

PACE HARP2 Level-1 Data Products: Radio-Polarimetric Performance and Recent Updates

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The Hyper-Angular Rainbow Polarimeter 2 (HARP2) is a critical component of the NASA Plankton, Aerosol, Cloud, ocean Ecosystem (PACE) mission, providing multi-angle, multi-spectral polarimetric observations essential for characterizing atmospheric aerosols, clouds, and surface properties [1,2]. With a wide field-of-view (FOV) and a unique hyper-angular capability, HARP2 provides a rich dataset for retrieving complex microphysical properties. Since the initial data release in early 2024, the mission has moved into a mature phase, allowing for extensive evaluation of the instrument’s stability and the refinement of its data products.

This presentation highlights the comprehensive post-launch calibration efforts aimed at optimizing HARP2 Level-1 (L1) radiometric and polarimetric performance. We describe the specific updates implemented in the L1 processing pipeline, including improved flatfield characterization, stray light corrections, and cross-instrument radiometric alignment with the Ocean Color Instrument (OCI) and the Spectro-polarimeter for Planetary Exploration (SPEXone) on the same satellite. Furthermore, we provide an in-depth analysis of over two years of on-orbit performance data. Key metrics, such as the stability of the Degree of Linear Polarization (DoLP) and radiometric gain consistency, are evaluated across various scene types. Our results demonstrate significant improvements in the accuracy of the radio-polarimetric data products, reducing systematic uncertainties and enhancing the reliability of the measurements for downstream Level-2 aerosol and cloud retrievals.

Preferred mode of presentation: oral

References

[1] Smith, R. E., McBride, B. A., Xu, X., Puthukkudy, A., Sienkiewicz, N., Cieslak, J. D., Remer, L. A., Fernandez-Borda, R., & Martins, J. V.: A new way to see the clouds: the hyper-angular rainbow polarimeter (HARP2) on the NASA PACE satellite mission, *Frontiers in Remote Sensing*, 6:1710909 doi: 10.3389/frsen.2025.1710909, 2025.

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