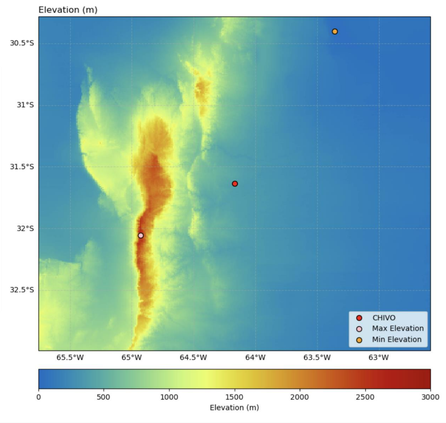
Terrain Impacts on Microphysical Processes of Deep Convective Storms in Central Argentina

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Motivation

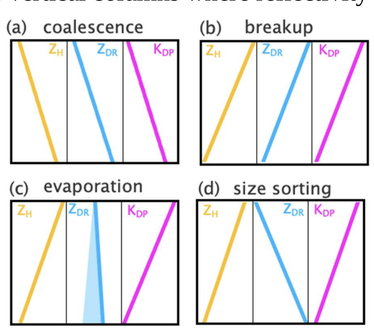
- The deepest storms in the world occur in Central Argentina near the Sierras de Córdoba (SDC) mountains.
  - Storms frequently form and grow rapidly in this region
  - Storms produce high rates of rainfall, lightning, and hail, causing a significant threat of flash flooding
- RELAMPAGO [1] (Remote sensing of Electrification, Lightning, And Mesoscale/microscale Processes And Ground Observations; 2018-2019) was conducted with the primary goal of investigating why this region produces deep convection and high precipitation.

Research question: How does the SDC mountain range impact the microphysical processes of deep convective storms?



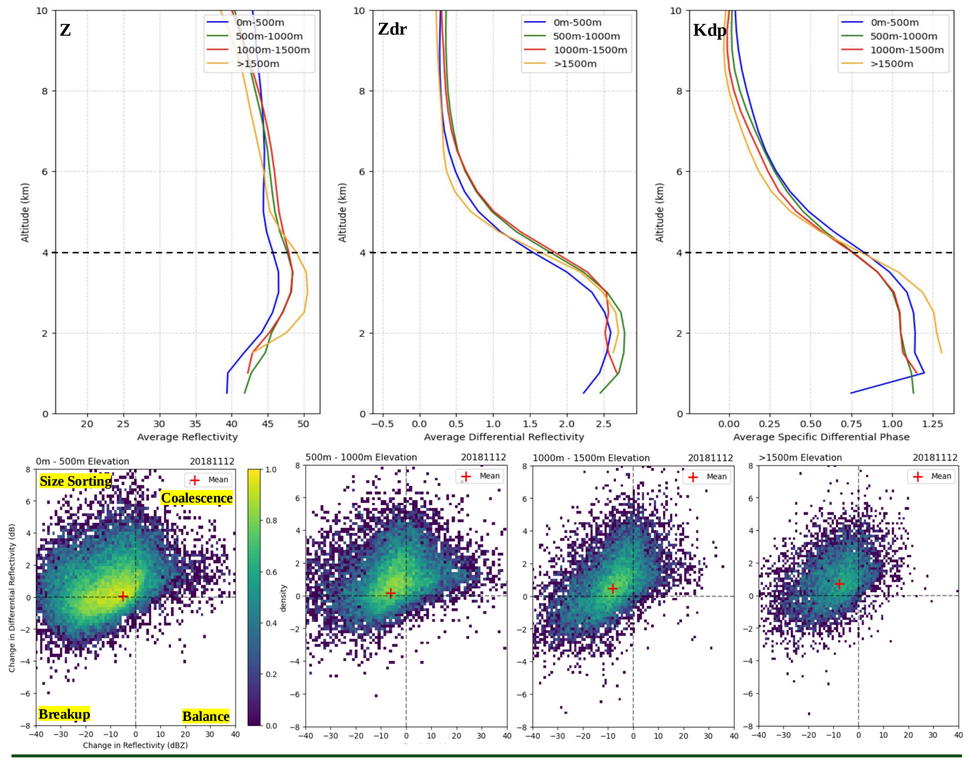
Methodology

- CHIVO C-band dual-polarization radar deployed near the SDC
  - Dual-pol radar can be used to determine the microphysical processes of precipitation particles in a storm through:
    - **Reflectivity (Z):** size and type
    - **Differential reflectivity (Zdr):** orientation and shape
    - **Specific differential phase (Kdp):** size and concentration
- Utilized microphysical fingerprinting [2] to understand and categorize the microphysical processes of the storms
  - Using gridded radar data from PPI (plan position indicator) data for vertical columns where reflectivity values are > 40

