

# PACE-HARP2 Pre-Launch Calibration Uncertainties

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**Abstract:** The HyperAngular Rainbow Polarimeter (HARP2) aboard the Plankton Aerosol Cloud and ocean Ecosystem (PACE) mission, launched in February 2024, is a wide field-of-view polarimeter with a division of amplitude measurement scheme. HARP2 has a  $114^\circ \times 114^\circ$  front lens and uses 3 CCDs with a size of 2048x2048 pixels. HARP2 underwent pre-launch characterization at the NASA Goddard Space Flight Center (GSFC) Code 618 Calibration Laboratory utilizing the Grande integrating sphere and the Goddard Laser for Absolute Measurement of Radiance (GLAMR) in 2022. HARP2 also underwent thermal characterization at GSFC with temperature swings from  $-20^\circ$  to  $+20^\circ$  C operationally, in a space-like environment. During these activities, the precision of HARP2 was well characterized at nadir and wider across the field-of-view (FOV). These off-nadir measurements were a first for the instrument and were performed using a dual-axis rotating mount scanning the FOV in a series of discrete sectors. Propagation of uncertainties through these measurements using high resolution captures provides insight into the absolute precision of the instrument in radiometric and polarimetric observations. Optical modeling was used to fully characterize the complex raytracing of the rotated scan positions and novel systematic effects in polarization calibration were corrected. Thermal scans were limited to nadir but also provide unique characterization of the instrument. Here we will present on the pre-launch dark signal, spectral bandwidths, and polarimetric/radiometric precision, especially off-nadir. We will also present a few comparisons between pre-launch dark and flat-field with their space-captured equivalents with trends from launch to November 2024.

Preferred mode of presentation: Poster