

Harmonizing Spectral and Polarimetric Cloud Remote Sensing – Developments & Lessons from the NASA PACE Mission

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Satellite remote sensing of liquid cloud properties remains the only method to obtain both the global and temporal observations required to monitor the response of clouds in a changing climate. With the launch of the PACE mission, two retrieval methods for obtaining cloud properties are now being obtained for the first time in orbit from a common satellite platform (OCI, spectral; HARP2 polarimetric). These two methods infer cloud properties in radically different ways, and have different retrieval sensitivities and artifacts that can inhibit our ability to fully leverage both sources of information. **The current operational spectral and polarimetric cloud products from PACE (CHIMAERA OCI, GPC) operate nearly entirely independently, presenting an opportunity to further develop cross-product synergy retrievals, improving PACE cloud products and subsequently the enabled science.**

In this presentation we will describe synergistic algorithms for the PACE mission that leverage polarimetric and spectral methods to further enhance our ability to retrieve cloud microphysics, phase, profile, and understand 3D radiative effects. Our algorithm enhancements advance three primary focus areas: 1) Enhancing microphysical information content by harmonizing spectral and polarimetric sensitivities to vertical and horizontal cloud inhomogeneity; 2) Improved cloud phase detection for multi-layer and mixed phase clouds; 3) Detection, attribution, and correction of 3D radiative effects. We'll discuss these different focus areas, algorithm developments, and preliminary results using PACE data.

Preferred mode of presentation: Oral