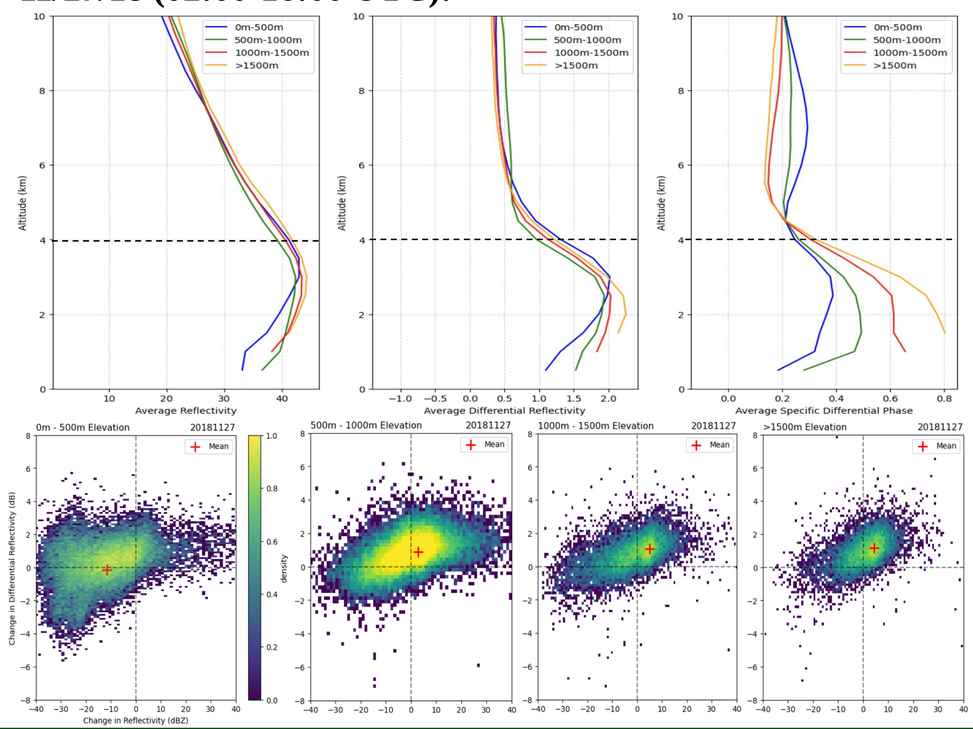


Case Study Results

11/12/18 (00:00-05:44 UTC):



11/27/18 (02:00-16:00 UTC):



Conclusions

- Dominant microphysical processes vary across elevation groupings for both the 11/12 case and the 11/27 cases
  - **11/12:**
    - Size sorting was dominant across all elevation groupings
    - Occurs within storms with stronger updrafts, in which smaller drops are lofted further into the cloud while larger drops fall against the updraft.
    - High vertical wind shear prevents the smaller drops from falling and subsequent downdraft causes coalescence, creating the heavier particles
  - **11/27:**
    - Lower elevations had breakup and size sorting as their most dominant processes, higher elevations had size sorting and coalescence as their most dominant
    - Size sorting did still occur due to the storms being weaker, but not as predominantly
    - Change in microphysical processes is consistent with weaker and more scattered storms, but the size sorting occurrences could indicate some stronger ones

Future Work

- Explore more cases in RELAMPAGO that had similar and differing storms to these cases to compare the microphysical processes
- Investigate the precipitation particles further by sub-setting each storm by the frequency of its particle types
- Examine environmental factors to further understand the behavior of the storms (temperature, humidity, etc.) to see how those relate to the dominant microphysical processes that occurred

References and Acknowledgements

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Questions?
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