

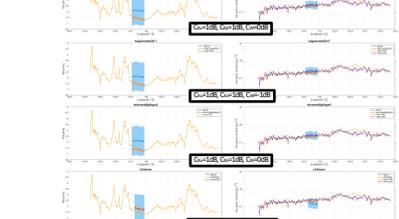
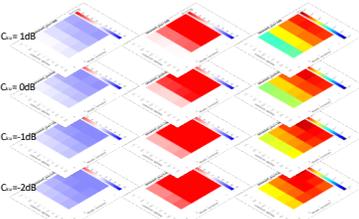
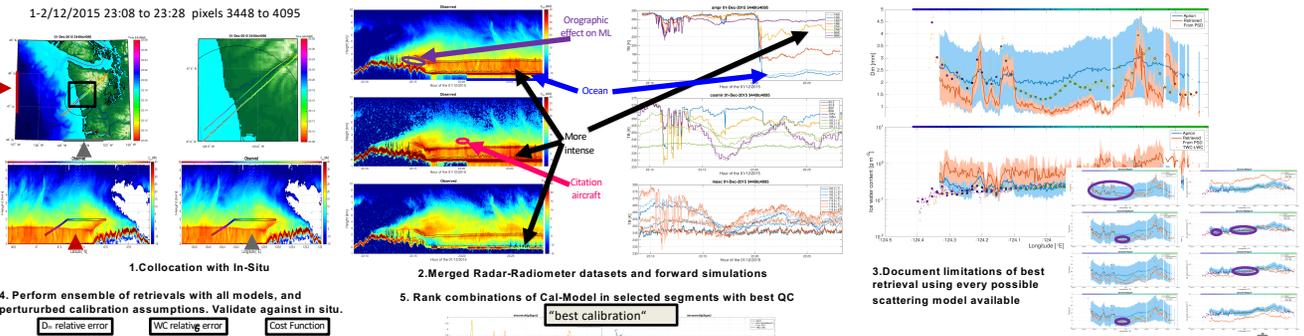
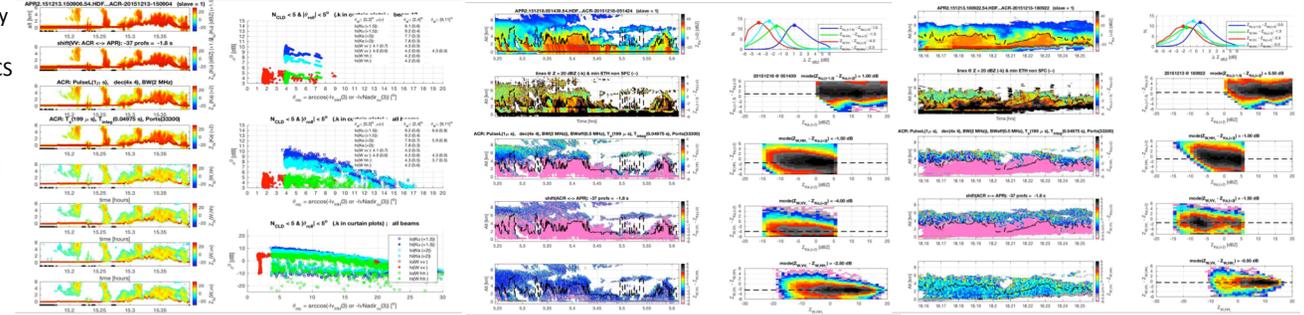
**Abstract**

The APR-3 project (ESTO AITT, initiated in 2014) unifies APR-2 (Ku/Ka) and ACR (W-band) to implement the first 3-frequency airborne Doppler scanning radar specifically to support the studies for CloudSat, GPM, the ACE mission concept, the ES DS 2017 CCP designated Targeted Observable and others. APR-3 successfully operated in the OLYMPLEX/RADEX'15 Field experiment (joint GPM GV and ACE Radar Definition Experiment) in the Earth Venture Suborbital-2 mission ORACLES (2016,17 and 18) deployments, and as APR-2 in the CPEX field campaign in 2017. It has acquired data in more than 60 science flights on two different aircrafts in the last 36 months. The type of cloud and precipitation systems observed span from winter mid-latitude storms, to tropical convection and marine stratocumulus (precipitating and non-precipitating).

Among the many objectives of the joint OLYMPLEX (GPM GV) and RADEX'15 (ACE Radar Definition Experiment #2) Field Campaign, one is to take advantage of the unprecedented dataset of collocated measurements capturing all phases of orographically enhanced winter weather systems to fully explore the strengths and limitations of using multi-frequency cloud and precipitation radars to retrieve various key parameters of the microphysics and dynamics of these storms. APR-3 successfully acquired a vast amount of data in all but one of the DC-8 science flights. Given the quality of the overall OLYMPLEX dataset, and the enthusiasm of the Science Team, a specific focus of the JPL team was that of providing as soon as possible a preliminary calibration product with sufficient Quality Control to support initial science investigations: this was accomplished with the first post-campaign release of APR-3 data in 2016. As feedback from users flowed in, a list of improvements was compiled and carried out in 2017. Some of these improvements focused on expanding the value of the dataset beyond the fundamental set of products (calibrated and geolocated radar reflectivity factors at Ku and Ka band, Linear Depolarization Ratio at Ku band and platform velocity-corrected mean Doppler velocity at Ku-band) for example creating a new "merged Doppler" product that blends the Ku and Ka band measurements to provide a more comprehensive view of Doppler velocities also for regions of the storm with weaker echoes. At the same time one specific effort emerged by noticing common denominators among the preliminary results of various science teams collaborating on OLYMPLEX analysis: to what extent is reflectivity product calibration a contributor to the retrieval uncertainties of frozen hydrometeors with respect to the uncertainties embedded in the available scattering models, their selection, and their application to hypothetical particle size distributions? How much does the presence of cloud liquid water affect this uncertainty? In this poster we summarize the primary findings of a multi-institutional effort that involved several team and resulted in the state-of-the-art APR-3 dataset as publicly released in March 2018.

