'2nd PAZ Polarimetric Radio Occultations User Workshop'

Discussion Materials

NOTE-1: Tentative, please send your suggestions or comments to estel@ice.csic.es and joseph.turk@jpl.nasa.gov

Suggested by Bill Kuo (UCAR)

DAY-1	**11:40-12:00 or AFTERNOON**
Topic:	**"Roadmap for research and NWP applications of PAZ polarimetric measurements"**
a. How useful are PAZ RO observations in evaluating model physical parameterizations?	
Variations of hydrometeors in different types of weather systems	We anticipate that the vertical distribution of snow, ice, graupel, rain, and cloud hydrometeors would be different for different types of weather systems, ranging from tropical mesoscale convective systems, Mei-Yu convection, atmospheric river, tropical cyclones, and extratropical cyclones (including polar lows and Kona lows). It would be desirable to compare the observations with simulations over a wide range of weather systems. This will provide a comprehensive evaluation of the usefulness of polarimetric measurements in evaluating the model cloud microphysical parameterizations.
Convective parameterization vs explicit microphysics	In a typical global or regional model, precipitation schemes are used: Convective subgrid-scale parameterization and resolvable scale explicit cloud microphysical parameterization. The two schemes would interact with one another. In regional models, it would be desirable to go with explicit cloud microphysical simulation (without subgrid-scale parameterization). However, this will require the use of a high-resolution grid and will be considerably more expensive. For global models, it would be hard to do without a convective parameterization. **NOTE**: L-band seems to simplify the required assumptions on hydrometeor shapes.
b. How do we assimilate PAZ RO data into NWP models?	
Development of forward operators	Given the fact that we have one measurement (polarimetric difference) with many unknowns (i.e., distribution of cloud, rain, ice, snow), we will have to make an apriori assumption on the distribution of these hydrometeors. How do we 'parameterize' the distribution of these hydrometeors will be the key. By comparing the PAZ observations over different types of weather systems will help us develop a path forward.
c. Roadmap for using GNSS PRO data in or for NWP models	
Next-steps	Can we agree on a set of steps to follow to investigate the points above?

DAY-2	AFTERNOON
Topic:	
a. How can commercial GNSS PRO expand the capabilities of this technique?	
Sub-sampling of systems	• Clusters of GNSS PRO observations to monitor both the core of a system an its surrounding areas
Potential impact in NWP	• Due to increased number of observations (once forward operators are ready). PAZ data alone do not provide sufficient number for any impact on NWP (?)
b. How useful are GNSS PRO observations in evaluating large scale parameterization of convective (and other) systems?	
Potential applications	See discussion slides by Joe Turk: • Enhanced climatologies of Moisture + Precipitation • Tropical Meteorology: Far Offshore Developing TC's • Moisture and "Depth" of Convection
c. Combined use of polarimetric RO and other sensors (polarimetric weather radars, IR imagers, radiometers)?	
…	• Verification of Over-Ocean Satellite Precipitation: global precipitation products (IMERG, GSMaP, CMORPH, and others) have little to no independent validation data over oceans
d. GNSS PRO for space weather	
…	…
e. Convenience to send an abstract to summarize the Workshop at the 8th WMO Impact workshop	
Deadline 12/15/2023	https://community.wmo.int/en/meetings/8th-wmo-impact-workshop-home "*Conclusions from the Workshop provide guidance on how to optimize the use of the current global observing system as well as help guide its future evolution.*"