PACE HARP2 Level-1 Data Products: First Results and Performance

Xiaoguang "Richard"Xu[a,*], J. Vanderlei Martins[a], Anin Puthukkudy[a], Brent McBride[a], Noah Sienkiewicz[a], Nirandi Jayasinghe[a], Rachel Smith[a], Greema Regmi[a], Roberto F. Borda[a], Lorraine Remer[a], Bryan Franz[b], Frederick Patt[b,c], Meng Gao[b,d], Kirk Knobelspiesse[b], Alexandr Semenov[b,c]

[a]*Earth and Space Institute & GESTAR-II & Department of Physics, University of Maryland Baltimore County, 1000 Hilltop Cir, Baltimore, MD 21250, USA*
[b]*Ocean Ecology Lab, NASA Goddard Space Flight Center, 8800 Greenbelt Rd, Greenbelt, MD 20771, USA*
[c]*Science Applications International Corporation, 12010 Sunset Hills Rd, Reston, VA 20190, USA*
[d]*Science Systems and Applications Inc, 10210 Greenbelt Rd, Suite 600, Lanham, MD 20706, USA*

[*]*Presenting author (xxu@umbc.edu)*

The Hyper-Angular Rainbow Polarimeter 2 (HARP2) teams up with the Ocean Color Instrument (OCI) and Spectro-polarimeter for Planetary Exploration (SPEXone) on the recently launched Plankton, Aerosol, Cloud, ocean Ecosystem (PACE) satellite to advance the global measurements of atmospheric aerosols, clouds, and ocean ecosystem. As a wide field-of-view (FOV) polarimeter, HARP2 measures the total and linearly polarized intensity of reflected solar light in four spectral bands at 440, 550, 665, 866 nm with a spatial resolution of about 2.5 km at nadir. These measurements are performed from multiple view directions (up to 60 views at 665 nm and 10 views in each of the other three bands) spanning ±57° along the satellite orbital track. As such, those combined multi-view and multi-spectral polarimetric observations provide unprecedented information for determining detailed microphysical properties of atmospheric aerosols and clouds. Therefore, it is critically important to provide well-calibrated and accurately geo-registered HARP2 radiance and polarization data products, or the Level-1 data. However, HARP2 Level-1 data processing and quality control are challenged and complicated by the large data volume and complexity of HARP2 observations.

The provisional HARP2 Level-1 data products were officially released in early April 2024, and since then the data have undergone rigorous quality assessment and improvement processes, focusing on calibration accuracy, on-orbit performance, geo-registration stability, etc. We will present the results from the preliminary analysis, showcasing the performance of HARP2 Level-1 data, as inter-compared with OCI and SPEXone. Additionally, we will discuss the ongoing efforts to refine the data processing algorithm and strategies to further improve the accuracy of the data products.

Preferred mode of presentation: oral