Baseline APR-3 Reflectivity Calibration is performed based on Sea Surface NRCS and Rayleigh assumption on top of cloud. Experiment-wide biases are readily diagnosed and eliminated. Short term biases require significant more work to understand and recalibrate.

Availability of in-situ PSD and particle type data from UND Citation combined with several scattering models developed in the last years, and tools developed first during GCPEX'12 we could perform extensive validation of all of them simultaneously. Several telecons organized to discuss the various results, reconcile to the extent that is possible, and further refine calibration. 6 papers either published or being prepared (Chase, Heymsfield, Sy, Tridon, Durden, Mroz)

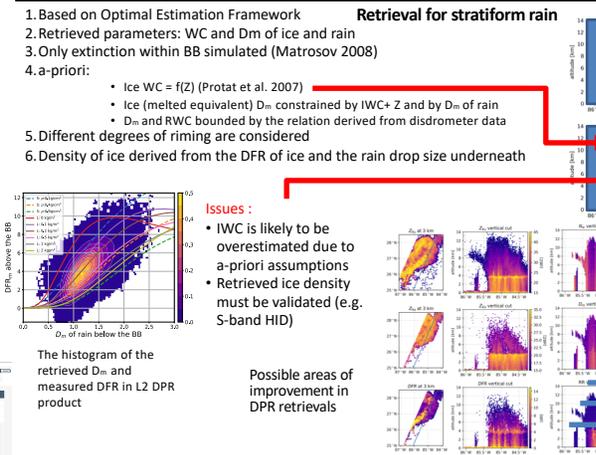


6. Hold series of telecons to collect findings from independent investigations by other teams, reconcile and finalize final re-processing calibration

OLYMPLEX APR-3 Proposed Cal Adjustments and Delta for RD h5 vs V23 HDF4 (Feb 5, 2018)

	Rel	WC	WC	WC	WC	WC	WC	Notes
Nov 12	0	0	+2.5	N/A	+5.8	+1.0	+3.2	N/A
Nov 23	0	0	+2.5	N/A	+5.8	+1.0	+3.2	N/A
Nov 18	0	0	0	N/A	+5.8	+1.0	+5.6	N/A
Nov 29	0	0	0	N/A	+5.8	+1.0	+5.6	N/A
Nov 24	0	0	0	N/A	+5.8	+1.0	+5.5	N/A
Nov 25	0	0	0	N/A	+5.8	+1.0	+5.4	Clear Air Day
Dec 2	0	0	+1.5	+1.5	+5.8	+1.0	+5.5	+1.0
Dec 9	0	0	+5.8	+5.8	+5.8	+1.0	+5.4	+5.4
Dec 4	0	0	0	+5.8	+1.0	+5.5	N/A	N/A
Dec 6	0	0	+1.5	+1.5	+5.8	+1.0	+5.7	+1.1
Dec 30	0	0	0	+5.8	+1.0	+5.4	N/A	CHECK ERR (Rayleigh vs Sigma_not discrepancy)
Dec 22	0	0	+4.0	+4.0	+1.0	+5.3	+2.5	N/A
Dec 11	0	0	+5.5	+5.5	+1.0	+4.8	+1.0	N/A
Dec 18	0	0	+3.0	+3.0	+1.0	+5.5	+5.4	N/A
Dec 20	0	0	0	+5.8	+1.0	+5.7	+5.6	N/A

Also acknowledging inputs from Joe Munchach (comparisons with ER-2 radars).



**Data User Corner:**

- Configuration notes:**
  - APR-3 can be installed and operated in various configurations. Users are cautioned to read the specific user guide for a given deployment.
  - OLYMPLEX is the maiden deployment on the DC-8 and ORACLES'16 is the maiden deployment on the P-3 therefore several minor configuration adjustments occurred during the experiments and the performance varied. Once again, users are cautioned to read the specific user guide for a given deployment.
- OLYMPLEX Data Processing**
  - The entire experiment has been re-processed in h5 format and released to the OLYMPLEX repository in March 2018
    - Adjustments in the Calibration
    - Improvements in the LDR minimum detection
    - New blended Ku/Ka Doppler product
  - Known issues and caveats in the posted version are listed in the Data User Guide.
  - More issues are present especially on small portions of the data, please contact us if you spot something odd. You will receive the fixed data before anybody else and a permanent citation in the userguide!