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### Introduction

- This research project was focused on comparing dropsonde and model profiles of temperature and dew point temperature to radio occultation (RO) measurements during intensification of tropical cyclones.
- We did a case study on Hurricane Ian (2022).
- COSMIC-2 consists of 6 satellites in low Earth orbit that use Radio Occultation (RO) measurements to provide vertical profiles of temperature and water vapor in areas usually sparse in data.
- Radio occultation (RO) consists of capturing GPS signals and the bending angle they experience due to differences in the density of the atmosphere.



Fig. 1: Coverage of COSMIC-2 RO for October 1, 2019.

Methodology

Extracting wetPf2 files • First step, wet profile files were extracted from the COSMIC Data Analysis and Archive Center for days September 27-29, 2022.

Plotting the profiles

Selected nearest RO soundings to the center of the storm (less than 300 km). Computed dew point from RH and plotted vertical thermodynamic profile using MetPy tools.

Comparing to dropsondes and ERA5.

Plotted the vertical profile of dew point and temperature for these measurements and compared to RO soundings.

## **COSMIC-2** Radio Occultation Temperature and Water Vapor Soundings in Hurricane Ian (2022)



2022 at 18:49 UTC. Distance from track: 146 km



# 28, 2022 at 18:45 UTC.

### Discussion

### A. RO observed soundings

## model

### Future work

- studies.

### Acknowledgements

### References





• Soundings from RO on September 28 and September 27 capture saturation from 350 mb. Dense cloud structures can be observed in RO soundings.

• For September 29, the sounding falls outside of the cloud area of the system but are a good reference of how RO capture drier environments

### B. Comparison to dropsondes and ERA5 reanalysis

• Differences between the measurements types in terms of temperature and dew point temperature are less that 3ºC in most profiles.

The employment of RO measurements can complement aircraft, radiosondes, dropsondes and other satellites observations.

• As next steps for this research project we would add to the comparison the models MERRA-2, JRA and GFS and work on additional hurricanes case

• Future areas of study could hurricanes upper to lower stratosphere effects.

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