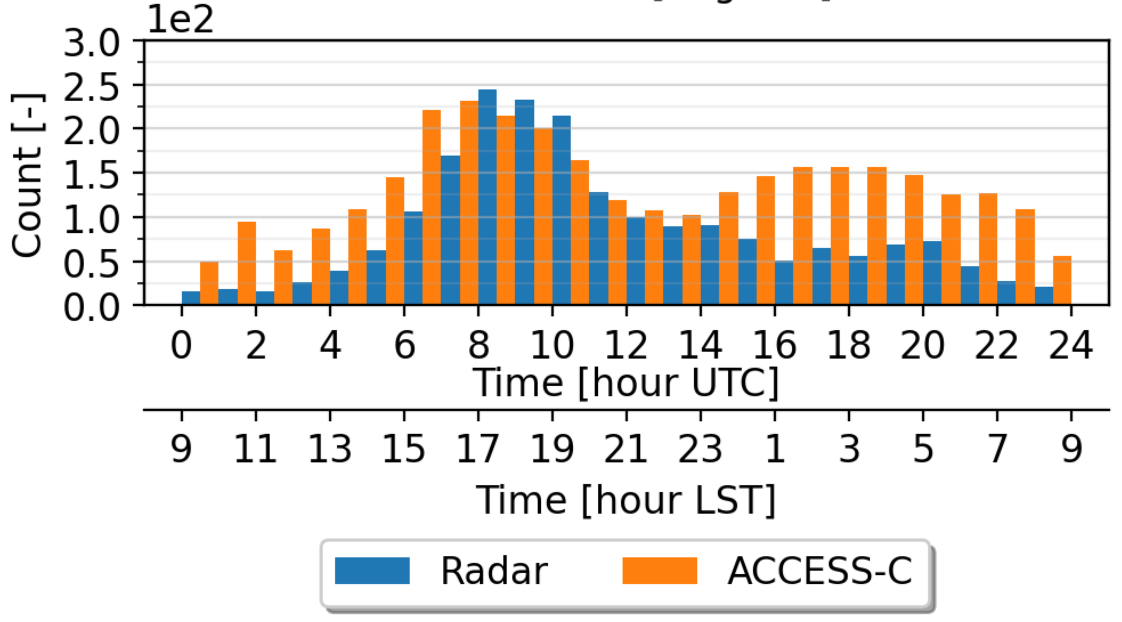
- Northern Australian mesoscale convective systems (MCSs) compared across Australian operational model (ACCESS-C) and radar datasets between Oct 2020 and May 2022.
- Systems identifed, tracked, and classified using the Mesoscale TINT (MINT) algorithm.
- Statistics compared between each.



