# DTC Visitor Project Update
# Proposal for extension

Visitor: Ivette Hernández Baños
Host: Ming Hu and DTC DA Team

October 9, 2020



# Project execution and Timeline

**Phase A**– Setup of the system

- ❖ Access to the NCAR HPC system, Cheyenne, and NOAA HPC Orion. Compilation of FV3-LAM and GSI on both machines.

**Phase B**– Build case study and debugging

- ❖ Case study selection and setup of the domain. Stage ICs, LBCs, and observations. Configure the hourly DA cycle and warm start. Initial check on analysis increments. Debugging of the systems.

**Phase C**– Testing and Evaluation

- ❖ Numerical experiments testing available CCPP suites (GFS and GSDSAR) and GSI parameters and methods (3DVar and 3DEnVar)
- ❖ MET tools for surface and upper-air verification

➔ Positive impact when using DA with well represented convective initiation using GSDSAR suite but better squall line structure when using GFS suite

**Phase D**– Results communication

Table 1. Timeline for the project execution

| Phases | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | x | x | x | x | | | | | | | | |
| B | | x | x | x | x | | | | | | | |
| C | | | | | x | x | x | x | x | x | x | |
| D | | | | | | | | | | x | x | x |

- Run experiments with 6h of spin-up changing other DA parameters and observations assimilated
- Evaluate other characteristics related to the structure of the squall line

- Run experiments for another squall line case and conduct the same verification as in the case currently under study
- Write a paper with the main findings and present a seminar at DTC staff meeting. Elaborate and submit the final report.

# Motivation

Amazon plays an important role in the weather conditions over South America

↓

acts as a source of moisture for other regions → ACSLs are responsible for a large portion of the precipitation

➔ Climatological, observational and theoretical studies

➔ Recent studies use LES, regional and global models

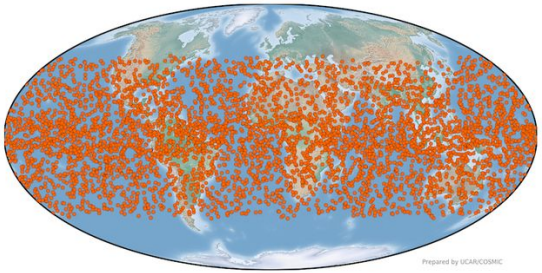
● Lack of detailed information in a daily basis, complexity of atmospheric processes, and scale interactions

↳ Lack of studies using numerical models with data assimilation

↳ Deep convection still not well represented operationally

Amazon Coastal Squall Lines (ACSLs)

Source: Fig. 1a in Oliveira and Oyama (2015) https://doi.org/10.1175/WAF-D-14-00120.1

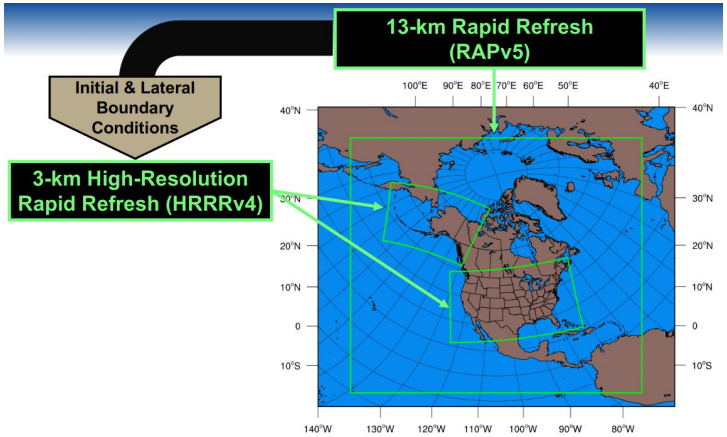


Source: https://www.cosmic.ucar.edu/what-we-do/cosmic-2/

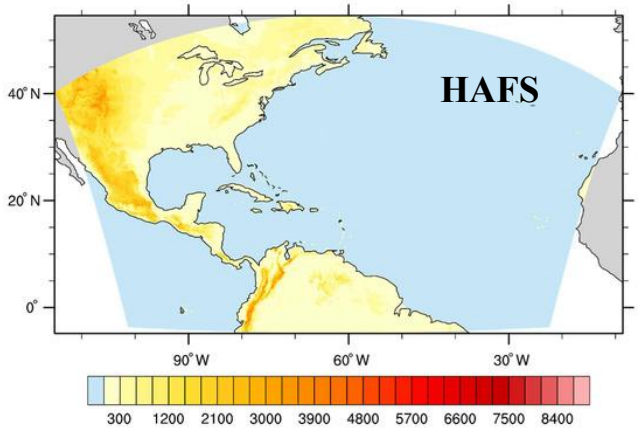
COSMIC-2 → ~4000 profiles/day with a dense equatorial coverage

# Motivation

- ➔ UFS goal of being a community system and open code to the wide research community
- ➔ Part of northern South America covered by RAP and HAFS domain
- ➔ FV3 dynamical core used for global and regional operational activities




Source: Fig. 1 in Alexander et. al (2020)
https://rapidrefresh.noaa.gov/




Source: Fig. 1 in Dong et. al (2020)
https://doi.org/10.3390/atmos11060617

- ❑ Rapid Refresh Forecast System ability to represent convection on the tropical region, such as the convection associated to Amazon Coastal Squall Lines

# Questions/suggestions/recommendations?