

Introduction to the Multi-center exercise for PAZ NWP simulations and comparisons

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After discussions with: JCSDA, UCAR, NOAA, ECMWF, JMA, NASA-GMAO, NASA-GSFC, UCSD/Scripps, U. Virginia, Spire, PlanetIQ...

April 2020: 1st GNSS PRO workshop

- **DISCUSSION:** Roadmap towards new activities and collaborations
- Activities receiving more interest:
 - To develop a **forward operator** (for NWP)
 - To quantify how accurate the NWP representation of hydrometeors is (NWP **diagnosis**)

Sep 2021: online meeting towards a collaborative multi-center exercise

- Proposal for a multi-center collaborative exercise on PAZ for NWP, prepared by ICE-CSIC/IEEC and JPL
- Invited: UCAR, JCSDA, ECMWF, Spire
- Agreement on the main objectives and overall approach

Is it possible to reproduce PAZ polarimetric profiles $\Delta\phi(h_{\text{tang}})$ from NWP fields?
Can all phenomena be well reproduced?
Does it carry information useful for NWP diagnosis?
Is it sensitive to microphysics schemes and larger scale parametrization?
Could it be used to improve such modeling/parametrizations?

Q1 2022: kick off the activity

- 28th Jan 2022: document to organize the exercise, prepared by ICE-CSIC/IEEC and JPL, is sent to UCAR, JCSDA, NOAA, ECMWF, NASA-GSFC, UCSD/Scripps, U. Virginia, Spire Global, PlanetIQ
- 2nd March 2022: meeting to agree on finer details of the approach
- 11th March 2022: initial list of ‘events’ to be studied sent out to JPL, JCSDA, UCAR, NOAA, ECWFMF, JMA, NASA-GSFC, UCSD/Scripps, U. Virginia, Spire, PlanetIQ.
 - Later to NCU Taiwan and U. Hawaii.
 - To be sent soon (adapted) to MeteoFrance.

STEP 1

- Select a few types of events of interest:
 - TC and AR were selected to begin with.
- Identify PAZ profiles within such events.
 - Ramon (ICE-CSIC, IEEC) found 6 good **PAZ profiles in TC**
 - Ramon + Jennifer and Michael (UCSD) found 20+ good **PAZ profiles in AR**
- For each case, Ramon provided **ID, time, lon-lat box**

STEP 2

- Each center runs its NWP model (regional, global...) with its own parametrizations and microphysics scheme/s
- The hydrometeor 3D information (e.g., water content at each 3D grid voxel) provided to ICE-CSIC/IEEC

**See next talks for details
about these runs**

STEP 3

- Ramon (ICE-CSIC, IEEC) interpolates the hydrometeor information into PAZ ray trajectories...
- ...and forward models PAZ-like polarimetric profiles $\Delta\phi(h_{\text{tang}})$

See 11:05 talk for details

- The NWP-based modeled $\Delta\phi^{\text{NWP}}(h_{\text{tang}})$ can be compared to the PAZ measured $\Delta\phi^{\text{OBS}}(h_{\text{tang}})$
 - Analyze sensitivity to microphysic schemes,
 - Analyze sensitivity to misplacement of the system
 - Analyze impact of initialization model
 - Identify phenomena that can be well / cannot be well reproduced by the model
 - ...

More partners welcome!

- The exercise has not concluded, yet
- More partners are welcome to provide their own NWP runs, with possibility to accommodate several runs for each case (e.g., changing parametrization, microphysics, ...)
- **Please contact us if interested**
- Please contact us if **interested in other phenomena** beyond TC and AR (e.g., Kona Storms being searched at the moment for U. Hawaii...)