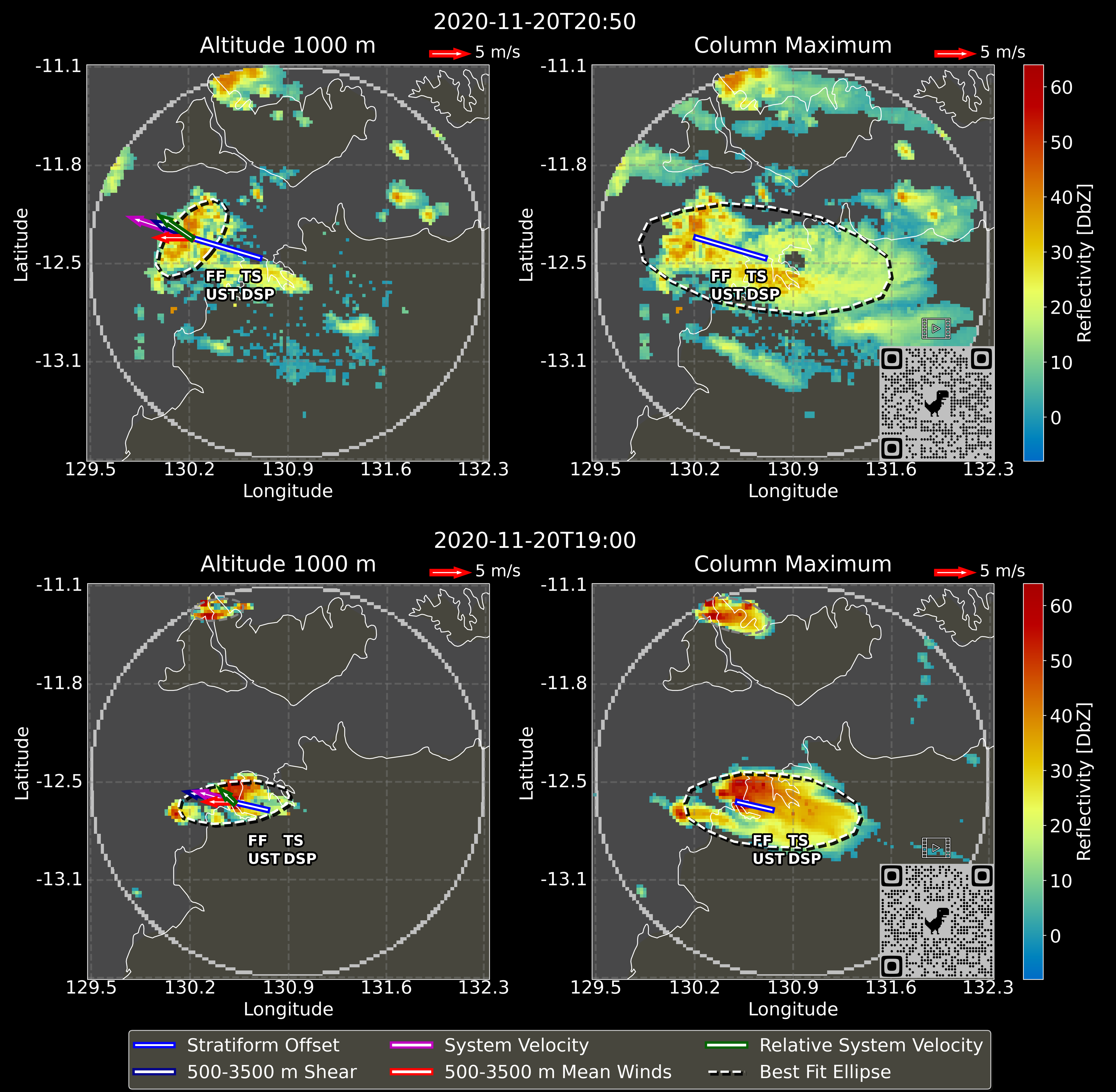
Results

- Too much simulated deep convection.
- Simulated convective cells too large, stratiform anvils too small.
- Orientation biases: too many shear parallel MCSs.
- MCS timing biases in response to land-breeze.





Does simulated convection organize ***realistically***?



Reality (Darwin Radar)

- Front-fed trailing-stratiform.
- Up-shear tilted.
- Down-shear propagating.
- Shear-perpendicular convective lines.
- Smaller convective cells.
- Larger anvils.

Model (ACCESS-C)

- Front-fed trailing-stratiform.
- Up-shear tilted.
- Down-shear propagating.
- Shear-parallel convective lines.
- Larger blobby convective cells.
- Smaller anvils.
- Timing biases.

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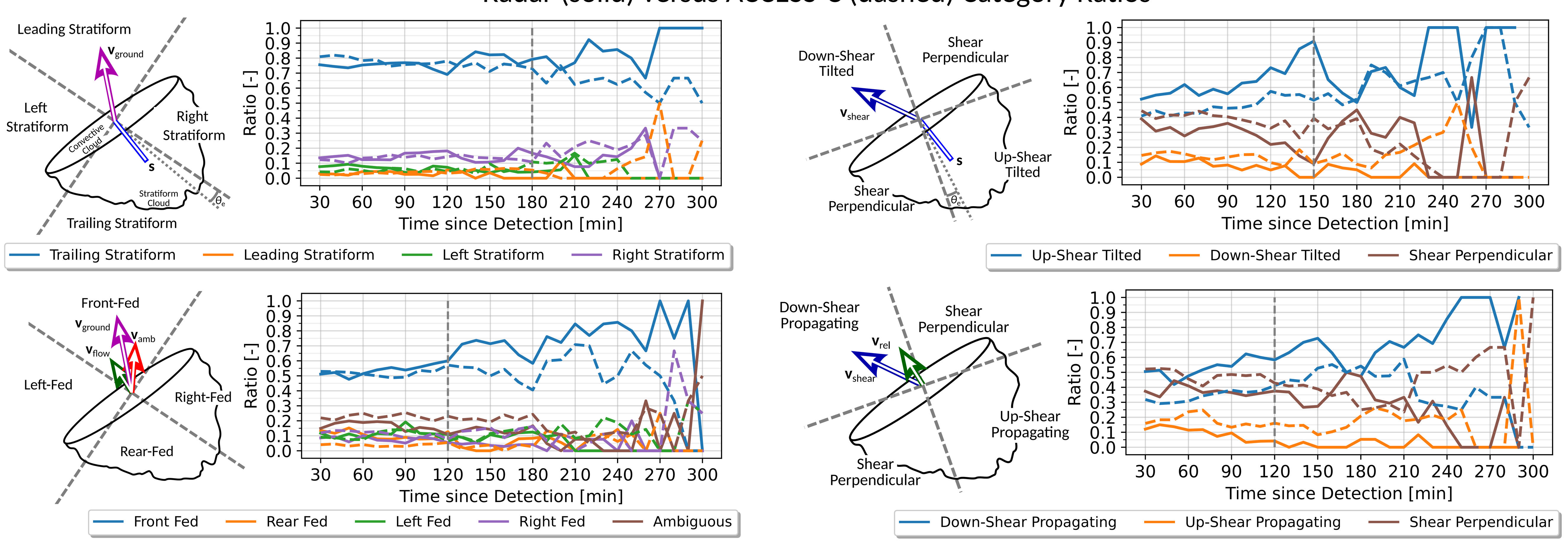
- Correct ratios of front-fed trailing stratiform MCSs (within 5-10%).
- Simulated MCSs 10-20% less likely to be up-shear tilted, down-shear propagating.

Radar (solid) versus ACCESS-C (dashed) Category Ratios



Select References/Acknowledgements

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- Grant et al. 2020, *Shear-parallel tropical convective systems: Importance of cold pools and wind shear*, GRL, 47 (12).
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